



Eco-innovations in the urban regeneration projects



# Green Project Funding

Hanna Godlewska-Majkowska, Katarzyna Sobiech-Grabka, Paweł Nowakowski



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## Publisher's note

We're delighted to bring you the book series prepared by the Authors taking part in the "[Eco-innovations in cities](#)" Project (POKL.04.03.00-00-249/12-00). The series, which is available free of charge, consists of six books:

- "[Eco-cities](#)" by Dominika Brodowicz, Przemysław Pospieszny and Zbigniew Grzymała
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The Project was designed and prepared by Professor [Marek Bryx](#), Deputy Rector of the [Warsaw School of Economics](#) (SGH), and Doctor [Dominika Brodowicz](#). The Project has been carried out within the Priority IV "Tertiary Education and Science", Measure 4.3 "Strengthening the didactic potential of universities in the fields of key importance for the aims of Europe 2020 Strategy". In line with the objectives, the Project is conducted from 1st July 2013 until 31st December 2015.

The main aim of this Project was to create at the Warsaw School of Economics a one-year specialisation entitled "[Eco-innovations in the urban regeneration projects](#)". What is more, the Project's aim is to develop the study offer concerning the area of green and socially responsible eco-innovations in cities regeneration. The main objective of this new specialisation is to enhance students' knowledge



about eco-cities, give them sufficient information and discuss case studies on the subject: how contemporary cities should be planned, developed and managed. As most of our communities exist within the urban environment, the provision of eco-innovations is essential for the well-being of society. This unique educational programme for M.A. students provides information on maximising the benefits of making innovative and creative cities to citizens, local authorities, planners, developers, students, researchers and non-government organisations interested in improving the quality of life in cities.

*MSc Alina Modrzejewska-Kořakowska – Project Manager*  
*Prof. Anna Szelaęowska Ph.D. – Project Methodological Coordinator*

## Introduction

Creating modern, environmentally friendly solutions, allowing for revitalization and restructuring of post-industrial areas, and spurring new development for less developed regions for less developed regions are all gaining significance in the 21st century.

The awareness of the need to create eco-innovative solutions has become common and widespread. However, their implementation faces financial barriers resulting from the capital-intensive character of majority of eco-innovative solutions, as well as the high investment risk related to them. Therefore, knowledge in the field of financing eco-innovations is increasingly important.

This textbook is designated for students of the “Green Project Funding” course, and it complements the knowledge available in the e-learning materials prepared for this course. Our goal is to provide readers with a compendium of knowledge necessary to operate in the eco-innovations market, including the specifics of green project funding and financing options for eco-innovative projects.

After reading this textbook, the reader should understand the specifics of eco-innovative projects, and be able to identify market regulations as well as the main mechanisms and instruments of financial resources allocation for eco-innovative projects.

In the first chapter, by Hanna Godlewska-Majkowska, the nature and characteristics of eco-innovations are presented, and the demand side characteristics and main sources of financing eco-innovations are described.

The distinctive characteristics of eco-project finance and public-private partnerships are described in the second chapter, authored by Katarzyna Sobiech-Grabka.

In the third chapter, Paweł Nowakowski presents the institutional foundations of developing eco-innovations, with a special focus on the factors supporting financing of eco-innovations.

The fourth chapter, written by Katarzyna Sobiech-Grabka, extends the previous material by focusing on intermediary instruments shaping the market of eco-innovations, including penalties and charges.

The fifth chapter, by Paweł Nowakowski, presents a systematic review of various forms of support provided for eco-innovative projects with public funds. It also presents the barriers to access eco-finance, with special focus on small and medium size companies.

In the seventh chapter, Paweł Nowakowski provides examples illustrating solutions designed to overcome the barriers described in chapter sixth, including debt risk sharing instruments, business angel co-financing, and other examples such as the JESSICA financing instrument and eco-incubators.

Despite the importance of public sources – especially during crises – they should typically be secondary types of funding for eco-innovations. The leading role in securing funds arguably belongs to commercial financing. Numerous forms of these sources are demonstrated in the eighth chapter, prepared by Katarzyna Sobiech-Grabka.

Within this textbook, the authors present not only Polish, but also other European sources of financing. Examples presented in particular chapters are further detailed within the e-learning materials and workshop type classes.

## Chapter 1

# Framework for financing eco-innovations

*Hanna Godlewska-Majkowska*

### Introduction

Green projects are investment projects that concern eco-innovative solutions. Thanks to these projects the leading innovations concerning sustainability, radical resource productivity, whole system design, biomimicry, green chemistry, industrial ecology, renewable energy and green nanotechnology can become important tools to build a framework for sustainable economy and influence living conditions of present and future generations.

As the range of eco-innovative solutions is wide, such projects can be financed by various types of stakeholders: companies, individuals, financial institutions, territorial government units, the state, international organizations, by means of special mechanisms that facilitate transfer of funds.

The goal of this chapter is to briefly show specificity and mechanism of financing eco-innovations, and explain why eco-innovations need combining various sources of financing.

The another aim of this chapter is to show global eco-innovation investment market and growth perspectives of this market and to point similarities and differences in attitudes towards eco-innovative solutions, depending on micro- and macroeconomic points of view. Moreover, the meaning of supporting pro-ecological attitudes with eco-labels is described.

## 1.1. Introduction to financing eco-innovations

**Green projects** are investment projects that concern eco-innovative solutions. Thanks to these projects the leading innovations concerning sustainability, radical resource productivity, whole system design, biomimicry, green chemistry, industrial ecology, renewable energy and green nanotechnology can become important tools to build a framework for sustainable economy and influence living conditions of present and future generations.

As the range of eco-innovative solutions is wide, such projects can be financed by various types of stakeholders: companies, individuals, financial institutions, territorial government units, the state, international organizations, by means of special mechanisms that facilitate transfer of funds.

„Defining **eco-innovation** is not an easy task although several attempts have been made in the literature. In general, these definitions emphasize that eco-innovations reduce the environmental impact caused by consumption and production activities, whether the main motivation for their development or deployment is environmental or not.<sup>1</sup> The concept of eco-innovations and their role in creating relations between humans and nature can be better understood by the following comparison of different approaches (Table 1.1):

**Table 1.1. The humans and nature conceptual framework developed from the literature**

| Perspective on humans and nature | Unity        | Connection            | Separation             | Contraction         |
|----------------------------------|--------------|-----------------------|------------------------|---------------------|
| <b>Metaphor</b>                  | Mother earth | Planet earth          | Spaceship earth        | Production resource |
| <b>Vision of nature</b>          | Cosmos       | Universe              | Creation               | Reservoir           |
|                                  | Wilderness   | Landscape             | Machine                |                     |
| <b>Basic attitude</b>            | Desire       | Respect               | Engineering            | Disrespect          |
|                                  | Reverence    | Exploring             | Power                  | Utility             |
|                                  | Humility     |                       | Control                | Exploiting          |
|                                  | Concern      |                       |                        |                     |
| <b>Relationship with nature</b>  | Reciprocal   | Observing             | Leading                | Superior            |
| <b>Ecology</b>                   | Gaia         | Industrial metabolism | Design for Environment | Eco-efficiency      |
|                                  | Biomimicry   | Cradle to cradle      | End-of-pipe            |                     |
|                                  | Biodiversity | Eco-effectiveness     | Cleaner Production     |                     |
|                                  | Deep Ecology |                       |                        |                     |
| <b>Eco-innovation</b>            | Regenerative | Cyclical              | Restorative            | Exploitative        |

Source: prepared by author, based on: N. Hofstra, D. Huisingh, 2014, *Eco-innovations characterized: a taxonomic classification of relationships between humans and nature*, *Journal of Cleaner Production*, 66, p. 465.

<sup>1</sup> Boons F., Montalvo C., Quist J. and Wagner M., 2013, *Sustainable innovation, business models and economic performance: an overview*, *Journal of Cleaner Production*, 45(0), pp. 1-8.

In the comparison above the regeneration roles of eco-innovations and self-supporting mechanisms are emphasized. This approach is especially important nowadays, when we face new dangers to public security like cyber-attacks or the risk of proliferation of bacteriological contamination resulting from great geographical mobility of people. These are combined with dangers that have been exposed to for a long time such as lack of access to strategic energy resources, due to cultural tensions combined with politically disadvantageous geographic structure of natural resources: 2/3 of known global resources of oil are in possession of the countries of the Persian Gulf Basin and 1/3 of global resources of natural gas are in possession of Russia.

At the same time intensive urbanization processes takes place, mainly in the developing countries, which is often combined with climate conditions that pose problems to safety management (e.g. the monsoon climate), like increasing risk of floods in big cities. This creates specific challenges concerning financing eco-innovations.

Because of the fact that eco-innovation can be widely defined, we can distinguish 6 groups of eco-innovations. They are described in the following table.

**Table 1.2. Types of eco-innovations**

| Type           | Types Description   |
|----------------|---|
| <b>Product</b> | Product eco-innovation includes goods and services. Eco-innovative goods are produced so that the overall impact on the environment is minimised, and eco-design is a key word in this area. Future product design will take into account resource constraints with a higher priority than it is happening today, especially if commodity prices continue to increase. Designing a product in a manner that leads to decreased environmental impacts and less resource use during operation and that allows recovery options like repairing, remanufacturing or recycling should become key business strategies not only to save costs, but also to enhance the supply security and resilience of markets. Eco-innovative services include green financial products (such as eco-leases), environmental services (such as waste management) and less resource intensive services (for instance car sharing) |
| <b>Process</b> | Process eco-innovations reduce material use, lower risk and result in cost savings. Examples include the substitution of harmful inputs during the production process (for example replacing toxic substances), optimisation of the production process and reducing the negative impacts of production outputs . In addition, reducing material inputs, so-called ‘ecological rucksacks’, of production and consumption processes can also be captured by process eco-innovation. Common terms linked with process eco-innovations include cleaner production, zero emissions, zero waste and material efficiency   |

|                       |   |
|-----------------------|---|
| <b>Organisational</b> | Organisational eco-innovation is the introduction of organisational methods and management systems for dealing with environmental issues in production and products. Such organisational changes are the socio-economic dimension of process innovation, especially as it is closely linked to learning and education. It includes pollution prevention schemes, environmental management and auditing systems and chain management (cooperation between companies to close material loops and avoid environmental damage across the whole value chain. As such, organisational eco-innovation may also include an enquiry into various collaborative organisational forms and their potential eco-innovative qualities; this can range from business networks and clusters to advanced solutions in industrial symbiosis.  |
| <b>Marketing</b>      | Marketing eco-innovation involves changes in product design or packaging, product placement, product promotion or pricing. It involves looking at what marketing techniques can be used to drive people to buy, use or implement eco-innovations. In marketing terms, brand (a collection of symbols, experiences and associations connected with a product or service by potential customers) is key to understanding the process of commercialisation of products or services. While green branding is important, in practice, it is not the only or best way of selling eco-innovations. Labelling is also an aspect of marketing eco-innovation, i.e. eco-labelling.  |
| <b>Social</b>         | Social eco-innovation considers the human element integral to any discussion on resource consumption. It includes market-based dimensions of behavioural and lifestyle change and the ensuing demand for green goods and services. Some firms are experimenting with so-called user-led innovation, meaning that the functionality of new goods is developed with stakeholders, thereby minimising the risk of superfluous product features. Another important aspect is product sharing, which may lead to an absolute decrease of material use without diminishing the quality of services they provide to users. The social dimension also involves the creative potential of society, with examples of innovative green living concepts.  |
| <b>System</b>         | System eco-innovation is a series of connected innovations that improve or create entirely new systems delivering specific functions with a reduced overall environmental impact. A key feature of system innovation is that it is a collection of changes implemented by design. For example, system eco-innovation related to a house is not about just insulating windows or just using a better heating system: it is about innovating the overall design to improve its functionality. "Green cities" are another example of system innovations when innovation and planning efforts lead to a combination of changes to make the functioning of the city and city life more "green". This includes, for instance, new mobility concepts that tackle not only traditional public transportation services but also shared-bike systems as well as planning to reduce the need for travel. |

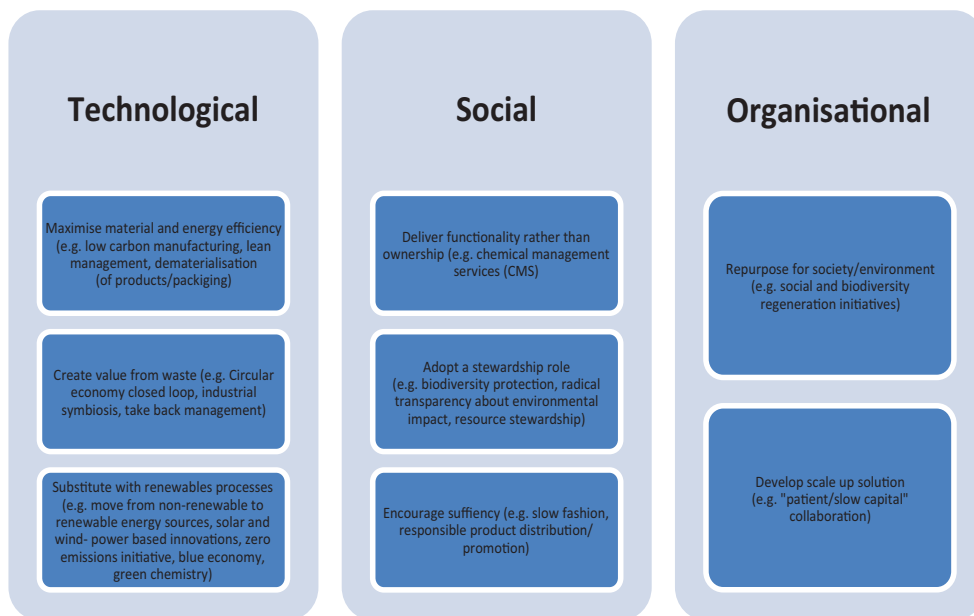
Source: prepared by author, based on: Europe in transition, Paving the way to a green economy through eco-innovations, Annual report 2012, The Eco-Innovation Observatory, p. 16.

Green projects are investment projects that concern eco-innovative solutions. Thanks to these projects the leading innovations concerning sustainability, radical resource productivity, whole system design, biomimicry, green chemistry, industrial ecology, renewable energy and green nanotechnology can become

important tools to build a framework for sustainable economy and influence living conditions of present and future generations.

They can be accomplished by various groups of stakeholders with the use of various types of projects, like these presented in Figure 1.1.

**Figure 1.1. Types of eco-projects**



Source: prepared by author, based on: Bocken N.M.P., Short S.W., Rana P. and Evans S., 2014, *A literature and practice review to develop sustainable business model archetypes*, Journal of Cleaner Production, 65(0), p. 48.

As the range of eco-innovative solutions is wide, such projects can be financed by various types of stakeholders: companies, individuals, financial institutions, territorial government units, the state, international organizations, by means of special mechanisms that facilitate transfer of funds.

Green projects are the element connecting both sides of the eco-innovations market, which means demand and supply. Supply of capital for financing eco-innovative solutions derives from policies of the state and international organizations as well as strategic decisions of entrepreneurs. Eco-investments are offered as a result of technological development of regions and countries and their openness to creation and absorption of eco-innovations.



In the market there are capital donors and capital recipients as well as intermediating organizations – mainly financial institutions. The investors can be divided into private and institutional investors. The institutional investors include banks and funds, especially big investment funds. They are open funds (such as securities funds) or other funds not being subject to formal regulations like venture capital and private equity funds. Thus, the financing resources and risk transfer are diversified.

Risk transfer is facilitated by derivative instruments whose value is dependent on their underlyings. They include commodity derivatives such as energy derivatives.<sup>2</sup> Hybrid instruments which combine characteristics of debt securities and derivatives are also available in the market. In this module, various ways of raising capital and sharing risk are shown.

From the point of view of the organizations who finance projects, the mechanisms and instruments used by them are aimed to provide capital for the needs of particular projects and, if necessary, to supply additional support for project accomplishment by decreasing investment costs and outlays (e.g. by tax exemptions or preferential loans). Thus, the amount of capital spent can be reduced, which fosters economic effectiveness of capital.

Other solutions that can be used to support project financing indirectly include:

1. granting loan guarantees required by financial institutions, instruments increasing access to financial capital,
2. project risk management e.g. by sharing risks among several participants,
3. creating additional mechanisms increasing the amount of capital allocated for eco-innovative solutions such as supplying funds with additional environmental fees,
4. creating organizational solutions that enable consolidation of funds for eco-projects or decreasing costs and investment outlays e.g. thanks to eco-parks, special ecological solutions in the special economic zones, R&D parks and eco-clusters.

In the literature we can find the term “project finance”, defined as „the financing of a single, capital-intensive, long-lasting industrial initiative. This initiative is incorporated in a specially created vehicle (an SPV) whose assets are given as collateral to the creditor as the only source – together with the cash flow generated by the project – for debt service repayment.”<sup>3</sup> The eco-innovative projects can often (but not always) be described by above-mentioned characteristics.

<sup>2</sup> K. Jajuga, T. Jajuga, *Inwestycje, instrumenty finansowe, ryzyko, inżynieria finansowa*, Wydawnictwo Naukowe PWN.

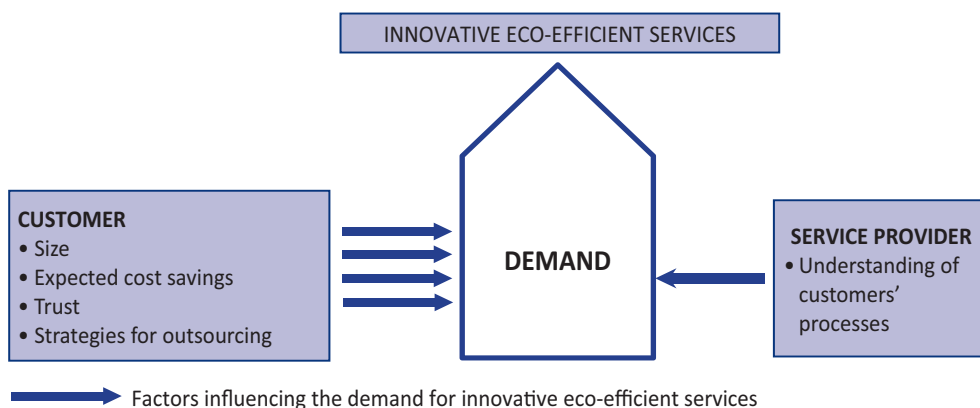
<sup>3</sup> S. Gatti, *Project finance in theory and practice, Designing, Structuring and Financing Private and Public Projects*, second edition, Academic Press is an Imprint of Elsevier 2012.

## 1.2. Demand conditioning of eco-innovations market

One of the most important factors influencing the development of eco-innovative market is demand.

Demand for eco-innovative goods and services can be analysed on micro-, mezo- and macroeconomic levels. Depending on the demand size, its dynamics and income and price elasticity, the financing possibilities for green projects are shaped. Special attention is given to the customers, especially their characteristics that influence demand for eco-efficient products or services, including e.g. size, expected cost saving, trust, and understanding of customer's processes – see Figure 1.2.

Figure 1.2. Factors influencing the demand for innovative eco-efficient services



Source: M. Anttonen, M. Halme, E. Houtbeckers, J. Nurkka, *The other side of sustainable innovation: is there a demand for innovative services?*, Journal of Cleaner Production, 45 (2013), p. 91.

It should be mentioned that **the more common the application of a particular eco-innovation, the smaller the probability of project failure.** Thus, the degree of market specialization is important. The more common the application of an eco-innovation is, the more favorable are the possibilities of its financing. Thus, it is important to recognize whether the market consists of specialized recipients (e.g. industry) or just the opposite. In the second case the eco-innovation can create universal markets, depending on population distribution and purchase power as well as economic potential of particular geographical markets.

It is also important **that the shorter the product (or service) lifecycle, the more difficult is to finance it.** This results from the fact that eco-innovations'

costs are especially high in the first phase when prototype solutions are created. This is connected with character of demand for eco-products or eco-services. The quicker the obsolescence of product or service is, the more quickly the demand for new generation of products or services comes up.

When analyzing green projects financing in terms of demand, the following criteria should be taken into consideration:

- **utility** – project's influence on satisfying the needs of target groups of groups of people concerned by the project
- **effectiveness** – project's influence on realization of micro- or macroeconomic goals. The effectiveness is assessed by comparison of planned results with the real results of the project.
- **relevance** – significance of the green project's aims in comparison with the needs and macroeconomic priorities defined on the domestic and EU level. This can be assessed by comparing project aims and expected results with the aims of the EU or domestic policies.

### 1.2.1. Investments in eco-innovations: micro- vs macroeconomic approach

Investments in eco-innovations are aimed at meeting society's needs according to the rules of sustainable development. However, the society is not only a group of people who have common goals, needs and culture code. It is also groups of people or individuals with own various goals and values. Thus, the ways the eco-innovations are seen, are different, depending on social structures.

As the main condition of eco-innovative investment is social consensus and all members of the society should have right to take part in the decision process, we should be aware that the stakeholders of micro- and macroeconomic levels have different interests. On the microeconomic level stakeholders are citizens, consumers and entrepreneurs. On the macroeconomic level they are various social groups, representing state, international structures and global organizations.

The comparison of these groups and their goals on micro- and macroeconomic levels is presented in Table 1.3.

**Table 1.3. Eco-innovations goals – micro- and macroeconomic approaches**

| Microeconomic level                          |   | Macroeconomic level  |  |
|--|---|--|--|
| Citizen                                      | Entrepreneur  | State  | Group of countries (EU)  |
| <b>Goals of investing in eco-innovations</b> |   |  |  |
| Decreasing of living costs                   | Decreasing of costs of running business                                 | Decreasing the amount of waste and decreasing environment pollution                    | Decreasing threats connected with turbulent and intensive urbanization                                 |
| Better health                                | Building pro-competitive marketing image                                | Resource security  | Political goals connects with international obligations  |
| Better living standard                       | Meeting consumers' expectations and creating new segments of the market | Environmental security or decreasing risk of natural disasters and their dissemination | Decreasing of political tenses resulting from the location of strategic natural resources in the world |
|  | Decreasing of bargaining power of resources and energy suppliers        | Decreasing of costs of healthcare as a result of better health of societies            |  |
|  | Meeting strategic goals of a company                                    | Better health and living conditions of societies                                       |  |
| Short-term character of goals                |   | Mid-term and long-term character of goals  |  |

Source: own work.

The goals of various groups are connected with costs both at the micro- and macroeconomic levels. At the macroeconomic level also political and social factors occur that are connected with the welfare functions of the state. In the conditions of corporate social responsibility the role of basic values like freedom and responsibility increases.

The aims (differently defined) influence investment's connections with time factor and investment risk. In the microeconomic approach the deciding role is played by short-term projects that allow gaining profits from eco-innovation implementation in a short time. People are usually not too interested in the state of natural environment in the globalizing world, which may be a result of increased people's mobility.

When it comes to the entrepreneurship, the management perspective is getting shorter and shorter. As the company's environment changes quickly and the internal environment is also not very stable, the long-term planning is getting more and more difficult. Lean or agile companies are not interested in ecological investments if they are not the source of competitive advantages within one term of office. Conflict of interests of management board (short-term goals) and owners (long-term goals) is common in big companies. The exception can be family businesses, controlled by owners' families.

When analysing micro- and macroeconomic approaches to eco-innovations, different investment risk and threat of insolvency or liquidation of the entity investing in eco-innovations should be taken into consideration. While in the microeconomic approach this risk is really high, especially at the initial levels of development, the risk of institutions representing macroeconomic levels are not burdened with the risk of bankruptcy.

However, the risk that public investment will not be completed, is connected with problems with investment financing, when the investment budgeting rules are disturbed. There are numerous examples of investments that were not finished or took a long time. A factor that disturbs economic calculations may be too rigid sticking to the project that should be corrected when there occur changes in the internal or external environment or, if during the ongoing project it appeared that there are mistakes in the approved plan.

The legal and organizational solutions in particular countries or regions (at the mezo-economic level) can prove a barrier instead of facilitation of good solutions. This should be remembered while trying to support good practices in the macro-economic scale.

In the microeconomic scale demand for eco-innovative solutions is a result of meeting consumers' needs with suppliers of eco-innovative services. This influences creation of entrepreneurs' competitive advantages. Successful development of eco-innovations market is not possible without private sector entities' commitment – both seeking for and offering capital.

„While sustainable innovations are an exciting and promising issue, the findings illustrate, perhaps paradoxically, that the needs for them are quite pragmatically-oriented. For instance, with regard to result-oriented material efficiency services, the mapped needs relate to side stream management and reuse, knowledge, and data management and their costs, as well as potential savings. Although there is indeed demand for innovative services, it seems that the step from pragmatic needs to radical industrial changes is a big one. Still, services solving these needs can create substantial material efficiency gains and open the door for more radical result-oriented services and other sustainable innovation.”<sup>4</sup>

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<sup>4</sup> M. Anttonen, M. Halme, E. Houtbeckers, J. Nurkka, *The other side of sustainable innovation: is there a demand for innovative services?*, Journal of Cleaner Production, 45 (2013), p. 99.

### 1.2.2. Consumers' demand for eco-innovative investments

**Increasing ecological awareness of societies** positively influences development of the eco-innovations market. The microeconomic goals described above, such as good health, living cost and quality of life are also connected with the policy of shaping the needs and consumption models by companies and by the state which creates investment needs of individuals and companies by providing public aid.

Legal regulations can be a demand engine by introducing new, more severe standards concerning CO<sub>2</sub> emissions, clean water, use of energy in housing and transport and emissions in manufacturing. New norms catalyse adjustment efforts in the economy and stimulate demand for eco-innovative solutions: often the producers willing to adjust their activity to new regulations create demand for a new generation of products that are more ecological. Consumers can also impact the eco-innovations market by influencing the kind of products and their characteristics. This concerns mainly eco-innovations based on their social context – the so called user-led or user-driven innovations.

On the basis of market observations and consumer behaviour observations new needs can be recognized, concerning the relation between manufacturing, after-sales service and the ecological perception of the product. Thus, new eco-innovative projects can be inspired by consumers' needs and suggestions. An example here can be the miniaturisation trend in mobile phones or hybrid supply energy solutions for appliances. Thus, a new product or service can be designed to make them less material – and energy-consuming (smaller packaging, hybrid solutions in cars) or to introduce one standard in all appliances of one kind (such as standardization of chargers for mobile phones). This is a significant factor influencing demand for innovative projects that lead to sustainable economy development as the foundation of the market economy is customer and his/her needs.

Environmental protection policy that aims to accelerate diffusion by price instruments can only be successful if it is accompanied by training and information supply (such as appropriate eco-labels)

*“An eco-label identifies a product that meets a wide range of environmental performance criteria or standards. Developed by governments, manufacturers, and third-company organizations, eco-labelling is a voluntary approach to environmental certification practiced around the world. In contrast to “green” symbols or claims, an eco-label is given to products **that have met specific environmental criteria.**”<sup>5</sup>*

<sup>5</sup> *An Overview of Eco-labels and Sustainability Certifications in the Global Marketplace*, Editor Jay S. Golden, PhD, Corporate Sustainability Initiative Nicholas Institute for Environmental Policy Solutions, Duke University, 2010, p. 14.

This solution was first introduced in 1977 in Germany, when the German government established the Blue Angel programme. The government's role in creating consumers' demand for eco-innovations is really significant.

The aim of eco-labelling is to decrease the negative influence of production and services on the environment. This aim can be analysed from both short – and long-term perspectives. In the short term, it is expected that eco-labels should increase demand for ecological products (and demand for environment-unfriendly products should decrease). In the long term, eco-labels should influence producers' efforts to develop eco-innovative technologies. In the course of time these technologies can lead to reduced costs and bigger profitability of eco-products.

The consumers' point of view concerning eco-labels can best be described by Mercedes Bleda and Marco Valente: *„Our core assumption is that consumers would be ready to purchase cleaner products if the products' characteristics are not 'too dissimilar' to those of more polluting alternatives. However, due to a lack of information about non-observable product characteristics, this assumption on its own is not sufficient for 'environment friendly' producers to become competitive. (...) Only if consumers are provided with appropriate information on the greenness of products through adequate eco-labels (graded eco-labels), then producers will be pressed to implement innovations aimed at reducing the environmental impact of their products.”*<sup>6</sup>

Products and their characteristics can be divided into three categories. The first one is the features that can be experienced with senses. The second one is experiences and the third one is the characteristics that cannot be experienced. This is why eco-labels are an instrument that can confirm the ecological character of projects of services.

Moreover, certificates described by the legal regulations can be used to confirm the ecological character of the product or production organization (like information on ISO 140001 certificate concerning production procedures). A good example can be the international egg labelling system, where the first number informs on the aviculture technique. If it is 0, the eggs come from free range layers from ecological farms. The eco-labels can also concern such characteristics as energy use of a fridge or a washing machine or the conditions or technological production processes.

The obvious problem is that there are many kinds of eco-labelling and the definitions and procedures concerning eco-products differ in different EU

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<sup>6</sup> M. Bleda, M. Valente, *Graded eco-labels: A demand-oriented approach to reduce pollution*, Technological Forecasting & Social Change 76 (2009), p. 512-524.

countries. This is why consumers are aware of domestic rather than EU eco-labels. For example, in the United Kingdom there is a labelling system that indicates the degree of packaging recycling.

**Eco-labels are a credible source of information for customers and confirm their good relations with the natural environment.** However, this function can sometimes be disturbed by some factors. One of them is overusing eco-labels connected with assigning ecological characteristics to a wider range of products offered by one producer or one vendor. What is more, the information can be too complicated or not clear enough for consumers. It can also prove that some labels are too simplified to be a credible source of information for the customer. This can result from lack of precise measurement or definitions for eco-labels.

Thus, the EU eco-labelling initiatives are very important. The EU Eco-label was launched in 1992 when the European Community decided to develop a Europe-wide voluntary environmental scheme that consumers could trust. The number of licenses rose from 6 in the year 1996 to 1357 in the year 2011 and its growth dynamics is exponential.

A licence gives a company the right to use the EU Eco-label logo for a specific product group.

The largest product group is hard floor coverings, whose share is more than 33% of EU Eco-label products. Textile products, all-purpose cleaners and tissue paper account for more than 10% of the total number of eco-labels each. Italy is the country with the highest number of eco-labels in the EU, outpacing France and the United Kingdom. Although these statistics refer to the Eco-label awarding countries, EU Eco-label products can be sold across the continent.

## 1.3. Global eco-innovation investment market

### 1.3.1. Determinants of development

Eco-innovation market is seen as a market with high potential for development. The main reason for this is rapid consumption of resources. „Resource consumption is the key focus of the EIO because the overuse of global resources is linked to the most prominent environmental problems and social inequalities today.”<sup>7</sup> This creates challenges that eco-innovations should address.

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<sup>7</sup> M.O'Brien, M. Miedzinski (ed.), *European transition. Paving the way to a green economy through eco-innovation*, Annual Report 2012, January 2013, Eco-innovation observatory, European Commission, p. 16.



Concern to save natural resources is a traditional way of thinking about environmental hazards, already mentioned in the 1970s in the reports by the Club of Rome. However, nowadays the awareness of increasing ecological barriers is getting wider and wider. The barriers are connected with the development of civilization, concentration of people in cities, especially in mega-cities in different regions of the world in different climates. They are especially difficult to manage as the development of civilization has a turbulent character, especially in the developing countries. This is why the initiatives aiming to increase environmental security are more and more popular and new revolutionary solutions are looked for.

„The well-known PH states that ‘well designed’ environmental regulations (e.g. economic instruments such as carbon taxes and emission trading, but not only) can stimulate innovations that intuitively give emphasis to complementarity among management practices concerning human resources and organisational changes, but they do not report specific tests on any sort of definition for complementarity.”<sup>8</sup>

Political conditions as well as appointments of heads of states and international organizations are of significance when discussing this topic. The statements of heads of states show us that there are different grounds for shaping pro-ecological attitudes, based on the willingness to create new jobs and develop new environment-friendly types of economic activity or on the willingness to be the leader in the rising markets due to the next wave of technological revolution.

US President Obama stated in 2009: „There is no longer a question whether the job and industries of the 21st century will be centred around clean, renewable industries. The question is: Which country will create these jobs and these industries. I want this country to be the United States of America”. EU Commission is claiming to be the world leader in renewable energy. China also wants to be the world’s leader, which is confirmed by its Vice Premier Li Keqiang who says: „We need to... seize the commanding point of having the world’s best environmental technology, to win the race between the global industries”. Willingness to be the world’s leader, but in the particular sectors, is shown by India, which concentrates on solar energy. Developing the World’s Best Energy-Efficient Appliances is the motto of the Japanese, who continue their policy of

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<sup>8</sup> Antonioli D., Mancinelli S. and Mazzanti M., 2013, *Is environmental innovation embedded within high-performance organisational changes? The role of human resource management and complementarity in green business strategies*, Research Policy, 42(4), pp. 975-988.

decreasing dependence on imported natural resources, especially energy resources.<sup>9</sup> Thus, eco-innovations market can be supported in various ways.

Eco-innovative solutions bring measurable benefits such as: increased ecological credibility of companies to customers, improved relations with local communities, improved market position of pro-ecological companies, gaining new groups of customers, access to other preferential sources of financing for development needs of an eco-business. Why are funds targeting eco-innovation? Not just for the profit motive, but also for “Impact Investing”.

On the other hand, the global market of ecological innovative investments is limited. This results from high capital intensity of eco-innovations, long time of return on investment, lack of experience or acquaintance with people who implement eco-innovations – both in private and public sectors.

An important element influencing development opportunities of this market is introducing legal regulations facilitating reduction in financial risk of investments. One of its significant determinants is valuation of natural resources and costs of their transfer throughout the supply chain, for example, calculating costs of transfer of renewable energy from a scattered energy system based on many energy sources to markets that are concentrated in one area. Financing green investments should be based on **economic calculations and right valuation of resources** used in particular investment projects. The right legal regulations can bring about increased demand for ecological products and improve the chances to replace already used technologies with those better for the environment.<sup>10</sup> It is also important to shape pro-ecological attitudes.

### 1.3.2. Eco-innovative investments market dynamics

It is very difficult to evaluate eco-innovations market dynamics as they are not precisely defined in the international statistics and the data concerning this topic is not gathered regularly. Available are only estimates prepared by a British state agency. According to the report released in 2010<sup>11</sup> the most eco-innovative products in the world are: alternative fuels, building technologies, wind, alternative fuel vehicle and geothermal. Important position of innovations

<sup>9</sup> Jänicke M., 2012. “Green growth”: From a growing eco-industry to economic sustainability, *Energy Policy*, 48(0), p. 15.

<sup>10</sup> Antonioli D., Mancinelli S. and Mazzanti M., 2013, *Is environmental innovation embedded within high-performance organisational changes? The role of human resource management and complementarity in green business strategies*, *Research Policy*, 42(4), pp. 975-988.

<sup>11</sup> *Innovas Low carbon and environmental goods and services: an industry*, 2010, after: C. Levy, *A 2020 Low Carbon Economy, A Knowledge Economy Programme Report* [http://www.theworkfoundation.com/assets/docs/publications/243\\_lowcarbon160410.pdf](http://www.theworkfoundation.com/assets/docs/publications/243_lowcarbon160410.pdf)

connected with energy security can be easily visible from this figure. Such situation can be observed in the countries that find eco-innovations important. When it comes to ecological production structure in Germany, in the past decade the first position was taken by renewable energy, with the highest market share (about 30%) and highest dynamics (35%). The energy efficiency and material efficiency eco-innovation market was developing (about 20% annual growth, by the 6% market share). Sustainable water management sector was growing at a slower pace (10% market share, 14% annual growth).<sup>12</sup> This can be connected with difficulties in calculation of long-term costs of projects concerning water economy and strong dependence of the protective effects of infrastructure built on natural phenomena. A good example can be a capital-intensive system of drainage in the UK, where, paradoxically, after the infrastructure capacity was expanded, the effects of floods were even worse than in the neighbouring regions. An indirect way of assessing the demand can be the number of patents.

As it can be seen from the figure, green energy supply and green mobility projects are characterised by the highest dynamics. Material efficiency and water projects are characterised by slightly slower dynamics.

Although detailed statistics are not available, we can assume that the eco-innovations market will be developing world-wide, because of the awareness of politicians, also those who represent interests of the global superpowers. The engine of the market growth are investments connected with energy security, which is a result of increasing dependence of the economy on energy resources combined with unfavourable geographical structure of traditional energy resources.

#### 1.4. Mechanisms of eco-innovations financing

Because eco-innovations are diverse, they also face various barriers as well as various factors that can stimulate their financing. Thus, the financing mechanisms differ, depending on the kind of eco-innovations and the sector in which they are implemented. The financing mechanism can be understood as a way in which the financial means are transferred when the eco-innovative solutions appear and diffuse.

The mechanism can be divided into the following stages:

- Raising capital and creating an investment portfolio,
- Execution of direct payments connected with specific projects whose eligible costs can be refunded,

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<sup>12</sup> BMU (Roland Berger) (Ed.), *GreenTech made in Germany2.0*, München 2009.

- Final stage of project financing, based on planned and actual costs of the project,
- Financing eco-innovative projects or services, including maintenance, modernization and product evaluation.

Depending on the kind of investment and its connection with the social objectives pursued by the state, a problem may appear if we try to estimate the costs of financing the maintenance and modernization of the product or service that results from implementing the particular eco-innovation.

To explain the difficulty of such calculations, the SUDS example can be used. Depending on the technological solutions there will be more or fewer elements that should be financed. The essence of the problem is that the investments are connected with costs in a very long term as they are very capital-intensive. The long term here can be understood as a generation or a few generations' lifecycle. In such situations a question can be raised concerning the responsibility for future costs of the project and the way of covering the costs that appear after accomplishing it and the costs of maintenance of the new solutions. According to the literature, the SUDS (Sustainable Urban Drainage System) infrastructure costs over the whole lifecycle are higher than the initial outlays connected with introducing the new solution or its diffusion.

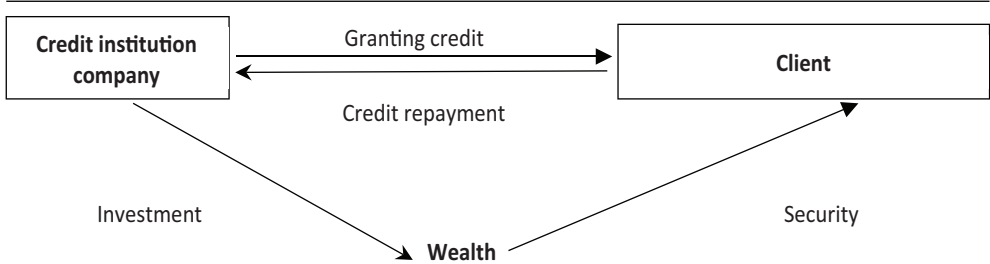
Another question is seeking financial support for particular business objectives (they can be completed e.g. with the help of investment loans and working capital loans).

This is why financing eco-innovations with public aims needs extremely mindful solutions. Especially the investors completing the least known investments have problems with financing their projects. In such cases sharing the risk between more capital suppliers is recommended as the project risk is higher. Thus, partnerships play an important role in such financing: public-private, public-public or private-private. Apart from the state, local and regional authorities, initiatives connected with financing investments by specialized funds are important.

While using various sources of capital, regulations concerning capital flows and organizational and legal conditions of their completion are of importance. This concerns especially investor's own financial contribution, advance payments rules, and determining eligible costs connected with the cost or investment outlays refund.

The most common mechanism is a loan or a credit – see Figure 1.3.

Figure 1.3. Financing investments with credits/loans

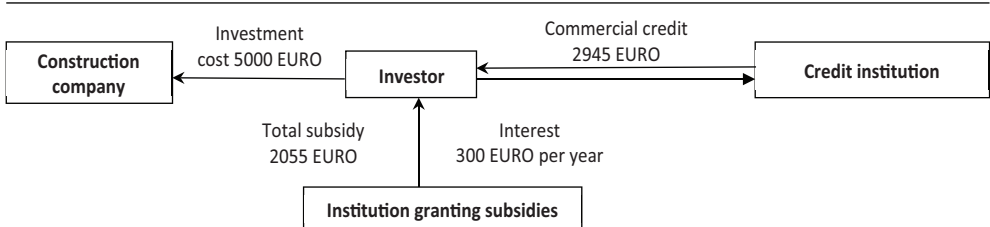


Source: prepared by author, based on: *Modernizacja budynków z uwzględnieniem poprawy efektywności energetycznej w wybranych regionach Europy*, MECHANIZMY FINANSOWANIA INWESTYCJI, Bałtycka Agencja Poszanowania Energii S.A., 2009, [http://bape.com.pl/Portals/8/WP3\\_finance\\_clearsupport\\_PL\\_130309.pdf](http://bape.com.pl/Portals/8/WP3_finance_clearsupport_PL_130309.pdf) (25.05.2014).

In this case, the important circumstances are: credit interest rate, repayment period and repayment schedule (considering the possibility of earlier repayment or conversion), loan collateral (form and amount). Credit history and customer credit rating are also important. They can be verified with professional information institutions (like Credit Information Bureau).

The financing mechanism gets complicated when the investor is a beneficiary of public help. In such situations an institution granting subsidies also takes part in the capital flows (compare Figure 1.4).

Figure 1.4. Financing with direct subsidies



Source: *Modernizacja budynków z uwzględnieniem poprawy efektywności energetycznej w wybranych regionach Europy*, MECHANIZMY FINANSOWANIA INWESTYCJI, Bałtycka Agencja Poszanowania Energii S.A., 2009, [http://bape.com.pl/Portals/8/WP3\\_finance\\_clearsupport\\_PL\\_130309.pdf](http://bape.com.pl/Portals/8/WP3_finance_clearsupport_PL_130309.pdf) (25.05.2014).

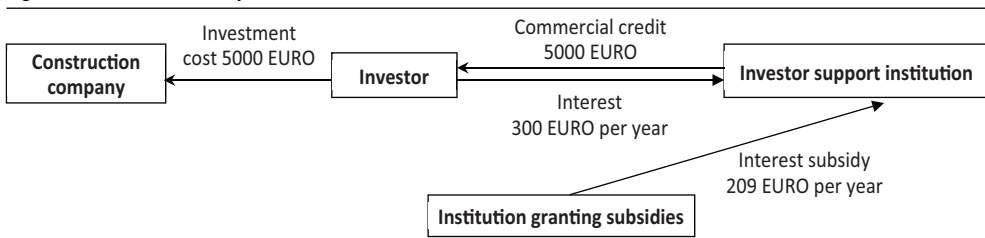
Beside the above-mentioned elements, other important factors include the subsidy amount, payment schedule and compliance of project completion with project description. The institution granting subsidies makes advance payments or refunds eligible costs. The highest risk appears in the application phase,

when the costs are not estimated in the correct way or the conditions stated in the contract are difficult to meet.

For example, it can appear that in a particular place the intensity of public aid changes or investment costs are higher than planned. Another difficulty for the innovation introduced by a company can be maintaining the newly created jobs for 3 to 5 years, no matter what the economic situation is after the project is completed.

Difficulties are smaller when the subsidy only refers to interest – see Figure 1.5.

**Figure 1.5. Interest subsidy**



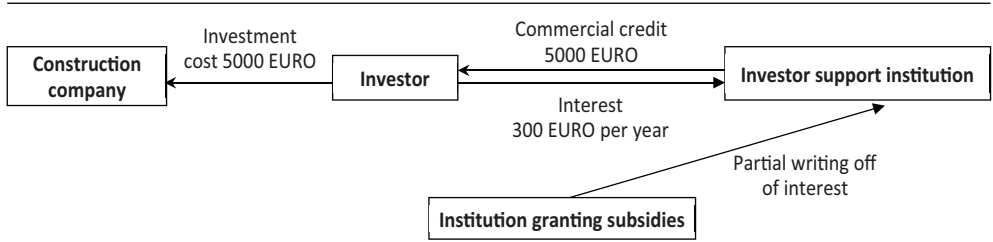
Source: prepared by author, based on: *Modernizacja budynków z uwzględnieniem poprawy efektywności energetycznej w wybranych regionach Europy*, MECHANIZMY FINANSOWANIA INWESTYCJI, Bałtycka Agencja Poszanowania Energii S.A., 2009, [http://bape.com.pl/Portals/8/WP3\\_finance\\_clearsupport\\_PL\\_130309.pdf](http://bape.com.pl/Portals/8/WP3_finance_clearsupport_PL_130309.pdf) (25.05.2014).

In such cases, the subsidy connected with preferential loans only refers to possible changes in public aid intensity. Wrong cost qualification does not apply here. The beneficiary in this case is the financial institution in its new role and not the investor.

The institution of investment support is usually a bank that can take a double advantage from the subsidy as it grants a commercial loan and gets a subsidy at the same time. This is a reasonable solution only for the projects with high investment risk, especially for new capital-intensive investments.

Another method of financing that can be taken into consideration is partial subsidy – see Figure 1.6.

Figure 1.6. Financing with partial subsidies



Source: prepared by author, based on: *Modernizacja budynków z uwzględnieniem poprawy efektywności energetycznej w wybranych regionach Europy*, MECHANIZMY FINANSOWANIA INWESTYCJI, Bałtycka Agencja Poszanowania Energii S.A., 2009, [http://bape.com.pl/Portals/8/WP3\\_finance\\_clearsupport\\_PL\\_130309.pdf](http://bape.com.pl/Portals/8/WP3_finance_clearsupport_PL_130309.pdf) (25.05.2014).

While financing eco-innovative projects, the most important are capital flows allowing the investor to accomplish the project.

In general, they can be divided into following groups:

1. for public institutions: their own funds allocated from their own income, subventions or subsidies from State Treasury, international aid funds (European Union funds, World Bank funds, Norway Grants), securities (stocks, bonds), loans, special purpose funds (in Poland: National Fund for Environmental Protection and Water Management) and companies' capital (for public-private partnership);
2. for entrepreneurs: their own capital, private capital (business angels, partners), securities (stocks, bonds), microloans, bank loans, domestic public funds, subsidies or preferential loans from the EU aid funds and other international financial mechanisms, special purpose funds, factoring and leasing.

Financing eco-innovations is connected with the cycle of eco-innovations diffusion. Basic sources of capital, divided into Risk Capital instruments, CIP Resources, RSFF (Risk Sharing Finance Facility) for SMEs and Mid Caps as well as Investment Loans. Their role increases along with the development of the project. In the seed or start-up phase the main source of capital is the entrepreneur, their friends and family. This is due to the fact that at the beginning the entrepreneur is usually confronted with the barrier of lack of creditworthiness as their activity is connected with high risk, especially when they operate in the eco-innovations market. This is why, at this stage, the main source of funds is usually entrepreneur's own capital raised from retained profits, selling other assets (e.g. real estate), or recapitalizing the company thanks to gaining new partners. It is also possible to obtain support of business angels, VC funds or

business incubators. Capital supply from these sources is no fortune, but the use of ready local infrastructure reduces capital needs. Often business incubators offer other services that enable cost savings in the organizational, legal and marketing areas.

At the next stage, when the eco-innovation is brought to life, the situation changes as investment risk decreases, customers' behaviour is known and economies of scale can be achieved. VC funds can perform a crucial role at this stage. Guarantees for small and medium-sized enterprises are needed. Characteristic of this stage are new forms of financing such as microloans, loans, equity or mezzanine securitization (financing after the phase of start-up is completed).

At the stage that follows, the entrepreneurs implementing innovations have already become important and attractive clients for the banks, which is reflected by a range of loans, including mezzanine ones, and funded risk sharing facilities offered by banks, who start to play the role of investors. RDI financing and sub-investment grade appear in this phase as well.

In the final phase, when innovations reach the level of maturity, the investment loans, RDI financing and public aid are of great importance. If eco-projects are financed by public entities, the process of granting funds looks quite different. If eco-investment projects are financed by public entities, the process of the funds development is quite different, and it will be discussed in subsequent chapters.

Similarly to financing other projects, the key to financing eco-innovations **is raising funds for eco-innovations**. Especially important is choosing the right sources of financing and creating the capital portfolio, by setting percentages of various sources of financing particular eco-innovations.<sup>13</sup> While choosing sources of financing, we should take into consideration a number of issues that should influence the choice of sources and their structure.

One of the key issues is specifying **the phase of innovation diffusion**. If it is the phase of conception and designing a new product, then usually co-financing is necessary, concerning future profits or social benefits. When an innovative technological solution is created or a knowledge-intensive device or product prototype is designed, the costs may be very high and the project may be risky. When the innovation is in the dissemination phase, the costs and investment risk are usually not high.

In the final phase, the investment risk increases as there comes a real threat that the project accomplished will not bring the expected economic results.

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<sup>13</sup> A. Michalak, *Finansowanie inwestycji w teorii i praktyce*, Wydawnictwo Naukowe PWN, Warszawa 2007, p. 66.



Such situation can take place if the eco-innovation is provided in areas whose culture type is different from those in the area of origin and the eco-products are not as popular as expected because of different consumption model. Some technological solutions may also be inadequate to environmental conditions – e. g. there will be few people interested in green roofs in areas with long snowy seasons or in farming a new race of pigs in the Middle East.

Another important issue then is the **kind of eco-innovation and its capital intensity**. Depending on the kind of innovation the financial needs are different and not always easy to compare (like a new line of buses with hybrid engines in big cities vs. green roofs).

The **kind of investor** should also be taken into consideration. The organizational and ownership structure influences access to sources of financing and motivation to implement or create particular eco-innovative solutions. If the entity applying for financing eco-innovation is private, then the main motivation has micro-economic grounds and it is connected with achieving strategic goals of such an entity. Such a goal can be achieving a specified company value, acquiring new markets important for the company or achieving the assumed competitive position. Investors of the above-described type are usually more interested in implementation of the project in the short term or in the middle-term.

If the investor is an already existing company with a stable position in the market, it may have a credit history that should help it to raise financing from external sources more easily. If it is a new company, the lack of credit history may be a big barrier to be granted a loan.

Of great importance is also the **location of the eco-innovation**. It is not always possible to make use of good practices in locations different from the place of their origin as the resources in different regions and the level of risks are different. Some locations may be advantageous when applying for specific sources of financing while the others may be disadvantageous. The spatial factor is also connected with the scope of the eco-innovative project. If the project is integrated and covers the space of a few local government units, then a synergy effect can be reached, e.g. a significant decrease in impact of existing polluters or increasing abilities of regional ecosystems to regenerate. In such cases, it is advisable that public funds should be available, not only domestic, but also international ones (like the funds from the World Bank or funds from the European Union). The kind of eco-innovations and the kind of entities/organizations seeking capital to finance eco-innovations are the key factors influencing the choice of sources of financing and their possible combinations within the portfolios created.

As different kinds of capital are taken into consideration while creating capital portfolios (like natural resources, human resources, intangible assets and financial assets), the vital issue for financing eco-innovations is valuation of natural resources. This is caused by the fact that many valuation methods do not fulfil the conditions of comparability and complexity e.g. travel cost method or alternative cost method. Thus, valuation of real estate and comparative analysis of various sources of financial capital are of fundamental importance.

For the eco-innovative solutions also **the long-term advantages** are important, as they result from the rules of sustainable development. Preservation of natural environment or creating infrastructure preventing natural disasters is difficult to plan, no matter if it is long-, middle- or short-term planning. At the same time a question can be raised whether it is worthwhile creating specialist infrastructure if it is not possible to calculate the risk of the natural disaster. Although we can use the measures that show the differentiation of expenditures on tackling the consequences of natural disasters, they are not precise enough to be used to measure the costs of capital.

Eco-innovative solutions are often **very capital-intensive** (or their costs are too high compared to traditional technologies). A good example of this problem is the use of renewable energy resources compared to the use of the traditional ones. In some locations green energy is often more expensive than traditional energy. In these locations economic reasons are a barrier to raising funds for eco-innovative projects. Thus, for strategic reasons, public intervention is needed, e.g. to improve energy security. Thanks to such intervention it is possible to move from experimental solutions to mass production and in this way decrease costs of new solutions.

This highlights the next feature of eco-innovations which is the **major importance of state governments' or local governments' obligation to co-finance or fully finance green projects**. This results from the role of the state and its institutions as creators of the foundations for sustainable development, which is connected with international obligations of countries concerning destructive influence of the economy on the environment. What is more, the role of local government units as sources of public capital is connected to communities' own tasks concerning creation of foundations for economic activity and shaping living conditions of local communities. If one of these tasks is building local infrastructure, the infrastructure should be built according to the rules of sustainable development. A good example of such attitudes can be regeneration works in many cities worldwide that were catalysed by the willingness to remove barriers for developing city districts.

Regeneration of the cities is favourable to introducing modern pro-ecological solutions that in the long run contribute to improved living conditions and

health, lower costs of running business due to reduction in water and air treatment expenses, more effective recycling processes and decrease in sewage infrastructure use (connected with a mixed treatment of industrial and municipal waste water combined with storm and rain water).

## Summary

Eco-innovation market is seen as a market with high potential for development. Consumers have huge influence on the eco-innovations market. However, their role is highly dependent on shaping the awareness of threats connected with economic development by the cost of increasing environmental barriers by the state and social organizations. Moreover, instruments regulating behaviour on the microeconomic level are important.

An especially important role can be assigned to eco-labels that are an important source of common information and a disciplining means for companies or other stakeholders (like institutions holding certificates). They are important for consumers on several conditions. It is important that eco-labels:

- inform the consumers about ecological characteristics of the products or production technology in a clear way,
- transfer into real advantages for the consumers (such as lower living cost),
- enable consumers to compare the products thanks to the grading scale.

As certification and unification requirements should be met, introducing EU Eco-label in all the EU-countries could be a good solution.

Financing eco-innovations is raising and gathering funds and investing in eco-innovations is effective spending of these funds. Depending on the kind of eco-innovations and the kind of the entity applying for particular funds, their availability and diversification in particular conditions are different.

The main questions connected with the topic are:

- What is subject to financing?
- Who is the entity applying for financing for the particular eco-innovation?
- What is the location of the planned eco-project and the scale of its impacts in the area after the investment is completed?
- Who are the beneficiaries of the particular eco-innovation?
- What kind of investment risk is connected with the project and what is the level of investment risk of the particular eco-innovative project?

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## Chapter 2

# Project finance and public-private partnerships in eco-innovations

*Katarzyna Sobiech-Grabka*

### Introduction

Projects may be financed in various ways. In developed countries, very-large-scale public-sector infrastructure projects are traditionally financed by public sector debt; private sector projects are typically financed by large companies raising corporate loans. By contrast, developing countries typically finance their infrastructure projects with the aid of development-finance institutions (e.g., the World Bank, the European Investment Bank, the European Bank for Development and Reconstruction, etc.) and/or by the government borrowing from the international banking market or through export credits.

The approach described above has changed in last few decades in Western countries (in Poland this shift has occurred over about 10-15 years), as privatisation and deregulation trends have emerged. As it will be described later in this chapter, governments have more recently tended to transfer a significant share of the financing burden of major public infrastructural investments to the private sector.

In the case of private sector, project finance (PF) techniques are becoming a popular financial and organisational scheme. Although PF is nowadays labelled as a new financing technique, it is in fact a centuries-old financing method that predates corporate finance. The method is, however, enjoying renewed attention in recent decades, as the explosive growth in privately financed infrastructure projects has occurred. Some authors claim that this

technique dates back to at least 1299 AD, when the English Crown secured finance for the exploration and the development of the Devon silver mines by repaying the Florentine merchant bank, Frescobaldi, with output from the mines<sup>14</sup>. PF has been long used in the natural-resources sector as well (e.g., in the 1880s, the French bank Crédit Lyonnais secured finance in this way for the development of the Baku oil fields in Russia<sup>15</sup>). With the Eurotunnel project as the vanguard of PF implementation in various infrastructure sectors, the method began its resurgence as of the mid-1980s.

Public-private partnerships (PPPs) are more and more frequently used by the public sector in recent decades, they are commonly based on project finance philosophy. PPPs differ significantly from the cooperation between the public sector and private companies undertaken under public procurement procedures. Deep understanding of virtues and shortcomings of PPP is thus crucial.

The goal of this chapter is to provide an overview of the main principles of project finance and public-private partnerships.

## 2.1. The idea and core characteristics of project finance

According to E.R. Yescombe, “*project finance is a method of raising long-term debt financing for major projects through ‘financial engineering’, based on lending against the cash flow generated by the project alone; it depends on a detailed evaluation of a project’s construction, operating and revenue risks, and their allocation between investors, lenders, and other parties through contractual and other arrangements*”<sup>16</sup>.

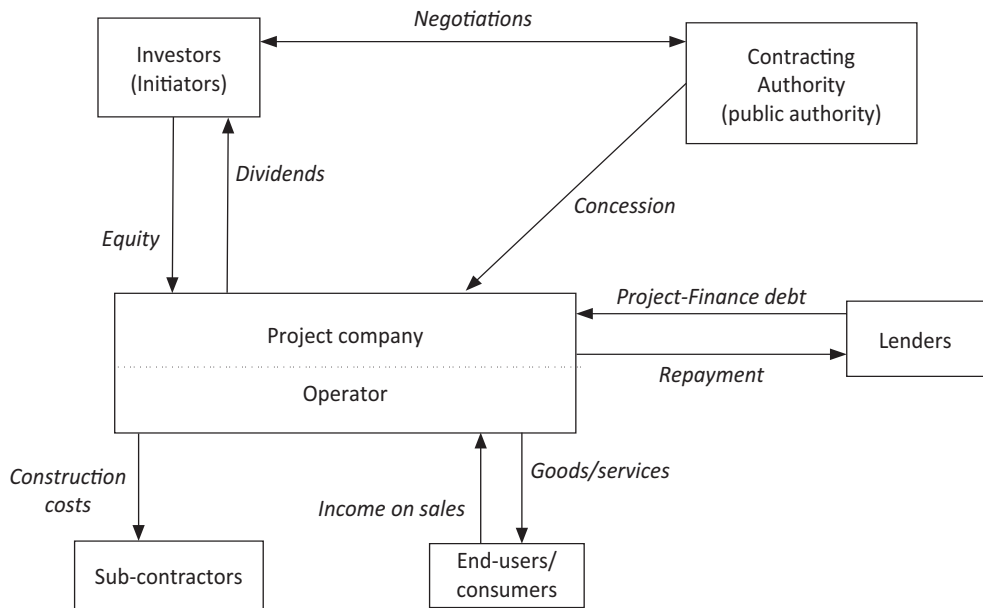
*The schematic links and flows between parties engaged in PF is presented in Figure 2.1. A few other definitions of PF are provided in Table 2.1.*

<sup>14</sup> B. Comer, *Project Finance Teaching Note*, The Wharton School, 1996, p. 2.

<sup>15</sup> E.R. Yescombe, *Principles of Project Finance*, Elsevier, Amsterdam-London-New York 2014, p. 9.

<sup>16</sup> E.R. Yescombe, *Principles...*, *op. cit.*, p. 1.

Figure 2.1. Structure of typical PF



Source: prepared by author, based on: K. Brzozowska, *Kapitał prywatny w finansowaniu projektów infrastruktury gospodarczej na zasadach project finance*, Akademia Rolnicza w Szczecinie, Szczecin 2003, p. 59 and E.R. Yescombe, *Principles of Project Finance*, Elsevier, Amsterdam-London-New York 2014, p. 19.

Table 2.1. List of various PF definitions

| Ild. | Author                                      | Definition of PF  |
|------|---|---|
| II   | The Export-Import Bank of the United States | <i>„...the financing of projects that are dependent on project cash flows for repayment, as defined by the contractual relationships within each project. By their nature, these types of projects rely on a large number of integrated contractual arrangements for successful completion and operation. The contractual relationships must be balanced with risks distributed to those parties best able to undertake them, and should reflect a fair allocation of risk and reward. All project contracts must fit together seamlessly to allocate risks in a manner which ensures the financial viability and success of the project.”</i>  |
| III  | Standard & Poor's                           | <i>„non-recourse financing of a single asset or portfolio of assets where the lenders can look only to those specific assets to generate the flow needed to service its fixed obligations, chief of which are interest payments and repayments of principal. Lenders' security and collateral is usually solely the project's contracts and physical assets. Lenders typically do not have recourse to the project's owner, and often, through the project's legal structure, project lenders are shielded from a project owner's financial troubles. Project finance transactions typically are comprised of a group of agreements and contracts between lenders, project sponsors, and other interested parties who combine to create a form of business organization that will issue a finite amount of debt on inception, and will operate in a focused line of business over a finite period.”</i> |

| IId. | Author   | Definition of PF   |
|------|--|--|
| III  | The Basel Committee on Banking Supervision   | „Project finance is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. This type of financing is usually for large, complex and expensive installations that might include, for example, power plants, chemical processing plants, mines, transportation infrastructure, environment, and telecommunications infrastructure. Project finance may take the form of financing of the construction of a new capital installation, or refinancing of an existing installation, with or without improvements. In such transactions, the lender is usually paid solely or almost exclusively out of the money generated by the contracts for the facility’s output, such as the electricity sold by a power plant. The borrower is usually an SPE (Special Purpose Entity) that is not permitted to perform any function other than developing, owning and operating the installation. The consequence is that repayment depends primarily on the project’s cash flow and on the collateral value of the project’s assets.”  |
| IV   | The OECD   | <p>„a) The financing of a particular economic unit in which a lender is satisfied to consider the cash flows and earnings of that economic unit as the source of funds from which a loan will be repaid and to the assets of the economic unit as collateral for the loan</p> <p>b) Financing of export transactions with an independent (legally and economically) project company, eg. special purpose company, in respect of investment projects generating their own revenues</p> <p>c) Appropriate risk-sharing among the partners of the project, e.g. private and creditworthy public shareholders, creditors, offtakers, including adequate equity</p> <p>d) Project cash flow sufficient during the entire repayment period to cover operating costs and debt service for outside funds</p> <p>e) Priority deduction from project revenues of operating costs and debt service.</p> <p>f) A non-sovereign buyer/borrower with no sovereign repayment guarantee (not including performance guarantees, e.g. offtake arrangements)</p> <p>g) Asset-based securities for proceeds/assets of the project, e.g. assignments, pledges, proceed accounts</p> <p>h) Limited or no recourse to the sponsors of the private sector shareholders/ sponsors of the project after completion”.</p> |
| V    | Benjamin C. Esty   | „Project finance involves the creation of a legally independent project company financed with nonrecourse debt for the purpose of investing in a capital asset, usually with a single purpose and a limited life”  |
| VI   | Larry Wynant, <i>Essential elements of project financing</i> , Harvard Business Review, May-June 1980, p. 166. | „A financing of a major independent capital investment that the sponsoring company has segregated from its assets and general purpose obligations.”  |

Source: Definitions I-IV: E.R. Yescombe, *Principles of Project Finance*, Elsevier, Amsterdam-London-New York 2014, pp. 6-7; Definition V: B.C. Esty, *The Economic Motivation for Using Project Finance*, Harvard, Boston 2003, pp. 6-7; Definition VI: B. Comer, *Project Finance Teaching Note*, The Wharton School, 1996, p. 3.



Each of the cited definitions captures selected features of PF, but, based on them, the principles of project finance may be summarised as follows:

- PF is especially designed for major infrastructure projects
- Project financing must be for a long term
- In PF, creditors assess future cash flows to repay their debt and pay their interest and fees
- PF is dedicated to a single, isolated asset, and the project company is entitled only to manage this project (so that those financing the project (the Lenders in Figure 2.1) can more easily maintain control over finance of the project)
- PF typically has a high ratio of debt to equity (debt may cover 70-90% of the capital cost of project's assets).

The use of PF enables financing for large-scale risky projects. In fact, PF is, in many cases, a more appropriate method than corporate loans (mainly because the financial obligations resulting from PF are off-balance-sheet).

According to B.C. Esty, *“project finance creates value by reducing the agency costs associated with large, transaction-specific assets, and by reducing the opportunity cost of underinvestment due to leverage and incremental distress costs”*<sup>17</sup>.

The main advantages and disadvantages of PF are presented in Table 2.2.

**Table 2.2. Advantages and disadvantages of PF**

| Advantages   | Disadvantages   |
|--|---|
| Elastic financial conditions (credit contracts are negotiated to fit into individual needs)  | Higher cost of capital (in exchange for their willingness to cover higher risks, banks expect a higher level of return)<br>High cost (due to huge scale, numerous participants and complexity, significant expenditures for pre-feasibility and feasibility studies, due diligence, as well as legal, tax and economic consultancy as needed)<br><br>Additional transaction costs<br>High cost of project management<br>Possible conflicts (due to numerous participants in the investment process) |
| Long-term finance  |   |
| Improved credibility (the loans in project finance are most commonly non-recourse loans, and they are not taken into consideration while granting short-term credit, which increases the possibility of procurement for several projects at the same time) |   |
| Off-balance-sheet financing  |   |
| Tax benefits (interest lessens the tax base, whereas the dividends do not; this makes loans even cheaper than equity and encourages taking on higher levels of debt)   |   |
| High financial leverage  |   |
| Risk limitation and spreading  |   |
| Possibility to finance a project that would not qualify for a „classical” loan (due to lack of credit history or low initial capital)  |   |

Source: prepared by author, based on: E.R. Yescombe, *Principles of Project Finance*, Elsevier, Amsterdam-London-New York 2014, pp. 21-24, and M. Kowalczyk, *Zarządzanie ryzykiem w project finance*, Materiały i Studia, nr 137, NBP, Warszawa 2002, pp. 7-9 and 12-13.

<sup>17</sup> B.C. Esty, *The Economic Motivation for Using Project Finance*, Harvard, Boston 2003, p. 2.

The final advantage listed in Table 2.2 – the possibility to finance a project that would not otherwise qualify for a traditional loan – seems to be one of the most important advantages of using PF in the case of eco-innovative projects.

### 2.2.1. Financial sources in project finance

Basically, we may divide sources of finance for PF in the following way:

- Initiators' capital
- Debt:
  - Bank financing
  - Non-bank financing (i.e., securitisation and bonds).

Initiators' (sponsors') funding is generally provided through equity contributions in the project company through share capital and other shareholder funds. Equity holds the lowest priority of the funding contributions in a project. As a result, the other contributors (such as lenders) will have the right to project assets and revenues before the equity contributors can obtain any return; or, on termination or insolvency, any repayment. Equity contributions bear the highest risk and therefore potentially receive the highest returns. Equity may be provided by the contractors who will build and operate the project as well as by financial institutions. A large part of the equity may take a form of shareholder subordinated debt, for tax and accounting benefits (this type of equity is often referred to as "quasi-equity")<sup>18</sup>.

Lenders will typically seek limited recourse to the assets of the shareholders in certain specified situations, up to a limited maximum amount and over a limited period. The extent to which some recourse is provided is commonly called "sponsor support"<sup>19</sup>.

Finance secured by banks (one bank or – more commonly – a bank consortium) is the main financial source in PF. Banks often form syndicates (consortia) in order to sell-down their interests.

Debt can be obtained from numerous sources, including commercial lenders, institutional investors, export credit agencies, bilateral or multilateral organisations, bondholders and sometimes the host country's government. Senior debt enjoys priority in terms of repayment over all other forms of finance. Mezzanine debt is subordinated in terms of repayment to senior debt but ranks above equity both for distributions of free cash in the so-called "cash waterfall" (i.e., priority of each cash inflow and outflow in a project) and in the event of

<sup>18</sup> <http://www.eib.org/epec/g2g/annex/1-project-finance/#> (accessed 14.07.2014).

<sup>19</sup> <http://ppp.worldbank.org/public-private-partnership/financing/sources> (accessed 14.07.2014).

liquidation of the PF Company. Since mezzanine debt's repayment can be affected by poor performance of the PF Company, and bearing in mind the priority in repayment of senior debt, mezzanine debt typically commands higher returns than senior debt<sup>20</sup>.

Nevertheless, investors should bear in mind two significant aspects of debt financing:

- projects may be funded with many kinds of debt, and each type of debt plays a different role; as B. Esty underlines, "*not all capital is created equal*"
- debt has advantages that go well beyond the interest-related tax benefits<sup>21</sup>.

### 2.2.2. Key risks in project finance

Due to the specific finance method used in PF (i.e., borrowing money against future cash flows), the following types of risks are crucial for projects organised in a PF manner:

- risk of delay in project completion (as it results in delays in reaching operation stage, when incomes begin to be generated)
- risk of overdraft (exceeding planned expenditure in construction phase)
- risk of lower-than-projected incomes.

All those risks would dramatically reduce the financial efficiency of the project and its ability to repay the debt. It is thus the role of the project finance advisor, the project sponsors and other participants to structure the financing in such a way that mitigates risks. The general rule in managing project risks is that they should be carved out and assigned to that party who is best suited to be responsible for controlling them.

As regards eco-innovative projects, the technological uncertainty (i.e., will the project become operational? will it generate profits?) may be perceived by lenders as a main source of risk. Banks are typically conservative lenders, and they prefer projects with solid, secure technologies.

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<sup>20</sup> <http://www.eib.org/epec/g2g/annex/1-project-finance/#> (accessed 14.07.2014).

<sup>21</sup> B.C. Esty, *Modern Project Finance*, A Casebook, John Wiley&Sons, Boston 2004, pp. 11-12.

## 2.3. Essence of PPP

### 2.3.1. PPP and new public management

The public-private partnership (PPP) approach has its root in new public management (NPM, see Box 1 for its basic characteristics), a trend in public management dated to the 1980s. At that time most Western countries focused on improvements in public management and attempted to make it “*lean and more competitive while, at the same time, trying to make public administration more responsive to citizens needs by offering value for money, choice, flexibility, and transparency.*”<sup>22</sup> NPM is directly connected to the three Es rule: *economy, effectiveness, efficiency.*

An increasing private involvement in the provision of public services was a visible effect of NPM. The role of the state shifted from a direct provider to an enabler<sup>23</sup>.

#### Box 1. Elements of NPM

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- emphasis on performance management
  - more flexible and devolved financial management
  - more devolved personnel management with increasing use of performance-related pay and personalized contracts
  - more responsiveness to users and other customers in public services
  - greater decentralization of authority and responsibility from central to lower levels of government
  - greater recourse to the use of market-type mechanisms, such as internal markets, user charges, vouchers, franchising and contracting out
  - privatization of market-oriented public enterprises.
- 

Source: T. Bovaird, E. Löffler *The changing context of public policy, in: Public management and governance*, A.G. Bovaird and E. Löffler (ed.), Routledge 2009, [www.summon.com](http://www.summon.com) (accessed 22 February 2014), p. 19.

The rationale for wider use of PPP lies in the better access to capital finance enjoyed by the private sector or in the perception that the private sector has greater know-how and expertise in certain functions. The perceived relative efficiency of private suppliers of public services is attributed to competition, economies of scale, and transaction costs.

In this section of the textbook, the main features of PPP will be presented with special emphasis on its virtues and shortcomings.

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<sup>22</sup> OECD, *Public management developments, Survey*, Paris 1993, p. 9.

<sup>23</sup> M. Prowle, *The changing public sector: a Practical Management Guide*, Aldershot, Gower, 2000, p. 18.

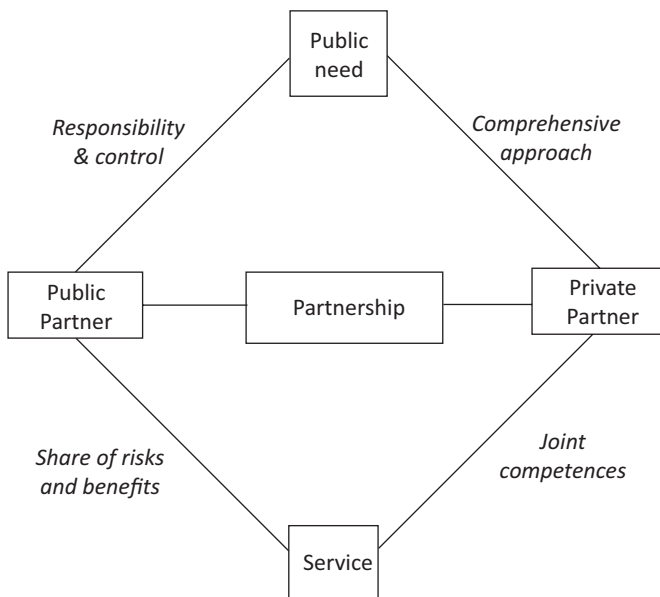
### 2.3.2. The key characteristics of PPPs

The PPP formula is based on the assumption that financing of public services may be provided by private capital. In PPP, the private sector accepts the burden of financing and takes the responsibility for most economic activities connected to a project's execution. However, the public sector retains the responsibility for the quality and quantity of the service (as well as accessibility to end-users) and has to control the private partner as regards meeting the agreed-upon standards of quality and quantity.

The common ventures undertaken by public and private partner must focus on a public need, very often connected with the delivery of a public good. As a hypothetical example, a public-private project of building a shopping mall cannot be defined as a public-private partnership, because building shopping malls is neither a traditional area of public sector activity nor an accepted responsibility of the State towards its citizens. In other words, not every cooperation between public and private sectors is a PPP.

Thus, a not-fulfilled public need is a prerequisite of cooperation between private and public partners in the form of PPP. Other important factors that characterise every PPP venture, are presented in Figure 2.2.

Figure 2.2. Diamond of PPP



Source: prepared by author, based on: *Wprowadzenie do PPP*, [in]: *Partnerstwo publiczno-prywatne*, A. Gajewska-Jedwabny (ed.), C.H. Beck, Warszawa 2007, p. 4.

According to the PPP diamond (Figure 2.2), public and private partners undertake cooperation (partnership) with the goal of fulfilling a public need via a given service provision. Identification of the public need and definition of the service able to satisfy this need are competences and tasks of the public sector. The private partner invests in particular assets that will be used to provide contracted services. That structure forces the private sector to choose a comprehensive approach (i.e., a whole project life approach). In this approach, the private partner is responsible not only for the construction of given assets but also for their operation and maintenance. Owing to that, the private partner will build the assets in a cost-effective way that may result in high-quality infrastructure assets that – at the end of the day – will be owned by the public sector.

The main reason for undertaking a PPP is an assumption that each partner has specific competences and their combination allows the optimal level of fulfilling public needs to be achieved. The overall efficiency of such cooperation is a result of appropriate sharing of risks and benefits among partners, according to their engagement in the project (as regards benefits) and in accordance with so-called “golden rule of risk sharing”: every risk is taken by the partner that is more skilled in – and better prepared for – dealing with it.

A review of PPP definitions is provided in Table 2.3.

**Table 2.3. Review of PPP definitions**

| Id. | Author   | Definition  |
|-----|--|---|
| I   | The National Council for Public-Private Partnerships | <i>“a contractual agreement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility”.</i> |
| II  | Standard’s and Poor                                  | <i>„any middle- or long term relationship between public and private sectors, based on such share of risks and benefits which best fits the skills, experiences and financial potential of every side, in order to gain expected results”.</i>  |
| III | Polish PPP Bill of 2009                              | <i>„Co-operation between public and private entities based on an agreement (contract), designed for the execution of a public task, if it takes place under the conditions determined by the PPP act”.</i>  |
| IV  | M. Moszoro   | <i>“A common public-private arrangement which couples – to a greater extent than ordinary contracting by the public sector – various advantages of the two sectors for provision of public services satisfying citizens’ needs”.</i>  |

|     |                                     |  |
|-----|-------------------------------------|--|
| V   | P. Vaillancourt-Rosenau             | „A common venture in co-operation between the government and private business”   |
| VI  | B. van Boxmeer,<br>E. van Beckhoven | „An institutionalized form of co-operation between government and one or more private partners in a project with common interests via a distribution of decision rights, costs and risks [...] The final result for every individual partner strongly depends on the action(s) of the other partners involved in the project.” |
| VII | European Commission                 | “...risks and responsibilities shared between the public sector and its private partners according to their strengths and weaknesses”.   |

Source: B. van Boxmeer, E. van Beckhoven, *Public-Private Partnership in Urban Regeneration: A Comparison of Dutch and Spanish PPPs*, “European Journal of Housing Policy”, vol. 5, No. 1, 2005, p. 3; M. Moszoro, *Partnerstwo publiczno-prywatne w monopolach naturalnych w sferze użyteczności publicznej*, Oficyna Wydawnicza SGH, Warszawa, 2005, p. 47; P. Vaillancourt-Rosenau, *Public-Private Policy Partnerships*, The MIT Press, Cambridge 2000, p. 19, <http://www.ncppp.org/howpart/index.shtml#define>, accessed 12.01.2010; EC, *Guidelines for Successful Public-Private Partnerships*, Brussels 2003, p. 13.

Public-private partnerships are perceived as an attractive alternative to direct (public) funding of an infrastructure investment. Enthusiasts of PPP underline that the borrowing is done by the private partner company, not by a governmental entity. Nevertheless, we should bear in mind that PPP is much more than a simple cure for public budget deficits, and much more than an additional source of capital. The cooperation of partners is built on the expertise of each partner that meets clearly defined public needs through the appropriate allocation of resources, risks, responsibilities and rewards<sup>24</sup>. The last aspect (rewards) is particularly crucial for successful PPP, as too often public administration aims to burden the private sector with too many tasks and risks without appropriate gratification.

Due to recent budgetary constraints in various European countries, it is worth underlining that if a contract is structured in an appropriate way, consistent with the Eurostat decision as regards risks transfer to private sector (see Box 2), the borrowing does not appear in the government’s accounts (i.e., “off balance sheet”).

Nevertheless, some risk is expected to be retained by the public sector even in the case of PPP. The valuation of the difference in risk between the two procurement schemes becomes a crucial determinant of the PPP outcome versus a conventional approach.

<sup>24</sup> UN ESCAP, *A Guidebook on Public-Private Partnership in Infrastructure*, Bangkok 2011, p. 1.

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**Box 2. New decision of Eurostat on deficit and debt. Treatment of public-private partnerships, 2004**

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"Eurostat recommends that the assets involved in a public-private partnership should be classified as non-government assets, and therefore recorded off balance sheet for government, if both of the following conditions are met:

- the private partner bears the construction risk, and
- the private partner bears at least one of either availability or demand risk.

If the construction risk is borne by government, or if the private partner bears only the construction risk and no other risks, the assets are classified as government assets. This has important consequences for government finances, both for the deficit and the debt. The initial capital expenditure relating to the assets will be recorded as government fixed capital formation, with a negative impact on government deficit/surplus. As a counterpart of this government expenditure, government debt will increase in the form of an "imputed loan" from the partner, which is part of the "Maastricht debt" concept. The regular payments made by government to the partner will have an impact on government deficit/surplus only for the part relating to purchases of services and 'imputed interest'."

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Source: Eurostat, New decision of Eurostat on deficit and debt. Treatment of public-private partnerships, 2004, available on: [http://epp.eurostat.ec.europa.eu/cache/ITY\\_PUBLIC/2-11022004-AP/EN/2-11022004-AP-EN.HTML](http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/2-11022004-AP/EN/2-11022004-AP-EN.HTML)

Apart from those virtues of PPP connected with risk transfer, there are also some shortcomings of PPPs compared with conventional funding via a public procurement system. The financial cost of PPP is higher (as it has to include a higher cost of borrowing and a return to shareholders). The contract period is also quite long (usually 25-30 years, but in certain cases it can reach as much as 90 years), which leads to reduced flexibility both as regards possible response to changing needs<sup>25</sup> and the technological possibilities of delivering services to a requested standard. The latter is especially valid in ICT and healthcare sectors. Moreover, cooperation within PPP is complicated and, as such, difficult to design, implement and manage.

### 2.3.3. PPP models

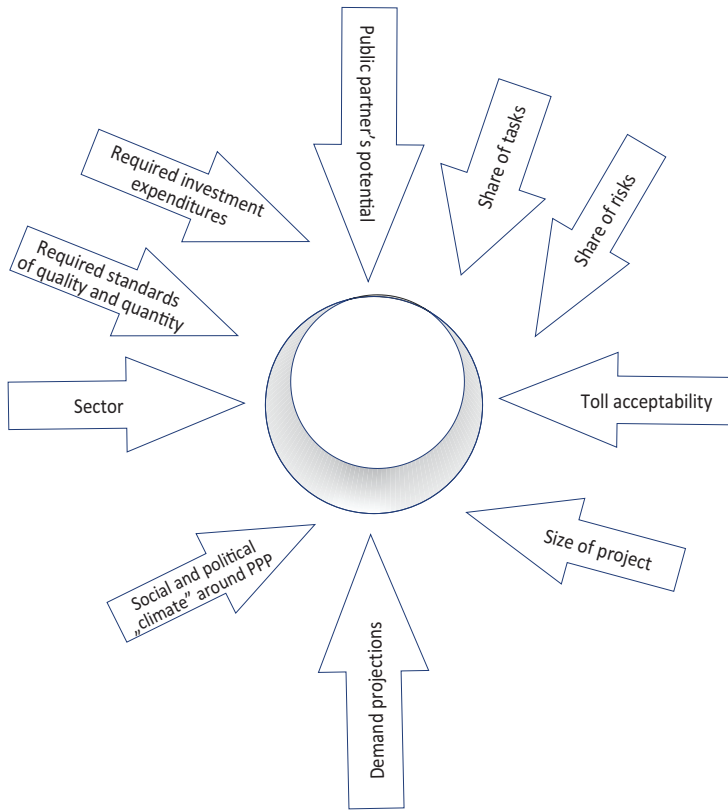
PPPs have a wide range of structural forms (models), from very simple to very complicated. They vary mainly by ownership of capital assets, responsibility for investment, risk allocation and contract duration. The chosen model is partially determined by the type of service to be delivered and the scope of responsibility taken by the private partner. Some important determinants of PPP model choice are presented in Figure 2.3.

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<sup>25</sup> N. Flynn, *Public Sector Management*, SAGE 2012, p. 224-225.



Figure 2.3. Premises of PPP model choice



Source: prepared by author.

The most popular types of PPP contracts are different forms of concessions. In this form of PPP, the public entity (usually a local or central government) defines and grants specific rights to an entity (usually a private company) to build and operate a facility for a fixed period of time.

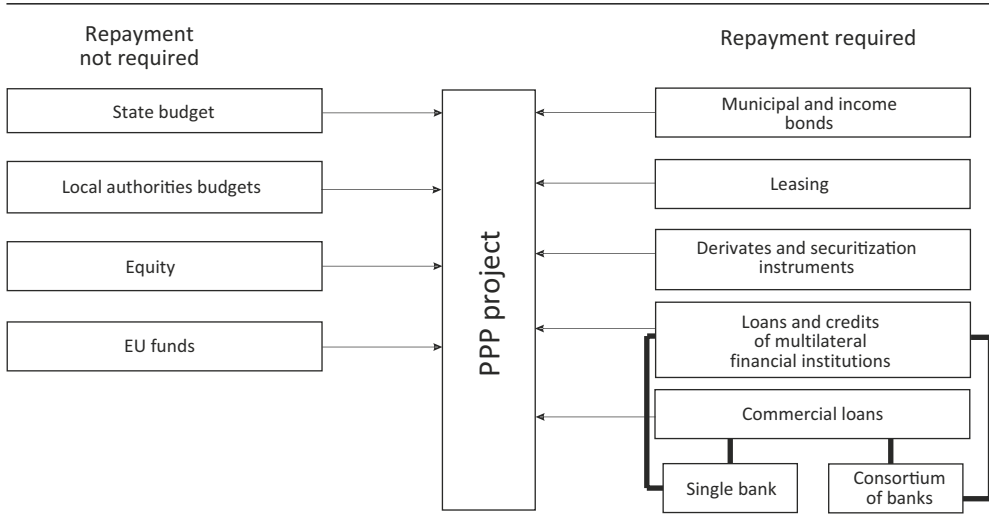
With some minor exceptions (i.e., the outright sale or sale and lease-back of public assets), design-build (DB) contracts are at the core of PPP concessions. Quite often in the literature, certain abbreviations are used to describe different variants of PPP structures, e.g., DB for design-build, DBFO for design-build-finance-operate, and so forth – the verbs describe the scope of tasks taken by private sector within PPP.

### 2.3.4. Funding in PPP

As PPP is a method of financing via private and public participation which may – but does not have to – be leveraged by bank loans in the overall project finance (PF) scheme,<sup>26</sup> we may conclude that PF is a cornerstone for the majority of PPP transactions. Therefore, advantages and disadvantages of PF, presented earlier in this textbook, are applicable for a majority of PPP projects.

PPP projects are typically financed in small part by an equity stake from the contractors, and in large part by debt borrowed from banks and other investors. Possible options for funding are presented in Figure 2.4.

Figure 2.4. Possible forms of funding within PPP schemes



Source: prepared by author, based on: K. Brzozowska, *Partnerstwo publiczno-prywatne. Przesłanki, możliwości, bariery*, CeDeWu 2006, p. 39.

The common forms of debt include:

- Commercial loans
- Bridge finance
- Bonds and other debt instruments (for borrowing from the capital market)
- Subordinate loans.

<sup>26</sup> A. Wojewnik-Filipkowska, *Project finance w inwestycjach infrastrukturalnych*, CeDeWu, Warszawa 2008, p. 189.

Commercial loans are funds secured by commercial banks and other financial institutions. Bridge financing is a short-term financing arrangement which is generally used until a long-term (re)financing arrangement can be implemented.

Bonds are long-term interest bearing debt instruments purchased either through the capital markets or through private placement (which means direct sale to the purchaser, generally an institutional investor).

Subordinate loans are similar to commercial loans, but they are secondary or subordinate to commercial loans in terms of repayment. Governments often provide subordinate loans to reduce default risk and thereby reduce the debt burden and improve the financial viability of the projects<sup>27</sup>. They may also more generally promote PPP in this way, by encouraging specific PPP projects and thereby demonstrating to the (sometimes skeptical) public that PPP projects are both viable and serve the public's interests.

### 2.3.5. Legal regulations of PPP in Poland

The legal framework for PPP in Poland since 1990 is presented in Table 2.4.

**Table 2.4. Legal framework for PPP since 1990**

| Period      | Legally binding bill  | Examples of investments  |
|-------------|---|--|
| 1990-2005   | No law specific to PPP. Contracts with public partners based on civil code, Public finance Bill, Public Procurement Act, etc.               | 1992: Gdańsk, municipal waterworks<br>1994: Kalisz, municipal heating system<br>1994: Kalisz, public transport<br>1998: Municipal light services<br>2001: Tczew, public transport  |
| 2005-2008   | Public-Private Partnership Act of 28 July 2005 (valid since 7.10.2005) and three decrees<br>PPP Act was not consistent with the other bills | No projects; the procedures provided by the law made the choice of private partner impossible. Some rules complicated the decision process, obliging the public entity to conduct detailed financial and risk analyses at the very beginning, before having decided if the investment was to be procured as PPP. That increased the transaction costs of projects and might have prevented the public sector from realising smaller-sized PPP investments. |
| Since 2009: | The New Polish PPP Act came into effect on 27 February 2009   | Projects in preparation or currently under contract, more interest in the method   |

Source: prepared by author.

<sup>27</sup> UN ESCAP, *A Guidebook ...*, *op. cit.*, pp. 41-42.

The PPP Act of 2005 had been heavily criticised for being overly complicated and adding too many layers of “red tape” to the implementation of PPPs. In the past, the market overcame such problems by procuring PPPs through other procurement methods, particularly in the roads sector, where PPPs were structured on a Design Build Finance Operate (DBFO) / Build Operate Transfer (BOT) basis, and were procured under the Act on Toll Motorways and National Road Fund.

The New Polish PPP Act is designed to set a legal framework for PPP projects in Poland, and should improve the opportunities for PPP development. It includes a short list of essential issues that a PPP agreement should cover to ensure that the key risks are properly allocated between the partners. A PPP contract resulting from application of the PPP Act is an umbrella agreement, i.e., the detailed arrangements are subject to negotiations between partners. This ensures the flexibility needed for complex and multidimensional PPP projects.

### 2.3.6. Remuneration of the private partner(s)

The most commonly used ways to compensate a private investor in a PPP project in Poland are:

- direct charging of users (“real” tolls)
- payment by the public partner (typically a periodic fixed amount, an “availability payment,” or according to use of the facility or service (“shadow” tolls))
- a combination of the two previous forms.

There are also other possibilities such as:

- Indirect charging of (third party) beneficiaries
- Cross-subsidization between project components.

Real tolls collected by the private investor are most common for economic infrastructure projects, such as power, telecommunication, water, and transport, particularly for port, airport and railway projects.

In the case of road projects, however, the private partner may be remunerated either through direct charging of users (tolls) or through payment by the government. Direct charging of road users may not always be possible<sup>28</sup> because

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<sup>28</sup> For instance, in Poland, it is not possible to implement real tolls on public roads different from highways because of law restrictions. However, it is still possible to establish sound PPPs for building, rehabilitation and management of secondary roads but only within the “availability payment” scheme.

of social and political reasons, especially in countries without previous experiences with toll roads.

For social infrastructure projects, the government will typically either make periodic payments of fixed amount or payments according to the use of the facility, product or service at a predetermined agreed price.

Systems for collecting payment from the indirect beneficiaries can constitute a major source of compensation. They include a capital gains tax in the form of certain land-related taxes and fees imposed on the property owners and developers. However, in most countries, such payment systems either do not exist or have very limited applications. Some countries have used the land readjustment tool for financing urban infrastructure projects.

Cross-subsidization between project components means that excess revenues generated from one component are used to compensate the shortfall in another component in order to make the whole project commercially self-sustainable<sup>29</sup>.

### 2.3.7. Governmental support and incentives

A feasibility study may reveal that an analysed project is not commercially sound or attractive to private investors but it is still important for a governmental authority as regards its social or economic aspects in long-term. Further, sometimes projects can generate additional external benefits that cannot be captured or priced by a private project operator.

In such cases, a government may consider some forms of support for a project in order to improve its commercial viability and attractiveness (see Box 3 for an Indian example).

#### **Box 3. Incentives for private sector participation in the road sector in India**

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- The government bears the expenses for land acquisition and pre-construction activities;
  - A capital subsidy up to 40 per cent can be provided to meet the viability of a project (“viability gap funding”);
  - Government equity can be up to 30 per cent;
  - There is a 100 per cent tax exemption in any consecutive 10 years;
  - Road construction equipment can be imported duty-free;
  - Bonds are exempted from capital gains tax;
  - Tax benefits are provided for property development activities;
  - There is a transparent and well defined procurement procedure;
  - There is an equitable dispute resolution mechanism.
- 

Source: [http://www.unescap.org/ttdw/ppp/ppp\\_primer/351\\_types\\_of\\_government\\_support\\_and\\_incentives.html](http://www.unescap.org/ttdw/ppp/ppp_primer/351_types_of_government_support_and_incentives.html) (accessed 18.07.2014).

<sup>29</sup> UN ESCAP, *A Guidebook ...*, *op. cit.*, pp. 41-42.

They include:

- Land acquisition: a public body may consider the use of public lands for infrastructure projects, or may acquire private land for a project on behalf of a private investor
- Capital grants and other forms of financial support: these may include interest-free or low interest loans, subordinated loans, operation and maintenance support grants, and interest subsidies.
- Revenue guarantee: the public partner can guarantee up to a certain specified percentage of the projected revenues. Where these guarantees are provided, governments normally also limit the maximum amount of revenues that the project developer can retain. Any amount in excess of this defined maximum limit is taken by the government. On the other hand, if there is a revenue shortfall, the public partner assumes the whole commercial risk, and to public partner the project will have a negative impact on government deficit (according to the Eurostat decision). Moreover, revenue guarantees may disincentivise the private partner regarding the project's efficiency, quality, or marketing efforts
- Foreign exchange risk: in order to protect a private partner from the negative impact of foreign exchange fluctuations, partners may agree that where foreign exchange fluctuations exceed a certain defined limit, a part of the losses due to such fluctuations may be offset through modifications of tariff rates, government subsidies, adjustment of the concession period, or other provisions.
- Tax incentives, e.g., exemption from registration tax on the acquisition of real estate; exemption from, or application of a lower rate of value added tax for infrastructure facilities or construction of those facilities; etc.
- Protection against reduction of tariffs or shortening of concession period (if the project developer is able to reduce construction costs below those estimated in the agreement)
- Loan guarantees: these provide assurance that, if a borrower defaults, the government will repay the amount guaranteed, subject to the terms and conditions of the agreement.
- Relief in certain *Force Majeure* events: the public partner may consider buyout of a project in cases of prolonged *force majeure*.
- Equity participation: direct or indirect equity participation in a project to assure government support.
- Performance guarantees: these are used to attract private investment and enhance investors' confidence. The idea is that the commitments of the contracting authority are supported by the government<sup>30</sup>.

<sup>30</sup> Ibidem, pp. 48-50.

## Concluding remarks

Project finance may be a significant source of funds for eco-innovative investments, but mainly during later stages of their development. The technological uncertainty at the start-up or seed phase makes a project less attractive, particularly for traditional creditors. Moreover, owing to higher cost of capital and additional transaction<sup>31</sup> costs, PF is more appropriate for large-scale projects.

Since PPP is, by definition, used with reference to a public need, its application to eco-innovative projects is limited. The tool may be used mainly at later stages of eco-innovation development, more often as a financial and organizational instrument that helps to “buy” a proven technology by a public sector that wants to become more sustainable or environmentally responsible than as a substantial supportive measure for innovators willing to secure their start-up projects.

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<sup>31</sup> As B. Esty states, in the case of smaller and unique or first-of-kind projects, total transaction costs can reach up to 10% of the amount invested. Cf. B.C. Esty, *The Economic ...*, op. cit., p. 9.

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## Chapter 3

# Institutional and regulatory stimulates and incentives for eco-innovations

*Paweł Nowakowski*

### Introduction

Widely understood eco-innovations are perceived by a growing part of the international community as one of the solutions to counteract the rising pressure of human activity on the environment, but also as an opportunity to gain political and economic independence in terms of natural resources thanks to production of energy from renewable sources.

In order to achieve these objectives the international community and policymakers created **multiple policies, institutions, and regulations**, at the international as well as at the national level. The main aim is to support the dissemination of eco-innovations and green projects by motivating companies, governmental institutions and individuals to focus on development and implementation of eco-innovative solutions.

If you are an inquisitive economist, the natural question is why the support is necessary, and why companies do not want to invest on their own. The main answer is the **double externality problem**<sup>32</sup>. In eco-innovations, externalities occur twice: first in pollution, when the polluters generate externalities in the form of environmental degradation experienced by the entire society, but do not have to pay for this environmental damage. The second place where externalities occur is the R&D phase, as the newly-invented eco-innovative products bring benefits not only to the producers who spent time and money to

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<sup>32</sup> A.L. Amin, T. Dimsdale, M Jaramillo, *Designing smart green finance incentive schemes*, 2014, p. 8.

develop them but also to the society by improving or preserving the environment. These externalities are not included in financial calculations, and bring no financial gain for the eco-innovators. Due to the above, one of the main rationales for supporting regulations is compensation for both externalities, positive for eco-innovators, and negative for polluters.

The aim of this chapter is to familiarize the reader with the regulatory and institutional support provided for the development of eco-innovations and all types of green projects.

For the purpose of this analysis, institutional incentives are understood in a broad sense, i.e. they comprise not only institutions in the form of organizations or legal entities but also legal constructions defining new incentive mechanisms for development and popularization of eco-innovations. The chapter puts special focus on regulatory incentives and mechanisms which influence the financing side of green projects.

### 3.1. Regulations as the main factor influencing eco-innovations

The search for the most effective stimulants of eco-innovations is on agenda of many governments, institutions, research institutes and individual researchers since many years already. The conducted so far researches identify four main sources of drivers stimulating the development of eco-innovations, and these are:

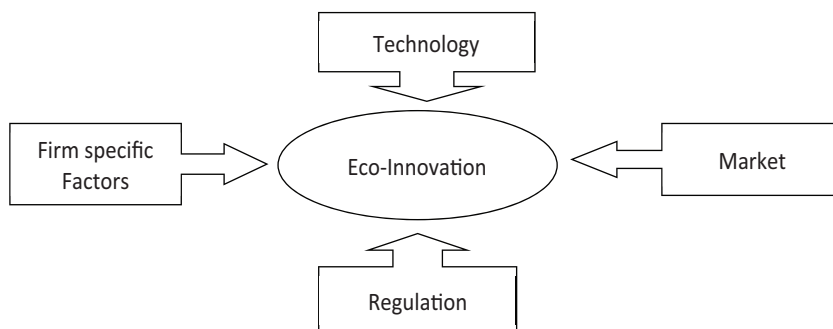
- regulations, which may have push or pull character,
- technology push,
- market pull – creating “customer benefits”<sup>33</sup>
- company specific characteristics, (company organizational capabilities).<sup>34</sup>

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<sup>33</sup> E. Kesidou, P. Demirel, *On the drivers of eco-innovations: Empirical evidence from the UK*, “Research Policy” 2012, vol. 41, no. 5.

<sup>34</sup> J. Horbach, C. Rammer, K. Rennings, *Determinants of eco-innovations by type of environmental impact – The role of regulatory push/pull, technology push and market pull*, *op. cit.*

Figure 3.1. Determinants of eco-innovation



Source: J. Horbach, C. Rammer, K. Rennings, *Determinants of eco-innovations by type of environmental impact – The role of regulatory push/pull, technology push and market pull*, "Ecological Economics," 06/2012, vol. 78.

According to multiple research projects conducted so far, there is a clear conclusion that regulations are the most effective and efficient tool in stimulating eco-innovations<sup>35</sup>. They may be also used in multiple combinations, and therefore, *supporting green investment can be achieved in also in multiple ways: by modifying the rules of the energy markets, by promoting equity or debt investment, by means of tax rules or by creating carbon markets. The choice of mechanism must depend on local political and economic conditions*<sup>36</sup>. Therefore, governments have a wide range of regulations which they can impose in order to support the development of eco-innovations, however due to differences in the natural conditions and geopolitical situation among the counties, there is no regulatory silver bullet solving all problems. The objective set for the governments and international organizations is therefore to identify the best solutions for each single case.

Michael Porter and Claas van der Linde<sup>37</sup>, claimed, that well-designed regulations do not have to result in additional costs for companies, but that they can enhance competitiveness. In so called "porter hypothesis", they state, that firms not always make optimal choices, and properly designed regulations can show them right way of actions, and partially or sometimes more than fully, offset the additional cost of implemented regulations. To create such "win-win" environmental regulations, governments have to follow several basic rules.

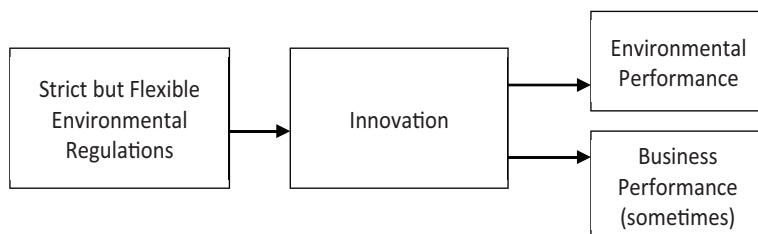
<sup>35</sup> M. Frondel, N. Ritter, C.M. Schmidt, C. Vance, *Economic impacts from the promotion of renewable energy technologies: The German experience*, "Energy Policy" 2010, vol. 38, no. 8.

<sup>36</sup> World economic Forum, *Green Investing 2010: Policy Mechanisms to Bridge the Financing Gap*, 2010.

<sup>37</sup> M.E. Porter, C. Van Der Linde, *Toward a New Conception of the Environment-Competitiveness Relationship*, "Journal of Economic Perspectives" 1995, vol. 9, no. 4.

They should be strict to a point, where they truly discourage from polluting and truly encourage to search for green substitute solutions. They should also be characterized by longevity, and stability. It is assumed, that the support mechanism of any instrument should be guaranteed for and restricted to a certain time frame, e.g. 10 years, in order to be a guarantee of provided incentive and in order to allow for planning and more precise forecasting of potential investment returns.<sup>38</sup>

**Figure 3.2. Schematic presentation of the Porter Hypothesis**



Source: J. Horbach, C. Rammer, K. Rennings, *Determinants of eco-innovations by type of environmental impact – The role of regulatory push/pull, technology push and market pull*, “Ecological Economics,” 06/2012, vol. 78.

Environmental regulations may also shape other, previously mentioned determinants of eco-innovations. Eco-labels for example, by providing proper information on products efficiency may determine a purchaser choice and this way influence market pull factor. On the other hand, regulations which require certain level of product or process efficiency (such as limits on car engine emissions – Euro 5 emission standard), contribute to the development of technical potential within the companies, which have to meet the environmental standards, and in order to do so, have to invest in eco-R&D.

Governmental regulations may also contribute to the construction of modern technical infrastructure which is made available for small and medium companies in order to conduct R&D using modern equipment. This way, indirectly, regulations influence also firm specific characteristic by increasing their the eco-innovative potential.

<sup>38</sup> Haas R., Eichhammer W., Huber C., Langniss O., Lorenzoni A., Madlener R., ... Verbruggen A. (2004). How to promote renewable energy systems successfully and effectively, *Energy Policy*, 32(6).

## 3.2. International policies supporting eco-innovations

International policies give governments the necessary background for implementation of new regulations and establishing new institutions. Due to lack of legislative enforcement of international regulations in independent countries, they remain the main available instrument of support for eco-innovations at the international level.

The first international initiative which among others defined the term of environmental protection policy was the United Nations Conference on the Human Environment, held in Stockholm in 1972. The UN agreed then to create a specialized agency to deal with environmental protection – the United Nations Environment Programme (UNEP).

The environmental policy at the level of the United Nations is shaped mainly by the provisions of the United Nations Framework Convention on Climate Change (UNFCCC), signed in 1992 during the Earth Summit in Rio. One of the main results of UNFCCC was signing the Kyoto Protocol in 1994. So far, it is the most significant expression of the fact that the environmental problems are not only noticed but also managed at the international level.

### 3.2.1. Kyoto Protocol and emission trading systems

The Kyoto Protocol entered into force in 2005, however, like other international agreements under the United Nations, the Kyoto Protocol also does not have enforcement mechanisms, as it is rather a declaration of good will of the signatory countries. In spite of that, it assigns to its signatories legally binding, quantitative targets of GHG emissions reduction in relation to the base year, which for majority of countries is set in 1990<sup>39</sup>.

The most tangible effect of the implementation of the Kyoto Protocol provisions is the fact of launching the GHG emissions trading systems (ETS) in some areas of the world. Currently there is a growing number of national or sub-national ETS schemes operating in such countries as Australia, Japan, New Zealand, Switzerland and the United States, and following systems are planned in Canada, China and South Korea<sup>40</sup>. The spread of the systems in the new parts of the world is progressing, and in 2017 it is expected to cover almost 25% of global energy and industry CO<sub>2</sub> emissions<sup>41</sup>. However, the biggest in transaction

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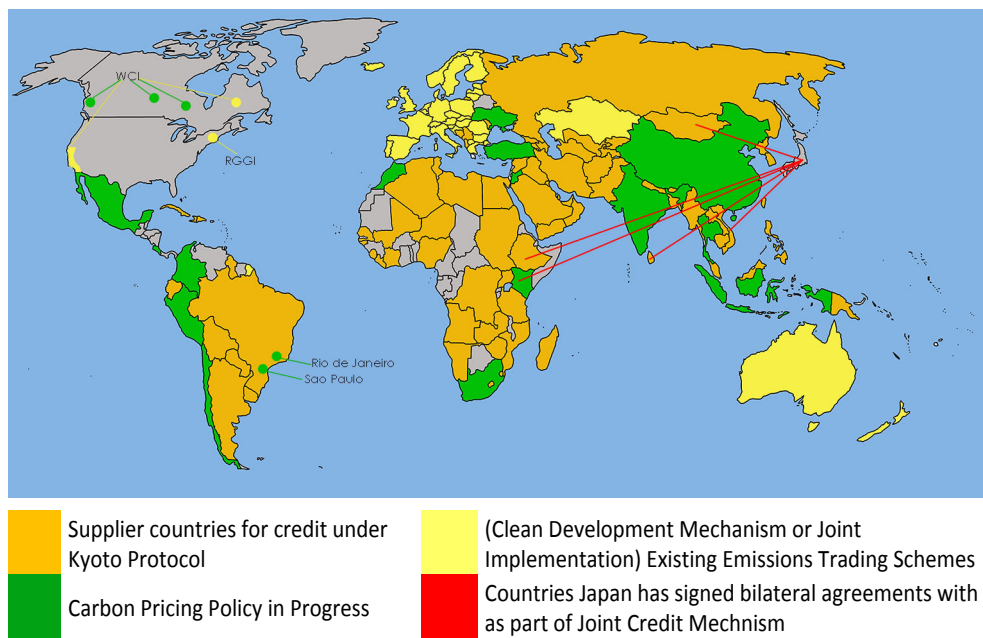
<sup>39</sup> 1988 for Poland and other post communist countries.

<sup>40</sup> European Commission, *The EU Emissions Trading System (EU ETS)*, 2014, p. 2.

<sup>41</sup> Ibidem.

numbers, volumes and the best performing is European Union Emissions Trading System (EU ETS)<sup>42</sup>.

Figure 3.3. Emission Trading Systems around the world



Source: Greenhouse Gas Market 2013, International Emissions Trading Association.

The impact of ETSs is assessed mainly in terms of two major objectives, having in mind the double externality problem:

- reducing GHG emissions efficiently, balancing economic cost and environmental gain at the level set by the participating countries;
- promoting corporate investments in low carbon technologies, including energy efficiency as well as low carbon energy sources.

Around the world there are varied approaches to emissions trading. Many ETS schemes operate on the 'cap and trade' basis, although there are single different solutions. In the case of 'cap and trade' systems, the total volume of GHG which can be emitted annually by the facilities or companies which are covered by the systems is limited by the cap set at the local, national or regional

<sup>42</sup> International Carbon Action Partnership (ICAP), *Emissions Trading Worldwide, Status Report 2014* p. 2.

level. Within the frames of this cap, companies acquire their own permits either by purchasing them all or receiving specific amounts for free. If they are about to emit more than they are entitled to, they may choose two ways of action: purchase additional permits on the market or pay the fine, which is higher than the market price of GHG emissions allowance.

Within the ETS, each purchased Emission Allowance Unit (EAU) gives its holder the right to emit one tone of CO<sub>2</sub>, or the equivalent amount of other greenhouse gases depending on the local market characteristics.

The trade in EAUs is possible thanks to differences in the final costs of GHG reduction among the ETS participants<sup>43</sup>. Companies which have low costs of GHG emissions reduction have the opportunity to gain additional profits from investments in new technologies by selling the saved EAUs, or by saving money on purchasing additional ones. This mechanism was set up in order to guarantee that GHG reductions will be made at the lowest possible cost, and can create win-win situations. So far, the majority of EAUs or Tradable Carbon Units (names vary depending on the system) are being traded in the OTC market, only a small part of them are auctioned. The ETS market is fluctuating as presented in the table below:

**Table 3.1. Global carbon market volumes and prices**

| Year | Volume (million tones CO <sub>2</sub> ) | Value (billion Euros) |
|------|---|-----------------------|
| 2005 | 94                                      | 2                     |
| 2006 | 485                                     | 9                     |
| 2007 | 1,076                                   | 19                    |
| 2008 | 3,006                                   | 63                    |
| 2009 | 7,107                                   | 81                    |
| 2010 | 6,865                                   | 86                    |
| 2011 | 8,721                                   | 98                    |
| 2012 | 10,711                                  | 62                    |
| 2013 | 10,088                                  | 40                    |
| 2014 | 8,311                                   | 46                    |

Source: A. McCrone, *Phoenix from the ashes – value of the world's carbon markets to rise again in 2014*, Bloomberg New Energy Finance.

<sup>43</sup> International Carbon Action Partnership (ICAP), *Emissions Trading Worldwide*, Status Report 2014, p. 14.

### 3.2.2. EU Emissions Trading Systems

The EU ETS was introduced in 2005 and currently covers more than 11,000 power stations and industrial plants in 31 countries, as well as airlines. The entities included into program are responsible for approximately 45% of total EU emissions<sup>44</sup>

It operates on the ‘cap and trade’ basis, with the cap set at the EU level, and spread between Member States and further between the companies. The EU ETS was developing in pre assumed phases, with currently active third phase for the period of 2013 to 2020. Starting from 2013 an annual reduction of the cap on emissions by 1.74% was introduced, which main aim is to reach the target of reducing emissions level by at least 20% in 2020 in comparison to 2005.

Figure 3.4. Greenhouse gasses and sectors covered

| EU ETS: Development in phases  | Preventing ‘carbon leakage’   |
|--|---|
| <p><b>2005-2007: 1<sup>st</sup> trading period</b> used for ‘learning by doing” EU ETS successfully established as the world’s biggest carbon market. However, the number of allowances, based on estimated needs, turns out to be excessive; consequently the price of first-period allowances falls to zero in 2007.</p> <p><b>2008-2012: 2<sup>nd</sup> trading period.</b> Iceland, Norway and Lichtenstein join(1.1.2008). The number of allowances is reduced by 6,5% for the period, but the economic downturn cuts emissions, and thus demand, by even more. This leads to a surplus of unused allowances and credits which weighs on carbon price. Aviation brought into the system (1.1.2012).</p> <p><b>2013-2020: 3<sup>rd</sup> trading period.</b> Major reform takes effect (1.1.2013). Biggest changes are the introduction of an EU-wide cap on emissions(reduced by 1,74% each year and a progressive shift towards auctioning of allowances in place of cost free allocation. Croatia joins the ETS (1.1.2013).</p> <p><b>2021-2028: 4<sup>th</sup> trading period.</b></p> | <p>‘Carbon leakage’ is the term used to describe the situation that may occur if for reasons of costs related to climate policies, businesses transferred production to other countries, which have laxer constraints on greenhouse gas emissions. This could lead to increase in their total emissions. This risk of carbon leakage may be higher in certain energy-intensive industries.</p> <p>The sectors and sub-sectors which are deemed to be exposed to significant risk of carbon leakage are those that figure in an official list. This is established for five years, on the basis of clearly defined criteria and after extensive consultation with stakeholders. The first carbon leakage list applies to the free allocation of allowances in 2013 and 2014. The list is based on agreed criteria and constrains 170 sectors and subsectors, covering a very high share of industrial emissions.</p> |

Source: EU ETS Factsheet pp.3-4

<sup>44</sup> [http://ec.europa.eu/clima/policies/ets/index\\_en.htm](http://ec.europa.eu/clima/policies/ets/index_en.htm) (accessed 2014.07.01).



In spite of several research studies showing that the EU ETS contributes to annual average emissions saving at the level of 40-80 millions tones<sup>45</sup>. (2-4% of the total capped emissions), in general the EU ETS is widely criticized. The major criticism concerns its insufficient size in the worldwide perspective, as only about 10%<sup>46</sup> of the worldwide GHG emission comes from European Union countries. Therefore, even limitation of these emissions by 20% will result in 2-4% drop in the global emissions.

### 3.2.3. Using EU ETS for green projects funding – NER 300

Program NER 300 is an example how the EU ETS can be used to finance green projects. It is designed to support innovative low-carbon energy demonstration projects, especially in the field of environmentally safe carbon capture and storage (CCS) and innovative renewable energy (RES) technologies implemented on a commercial scale within the European Union. The programme was financed through a sale of the 300 million allowances from the new entrants reserve of the EU Emissions Trading System. The estimated worth of the EAU was €4-5 billion. The second call for proposals deadline was in July 2013 and 33 projects from Member States were financed this way<sup>47</sup>.

## 3.3. Policies and regulations within the EU in support for green projects

Support for eco-innovations and green projects has been among the major objectives of the European Union policy for many years and holds this status in the current mid-term (until 2020), as well as in the long-term (until 2050) perspective.

The focus on green projects is stressed at all levels of the EU policies, starting from the EU strategy, Europe 2020, through the European Framework Programmes finishing with the objectives set for National Operational Programmes. The EU not only provides financial support but also defines recommended or required regulations for its Member States.

According to requirements set by the European Commission, the Multiannual Financial Framework 2014-2020 will ensure that at least 20% of the European budget is climate-related expenditure. In addition to this, there are multiple

<sup>45</sup> T. Laing, M. Sato, M. Grubb C. Combetti, *Assessing the effectiveness of the EU Emissions Trading Scheme*, January 2013, p. 8.

<sup>46</sup> [http://ec.europa.eu/clima/policies/g-gas/index\\_en.htm](http://ec.europa.eu/clima/policies/g-gas/index_en.htm), (accessed on 2014.07.01).

<sup>47</sup> <http://www.eib.org/products/ner-300/index.htm> (accessed at 2014.07.01).

initiatives and programs designed in order to contribute to environmental protection not related to climate change, but providing opportunities of support for eco-innovations.

Under all of the major five European Structural and Investment Funds (ESI Funds): the European Regional Development Fund (ERDF), European Social Fund (ESF), Cohesion Fund (CF), European Agricultural Fund for Rural Development (EAFRD), and European Maritime and Fisheries Fund (EMFF), it is possible to identify priorities, which are related to environmental protection, climate change mitigation, support of innovation and eco-innovation and general development of the green economy.

These priorities are present also in Framework Programs and in smaller initiatives managed directly by the European Commission and funded from central budget.

The case of the European Union exemplifies how international regulations can be implemented in order to support green projects. The European Council and European Parliament are the bodies entitled to create and impose on the Member States the obligations to implement some rules by means of directives. A directive is a legal act which requires member states to achieve a particular result, without determining the means of achieving that result. Moreover, it usually leaves a certain amount of leeway as to the exact rules to be adopted. The EU also implements some central solutions in the field of environmental schemes in which all member states participate – such as the EU ETS.

### 3.3.1. EUROPE 2020 strategy

The Europe 2020 strategy is the main EU strategic document. Of its 5 main objectives, two confirm general engagement of the EU in support for all types of green projects including:

**“Climate change and energy sustainability”**, focusing on energy production and efficiency with its “triple 20” aims:

- 20% drop in greenhouse gas emissions in comparison to year 1990 (or even 30%, if the conditions are right),
- 20% of energy produced from renewable sources,
- 20% increase in energy efficiency,

and **“Research and Development”**, which is directed at promoting innovations in general, but eco-innovations can widely benefit from it. This objective is that by 2020 at least 3% of the EU GDP will be allocated for investments in R&D.

In order to meet these strategic objectives, the EU also launched smaller but more precisely focused initiatives in order to support green projects, such as the Eco-innovations Action Plan (EcoAP), and Environmental Action Program to 2020 (EAP) and the EU ETS.

### 3.3.2. Eco-innovation Action Plan

Eco-innovations Action Plan (EcoAP) is the flagship initiative of the EU in promoting eco-innovations. It is a broad policy framework financed in the 2014-2020 budget perspective through the Horizon 2020 Framework Programme funding mechanisms. The support is planned to be provided through newly developed financial instruments, which will offer targeted debt and equity facilities to private and public sector.

### 3.3.3. Environmental Action Program to 2020 (EAP)

The EAP become operational in January 2014, it is coordinated by the Environment Directorate General. The programme identifies three priority areas where more action is needed to protect nature and strengthen ecological resilience, boost resource-efficient, low-carbon growth, and reduce threats to human health and wellbeing linked to pollution, chemical substances, and the impacts of climate change<sup>48</sup>. There are also two additional horizontal priority objectives within the EAP:

- to make the Union's cities more sustainable,
- to help the Union address international environmental and climate challenges more effectively.

The funding for the purpose of the EAP realization, similarly as in the case of EcoAP is provided through two EU Framework Programmes: Horizon 2020 and LIFE+.

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<sup>48</sup> European Commission, Living well, within the limits of our planet, 7th EAP — The new general Union Environment Action Programme to 2020, 2014, p. 2.

### 3.4. International institutions supporting green projects funding

In general, each global or major regional organization has some department, office, or other organizational institution responsible for supporting initiatives in the field of environmental protection (usually with an emphasis on tackling climate change).

The support for the development of green projects from the international organizations is provided mainly in three forms. The first concerns **promotional and informational actions** undertaken by a majority of international institutions and aimed at raising the general awareness of the need for green solutions in the international community<sup>49</sup>.

The second concerns **data gathering, analysis and reporting**, providing recommendations on environmental policy measures. Support of this type is provided mainly by such institutions as the OECD or the EEA.

The third concerns **providing the financial support**. In the case of the UN such role is played by United Nations Environmental Program (UNEP)<sup>50</sup> which is responsible for implementation of projects financed by another international initiative – Global Environment Facility (GEF). It is a financial mechanism available within four major multilateral environmental conventions, including UNFCCC which was the basis for the Kyoto Protocol.

International banks are also involved in providing financial support for eco-innovative projects. This concerns among others the World Bank, the regional development banks and the European Investment Bank.

#### 3.4.1. The World Bank and regional development banks

The financing from the UN funds is directed mainly to the developing countries and is distributed by the World Bank or one of the regional development banks mainly for pilot programmes testing new technologies and ideas in the field of green projects.

The World Bank, in cooperation with regional development banks, and thanks to the financial support from 14 developed countries<sup>51</sup>, which pledged \$8 billion for this purpose, developed several investment funds and programs. All of them have been created in order to provide financing for initiatives

<sup>49</sup> [www.unep.org/about](http://www.unep.org/about) (accessed 2014.06.23).

<sup>50</sup> <http://www.thegef.org/gef/whatisgef> (accessed 2014.07.01).

<sup>51</sup> <https://www.climateinvestmentfunds.org/cif/node/39> (accessed 2014.07.01).

contributing to climate change counteraction in 48 developing and middle income beneficiary countries.

The bank is also engaged in providing financing for green projects within the Climate Investment Funds initiative. The funding support is designed to attract investment in the selected countries and stimulate their transformation by providing financial support for the private sector as well.

### 3.4.2. The European Investment Bank

The European Investment Bank (EIB) is one of the main European institutions active in green project funding. The bank is engaged as the financing or co-financing partner in a wide range of environmental initiatives of the EU, contributing to achieving its goals regarding the low-carbon and climate-resilient growth.

The main financing instruments offered by the EIB are medium- and long-term loans with either fixed or variable interest rates, which are offered in Euro as well as in other currencies. Additionally, the EIB offers access to equity funds. Through these capital sources, the EIB indirectly participates in companies and projects promoting low-carbon investment, especially in renewable energy and energy efficiency projects. The financing provided by the EIB as one of the EU executive institutions, is often accompanied by EU grants. The bank also provides technical assistance.<sup>52</sup>

One of the most important EIB initiatives designed for obtaining funds for green investment purposes is issuing Climate Awareness Bonds (CAB), which started in 2007. Since then, to February 2014, Climate Awareness Bonds raised EUR 4.3bn equivalent. 2013 was the best year for CAB issue with over EUR 1.4bn raised.<sup>53</sup> The funds raised thanks to the Bonds are used for financing EIB projects in the field of renewable energy and energy efficiency. So far over 55 projects received funding thanks to this scheme, not only in the EU but also outside EU<sup>54</sup>.

Among financed projects the majority accounts for wind farm constructions (in UK, Austria, Spain, Belgium and other), modernization of electricity transmission systems or construction of waste-to-energy combined heat and power plants. Among the projects there is also one located in Poland, concerning

<sup>52</sup> D. Croce, R.C. Kaminker, F. Stewart, *The Role of Pension Funds in Financing Green Growth Initiatives*, OECD Publishing, Paris, 2011 p. 44.

<sup>53</sup> [http://www.eib.org/investor\\_relations/sri/index.htm?lang=en](http://www.eib.org/investor_relations/sri/index.htm?lang=en) (accessed 2014.07.01).

<sup>54</sup> EIB 2013 Activity report, p. 4.

Połaniec power plant, where the EIB financed the replacement of a coal-fired boiler with a new biomass-fired boiler.

The EIB has launched several funds jointly with other institutions including the private sector providing equity mainly for investment in the field of renewable energy and energy efficiency.

One of such funds is the European Energy Efficiency Fund (EEEF) which aims at supporting small scale renewable energy investments and energy efficiency and so far has invested over EUR 100 million in projects within the EU.

Among the funds created by the EIB, the most important is the European Investment Fund, which is used to provide risk finance to SMEs across Europe in accordance to the EU policies and programmes.

### 3.5. National institutions supporting eco-innovations by financing green projects

At the national level, there are usually several types of institutions active in financing green projects. Their structure and objectives differ among countries, even within the EU. There are, however, a few types of institutions which are common for many countries, and these include: **environmental banks**, **R&D agencies** and **environmental funds**.

In Poland, the provider of financial support for green projects is the Bank for Environmental Protection (Bank Ochrony Środowiska – BOŚ) and Bank Gospodarstwa Krajowego (BGK), similar banks function in other European countries e.g. KfW in Germany, Green Investment Bank in the UK. The ‘green’ banks provide banking products for financing green projects, often equipped with additional governmental support such as preferential interest rates, more relaxed granting procedure or repayment scheme.

The role to promote R&D in the field of eco-innovations as well as implementation of new ideas is among the duties set for R&D agencies. They are usually focused on innovations in general, with eco-innovations constituting a part of their scope. In Poland, this function is performed by the National Centre for Research and Development (NCBR) and Polish Agency for Entrepreneurship (PARP). Similar agencies, such as Technology Strategy Board in the UK operate in other EU and non-EU countries.

National Fund of Environmental Protection and Water Management (NFOŚiGW) in Poland is another example of an institution focused on promoting and financing eco-innovative technologies and green projects, especially among

the end users. The fund is in general responsible for implementation of the governmental financing policy and governmental funding for eco-innovations and green projects. In the UK, it is the Technology Strategy Board which deals with these issues and manages some governmental funds. In Germany, Federal Agency for Nature Conservation (BfN) runs and technically and scientifically supervises several governmental funds for nature conservation projects including promotion of eco-innovations.

### 3.6. Types of environmental regulations supporting eco-innovations

Regulations, in general, are a responsibility of national authorities. Governments through regulations create the legal order to achieve priorities set within their strategies and policies and perform the main functions of the State. Regulations are also created in order to meet the international obligations, e.g. to comply with the Kyoto Protocol obligations or to adjust the national legal system to the European Union directives.

#### 3.6.1. “Carrot” and “stick” regulations

The regulations designed to contribute to the environmental protection and development of green projects can be divided basically into two groups: “**carrots**” and “**sticks**”.

“**Carrot**”-type regulations offer a kind of prize for those who follow their guidance, usually in the form of financial gain like tax incentives, partial subsidies and grants, preferential loans or guarantees etc. but also in the form of other privileges. Their general assumption is that companies aiming at profit maximization will adopt the promoted operating method in order to maximize to profits.

The “**stick**”-type regulations impose various types of penalties for undesired or forbidden actions and in this way they aim at discouraging from environmentally harmful actions using such tools as additional taxes, emissions limits, fees for pollution and waste production. Stick and carrot regulations enable compensating for both types of externalities.

The other main classification of environmental regulations divides them into two different groups: **command & control (CAC)** and **incentive-based (IB)** regulations (sometimes named market-based regulations)<sup>55</sup>.

<sup>55</sup> W. Harrington, R.D. Morgenstern, *Economic Incentives versus Command and Control*, Resources For The Future, 2004.

The **command & control** regulations typically involve three elements: identification of an environmentally harmful activity; setting required standards or conditions on that activity; prohibition and penalty for the forms of the activity that fail to comply with the imposed conditions or standards. This is, in general, a form of “sticks” regulations.

On the other hand, the **incentive-based** regulations are designed to promote desired actions with a form of financial gain but also penalize the undesired actions by increasing their costs. The IB regulations were created on the assumption that the level of financial gain or loss is directly correlated with the scope/amount/importance of the environmental profit or loss caused by these actions. Therefore, companies are able to achieve a higher financial gain if they perform more in line with the regulations. A majority of IB regulations are of the “carrot” type, but e.g. pollution taxes are also among incentive-based regulations, although they are “stick” type.

IB regulations, as the name suggests, are focused on providing **direct support** for environment-friendly solutions. They are designed precisely to stimulate particular actions such as feed-in-tariffs, tax incentives, subsidies for purchase and installation of devices generating renewable energy.

However, the “stick” and command & control regulations may have a stimulating effect by exerting **indirect influence** – by imposing limits, standards, norms or high pollution taxes governments force polluters to look for solutions which will tailor their businesses to the new regulatory order. In search of such solutions, they tend to invest in research and implementation of eco-innovations. Additionally, new standards create demand for better and greener products.

The ‘carrots’ – incentive-based regulations – can be divided into two main groups: **reducing expenses** related to green projects or **increasing revenues** resulting from implementation of green projects.

**Table 3.2. Classification of incentive-based regulations.**

| Expense reducing regulations   | Revenue boosting regulations  |
|--|---|
| <ul style="list-style-type: none"> <li>• fiscal incentives – reducing tax burden,</li> <li>• preferential loan programmes – reducing interest rate costs,</li> <li>• equipment or infrastructure subsidies and grants which lower their purchase costs,</li> <li>• bank guarantees programmes – reducing the costs of collateral,</li> </ul> | <ul style="list-style-type: none"> <li>• Feed-in-Tariffs,</li> <li>• subsidies for renewable energy production,</li> <li>• tradable certificate systems,</li> </ul> |

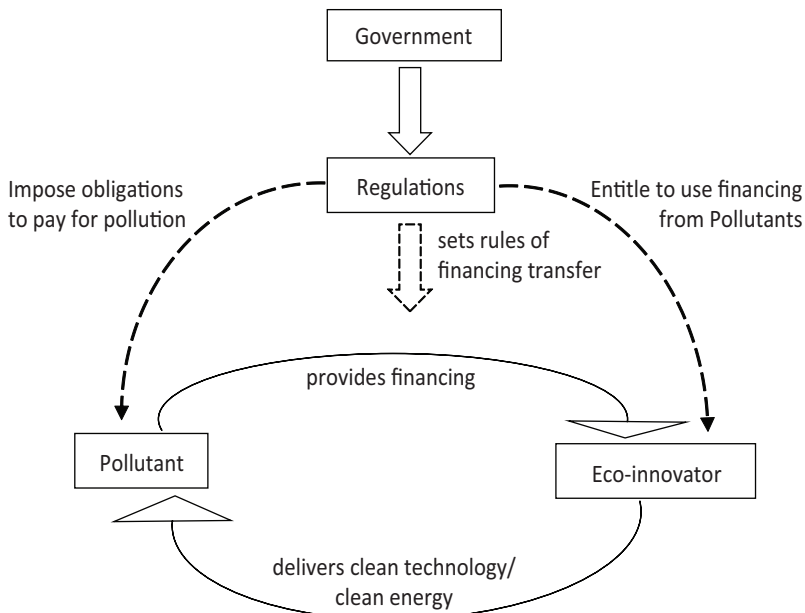
Source: prepared by author.



### 3.6.2. The “carrot-stick” regulations

Among incentive-based regulations providing incentives for green projects, public grants, subsidies or tax incentives are the easiest to implement. They are examples of direct support, usually in a way adjusted to the market conditions, e.g. constituting a percentage of purchase or construction costs. However, this kind of support is limited, mainly due to limitations in the particular country’s budget spending and incomes. The main disadvantage of grant and subsidy funding is the low ability to generate co-investment from the private sector. They are also used to target the end user, e.g. public entities or private consumers, therefore their innovation inventiveness is limited.

Figure 3.5. “Carrot-stick” mechanism



Source: prepared by author.

Due to the above, the challenge was to introduce regulations which would provide noticeable financial help to the widest possible range of eco-innovators (companies of all sizes, local authorities and consumers) and green projects, and at the same time not to impact the national budget expenditures significantly. Several solutions of this type are already being implemented, e.g. Certificate Systems, Emissions Trading Systems or, in some countries, the Feed-in-Tariffs.

They are widespread in Europe and other countries and provide financial incentives for co-innovative solutions using the ‘polluter pays principle’<sup>56</sup>. The general idea is to transfer money from pollutants to eco-innovative entities without significant financial and organizational engagement by the government. Regulations of this type may be called as “**carrot-stick**” regulations, as they impose an additional financial burden – a “stick” – on the ‘polluters’, and spend the funds raised this way in order to support the eco-innovative entities – ‘carrots’. The scheme of functioning of such regulations is presented below, examples are provided further in this module.

Unfortunately, apart from the abovementioned good practices (Certificate Systems, European Emission Trading System or Feed-in-Tariffs), there are also some legislative mistakes, which were copied from one country to another. For example, within the EU, wood is treated as a source of renewable energy. Due to the broad definition of Renewable Energy Sources (RES) in the EU directive, wood is used as one of the cheapest ways to meet the renewable energy limits set by the governments and the European Commission. This leads to absurd situations where coal boilers are replaced with financial help from the government in order to install wood-fuelled boilers. Moreover, e.g. in the UK, power plants import wood from Canada to meet the requirements regarding energy produced from renewable sources. These solutions are neither more efficient nor environmentally friendly, nor applying any innovative solutions, but are a great example of how regulations should not be created.

According to regular studies on renewable energy development called “Energy Technology Perspectives” conducted by the International Energy Agency (IEA), governmental support policies should be tailored and changing in time depending on the development stage of a technology.

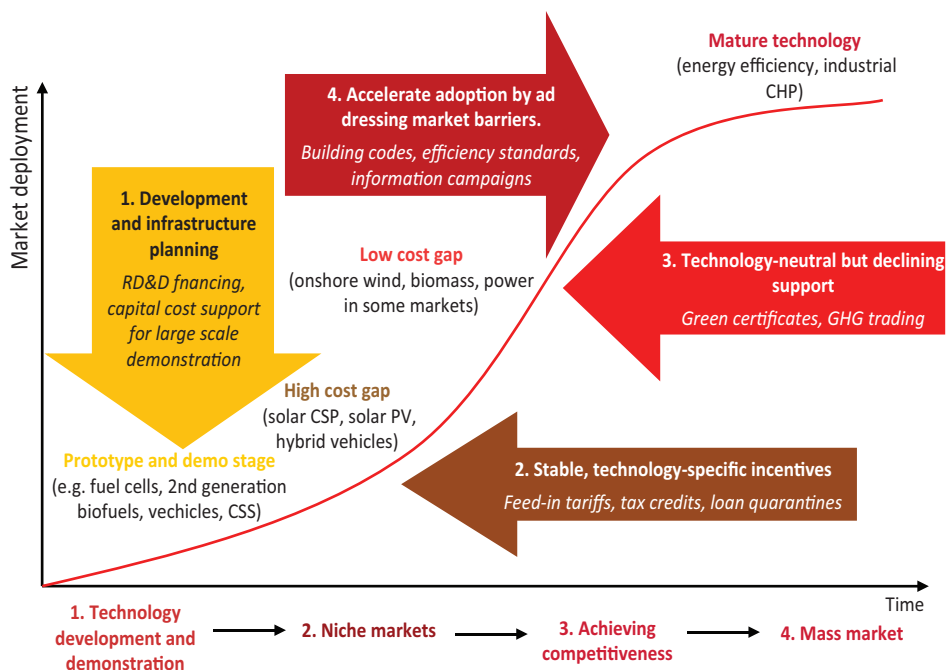
The IEA’s research concerned the development of renewable energy technologies, which is an example of only one field of eco-innovations, however may be translated to other fields also.

According to the IEA’s findings, the maturity of technologies and type of financing available will ultimately result in differences in risk/return profiles of green investment opportunities to investors, therefore the form and scope of support should be changed over time.<sup>57</sup> The recommended pattern of policies and regulations supporting development of clean energy is presented in the figure below.

<sup>56</sup> “The ‘polluter pays principle’ states that whoever is responsible for damage to the environment should bear the costs associated with it.” (Taking Action, The United Nations Environmental Programme).

<sup>57</sup> D. Croce, C. Kaminker, F. Stewart, *The Role of Pension Funds in Financing Green Growth Initiatives*, OECD Publishing, Paris 2011.

Figure 3.6. Policies for supporting low-carbon technologies



Source: IEA (2010), *Energy Technology Perspectives 2010*, Kalamova, Kaminker and Johnstone, (OECD, 2011).

The figure above shows that there is no silver bullet to solve all problems, but there is a need to modify and adjust the approach in time in order to provide effective support for the development of eco-innovations and green projects.

There are various types of identified renewable energy promotion policies, below there is a list of recommendations toward its use at the specific stage of technology development.

Table 3.3. Renewable energy promotion policies along the stages of technology development

| Classification            | Policy examples                       | Stage of technology development |                    |                        |
|---------------------------|---------------------------------------|---------------------------------|--------------------|------------------------|
|                           |                                       | Research and Development        | Capital Investment | Large-scale Deployment |
| Energy market regulations | Feed-in tariff                        | Indirect impact                 | Indirect impact    | YES                    |
| Direct financial transfer | Capital grants                        | YES                             | YES                |                        |
|                           | Low-interest loan and loan guarantees | YES                             | YES                |                        |

| Classification  | Policy examples                                  | Stage of technology development |                    |                        |
|---|--|---------------------------------|--------------------|------------------------|
|   |  | Research and Development        | Capital Investment | Large-scale Deployment |
|   | Government-funded/run venture capital funds      | YES                             | YES                |                        |
| Preferential tax treatment                            | Accelerated depreciation                         |                                 | YES                |                        |
|   | Investment tax credit                            |                                 | YES                |                        |
|   | R&D tax credit                                   | YES                             | Indirect impact    | YES                    |
|   | Production tax credit                            |                                 |                    | YES                    |
|   | Sales tax, energy tax, excise tax, VAT reduction |                                 |                    | YES                    |
| Trade restrictions                                    | Renewable portfolio standards (quotas)           |                                 |                    | YES                    |
|   | Tradable renewable energy certificates           |                                 |                    | YES                    |
| Service provided by government at less than full cost | Public investment in infrastructure              |                                 | Indirect impact    | YES                    |
|   | Government research and development              | YES                             | Indirect impact    |                        |

Source: (Kalamova, Kaminker and Johnstone, OECD, 2011).

### 3.7. Fiscal incentives in support of eco-innovations

One of the commonly used tools to promote eco-innovations and green investment is the fiscal policy. Its main advantage, stressed by many researchers, is the fact that it is a market-based tool, not a governmental command & control policy<sup>58</sup>. Like in other types of regulations, there are “sticks” – tax penalties, and “carrots” – tax incentives. Due to the fact that the natural role of taxes is providing the “sticks”, there are many more regulations of this type and a separate module has been devoted to them, here we will focus on tax incentives.

Tax incentives promoting innovation and green initiatives are present in almost all fields of green economy. The main aim of fiscal incentives is increasing availability of energy efficient equipment, resources and assets which due to, among others, the relatively early stage of the life cycle, are usually more expensive than traditional material benefits from the maturity in the market. The incentives are designed to shape the demand side of the economy, increasing

<sup>58</sup> R. Kemp, S. Pontoglio, *The innovation effects of environmental policy instruments – A typical case of the blind men and the elephant?*, Ecological Economics, 2011.

the turnover in green goods, and interest in green R&D, and in this way increasing the size of the market and its attractiveness.

The level of incentives depends to a large extent on the development stage of the technology – the more mature the technology is, the fewer incentives are usually provided to support it.

There are several types of incentives available under the fiscal policy instruments:

- tax credits,
- tax rate rebates,
- tax deductions, tax allowances,
- tax exemptions,
- tax holidays,
- accelerated depreciation,

Below are selected types of fiscal incentives which are currently operational or were used in the past and proved to be effective.

### 3.7.1. Tax credits

Tax credit is a specific amount of money that an entitled taxpayer is able to subtract from the amount of tax that he/she owes to the government as a reward for a defined action. A tax credit may be granted for various types of taxes, such as income tax, property tax, or VAT.

Tax credit may be set as a fixed amount of money, which is deducted from the tax payable, or the deduction can be set as a percentage of the investment value (purchase price). None of the solutions is prevailing.

It is an especially popular solution in the US where multiple environment-friendly goods are supported in this way: electricity from renewable sources, electric or low carbon vehicles and alternative vehicle refuelling equipment.

In the case of renewable energy, the tax credit depends on the energy (in kWh) generated from renewable sources. The companies may deduct from their Corporate Tax from 1.1 to 2.3 ¢ for each kW/h of the renewable energy generated.

Tax credits in the US were especially successful when it comes to the wind renewable energy sources promotion, the government finally resigned from it, due to extreme increase in new wind farm installations in 2012. It was a result of dropping prices of wind energy equipment, which, in combination with tax credits, made investments very profitable.<sup>59</sup>

<sup>59</sup> <http://www.eia.gov/todayinenergy/detail.cfm?id=8870> (accessed 2014.07.01).

### 3.7.2. Tax rate rebate

It is not a very popular solution, although it is applied in some countries. It assumes lowering the tax burden in reward for undertaking environmentally friendly initiatives and projects. Companies or individuals following the rules of green economy have a chance to save some money by paying lower tax rates than others.

In Germany, there is a an electricity tax levied on companies from highly energy consuming industries (steel, aluminium production). Those companies which introduce ISO 140001 or another environment management system may benefit from reduced electricity tax rate.

In Belgium, local authorities offer up to 50% property tax rate rebate if the building meets certain energy efficiency criteria. A similar type of incentive is available in Spain for those who purchase low carbon or electric cars.

### 3.7.3. Tax deductions, capital allowances

Tax deductions and capital allowances are among the most popular fiscal incentives. Regulations were created on the assumption that the amount of money spent on specific goods or services can be deducted from the taxed income and therefore lower the taxpayer's income tax. In terms of green projects, they are applicable especially for the "green" equipment and infrastructure.

The deduction may be a percentage of the incurred costs (often up to 100% of costs for green products), but usually it is also limited with a cap set on the total amount of investment or the amount of deducted income.

In the US, for example, companies may claim a tax deduction as high as 100% of the cost of equipment installed in commercial buildings, which significantly reduces heating, cooling or lighting costs. The cap set for this allowance amounts to 1.80 USD per building square foot.

### 3.7.4. Accelerated depreciation

Accelerated depreciation is used as a tax incentive for purchase of expensive equipment or investing in environment-friendly assets, such as green buildings. It is designed mainly to motivate companies and institutions to invest in green infrastructure and expensive equipment.

Accelerated depreciation is a mechanism where an entitled entity can depreciate the value of the purchased green tangible assets faster than in normal

conditions, and in this way diminish the level of tax liability. It is available mainly for companies.

In Germany and the Netherlands it is used in order to promote green buildings, if the buildings meet certain criteria, their owners are allowed to depreciate their value at a faster pace. In the US and several other countries, corporations can benefit from accelerated depreciation of assets purchased for the reuse and recycling of waste materials or conducting projects improving energy efficiency, such as installing energy management systems.

### 3.7.5. Tax exemptions

Tax exemption is used as a type of benefit or reward which is granted to companies or individuals operating in compliance with the national strategy. It assumes that some 'green' goods are exempt from taxation with special taxes applicable for regular goods. In Poland, the energy produced from renewable sources is exempt from the tax enforced on electricity consumers.<sup>60</sup> Also France provides the opportunity of up to 5 years' tax exemption from local property tax for buildings qualified as energy efficient. In some cases there are also VAT exemptions for green products and materials, as well as for low carbon cars.

#### Box 4. Analysis of different types of tax incentives:

Let us assume there is a company which invests in retrofitting of the production and headquarters building with an area of 1,500 sqm, in order to adjust it to the low emissions building standards. Let's follow the examples of two companies (with different incomes and profits)

|   | Company 1                    | Company 2                    |
|---|------------------------------|------------------------------|
| Income:   | 10 000 000 PLN               | 2 000 000 PLN                |
| Profit:   | 500 000 PLN                  | 250 000 PLN                  |
| Green investment :  | 750 000 PLN                  | 750 000 PLN                  |
| Corporate tax rate:   | 19%                          | 19%                          |
| Corporate tax payable:  | 95 000 PLN                   | 47 500 PLN                   |
|   |                              |                              |
| Property tax on the building per 1 sqm  | 22 PLN                       | 22 PLN                       |
| Area (sqm)  | 1 500                        | 1 500                        |
| <b>Tax incentive</b>  | Possible annual savings/gain | Possible annual savings/gain |
| Corporate tax credit at the level of 10% of investment value (75,000 PLN)           | 75 000 PLN                   | 47 500 PLN                   |
| 50% property tax rate rebate  | 33 000 PLN                   | 33 000 PLN                   |
| Tax deduction of up to 100% of the investment but not more than 60 PLN/sqm          | 17 100 PLN                   | 17 100 PLN                   |
| Accelerated depreciation (10% annually instead of 2.5%) – savings in the first year | 10 688 PLN                   | 10 688 PLN                   |

Source: authors own work

<sup>60</sup> <http://www.res-legal.eu/search-by-country/poland/>, (accessed 2014.04.23).

### 3.8. Regulations promoting and financing renewable energy sources

There are several reasons for energy production to be at the top of the environmental agenda but two of them are of major importance: one is that **energy production is responsible for a majority of global GHG emissions** and the other crucial one is that energy production and especially the **access to energy resources is also among the most important political issues**. The geographical discrepancy between the location of the most energy consuming countries (the US, the EU, China, India) and the location of the majority of energy resources (Russia, the Middle East) motivated many governments to introduce policies and regulations promoting innovations in the field of renewable energy and energy efficient technologies. Although not necessarily driven by the concern for the natural environment, these regulations are in line with the aims of environmental protection, and due to their major political importance they receive a great deal of attention.

Due to the above, regulatory incentives in the field of production of energy from renewable sources and energy efficiency are the most developed in terms of quality, quantity and popularity.

Promotion of renewable energy generation focuses mostly on two types of regulations: price-driven, (e.g. feed-in-tariffs-FITs) and capacity-driven (e.g. Tradable Certificates, Obligatory Quotas) strategies<sup>61</sup>.

**Table 3.4. Renewable energy promotion strategies**

|                    | Price-driven                             | Capacity-driven |
|--------------------|--|-----------------|
| Investment focused | Rebates<br>Tax incentives                | Bidding         |
| Generation based   | Feed-in-tariffs<br>Rate-based incentives | Quotas/TGC      |

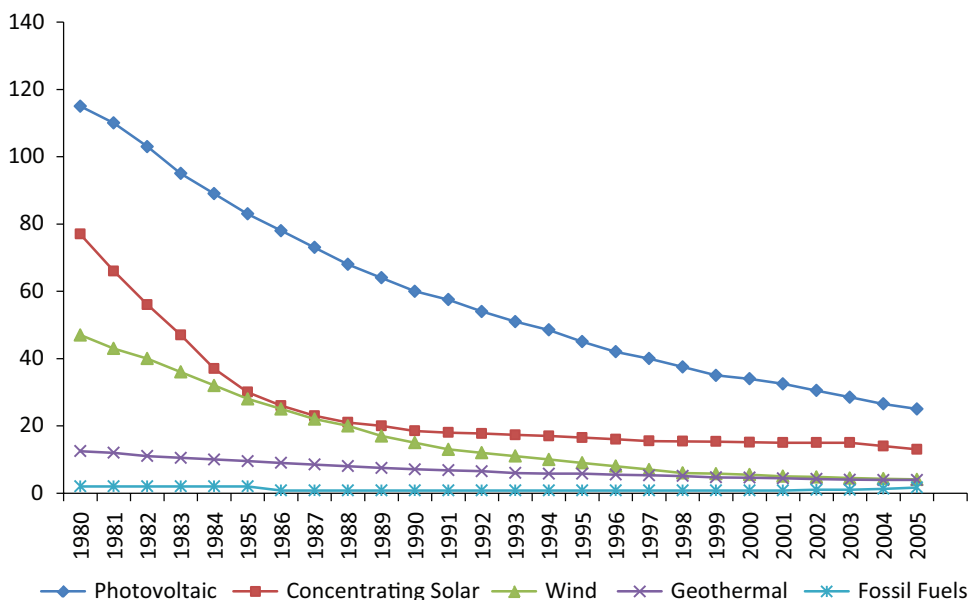
Source: Haas R., Eichhammer W., Huber C., Langniss O., Lorenzoni A., Madlener R., Verbruggen A., *How to promote renewable energy systems successfully and effectively*, 2004, "Energy Policy", 32(6), 833-839.

These regulatory instruments have been defined and implemented in recent decades. During this time, multiple types of regulations were tested, and the renewable energy market was developing relatively fast. Regulations in general proved to be successful, what is expressed in the drop of renewable energy production costs shown in the figure below:

<sup>61</sup> Dusonchet L. & Telaretti E., *Economic analysis of different supporting policies for the production of electrical energy by solar photovoltaics in eastern European Union countries*, Energy Policy, 38(8), (2010).



Figure 3.7. Renewable energy production costs



Source: Koseoglu N.M., van den Bergh J.C.J.M. & Lacerda J.S., *Allocating subsidies to R&D or to market applications of renewable energy? Balance and geographical relevance*, 2013 “Energy for Sustainable Development”, 17(5), 536-545.

It was achieved by combination of many policies and strategies among those listed in the table below:

Table 3.5. Renewable energy support policies in various countries

| Support policies                      | Advantages  | Disadvantages   | Country  |
|---------------------------------------|---|---|--|
| <b>Regulatory policies</b>            |   |   |  |
| Feed-in tariff                        | <ul style="list-style-type: none"> <li>investment security,</li> <li>Predictable cost (in medium &amp; long term)</li> <li>Technology specific (adjustable to policy goals)</li> <li>Transparency,</li> <li>Mobilization of producers investors,</li> <li>Large investment and government funding,</li> </ul> | <ul style="list-style-type: none"> <li>Unpredictable total costs of the support scheme,</li> <li>High risk of excessive investment,</li> <li>Technological lock-in-risk</li> <li>Bad for R&amp;D</li> </ul> | Germany, Italy, Spain, Denmark, globally existent in more than 50 countries, also in Florida and California, Hawaii in the US, |
| Electric utility quota obligation/RPS | <ul style="list-style-type: none"> <li>Predictability of reaching the targets</li> <li>Technology neutral – competition between renewable sources</li> </ul>  | <ul style="list-style-type: none"> <li>Risk of volatile price increase for consumers,</li> <li>High risk for investors,</li> </ul>  | Sweden, China, UK  |

| Support policies  | Advantages   | Disadvantages  | Country   |
|---|--|--|---|
| <b>Regulatory policies</b>  |  |  |   |
| Netmetering   | <ul style="list-style-type: none"> <li>Increasing of supply for remote users</li> <li>No need for storage of wind energy in batteries,</li> <li>Inclusion of small and on-site producers</li> </ul>  | <ul style="list-style-type: none"> <li>Variable connection costs,</li> </ul>   | US, Japan, Canada, Germany, Sweden, Mexico, Denmark,                                      |
| Voluntary green electricity schemes   | <ul style="list-style-type: none"> <li>Complementary with obligatory quotas,</li> <li>lower market penetration when used alone</li> </ul>  | <ul style="list-style-type: none"> <li>Relies solely on customer motivation</li> </ul>   | Sweden, Spain, The Netherlands,   |
| Tradable renewable energy certificate scheme  | <ul style="list-style-type: none"> <li>Market competition</li> <li>Cost reduction</li> <li>Higher transparency</li> <li>Lower administration cost</li> <li>Less uncertainty in the market,</li> <li>Higher stability for investors,</li> </ul>   | <ul style="list-style-type: none"> <li>Need for tentative approach (first local than national)</li> <li>High administration cost,</li> <li>Uncertainty in regulations</li> </ul> | Sweden, Spain, Italy, Russia, Denmark, India, Australia, United Kingdom, The Netherlands, |
| <b>Fiscal incentives</b>  |  |  |   |
| Capital subsidy, grant or rebate  | <ul style="list-style-type: none"> <li>Alternative to conventional lending practices of banks,</li> <li>Support of promotion and supporting, such as demonstration projects, training, grants, concessional loans, credit facilities, guarantee schemes</li> </ul>   | <ul style="list-style-type: none"> <li>Possibly downsized with very limited notice,</li> </ul>   | Australia, the US, and almost in all EU countries,  |
| Investment or reduction of production tax credit, CO <sub>2</sub> , VAT or other taxes, | <ul style="list-style-type: none"> <li>Accelerated transition to cleaner technology</li> <li>Initiation of private investment</li> </ul>   | <ul style="list-style-type: none"> <li>Risk of excessive investment</li> </ul>   | US, China, Iran, India and in most EU countries   |
| <b>Public financing</b>   |  |  |   |
| Public competitive bidding  | <ul style="list-style-type: none"> <li>Useful for reducing subsidies and initiating private sector investment,</li> </ul>  | <ul style="list-style-type: none"> <li>Lack of transparency</li> <li>Possibility of corruption</li> </ul>  | Brazil, France, Canada, Denmark, Poland,  |
| Public investment, loan or grants   | <ul style="list-style-type: none"> <li>Filling of the research gap present in the private sector</li> </ul>  | <ul style="list-style-type: none"> <li>Uncertainty and possibly low profitability of outcomes (“Black Box” effect)</li> </ul>  | Sweden, the US (mainly in the state of California)  |
| R&D support,  | <ul style="list-style-type: none"> <li>Higher innovation and efficiency</li> <li>Creating employment and education opportunities for skilled labor</li> <li>Attraction of more venture capital</li> <li>Avoidance of technological lock-in</li> <li>Technological leadership through possession of patents,</li> </ul> | <ul style="list-style-type: none"> <li>Long period of returns, unfavourable for private investment</li> </ul>  | Sweden, the US,   |

Source: Koseoglu N.M., van den Bergh J.C.J.M. & Lacerda J.S., *Allocating subsidies to R&D or to market applications of renewable energy? Balance and geographical relevance*, (2013), “Energy for Sustainable Development”, 17 (5), 536-545.

The most popular of them are further discussed more precisely.

### 3.8.1. Feed-in-Tariffs

In the Feed-in-Tariffs (FITs) support model, the government offers help to producers of electricity from renewable energy sources by imposing on electricity suppliers an obligation to purchase electricity from renewable sources at a predetermined price, higher than the electricity market price. The actual amount of the guaranteed price depends essentially on the cost of energy produced from the particular type of a renewable source. Therefore, the guaranteed rates provided for wind power are different from those for hydro- and geothermal energy.

The guaranteed rates are determined upfront at a certain level, with the pre-defined mechanism of indexation, or in the form of a discount in relation to conventional energy prices. This mechanism is launched in order to raise the prices of energy from renewable sources up to the level where production of such energy is economically justified.

The model assumes that traditional energy providers will incur higher costs of renewable energy purchase to supply the end consumers, but due to the small share of renewable energy supported with FITs in total energy produced, this should not have any significant influence on the final energy price.

One of the first countries to introduce the FITs was Germany, and it is generally considered to be a success story, since it is perceived as the main factor contributing to the fast development of renewable energy production in Germany, as it is presented in the table below:

**Table 3.6. Renewable energy installed between 1990 and 2010 in Germany**

| Year | Installed capacity (MW) | Hydro-power (GWh) | Wind energy (GWh) | Biomass (GWh) | Biogenic waste (GWh) | Photo-voltaic (GWh) | Geo thermal energy (GWh) | Total electricity generation from renewable sources (GWh) |
|------|-------------------------|-------------------|-------------------|---------------|----------------------|---------------------|--------------------------|---|
| 1990 | 4,069                   | 15,580            | 71                | 221           | 1,213                | 0.6                 | 0                        | 17,086  |
| 2000 | 10,875                  | 24,867            | 7,550             | 2,893         | 1,844                | 64                  | 0                        | 37,218  |
| 2010 | 55,578                  | 20,956            | 37,793            | 29,085        | 4,781                | 11,683              | 27.7                     | 104,326   |

Source: Koseoglu, N.M., van den Bergh, J.C.J. M. & Lacerda J.S., *Allocating subsidies to R&D or to market applications of renewable energy? Balance and geographical relevance*, 2013, "Energy for Sustainable Development".

The FIT schemes are usually designed in a way that enables investors to benefit for the longest period of time possible. In the UK the FITs guarantee a determined income level for the period of 20 years for new PV (photovoltaic) installations.

Due to the fact that there is no limit set on the energy capacity for entities entitled for funding the FITs, it may lead to excessive funding, and requires constant control of the renewable energy price level within the scheme. Therefore, there is a significant risk of a “technological lock”. It can occur if the FITs provide too high financial gains, which discourages the producers of renewable energy equipment from improving their products.

Research show, that in Germany, while making up only 6.2% of overall renewable electricity production, the PV received 24.6% of total FITs in 2008. This pushed the government to limit the provided support, as due to convenient economic conditions PV producers and investors were discouraged from installing the most efficient devices and turned to import cheap, but not state-of the art solutions from such countries as China and India. High FIT caused lack of motivation for further R&D expenses, and in result slowed down the innovation.

**Table 3.7. Feed in tariffs in Germany**

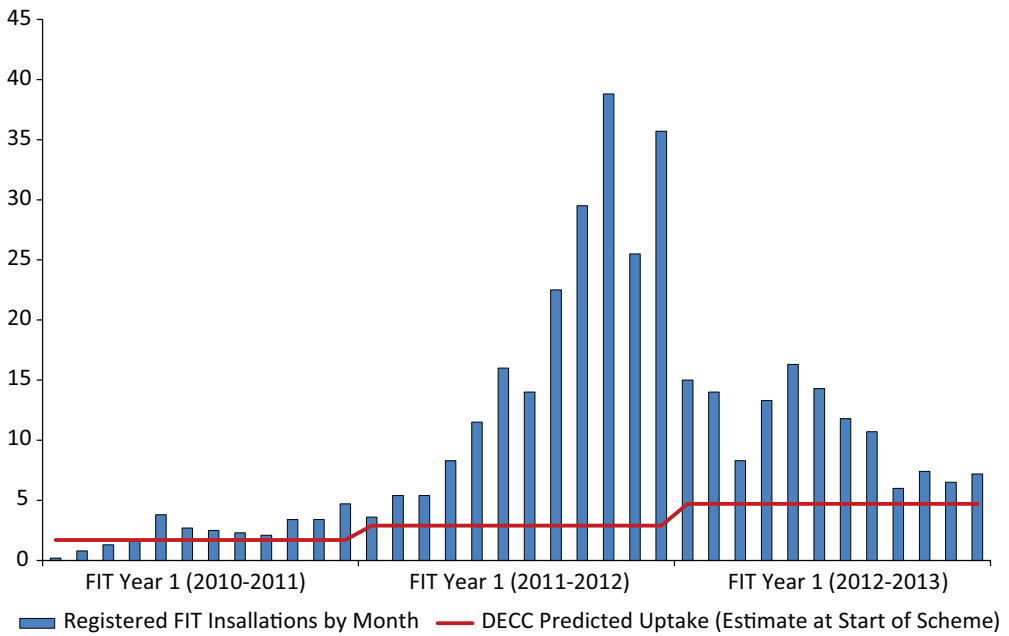
| Energy source | Range of rates offered in EUR cents per kWh |             |
|---------------|---|-------------|
|               | 2009  | 2012        |
| Biomass       | 7.79-11.67                                  | 6-14.3      |
| Solar         | 31.94-43.01                                 | 21.11-28.74 |
| Geothermal    | 10.5-16                                     | 25          |
| Biogas        | 6.16-11.67                                  | 6-8.6       |
| Offshore wind | 3.5-13                                      | 3.5-19      |
| Onshore wind  | 5.02-9.2                                    | 4.87-8.93   |
| Hydro         | 3.5-12.67                                   | 3.4-12.7    |

Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, RES Legal.

In the UK, the introduction of FIT in 2010 showed similar results in term of renewable energy capacity as in Germany, as it is shown in Figure 3.8.

The scheme working in the UK allows especially individual producers to benefit from three sources: 1. Savings on the energy bills; 2. Payment for the produced and not exported energy with feed-in-tariff as a green energy, 3. Bonus payment for the exported energy. Mechanism is shown in the box below.

**Figure 3.8. Total renewable energy production installations registered by month**



Source: Feed-in Tariff Annual Report 2012-13, OFGEM.

**Box 5. How the FIT scheme in the UK works**

Let us analyze a simple case of a single family house PV installation of approx. 3.5 kW power. able to produce approx. 14 kWh of power daily.

- A typical 3.5kW solar PV system costing: £6,500

Annual income from FIT would be:

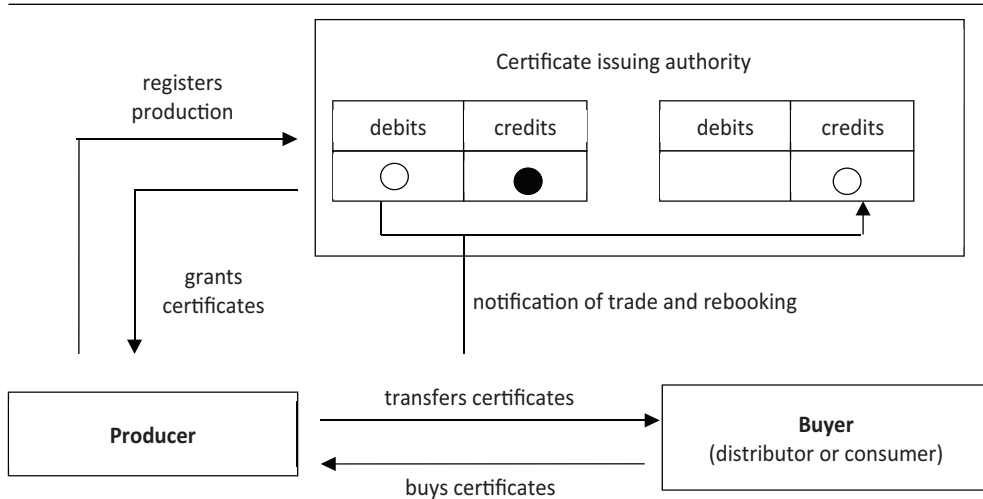
- Generation tariff (currently 14.9p/kWh) £443
- Export tariff (currently 4.64p/kWh) £69
- Plus electricity saved: (15 p/kWh) £223
- Giving a total annual income/saving of: £735
- Rate of return on the investment: 11.30%
- The cumulative income and savings from FiT would be: – £14,700
- NET savings to the homeowner over the 20 year period: £14,700 – £6,500 = **£8,200**.

The FITs are being implemented in next countries including Poland.

### 3.8.2. Tradable Certificates System

The Tradable Certificates System (TCS) was created in order to identify the origin of energy produced or saved. The TCSs differ slightly in particular countries, in general they manage the trade in certificates of multiple colors. The colors are designed to distinguish the source of the energy produced. The most popular are Green Certificates (GC) used for energy produced from renewable sources and White Certificates (WC) which are provided to confirm energy saved thanks to implementation of energy efficient solutions. In Poland there are several additional types (colors) of certificates, the remaining, however, are less significant.

Figure 3.9. Functioning of green certificate model



Source: Ringel M., *Fostering the use of renewable energies in the European Union: The race between feed-in tariffs and green certificates*, 2006, "Renewable Energy", 31(1), pp. 1-17.

The TCs are issued by an independent regulatory institution, which is also responsible for measuring the green electricity produced. Usually, for the measuring purposes, 1 Green Certificate (certificate of origin) corresponds with 1 MWh of generated electricity.<sup>62</sup> White Certificates represent the amount of energy saved.

This process resembles the way banks work, but instead of money, the amounts of produced energy are accumulated on special accounts. Producers generate GCs, which they can sell later in the market, not necessarily to consumers or companies who buy the energy.

<sup>62</sup> R. Gnatowska, *Charakterystyka polskiego systemu certyfikacji pochodzenia energii elektrycznej*, Polityka Energetyczna, Volume 13, Notebook 2, 2010, p. 148.

With the GC market operating, renewable energy producers conduct two types of transactions – first they sell the energy at the market price, which usually generates some loss, due to the lower price of energy from traditional sources. Then, they sell the GCs, which are supposed to compensate for this difference.<sup>63</sup>

### 3.8.3. Quota obligations and Tradable Certificates

The renewable energy quota obligation systems (RQS) are operating in multiple European countries, and recently this system was combined with another regulatory tool – Tradable Certificate System

Within the RQS, based on the quota provided by the government or special regulatory institution, electricity suppliers are obliged to prove that a certain proportion of the electricity they supply over a specified period of time (usually a year) comes from renewable sources. In order to perform this, producers have to acquire a kind of Tradable Certificate or another certificate of origin, which will confirm that a specified amount of the energy produced, sold or consumed by that company, comes from a renewable source. As an alternative, the company may pay a fee and purchase such certificate from the regulatory institution. If the company meets none of these obligations, it pays a penalty.

There are two ways for producers to obtain certificates – by producing electricity in their own facilities, or by purchasing certificates in the market.

The government, by setting the quotas for green energy, determines the level of demand, but does not regard the efficiency. Free trade in the GCs compensates for it, by promoting renewable energy production in the field where it is the most cost efficient.<sup>64</sup> The entities obliged to present certificates may themselves choose to produce the energy or to purchase it in the market. A reasonably managed company will focus on cost efficiency in such a case, which ensures efficiency of the entire system. The market is monitored and regulated (using the required quota levels) by the government and the certificate issuing authority, also by means of double bookkeeping.

Within the EU countries, the required renewable energy quotas differ depending on the stage of the renewable energy market development and on the target set for the year 2020 in the national policy. The quotas are set either as percentages of total supplied energy, or as fixed totals. In Poland the target is set by the Ministry of Economy and for the year 2014 it amounts to 9%.

<sup>63</sup> C. Crookall-Fallo, T. Crozier-Cole, *Europe plans trading in greenness*, "Environmental Finance", 2002, pp. 17-19.

<sup>64</sup> M. Ringel, *Fostering the use of renewable energies in the European Union: The race between feed-in tariffs and green certificates*, Renewable Energy, 2006.

### 3.9. Green Public Procurement regulations

Green Public Procurement (GPP) regulations do not fit into previously presented classifications, neither stick-and-carrot, nor CAC-IB divisions of regulations apply to it. It is, however, one of the ways to promote and provide financing for eco-innovations, especially at the stage of diffusion.

GPP regulations impose an obligation on public institutions, authorities and publicly owned companies which are subject to public procurement rules to use sustainability and environmental protection criteria in their procurement procedures and project evaluation. GPP is a way to give a good example, but also to provide an opportunity to develop innovative solutions in practice.

GPP is one of the initiatives promoted within the EU institutions and among Member States by the European Commission. The EU motivates national authorities to provide National GPP Action Plans, which has been performed by 22 of them<sup>65</sup>.

In spite of the promoting initiative, the GPP is not a law yet, however there are some countries like Finland, where it is a leading attitude in public procurement.

One of the advantages of GPP regulations is the opportunity to introduce innovative solutions in a wide range of fields, without setting different regulations for each sector.

The less positive fact is that public procurement is not the most efficient way to purchase goods or services, and it is subject to risk resulting from lack of environmental and technical knowledge regarding the implemented innovations within the public institutions organizing tenders. This can lead to implementation of inadequate or incompatible but eco-innovative solutions, whose effects may be opposite to those assumed.

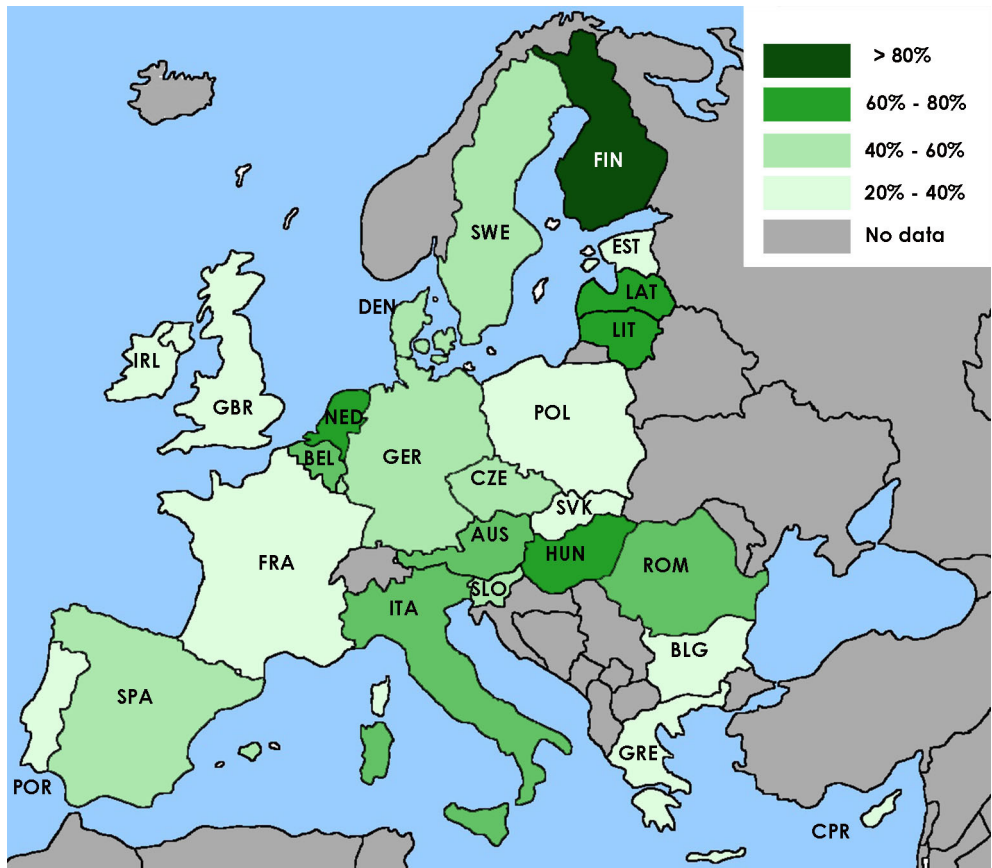
In spite of the fact that the UK is not a leader in GPP implementation, there are also some interesting solutions used in the market. One of the examples are regulations on construction or purchase of new buildings by local authorities. Such investments will be entitled to any governmental support only if the buildings receive high enough scores in the energy efficiency certification. Otherwise the support can be reduced or cancelled.

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<sup>65</sup> [http://ec.europa.eu/environment/gpp/action\\_plan\\_en.htm](http://ec.europa.eu/environment/gpp/action_plan_en.htm) (accessed 2014.06.22).



Figure 3.10. Uptake of GPP in the EU 27 countries in 2009-2010 by value\*



\* the percentage presented in the map represents the share of value of public procurements contracts conducted in accordance to the EU GPP guidelines in the value of all public procurement contracts signed in the analyzed period in that country. The GPP uptake was calculated for all ten product/service groups in the EU27<sup>66</sup>.

Source: Guidance To Foster Green Public Procurement, European Environmental Bureau, 2012.

<sup>66</sup> Centre for European Policy Studies, College of Europe, *The uptake of green public procurement in the EU27*, February 2012, p. viii.

## Conclusions

Policies and regulations stimulating development of eco-innovations become increasingly popular. A special focus is placed on the eco-innovations in the field of production of energy from renewable sources, which is the result of not only environmental concern but also geopolitical matters.

Policymakers developed a wide range of regulations stimulating eco-innovations by providing new financing sources, and trying to overcome major market failures. Most attention is paid to development of instruments which will contribute to the 'the pollutant pays' rule, and transfer this money with minimum engagement by the government to eco-innovative companies. The remaining role of the governments is however to provide control over the introduced system by regulating their variables in order to achieve the best effectiveness.

The most important regulatory incentives are:

- **fiscal incentives** – in multiple forms used mainly for support of R&D and green infrastructure,
- **emissions trading systems** – used to reduce GHG emissions and promote energy efficiency
- **feed-in tariffs** – used to support generation of energy from renewable sources,
- **tradable certificates** – used to promote energy efficiency, production of renewable energy and reduction of GHG emissions,
- **green public procurement** – suitable to promote multiple types of eco-innovations in the process of public spending.

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## Chapter 4

### Green taxes

*Katarzyna Sobiech-Grabka*

#### Introduction – rationale for ecological taxation

Today's world faces environmental challenges that are a result of numerous factors, from wasteful exploitation of resources, thoughtless consumption, and demographic changes up to non-sustainable (rather than future-generations-oriented) urban development, just to name a few.

There is a growing demand for joint efforts of citizens, companies and governments to encourage less pollution and degradation, a demand that is becoming more popular and shared by many people around the world. One possible answer is environmentally related taxation as a tool to change existing patterns of demand and supply. Let us examine some arguments for green taxes derived from economic theory and literature.

#### 4.1. Theoretical frames: public goods, the tragedy of the commons, and market failure

Goods such as air, water, global atmosphere or biodiversity are public goods. By contrast with private goods, public goods can be used by the public for free. The price mechanism is very unlikely to be applied to public goods, and their use is non-exclusive: every additional person can consume them. Private investments in public goods are rather unlikely, at least without any governmental support. For example, making fuel with higher carbon content more expensive

with the aid of carbon tax, policy makers aim to reduce demand for carbon-based fuels and incentivise substitution of cleaner fuels.

The tendency to overuse public goods is connected to the tragedy of the commons, described by Garret Hardin. According to Hardin, the tragedy of the commons happens when everybody wants to profit from a common, pooled resource that is available without payment (so-called “common pasture”) and there is a lack of coordination or responsibility for long-term maintenance. The result is easy to predict: a rapid depletion of this resource. The conclusion is that some kind of sovereignty has to be established over public goods.

One key action undertaken in order to overcome the situation of common pasture depletion on the worldwide scale is an artificial market of carbon emissions trading schemes, established under the Kyoto protocol, with the aim of creating incentives to reduce emissions. Other solutions applied by individual countries or even cities include: fuel taxes, congestion charges (as disincentives), and credits for hybrid or electric cars as incentives for individuals to change their transport patterns. Green taxes are, to some extent, an epitome of the “polluter pays” principle, and they enable the internalization of externalities (in other words, those who caused externalities are forced to include those costs into their own economic calculations).

## 4.2. Main tools used

In 2010, the OECD published a report entitled *Taxation, Innovation and the Environment*. It gives a definition of an environmentally related tax, as follows: *“The OECD, the International Energy Agency (IEA) and the European Commission have agreed to define environmentally related taxes as any compulsory, unrequited payment to general government levied on tax bases deemed to be of particular environmental relevance. The relevant tax bases include energy products, motor vehicles, waste, measured or estimated emissions, natural resources, etc. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in proportion to their payments. Requited compulsory payments to the government that are levied more or less in proportion to services provided (e.g. the amount of wastes collected and treated) can be labelled as fees and charges. The term levy covers both taxes and fees/charges.”*<sup>67</sup>

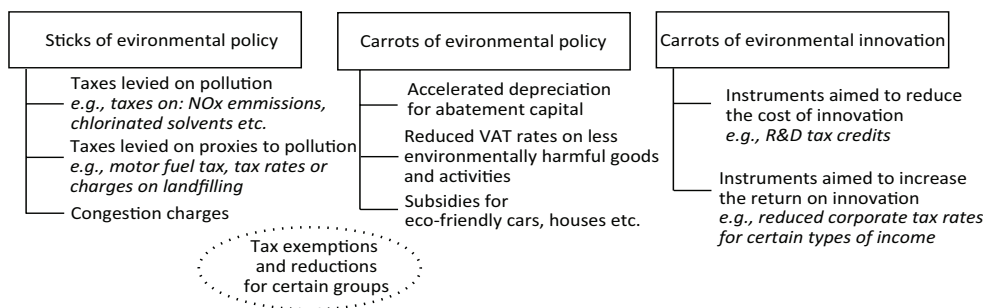
Based on this definition, it is easily noticeable that the notion of “green taxes” encompasses a wide range of taxes, such as excise taxes on fossil fuels, motor

<sup>67</sup> OECD, *Taxation, Innovation and the Environment*, 2010, p. 33.

vehicle registration taxes, and taxes on water pollution and waste. They have been used by governments for years and initially were not necessary perceived as tools to address climate change.

If we go further and also attempt to analyze the expenditure side of public budgets (this becomes a complex analysis of fiscal policy instruments designed to achieve certain goals in combating climate change), we can distinguish various measures used by governments, as shown in Figure 4.1.

**Figure 4.1. Categories of fiscal measures addressing climate change**



Source: prepared by author, based on: *OECD, Taxation, Innovation and the Environment*, 2010, pp. 43, 51 and 111.

These measures are also sometimes called economic instruments of environmental policy, and they provide an attractive mix for policymakers. They discourage environmentally damaging activities by making them more costly, while incentivising the creation and diffusion of eco-innovations<sup>68</sup>. Governments may use income from green taxes to reduce the fiscal burden of supporting eco-friendly solutions, or even to subsidize such actions. However, green taxes remain a secondary source of budget incomes for most OECD countries – the contribution of those taxes to the overall tax revenues is quite low, as shown in Figure 4.2. Most green taxes are currently levied on energy production and consumption.

The first category of measures – “sticks of environmental policy” – aims to discourage environmental evils. The idea that lies behind these measures is to add a financial burden on environmentally harmful activities, so that the prices reflect environmental costs, thus lowering pollution and encouraging innovation. Taxes on proxies to pollution are typically imposed on goods or

<sup>68</sup> European Environment Agency, *Environmental tax reform in Europe: opportunities for eco-innovations*, EEA Technical Report No 17/2011, Copenhagen 2011, p. 5.

actions that generally lead to pollution in a subsequent step. Motor vehicle fuel taxes are a common example in this category, as they tax the fuel, not the actual pollutants that are emitted when it combusts<sup>69</sup>. Congestion charges are treated as a separate type of a green tax here because of their specific formulation, one that will be presented in detail in a next section of this text.

By measures grouped in the second cohort of instruments – “carrots of environmental policy” – governments try to encourage environmentally beneficial actions by decreasing their cost. Among the approaches used here are targeted reductions in the rate of value added tax for certain appliances, accelerated depreciation for investments in environmentally related capital, or various forms of subsidies favouring sustainable solutions (such as hybrid or electric vehicles, passive or energy-efficient houses etc). See Box 6 for a case study of UK Plug-in Car Grants.

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#### **Box 6. Plug-in Car and Van Grants in the UK**

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In the UK, grants for cars were introduced in January 2011, and for vans in February 2012. They are designed to provide 25% of the cost of a car (up to 5,000 pounds) or 20% in case of vans (up to 8,000 pounds). The list of qualifying models is available online at: <https://www.gov.uk/government/publications/plug-in-car-grant/plug-in-car-grant-vehicles>.

Results: Vehicle registrations in 2013 included 3,445 cars and 180 vans of models eligible for these grants, 47 per cent higher than in 2012.

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Source: *Vehicle Licensing Statistics 2013*, UK Department for Transport, London, 10 April 2014, p. 6.

Somewhere between those two categories (environmental policy “carrots” and “sticks”) we could place various tax exemptions and reductions for environmentally friendly users (e.g., exemption or reduction of vehicle excise taxes for hybrid/electric cars, congestion charge exemption for the same category of cars, etc.). These approaches encourage a preferred pattern of consumption or demand for a certain type of vehicles perceived as eco-friendly.

Other approaches used by some cities introduce further incentives for motorists using eco-friendly cars, such as free parking in paid-parking zones (in Poland for example in: Toruń<sup>70</sup>, Katowice, Tarnów and Kraków<sup>71</sup>) or the option to drive using restricted bus lines.

In the third group of measures (“carrots of environmental innovation”), governments can use fiscal policy to try to encourage supplemental innovation,

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<sup>69</sup> OECD, *Taxation...*, *op. cit.*, p. 112.

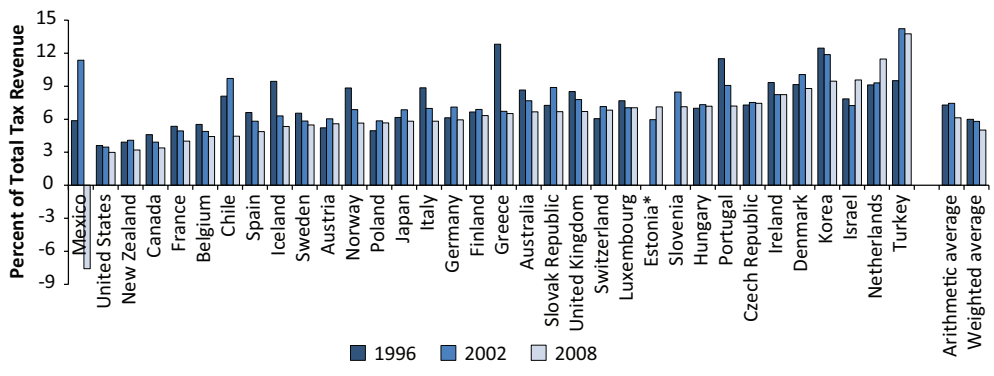
<sup>70</sup> <http://virtusun.pl/co-nowego/Bezplatne-parkowanie-dla-samochodow-hybradowych-i-elektrycznych-w-Toruniu/5> (accessed 14.04.2014).

<sup>71</sup> [http://moto.pl/Ekologia/1,117005,13784070,W\\_tych\\_miastach\\_hybrydy\\_parkuja\\_za\\_darmo.html](http://moto.pl/Ekologia/1,117005,13784070,W_tych_miastach_hybrydy_parkuja_za_darmo.html) (accessed 14.04.2014).



using measures such as R&D tax credits and lower corporate tax rates on the returns from innovation. The underlying philosophy here is quite simple: instead of focusing on punishment for pollution, these instruments are designed to provide benefits for innovating and adopting clean investments.

**Figure 4.2. Revenues from environmentally related taxation as percentage of total tax revenues in OECD countries**



Notes:

1. Estonia is an accession country to the OECD and has not been included in the averages.

\* The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: OECD, *Taxation, Innovation and the Environment*, 2010, p. 34.

### 4.2.1. Taxes on pollution

Governments levy taxes and charges in areas like waste disposal and on specific pollutants, such as emissions of  $\text{NO}_x$  and  $\text{SO}_x$  to the atmosphere.

#### 4.2.1.1. Tax on $\text{NO}_x$ emissions

Although  $\text{NO}_x$  emissions are restricted by norms and regulations, some countries also use taxation to deter  $\text{NO}_x$  pollution. The rationale for that lies in the harmful impact of  $\text{NO}_x$  on local air pollution: nitrogen oxide contributes to ground-level ozone (smog), acid rain, airborne particulates, climate change, and water quality deterioration. Countries have put in place taxes directly on  $\text{NO}_x$  emissions to air, or have established tradable permit systems (e.g., the US and Korea).

Calculating NO<sub>x</sub> emissions is quite difficult, because of a wide range of factors affecting its formation in the combustion process. Thus, taxing NO<sub>x</sub> emissions requires relatively high implementation costs of sophisticated monitoring systems.

#### 4.2.1.2. Carbon dioxide tax

Carbon dioxide tax (in short: carbon tax) is a direct tax on the carbon dioxide emissions from burning fossil fuels. As opposed to NO<sub>x</sub> emissions to air, which are difficult to measure, the carbon content of every form of fossil fuel is precisely known. As a result, the amount of CO<sub>2</sub> emissions is easy to calculate. Thus, the administration of a carbon tax is simple and inexpensive.

Countries implement this tax in order to address Kyoto protocol commitments. As David Rich and Larry Karp note, “*since their adoption carbon taxes have proven to be largely effective.*”<sup>72</sup> Reductions in CO<sub>2</sub> emissions achieved after carbon tax implementation have varied from 4% (Denmark, 1992-2000) and 7% (Finland, 1990-1998) up to 20% (Sweden, 1991-2000)<sup>73</sup>. Various types of carbon taxes used by countries are characterised in Table 4.1.

**Table 4.1. Carbon taxes in countries across the globe**

| Country/<br>Jurisdiction | Start<br>Date | Tax Rate   | Annual Revenue                | Revenue Distribution  |
|--------------------------|---------------|--|-------------------------------|---|
| Finland                  | 1990          | \$30/metric ton CO <sub>2</sub>  | \$750 million                 | Government budget; accompanied by independent cuts in income taxes                            |
| Netherlands              | 1990          | ~\$20/metric ton CO <sub>2</sub> in 1996   | \$4.819 billion*              | Reductions in other taxes; climate mitigation programs  |
| Norway                   | 1991          | \$15.93 to \$61.76/metric ton CO <sub>2</sub>  | \$900 million (1994 estimate) | Government budget   |
| Sweden                   | 1991          | Standard rate: \$104.83/metric ton CO <sub>2</sub><br>Industry rate: ~\$23.04/metric ton CO <sub>2</sub> | \$3.665 billion               | Initially government budget; Starting in 2000, revenue used to offset labor taxes             |
| Denmark                  | 1992          | \$16.41/metric ton CO <sub>2</sub>   | \$905 million                 | Environmental subsidies and returned to industry  |
| Costa Rica               | 1997          | 3.5% tax on hydrocarbon fossil fuels   | n/a                           | A portion goes to a program that incentivizes sustainable development and forest conservation |

<sup>72</sup> D. Rich, L. Karp, *Climate Change, Carbon Taxes, and International Trade: An Analysis of the Emerging Conflict between the Kyoto Protocol and the WTO*, Berkley, December 2004, available on: [are.berkeley.edu/courses/EEP131/fall2006/NotableStudent04/ClimateChangeRich.pdf](http://are.berkeley.edu/courses/EEP131/fall2006/NotableStudent04/ClimateChangeRich.pdf) (accessed 15.04.2014).

<sup>73</sup> *Ibidem*.

| Country/<br>Jurisdiction   | Start<br>Date | Tax Rate  | Annual Revenue                              | Revenue Distribution   |
|--|---------------|---|---|--|
| United Kingdom   | 2001          | \$0.0078/kWh for electricity;<br>\$0.0027/kWh for natural<br>gas provided by gas utility;<br>\$0.0175/kg for liquefied<br>petroleum gas or other<br>gaseous hydrocarbons<br>supplied in a liquid state; and<br>\$0.0213/kg for solid fuel | \$1.191 billion                             | Reductions in other taxes  |
| Switzerland  | 2008          | \$11.41/metric ton CO <sub>2</sub> in<br>2008, increased to \$34.20/<br>metric ton CO <sub>2</sub> in 2010.   | \$209 million                               | One-third of revenues funds<br>climate-friendly building<br>renovations; remainder<br>redistributed back through benefits<br>system                            |
| Ireland  | 2010          | \$19.60/metric ton CO <sub>2</sub> in 2010<br>to \$26.17 per metric ton CO <sub>2</sub><br>in 2012  | \$523 million (in<br>2012)                  | Government budget  |
| Australia**  | 2012          | \$23.78/metric ton CO <sub>2</sub> ,<br>increasing 2.5% annually. The<br>fixed price will transition to a<br>cap-and-trade system in July<br>2015.  | \$24 billion (for the<br>first three years) | Over 50% of the revenue will be<br>used to assist households, reduce<br>other taxes, and provide assistance<br>to energy-intensive trade-exposed<br>industries |
| France   | 2014          | 7 euro/ metric ton CO <sub>2</sub> in<br>2014, 14,5 euro/ metric ton<br>CO <sub>2</sub> in 2015 and 22 euro/<br>metric ton CO <sub>2</sub> in 2016  | 4 billion euros<br>(estimated in 2016)      | Further emissions reductions,<br>reductions in other taxes   |
| Boulder,<br>Colorado   | 2007          | \$12-13/metric ton CO <sub>2</sub>  | \$846,885                                   | Climate mitigation programs  |
| Quebec, Canada   | 2007          | \$3.20/metric ton CO <sub>2</sub>   | \$191 million                               | Climate mitigation programs  |
| British<br>Columbia,<br>Canada                                   | 2008          | \$9.55/metric ton CO <sub>2</sub> in 2008<br>increasing \$4.77/metric ton<br>CO <sub>2</sub> annually to \$28.64 in<br>2012.  | \$292 million                               | Reductions in other taxes  |
| Bay Area<br>Air Quality<br>Management<br>District,<br>California | 2008          | \$0.045/metric ton CO <sub>2</sub> .  | \$1.1 million<br>(expected)                 | Climate mitigation programs  |

\* Revenue in the Netherlands is from all environmentally related taxes, of which carbon taxes are the clear majority.

\*\*Australia has implemented a fixed price in the first three years of their program, which effectively acts like a carbon tax.

Source: prepared by author, based on: Centre for Climate and Energy Solutions, available on: <http://www.c2es.org/publications/options-considerations-federal-carbon-tax> (accessed 15.04.2014); *Contribution climat énergie. Elle ne «modifiera pas le niveau des prélèvements»*, Le Télégramme 25.08.2013 <http://www.letelegramme.fr/ig/generales/france-monde/france/contribution-climat-energie-elle-ne-modifiera-pas-le-niveau-des-prelevements-25-08-2013-2212304.php> (accessed 15.04.2014); *Vive le carbon tax: France to tax fossil fuels*, <http://www.newscientist.com/article/dn24259-vive-le-carbon-tax-france-to-tax-fossil-fuels.html#.U01NGal7Lxg> (accessed 15.04.2014) and *Budget 2014: la contribution climat-énergie votée à l'Assemblée*, „Le Nouvel Observateur” 21.10.2013, <http://tempsreel.nouvelobs.com/economie/20131021.OBS2040/budget-2014-la-contribution-climat-energie-votee-a-l-assemblee.html> (accessed 15.04.2014).

#### 4.2.1.3. Taxes on proxies to pollution

#### 4.2.1.4. Fuel tax

According to Jan Gehl, transport is a particularly important component of sustainable cities, because it is responsible for massive energy consumption which results in heavy pollution and carbon emissions. In the US, for instance, transport accounts for no less than 28% of carbon emissions<sup>74</sup>. For that reason, encouraging people to use public transport instead of private cars (or, at least, encouraging them to use cars in a smarter way or to shift towards less-polluting vehicles), is a crucial task for local and central governments nowadays. Petrol tax is thus becoming a commonly used instrument by countries, as it is perceived as a convenient tool to deter increases in greenhouse gases (GHG) emissions (simultaneously increasing government revenues).

In fact, excise taxes on fuel have been used for many years, originally being motivated by non-environmental needs (for instance, they were efficient source of budgetary revenues or sometimes earmarked for specific infrastructure projects, e.g., highway construction). The obligation to invest funds generated by fuel tax in road development has recently become a kind of a curse for urban development and, as a result, for environment, especially in the US. As Patrick M. Condon underlines: *“US transportation bills from the 1970s through the 1990s favored expanding the interstates and feeder highways over transit; no policy proposals to require walking-distance access to transit and commercial services in new districts were ever seriously considered. Canada fared somewhat better. The Canadian federal government was happy to collect a substantial gas tax but, unlike the U.S. government, was under no obligation to return it to the provinces in the form of highway funds.”*<sup>75</sup>

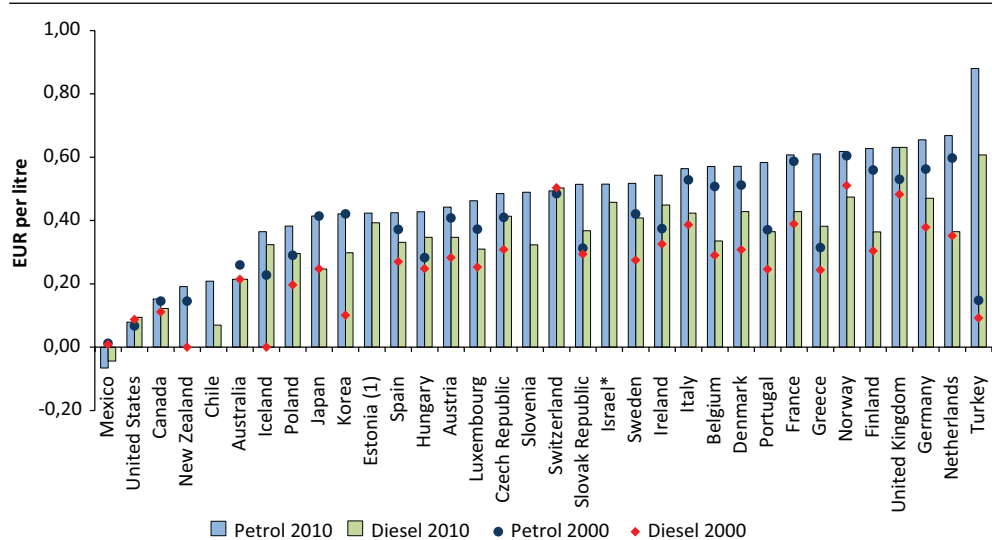
The structure of motor fuel taxes is relatively homogenous across countries. Interestingly, the excise taxation levels for diesel fuel are significantly lower than those for petrol. Only Switzerland and the United States (among OECD countries) have a higher level of tax for diesel than petrol; in Australia and the United Kingdom the rates for both fuel types are equal. The majority of diesel rates are situated within the 70-80% of petrol range, with New Zealand not levying any excise tax on diesel. It is possible to group OECD countries by geographic area, with regard to the fuel tax rate: North America has the lowest petrol taxes, followed by OECD countries in Asia and the Pacific, with European countries having significantly higher tax rates<sup>76</sup> (see Figure 4.3).

<sup>74</sup> J. Gehl, *Cities for People*, Island Press, Washington, Covelo, London, 2010, p. 105.

<sup>75</sup> P.M. Condon, *Seven Rules for Sustainable Communities. Design Strategies for the Post-Carbon World*, Island Press, Washington, Covelo, London 2010, p. 7.

<sup>76</sup> OECD, pp. 37-38.

Figure 4.3. Tax rates on motor fuel in OECD countries



Notes: Rates are as of 01.01.2010 and 01.01.2000 and converted using the average exchange rate for 2009. Data for the United States and Canada include average excise taxes at the state/provincial level. VAT is not included.

1. Estonia is an accession country to the OECD and has not been included in the averages.

\* The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: same as Figure 4.2, p. 37.

#### 4.2.1.5. Motor vehicles tax

European regulation 443/2009 determines a pan-European sales-weighted-average new car CO<sub>2</sub> emissions target of 130g/km by 2015 and 95g/km by 2020<sup>77</sup>. Such ambitious goals (in fact, the most stringent in the world) might be achieved with provision of significant incentives for less-polluting cars (and disincentives for the biggest polluters). It appears that motor vehicle taxes and fuel taxes are the main tools being used to achieve this target<sup>78</sup>.

Motor vehicle taxes are generally constructed in two ways:

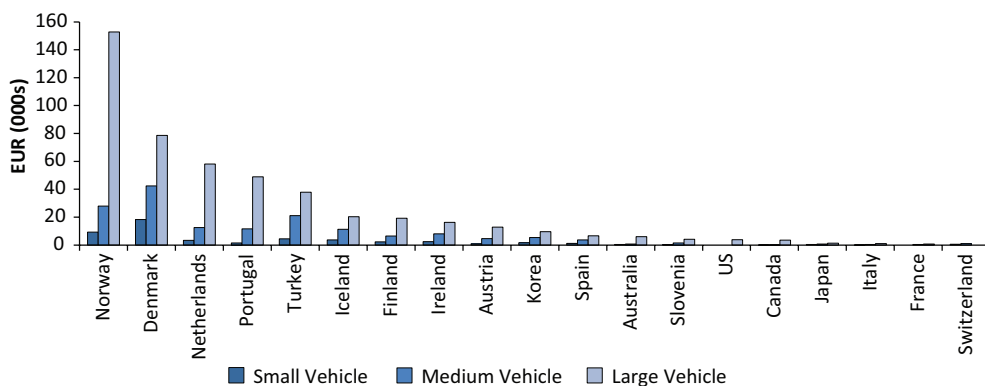
- levied on the initial or subsequent sale or import into the country (they are thus one-time)
- levied on an annual basis (recurrent).

<sup>77</sup> SMMT, *Car CO<sub>2</sub> Report 2014*, p. 3.

<sup>78</sup> The European Commission also set up emission targets for car manufactures.

They more strongly affect the level of car ownership and the composition of a national fleet of vehicles than actual emissions.

Figure 4.4. One-off motor vehicle taxes in OECD countries



Notes: As of 01.01.2010. One-off taxes on new vehicles only. “Small” refers to a petrol-based car with 53 kW of power, 6.5 l/100 km, 821 kg, 1 000 cc engine, EUR 12 000 pre-tax price; “medium” refers to a petrol-based car with 132 kW of power, 9.4 l/100 km, 1 468 kg, 2 400 cc engine, EUR 25 000 pre-tax price; “large” refers to a petrol-based car/SUV with 300 kW of power, 16.8 l/100 km, 2 587 kg, 6 200 cc engine, EUR 45 000 pre-tax price. Countries with CO<sub>2</sub> components in their taxes on motor vehicles are calculated based on fuel efficiency. For countries with sub-national governments that levy applicable rates, the following jurisdictions are used: New South Wales (Australia), Ontario (Canada), and California (United States). These tax levels do not include non-environmentally related taxes, such as VAT, nor environmentally related tax components that vary significantly between vehicles of a similar size, such as those based on NO<sub>x</sub> emissions from each vehicle.

Source: same as Figure 4.2, p. 41.

Motor vehicle tax construction has been changing, and countries are now more likely to base such charges on the environmentally-related features of the vehicle (e.g., fuel efficiency, CO<sub>2</sub> emissions per kilometre, engine power, and weight). In many countries there is more than one feature used to derive a fiscal burden per vehicle (for example: Norway uses CO<sub>2</sub> emissions, vehicle weight, and engine power to calculate the tax)<sup>79</sup>.

To have a significant impact on buying decisions, a motor vehicle tax has to be wisely and carefully designed. For instance, if the tax does not distinguish between an ordinary family car and huge four-wheel-drive gas-guzzler, there is no substantial disincentive for buying the latter (see Figure 4.4).

<sup>79</sup> OECD, *Taxation...*, op. cit., p. 41.

### 4.2.2. Congestion charges

Ekins and Dresner describe congestion charges as “*the most sophisticated approach to the spatial consequences of traffic growth.*”<sup>80</sup> Singapore was the pioneer in a cordon-based congestion pricing system implementation in 1975<sup>81</sup>. Cambridge examined a cordon-based congestion charging scheme in the mid-1990s<sup>82</sup>. Cordon-based congestion pricing is currently implemented in various cities, such as London, Durham, Stockholm and Milan<sup>83</sup>. Other cities, for example, San Diego and Minneapolis utilize a system of charging on corridors (as opposed to a cordon zone) during peak hours<sup>84</sup>.

Congestion pricing was introduced in London in 2003, with initial level of 5 pounds/day for driving a vehicle within the congestion charge zone from 07:00 and 18:00, Monday to Friday<sup>85</sup>.

Central London was badly affected by traffic jams (drivers in central London spent 50% of their time idling in traffic), poor air quality and a lack of needed transport investments.

In spite of those threats, Mayor Ken Livingstone’s proposal of instituting congestion pricing was initially greeted with skepticism.

The results of this policy are positive: traffic delays in the Congestion Zone have dropped by 26%, bus service has become faster and more reliable, and bicycling rates have skyrocketed. Nitrogen Oxides and particulate matter have dropped sharply, while CO<sub>2</sub> emissions are down 15%<sup>86</sup>.

The Ultra Low Emission Discount (for eligible cars), which replaced the Greener Vehicle Discount (GVD) and Electric Vehicle Discount (EVD), was introduced on 1 July 2013. It provides a single 100% discount on the Congestion Charge for all electric vehicles and for ultra low emission cars and vans. Eligible vehicles will have to be either electric or be cars and vans that emit 75 g/km or less of CO<sub>2</sub> and meet the Euro 5 emission standard for air quality<sup>87</sup>.

<sup>80</sup> P. Ekins, S. Dresner, *Green taxes and charges. Reducing their impact on low-income households*, Policy Studies Institute, York 2004, p. 33.

<sup>81</sup> <http://transalt.org/issues/congestion/international> (accessed 10.04.2014).

<sup>82</sup> P.T. Blythe, Congestion charging: Technical options for the delivery of future UK policy, “Transportation Research Part A”, 39 (2005), p. 571.

<sup>83</sup> I. Lapsley, F. Giordano, *Congestion charging: a tale of two cities*, “Accounting, Auditing & Accountability Journal” Vol. 23 No. 5, 2010, p. 676.

<sup>84</sup> <http://transalt.org/issues/congestion/international> (accessed 10.04.2014).

<sup>85</sup> TfL, *Central London Congestion Charging. Impacts monitoring. Fifth Annual Report*, July 2007, p. 10.

<sup>86</sup> Ibidem.

<sup>87</sup> <http://tfl.gov.uk/modes/driving/congestion-charge/changes-to-the-congestion-charge> (accessed 10.04.2014).

It appears that monetary disincentives – such as the congestion charge – could (and perhaps should) be used more often as a tool to encourage people to use public transport instead of a private car. This approach is unfortunately in quite limited use across cities, as politicians are often afraid of possible negative political implications. However, Stockholm’s experience with a trial of congestion charging<sup>88</sup> showed that most of people developed a more positive attitude towards the charges during the trial<sup>89</sup>.

#### 4.2.3. Extending green taxes to the waste industry

Green taxes arguably have the potential to provide a revenue stream for public budgets and deliver environmental savings at the same time. They also, as it was stated before, enable a switch in taxation from “goods” to “bads”.

However, in the majority of Western European countries, the main emphasis has been put on carbon-related taxes while waste/resource taxation has stayed unchanged.

The landfill tax, adopted for instance in the UK, was originally designed to be a green tax. Quoting the report prepared by Environmental Services Association (ESA) entitled *Beyond landfill. Using green taxes to incentivise the waste hierarchy*: “...the Government commissioned an economic study to estimate the environmental damage costs associated with landfill and set the level of the tax at this level. The landfill tax escalator has gone on to become the principal policy driver effecting change in the waste and recycling sector”<sup>90</sup>.

The UK’s landfill tax, increased in a uniform and predictable way, was a good tool that encouraged the waste industry to invest in a range of various, alternative treatment facilities. As a result, the amount of UK waste going to landfill has been reduced by half since 2000<sup>91</sup>.

As ESA suggests, new green taxes would need to focus on:

- increasing incentives for recycling
- incentivising the best option from the environmental point of view (e.g., by encouraging high efficiency among energy-from-waste (EFW) plants or high quality recycling systems).

<sup>88</sup> The Stockholm congestion pricing trial was carried out in the first months of 2006 and restored on a permanent basis on 1 August, 2007.

<sup>89</sup> L. Winslott-Hiselius, K. Brundell-Freij, A. Vagland, C. Bystrom, *The development of public attitudes towards the Stockholm congestion trial*, “Transportation Research Part A” 43 (2009), p. 269.

<sup>90</sup> ESA, *Beyond landfill. Using green taxes to incentivise the waste hierarchy*, November 2012, p. 3.

<sup>91</sup> *Ibidem*.



Moreover, waste taxation should not complicate the tax code in a given country. The tax base of such waste taxation should be easy to identify, easily measurable, and directly correlated with the targeted behaviour. To be efficient, the tax should also be visible: for instance, taxes levied at the point of purchase have a bigger potential to influence consumer behaviour (as the successful cases of the plastic bag levy in Ireland and Poland show) than when it is levied on retailers<sup>92</sup>.

#### 4.2.4. Effects on low-income households

Green taxes have the potential to disproportionately affect low-income households. Paul Ekins and Simon Dresner have noted that poor people often cannot significantly decrease their use of environmental resources, even if incentivized by tax structures to do so. Further, even when they can decrease resource use to some extent, for example in transport (although low-income households also own cars, especially in rural areas), the correlation between income and environmental resource use is not perceivable in waste generation, water and energy use<sup>93</sup>.

Furthermore, the implications of reduced consumption vary depending on the specific resources being discussed. For example, for energy and water there is a risk of serious health effects, while for transport there is a threat of increased social exclusion<sup>94</sup>.

A more proactive approach to reducing use of environmental resources would be to invest in more energy efficient appliances (e.g., retrofitting a house to improve insulation standards, exchange old household equipment or vehicles, etc.), but this approach, too, is often beyond the financial possibilities of low-income households.

This implies a very important issue for policymakers: if they do not want green taxes and charges to be regressive (in other words: if green taxes are not to have a disproportionate effect on low-income households), they must consider some types of compensation for the effects on poorer citizens<sup>95</sup>.

<sup>92</sup> Ibidem, p. 8.

<sup>93</sup> That is not really surprising: the poorer households cannot afford to replace old appliances with modern, energy-efficient/water-saving ones; they live in housing stock of mediocre thermal characteristics and they are forced to use more energy in order to obtain an adequate level of warmth.

<sup>94</sup> P. Ekins, S. Dresner, *Green taxes and charges. Reducing their impact on low-income households*, Policy Studies Institute, York 2004, p. 48.

<sup>95</sup> Ibidem.

## Conclusions

A general rule concerning good taxation, formulated by Adam Smith, is that a tax should be cheap to collect and administer. As regards this issue, taxes on pollution may be more expensive for governments (and companies as well) to introduce in comparison to taxes on proxies to pollution. Imposing the latter is quite easy and cheap, as, for instance, there is already VAT levied on fuel and the appropriate tax infrastructure already exists. Taxes on pollution, however, sometimes come with the need to purchase monitoring equipment or employ additional staff to manage tax compliance (additional costs for polluters)<sup>96</sup>.

When designing a green tax with consideration of its impact on low-income households, policy makers also face a question of whether the costs of compensation (not only the direct costs of subsidies but also administration cost of new tax) do not exceed the expected benefits from the tax (not only direct, incoming monetary streams but also social, economic and environmental benefits). It is important to conduct a deep-reaching sophisticated cost-benefit analysis in every case.

In summary, the main advantages of environmental taxes are:

- Incentives for behaviour that protects or improves the environment, and disincentives for actions that are damaging to the environment
- Incentives for innovation and development of new, eco-friendly and innovative technologies
- An economic instrument that can facilitate achieving environmental goals at the lowest cost and in the most efficient way
- Internalization of environmental costs into prices helps to shape structural economic changes needed as a part of a shift to a more sustainable economy (i.e., internalizing externalities)
- The revenue raised by green taxes can be used as part of a smart policy mix to decrease the level of other taxes, to subsidize desired environmentally-oriented actions, and/or to help to reduce distortions in the economy
- They are transparent: it is clear when, how, and to what extent they apply.

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<sup>96</sup> OECD, *Taxation...*, op. cit., p. 112.

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## Chapter 5

# Availability of government grants, subsidies and other financial incentives for environmental innovation

*Paweł Nowakowski*

### Introduction

Financing of green projects and eco-innovations is possible with financing instruments and programs generally devoted for support of innovations and infrastructure or project development. However the main aim of this study is to analyze those governmental funding sources, which were designed in order to supply the eco-innovations and investments contributing to the projects in the field of environmental protection or climate change mitigation.

Under the term of **subsidies and grants** we will understand not only transfers of fixed sums of money in order to support financing of some projects, but also providing any other direct financial help which falls under the term of “public help” within the EU law.<sup>97</sup>

The aim of this chapter is to present the direct sources of funding provided or distributed by the governments to various types of legal entities active in the market in order to facilitate implementation of eco-innovative solutions and widely understood green projects.

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<sup>97</sup> *Environmentally Harmful Subsidies: Challenges for Reform*, OECD, Paris 2005, p. 9.

## **5.1. Characteristics of government grants and subsidies in terms of form, scope and target beneficiary group**

### **5.1.1. Public help**

State aid, in national legislation called the public help or public support, includes any funds from public sources, which were made available in any form to a private or semi-private entities for their benefit, and which could not be obtained by these entities just by doing their business. As such aid may contribute to distortions of competition in the market, it should be provided in reasonable way and extent and provided in accordance with regulatory rules.

The direct public help is a direct transfer of public funds from the national budget, local government entities, or other institutions financed from public funds to the beneficiary. Indirect public help occurs when a state or other public institution resigns from enforcement of some legally chargeable fees or provisions. The legal agreements between Member States and the European Commission sets some limits on the amount of public support which can be delivered to particular types of beneficiaries.

Government grants and subsidies are among the most common types of financing support constituting public help, provided for variable types of legal entities starting from individuals, through small companies, communities and finishing at the large holdings and local authorities. They are a popular form of financing not only on the side of beneficiaries, but also on the governmental side, as they can be simply constructed and implemented precisely to support ideas and policies perceived as priorities within the governmental policy.

Green projects and eco-innovations, due to their cross-sector character fit into many different types of subsidies and grants generally focused on promoting innovations and new technologies, but due to the recent focus on energy efficiency and climate change mitigation can benefit also from governmental financing devoted solely for environmental protection, supporting eco-innovative solutions, promoting energy efficiency and creating alternative sources of energy.

### **5.1.2. Types of projects financed by grants and subsidies**

Governmental grants and subsidies are commonly used to finance projects which are time or capital consuming, and require postponing the potential returns in time, which translates into higher risk. In addition, subsidies may be used in order to promote projects that can generate only limited amount of

revenues or provide no financial revenues. This kind of projects would not be accomplished by private investors who look for profit-generating opportunities. These patterns are also followed in green project funding. Grants allow some economically inefficient projects to be accomplished, while subsidies are primarily used in order to cut the cost of specific goods or services to a level attractive enough to become commonly available in the market. In the field of eco-projects it is especially visible in small-scale renewable energy production.

### 5.1.3. Forms of the support

Grants and subsidies may be provided in a wide range of forms. The form of support is important as it may determine the range of governmental aid in two ways. First of all, the less direct form of support the higher the multiplier factor<sup>98</sup>, and thus the higher impact of the programme. Secondly, the form determines access to funding for particular types of beneficiaries, e.g. a preferential loan is accessible only to those entities which are able to meet all requirements to qualify for a loan.

The most common instruments used in order to provide direct governmental funding for green projects are:

- investment and non-investment grants,
- low interest loans,
- credits granted by banks from the public financial resources,
- surcharge payments for some services,
- credit redemptions,
- capital investments,
- credit interest rate subsidies,
- partial credit or loan repayment,

### 5.1.4. Beneficiaries of grants and subsidies

Large companies and local authorities are the natural beneficiaries of grants provided for development of green infrastructural projects. They are large enough to undertake projects which require large capital investments even without public help. It is also the scope of duties and obligations of local authorities which makes them natural beneficiaries of funding within projects in the field of e.g. waste management, water supply and wastewater management.

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<sup>98</sup> Multiplier factor is an amount of money invested in a project subsidized by the government from other sources. The higher the multiplier, the more effective the governmental aid is. However, it cannot be the only measure of success, as achieving the objective set for the financing should always prevail.

On the other hand, grants and subsidies provided for purchase and installation of some environmentally friendly devices, or construction of small-scale renewable energy generating facilities are targeted at end consumers e.g. private persons, small housing communities or small and medium-sized companies, but also independent units of local authorities.

The group of beneficiaries of grants and subsidies designed to support R&D in the field of eco-innovations and green economy are innovative companies – not only small but also large ones, which have already invested significant amounts of capital into their R&D activity.

## 5.2. Grants and subsidies within the EU National Operational Programs

Thanks to the priorities set in the Europe 2020 strategy and 11 Thematic Objectives of Cohesion Policy<sup>99</sup> which put strong emphasis on the matters of environment, resource efficiency, and smart innovative growth, the European funds are among the most important potential sources of financing for eco-innovations and green projects in Poland and other EU member states.

Due to the fact that the economic as well as environmental situations of particular member states differ, each member state has its own strategy and its own priorities; therefore, the funds are allocated for various environmental projects. Europe has the objective to produce 20% of energy from renewable sources in 2020, however setting such an objective for Austria would make no sense, as it already produces much more (approximately 60%) of its electricity from renewable sources.

Due to that individual character of the funds resulting from different priorities set for particular countries we will concentrate on the availability of the EU Funds in the form of grants and subsidies at the national level in Poland.

According to the recently signed Partnership Agreement for the 2014-2020 perspective Poland should spend 20% of the European Funds on climate change related projects<sup>100</sup>. In total, it amounts to approximately EUR 22.7 billion in the coming 6 years. This creates a great opportunity for development of eco-innovations and green projects.

<sup>99</sup> Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013.

<sup>100</sup> Programowanie perspektywy finansowej 2014 -2020, – Umowa Partnerstwa, Ministry of Infrastrucutre and Development 2014.



### 5.2.1. Availability of subsidies and grants financed from the EU Funds in Poland

According to the Partnership Agreements, there are following **National Operational Programs** designed for the 2014-2020 perspective in Poland, which, among others, prioritize financing projects and activities perceived as green and eco-innovative:

- **OP Infrastructure and Environment** – designed mainly to support the development of the country's technical infrastructure contributing to its sustainable development. Potential beneficiaries of these funds are public entities including local authorities and big companies all around the country.
- **OP Intelligent Development** – designed to support scientific research and development of new innovative technologies and measures to enhance competitiveness of small and medium-sized enterprises. Potential beneficiaries of these funds are entrepreneurs (mainly SMEs), scientific units, clusters, business environment institutions, such as: techno-parks, technology transfer centers, business angel networks, capital funds.
- **OP Eastern Poland** – designed to support five voivodeships of Eastern Poland: lubelskie, podlaskie, podkarpackie, świętokrzyskie and warmińsko-mazurskie. The main beneficiaries of the program are: entrepreneurs, cluster initiatives, innovation centers, local government units and PKP PLK SA.
- **Regional Operational Programs** – designed to support wide range of investments depending on the regional characteristic. in the period of 2014-2020, voivodeship authorities will manage approximately EUR 31.28 billion.

Below the main priorities of Operational Programs are presented, contributing to Europe 2020 strategy in the field of eco-innovation and green economy, which in a natural way will be the source of financing for green projects for the following 7 years.

### 5.2.2. Operational Program Infrastructure and Environment 2014-2020 (OPI&E)

The OPI&E is designer mainly in order to focus on low emission economy, environmental protection, climate change counteraction and adaptation and energetic security by supporting development of country's technical infrastructure but also health care infrastructure and national heritage protection.

The OPI&E is planned to support projects contributing to fulfillment of 5 of the Thematic Objectives<sup>101</sup> set for Cohesion Policy by the EU and these are:

- TO 4 – Supporting the shift towards a low-carbon economy in all sectors
- TO 5 – Promoting climate change adaptation, risk prevention and management
- TO 6 – Protecting the environment and promoting resource efficiency
- TO 7 – Promoting sustainable transport and removing bottlenecks in key network infrastructures
- TO 9 – Promoting employment and supporting labor mobility.

The budget of the OPI&E is the largest among the funds available for Poland and amounts to EUR 27.41 billion. The support will be available from Cohesion Fund and European Regional Development Fund.

Potential beneficiaries of these funds are public entities including local authorities and big companies. The support will be equally available within the entire country.

At the national level there are 8 priority axis set for the OPI&E, out of which following will provide financing for green projects:

**Priority axis I** – with a budget of EUR 1.263 billion governed by the Ministry of Economy focusing on promotion of renewable energy sources and energy efficiency by:

- production, distribution and use of renewable energy sources (RES), i.e. construction and redevelopment of wind farms, biomass or biogas installations;
- improving energy efficiency in the public and housing sectors;
- development and implementation of smart distribution systems, such as the construction of distribution networks of medium and low voltage.

**Priority axis II** with a budget of EUR 3.458 billion governed by the Ministry of Environment focusing on environmental protection, including adaptation to climate change by:

- development of environmental infrastructure (e.g. sewage treatment plants, sewage system and water supply installations for municipal waste management, including their thermal processing);
- protecting and restoring biodiversity, improving the quality of urban environment (e.g., reduction of air pollution and the rehabilitation of degraded areas);

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<sup>101</sup> Programowanie perspektywy finansowej 2014-2020 – Umowa Partnerstwa, Ministry of Infrastructure and Development 2014.

- adapting to climate change by protecting urban areas from adverse weather events, storm water management projects in the field of small retention and disaster management systems.

**Priority axis III** with a budget of EUR 14.688 billion governed by the Ministry of Infrastructure and Development focusing on development of environmentally friendly and European scale transport infrastructure by:

- development of road and rail infrastructure in the TEN-T rail connections outside the network, and the urban environment;
- low-carbon urban transport, inland waterway transport, maritime and intermodal;
- improving the safety of air traffic.

**Priority axis V** with a budget of EUR 642 million governed by the Ministry of Economy focusing on development of energy security infrastructure by:

development of smart distribution systems, storage and transportation of natural gas and electricity, e.g. the construction of the transmission and distribution systems of natural gas or electricity.

### 5.2.3. Intelligent Development Operational Program (ID OP)

Its main purpose is to stimulate innovation in the Polish economy, by increasing private expenditure on R & D and the creation of corporate demand for innovation and research and development. It focuses not only on the eco-innovations and eco-innovative companies but on innovations and SMEs in general, however the promoting of eco-factor is among the priorities and major objectives of the program. Funding will be directed in particular to support the entire process of creating innovation from idea incubation phase, through R & D, prototyping, through to the implementation of research results.

Due to the high risk associated with implementation of innovative projects, funding research and innovation in the ID OP will rely heavily on the support in the form of grants, however the financial instruments and reimbursable funds are also planned to be provided.

The ID OP is planned to support projects contributing to fulfillment of two Thematic Objectives set by the EU and these are:

- TO 1 – Strengthening research, technological development and innovation
- TO 3 – Enhancing the competitiveness of SMEs, the agricultural sector (for the EAFRD) and the fisheries and aquaculture sector (for the EMFF).

The budget of the ID OP in Poland amounts to EUR 8,61 billion. The support will be available from European Regional Development Fund. The potential beneficiaries of these funds are entrepreneurs (mainly MESSs), scientific units, clusters, business environment institutions, such as: techno-parks, technology transfer centers, business angel networks, capital funds.

At the national level there are 5 priorities axis set for the ID OP, and majority them will be able to provide financing for green projects, especially for eco-innovations, their implementation and popularization at the level of SMEs. All axis are supervised by the Ministry of Infrastructure and Development but governed by the supporting institutions.

**Priority axis I** – with a budget of EUR 3.450 billion, governed by the National Centre for Research and Development (NCBR) focusing at supporting R&D within enterprises and scientific and industrial consortia, among others by:

- supporting R&D projects,
- providing support for conducting research and development with the participation of capital funds,
- financing R & D programs conducted by scientific and industrial consortia,

**Priority axis II** with a budget of EUR 2.423 billion governed by the Ministry of Economy focusing on support for innovations in enterprises by i.e.:

- supporting implementation of R&D results,
- creating infrastructural background for conducting R&D activity by private companies,
- providing loans for technological innovations,
- creating a guarantee fund to support innovative companies

**Priority axis III** with a budget of EUR 1.071 billion governed by the Ministry of Economy focusing on supporting the potential and environment of innovative enterprises i.e. by:

- supporting the development of open innovation;
- supporting the protection of industrial knowledge of enterprises;
- stimulating cooperation between science and business – introduction of innovation vouchers;
- development and professionalization of pro-innovative services of institutions of business environment;
- supporting cluster development – building a system of key national clusters;
- supporting enterprises and research units in preparation for participation in international programs;

- supporting internationalization of innovative enterprises;
- supporting cooperation between science and business, developing and promoting innovation as a source of competitiveness of the economy.

**Priority axis IV** with a budget of EUR 1.373 billion governed by NCBR focusing on increasing the R&D potential i.e. by:

- financing scientific research;
- developing the modern R&D infrastructure for scientific sector;
- support in creation of international research institutions.

#### 5.2.4. Eastern Poland Operational Program (EP OP)

Its main purpose is to stimulate innovation and competitiveness of the Eastern Poland macro-region. This will be achieved by focusing on:

- support in the area of innovation and R & D
- supporting the competitiveness of enterprises, in particular in the area of internationalization,
- support for improving transport systems efficiency in regions capital cities and their functional areas
- Improving the internal consistency of the macro-region.

Objectives and scope of the Program are the answer to selected development challenges outlined in the Partnership Agreement for the five provinces of this macro-region.

The EP OP is planned to support projects contributing to fulfillment of 3 Thematic Objectives set by the EU:

- TO 3 – Enhancing the competitiveness of SMEs, the agricultural sector (for the EAFRD) and the fisheries and aquaculture sector (for the EMFF);
- TO 4 – Supporting the shift towards a low-carbon economy in all sectors;
- TO 7 – Promoting sustainable transport and removing bottlenecks in key network infrastructures.

The budget of the EP OP amounts to EUR 2.117 billion. The support will be provided within the frames of European Regional Development Fund. The main beneficiaries of the program are: entrepreneurs, cluster initiatives, innovation centers, local government units and PKP PLK SA.

At the macro-regional level there are 5 priorities axis set for the EP OP, and financing for green projects will be available within some of them. All axis are supervised by the minister responsible for the regional development and

governed by the supporting agencies such as PARP, The Centre for EU Transport Projects, Polish Truism Organization.

**Priority axis I** – with a budget of EUR 485 million, focusing at developing Innovative Eastern Poland and by:

- providing support for enterprises in the field of R & D and innovation,
- increasing the capacity of business environment institutions to provide services to enterprises in terms of innovation, R & D and their implementation,

**Priority axis III – Modern transport infrastructure** with a budget of EUR 843 million focusing among others on promoting low-carbon strategies for all types of areas, in particular urban areas, including the promotion of sustainable urban transport and undertaking appropriate adaptation and mitigation actions by:

- construction/reconstruction of the rail ways, trolleybus and bus lines along with the purchase of low-emission mass transport fleet,
- implementation of new/expansion or modernization of existing telematics systems for transportation needs.

#### 5.2.5. Regional Operational Programs (ROP)

In the period 2014-2020, voivodeship authorities will manage approximately 40 percent of Cohesion Policy funds provided to Poland – it is EUR 31.28 billion. These money will be invested through 16 Regional Operational Programs – one for each voivodeship. Regional programs will be financed by the European Regional Development Fund and European Social Fund.

Negotiations with the European Commission regarding the shape of the regional programs are currently underway. However, according to the Partnership Agreement, the Regional Operational Funds should be designed in order to fulfill 10 out of eleven Thematic Objectives, therefore their scope of actions and support will be wide and will provide multiple opportunities for financing green projects and eco-innovations. Similarly as in terms of priorities set for particular countries the individual priorities for regions are expected.

The general sums allocated for particular regions in Poland are presented in the table below:

**Table 5.1. Regional Operational Programmes budgets for Polish regions**

| Voivodeship         | Total allocation for ROP – in current prices (EUR) |
|---------------------|--|
| dolnośląskie        | 2,252,546,589                                      |
| kujawsko-pomorskie  | 1,903,540,287                                      |
| lubelskie           | 2,230,958,174                                      |
| lubuskie            | 906,929,693  |
| łódzkie             | 2,256,049,115                                      |
| małopolskie         | 2,878,215,972                                      |
| opolskie            | 944,967,792  |
| podkarpackie        | 2,114,243,760                                      |
| podlaskie           | 1,213,595,877                                      |
| pomorskie           | 1,864,811,698                                      |
| śląskie             | 3,476,937,134                                      |
| świętokrzyskie      | 1,364,543,593                                      |
| warmińsko-mazurskie | 1,728,272,095                                      |
| wielkopolskie       | 2,450,206,417                                      |
| zachodniopomorskie  | 1,601,239,216                                      |
| mazowieckie         | 2,089,840,138                                      |
| <b>Total:</b>       | <b>31,276,897,550</b>                              |

Source: *Programowanie perspektywy finansowej 2014-2020, – Umowa Partnerstwa*, Ministry of Infrastructure and Development 2014,

### 5.3. Funding provided for green projects within the EU Framework Programs

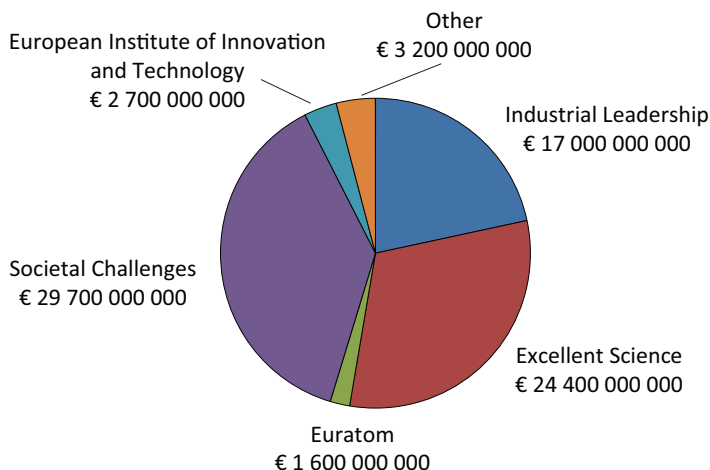
A part of the EU funding may be provided directly by the European Commission within the Framework Programs covering all member states. Among the innovation-focused Framework Programs, several have eco-innovations as one of the priorities, designed to finance investments preventing climate change and promoting energy efficiency. The most important of these are Horizon 2020, LIFE Program and COSME – for innovative SMEs.

#### 5.3.1. Horizon 2020

**Horizon 2020** is a EU financing mechanism supporting ideas of Innovative Union in Europe 2020 Strategy. Over one third of the Horizon 2020 budget, which is approximately EUR 31 billion (35%), is planned to be allocated for climate-related research such as climate change, developing sustainable

transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population.<sup>102</sup>

Figure 5.1. Horizon 2020 Budget (EUR 78.6 billion, current prices)



Source: Factsheet: Horizon 2020 budget, 2014.

The funding is granted centrally by the European Commission mainly in the form of grants distributed by calls for proposals, but also other types of instruments such as prizes, tenders or public procurement.

There are some requirements set for the entities applying for funding within the Horizon 2020 instruments. In order to meet these criteria the applications have to be filed by:

- For standard research projects – a consortium of at least three legal entities. Each entity must be established in an EU Member State or an Associated Country.
- For several other programmes including SME Instrument – single legal entity established in a Member State or in an Associated Country.

Horizon 2020 funding is designed to support actions in multiple fields. Those which are the most suitable for green projects and implementation of eco-innovations are listed below:

**Research and innovation actions** – Funding for research projects tackling clearly defined challenges, which can lead to the development of new knowledge or a new technology.

<sup>102</sup> Factsheet: Horizon 2020 budget, European Commission, 2013.



**Innovation actions** – funding is more focused on closer-to-the-market activities, such as prototyping, testing, demonstrating, piloting, scaling-up etc. if they aim at producing new or improved products or services.

For innovation actions, funding generally covers 70% of eligible costs, but may increase to 100% for non-profit organisations.

Indirect eligible costs (e.g. administration, communication and infrastructure costs, office supplies) are reimbursed with a 25% flat rate of the direct eligible costs (those costs directly linked to the action implementation).

The agenda of funding opportunities is prepared in biannual Work Programmes which are announced by the EC and which consist description of planned calls for proposals together with designated budgets and deadlines for applications.

The Horizon 2020 is organized within 6 programme sections: Excellent science, Industrial leadership, Societal challenges, European Institute of Innovation and Technology, Euratom; Spreading excellence and widening participation and Science with and for society. Among each of these programme sections there are challenges which create opportunity for green projects funding and they are listed below:

### The SME Instrument

This instrument is delivered within Industrial Leadership Programme and will provide about EUR 3 billion in funding for the high-potential SMEs to develop innovative ideas for products, services or processes.

The SME Instrument offers small and medium-sized businesses the following:

- Business innovation grants for feasibility assessment purposes: EUR 50,000 (lump sum) per project (70% of total cost of the project);
- Business innovation grants for innovation development & demonstration purposes: an amount in the indicative range of EUR 500,000 and 2,5 million (70% of total cost of the project as a general rule);
- Free-of-charge business coaching, in order to support and enhance the firm's innovation capacity and help align the project to strategic business needs;
- Access to a wide range of innovation support services and facilitated, to facilitate the commercial exploitation of the innovation.<sup>103</sup>

<sup>103</sup> <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/sme-instrument>, (accessed 2014.07.01).

### Secure, Clean and Efficient Energy

The Energy Challenge within Societal Challenges Programme with the budget of EUR 5,931 million for the current budget period will focus on seven specific objectives and research areas:

- Reducing energy consumption and carbon footprint
- Low-cost, low-carbon electricity supply
- Alternative fuels and mobile energy sources
- A single, smart European electricity grid
- New knowledge and technologies
- Robust decision making and public engagement
- Market uptake of energy and ICT innovation

The support within this challenge is planned to be provided using the typical call for proposals for projects prepared in accordance to the biannual Work Programme.

### Smart, Green and Integrated Transport

The Transport Challenge within Societal Challenges Programme has a budget of €EUR 6,339 million for current financing period, and will support projects contributing to four key objectives,:

- resource efficient transport that respects the environment,
- better mobility, less congestion, more safety and security,
- global leadership for the European transport industry,
- a socio-economic and behavioral research and forward looking activities for policy making,<sup>104</sup>

Each of them will be supported by specific activities, addressed in the Work Programme. The support will be granted by the means of call for proposals but also using calls for tenders or other instruments.

### Climate Action, Environment, Resource Efficiency and Raw Materials

Activities in this Challenge are designed to support projects contributing to the increase of European competitiveness, raw materials security and improvement of Europeans wellbeing. The total budget of the challenge is EUR 3,081 million. The set for the first two years of the financing period amounts to EUR 735 million and is designated to meet following specific objectives:

<sup>104</sup> <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/smart-green-and-integrated-transport> (accessed 2014.07.01).

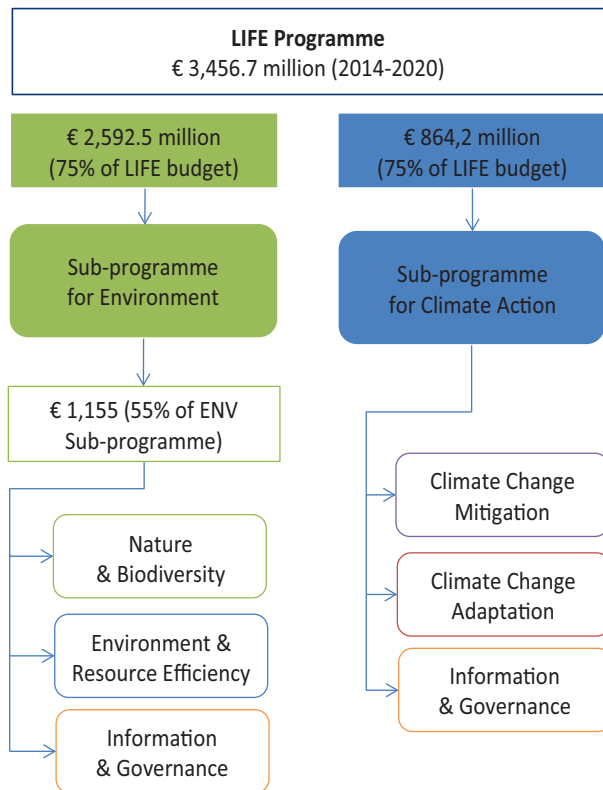
- to achieve a resource – and water – efficient and climate change resilient economy and society,
- the protection and sustainable management of natural resources and ecosystems, and
- a sustainable supply and use of raw materials, in order to meet the needs of a growing global population within the sustainable limits of the planet’s natural resources and eco-systems.

The funding will be made available mainly through calls for proposal procedure.

### 5.3.2. LIFE Programme

The **LIFE Programme** is designed for co-financing pilot and demonstration projects which will contribute to the development of EU environmental policy and legislation. Its budget for the period of 2014-2020 was set at €3.4 billion.

Figure 5.2. Structure of the LIFE programme



Source: European Commission, LIFE Programme – factsheet, 2014.

The total budget planned project funding within the Life Programme was divided into two sub-programmes: Environment with €2,59 billion assigned (€1.1 billion for 2014-2017 period), and Climate Action with €0,86 billion (€0.36 billion for 2014-2017).

### **The sub-programmes cover following priority areas:**

The sub-programme for Climate Action:

- Climate Change Mitigation focusing on reducing GHG emissions;
- Change Adaptation focusing on increasing resilience to climate change;
- Climate Governance and Information focusing on increasing awareness, communication, cooperation and dissemination on climate mitigation and adaptation actions.

The sub-programme for Environment:

- Environment & Resource Efficiency;
- Nature and Biodiversity;
- Environmental Governance & Information.

The possible project co financing rate range depending on the projects from 55% to 75%. It will be provided in the form of grants but also using pilot instruments of Natural Capital Financing (NCFF) and Private Financing for Energy Efficiency instrument (PF4EE)<sup>105</sup>. The accepted work programme features also the assumed timetable for the calls for proposals for action and operating grants as well as for the mentioned two pilot financial instruments.

## **5.4. Polish governmental subsidies and grants**

The majority of grants and subsidies financed directly by the Polish government are managed and allocated with the use of the **National Fund for Environmental Protection and Water Management (NFOŚ)**. The NFOŚ is responsible for financing green projects at the national or macro-regional level, while the regional counterparts – WFOŚiGW are focused on environmental protection at the regional level.

The NFOŚ is in charge of several types of funds. First of all, it is responsible for distribution and control over the funds designed to provide environmental protection within the national budget. In addition, in the 2007-2013 EU

<sup>105</sup> Commission Implementing Decision, of 19 March 2014 on the adoption of the LIFE multiannual work programme for 2014-17, (2014/203/EU), p. 1, 2 and 36.

financing perspective, the fund was responsible for allocation of the European Funds within the OPI&E 2007-2013 and for implementation of the Financial Instrument LIFE+, provided by the EU. Moreover, the NFOŚ was in charge of distribution and monitoring the funds from the Norwegian Financial Mechanism and the Financial Mechanism of the European Economic Area, it also manages the National Green Investments System (GIS – Green Investment Scheme) distributing money from it. So far, the NFOŚ has not been set as a supporting agency for the 2014-2020 EU funding perspective, however it can be expected that it will play this role again in the coming years.

A table listing a majority of support programs managed by the NFOŚ with some basic characteristics is presented below.

Table 5.2. Polish national support schemes managed by NFOŚ

| Support Scheme Name                                 | SOWA              | GAZELA            | Energy management in public buildings | National Program for Municipal Wastewater Treatment (KPOŚK) | Wastewater management within National Program for Municipal Wastewater Treatment | Municipal waste management systems | Waste management installations | KAWKA           | LEMUR             |
|---|-------------------|-------------------|---------------------------------------|---|--|------------------------------------|--------------------------------|-----------------|-------------------|
|   |                   |                   |                                       |   |  |                                    |                                |                 |                   |
| Financing source                                    | GIS               | GIS               | GIS                                   | Government NFOŚ   | Government NFOŚ  | Government NFOŚ                    | Government NFOŚ                | Government NFOŚ | Government NFOŚ   |
| Governing party                                     | NFOŚ              | NFOŚ              | NFOŚ                                  | water management  | water management   | waste management                   | waste management               | NFOŚ/WFOŚ       | NFOŚ              |
| Field of green economy                              | energy efficiency | energy efficiency | energy efficiency                     | 2014-2015   | 2014-2025  | 2014-2020                          | 2014-2020                      | air pollution   | energy efficiency |
| Financing period                                    | 2013-2017         | 2013-2015         | 2010-2017                             | 2014-2015   | 2014-2025  | 2014-2020                          | 2014-2020                      | 2014-2020       | 2014-2020         |
| Financing allocation                                | 2014              | 2014              | 2010-2016                             |   | 2014-2015  | 2014-2017                          | 2014-2017                      | 2014-2015       | 2014-2020         |
| <b>Form of support</b>                              |                   |                   |                                       |   |  |                                    |                                |                 |                   |
| <i>grant</i>  | x                 | x                 | x                                     | -   | -  | -                                  | -                              | x               | x                 |
| <i>loan</i>   | x                 | -                 | x                                     | x   | x  | x                                  | x                              | -               | x                 |
| <i>subsidies to the bank loan capital repayment</i> | -                 | -                 | -                                     | -   | -  | -                                  | -                              | -               | -                 |
| <i>interest rate subsidies on bank loans</i>        | -                 | -                 | -                                     | x   | x  | -                                  | -                              | -               | -                 |
| <i>subsidies to the price of bonds redemption</i>   | -                 | -                 | -                                     | x   | x  | -                                  | -                              | -               | -                 |
| <b>Budget</b>                                       |                   |                   |                                       |   |  |                                    |                                |                 |                   |
| <i>grant</i>  | 160 000 000 PLN   | 80 000 000 PLN    | 350 000 000 PLN                       | 17 000 000 PLN  | 205 000 000 PLN  | 46 000 000 PLN                     | 405 000 000 PLN                | 30 000 000 PLN  | 30 000 000 PLN    |
| <i>loan</i>   | 196 000 000 PLN   | -                 | 465 000 000 PLN                       | 237 000 000 PLN   | 392 800 000 PLN  | 21 050 000 PLN                     | -                              | 270 000 000 PLN | 270 000 000 PLN   |

| Support Scheme Name                                | SOWA           | GAZELA        | Energy management in public buildings | National Program for Municipal Wastewater Treatment (KPOŚK) | Wastewater management within National Program for Municipal Wastewater Treatment | Municipal waste management systems | Waste management installations | KAWKA | LEMUR          |
|--|----------------|---------------|---------------------------------------|---|--|------------------------------------|--------------------------------|-------|----------------|
| <b>Maximum level of support</b>                    |                |               |                                       |   |  |                                    |                                |       |                |
| <i>grant</i>                                       | 15 000 000 PLN | -             | -                                     | -   | -  | -                                  | -                              | -     | -              |
| <i>loan</i>  | 18 300 000 PLN | -             | -                                     | -   | -  | -                                  | -                              | -     | PLN 1000 / sqm |
| <b>Minimum level of support</b>                    |                |               |                                       |   |  |                                    |                                |       |                |
| <i>grant</i>                                       | -              | 8 000 000 PLN | 2 000 000 PLN                         | -   | -  | -                                  | -                              | -     | 1 000 000 PLN  |
| <i>loan</i>  | -              | -             | -                                     | -   | 1 000 000 PLN  | -                                  | -                              | -     | 1 000 000 PLN  |
| <b>Loan</b>  |                |               |                                       |   |  |                                    |                                |       |                |
| <i>interest rate (annual)</i>                      | 3%             | -             | WIBOR 3M + 50 pp.                     | 2,50%   | 2,50%  | 1,0%                               | 3,5%                           | -     | min. 2%        |
| <i>lending period</i>                              | 10 years       | -             | 15 years                              | 15 years  | 15-25 years  | 5-15 years                         | 15 years                       | -     | 15 years       |
| <i>grace period</i>                                | 18 months      | -             | 18 months                             | 6 months  | 6 months   | 18 months                          | 18 months                      | -     | 18 months      |
| <b>Maximum share of funding within the project</b> |                |               |                                       |   |  |                                    |                                |       |                |
| <i>grant</i>                                       | 45%            | 100%*         | 30%                                   | -   | -  | -                                  | -                              | 90%   | 70%            |
| <i>loan</i>  | 55%            | -             | 60%                                   | 100%  | -  | 90%*                               | 75%*                           | -     | -              |
| <b>Beneficiaries</b>                               |                |               |                                       |   |  |                                    |                                |       |                |
| <i>Private Companies/ entrepreneurs</i>            | -              | X             | -                                     | -   | -  | X                                  | X                              | -     | -              |
| <i>Local authorities</i>                           | X              | X             | X                                     | X   | X  | X                                  | X                              | X     | X              |
| <i>Public companies</i>                            | X              | X             | X                                     | -   | X  | -                                  | -                              | X     | X              |
| <i>Utilities companies</i>                         | -              | X             | X                                     | X   | X  | -                                  | -                              | -     | X              |
| <i>Other</i>                                       | -              | -             | X                                     | -   | -  | -                                  | -                              | -     | X              |
| <i>Private individuals</i>                         | -              | -             | -                                     | -   | -  | -                                  | -                              | -     | -              |

| Support Scheme Name                                 | Loan subsidies for credits taken for construction of energy efficient houses | Investments in energy efficiency in small and medium sized companies | BOCIAN           | Subsidies for partial repayment of bank loan taken in order to finance construction of Thermal-photovoltaic energy sources | Prosument        | Increasing energy efficiency in companies and E-akumulator |
|---|--|--|------------------|--|------------------|--|
| Financing source                                    | Government   | Government   | Government       | Government   | Government       | Government   |
| Governing party                                     | NFOŚ   | NFOŚ   | NFOŚ             | NFOŚ   | NFOŚ             | NFOŚ   |
| Field of green economy                              | energy efficiency  | energy efficiency  | renewable energy | renewable energy   | renewable energy | energy efficiency  |
| Financing period                                    | 2013-2018  | 2014-2016  | 2014-2022        | 2010-2015  | 2014-2020        | 2014-2017  |
| Financing allocation                                | 2013-2018  | 2014-2015  | 2014-2018        | 2010-2015  | 2014-2018        |  |
| <b>Form of support</b>                              |  |  |                  |  |                  |  |
| <i>grant</i>  | -  | -  | -                | -  | X                | -  |
| <i>loan</i>   | -  | -  | X                | -  | X                | X  |
| <i>subsidies to the bank loan capital repayment</i> | X  | X  | -                | X  | -                | -  |
| <i>interest rate subsidies on bank loans</i>        | -  | -  | -                | -  | -                | -  |
| <i>subsidies to the price of bonds redemption</i>   | -  | -  | -                | -  | -                | -  |
| <b>Budget</b>                                       |  |  |                  |  |                  |  |
| <i>grant</i>  | 300 000 000 PLN  | 60 000 000 PLN   | -                | 82 000 000 PLN   | 150 000 000 PLN  | -  |
| <i>loan</i>   | -  | -  | 420 000 000 PLN  | -  | 450 000 000 PLN  | 425 000 000 PLN  |
| <b>Maximum level of support</b>                     |  |  |                  |  |                  |  |
| <i>grant</i>  | 50 000 PLN   | 1 000 000 PLN  | -                | -  | -                | -  |
| <i>loan</i>   | -  | -  | 40 000 000 PLN   | -  | -                | 50 000 000 PLN   |



| Support Scheme Name                                | Loan subsidies for credits taken for construction of energy efficient houses | Investments in energy efficiency in small and medium sized companies | BOCIAN                     | Subsidies for partial repayment of bank loan taken in order to finance construction of Thermal-photovoltaic energy sources | Prosument     | Increasing energy efficiency in companies and E-akumulator |
|--|--|--|----------------------------|--|---------------|--|
| <b>Minimum level of support</b>                    |  |  |                            |  |               |  |
| <i>grant</i>                                       | 11 000 PLN   | -  | -                          | -  | 1 000 000 PLN | -  |
| <i>loan</i>  | -  | -  | 2 000 000 PLN              | -  | -             | 300 000 PLN  |
| <b>Loan</b>  |  |  |                            |  |               |  |
| <i>interest rate (annual)</i>                      | -  | -  | WIBOR 3M - 100 pp., min 2% | -  | 1%            | WIBOR 3M - 150 p.p. min 2,5%                               |
| <i>lending period</i>                              | -  | -  | 15 years                   | -  | 15 years      | 10 years   |
| <i>grace period</i>                                | -  | -  | -                          | -  | -             | 12 months  |
| <b>Maximum share of funding within the project</b> |  |  |                            |  |               |  |
| <i>grant</i>                                       | -  | 15%  | -                          | 45%  | 30%           | -  |
| <i>loan</i>  | -  | -  | 75%                        | -  | 70%           | 75%  |
| <b>Beneficiaries</b>                               |  |  |                            |  |               |  |
| <i>Private Companies/entrepreneurs</i>             | -  | X  | X                          | -  | -             | X  |
| <i>Local authorities</i>                           | -  | -  | -                          | -  | X             | -  |
| <i>Public companies</i>                            | -  | -  | -                          | -  | -             | X  |
| <i>Utilities companies</i>                         | -  | -  | -                          | -  | -             | X  |
| <i>Other</i>                                       | -  | -  | -                          | X  | -             | -  |
| <i>Private individuals</i>                         | X  | -  | -                          | X  | -             | -  |

Source: own work, based on the programmes published by NFOŚ

## 5.5. Other types of direct financial support allocated by government in Poland

### 5.5.1. EEA Grants and Norway Grants

Norwegian Financial Mechanism and the European Economic Area Financial Mechanism, i.e. EEA and Norway Grants, are a source of financing available for some green projects thanks to the aid granted by Norway, Iceland and Liechtenstein to the new UE Member States.

The first edition covered the period 2004-2009, current, second edition of the grants is implemented from 2009 to 2014 in following countries: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain.

The budget of EEA and Norway Grants designated for Poland accounted EUR 570 million over these 5 years. Currently, almost all calls for proposal have been announced and money allocated. Information regarding the continuation of these help after the year 2014 are not available yet.

Within the EEG and Norway Grants mechanism there are several priority programs among which some could provide financing for green projects i.e.: Protection of the environment and renewable energy, managed by NFOŚ. The CO<sub>2</sub> capture and storage (CCS) priority – implemented by single predefined project in Bełchatów.

The support within the EEG Grants in the field of green economy was so far directed mainly to public entities such as local authorities or companies fulfilling the public duties. The provided grants might accounted for up to 80% of eligible project costs.

### 5.5.2. Thermo-modernization and Retrofitting Fund

Among the other types of governmental financing sources for some green projects in Poland is the Thermo-modernization and Retrofitting Fund (TRF). It is one of target funds created by Polish government, financed from Polish budget and distributed by the BGK – Polish state owned bank.

Within this programme there are three types of support possible:

- Thermo-modernization Bonus,
- Retrofit Premium,
- Compensation Bonus

All bonuses and premiums are delivered to final beneficiaries as partial repayment of the commercial loan taken for construction or retrofitting project.

The Thermo-modernization Bonus has the widest range of influence as it is directed to local governments, private companies, housing communities and private house owners as well as to the heat production or heat network management companies.

A Thermo-modernization Bonus provides financial support for thermo-modernization projects which aim at:

- reducing energy consumption for heating and water heating in various types of residential buildings;
- reducing the cost of the heat delivered to those buildings – as a result of a new technical connection to a centralized heat source which is accompanied by removal of the local heat source;
- reduction of primary energy losses in the local district heating networks and supply them local heat sources;
- total or partial replacement of traditional energy sources with renewable or cogeneration application – with the obligation to obtain specified in the savings in energy consumption.

In order to qualify for the project, the applicants are to provide an energy audit which will be positively verified by BGK. The basis for TRF is one of polish legal acts, therefore currently it has no validity time limit.

The Thermo-modernization Bonus may account for 20% of credit used for financing the investment, but not more than 16% of the eligible costs incurred for the project and not more than twice the amount of projected annual savings in energy costs. These are determined based on an energy audit.

Annually approximately PLN 160-170 million is provided by the government for this purpose what allows for financing up to 3,600 projects.

## 5.6. Examples of state subsidies and grants available for green projects in other countries

### 5.6.1. Australia<sup>106</sup>

In Australia there are multiple institutions providing financing for green, environmentally friendly projects one of them is the Australian Renewable Energy Agency (ARENA) has a budget of approx. AUD3.2 billion with the aim of improving the competitiveness of renewable energy technologies and increasing

<sup>106</sup> Based on the KPMG Green Tax Index report.

the supply of renewable energy in Australia. ARENA is also responsible for control over previously allocated funding under a number of programs: Regional Australia's Renewables, Emerging Renewables Program, Advanced Biofuels Investment, Investment Readiness Program and the Renewable Energy Venture Capital Fund

### 5.6.2. The United Kingdom

One of major British initiatives is **The Green Deal**<sup>107</sup> which was launched in January 2013 and applies to both domestic and non-domestic sectors. The support is provided in the form of a loan to the beneficiary for installation of proper energy efficiency measures package. It is installed at no up-front cost from a Green Deal provider. The cost of the measures is paid off long-term (for example 25 years) through repayments made via energy bills. The customer's energy supplier will act as a conduit to pass the Green Deal repayments to the Green Deal provider.

In contradiction to an ordinary loan, under the Green Deal, the beneficiary is not liable for the whole principal, but only the repayments whilst they occupy the property. If the property owner or occupant changes, the obligation to pay the Green Deal charge on the energy bills will pass on to the new occupier. The Green Deal includes owner-occupiers, the private and social rented sectors as well as the commercial sector.

The British Government believes Green Deal loans will be repaid at a rate not exceeding 6.92%. This is, however, significantly higher than average household mortgage loans, which reduces the popularity of the scheme.

Another support scheme is the **Renewable Heat Incentive**<sup>108</sup> (RHI), which is the long-term financial support programme for renewable heat introduced in the UK in two phases:

- Domestic RHI – launched 9 April 2014 and open to homeowners, private landlords, social landlords and self-builders
- Non-domestic RHI – launched in November 2011 to provide financial support to industry, businesses and public sector organisations

The idea of the RHI is similar to the feed-in-tariffs i.e. participants of the scheme who generate and use renewable energy to heat their buildings are

<sup>107</sup> <https://www.gov.uk/green-deal-energy-saving-measures/overview> (accessed: 2014.07.01).

<sup>108</sup> <https://www.gov.uk/government/policies/increasing-the-use-of-low-carbon-technologies/supporting-pages/renewable-heat-incentive-rhi> (accessed: 2014.07.01).

being paid for that in order to lower the installation costs of the renewable energy producing devices.

The participants benefit in two ways:

- They save money by eliminating or reducing their need for gas or oil,
- They are paid fixed amounts for the hot water and heat generated and used themselves. The amount of the additional payments depends on the type of the heating system used.

The tariff is fixed but inflation-adjusted and guaranteed for 20 years from the registration date. Expected return period for the investment is 9 years, which should guarantee attractive return on investment.

The tariffs apply only to listed technologies approved by the government. There are various detailed technical and accreditation requirements which have to be met.

### 5.6.3. Canada<sup>109</sup>

In Canada the Next Generation Biofuels Fund of USD490 million provides up to 40% of eligible costs for first-of-kind large scale demonstration facilities for next-generation renewable fuels. The contribution will be repayable at a rate based on the company's free cash flow over a period of 10 years after project completion. Additionally the Freight Technology Incentives Program provides financing to support the purchase and installation of proven technologies reducing the emissions of air pollutants and GHGs. Among the examples there are: hybrid switching locomotives, diesel anti-idling equipment and electronic speed control systems. The program requires provides the minimum funding of CAD 25,000 with the top limit of 50 percent of project total eligible costs, or CAD 500,000 over a 2-year period.

## Conclusions

What is important to be aware of is that each of the funding sources is constructed in a way that makes it available to a particular group of beneficiaries. Governments as well as the European Union tend to withdraw from providing support in the form of direct grants, preferring other types of state aid such as preferential loans and partial repayment of commercial loan principal.

<sup>109</sup> Based on the KPMG Green Tax Index report 2013.

These types of support, although less attractive from the point of view of beneficiaries, make governments analyze the projects more thoroughly and organize them in a form that is closed to the market.

The efficiency of funds provided through grants and subsidies depends on many factors, such as territorial limitations, available budget, form of support (preferential loan, grant, partial repayment of a credit etc.), beneficiary group and many others. The governmental funding is focused on providing support for tangible assets and tangible projects. In Poland, significantly larger aid in terms of volume but also in terms of support programmes is available to public entities or quasi-private companies focusing on infrastructural projects. Private companies are offered significantly weaker support, therefore they should look for financing their eco-innovative solutions from other sources.

## Chapter 6

# Barriers to accessing eco-finance

*Paweł Nowakowski*

### Introduction

Access to finance is an important element facilitating dissemination of eco-innovative solutions, technologies and products. In order to bridge the existing “financial gap” in eco-innovations and green projects, governments implemented multiple instruments of financial support. The development potential in this field was also spotted by the private sector which provides financing through specialized venture capital funds and business angels associations.

In spite of this, there are still some barriers which block access to financing. These barriers are not necessarily of economic nature, **many of them are of political, social and human origin**<sup>110</sup>. The aim of this chapter is to present and analyse barriers faced in general by green projects and additionally those experienced especially by eco-innovative SMEs.

### 6.1. Types of barriers

There are some general barriers which result from specific risks and characteristics of eco-innovations but also barriers specific for particular types of green projects. The biggest differences can be observed between barriers encountered by SMEs in their eco-innovative activity and green projects implemented in the field of built environment. Some general barriers to financing almost all types of green projects are discussed below.

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<sup>110</sup> EIM and Oxford Research, *Financing Eco-innovation Final Report*; 2011, pp. 44, and Amin, T. Dimsdale, M. Jaramillo, *Designing smart green finance incentive schemes*, E3G, London, 2014, p. 6.

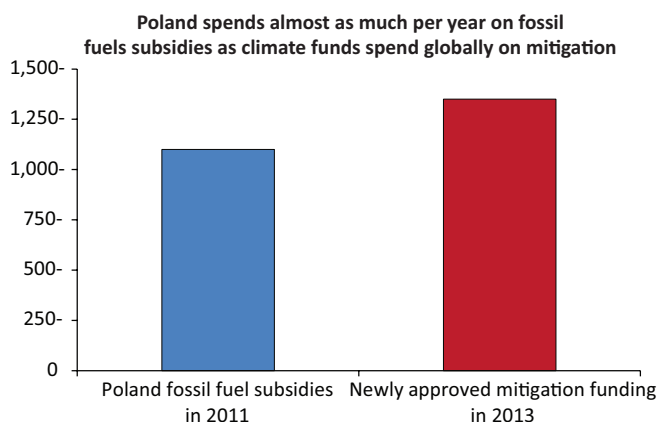
### 6.1.1. Location barrier

One of the main barriers to accessing eco-finance is location. The incentives and support programs presented in previous chapters are to a major extent locally oriented. It concerns not only governmental support, which is naturally limited with the state borders, but also international and local programmes as there are discrepancies in access to finance even within the national borders. Projects or companies located in Eastern Poland may benefit from a wider range of European Funds than similar companies located in Western Poland or in London in the UK, but at the same time they have limited access to VC or BA funding.

### 6.1.2. Policy and regulatory insecurity

Although governments implement multiple policies and regulations in favour of green solutions, the fact that eco-innovations depend largely on regulations makes them especially vulnerable to any changes in policies and legal rules<sup>111</sup>. It is the inconsistent and changing policy that discourages potential investors.<sup>112</sup> Governments try to counteract these fears by making long-term commitments – e.g. by introducing feed-in-tariffs, which are being granted for up to 20 years, but at the same time many countries subsidize the extraction of fossil fuels, which evokes the feeling of double-dealing.

Figure 6.1. Fossil Fuel Subsidies in Poland



Source: <http://www.climatefundsupdate.org/>

<sup>111</sup> A. Amin, T. Dimsdale, M. Jaramillo, *op. cit.*, p. 6.

<sup>112</sup> G. Marin, A. Marzucchi, R. Zoboli, *SMEs and Barriers to Eco-Innovation in EU A Diverse Palette of Greens*, 2014.



### 6.1.3. Technological risks

Technological risk is characteristic of almost all types of green projects and is present in all sectors of the economy. It depends on the level of development of the technology deployed, and therefore in a natural way attracts or repels specific types of potential financing, e.g. a public-sector sponsor will accept risk connected to financing R&D, which is unacceptable to a venture capitalist. It is crucial to convince financing providers that the supported technology is able to perform consistently in a commercial setting, to meet commercial standards over the whole life cycle of the project and that it will not become prematurely obsolete.

### 6.1.4. Market barriers

There are several market barriers to accessing eco-finance, which are especially important when it comes to private investment sources, as those are driven by market conditions in the first place.

#### 6.1.4.1. Project profitability barrier

Green projects and eco-innovations are also subject to **market conditions and expectations**. It is especially important when private financing sources are concerned. Research<sup>113</sup> shows that private capital is aware of the positive environmental effects of green projects, but it is being treated as a kind of bonus, while **the economic output of the project**, usually measured based on its rate of return, **remains the most important element**. As for private funding, green projects and eco-innovations have to compete in terms of possible returns in the same market with other projects and innovations which do not produce any externalities. The problem is that externalities generated by green projects do not generate additional cash flow for capital providers.

#### 6.1.4.2. Market immaturity

The investments in eco-innovations and green projects increase relatively fast, however it is still an immature investment market, with low supply of finance and low number of potential investment deals. This market immaturity may cause some deal flow problems resulting from an insufficient number of commercially attractive deals available, making diversification of investment

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<sup>113</sup> *Financing Eco-innovation Final Report*; EIM and Oxford Research, 2011, p. 68.

portfolios difficult to achieve.<sup>114</sup> Another disadvantage is the low number of potential deals combined with low level of available information, which causes comparability problems for potential investors.

#### 6.1.4.3. High up-front costs

Green technologies are characterized by high up-front costs resulting from product immaturity and its innovative character. As a result, entities struggling for financial support will have to spend more in the beginning. Many programmes support the expenditures of 60-75% of the costs, therefore the remaining 25-40% still has to be raised by the financed party.

#### 6.1.5. Insufficient collateral

Collateral value of green infrastructure and green equipment is low because those assets entail high engineering, development and installation costs. In addition, innovative equipment is highly specific to a certain site or application and usually hardly transferable (specialized assets cannot be redeployed without sacrificing the productive value), which makes the investment illiquid and limits its collateral potential.

As for SMEs, it is especially important for early-stage eco-innovative companies, as they usually have a lot of potential and intangible assets, while only tangible assets can be offered as collateral.

#### 6.1.6. Investment scale

Investment scale is a barrier specific for green projects. It is especially visible in the field of renewable energy generation, where projects are strongly distributed in comparison to traditional power plants. They are smaller, but at the same time in many cases cannot be standardized. Large and standardized projects have a competitive advantage due to economies of scale but also due to lower project operating costs such as due-diligence and transaction costs.

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<sup>114</sup> D.P. Goldman, J.J. McKenna, L.M. Murphy, *Financing Projects That Use Clean-Energy Technologies: An Overview of Barriers and Opportunities*, National Renewable Energy Laboratory, Golden, 2005.

## 6.2. Barriers to access finance for eco-innovative SMEs

For our purposes, the term of “eco-innovative SMEs” will be understood as companies that fall within the EU definition of SMEs and whose activity focuses on **developing or implementing innovations which target markets of “eco” industries**.<sup>115</sup>.

SMEs face specific barriers while trying to finance their eco-innovative initiatives. They need financing at all stages of development mainly for R&D, concept projects, prototypes, and further for commercialization and diffusion of the invented eco-innovations.

The survey conducted in 2011 for the European Commission, DG Environment, showed that it is the initial funding, required at the pre-seed or seed stage of development, that is usually the hardest to raise. That is why the transition from R&D funding to the market-based funding is often called a “**valley of death**”. It is because of eighteen barriers identified in the survey that SMEs are confronted with at the early stage of their development. These barriers have been divided into internal and external ones.

**Internal barriers** result from low level of resources of any kind, not only financial but also skills, experience, workforce, financial knowledge and awareness of the company’s own imperfections. The most important of the identified internal barriers are **limited resources allocated to seeking or securing financing, insufficient collateral availability and high administrative burdens**<sup>116</sup>. The identified internal barriers are common for SMEs in general, not only to eco-innovative SMEs.<sup>117</sup>

The personnel or team shortages were among those pointed out the most often by the financing institutions which had the opportunity to meet and analyze not only the companies that received funding, but also those that did not succeed.

The **external barriers** are in general a result of some market failures, immaturity or regulatory limitations. Among them, the interviewed companies and institutions mentioned the following three as the most important: **available financing not tailored to small-scale investment needs (up to €300.000), potential financing suppliers insufficiently engaged into eco-innovative industries, and uncertainty of government regulation**<sup>118</sup>. The enumerated

<sup>115</sup> *Financing Eco-innovation Final Report*; EIM and Oxford Research, 2011, p. 9.

<sup>116</sup> *Ibidem*, p. 44.

<sup>117</sup> *SME Access to Finance, Flash Eurobarometer 174*, European Commission, 2005 pp. 50-51.

<sup>118</sup> EIM and Oxford Research, *op. cit.*, p. 45.

barriers are among the most discussed in other reports and publications including the OECD reports.<sup>119</sup>

External barriers, in opposition to internal ones, are in general specific for the area of eco-innovations, therefore, they should be perceived as the most important to overcome. All barriers (both internal and external) are perceived to be more significant for early stage eco-innovative SMEs compared to eco-innovative companies at later stages of development<sup>120</sup>.

## Conclusions

In spite of some efforts made by governments and private sector to promote development of eco-innovations and green projects, they are still subject to rules of the market, and therefore have to overcome multiple barriers to get access to external financing. Only some of these barriers are specific for green projects. The major identified barriers to accessing eco-finance are:

- location
- regulatory instability,
- market immaturity
- project profitability,
- technology risks,
- insufficient collateral.

The result of these barriers is visible in the common financing structure of green projects but mainly in the financing structure of eco-innovative small and medium-sized companies. This structure will be presented in the next chapters, together with the steps taken in order to overcome the identified barriers.

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<sup>119</sup> OECD, *SMEs and Green Growth: Promoting sustainable manufacturing and eco-innovation in small firm*, 2010, pp. 3-7.

<sup>120</sup> EIM and Oxford Research, *op. cit.*, p. 47.

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## Chapter 7

# Instruments facilitating access to eco-finance

*Paweł Nowakowski*

In the previous chapters we focused on the barriers in accessing eco-finance and financing structure of eco-innovative companies, which are a result of these barriers. In this chapter we will present mechanisms and tools used by public and private sector in order to overcome these identified barriers. For this purpose we will discuss:

- risk sharing instruments which constitute for new type of additional actions undertaken by governments and the EU in order to overcome some of the identified barriers in acquiring financing for green projects;
- JESSICA financing instrument – Joint European Support for Sustainable Investment in City Areas;
- eco-incubators as a source of support for development of eco-innovations and eco-innovative SMEs.

### 7.1. Risk sharing instruments

#### 7.1.1. Introduction

The idea behind the risk-sharing instruments is to provide financial tools which will lower the risk of external investors, and thus allow for easier access to financing for eco-innovative companies. The risk is lower thanks to public engagement into the investment process by moving a part of the risk from the private investor to the public supporting body.

The risk-sharing instruments are relatively new instruments supporting innovative and eco-innovative investments, which in general are characterized by high risk and low availability of collateral. This type of support is, for the

most part, targeted at small and medium-sized companies at the early stage of development which, as presented in previous chapters, have the biggest problems with acquiring external financing.

The risk-sharing instruments are promoted by the EU, which supports their creation through the ERDF. Risk-sharing instruments have been implemented in two main fields:

- **banking sector** -providing debt financing
- **business angels** -providing equity financing for companies at the early stage of development.

The details are presented below:

### 7.1.2. Debt financing risk-sharing instruments

As it was shown in the chapters on barriers to accessing eco-finance and financing structure of eco-innovative companies, there are several reasons for banks to be reluctant to lend money to young, inexperienced and technically advanced companies. The most important of these are:

- there is an information asymmetry between banks who are supposed to deliver funding and eco-innovative SMEs which seek this funding. Banks have problems to assess the risk connected to the project properly, as they do not have enough technical skills and the companies usually share only positive type of information, and are able to hide shortcomings,
- eco-innovative companies deliver usually new unproven products, for which market demand is unknown, which makes it hard to calculate potential income,
- there is a general lack of collateral in eco-innovative companies due to high importance of soft investments,<sup>121</sup>

All these elements make banks, which in general engage in moderately or low-risk projects, tend to avoid financing eco-innovative companies at early stages of development. It is worth remembering that even if the supported company is an extraordinary success, banks cannot count on additional income, as the initially set interest rate cannot be exceeded.

In order to counteract these tendency, and make small-scale debt financing more available for innovative companies, new instruments have been developed enabling public institutions and private banks to share risk, and this way to lower it to the point acceptable for private banks. These instruments are

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<sup>121</sup> EIM and Oxford Research, *op. cit.*, p. 110.

generally targeted at innovative companies, and not precisely eco-innovative companies, but the latter are fully eligible to use these financing sources. The risk-sharing programmes are supported to a large extent by the EU which has introduced two Europe-wide pilot programmes: Risk Sharing Finance Facility (RSFF)<sup>122</sup> designed to support R&D in public institutions and medium-sized companies by providing loans and mezzanine financing for high-risk projects, and Risk Sharing Instrument for Innovative Research oriented SMEs & Small Mid-Caps (RSI), intended to support SMEs and Mid-Caps and completing the scope of RSFF. Under RSI, the EIF issues guarantees and counter-guarantees to selected financial intermediaries, thus allowing them to provide loans, financial leases and loan guarantees to research-based SMEs and/or Small Mid-Caps.<sup>123</sup>

At the national level such instruments are usually operated by state-run promotional banks like KfW in Germany, AWS in Austria or Credit Cooperatif in Belgium which often cooperate with private banks as intermediaries. The EU is usually the source of financing for multiple risk-sharing instruments, which is distributed within the ERDF. One of a few programmes which are targeted at environmental SMEs (but not necessarily at eco-innovative ones) is offered by the Credit Cooperatif in Belgium, where it is combined with the engagement of a business angel. National support schemes are often supplied with the EU funding, therefore they are active in appropriate EU budget periods.

The risk-sharing instruments assume sharing the risk either by engaging several creditors, one of whom is usually a public institution, or by combining two or more borrowers within one enterprise. The major form of support in this case is a loan guarantee provided by the public institution, however there are also other forms of support which may vary. The most common of them are listed below:

**Loan guarantees** – the public institution, usually a government-owned bank, issues a document which guarantees repayment of a part of a loan taken by the SME. The percentage of the loan covered with a guarantee varies (usually between 50-75%), depending on the risk level. Guarantees serve as a form of collateral for the banks if the collateral from the borrower appears insufficient. This way they lower the risk taken by the bank, and thus make more projects suitable for debt financing.

**Lower interest rate** – lowering the interest rate below the market level is a form of subsidy, but not necessarily a direct one. This may refer to a loan guarantee which, by providing a collateral, lowers the risk taken by the bank,

<sup>122</sup> <http://www.eib.org/products/rsff/financing-products/index.htm> (accessed 01.07.2014).

<sup>123</sup> [http://www.eif.org/what\\_we\\_do/guarantees/RSI/](http://www.eif.org/what_we_do/guarantees/RSI/) (accessed 01.07.2014).



and allows the bank to apply lower interest rate. It is important especially for projects with low rate of return or SMEs with low level of profit.

**Grace period** – is a common benefit in many types of preferential loans. Concerning risk-sharing instruments targeted at SMEs, the grace period is especially relevant for the companies with longer development time, as they cannot generate positive cash flow in the first years of activity. The grace period should be longer for start ups-in comparison to established SMEs.

**Subordinated loans** – this type of support is used not only in debt financing but also in equity investments. The mechanism of a subordinated loan is activated if the borrower goes bankrupt. Then the provider of the subordinated loan is in a subordinated position in relation to other debt providers, which means that his claims will be satisfied only if the claims of regular creditors are fully satisfied. Thanks to the subordinated loan, the risk taken by the banks is reduced as they have to provide only a part of the capital and are ranked as the first creditors to be repaid in the event of company's failure.

The described promotional elements may be combined in various ways in order to create risk-sharing instruments aimed at specific groups of companies. Apart from special loan provisions, banks sometimes offer support in the form of non-financial services, for example advisory services, to enterprises. These usually require some preconditions which have to be met in order to apply for the risk-sharing instruments financing.

#### 7.1.2.1. Examples of risk sharing instruments

Basic information regarding support provided by two national institutions in Sweden and one in Germany as well as a more precise description of the EU RSI and RSFF instruments is presented below.

##### RSI and RSFF instruments

The RSFF and RSI are facilities developed jointly by the European Commission (EC) and the European Investment Bank (EIB). They operate on a slightly different basis. As for RSFF, the EIB provides funding directly, as it is designed to support large projects. On the other hand, access to RSI facility is available only through intermediaries – banks which have previously signed proper agreements with the EIB, in Poland it was the Bank Pekao S.A.

Each intermediary can grant credits and loans for a sum of up to EUR 80 million with 50% of this amount being granted by the EIB. Thanks to low costs of capital raised and the non-profit character of the bank, it can offer low and

attractive interest rates. Thanks to the guarantee, banks are also more willing to grant financing to SMEs.

Both risk-sharing instruments are perceived as a success story. In the 2014-2020 financing period their equivalents are planned to be implemented under the Horizon 2020 framework Programme with EUR 3.5 billion budget. The instruments are perceived as a success, due to high multiplier factor of such support in mobilizing private investments.

### **ALMI – Innovation Loan**

ALMI is a Swedish state-owned bank, which cooperated with county councils, regional authorities, and municipal cooperative bodies through its subsidiaries in order to support development of innovative companies by providing debt financing in the form of Innovation Loan. Innovation Loan is a conditional loan, which means that SMEs which applied for the loan will have to meet a number of conditions in order to qualify for it. It is designed to focus on innovative projects, which are waiting to be commercialized.

The percentage of loans that are provided to eco-innovative SMEs is estimated to be 15-20% of all loans. Approximately 30% of the loans granted are not repaid.<sup>124</sup>

ALMI Innovation Loan can provide financing starting from €5,000 (SEK 50,000) up to €44,000 (SEK 400,000), and the maximum share of ALMI in the expected total financing cannot exceed 50%. For loan principals above €33,000 (SEK 300,000) at least half of the financing has to be co-financed either by self-payment, additional bank loans, or other forms external funding.<sup>125</sup>

The maximum loan period is 8 years but it is divided into two phases: 1. The project period until commercialization (up to 3 years); 2. The repayment period (after commercialization of the project).

The interest rate is variable and in general higher than the interest rates in banks. During the project period it is at the same level as ALMI's basic interest, but after the project is commercialized it rises by three percentage points. There is a possibility to obtain the grace period of up to 3 years during the project period.

### **KfW Mittelstandsbank financing instruments**

KfW Mittelstandsbank is a German state-owned promotional bank and one of the banks which provide major support to innovative SMEs in Europe thanks

<sup>124</sup> EIM and Oxford Research, *op. cit.*, p. 112.

<sup>125</sup> <http://www.almi.se/Blekinge/Erbjudanden/Innovationslan/>

to cooperation with the EU. The KfW Mittelstandsbank acts via intermediaries – mainly banks, and thus is active not only in Germany, but also in other European countries. In Poland it provides funding through Bank Ochrony Środowiska S.A.

The intermediary banks grant funding and monitor the development and success of the supported enterprises. The KfW refinances these banks, after receiving and accepting the financing documentation.

The crucial element of this cooperation from KfW's point of view is compatible incentives between the intermediary banks and the KfW, in order to motivate intermediary banks to scrutinize the loan application thoroughly. The KfW aims at creating a balance between the risk taken by intermediaries and itself.

The interest rates for all programmes are set based on the individually conducted process, where each SME is individually assessed based on risk categories and the company performance assessed in the tests.

**Table 7.1. Risk Sharing Programmes offered by KfW**

| Name of the program                           | Target   | Type of the support                       | Promotional elements  |
|---|--|---|---|
| <b>ERP Innovation Programme</b>               | Self-employed professionals and SMEs   | mix of debt capital and subordinate loans | Grace period of 2 years   |
| <b>ERP Capital for start-ups</b>              | Start-ups and companies that are less than three years old   | subordinate loans                         | Grace period of 7 years<br>Subsidised interest rate.  |
| <b>BMU – Environment Innovation Programme</b> | Public and private entities implementing large scale demonstration non-energy eco-innovation projects; | loan with interest subsidy                | Grace period of 7 years,<br>In exceptional cases grant covering up to 30% of the financeable costs. |

Source: On the basis of information available at <https://www.kfw.de>

### 7.1.3. Business angel co-financing instruments

Co-financing instruments are another type of risk-sharing tools, which aim at cooperating in providing equity investments in innovative SMEs. Debt financing risk-sharing instruments are another form of support targeting innovative companies in general. However, eco-innovative companies can benefit from this type of support on equal terms with companies from other sectors.

Co-financing instruments are introduced by public authorities, usually at the national level in order to support equity type of financing provided by business

angels or venture capital to SMEs at the early stage of development, and in this way to minimize the existing financial gap.

The general idea of co-financing instruments is to provide additional financial resources to the market of business angels and venture capital equity investments. The allocated funding is intended for young innovative companies, which receive funding from a business angel or a venture capital fund and simultaneously from a public body. The rule that is usually followed in this process says that the public sector's contribution will be on a *pari passu* basis. It assumes that the private partners, in order to obtain co-financing from a public source, must invest in the same project at least as much as the co-investing public entity. Using it overcomes many issues related to public expenditures, as it minimizes the risk of public money abuse. Thanks to the balance of the equity invested, the risk and the potential loss of the other investing party is equal or higher than the risk of the public body, but significantly lower than if the public institution was not engaged.

The business angel co-financing instruments have **two main objectives**:

- filling the financial gap,
- encouraging the development of the business angel market.<sup>126</sup>

There are various forms of financing support available through the co-financing instruments, the most popular solutions are capital equity investments and loans.

The co-financing instruments are in general designed to correspond with the private sector schemes which include private seed investment funds, business angel syndicates and venture capital funds, and target companies at different stages of development.

There are four major types of co-financing instruments:

**Equity co-financing for SMEs.** – An innovative SME obtains a co-investment from a public body the moment it is being granted an investment from a business angel. Business angels are often pre-approved for the co-investment and therefore the due diligence is conducted once, for the business angel, and not before every transaction, which lowers transaction costs. There are many funds operating on this basis, such as the Scottish Co-investment Fund (SCIF), or Angels CoFund in the UK.

**Equity co-financing for business angels investment bodies** – Business angels which have established an investment body (SPV or a type of a fund) can receive a financial co-investment into this fund to increase the volume of

<sup>126</sup> S. Beattie, D. De Vroey, *Scottish Co-Investment Fund: Partnerships for SME Financing*, Case Study, World Bank 2014.

investments. This co-investment scheme facilitates fundraising and helps funds reach the critical size which allows them to spread their investments and risk over a larger number of companies.

**Loan co-financing for SMEs** – in this case, usually an SME can obtain a loan from a public body of up to the same amount as the investment received from a business angel. The loan period is prolonged up to 10 years and low interest rate or a grace period is included into the offer. This instrument targets SMEs, and enables them to leverage financing raised from business angels.

**Loan co-financing for business angels** – The co-financing can also take the form of a loan to business angels to provide additional capital alongside their own resources. Usually the *pari passu* rule applies. The loans can have flexible payback arrangement as an additional promotional element. For example, the business angel will get the majority of the revenues generated until the investment has been earned back. The loan co-financing instrument is the less typical type of instrument<sup>127</sup> than those noted above.

For all types of support, the mechanism is not automatic. In order to maintain balance and control over the invested funds, the selection process of both the cooperating business angels and the SMEs requires an approval from a credit or investment committee, and there are many efforts to ensure that this process is clear, transparent and conducted by true professionals.

Some sceptics raise the issue that when the public co-financing schemes are widely available in the market, they compete with private equity for the investment opportunities and in this way they crowd out private sector investing. In order to mitigate this issue, the procedure must be initiated by the private sector entity. Thanks to that, business angels enjoy a lot of freedom in their actions, and are free to finance projects on their own, or ask for co-financing. The schemes do not undertake any financing actions by themselves.<sup>128</sup>

On the other hand, this freedom of choice can lead to another failure. While using leverage in the form of public co-financing, the business angels or venture funds are likely to engage into more risky activities. A survey conducted after 5 years of the Scottish Co-investment Fund operations confirms these doubts. It appeared that partners either would not invest at all or would have invested in less risky sectors (such as property) if there was no risk-sharing co-investment model.<sup>129</sup> We should also be aware of the fact that business angels are experienced entrepreneurs, able to spot opportunities. Therefore, the most promising

<sup>127</sup> EIM and Oxford Research, *op. cit.*, p. 107.

<sup>128</sup> *Ibidem*.

<sup>129</sup> K. Hayton, G. Thom, V. Percy, C. Boyd and K. Latimer, *Evaluation of the Scottish Co-Investment Fund*, Hayton Consulting, 2008.

companies will be financed solely by the BA syndicates, as it gives the best profit opportunities, while those which are less promising will be co-financed with public funds.

#### **7.1.3.1. Application process and benefits for the co-financed companies**

The idea of co-financing assumes that a company applying for support should not face any additional financial or administrative burdens.

Firstly, it has to pre-qualify for financing by meeting organizational and background criteria set by the co-financing institutions. Usually limitations concern such aspects as the size of the company (if it is an SME), its location (if it is a local company) and level of development (i.e. annual turnover). If the company meets these criteria, the application process starts from finding and convincing a business angel to invest.

Thanks to the engagement of a co-financing scheme, as it was said before, business angels tend to be more eager to invest in companies they would normally skip in their investment plans. In such cases companies with lower than usually expected growth potential, or too high risk of total failure, can still be considered as investment opportunities.

The application process is generally free of charge. The majority of fees, including the fee paid usually to a business angels' network (if required) is covered by the co-financing institutions (proportionately to the co-financed amount).

Another aspect is the engagement of the co-financing institution in the management and functioning of the newly financed companies. Attitudes in this field vary, the Seed Fund Vera operating in Finland requires from the financed enterprises a seat on the management board with the right to vote, while the SCF does not have such requirements. This problem does not arise in co-financing institutions engaged in loans and guarantees. In general, the expectations of co-financing institutions are either similar to those common in the market or more relaxed.

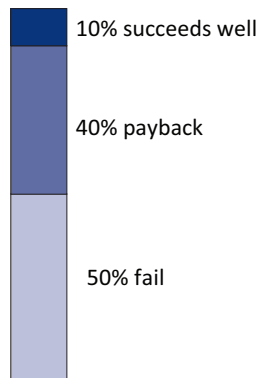
#### **7.1.3.2. Benefits to the Business Angels**

The co-financing instruments stimulate also development of Business Angels Networks (BAN) and syndicates. In order to properly organize the co-financing the governmental institutions need to cooperate rather with organized entities, than individual business angels. Meeting together the institutional character of co-financing instruments with typical business approach of a single Business

Angel could lead mutual misunderstandings, what proved the need to create BA syndicates, which could organize this process. Joining BANs allowed Business Angels to diversify their investment portfolios thanks to joint investments, and increased accessibility to new opportunities for an average business angel.

It is extremely important taking into consideration the level of risk and success factor of BA investment. According to the Finnish Business Angels Network representatives, only 10% of business angels investments is a real success, approx. 40 pays back, but remaining 50% simply fail.<sup>130</sup>

Figure 7.1. Percentage of successful business angel investments



Source: Presentation Business Angels Networks – Activity and Members, FIBAN, available at <https://www.fiban.org/about>. (accessed 2014.07.01).

Joining syndicates and networks gives business angels the opportunity to invest at the same time in larger number of deals, and the co-financing instruments can significantly multiply this effect. This way business angels have the opportunity for further investment diversification.

Thanks to the engagement in cooperation with co-financing schemes and required for this reason syndication, business angels have access to a larger number of investment opportunities. Business angels syndicates or networks usually get also an additional commission from the co-financing institution – in case of SCF and English CoFund it is 2.5% of the investment value<sup>131</sup>.

<sup>130</sup> *Business Angels Networks – Activity and Members*, FIBAN, available at <https://www.fiban.org/about>. (accessed 2014.07.01).

<sup>131</sup> *Business Angel Co Investment Fund, Information Note 1*, CfEL, 12 April 2011.

### 7.1.3.3. Examples of co-financing schemes

In order to further discuss some more detailed strategies and working methods of co-financing institutions and schemes, we present selected schemes which are active in Europe. The presented cases are not examples of the best practice, due to the development stage of co-financing instruments. As majority of these funds is relatively young, several more years are required in order to evaluate their performance reliably.

#### Business Angel+ loan

The Business Angel+ loan (BA+ loan) is provided by the Participation Fund which is a Belgian federal financial institution and acts as a public credit institution granting preferential loans. The BA+ loan provides investment loans granted in addition to the venture capital supplied by private investors based on co-operation agreement with the business angels networks such as “Be Angels” and “Business Angels Network Vlaanderen”.

The companies applying for financing are in the first phase preselected by the business angel network. Based on this selection, the loan applications are offered to potentially interested business angels. The Participation Fund gets involved when the “matching” is near the conclusion. The applying companies have to meet some formal criteria regarding their size, level of development and business location.

The main **financing conditions** of the BA+ loan include:

- 5-, 7- or 10-year financing period;
- 1 to 3 years of capital repayment grace,
- The minimum loan amount is €7,500 and the maximum is €125,000, assuming the co-investing BA contributes the same or a larger amount.

The level of **interest rate**, and its basis:

- the reference rate is increased by a margin of 1%, or 1,25% for the entire period if the period of capital repayment grace is more than a year
- currently the interest rate is at the level of 3-5% annually,
- the interest rate is fixed.

The **guarantee** requirements:

The Participation fund is flexible with requirements regarding the loan guarantee, and they depend on the credit risk associated to the project. It is possible, as the Participation Fund and Business Angel+ loan benefits from a guarantee issued under the European Community’s Competitiveness and Innovation Framework Programme.



The criteria based on which the Participation Fund decides about granting the loan are:

- The project's chances of success, at the financial, economic and technical levels alike;
- The applicant's business and managerial competence and his or her worthiness;
- The business's quality and policy;
- The company's viability and capitalization;<sup>132</sup>

The **major benefits** resulting from use of BA+ loan in comparison to a commercial financing are:

- Free of charge application process;
- Low interest rate,
- Flexible loan security requirements,
- Possible capital repayment grace period,
- Doubling the engagement of the Business Angel,
- Taking some risk of the shoulders of Business Angels,
- Extending the scope of financed projects, through higher money supply,

Moreover, the loan is **subordinated**, therefore it does not block the traditional debt financing from commercial banks.

#### Seed Fund Vera Ltd.

The Seed Fund Vera is a state-owned, nationwide fund specializing in investments in seed, early, and start-up stage companies. The establishing of the Seed Fund Vera Ltd was part of the Finnish Ministry of Trade and Industry's strategy to revise the seed funding and service system of starting innovation enterprises. The value of the fund's assets in 2013 exceeded EUR 110 million.

Due to the public(state owned) character of the fund, the investments and all other activities of the Seed Vera Fund must be in line with rules set by the EC State Aid Legislation, as they are perceived as a public help.

The Seed Vera Ltd. investments are intended for technology-intensive or innovative companies that have operated for less than 3 years and have received financing from private sector investors, which acts as a type of confirmation of the company's commercial potential.

The financial engagement can be of various types, the most popular is the **equity investment**, but available are also such instruments as convertible

<sup>132</sup> <http://www.fonds.org/en/creditactivities/ba/more> (accessed 2014.07.01).

bonds, bonds with equity warrants and capital loans. The fund makes minority (10-40%) equity investments in an enterprise, and in return takes a seat on the board in its portfolio companies.

In addition to the percentage investment limit, there are also **value-based limits** which vary between €100,000 and €250,000 and up to a maximum of €500,000 in multiple investment rounds. There is no time limit set for the fund's investment.

There is no time limit set for the fund's investment. The aim of the fund is to grow the company to the level at which it could become attractive investment for the market rooted investment funds and venture capital. At that point the exit strategy is being initiated, and this can be in a form of: listing; trade sale; sale to another venture capitalist; sale to the management and other.

In 2013, there were 17 full or partial exits conducted by the fund. In these cases the portfolio company was sold either to an industrial buyer or another venture capital investor. Eight companies from the portfolio filed for bankruptcy.

**Figure 7.2. Seed Fund Vera Ltd – performance, situation on 25 March 2013.**

Total capital – EUR 113,6 million

(Finnavera plc, Sitra, Academic Engineers and Architects in Finland – TEK, Ilmarinen Mutual Pension Insurance Company, Fennia Mutual Pension Insurance Company, Kesk. Pension-Fennia Mutual Insurance Company)

|                                       |         |                    |
|---------------------------------------|---------|--------------------|
| • Initial investment decisions made   | – 237   | – EUR 68.2 million |
| • Follow-up investment decisions made | – 300,  | – EUR 52.2 million |
| • Exit decisions made                 | – 61    |                    |
| • Rejected/lapsed/moved elsewhere     | – 1,281 |                    |
| • Projects processed, in total        | – 1,526 |                    |

Source: Presentation from 06.11.2011; *Nordic Business Angel Funds*, FiBAN.

### The Seed Fund Vera performance

The investment capital distributed by the fund comes in the major extent from the loans granted by the Finnavera (governmental agency). The loans are supposed to be paid back in one installment at the end of the loan period – after withdrawal from the co-investment.<sup>133</sup>

In 2012 the Finnvera's Board of Directors decided to discontinue its involvement in venture capital investment altogether. Due to this decision the new strategy for the Seed Fund Vera includes termination of the new investment

<sup>133</sup> Finnvera Q4/2013 and Financial Statements 2013.

processes until the end of 2017<sup>134</sup>. According to the new strategy the Finnvera's early stage fund investment activities will be gradually transferred to Tekes – the Finnish Funding Agency for Innovation.

Although it is not directly stated, taking into consideration the poor financial results of the fund, there is a large probability of them being the major factor contributing to the change in the fund's strategy. The new loans from Finnvera, which were expected to increase the investment capital of Seed Fund Vera have been cancelled as the fund shown loss for the financial year 2012. At the end of 2013 Seed Fund Vera had capital engagement into 48 companies, out of them two recorded some profit for that year and the remaining 46 recorded loss.

### Scottish Co-investment Fund

The Scottish Co-Investment Fund (SCF) was among the first initiatives of this kind in Europe. Introduced in 2000, it is managed by the Scottish Investment Bank, a part of Scottish Enterprise, a public-sector economic development agency. The SCF works on the basis of contractual partnerships with active VC fund managers, business angels and business angel syndicates from the private sector, who gain the title of SCF partner. It is the SCF partner who seeks the opportunity, negotiates the terms of the deal on their own behalf and on behalf of the SCF, and offers the investment. There are now forty-one SCF partners, of which nineteen are angel syndicates (46 percent), sixteen are VCs (39 percent), and six are corporate entities (15 percent).<sup>135</sup>

Companies eligible for financing need to have their business “centre of gravity” in Scotland, fall within the EU definition of a Small to Medium Enterprise (SME) and have net assets of less than £16 million. There are also some sector restrictions as companies active in the following sectors are not liable for the fund's investments: real estate/property development, social and personal services, pubs, clubs and restaurants, local services, banking and insurance, motor vehicles, nuclear decommissioning, professional services, retail.

The financial rules of the SCF engagement are similar to those applied by a typical venture capital fund or a seed fund.

- The minimum investment is £100,000,
- The maximum value of single investment (in one and in multiple rounds) cannot exceed the value of £1,000,000,

<sup>134</sup> Nordic Business Angel Funds presentation, FIBAN, 2013.

<sup>135</sup> K. Hayton, G. Thom, V. Percy, C. Boyd and K. Latimer, *Evaluation of the Scottish Co-Investment Fund*, Hayton Consulting, 2008.

- The level of the SCF engagement cannot exceed the engagement of the SCF partner in the same company,
- A cap of £2,000,000 is set at the total value of the investment/deal,
- The terms obtained by the SCF must be equal to those of the SCF partner.
- Scottish Enterprise (the owner of the SCF cannot hold in aggregate more than 29.9% of the voting rights of a company).
- Public money cannot account for more than 50% of the total risk capital funding in a deal.<sup>136</sup>

Meeting all the eligibility criteria and being recommended by an SCF partner does not guarantee the funding, the final decision is always made by the managing committee.

### The performance analysis of the SCF

The SCF model is generally perceived as a success, especially by the policy makers, as it was also copied by many countries all over the world. It is however hard to convincingly state, that the fund is evergreen and sustainable. So far its investment capital is being raised and the money are invested. There is however little evidence on the performance of the invested money and the annual rate of return.

The board confirms that the fund never achieved the assumed by its creators level of 20% return per annum.<sup>137</sup> It means, that the fund may never be an evergreen fund, as it was assumed when it was created. The reality of the assumed level of returns can be discussed, given that the SCF partners might have engaged in cherry-picking by keeping the good deals for themselves and involving the SCF only in the less promising ones. This problem concerns however all co-investment schemes, and not only the SCF.

In spite of some problems with estimating economic performance, there are however some definitely positive aspects of funds operations. One of the success areas of the SCF is the growth of angel syndicates. From an initial two main groups involved in Scotland this number has grown to 20 in 10 years.<sup>138</sup>

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<sup>136</sup> <http://www.scottish-enterprise.com/services/attract-investment/scottish-coinvestment-fund/scif-overview>

<sup>137</sup> K. Hayton, et.al. , *Evaluation of the Scottish Co-Investment Fund*, Hayton Consulting, 2008.

<sup>138</sup> Mason, C., Michie, R., & Wishlade, F. (2012). Access to finance in Europe's disadvantaged regions: Can "new" financial instruments fill the gap?

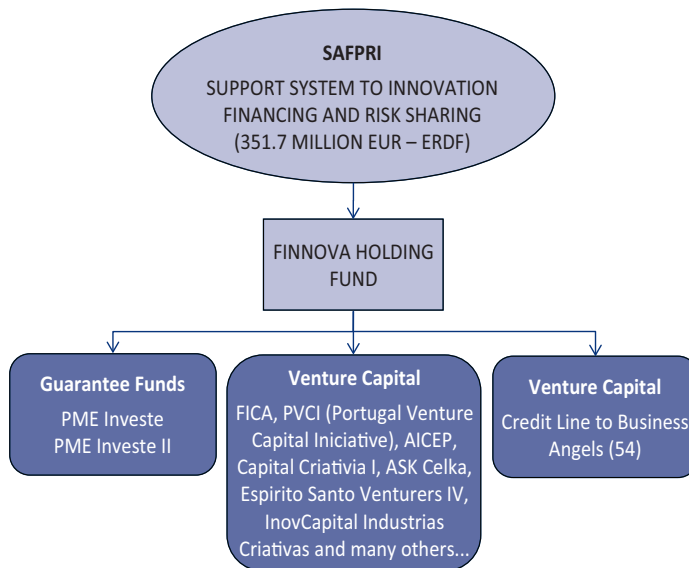
The positive aspect is also the market demand for investments. During the period from 2003 to March 31, 2013, the fund invested £87.1 million in 564 deals alongside SCF private sector partners, who invested £166.7 million<sup>139</sup>.

#### SAFPRI – Financing Lines for Business Angels

The SAFPRI – Finance Support and Sharing Risk programme was established in Portugal to support investments of Business Angels and increase availability of funds for SMEs at the early stage of development.

The SAFPRI is implemented using as the preferred vehicle Support Fund for Financing Innovation (FINOVA), which involves among other the innovative financing solutions directed to Business Angels and innovative companies which seek for additional financing. Among multiple financial products it offers Financing Line for Business Angels which is a mechanism for financing innovation and risk-sharing<sup>140</sup>, and is a complementary tool to grants and subsidies.

Figure 7.3. SAFPRI and FINOVA structure



Source: <http://www.cedru.com/pt>, (accessed 2014.07.01)

<sup>139</sup> Scot Beattie and Damien De Vroey, Scottish Co-Investment Fund: Partnerships for SME Financing, The Innovation Policy Platform, World Bank 2014.

<sup>140</sup> The 2010 Annual Report On The Activity Of The CMVM And The Securities Markets.

The state aid is organized in the form of co-investment and offered to Vehicle Entities (VE) – a company with venture capital investment of at least 3 business angels and created in order to invest in new companies functioning as business angels.

The VE can invest in micro, small or medium-sized companies, which are at the seed or early stage of development, have less than 5 years of history and have their head office in the Northern, Central and Alentejo Regions of Portugal.

#### **The financing rules and conditions**

- Medium-term funding – assumed 7 year of holding period, not more than 10 years;
- funding up to 65% of the amount of each of the business angels operations;
- a maximum amount of €1,000,000 but up to €500,000 in the first financing round carried out in accordance with venture capital operations;
- return on funding set according to the performance of the underlying venture capital operation
- repayment of funding with asymmetric distribution between FINOVA and BAs:
  - 20% (FINOVA)/ 80% (BA), until BAs are repaid the total amount they invested;
  - (50%/50%), until FINOVA is reimbursed the amount funded;
  - 20% (FINOVA)/ 80% (BA) – the remaining part;

#### **The benefits and performance of the scheme**

The co-financing instrument available in Portugal under the SAFPRI regulation is slightly different from previously discussed. In contradiction to the *pari passu* rule, which was present in co-investment funds, here the balance between the invested capital from public and private side is disturbed. In case of Financing lines for Business Angels, the public sector engagement is possible to the extent of 65%, what removes additional risk from the business angels and transfers it to the public funding.

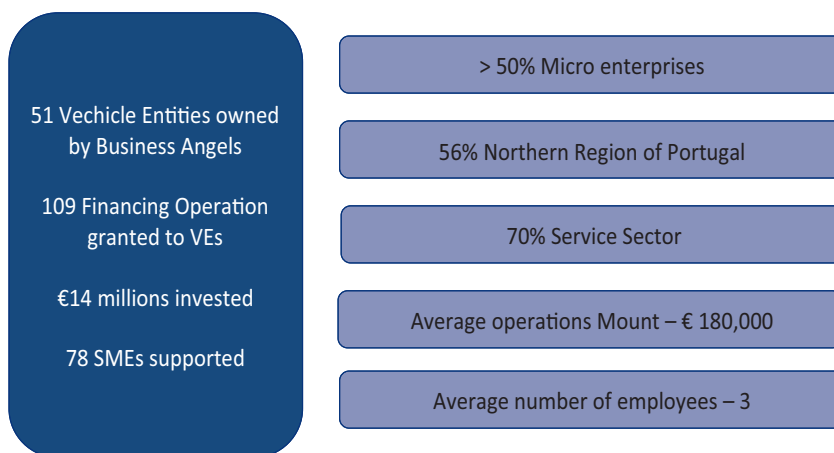
Other crucial difference, is that the finding is granted not to the final beneficiary company, but to the Business Angels Vehicle Entities which are supposed to identify the opportunity, and want to invest in it.

Other important difference is the pre-assumed limited duration of financing engagement, it puts larger pressure on the business angels to develop the company up to the stage, where it could be sold in the market. This pressure is

however released in great extent by the repayment method applied, which secures the business angels in great extent.

Summing it up, the scheme enjoyed significant interest in the first period as it is showed in the figure below:

**Figure 7.4. Financing Line for Business Angels – performance**



Source: Presentation: *FINOVA – Support Fund to Finance Innovation*, held by Carlos de Castro during the Lisbon Meeting, 26 September 2013

Similarly to other co-financing instruments, the Financing Lines for Business Angels is now in the investing stage, therefore the results of these investment will gradually level in time.

### Conclusions

By and large, the co-financing and debt risk-sharing focus on developing industries and innovations in general, without special focus on eco-innovations, however, the majority of eco-innovative companies is eligible to use this form of financing.

They are relatively new financial instruments, therefore, there is limited information regarding their performance. Thus, it is hard to evaluate their results and find the best solution.

Both types of support attract a great deal of attention of innovative companies as well as business angels (in co-financing), which confirms that there is a significant demand for additional financing for innovative but high-risk companies at the early stage of development.

From the SMEs point of view the co-financing and debt risk-sharing instruments widen the scope of opportunities to access financing without incurring high additional application costs. Moreover, it gives an opportunity to acquire financing for more risky businesses.

As for risk-sharing and co-financing, the challenge is to create a mechanism that would motivate intermediaries (banks or business angels) to evaluate loan or equity applications thoroughly. The risk assumed by the private sector must not be too high for the private investors to approve applications, but should not be too low either, as it would make BAs or intermediary banks accept every project regardless of whether it is promising or not.

In spite of currently taken safeguards, there is no credible information regarding the performance of co-investment funds. It was assumed that, like BAs or Venture Capital, they would benefit from investments, however, some partial information<sup>141</sup> indicates that it may be hard to achieve. As for debt risk-sharing, in both ALMI Innovation Loan and in KfW programmes around 30% of loans is not paid off<sup>142</sup> – which confirms the high-risk profile of undertaken investments.

Both types of support are being promoted by the EU directly, as for example RSFF and RSI, but also indirectly – by funding provided within the ERDF. The EU plans to continue the implementation and promotion of similar instruments in 2014-2020, the idea is also popular with local policymakers, therefore it is justified to expect risk-sharing instruments to become a more common source of financing.<sup>143</sup>

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<sup>141</sup> Centre for Strategy and Evaluation Services, *Evaluation of EU member states' Business Angel Markets and Policies Final Report*, October 2012, p. 23.

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<sup>143</sup> *Ibidem*.



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## 7.2. JESSICA as an example of a reimbursement fund

### 7.2.1. Introduction

Among the ways to provide green project funding the Joint European Support for Sustainable Investment in City Areas (JESSICA) is an interesting alternative.

JESSICA was created in order to promote the development and regeneration of urban areas in economic and social aspects, what makes green projects (contributing to the environment) an excellent candidates for such funding.

It is good to be aware from the very beginning, that JESSICA is not a source of funding but a funding mechanism promoted and implemented by the European Commission for the first time in the financial perspective 2007-2013. The reimbursable character of funding was designed in order to create a long lasting source of support for urban development. The mechanism assumes, that the repaid loans remain within the local development funds, and will contribute in the future to development of new urban projects on the same or similar basis.

JESSICA was created in order to promote the development and regeneration of urban areas in economic and social aspects by providing reimbursable financing for projects in following fields:

- **municipal infrastructure** – including transport, water/waste water, energy, etc.,
- **heritage and culturally important places** – for tourism or other sustainable uses;
- **office space for SMEs, IT and/or R&D** – by decontamination, and all other types of land cleaning.
- **creation of new commercial units** – for SME's and R&D.
- **university buildings** – covering special purpose areas such as designed for medicine, biotechnology etc.
- **energy efficiency improvements**<sup>144</sup>.

Therefore in addition to the urban regeneration, the scope of support within the initiative covers among others also transportation and renewable energy sources.

According to the basic assumptions and conditions set for JESSICA initiative, the urban projects eligible for it should incorporate two aspects: **the commercial element**, which can assure profitability of the project, and this way can generate financial surplus allowing the loan repayment; **the social element** – which is

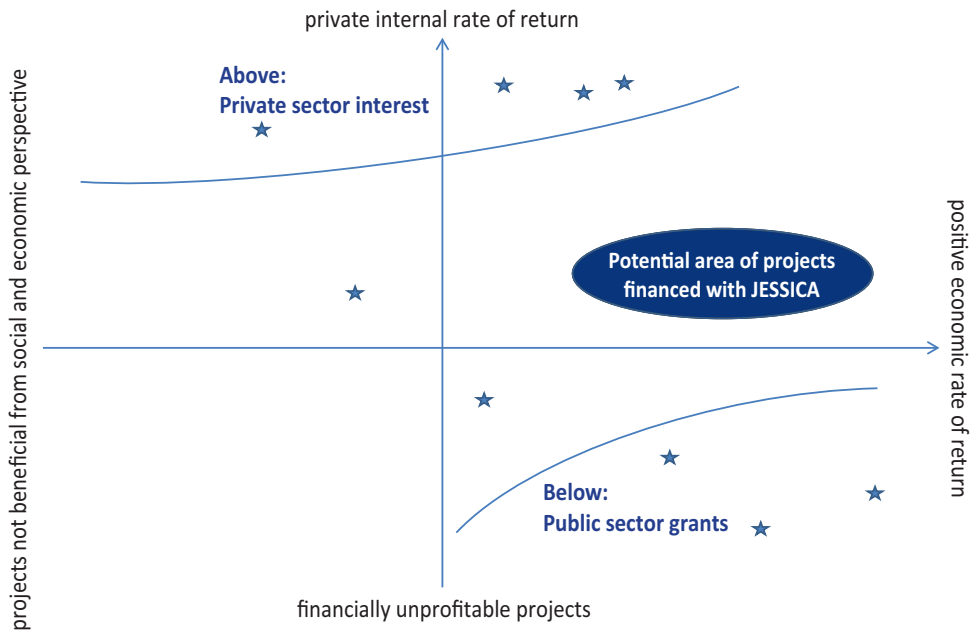
<sup>144</sup> <http://www.eib.org/products/jessica/index.htm> (accessed 2014.07.01).

crucial from the point of view of local community, by improving attractiveness of covered urban area, or supporting local social initiatives. The first aspect is designed to link projects to market conditions, while the second gathers the impact effect in terms of city regeneration and increase the standard of life for local community.

The social factor requirements set to the JESSICA projects suits perfectly characteristics of the majority of green projects, as in their main idea there is always an environmental factor, which can be treated as social factor. Therefore the green projects implemented within urban environment are the natural financing targets for JESSICA.

JESSICA's aim is also to allow development of the projects which could not be carried out under strictly commercial conditions, as they generate to low rates of return, but also due to the fact of generating income do not qualify for majority of grant programmes. Graphic presentation of it is presented in the Figure 7.5.

Figure 7.5. Potential area of projects with JESSICA support



Source: *Jessica Evaluation Study – West Poland*, Final Report, EIB, 2009.

### 7.2.2. Financing sources for JESSICA

As it was said in the beginning JESSICA is not a funding source, but a mechanism, therefore the natural question arises: where do the money provided within JESSICA come from?

JESSICA mechanism is a joint initiative of the European Union, the European Investment Bank (EIB) and the Council of Europe Bank (CEB). The money used for financing projects within JESSICA mechanism in the previous EU budget perspective came from the Regional Operational Programs under the Cohesion Policy e.g. European Regional Development Fund (ERDF).

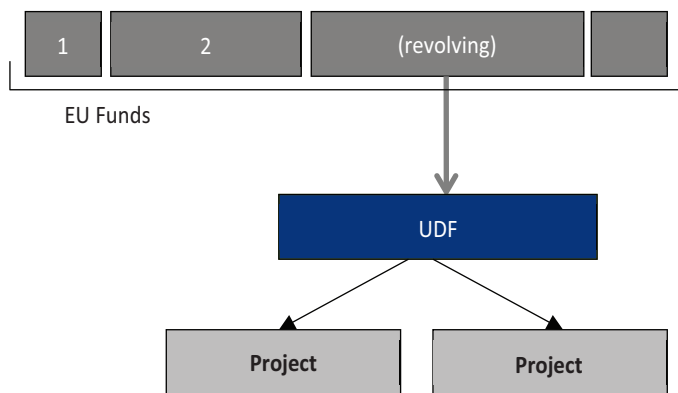
In the new EU financing perspective, the reimbursable funding is planned to account for much larger share of available funds, than it was before, and in contradiction to the 2007-2013 perspective the use of financial engineering instruments will be obligatory. It justifies expectations for JESSICA, or similar financial instruments, to be commonly used instead of grants.

### 7.2.3. Organizational framework and implementation

JESSICA is designed to be operational on the regional level with the main executive institution in the form of the Urban Development Fund (UDF). Additionally there is a possibility to appoint a parent institution over several UDF's, which will be responsible for investment strategy, search for co-financing sources, fund management, performance monitoring and reporting to the regional Management Authority. In 2007-2013 perspective this role was played by Holding Funds which were set on the regional level – as in Italy, Poland, Spain, and the UK, or at the national level like in Greece, Lithuania or Portugal.

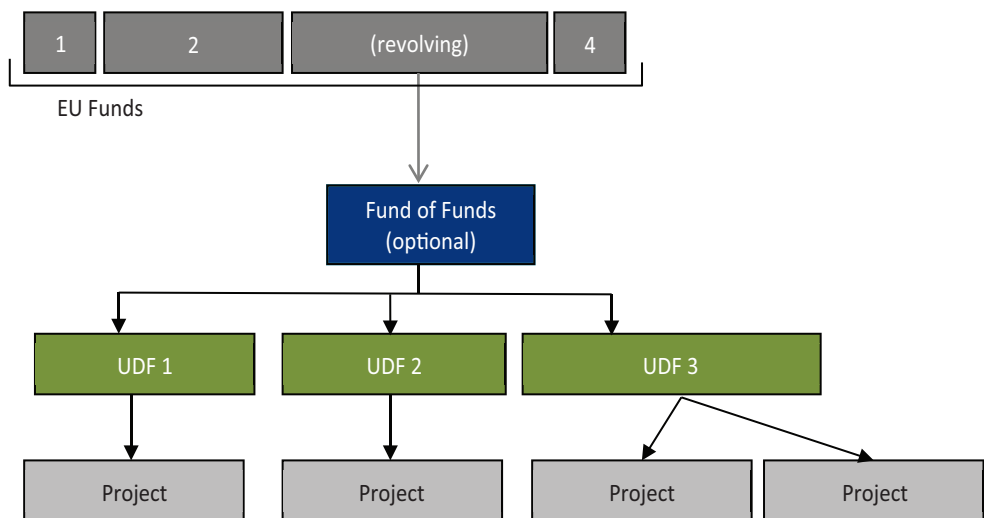
In the new EU financial perspective this role is recommended to entities called Funds of Funds (FoF). The change is a result of planned use of other than ROP funds within the JESSICA initiative. Combining the ROP funds with the European Structural Investment Funds. Appointing the FoF is still not obligatory, therefore there are two possible organizational schemes for JESSICA implementation, as presented in Figure 7.6 and Figure 7.7:

Figure 7.6. Single UDF without Funds of Funds



Source: EIB, 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie Final Report, 2014.

Figure 7.7. Indicative Fund of Funds Structure



Source: EIB, 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie Final Report, 2014.

Despite setting the parent institution over the UDF's is not necessary it was a common practice in Poland and other Member States. The Holding Funds were managed by EIB which provided the regional Managing Authorities with

necessary expertise, organizational and administrative skills together with professional monitoring. According to the EU regulations the cost of fund management charged by the parent authority cannot exceed 2% of funds value, but in practice they are at a lower level<sup>145</sup>. The Holding Funds and Funds of Funds give also opportunity to launch more than one Urban Development Fund within a single region and coordinate their operations.

Such a scheme was used in the case of the London Green Fund, which acts as a fund governed by the EIB Holding Fund for the Greater London area. Its engagement is divided between two Urban Development Funds: The Waste UDF – focusing on waste management investments and the London Energy Efficiency Fund – focusing on energy efficiency oriented investments.<sup>146</sup> The London Green Fund is also an example of a Holding Fund which is managed by the European Investment Bank. The same scheme was also used in Poland, where the Holding Funds were created at the regional level (for 5 regions participating in JESSICA) and in the majority of other cases.

#### 7.2.3.1. The Urban Development Funds

The Urban Development Funds serving as the final stage of the financing mechanism may be created separately for each field of activity within the scope of the JESSICA initiative, in order to focus on one type of investment projects. This way different UDFs can provide JESSICA's funding based on slightly different rules, tailored to the projects within particular fields of economy. This idea was used in the previously recalled case of the London Green Fund.

It is also possible to establish UDFs which are not focused on a specific field of action but covering a specific land area or just working on general terms within the same area. This was the case in Poland within Pomerania, and Western Pomerania regions. In each of them two banks were chosen as the Urban Development Funds: Bank Ochrony Środowiska S.A. (BOŚ) and Bank Zachodni WBK SA are playing the UDF's role in Western Pomerania and BOŚ with Bank Gospodarstwa Krajowego (BGK) in Pomerania.

Some other examples of subject focused funds are presented below.

<sup>145</sup> Inicjatywa wspólnotowa JESSICA – dotychczasowe doświadczenia i szanse wdrożenia w województwie mazowieckim, Warszawa 2011.

<sup>146</sup> <http://www.aeidl.eu/en/projects/urban-development/jessica-in-london-the-london-green-fund.html> (accessed 201407.01).

Figure 7.8. Examples of subject focused funds

|   |   |
|---|---|
| <p><b>Urban regeneration funds (mainly area-based)</b></p> <ul style="list-style-type: none"> <li>• “Place making” locations/ incubators/ creative class attractors,</li> <li>• Brownfield locations, mostly in inner city areas,</li> <li>• Deprived city districts, urban sprawl voids</li> </ul>                         | <p><b>City infrastructure transformation funds (for city systems)</b></p> <ul style="list-style-type: none"> <li>• Addressing infra/urban imbalances from changes in city hierarchy</li> <li>• Focusing on the provision of capital in less competitive areas</li> <li>• Focusing on the provision of capital in less competitive areas</li> <li>• Focusing on transformation of strategic urban infrastructure</li> <li>• IT broadband, waste to energy, water, electric public transport, etc.</li> </ul> |
| <p><b>Energy-focused funds (regional or city-based)</b></p> <ul style="list-style-type: none"> <li>• EE/RE and energy / emission audit/ certification systems</li> <li>• Climate action strategies (EU 20/20/20 targets in urban areas)</li> <li>• Regional upgrade of green technology and transmission systems</li> </ul> |   |

Source: J.M. Fernández Martín Presentation: Financial engineering under the Structural Funds and urban regeneration: The Joint European Support for Sustainable Investment in City Areas (JESSICA) Initiative, EIB, Sevilla 2012

The Urban Development Funds are being launched by the local authorities which provide them with funding in order to support the final projects. The costs of management of the UDF should not exceed 3% of governed funds annually. The offers set in Poland so far were in the range of 0,5-2,5%<sup>147</sup>

#### 7.2.4. Available forms of support

There are three types of support instruments designed under JESSICA initiative:

- **preferential loan** – which reduce the project’s borrowing costs and mitigate project’s risks – thanks to possible subordination of the JESSICA loan to the bank commercial loan.
- **equity contribution** – (so far not available in Poland and majority of other Member States) which lower equity capital funding requirements; be the subordinated to the private equity, set at pari-passu basis.
- **financial guarantee** (so far not available in Poland and majority of other Member States) – a guarantee to repay a loan in the event of default by the borrower or to pay a surcharge for exceeding a budget, which allows the banking sector to grant a larger loan to the project. It is possible to set a guarantee which will follow the principle of “first

<sup>147</sup> Inicjatywa wdrożeniowa JESSICA – dotychczasowe doświadczenia i szanse wdrożenia w województwie mazowieckim. Warszawa, 2011, p. 12.

loss” which doesn’t insure the beneficiary bank for the entire amount but only part of the loan<sup>148</sup>.

During the 2007-2013 perspective JESSICA offered mainly preferential loans due to general lack of understanding of other financial instruments and, lack of time for learning (this concerned local authorities as well as the private sector). Additionally the loan was the simplest financial instrument and gave the most visible benefits in comparison to equity or guarantees.

The new evaluation studies for regions all around Europe (Ireland, France, Poland) prepared for JESSICA implementation recommend widening the scope of available FIs to all possibly provided by the EIB. Which of them will be in fact available depends on guidelines and programming documents agreed between the EC and the Managing Authority from the side of Member States.<sup>149</sup>

### 7.2.5. Major differences between JESSICA and grant type funding

JESSICA was designed to overcome several problems and disadvantages which characterize non-refundable financial help provided so far in great extent within the EU Framework Programmes and Structural Funds. The main implemented differences and their reasoning is given below<sup>150</sup>:

- **reimbursable character of the funds** – This is the main and most visible difference, which causes, that the funding which was granted to the projects, slowly, but finally comes back to the funding authority, and in result is available again for further investments.
- **profit generation** – In order to allow the pay-off, the projects financed within the frames of JESSICA should in general generate positive financial results by generating additional cash flow or cutting some regularly incurred costs. These conditions bring JESSICA financing closer to the market conditions, and therefore in some extent prevent spending EU money for investments which in addition to high development costs generate also high operational costs – as “cold” thermal baths in Lidzbark Warmiński or the opera building in Białystok.
- **flexibility in form and scope** – JESSICA allows for greater flexibility in terms of structure as well as target of financing in comparison to traditional grant funding. Combination of three major instruments i.e.

<sup>148</sup> European Investment Bank, *Jessica Evaluation Study – West Poland, Final Report*, EIB, 2009.

<sup>149</sup> European Investment Bank – *2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie*, April 2014.

<sup>150</sup> <http://www.eib.org/products/jessica/faq/index.htm> (accessed 2014.07.01).



equity, debt financing or guarantees, may be tailored to the specific needs of region or country and result in financing more complex projects.

- **project professionalism** -The project professionalism is expected to be higher in case of JESSICA projects, due to the engagement of private equity and provided by the private companies experienced project management professionals increases expectance,
- **engagement of private equity** – JESSICA mobilizes additional financial resources for PPPs and other sustainable urban development projects.
- **leverage** – JESSICA requires some share of own equity in the project, what will contribute to attracting also private equity and this way allow to finance larger number of projects.
- **eligible expenditures** – Expenditures such as land acquisition, urban rehabilitation for housing purposes, implementation of projects through direct administration or second hand purchase of equipment are not eligible in case of majority of grant funding what can become an important barrier in funding and implementation of urban development programs and projects. Through the use of financial instruments like the JESSICA, projects including such normally not eligible expenditures still can be implemented.
- **social factor** – the social factor is a crucial element to receive JESSICA financing, and therefore is an element of counterweight in regard to the more market and profit oriented assumptions of JESSICA projects. The social factor translates into availability to lower the interest rate of the granted loan. The idea assumes that, the higher the social factor scores, the lower interest rates are available.

### 7.2.6. Benefits generated by JESSICA

#### Benefits for local authorities

The reimbursable character of the financing through JESSICA mechanism cause some constrains for the local authorities, as the projects design is more complicated, and requires positive cash flow generation. However the experience of local authorities from regions which took part in JESSICA initiative in the 2007-2013 perspective, shows that it is possible to successfully prepare and conduct such projects.

Thanks to the reimbursable character of the financing, in the long run, the use of JESSICA should result in more projects funded than in case of grant funding with the same amount of money distributed. Therefore the impact of the same amount of funding will be greater.

The benefit from using JESSICA for the local authorities, is also the possibility to connect typical public projects with the commercial part, what was almost impossible or brought many constraints while using the grant funding. Such combination is a natural solution in current economic conditions, where the previously public owned companies such as national railway or post operators as well as local utilities companies search for economic efficiency and look closely at operational expenses. It is also the great opportunity to develop the PPP projects, where JESSICA may act as a risk sharing instrument, mainly by removing the burden of commercial level capital cost.

### Benefits for private sector

The private sector is interested mainly in the commercial benefits, and JESSICA can offer several of these. In the previous budget perspective the main benefit was naturally the low interest rate, which thanks to the social factor bonus could be significantly below the market level. The lending conditions within JESSICA gave also some other benefits, such as:

- almost no costs related to the process of financing issue or project evaluation;
- 2 to 4 years grace period in the capital payment;
- lower level of required own capital engagement (again increasing the level of the leverage);
- longer than in the commercial credits repayment period – up to 20 years.

Additional bonus is the free of charge advisory available for the project, and the fact, that JESSICA allows for financing of significantly larger urban development projects than in the case of grants or financial instruments available for SMEs at the regional level.<sup>151</sup>

As the experience in Polish projects shows, the private companies taking part in the JESSICA initiative benefit also by lowering the costs of acquiring their own financing for the project. As the evaluation of the projects is done by the UDF's, in Poland their role is played by two national banks, the private companies tend to apply for debt financing also within these banks. This lowers the cost of applying for the private capital as well, as the banks already know the project, and majority of documents was previously prepared.<sup>152</sup>

<sup>151</sup> 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Zachodniopomorskie Final Report 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Zachodniopomorskie Part I.

<sup>152</sup> [http://www.pi.gov.pl/PARP/chapter\\_86196.asp?soid=A038F51DE4BD4E76A331032122284785](http://www.pi.gov.pl/PARP/chapter_86196.asp?soid=A038F51DE4BD4E76A331032122284785) (accessed 2014.07.01).

### 7.2.7. JESSICA in Poland

Poland was one of the pioneer countries introducing JESSICA initiative, mainly as a tool for urban regeneration. Within the first budget perspective it was implemented in five voivodships: Wielkopolskie, Zachodniopomorskie, Śląskie, Pomorskie and Mazowieckie. Together, the total amount of the programme was EUR 256.3 M.

**Table 7.2. Urban Development Funds in Poland, 2007-2013**

| Region                    | UDF Fund Manager  | Size EUR (millions) | Main urban project types<br>Projects financed  |
|---------------------------|---|---------------------|--|
| <b>Wielkopolskie</b>      | Urban Development Fund Wielkopolska – BGK   | EUR 66.3            | Urban regeneration,<br>Support for BE institutions<br>22 projects finances                               |
| <b>Zachodniopomorskie</b> | UDF for the Szczecin Metropolitan Area – BZ WBK in cooperation with a local development agency ZARR S.A.)<br>UDF for the areas outside the SMA – BOŚ (in cooperation with a local development agency ZARR S.A.) | EUR 33.1            | Urban regeneration,<br>Urban infrastructure<br>14 projects finances                                      |
| <b>Pomorskie</b>          | UDF for the cities with country rights – BGK (in cooperation with a local development agency ARP S.A.)<br>UDF for other cities – BOŚ (in cooperation with a local development agency ARP S.A.)                  | EUR 56.8            | Urban regeneration,<br>EE and renewable energy<br>Public transport<br>12 projects finances               |
| <b>Śląskie</b>            | UDF for JESSICA in Silesia – BOŚ (in cooperation with Centrum Projektów Rewitalizacji S.A.)   | EUR 60.0            | Urban regeneration,<br>Revitalization of post-industrial and post-military areas<br>10 projects finances |
| <b>Mazowieckie</b>        | UDF for JESSICA in Mazowia – BGK (in cooperation with Mazovian Energy Agency and Mazovian Development Agency)   | EUR 40.0            | Urban regeneration,<br>EE and renewable energy<br>Cluster development initiatives<br>5 projects finances |

Source: EIB – 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie, April 2014.

The main characteristic of JESSICA implementation in Poland are as follows<sup>153</sup>:

- the EIB acts as the Manager of the respective HFs and manages the JESSICA operations on behalf of the Managing Authorities in all Polish regions.

<sup>153</sup> EIB – 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie, April 2014.

- all UDFs have been established by Polish-based banks: BGK, BZ WBK and BOŚ with the market dominated by BGK which manages over 60% of funds;
- Loans were the only financial product used through the UDFs so far – this results mainly from regulations concerning public help that limits exemptions to loans and guarantees for micro- companies and SMEs (in case of the latter instrument no interest on final recipients side has been reported);
- Pomorskie and Zachodniopomorskie regions explicitly differentiated their UDFs between larger cities (agglomerations) and smaller cities, while Mazowieckie and Wielkopolskie required their UDFs for certain allocation of funds (cities below and above 50 thousand inhabitants or special areas of intervention as energy efficiency, regeneration or clusters).
- The conducted study confirms that the understanding of equity, mezzanine instruments or guarantees is very low.

As for now, in the new perspective JESSICA is planned to be launched in 9 out of 16 Polish regions including following Voivodeships: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie. There has been an evaluation study prepared for these regions which aims at identifying the financial needs based on the prepared by the voivodeships plans. The summary of the identified funding needs is presented in the table below:

**Table 7.3. JESSICA funding needs in 9 Polish regions**

| Field of JESSICA support: | Energy  | Urban   | Business Environment | Other | Total       | Leverage |
|---------------------------|---------|---------|----------------------|-------|-------------|----------|
| Kujawsko-Pomorskie        | 185-215 | 65-70   | 50-55                | 55-65 | 354-405     | 2.6      |
| Łódzkie                   | 345-360 | 575-580 | 95-100               | 30-35 | 910-1,075   | 2.7      |
| Lubelskie                 | 235-240 | 280-290 | 55-60                | 55-60 | 550-650     | 2.3      |
| Małopolskie               | 380-385 | 295-300 | 615-620              | 25-30 | 1,150-1,500 | 2.2      |
| Mazowieckie               | 570-575 | 465-470 | 215-220              | 0     | 1,100-1,250 | 2.2      |
| Śląskie                   | 754-480 | 690-700 | 295-300              | 10-15 | 1,250-1,500 | 2.3      |
| Wielkopolskie             | 530-540 | 315-320 | 95-100               | 55-60 | 865-1,000   | 2.2      |
| Zachodniopomorskie        | 380-385 | 310-315 | 50-55                | 15-20 | 660-680     | 2.2      |

Source: EIB – 2014-2020 JESSICA Evaluation Study for Nine Polish Regions: Kujawsko-Pomorskie, Łódzkie, Lubelskie, Małopolskie, Mazowieckie, Śląskie, Świętokrzyskie, Wielkopolskie, Zachodniopomorskie, April 2014.

### 7.2.8. JESSICA in other Member States

In the previous perspective JESSICA was not present in all Member States. The implementation of the initiatives took place mainly in following countries: Greece, Italy, Lithuania, Portugal, Spain and the UK. The complete list of countries which established Holding Funds and Urban Development Funds is presented below:

**Table 7.4. JESSICA funding in other Member States**

| JESSICA HF            | UDF name   | Year | Currency | Amount signed |
|-----------------------|--|------|----------|---------------|
| <b>Bulgaria</b>       |  |      |          |               |
| HF Bulgaria           | Regional Urban Development Fund AD                     | 2011 | BGN      | 37            |
|                       | Fund for Sustainable Urban Development of Sofia JSC    | 2012 | BGN      | 24.6          |
| <b>Czech Republic</b> |  |      |          |               |
| HF Moravia-Silesia    | Contera Urban Development Fund MS s.r.o.               | 2012 | CZK      | 170           |
|                       | CMZRB – Českomoravská záruční a rozvojová banka, a .s. | 2012 | CZK      | 170           |
| <b>Greece</b>         |  |      |          |               |
| HF Greece             | Pancretan Cooperative Bank and TT Hellenic Postbank    | 2011 | EUR      | 15            |
|                       | National Bank of Greece S.A.                           | 2011 | EUR      | 83            |
|                       | Investment Bank of Greece                              | 2011 | EUR      | 49            |
|                       | EFG Eurobank Ergasias S.A.                             | 2012 | EUR      | 67            |
|                       | Piraeus Bank   | 2012 | EUR      | 39            |
| <b>Italy</b>          |  |      |          |               |
| HF Campania           | Iccrea Bancalmpresa SPA                                | 2012 | EUR      | 31.9          |
|                       | Banco di Napoli SPA                                    | 2012 | EUR      | 63.8          |
| HF Sardinia           | Fondo Sardegna Energia (Equiter)                       | 2012 | EUR      | 33.1          |
|                       | Banco di Sardegna S.p.A.                               | 2012 | EUR      | 33.1          |
| HF Sicily             | Fondo di Rigenerazione Urbana Sicilia SRL(Equiter)     | 2011 | EUR      | 90            |
|                       | ICCREA Bancalmpresa                                    | 2012 | EUR      | 53            |
| <b>Lithuania</b>      |  |      |          |               |
| HF Lithuania          | Siaulių Bankas AB                                      | 2012 | EUR      | 18            |
|                       | Swedbank AB  | 2010 | EUR      | 18            |
|                       | Siaulių Bankas AB                                      | 2010 | EUR      | 10            |
|                       | SEB Bank   | 2010 | EUR      | 6             |
|                       | VIPA/CPMA  | 2013 | EUR      | 20            |
|                       | Siaulių Bankas AB                                      | 2013 | EUR      | 40            |
| <b>Poland</b>         |  |      |          |               |
| HF Mazovia            | Bank Gospodarstwa Krajowego                            | 2012 | PLN      | 154.7         |
| HF Pomerania          | Bank Gospodarstwa Krajowego                            | 2011 | PLN      | 154           |
|                       | Bank Ochrony Srodowiska S.A.                           | 2011 | PLN      | 66            |

| JESSICA HF            | UDF name                                   | Year | Currency | Amount signed |
|-----------------------|--|------|----------|---------------|
| HF Silesia            | Bank Ochrony Srodowiska S.A.               | 2011 | PLN      | 243           |
| HF Westpomerania      | Bank Ochrony Srodowiska S.A.               | 2011 | PLN      | 63            |
|                       | Bank Zachodni WBK SA                       | 2010 | PLN      | 77            |
| HF Wielkopolska       | Bank Gospodarstwa Krajowego                | 2011 | PLN      | 294           |
| <b>Portugal</b>       |  |      |          |               |
| HF Portugal           | Banco BPI S.A.                             | 2010 | EUR      | 61            |
|                       | Caixa Geral de Depositos S.A.              | 2011 | EUR      | 49            |
|                       | Turismo de Portugal IP                     | 2011 | EUR      | 15            |
| <b>Spain</b>          |  |      |          |               |
| HF Andalucía          | AC JESSICA Andalucía, S.A.                 | 2011 | EUR      | 80.5          |
| HF FIDAE (ES)         | Banco Bilbao Vizcaya Argentaria SA         | 2012 | EUR      | 123.2         |
| <b>United Kingdom</b> |  |      |          |               |
| HF London             | Foresight Environmental Fund LP            | 2011 | GBP      | 35            |
|                       | Amber Green LEEF LP                        | 2011 | GBP      | 10            |
|                       | Amber Green LEEF 2 LLP                     | 2011 | GBP      | 40            |
|                       | The Housing Finance Corporation Ltd (THFC) | 2013 | GBP      | 12            |
| HF Northwest England  | North West Evergreen LP                    | 2011 | GBP      | 36.1          |
|                       | Chrysalis LP                               | 2012 | GBP      | 32.6          |
| HF Scotland           | Amber Green SPRUCE LP                      | 2011 | GBP      | 8             |
|                       | Amber Green SPRUCE 2 LLP                   | 2011 | GBP      | 40            |

Source: <http://www.eib.org/products/jessica/eoi/index.htm>

## 7.2.9. Technical and financial aspects of JESSICA

The precise conditions of financial instruments within JESSICA are established at the regional or national level by cooperation of Managing Authority, the EIB and taking into consideration the legal regulations in particular country. Due to that in the technical analysis we will focus on Poland as an example.

### 7.2.9.1. Project and beneficiary eligibility

The general formal and economic requirements set for the projects to qualify for the JESSICA funding are listed below:

- an investment must fit into the local revitalization plan.
- an investment character should tailor to the priorities set in the Structural Funds and Regional Operational Programme for this region,

- a project's business plan confirms the positive financial effect of the project allowing to repay the loan ( $IRR > 0$ ), but it should not exceed the market levels approx. 15%,
- the Project is characterized by social factor is of significant matter,

The filed applications are analyzed and assessed by the Urban Development Funds managing bodies – Bank Ochrony Srodowiska S.A. (BOŚ), Bank Zachodni WBK SA and Bank Gospodarstwa Krajowego (BGK) in Poland. The available loan conditions depend on the local JESSICA characteristic and may differ between regions.

#### 7.2.9.2. Financial aspects of the JESSICA preferential loan

In order to receive the loan within JESSICA initiative the borrower has to prove the ability to fulfill following obligations:

- **keep the project's durability** – maintain results of implemented project for a period of at least five years, and in the case of SMEs, three years after the completion of the project,,
- **fulfill the stimulus effect** – providing justification for the use of JESSICA and not other commercial types of finding with the benefits for the scale, time or scope of the project.,
- **contribute or provide documentation of own capital corresponding to at least 25% of eligible expenditure**, coming from his own resources or from external financing (loan/credit), however without any public funds. The city projects (implemented by municipalities) are favored by the limit lowered to at least 15% of eligible expenditure.

The loan is granted based on the decision of Investment Committee, for up to 20 years with grace period of maximum one year after the development of the project. The Investment Committee is formed by the UDF's managing body (previously mentioned banks in Poland) and do not collect any additional fees or commissions for starting the loan.

The loan **interest rate is variable**, calculated based on the base interest rate diminished by the **social factor** according to the following formula:

$$\text{JESSICA interest rate} = (100\% - \text{social factor}) * \text{base interest rate}$$

The annual interest rate cannot be lower than 0.25%. Currently with the reference rate in Poland at the level of 2.5% in case of the maximum level of social factor the interest rate within JESSICA loan might be at the level of 0.5%

annually. What is far less in comparison to the market interest rates. Any change in the base interest rate influences the JESSICA interest rate<sup>154</sup>.

### 7.2.9.3. The Social Factor

The social factor is an element which can significantly influence the interest rate at which the loan within JESSICA mechanism is granted. It is determined once for the duration of the investment agreement on the basis of the project's social costs and benefits analysis and may be in the range from 0 to 80%.

The calculation method is introduced by the managing body of the UDF and is dependent on the type of the project. Due to the internal process and procedure clauses, the exact methodology is a matter of each managing body and is not publicly disclosed. Based on the publicly available information, including the methodology recommended by the European Commission, it is however possible to analyze the elements influencing the social factor.

It is important to be aware, that the social factor includes not only **external social profits**, but also possible **external social costs** (working naturally to disadvantage of the factor).

The methodology used by the BGK in Poland for the calculation of social factor includes three fields of analysis:

- Examination and assessment of the **numerically measurable social effects** of the project – this part includes the social effects of the project, which can be measured in money saved, earned or additionally spent (social cost). If the project includes some developed space which will be made available for some socially useful activity, the market rent which would normally be charged for it is being calculated. The sum of this rent over the entire project life is calculated as the social benefit. Other example is the green area, such as park or a square. If it is developed and maintained by the investor, than the development and maintenance cost will contribute to the social factor.

After identifying all measurable social effects and implementing them to the cash flow the ERR and IRR are calculated for the project. The bigger is the difference between these factors, the highest is the numerically measurable part of the social factor.

- The second phase of social factor evaluation includes the **analysis of the numerically immeasurable social effects** of the project. The evaluation of this aspect is usually conducted taking in consideration four areas:

<sup>154</sup> PWC, *Podręcznik dla beneficjentów*, EIB 2012.



1. Social external effects, 2. Economic effect, 3. Environmental effect, 4. Urban zoning effect. The impact of the project within each of these aspects is based on the expert evaluation method, with The Delphi method using scores from 0-5 for each of the fields of impact and summing them up. An example of immeasurable social effect is: renovation of building's facade or lowering the noise level in the area.

- The third measured aspect in assessing the social impact factor is the projects **contribution to fulfilling the regional operational programme aim**. If the RPO assumes regeneration of the urban space with an area of 20 ha, and the analyzed project will redevelop the area of 5 ha out of this 20 it scores 25%. The higher the score the higher the social factor will be.

The example of social effects taken into consideration in order to lower the interest rate of the project of redevelopment of railway and bus station in Sopot together with the development of a commercial part including the retail area, hotel and office building with total join area of 14,000 sq m is presented below:

- creation of new job places,
- improving the city touristic attractiveness
- increase of the corporate income tax inflow to the local authorities;
- improvement of the esthetics and functionality of areas located in the centre of Sopot,
- improved safety of pedestrians and other traffic participants,
- increased availability of parking spaces within the city centre;
- improvement of railway station functionality and passenger service quality;
- improved Access to the tourist information;
- widening the scope of hospitality infrastructure in the region, activating local community, promoting the healthy lifestyle, developing talents and competence of youngsters;
- expansion of urban area suitable for cultural events;
- improved adjustment of the Sopot city centre for the needs of disabled people.<sup>155</sup>

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<sup>155</sup> Presentation on the JESSICA financed Project in Sopot by BZBK, 2011.

## Conclusions

JESSICA is a mechanism which shows great potential in financing urban regeneration projects. Due to many fields covered by the scope of JESSICA including energy efficiency it has a great potential to be used for the purpose of green urban regeneration projects. The requirement of social factor, which is a natural outcome of green projects and acceptance or even requirement of the positive cash flow generated by the projects opens door for development of variable renewable power plants including waste-to energy schemes.

In order to properly use JESSICA it is however important to understand the mechanism and benefits of all types of support available. As the experience and conducted in Poland studies showed, there is significant lack of knowledge within the local authorities but also among private investors regarding the use and usefulness of such products as bank guarantee or equity contribution. However bearing in mind the fact, that in the new EU budget perspective Financial Instruments such as JESSICA are expected to play significantly bigger role than previously the knowledge in this field may be of high value.

The summary of the most important characteristics of JESSICA mechanism are presented below:

- it s reimbursable mechanism design to invest European funds in urban projects which will generate positive financial effects,
- the aim of JESSICA is to support redevelopment and regeneration of degraded urban areas,
- the support may be provided in a form of a preferential loan (most used), guarantee or equity input (planned for new budget perspective),
- the funds are gathered in Urban Development Funds, the role of which in Poland is played by banks, but may be also played by other entities (i.e. investment funds in the UK),
- in case of preferential loans the social factor has major impact on the interest rates charged.

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### 7.3. Business incubators and eco-incubators

The idea of business incubation is almost 30 years old<sup>156</sup>, and it is present almost all around the world. *A business incubator is an organization that supports the growth of start-ups to successful enterprises by offering an integrated package of possible services such as workspace, coaching, complementing the team with the right people, providing channels to investors, helping them to enter domestic and international markets, and finally to suggest suitable exit strategies how to leave the incubator as a full grown company.*<sup>157</sup> The main goal and of incubator is to accelerate the development of the hosted start-ups and to create successful young entrepreneurs through a structured incubation programme.

Business incubators are usually focused on innovative companies and ideas in general, in turn **eco-incubators** are focused on specific theme – eco-innovations and clean technology and all stakeholders active in this field. Eco-incubators, are more often called **cleantech incubators** and we will use these two names alternatively.

There are several business models for business incubators and eco-incubators to operate and prosper, however their main idea is to provide some facilities and services for start-up companies below the market costs. Therefore eco-incubators in Europe are strongly based on stimuli and commitment of public bodies, and financed in greatest extent thanks to support from government or local authorities. Due to that it strongly depends on the local and national policy in terms of promoting innovations and entrepreneurship.

#### 7.3.1. The cleantech eco-system

The cross sector character of eco-innovations requires from eco-incubators to create a network of companies, organizations and institutions, which may have relevant influence on the incubator organization and its start-up businesses, but also on the process of promotion, networking and shaping local business environment. Such **stakeholder network** should include investors, knowledge institutes, authorities and companies, and may be treated as a kind of **cleantech eco-system** of an eco-incubator.

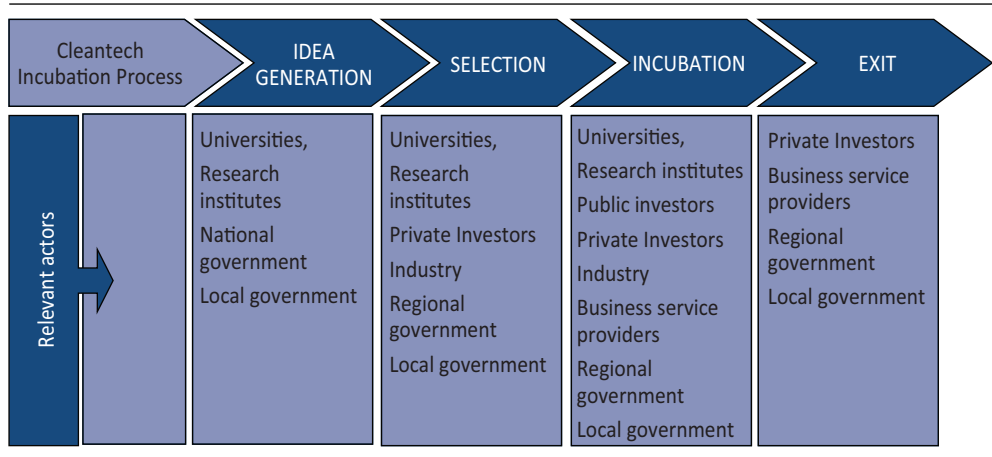
Various stakeholders of the cleantech incubator are active at different stages of incubation process, as it is shown in the Figure 7.9 below.

<sup>156</sup> <http://worldbusinessincubation.wordpress.com/business-incubation-models/> (accessed 2014.07.01).

<sup>157</sup> Cleantech Incubation, *Cleantech Incubation Policy and Practice*, 2014, p. 31.

Among the various stakeholders three are the most important, and should always be involved into operations of eco-incubators: universities, industries and governments, this collaboration is called 'triple helix cooperation'<sup>158</sup>, and is perceived as a major advantage for start-ups, since thanks to it, they will find both a facilitator for their needs as well as a possible buyer or market for their products.

Figure 7.9. Stakeholders active during cleantech incubation process



Source: Cleantech Incubation, Cleantech Incubation Policy and Practice, 2014.

### 7.3.2. Cleantech Incubation Process

One can distinguish four different phases of incubation, and eco-incubation process. The first phase – **the idea generation** by the entrepreneur is designed for preparation. The process of potential **start-ups selection** by the incubation programme is the second phase. Then, the third phase is the **core incubation process** that should lead finally to the fourth phase a, preferably profitable, **exit**.<sup>159</sup>

**Idea generation** is the stage at which the support of universities, research Institutes and local government is of the highest importance with such actions as basic R&D funding, idea generation education and scouting for innovative entities within the regional companies.

<sup>158</sup> H. Etzkowitz, *Innovation in Innovation: The Triple Helix of University-Industry-Government Relations*, Social Science Information 2003; p. 42.

<sup>159</sup> Cleantech Incubation, *Cleantech Incubation Policy and Practice*, 2014, p. 31.

**The selection process** decides which companies will receive support and get access to eco-incubator. It should be possibly simple and transparent, as the eco-incubators are funded in general with public money. Usually it includes three elements i.e. the *idea and business plan competitions* which give opportunity to demonstrate existing ideas; *pre-incubation* designed to prepare some raw innovations and innovators to apply for a place in the eco-incubator, and *formal selection process*. The formal selection usually consists of the following general steps: 1) Application submitted in the form of an idea/business model or plan; 2) Presentation in front of a selection committee; 3) Acceptance and setting expected results and incubation conditions (clear targets), 4) Monitoring of expected results.<sup>160</sup>

The cleantech incubators seem to apply the same selection and incubation processes as any other business incubators. There are two crucial elements evaluated during the selection process, these are: “product/service” and the “entrepreneurs.” In case of clean-tech projects one of the most important elements is the return of investment. Since clean-tech investments usually require the long term approach, it is important for the applying company to show its mid-term concept – i.e. for 4-6 years ahead.

One could expect that in eco-incubators, the climate or other eco-benefits would be of high importance. According to the research conducted in 2013 none of the eco-incubators used such criteria. One of the reasons is that it is sometimes difficult to evaluate eco-criteria such as a CO<sub>2</sub> – reduction benefit, reduction of energy consumption, etc. The impact is highly dependent on the actual adoption in the market, such as market share and actual usage of the product in 5 to 10 years.<sup>161</sup>

**Core incubation process** – the process of support with all types of benefits listed in the paragraphs below.

**Exit** – Most incubators have a fixed maximum duration for providing support to start-ups, which depends mainly on the sector in which the company or business incubator is active. Cleantech incubators have in general longer ‘time to market, and incubation programmes for cleantech start-ups are commonly between two to three years. After this period the company should be strong enough to survive outside of the incubator and within the competitive marketplace. As it is one of the most challenging moments in the company’s life, the exit criteria should be clearly described from the very beginning of the incubation process.

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<sup>160</sup> *Ibidem*, p. 49.

<sup>161</sup> *Ibidem*, p. 70.

Eco-innovative companies in order to grow and develop require access to dedicated infrastructure such as demonstration and test facilities. Majority of them after leaving the eco-incubator would not be able to rent such facilities on a market basis. Therefore some cleantech incubators in cooperation with stakeholders launch so-called 'growth' programme. It aims to support start-ups with high-growth potential after the incubation phase that still need support or dedicated infrastructure (office space, R&D labs, etc.) that they themselves cannot yet finance or realize, allowing them to continue operating.

### 7.3.3. Benefits available within the incubation process

In order to fulfill their objectives and general aim of supporting start-up companies cleantech incubators provide physical support in such form as: office spaces; test and demonstration facilities, and intangible support in the form of business services such as mediation and networking tools; training & coaching; business support, and other related services, provided by the incubator management team and external cooperating experts.

Office space – incubators usually offer separate small office for each start-up, and grant access to general office equipment including common meeting rooms, relaxation areas, economic and management literacy and ICT devices. The size of an offered office space within one incubator ranges from 500 to 6,000 m<sup>2</sup>. Quite often the office spaces available at the incubator are not big enough for fast growing start-ups.

**Test and demonstration facilities** – specific infrastructure including equipped laboratories, prototyping, testing and demonstrating facilities is extremely important for eco-innovative companies, and needed in much larger extent than in other sectors such as ICT or consumer products. However it is not the total size of the available facilities, what decides of successful incubation, the quality and flexibility are similarly important. Due to these expectations and high costs of such specific devices, the engagement of local governments and universities together with the cleantech industry is very important. The use of the office spaces, other specialist facilities within the incubator can be either free of charge or subject to a fee payment. It depends on the business model of the incubator; however the rates paid for the use of infrastructure are in general below the market level. If an incubator that is too expensive it will put off young start-ups. In SciencePark Graz for example the office space can be used for free.

**Business support** – is provided by every incubation programme to help the start-ups in approaching market and business related issues. It is important in cleantech incubation, as majority of companies targets B2B activity, and often

does not have proper understanding of it. Incubators provide also services in business strategy development, sales and marketing, or web design and general legal services especially in the field of intellectual property rights.

**Training and coaching** is another incubation service, which gives the start-up tools to tackle start-up specific challenges on a daily basis. It is provided by external experts and/or experienced entrepreneurs who act as a mentor and coach during the entire incubation phase.

**Mediation and networking** is an important role of an incubator. The aim is to make the group of start-ups operating in the incubator, more visible to the outside world. The B2B focused companies require it the most, as they can experience high entrance barriers to the already established companies.

**Funding support** – is provided by eco-incubators in limited extent, however within the training and coaching there are showing multiple funding sources. Incubators are also a good contact-point for governmental and local support programmes. Sometimes they also provide so called **pre-seed loans**. These are usually relatively small amounts of money (€15,000 to €25,000), that the entrepreneur can receive as a personal loan (not as a company) to support him/her in setting up the company.<sup>162</sup>

#### 7.3.4. Examples of eco- and cleantech incubators

Eco-incubators and cleantech incubators are moderately new idea. In general there are just few incubators focused only on environmental technologies. In majority of cases, the cleantech is among the priorities, but there are also active companies focused on other types of activity. Cleantech incubators are present already all around the world. In the US there are e.g. Rutgers EcoComplex in New Jersey, and the LA Cleantech Incubator. In Europe in case of majority of incubators, cleantech is only one of priority themes, but there are such as KIC InnoEnergy in Barcelona or Green Net Finland and TTP Ventures cleantech incubators which focus mainly on cleantech companies. There are however multiple other which treat cleantech as one of several priorities, these are e.g. Munich – UnternehmerTUM in Germany, I3P incubator in Torino – Italy, Yes! Delft incubator in Rotterdam and Impact Hub Zürich in Switzerland. The cleantech companies usually account for 20-60% of their activity.

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<sup>162</sup> *Ibidem*, p. 76.



## Conclusion

Eco-incubators are designed to support start-ups with passing the so called “valley of death” by providing infrastructure necessary for company’s development for free or at the rates below the market level. The incubators focused only on environmental technologies are rare, usually cleantech is one of several focus points of an incubator. Eco-incubators to be successful require modern test and demonstration facilities, and cooperation of all stakeholders within the created cleantech eco-system. In spite of available in eco-incubators support from professionals and experienced entrepreneurs, they operate mainly thanks to public funding, therefore the local and state support policy is of high importance for their development.

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## Chapter 8

# Overview of possible forms of commercial funding for eco-innovations

*Katarzyna Sobiech-Grabka*

### Introduction

According to traditional principles of finance, the preferred financing source of choice is earnings retention, followed by external debt, and, lastly, external equity. However, in the case of start-ups, especially eco-innovative ones, this traditional approach can be confronted by the excessive demand for external equity. To quote R. Aernoudt, *“the traditional finance pecking order seems to be reversed for start-ups, especially for high-tech start-ups.”*<sup>163</sup>

In general, we can distinguish three types of finance that can be used to develop projects:

- investment grants (subsidies) – that were presented earlier in this book (Chapter 5) by P. Nowakowski
- loans (debt)
- and equity.

Definitions of non-public forms are presented in Box 7.

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<sup>163</sup> R. Aernoudt, *Business Angels: The Smartest Money for Starters? Plea for A Renewed Policy Focus on Business Angels*, “International Journal of Business”, 10 (3), 2005, p. 272.

**Box 7. Types of finance**

Equity: capital raised from shareholders that receive returns through dividends (distribution of cash from after-tax profits) or from the sale of shares. Note that shareholders have only a residual claim to the assets of the project’s parent company.

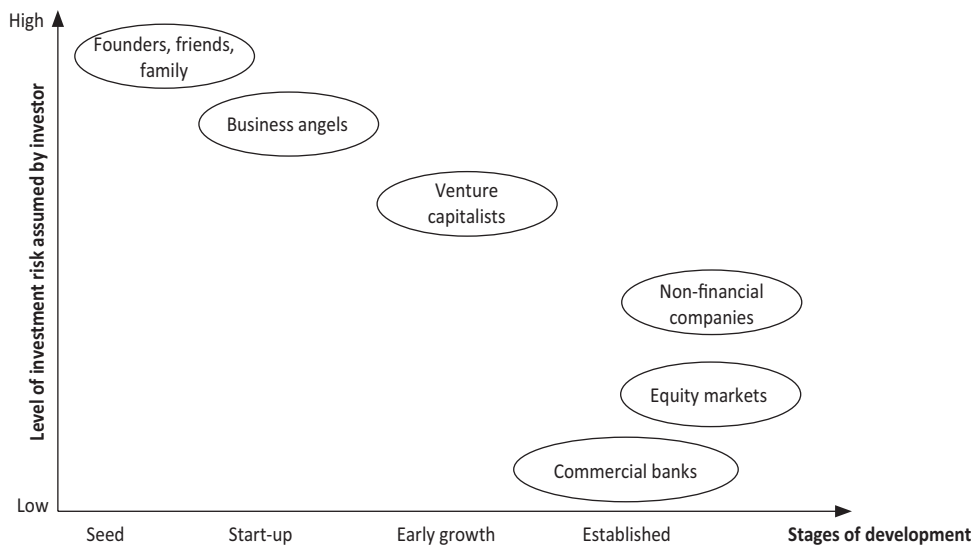
Debt: money provided by a third party to a project that must be repaid either during or at the end of its agreed term. Interest has to be paid over the period of the borrowing. Loans are mainly provided by banks, but persons and organizations may also act as lenders.

Mezzanine finance: a hybrid product, a combination of debt and equity.

Source: OECD, M. Kalamova, C. Kaminker and N. Johnstone, *Sources of Finance, Investment Policies and Plant Entry in the Renewable Energy Sector*, OECD Environment Working Papers, No. 37, OECD Publishing 2011, p. 14.

Those sources differ as regards their level of risks and the advantages (as well as disadvantages) they offer for a project’s developer. Various types of finance may be used during different stages of one project, as is shown in Figure 8.1.

**Figure 8.1. The development and financing of innovative firms**



Source: C. Mayer, *Institutional Investment and Private Equity in the UK*, Conference Corporate Governance: Reassessing Ownership and Control, Cambridge 2001, p. 21.

In the eyes of entrepreneurs not all money is the same – they have to consider several criteria when they are planning the most appropriate finance montage for their ventures. As R. Aernoudt underlines, “to achieve a successful and

*profitable business development it is necessary to ensure the right type of money is matched to the real risk involved. For a start-up, with no income until the product is fully developed and the first sales are made, debt finance is rarely the best source of external finance. Debt finance is usually secured on assets. The longer or the more uncertain the exit period, the higher the collateral required. Moreover, the riskier the project, the higher the anticipated reward that is needed to attract investors.<sup>164</sup>*

Eco-innovative projects are quite commonly undertaken by innovative entrepreneurs (inventors) with inappropriate financial experience: they do not have an organizational background nor are they proficient in gathering finance for their projects. Further, they may be limited by lack of business skills. In other words, innovative entrepreneurs are often not creditworthy.

In finance literature we can find the term “Macmillan gap”, which is used to describe a situation when small innovative entities face problems with raising long-term capital. The gap can be defined as a difference between the capital raised from private sources and the required investment expenditures for starting the project/activity.

The Macmillan gap (or equity gap) is linked with the so called capital gap, which is described as the difference between the needs of those looking for capital and the requirements demanded by owners of surplus capital. The situation is common during the seed, early development and start-up stages.

Some determinants of capital gaps include:

- investment risk may be higher for activities in early stages, as the managers are not suitably experienced and the market is uncertain, moreover uncertainty is higher when the technology used is innovative
- potential investors may face information asymmetry that can be reduced only by detailed due diligence (due diligence analysis generates additional costs that are fixed, they do not depend on the investment size: this may make smaller projects not cost-effective because of the additional cost of analysis)
- monitoring costs, which are also mainly fixed, are a relatively bigger burden on smaller projects
- uncertainty regarding potential exit-options for external investors expecting repayment in a form of capital profits may also have discouraging effect.

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<sup>164</sup> R. Aernoudt, *Business Angels...*, op. cit., p. 273.

- funds specialised in later investment phases typically generate the highest profits on capital; thus, investors are generally not inclined to finance earlier stages of a project<sup>165</sup>.

The choice of financing sources is a strategic decision, therefore we will discuss in this text the differences between the various private finance sources, as well as their advantages and disadvantages.

Transitioning to a low-carbon economy will require huge capital investments over the next 20 years. At the same time, eco-innovative projects are, by definition and by their nature, very risky. Green projects will need more private financing, especially because of current (and worldwide) budgetary constraints. Institutional investors, such as pension funds, may finance eco-innovative projects via equity (e.g., index funds, mutual funds and ETFs), fixed income (e.g., green bonds) and alternative investments (like direct investment via private equity or via green infrastructure funds)<sup>166</sup>.

## 8.1. Debt financing

Debt financing provides finance with an obligation of repayment. In other words, the investor does not receive any equity stake, and only makes the funds available to a borrower for a given time. Debt financing includes a wide range of financing schemes: loans from individuals, banks or other financial institutions, selling bonds, notes or other debt instruments, and also other types of credit such as leasing or credit cards.

Debt financing is the most popular source of financing for small, young, innovative companies, although, as the OECD report of 2011 underlines, innovative and high-growth firms seek equity financing more than other types of small firms<sup>167</sup>.

### 8.1.1. Bank credits

Banks are quite often reluctant to lend to small, young, innovative companies owing to their perceived riskiness and lack of tangible assets (and therefore collateral). They are also characterised by higher risk profiles.

<sup>165</sup> Cf. K. Brzozowska, *Business angels na rynku kapitałowym. Motywacje, inwestowanie, efekty*, CeDeWu, Warszawa 2008, pp. 18-19.

<sup>166</sup> OECD, R. Della Croce, C. Kaminker and F. Stewart, *The Role of Pension Funds in Financing Green Growth Initiatives*, OECD Publishing, Paris 2011, pp. 6 and 14.

<sup>167</sup> OECD, *Financing High-Growth Firms. The Role of Angel Investors*, 2011, p. 19.

According to the study *Financing eco-innovation*, the primary source of eco-innovative SMEs is “own source”, which includes family, friends, and founders. The second-most commonly used sources are public grants and debt financing. Business angels and venture capital (VC) funds accounted for approximately 18 percent each (only 2% of traditional SMEs rely on VC). Own source of financing plays a significant role in terms of its relation to total financing obtained (in nearly half of businesses that have received own source financing, it accounted for over 50% of the total amount of financing). Debt financing is more popular in later development stages. Eco-innovative companies are also more likely to receive public grants (59%, compared to 11% in the case of traditional SMEs)<sup>168</sup>.

While analysing banks’ activity in securing financing for eco-innovative companies, it is important to distinguish between traditional banks, banks that have special focus on eco-innovative projects, and state promotional banks (e.g., the UK’s Green Investment Bank).

The latter two are known as sustainable banks, because they tend to have a focus on sustainability, ethics and solidarity, with an aim to be part of a “just” society. These characteristics make them different than typical banks, whose main goal is maximisation of value for their shareholders. Owing to that, the sustainable banks seek to promote eco-projects. Nevertheless, the banks interviewed within the *Financing eco-innovation* project admitted that they are fairly conservative when assessing risks of projects, and said that they would not take risks that traditional banks would not take<sup>169</sup>.

For that reason, overall criteria for assessing loan applications are the same for eco-innovative companies as for different sectors, and these criteria typically include:

- the team behind the business
- the business plan
- the balance sheet
- assets that can be used as collateral
- payment and credit history
- the risk related to the market, including competition
- the risk related to the product or service
- credit rating<sup>170</sup>.

Governments willing to back green economy development and looking for instruments to fulfill their environmental commitments (e.g., carbon footprint

<sup>168</sup> EIM and Oxford Research, *Financing Eco-Innovation. Final Report*, January 2011, pp. 53-54.

<sup>169</sup> EIM and Oxford Research, *Financing ...*, *op. cit.*, pp. 69-70.

<sup>170</sup> *Ibidem*, p. 76.

reduction) have started to establish green banks. For instance, the British government launched the Green Investment Bank in November 2012 (see Box 8).

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#### **Box 8. UK Green Investment Bank (GIB) at a glance**

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The GIB's purpose is to accelerate the UK's transition into greener, stronger economy. It is a "for profit" bank with a mandate to tackle risk that markets currently cannot handle and thus be a catalyst for further private sector investment.

To date the GIB has invested in 31 projects in 198 locations around the UK, directly committing 1.3 billion pounds and helping to mobilise 4.8 billion pounds into the UK green economy. Some of these projects are organized within Private Finance Initiative/Public Private Partnership (PFI/PPP) scheme.

Every project must pass through a robust green impact assessment process before it can be approved.

GIB's definition of "green impact" is based on five measures:

- The reduction of greenhouse gas emissions
- The advancement of efficiency in the use of natural resources
- The protection or enhancement of the natural environment
- The protection or enhancement of biodiversity
- The promotion of environmental sustainability

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Source: <http://www.greeninvestmentbank.com/> (accessed 15.07.2014).

Besides new, specially designed institutions, a number of multi-national development banks already perform similar functions to an eco-focused state promotional bank. For example, the European Investment Bank has an annual lending program for climate change solutions. An interesting point in public debate nowadays is the extent to which these banks continue to fund more carbon intensive projects while at the same time working to mitigate carbon emissions with their climate change related portfolios<sup>171</sup>.

#### **8.1.2. Microcredits**

The European Commission (EC) perceives inclusive growth as one of the three key priorities of the Europe 2020 strategy, and underlined in a 2012 report that *"microcredit is generally recognised (...) as an effective financing channel for job creation and social inclusion, which can attenuate the adverse effects of the current financial crisis while contributing to entrepreneurship and*

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<sup>171</sup> OECD, R. Della Croce, C. Kaminker and F. Stewart, *The Role of...*, op. cit., p. 60.



*economic growth in the EU.<sup>172</sup> The EC emphasises the social and economic objectives associated with microfinance.*

Box 9 contains some definitions that will be useful in further reading of this chapter.

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**Box 9. What is “micro”?**

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Microenterprise – any enterprise with fewer than 10 employees and a turnover below EUR 2m.

Microfinance institution (MFI) – an organization or financial intermediary that provides microfinance services.

Microcredit – defined by the EC as a loan or lease under EUR 25,000 to support the development of self-employment and micro-enterprises.

Microfinance – traditionally defined as the provision of basic financial services to low-income people who traditionally are constrained in their access to banking and related services. The term is also used in a wider sense and includes financial services to existing microenterprises.

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Source: EIF Research & Market Analysis, H. Kraemer-Eis, F. Land, S. Gvetadze, *European Small Business Finance Outlook*, EIF Working Paper 2014/24, Luxembourg June 2014, p. 64.

Microfinance institutions in Europe range from microfinance associations to credit unions, cooperatives, Community Development Financial Institutions, non-bank financial institutions, government bodies, religious bodies and Non-Governmental Organizations or Foundations. MFIs may be classified according to their “legal status”:

- MFIs with a bank license
- MFIs without a banking license (i.e., non-bank MFIs).
- MFIs may also be classified according to the “nature” of the MFI determinant:
- For-profit Small – to Mid-sized microfinance institutions: privately owned financial intermediaries that offer exclusively or mostly microfinance services (typically micro-loans)
- Mainstream banks operating microfinance windows
- Public entities operating microfinance windows: they consider microfinance as part of their public enterprise promotion or social inclusion mandate and typically finance these activities with public funds, usually at relatively low margins
- Greenfield entities: start-up MFIs or MFIs with little or no track record, sponsored by private individuals or other investors

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<sup>172</sup> EC, *Report from the Commission to the European Parliament and the Council on the application of Directive 2006/48/EC to microcredit*, COM (2012) 769, Brussels 18.12.2012, p. 3.

- Dedicated microfinance vehicles: funds or vehicles, often set-up for a limited time, that invest in MFIs or provide micro-loans directly<sup>173</sup>.

The business models and client targeting of these various types of MFIs are summarised in Table 8.1.

**Table 8.1. Types of MFIs and their characteristics**

| Type                       | Role of microfinance in business model  | Target clients  | Main products  |
|----------------------------|---|---|--|
| Small/Mid-sized MFIs       | Main (or only) part of business model, possibly complemented by SME lending (i.e., up-scaling)  | Profitable micro-enterprises, with no or limited alternative access to funding  | Commercially priced micro-loans  |
| Mainstream Bank/ Bank MFIs | Small (non-core) part of business model, either (i) as part of its social responsibility programme or (ii) as an extension of its commercial SME lending (i.e., down-scaling) | Depending on business model, either (i) individuals and micro-enterprises with certain socioeconomic attributes, whether or not they are profitable micro-enterprises or (ii) profitable enterprises with no or limited access to funding | Depending on business model, either (i) soft-priced micro-loans; or (ii) commercially priced micro-loans |
| Public Entities            | Varies  | Depending on mandate, usually as above  | Soft-priced micro-loans  |
| Greenfield Entities        | Main (or only) part of business model   | Varies  | Commercially-priced or soft-priced micro-loans   |
| Funds and vehicles         | Main (or only) part of business model   | Allows access to intermediaries and hence final beneficiaries, which otherwise could not be included in the fund  | Varies, depending on business model of the intermediaries pooled in the Indirect Investment              |

Source: EIF Research & Market Analysis, B. Bruhn-Leon, P.-E. Eriksson, H. Kraemer-Eis, *Progress for Microfinance in Europe*, Working Paper 2012/13, Luxembourg January 2012, p. 23.

For bank MFIs, microfinance is a small part of their activity and microfinance offered by them is either:

- a part of the financial intermediaries' social responsibility programme or
- a part of the financial intermediaries' commercial activities<sup>174</sup>.

In the first situation, micro-loans are usually focused on social inclusion, with lower interest rates that are not priced reflecting all costs and credit risks.

<sup>173</sup> EIF Research & Market Analysis, H. Kraemer-Eis, F. Land, S. Gvetadze, *European Small Business Finance Outlook*, EIF Working Paper 2014/24, Luxembourg June 2014, p. 69 and EIF Research & Market Analysis, B. Bruhn-Leon, P.-E. Eriksson, H. Kraemer-Eis, *Progress for Microfinance in Europe*, Working Paper 2012/13, Luxembourg January 2012, p. 22.

<sup>174</sup> EIF Research & Market Analysis, B. Bruhn-Leon, P.-E. Eriksson, H. Kraemer-Eis, *Progress for ...*, *op. cit.* p. 21.

In the latter case, interest rates completely reflect the risk profile and cost structure of the financial intermediary. Banks typically focus more on the commercial aspects of the project<sup>175</sup>.

A recent European Microfinance Network (EMN) survey conducted in 2014 revealed that the microcredit provision in Europe showed a positive trend as regards the overall total value and the number of microloans. The surveyed European MFIs provided a total of 207,335 microloans with a total volume EUR 1.26 billion in 2013. The average loan amount was EUR 9,234 (increased from EUR 7,129 in 2011). This generally positive picture is fractured, however, as MFIs have been seriously affected by the adverse macro-economic conditions during the global economic and financial crisis, mainly through much higher bad debts rates among their clients<sup>176</sup>. That will arguably reduce the MFIs' ability to secure microloans in the coming years. That trend will be enhanced by shrinking public support in the years to come, due to public budget restrictions.

The range of interest rates charged by European microfinance lenders varies widely from country to country, as a function of:

- business models (determined by: product range and pricing policy, level of subsidies, institutional mission, collateralisation practices, etc.),
- differences in refinancing costs, and
- different local laws regarding usury and consumer protection.

In 2011 there were specially designed usury rules in 10 member EU states: Austria, Denmark, Finland, Germany, Hungary, Italy, Poland, Romania, Spain and Sweden. There is a significant difference in pricing between Eastern-EU member states and the Western part of the EU. In the latter, social microfinance, corporate social responsibility initiatives and MFIs with subsidised, partly grant dependent business models are more prevalent, whereas business models in countries such as Bulgaria, Romania or Poland are mainly non-subsidy based<sup>177</sup>. The UK stands out as an interesting counter-example, in large part because (unlike the 10 member EU states with specially designed usury rules previously noted) the UK has no governmental restrictions on interest rates.

### 8.1.3. Bank guarantees

Guarantee mechanisms are one of the possible ways for reducing information asymmetries (two others are: a strong relationship between lender and

<sup>175</sup> Ibidem, p. 21-22.

<sup>176</sup> EIF Research & Market Analysis, H. Kraemer-Eis, F. Land, S. Gvetadze, *European Small Business...*, op. cit., p. 70.

<sup>177</sup> EIF Research & Market Analysis, B. Bruhn-Leon, P.-E. Eriksson, H. Kraemer-Eis, *Progress for...*, op. cit., pp. 26-27.

borrower, and due diligence/lenders' examination). Guarantees reduce lenders' risk, favour the provision of financing to sound businesses that face troubles in accessing finance, and are essential to cover additional loans or new credit<sup>178</sup>.

Bank guarantees are frequently used in the cases of big public eco-projects (e.g., a public electric car sharing service).

According to the EU guideline concerning financial provisions of the Eco-Innovation grants, a bank guarantee is always required as a part of the application documentation<sup>179</sup>.

The European Investment Bank also provides guarantees for both small and large-scale investment projects, in order to make them more attractive to other investors.

#### 8.1.4. Green bonds

Green bonds are fixed-income securities issued by governments, multinational banks or corporations in order to raise capital for green projects<sup>180</sup>. They involve the issuing entity guaranteeing to repay the bond over a certain period of time (plus a fixed or variable rate of return). They can be either asset backed securities (ABS) connected to specific green infrastructure projects or plain "treasury-style" bonds issued to raise capital that will be then allocated across a portfolio of green projects.

Green bonds are becoming an important source that fills in the financial gap and spurs additional private investments (including structured project finance and securitization). According to the Climate Bond Initiative, more than a thousand bonds have been issued, generating hundreds of billions of dollars for climate finance<sup>181</sup>. To-date they have been issued predominantly as AAA-rated securities by the World Bank, other development banks, and some other institutions.

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<sup>178</sup> European Parliament, *Eco-innovation – putting the EU on the path to a resource and energy efficient economy*, Brussels March 2009, p. 118.

<sup>179</sup> EC, *Market Replication: Eco-Innovation 2008-2013. Financial guidelines for co-ordinators and co-beneficiaries*, 20.03.2014, p. 16.

<sup>180</sup> OECD, R. Della Croce, C. Kaminker and F. Stewart, *The Role of ...*, *op. cit.*, p. 14.

<sup>181</sup> The World Bank, *The World Bank Green Bond. Fifth Annual Investor Update 2013*, p. 2.

## 8.2. Equity financing

Entrepreneurs quite often raise funds with informal financing – their own funds and those of families and friends. When the project is growing, they may need other external sources of seed capital such as angel investment or venture capital. These sources of seed capital will be described in the following sections of the text.

### 8.2.1. Eco-business angel (BA) funding

#### 8.2.1.1. The definition of business angels

Alexander Graham Bell, Henry Ford, Anita Roddick (founder of The Body Shop company) and Jeff Bezos – entrepreneurs living in different periods – were all in need of capital at the early stage in the development of their companies, and in each case traditional financial institutions appeared to be too orthodox and conservative to secure funding for their businesses. In each of these cases, wealthy individuals (or group of individuals), so called business angels, provided money at the early phase of a project.

The term ‘business angel’ was brought into general use by Broadway insiders in the early 1900s, and originally was used only to describe people (wealthy theatre-goers) investing in risky theatrical performances<sup>182</sup>. Nowadays, a business angel is a wealthy person, experienced in business, ready to take some risk connected with investing is small, new entities that hold the promise of future profits. In other words, a business angel is an independent investor, able to assess the risk of a business at the seed or start-up phase, and seeking new opportunities to make profits on those innovative companies<sup>183</sup>. Business angels create a market that is termed the informal capital market (in contrast to the formal or institutional venture capital market).

As J. E. Sohl summarises, a typical angel deal in the US is an early-stage round (seed or start up) in the \$100,000 to \$1 million range, raised from six or eight investors. The co-investors are usually trusted friends and business associates. Typically they have longer exit horizons than their venture fund counterparts<sup>184</sup>.

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<sup>182</sup> C.M. Mason, *Informal sources of venture finance*, University of Strathclyde, Glasgow 2005, p. 1.

<sup>183</sup> K. Brzozowska, *Business angels...*, *op. cit.*, p. 29.

<sup>184</sup> J.E. Sohl, *The early-stage equity market in the USA*, “Venture Capital”, 1999, vol. 1, No 2, p. 108 and 111.

### 8.2.1.2. Core characteristics of business angels

Colin M. Mason's definition of business angel will help us to understand the most important factors characterising business angels: *"high net worth individuals who invest their own money along with their time and expertise, directly in unquoted companies in which they have no family connection, in the hope of financial gain"*<sup>185</sup>.

As business angels invest upwards of 10,000 pounds per deal (sometimes in excess of 100,000 pounds), they have to be wealthy. Typically one private investor has a portfolio of two to five investments, and he or she allocates just 5-15% of their overall investment portfolio in such high risk projects. Some studies suggest that investors are typically 'comfortably off' rather than super-rich<sup>186</sup>.

The fact that business angels invest their own money brings some important implications: they do not have to invest if they do not find appropriate investments (in contrast: venture capital funds need to invest as they have a fixed life, usually 10 years, over which the funds must invest and exit). The decision-making process is also faster in the case of business angels, and they rely on their own experience and knowledge while analyzing the project rather than on formal due diligence.

Angels often want to be mentors or take active part in managing a new business<sup>187</sup>. According to the Angel Capital Education Foundation, a really great angel helps an entrepreneur:

- see around the corner
- gain a sober second opinion
- network with people who can help build the business
- by being an ambassador
- gain credibility in the field<sup>188</sup>.

It is worth mentioning that business angels are value-added investors, as they not only secure funds, but also bring know-how to the investment. J.E. Sohl underlines that angels often describe their activity as being a "mentor for

<sup>185</sup> C.M. Mason, *Informal sources ...*, op. cit., p. 3.

<sup>186</sup> Only 19% of UK business angels were millionaires. Cf: Ibidem, p. 4.

<sup>187</sup> D.A. Prisciotta, R.M. Weber, *Raising Capital and Developing Exit Strategies for the Closely Held Business Owner: A Tutorial for Financial Professionals*, "Journal of Financial Service Professionals", 2005, vol. 59, No. 3, p. 64.

<sup>188</sup> Presentation *Important Things for Entrepreneurs to Know about Angel Investors* available on: [www.angelcapitalassociation.org/data/Documents/Press%20Center/What%20Ents%20Should%20Know%20About%20Angels%202009.pdf](http://www.angelcapitalassociation.org/data/Documents/Press%20Center/What%20Ents%20Should%20Know%20About%20Angels%202009.pdf) (accessed 7.07.2014).

money”<sup>189</sup>. R. Aernoudt concludes: *“They are not looking to invest money, but to invest money and time. This input allows advice and guidance to be given to young entrepreneurs both on the technical and on the managerial aspects of running a business. Business angel money is hence smart money and crucial to the creation and development of new enterprises”*<sup>190</sup>.

Business angels may also play a significant role in securing debt financing because they have direct access to top-level bank managers in the region. As they have good reputation from involvement in past projects, they can act as referrers for entrepreneurs having trouble obtaining finance<sup>191</sup>.

BA investments are made in unquoted companies as opposed to companies that are listed on a stock market.

Although business angels invest in the hope of financial return, typically in the form of a capital gain that is accomplished through some form of harvest event (e.g., acquisition of the investee company or an IPO), there is also an additional motivation for private informal investors, namely: psychic income. Sohl describes them as “adventure investors” who “continue to yearn for the excitement of the high-growth venture, but tend to eschew the sleepless nights associated with running a start-up company”<sup>192</sup>. Some business angels, especially in the US, also express altruistic motives (creating new jobs in their own communities, helping other entrepreneurs to succeed, etc.).

BAs typically invest close to their principal place of residence (often within 1 day’s travel time). That is crucial, since it is much easier to share one’s knowledge and experience if the venture is near the investor. The psychic income is also more easily derived if the project is located close to the business angel. Some angels also follow a “kick the tyres” approach to the investment (they are sometimes characterised as being hands-on investors), and therefore they want to be close<sup>193</sup>.

Brief characteristics of business angels, in comparison to venture capitalists, is provided in Table 8.5 (in the Venture Capital section of the text).

J.E. Sohl describes the difference between BAs and VCs in the following way: *“In reality there are two segments to the venture capital market: one visible and one relatively invisible. The visible segment is represented by about 500 venture capital funds that manage between \$35 to \$45 billion. The invisible segment is the*

<sup>189</sup> J.E. Sohl, *The early-stage...*, op. cit., p. 112.

<sup>190</sup> R. Aernoudt, *Business Angels: The Smartest Money for Starters? Plea for A Renewed Policy Focus on Business Angels*, “International Journal of Business”, 10 (3), 2005, p. 272.

<sup>191</sup> R. Sorheim, *Business angels as facilitators for further finance: an explanatory study*, “Journal of Small Business and Enterprise Development”, Vol. 12, No 2, 2005, p. 187.

<sup>192</sup> J.E. Sohl, *The early-stage...*, op. cit., p. 112.

<sup>193</sup> C.M. Mason, *Informal sources...*, op. cit., pp. 5-6.

*oldest and largest segment of the US venture capital industry and is made up of about two million self-made, high net worth individuals. Individually, these investors don't merit a blip on any chart of total investment capital in the USA. Collectively, however, hundreds of thousands of similar investors, successful entrepreneurs who are willing to invest in other entrepreneurs, have quietly become the nation's major source of start-up capital. These private investors are the spawning grounds for their venture capitalist counterparts and in terms of seed and start-up capital far outpace the venture capitalists that are in the headlines of today's financial news."*<sup>194</sup>

As studies suggest, there is a remarkable consistency in the characteristics of business angels across countries (with Japan as the only one state where research indicates a significantly different profile of BAs). The profile of typical business angel is presented in Table 8.2.

**Table 8.2. The profile of the typical business angel**

| Characteristics     | Description   |
|---------------------|---|
| Gender              | Male: upwards of 95% of BAs are male. This fact can be the result of the relatively small cohort of female entrepreneurs or holding senior positions in large companies   |
| Age                 | In the 45-65 year age group. This reflects the length of time required to build a successful entrepreneurial company and personal net worth. At that age both they and their children are already financially independent. The decision to become BAs may be driven in part by a desire to remain economically active and avoid the boredom of a life of leisure. |
| Professional status | Successful cashed-out entrepreneurs. Most BAs have had experience with business start-up and growth.  |
| Education           | Well educated, typically they have a university degree and/or professional qualifications, but angels with PhD are rare.  |

Source: prepared by author, based on: C.M. Mason, *Informal sources of venture finance*, University of Strathclyde, Glasgow 2005, pp. 6-7.

### 8.2.1.3. Business angels in Europe: a short overview

According to The European Trade Association for Business Angels, Seed Funds and other Early Stage Market Players (EBAN), angel investments in Europe in 2013 increased to 5.5 billion Euros. This represents a growth of 8,7% from 2012. BAs remain the main financier of European startups (with a 73% share). Data from both the US and the UK from over the past ten years reveal

<sup>194</sup> J.E. Sohl, *The early-stage ...*, op. cit., p. 106.



that angel investment has been constantly larger than seed and early-stage venture capital investment<sup>195</sup>.

The European investors' community consists of 271.000 investors which closed 33.430 deals last year. A new record investment amount was reported in 2013: 5.543 million Euros. Individual angel investment averages 20.000 Euros, and the average investment per deal is 165,787 Euros (in the US the average investment per deal is significantly bigger and reaches 260.000 Euros).

As regards regional comparisons, the United Kingdom continues to be the leading country with EUR 84,4 million invested in 535 companies (see Table 8.3). The second one is Spain with 57,6 million Euros of investment followed by Russia with 41,8 million Euros. It is worth underlining that 96% of the deals take place in the country of the investor.

**Table 8.3. Angel investment by country, European market**

| Country       | #BAs       | #BANs    | # companies financed | BA Inv. 2013 (M€) | YoY         | BA Inv. 2012 (M€) | Jobs created | Average Inv. per company (€) | Average Inv. per BA (€) | Average Inv. per BAN (M€) |
|---------------|------------|----------|----------------------|-------------------|-------------|-------------------|--------------|------------------------------|-------------------------|---------------------------|
| UK            | 4350       | 38       | 535                  | 84.4              | 24%         | 68.3              | 2354         | 157,757                      | 19,402                  | 2.2                       |
| Spain         | 2520       | 63       | 245                  | 57.6              | -8%         | 63.5              | 1485         | 235,102                      | 22,857                  | 0.9                       |
| Russia        | 220        | 13       | 165                  | 41.8              | n.a.        | n.a.              | 808          | 253,030                      | 189,773                 | 3.2                       |
| France        | 4320       | 83       | 376                  | 41.1              | 0%          | 40.9              | 1807         | 109,176                      | 9,502                   | 0.5                       |
| Germany       | 1510       | 37       | 185                  | 35.1              | 26%         | 27.9              | 916          | 189,838                      | 23,258                  | 0.9                       |
| Finland       | 490        | 12       | 208                  | 26.4              | -7%         | 28.4              | 916          | 126,683                      | 53,776                  | 2.2                       |
| Sweden        | 762        | 11       | 110                  | 19.4              | -17%        | 23.2              | 506          | 175,909                      | 25,394                  | 1.8                       |
| Turkey        | 450        | 10       | 61                   | 14.7              | 40%         | 10.5              | 400          | 240,984                      | 32,667                  | 1.5                       |
| Portugal      | 611        | 13       | 73                   | 13.8              | 19%         | 11.6              | 497          | 189,000                      | 22,581                  | 1.1                       |
| Switzerland   | 424        | 7        | 44                   | 13.3              | 15%         | 11.6              | 130          | 302,273                      | 31,368                  | 1.9                       |
| Ireland       | 480        | 6        | 59                   | 13.2              | 9%          | 12.1              | 286          | 222,966                      | 27,406                  | 2.2                       |
| Denmark       | 155        | 5        | 102                  | 11.8              | n.a.        | n.a.              | 539          | 115,882                      | 76,258                  | 2.4                       |
| Belgium       | 350        | 6        | 67                   | 10.0              | 96%         | 5.1               | 332          | 149,254                      | 28,571                  | 1.4                       |
| Italy         | 760        | 11       | 43                   | 9.9               | -10%        | 11.0              | 282          | 230,233                      | 13,026                  | 0.9                       |
| Netherlands   | 810        | 11       | 58                   | 9.8               | -3%         | 10.1              | 281          | 169,310                      | 12,123                  | 0.9                       |
| <b>Poland</b> | <b>160</b> | <b>4</b> | <b>38</b>            | <b>6.6</b>        | <b>n.a.</b> | <b>n.a.</b>       | <b>233</b>   | <b>173,158</b>               | <b>41,125</b>           | <b>1.6</b>                |
| Estonia       | 52         | 1        | 83                   | 4.7               | n.a.        | n.a.              | 457          | 56,108                       | 89,558                  | 4.7                       |
| Norway        | 110        | 3        | 19                   | 4.2               | n.a.        | n.a.              | 88           | 222,105                      | 38,364                  | 1.4                       |
| Austria       | 240        | 2        | 24                   | 2.9               | n.a.        | n.a.              | 132          | 121,000                      | 12,100                  | 1.5                       |
| Bulgaria      | 52         | 2        | 37                   | 2.9               | n.a.        | n.a.              | 163          | 77,027                       | 54,808                  | 1.4                       |
| Greece        | 52         | 2        | 18                   | 2.1               | 40%         | 1.5               | 99           | 116,667                      | 40,385                  | 1.1                       |
| Lithuania     | 80         | 1        | 18                   | 2.0               | -81%        | 10.9              | 77           | 112,556                      | 25,325                  | 2.0                       |
| Luxembourg    | 80         | 1        | 17                   | 1.6               | 433%        | 0.3               | 59           | 94,118                       | 20,000                  | 1.6                       |

Source: prepared by author, based on: EBAN, *The Statistics Compendium 2014*, Bruxelles 2014, p. 5.

<sup>195</sup> OECD, *Financing High-Growth Firms. The Role of Angel Investors*, 2011, p. 9.

Sectorial analysis shows that the main sector of investment is ICT (32%), followed by biotech & life sciences (10%), mobile (10%) and manufacturing (10%).

The majority of the targeted companies (87%) are in early stages, notably startup, seed and pre-seed stages.

Business angel networks (BANs) across Europe have been growing consistently and are today estimated at 468 BANs<sup>196</sup>.

#### 8.2.1.4. The BA market in Poland<sup>197</sup>

The only research available is as regards visible BAs (i.e., BA networks) in Poland. In 2012 there were 11 BANs in Poland, as enumerated in Table 8.4.

**Table 8.4. Business Angels Networks in Poland in 2012**

| Name of the Network   | City of establishment   | Year of establishment |
|---|---|-----------------------|
| PolBAN Business Angels Club   | Warszawa, Bydgoszcz   | 2003                  |
| Lewiatan Business Angels  | Warszawa  | 2005                  |
| Śląska Sieć Aniołów Biznesu Silban  | Katowice  | 2006                  |
| Sieć Inwestorów Prywatnych SATUS  | Kraków  | 2006                  |
| Regionalna Sieć Inwestorów i Inwestycji Kapitałowych RESIK                  | Kraków  | 2007                  |
| Lubelska Sieć Aniołów Biznesu (actual name: Wschodnia Sieć Aniołów Biznesu) | Lublin  | 2007                  |
| Sieć Aniołów Biznesu Amber  | Szczecin  | 2009                  |
| Secus Wsparcie Biznesu  | Poznań, Warszawa, Kraków, Wrocław, Katowice                               | 2010                  |
| Ponadregionalna Sieć Aniołów Biznesu  | Katowice, Warszawa, Wrocław, Białystok, Gorzów Wielkopolski, Zielona Góra | 2010                  |
| Gildia Aniołów Biznesu  | Łódź  | 2010                  |
| Studencka Sieć Aniołów Biznesu  | Katowice, Warszawa, Wrocław, Białystok                                    | 2011                  |
| Kobieca Sieć Aniołów Biznesu  | Warszawa  | 2012                  |

Source: prepared by author, based on: CSES, *Evolution of EU Member State Business Angel Markets and Policies. Final Report*, Sevenoaks, October 2012, p. 95 and [http://www.pi.gov.pl/PARP/chapter\\_86197.asp?soid=C39DA179C993412C98FAF588BB3AED2A](http://www.pi.gov.pl/PARP/chapter_86197.asp?soid=C39DA179C993412C98FAF588BB3AED2A) (accessed 21.02.2015).

<sup>196</sup> EBAN, *The Statistics Compendium 2014*, pp. 1-2 and 6-7.

<sup>197</sup> Based on: CSES, *Evolution of EU Member State Business Angel Markets and Policies. Final Report*, Sevenoaks, October 2012, pp. 95-101.

Polish BANs are interested in projects for which capital needs range from 50,000 to 5 million zł. According to the very limited data (from four deals), the average deal was around 40,000 EUR and each angel invested around 25,000 EUR per deal. BANs receive 97 project proposals each month and around one quarter are deemed worthy of closer consideration. Investing priorities of Polish BANs are: high-tech sectors including ICT and mobile, ecology and environment, biotechnology and pharmaceuticals. Angels focus on pre-seed (60%), seed (30%) and early stage start-up (10%).

As regards barriers in development of BAN investments in Poland, directors of the largest networks point out several, including: reluctance of the scientific community to commercialise scientific achievements, lack of business confidence for this form of project financing, and even sometimes lack of projects to commercialise.

### 8.2.2. Venture Capital

In contrast to business angels, venture capital is a rather recent phenomenon: the first VC funds were established in the US in 1946, and in Europe only in 1970s. Since then, VC expanded in a number of countries (the UK is a good example here), in part thanks to various governmental mechanisms such as tax exemption and subsidies<sup>198</sup>. The American VC market is the most developed in the OECD. Many leading high-tech companies that contributed to the astonishing growth in the US in late 1990s were venture-backed<sup>199</sup>.

The OECD provides a useful definition of venture capital: *“Venture capital is a type of private equity capital typically provided for high-potential technology companies in the early market deployment phase in the interest of generating a return on investment through a trade sale of the company or an eventual listing on a public stock exchange”*<sup>200</sup>.

Venture capital is typically invested through funds provided by institutional investors (called limited partners, LPs). Among LPs there are pension funds, endowments, funds of funds, banks, insurance companies and also high net worth individuals and family businesses. The VC funds obtain management fees (normally 1-2% of the capital committed) from the LPs (see Figure 38 for the

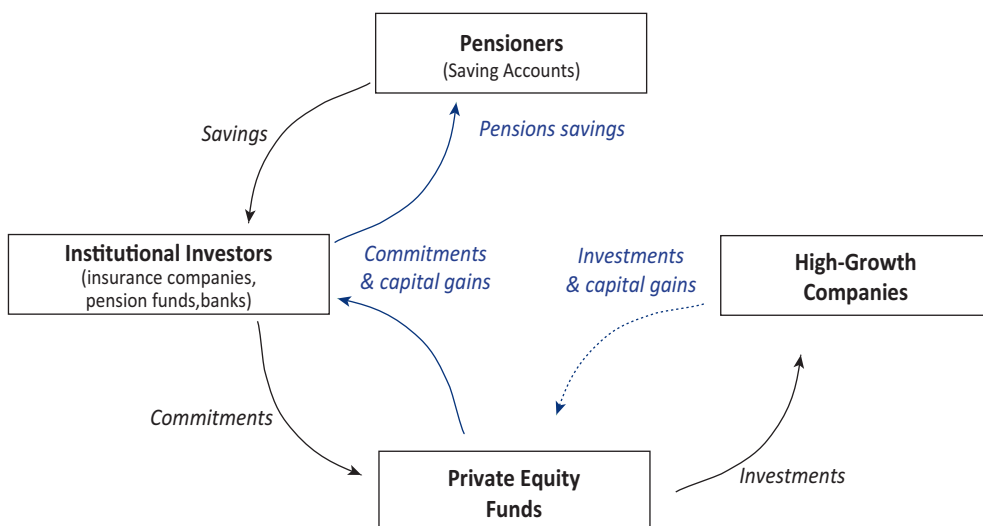
<sup>198</sup> J. Randjelovic, A.R. O'Rourke, R. Orsato, *The Emergence of Green Venture Capital*, 2002/51/CMER, Working Papers, INSEAD, Fontainebleau 2002, p. 4.

<sup>199</sup> OECD, G. Baygan, *Venture Capital Policy Review: United States*, OECD Science, Technology and Industry Working Papers, 2003/12, OECD Publishing 2003, p. 5.

<sup>200</sup> OECD, M. Kalamova, C. Kaminker and N. Johnstone, *Sources of Finance, Investment Policies and Plant Entry in the Renewable Energy Sector*, OECD Environment Working Papers, No. 37, OECD Publishing 2011, p. 15.

investment model of VC) and a share of the profits. Thanks to those fees, VCs may hire a group of professionals – in this way LPs delegate the investment process to experienced fund managers. Shares of profits incentivise VC managers to raise the largest funds possible and generate sufficient returns. Funds are invested directly in entrepreneurial ventures (“portfolio companies”, PCs).

Figure 8.2. Private equity and venture capital financing cycle



Source: prepared by author, based on: OECD, *Financing High-Growth Firms. The Role of Angel Investors*, 2011, p. 24.

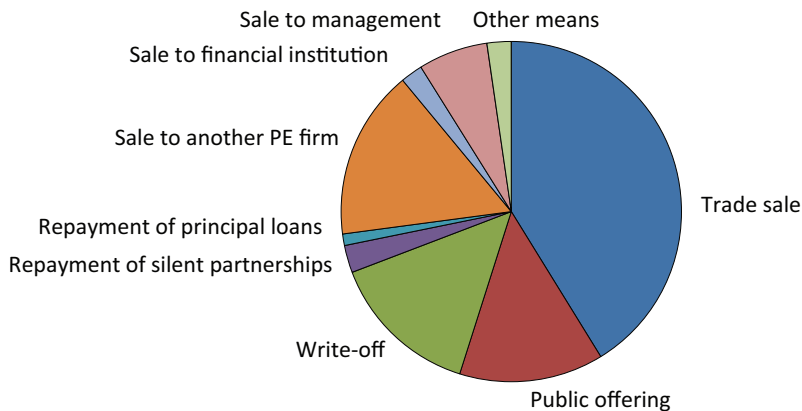
VC managers often want to be actively involved in the management of the start-up companies they invest in. Venture capitalists receive equity shares and privileges (e.g., active participation in the enterprise’s governance), management and profit sharing<sup>201</sup>.

The ways in which European VCs exit from the investment are presented in Figure 8.3. As we can easily observe, the most lucrative exit, by IPO, represents only 13.7% of all exits. *The Economist* suggests that selling the companies too early may be a common mistake done by European VCs, which negatively influences their rate of returns<sup>202</sup>.

<sup>201</sup> J. Randjelovic, A.R. O’Rourke, R. Orsato, *The Emergence ...*, op. cit., p. 4.

<sup>202</sup> *The Economist*, *European Venture Capital: Innovation by fiat*, 17 May 2014.

Figure 8.3. European VC exits in 2010



Source: OECD, *Financing High-Growth Firms. The Role of Angel Investors*, 2011, p. 24.

We should bear in mind that only a small fraction of small and medium enterprises (SMEs) is qualified to be financed via VCs. Data gathered by the European Investment Fund (EIF) show that the most popular sectors to be financed by VCs are (and the trends show certain stability over time): life sciences, computer/consumer electronics, and communications<sup>203</sup>. Eco-innovative projects would fit within the energy and environment category but its share in VC investment had been seriously decreasing between 2008 and 2013.

As the OECD underlines, VC funds seem to be *“appropriate for high-growth companies which are usually technology or science based companies with scalable, high-growth business models and therefore [VC funds] should not be viewed as the panacea for new venture financing.”*<sup>204</sup>

A comparison between business angels and venture capitalists is presented in Table 8.5.

<sup>203</sup> EIF Research & Market Analysis, H. Kraemer-Eis, F. Land, S. Gvetadze, *European Small Business Finance Outlook*, EIF Working Paper 2014/24, Luxembourg June 2014, p. 27.

<sup>204</sup> OECD, *Financing High-Growth Firms...*, *op. cit.*, p. 22.

**Table 8.5. Differences between business angels and venture capitalists**

| Characteristics                     | Angel Investors  | Venture Capitalists   |
|-------------------------------------|--|---|
| Background                          | Former entrepreneurs   | Finance, consulting, some from industry   |
| Investment approach                 | Investing own money  | Managing a fund and/or investing other people's money   |
| Investment stage                    | Seed and early stage   | Range of seed, early stage and later stage but increasingly later stage   |
| Investment instruments              | Common shares  | Preferred shares  |
| Deal Flow                           | Through social networks and/or angel groups/networks                             | Through social networks as well as proactive outreach   |
| Due Diligence                       | Conducted by angel investors based on their own experience (more cost efficient) | Conducted by staff in the VC firm, sometimes with the assistance of outside firms (law firms, etc.) (more costly)                           |
| Geographic proximity of investments | Most investments are local (within a few hours' drive)                           | Invest nationally and increasingly internationally with local partners  |
| Post-investment role                | Active, hands-on   | Board seat, strategic   |
| Return on investment                | Important but not the main reason for angel investing                            | Critical. The VC fund must provide decent returns to existing investors to enable them to raise a new fund (and therefore stay in business) |

Source: Presentation by K. Wilson, *Financing for Innovative Young Firms and the Role of Policy*, Investment, Enterprise and Development Commission 5th Session, Geneva 29.04-3.05.2013, OECD.

Business angels and the institutional venture capital market are complimentary: they operate in different stages. Private investors secure seed and start-up capital that is needed for a new business to grow up. As it grows, its appetite for cash grows as well, and it begins to outstrip the ability of business angels to supply adequate equity capital. At this point, professional venture capital funds step on stage, especially if the venture has proved some success and has progressed beyond the risk-laden seed and start-up stages of its development towards sustainable growth<sup>205</sup>. VCs are keen to migrate to less risky later-stage investments.

R. Aernoudt points out one more advantage of BA financing in comparison to VC: *“besides the high level of expected return required, the real cost of venture capital is the control and induced information requirements a venture capitalist wants to have about the company. As business angels focus more on the ‘jockey’ than on the ‘horse’, we can assume that business angels can be the real entrepreneurs’ best choice”*<sup>206</sup>.

<sup>205</sup> J.E. Sohl, *The early-stage...*, op. cit., p. 109.

<sup>206</sup> R. Aernoudt, *Business Angels...*, op. cit., p. 273.

Many investors, including venture capitalists, face difficulties with understanding the idea that is behind the project: investors are not familiar with the technologies and concepts. This is an additional reason for which VC funds tend to postpone their activities until later stages of an eco-company's development.

As Aernoudt observes, banks and venture capitalists are not complementary to one another; the only difference between banks and venture capitalists is that the latter take limited risk without sufficient coverage in the case of failure. Even the way in which VC funds evaluate projects is similar to banks' approach: both types of institutions use the discounted cash-flow method, together with the use of comparables. As start-ups are rather unlikely to present stable cash-flow projections, in the short run they will appear less attractive when assessed in this way. Aernoudt notes that most venture capitalists appraise projects through bankers' eyes because most of the fund managers have bank professional backgrounds (they are ex-bankers).

There is a fundamental difference between sources of venture capital in Europe and in the US: in North America venture capital is more commonly raised from funds with longer investment terms (e.g., institutional investors such as public or private pensions funds and insurance companies), whereas in Europe banks are the most important source of finance for the risk capital sector<sup>207</sup>.

There has been a remarkable shift in the investor base during the past few years toward government agencies (for instance, venture capital activity by the European Investment Bank is managed by the European Investment Fund (EFI). Public (governmental) support for European venture capital represented 38% of total investors into VC funds in 2013. Public (governmental) support for Polish venture capital is also growing. This demonstrates that government agencies can play an important counter-cyclical role by securing finance for SMEs. The assessment of their efficiency will only be possible, however, in the years to come.

### 8.2.3. Access to equity in Poland<sup>208</sup>

As regards access to equity in Poland, there are few instruments currently available:

- The National Capital Fund (NCF, Krajowy Fundusz Kapitałowy<sup>209</sup>) was established in 2005 by the Polish government with the aim of filling the equity gap in the Polish SME market. It is the central fund of funds investing in VCs in Poland. The NCF provides VC funds with financial

<sup>207</sup> Ibidem, pp. 273-274.

<sup>208</sup> CSES, *Evolution of ...*, *op. cit.*, p. 100.

<sup>209</sup> [www.kfk.org.pl/en/how-we-invest/investment-policy](http://www.kfk.org.pl/en/how-we-invest/investment-policy) (accessed 14.07.2014).

support for their investment in SMEs, especially innovative entrepreneurs already carrying out research and development projects and these having huge development potential (see Box 10).

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**Box 10. National Capital Fund at a glance**

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As the NCF is described on the website: “Our capital is entrusted to best managers who are able to create substantial value of portfolio companies and consequently generate high rate of return for the potential funds’ investors.”

The NCF selects a fund by an open tender of offers. The participation of private investors is a precondition for creating a fund in cooperation with the NCF. Private investors are expected to submit to a fund at least 50% of its total capitalization, while the NCF’s share in a fund’s capitalization can reach up to 50%.

Each NCV fund has a duration is 10 years (in special cases up to 12 years), with a four-year investment period (with possible continuation of one extra year).

The preferred financing structure is based on capital entry with slight debt, mostly by a ratio of 85% of capital to 15% debt in form of bonds. Moreover, the NCF can provide some non-returnable funding reaching up to 10% of its own financial contribution for the portion of costs connected with preparation and monitoring of the investment.

Evaluation criteria:

- as high as possible capitalization of a capital fund,
- experienced and professional management with great successes in PE/VC investments (measured by number of deals and IRRs).
- funds with investment strategies projecting high rates of return
- compatibility of management’s experience with the fund’s investment strategy inclusive of knowledge about Polish market and specificity of its business lines
- management with good potential for investment strategy realization
- management effective as a team
- capital funds with optimal operating budgets that will be compatible with the investment strategies
- capital funds with hurdle rates exceeding the average profitability of ten-year wholesale bonds
- capital funds with management bodies contributing to the fund’s share capital pay-out

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Source: <http://www.kfk.org.pl/en/how-we-invest/investment-policy> (accessed 14.07.2014).

- Seed funds (e.g., AIP SEED CAPITAL, IIF Group of Business Angel Seedfund) – venture capital funds, specialising in investments in projects at the seed and start-up stage.
- NewConnect – a new stock market financing the growth of young companies with a large growth potential, organised and operated by the Warsaw Stock Exchange (started in August 2007). NewConnect offers more liberal formal obligations and information requirements, which reduces the cost of capital (see Box 11).



### Box 11. NewConnect at a glance

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Before NewConnect's launch, the needs of innovative companies with a short track record and the needs of investors interested in that segment and in higher-risk investments offering above-average profits have could not be satisfied due to the lack of a safe trading platform. Investors interested in promising companies listed on NewConnect include, among others:

- individual investors with a bigger risk tolerance looking for above-average return on investments,
- hedge funds,
- closed-end funds,
- asset management companies,
- private equity and venture capital funds.

NewConnect is a market for companies:

- with large growth potential,
  - looking for equity between several hundred thousand and several million zł,
  - operating in innovative sectors, mainly with intangible assets (e.g., ICT, electronic media, telecommunication, biotechnology, environmental protection, alternative energy),
  - with a vision and a likelihood of an IPO in the exchange market in near future.
- 

Source: [http://www.newconnect.pl/index.php?page=o\\_ryнку\\_en](http://www.newconnect.pl/index.php?page=o_ryнку_en) (accessed 14.07.2014).

### 8.2.4. Pre-IPO sources

An Initial Public Offering (IPO) occurs when a private company decides to sell shares to public investors. In other words, it is the first sale of stock by a private company to the public. Before an IPO, a company's stock is not traded on a public stock exchange. These offerings are usually underwritten by an investment bank<sup>210</sup>.

Every company that decides to go public has to find funds to finance that process. Apart from typical sources such as company's own funds and debt financing, BAs sometimes secure money during the pre-IPO stage. In this case, financing is provided for a company expected to "go public" within six months to a year. The funds are used, for example, to finance various requirements, expand a company's capacity, or provide liquidity prior to making a public offering or some other major restructuring event<sup>211</sup>.

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<sup>210</sup> <http://www.accreditedinvestormarkets.com/glossary/> (accessed 14.07.2014).

<sup>211</sup> EBAN, *The Statistics...*, *op. cit.*, p. 8.

#### 8.2.4.1. Hedge and mutual funds<sup>212</sup>

With regard to VC deals, hedge and mutual funds (see Box 12 for brief descriptions of their characteristics) are non-traditional investors that, as observed recently in the US, are becoming more active at the pre-IPO stage.

##### **Box 12. Hedge and mutual funds: definitions**

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Hedge fund – an aggressively managed portfolio of investments that uses advanced investment strategies such as leveraged, long, short and derivative positions in both domestic and international markets with the goal of generating high returns.

Mutual fund – a fund that invests pooled money from many investors into stocks, bonds, short-term money-market instruments, other securities or assets, or some combination of these investments.

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Source: [www.sec.gov/investor/pubs/inwsmf.htm](http://www.sec.gov/investor/pubs/inwsmf.htm) and [www.investopedia.com/terms/h/hedgefund.asp](http://www.investopedia.com/terms/h/hedgefund.asp) (accessed 14.07.2014).

By doing that, they obtain access to growth companies with the potential for strong IPOs. However, because of their increasing pre-IPO investments, there is a noticeable trend toward higher valuations of some companies at IPO. As M. Boslet underlines, the high valuations position a company for a potential IPO event. They help to back company with capital needed for unexpected expenditures six to nine months before going public. They may give a company more flexibility, and enable it to go public at the best moment (e.g., when it may request a higher price per share). On the other hand, the increasing hedge and mutual fund pre-IPO investments can result in extremely high valuations.

## Conclusions

General rules that normally apply to financial decisions about how to most efficiently structure financial resources for a given project do not seem to apply in the case of innovative eco-projects, especially at the seed and start-up stages. They face so many difficulties in securing finance that the question is not “how expensive it might be to raise finance” but rather “is it at all possible to obtain finance for my project”. For the same reason, even simple and otherwise commonly-used indicators, such as weighted average cost of capital (WACC), will not be in common use for innovative eco-projects.

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<sup>212</sup> M. Boslet, *Hedge Funds Storm into Venture*, “Venture Capital Journal” May 2014, pp. 30-33.

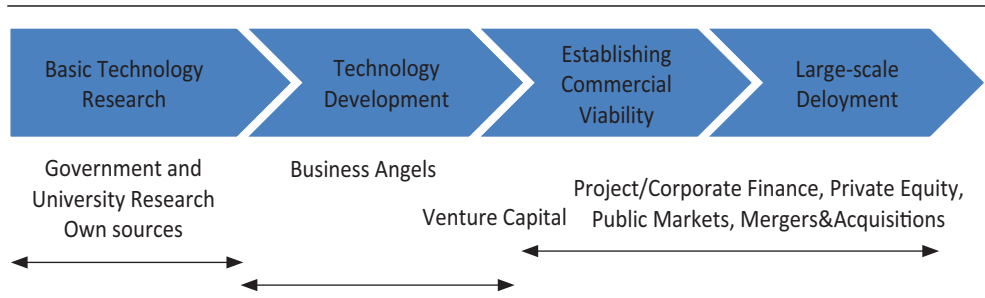
Nevertheless, some types of finance resources are more achievable for eco-innovative start-ups than the others. For instance, microloans, seed funds in the form of VC funds, and business angel financing may be fundamental sources of capital for those kinds of companies and projects.

Microloans may be an important instrument to alleviate the effects of the recent financial crisis and to support sustainable and inclusive growth. However, if banks continue to reduce their exposure to risky, small projects, the financial gap (and a significant portion of this gap affects microenterprises) may become wider. The question is how many eco-companies belong to the category of microenterprises and – going further – how badly eco-companies may be affected by growing financial gap. If we take into account that young companies and start-ups by definition have no track record, often only limited collateral, and not-yet-established or no-long standing relationships with lenders, we can expect that their difficulties in obtaining finance may be growing.

Business angel financing of eco-innovations is arguably crucial, since conventional finance schemes and traditional options are too often unavailable. Thus, innovators must often repeat the history of their great predecessors such as Alexander Graham Bell or Henry Ford. Moreover, as R. Aernoudt underlines, “*business angel financing might also open doors to second round venture capital or to classical debt financing*”<sup>213</sup>.

Figure 8.4 summarises our findings as regards achievable financing options at various stages of project development. Originally it described the situation in the renewable energy sectors, but it seems to also apply to eco-innovative projects in different sectors. (Please refer to the Project Finance section presented elsewhere in this textbook).

**Figure 8.4. Stages of technology development and sources of finance in the renewable energy sectors**



Source: prepared by author, based on: OECD, M. Kalamova, C. Kaminker and N. Johnstone, *Sources of Finance, Investment Policies and Plant Entry in the Renewable Energy Sector*, OECD Environment Working Papers, No. 37, OECD Publishing 2011, p. 15.

<sup>213</sup> R. Aernoudt, *Business Angels...*, *op. cit.*, p. 272.

The appropriate type of financing is to be chosen on the basis of the stage of development of the technologies. For instance, BA funding will be more achievable in the case of un-proven and un-tested technologies, while more traditional forms of project finance will be used for mature technologies. Projects also differ as regards their phases (development, construction, operation) and each phase requires different financing methods: typically equity, then debt will be more popular at early phases, while at the later phases (e.g., operational refinancing) instruments such as green infrastructure bonds may become more useful.

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