Eco-innovation in The Czech Republic

EIO Country Profile
2011
Eco-Innovation Observatory

The Eco-Innovation Observatory functions as a platform for the structured collection and analysis of an extensive range of eco-innovation information, gathered from across the European Union and key economic regions around the globe, providing a much-needed integrated information source on eco-innovation for companies and innovation service providers, as well as providing a solid decision-making basis for policy development.

The Observatory approaches eco-innovation as a persuasive phenomenon present in all economic sectors and therefore relevant for all types of innovation, defining eco-innovation as:

“Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole life-cycle”.

To find out more, visit www.eco-innovation.eu

Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Commission.
Eco-Innovation Observatory

Country Profile 2011: Czech Republic

Author
Ketino Popiashvili

Coordinator of the work package
Technopolis Group Belgium

Acknowledgements
This document has been prepared with kind support and great help from the Czech Environmental information Agency, Ministry of the Environment of the Czech Republic, namely by Mr. Miroslav Hájek and Mr. Evžen Ondráček; environmental NGO Hnuti DUHA, namely by Mr. Martin Mikeska, energy and environment expert.

A note to Readers
Any views or opinions expressed in this report are solely those of the authors and do not necessarily reflect the position of the European Commission. A number of companies are presented as illustrative examples of eco-innovation in this report. Their inclusion in this report does not imply that EIO endorses these companies and, it should also be noted that, the report is not an exhaustive source of information on innovation at company level.

This brief is available for download from www.eco-innovation.eu/CzechRepublic
Table of contents

Summary ...........................................................................................................................................4
1 | Introduction ..................................................................................................................................5
2 | Eco-innovation performance .......................................................................................................6
3 | Established eco-innovation areas and markets ..........................................................................10
4 | New trends and emerging eco-innovation markets ..................................................................16
5 | Public policy in support of eco-innovation ..............................................................................19
6 | Main findings ............................................................................................................................22

6.1 Strengths and weaknesses of the Czech Republic in promotion of eco-innovations ...........22
6.2 Opportunities and threats to eco-innovation in the Czech Republic ....................................23

References ......................................................................................................................................25

ANNEX 1. Policy measures addressing eco-innovations in the Czech Republic .......................27
Summary

The Czech Republic’s eco-innovation performance has changed slightly in comparison to 2010. It went to the 14th position from the 15th position in the EU27 Eco-innovation scoreboard. It is especially well situated in the eco-innovation activities, due to the increasing number of ISO 14001 registered organisations and firms having implemented innovation activities aiming at improving energy efficiency. The country’s socio-economic indicator also performs well thanks to increased exports of products from eco-industries and employment in eco-industries in 2010.

The Czech Republic’s leading eco-innovation areas are sustainable energy, sustainable motor transport, and effective waste management. The country places a big emphasis on the development of sustainable energy, namely on clean energy technologies which found application in electricity generation, heating and cooling systems, energy efficiency, and energy savings. A lot of attention is paid to deliveries from renewable energy sources (wind power plants, biomass combustion). Out of all renewable sources, biomass has the greatest potential for technical use in the country.

There are big eco-innovative developments in waste management systems, with a new and more effective hierarchy, environmental technology, and new certification that give high possibility for effective recycling and re-use of materials. In the Czech Republic, there are also innovative developments in the transport area; some innovation has already been applied to mass production, for example, a more efficient combustion of fuels and catalytic systems.

Newly emerging and more developing eco-innovation areas include innovation in the motor transport sector; in the energy sector it is intelligent distribution network development (Smart Grids); in waste management it is the use of waste as energy source; production of solid alternative fuels from waste, and plasma melting technology in electric waste. Depending on the overall developments in the economy of the country, many other areas are waiting for an eco-innovative approach, technology, and systems.

The State agenda in favour of eco-innovation is focused on support of environmental technologies in the framework of the Environmental Technology Action Plan (ETAP). The main goal of ETAP is to remove the barriers to the introduction and development of environmental technologies. According to the assessment of ETAP roadmaps with regard to the eco-innovation potential (2009), the policy approach in the Czech Republic is mainly focused on the demand side and policy is based on the instruments, like regulations and standards. On the supply side the emphasis is put on the promotion of networks and partnerships, complemented by the support for R&D activities. Climate change and energy issues are the environmental policy priorities. The bigger share of policy instruments targets energy efficiency measures and renewable energy generation, followed by waste management, water, and air pollution control.
1 | Introduction

Environmental burdens in the Czech Republic have been developing in close relationship to the nation’s past economic performance. The current nature and structure of the economy has become more similar to that seen in other EU15 countries. In comparison with both EU15 and EU27, the material intensity of the Czech economy remains very high, similar to other countries of the Visegrad Group. The unfavourable position of the new EU Member States results from the fact that while their DMC per capita is comparable to EU15, their GDP per capita is several times lower. The low material intensity in Western European countries is also attributable to production being moved eastwards (EEA, 2011).

The quality of the environment has not significantly improved even though the overall pressures on the environment from the national economy’s main industries decreased. In the last decade, industrial production has decreased and there has been a continuing decline in electricity generated from coal-burning power plants. The share of industry in the national economy of the Czech Republic is still quite high, around 38% that causes high demands on energy, resources, and materials. At the end, the impact on environment through air and water pollution and wastes is also quite high. In the major part of the territory the limits of air particles for some pollutants are not in compliance (the suspended particulate matter PM10 and nitrogen dioxide) and it is almost certain that some limits which will enter into force in the coming years will not be kept, (tropospheric ozone, suspended particles PM 2.5 and polycyclic aromatic hydrocarbons). A significant part of water flows in the country is still considered to be of lower class quality waters.

Although the Czech Republic keeps its commitment under the Kyoto Protocol, its greenhouse gas emissions per capita per year rank quite high in the European Union and OECD. It is caused by the structure of primary energy sources with a very high proportion of solid fuels. Nearly two-thirds of the electricity and heat produced come from fossil fuel power plants. The energy sector is the largest source of greenhouse gas emissions, main air pollutant, and an important producer of solid waste. The industrial and transport sectors are the highest consumers of energy as well as contributors to GHG emissions and air pollution. In spite of a steady decline of energy intensity in the national economy performance, it still remains quite high. A specific problem is also the combustion of solid fossil fuels and wastes in households. Transportation remains the largest producer of both carbon monoxide and nitrogen oxides and the second-largest producer of dust particles; its share of total emissions for almost all pollutants is increasing. In the coming years the pressure of the transport sector on the environment is expected to grow. The transport sector is also a source of further risks to human health and the environment (noise, emergency releases of pollution to water).

One of the key issues of territorial development and an important driving force behind pressures on the environment in the Czech Republic is suburbanisation, or the expansion of the residential and commercial functions of urban areas into the surrounding landscape. It is taking place around several cities and causes urban sprawl, fragmentation of the landscape, the creation of new transport infrastructure and an increase in transport volumes (CENIA, 2011).

Furthermore, here is a big challenge linked to managing increasing waste quantities, in particular industrial and agricultural wastes. The level of reuse of material and energy waste is unsatisfactory; a significant proportion of waste is stored in the landfills.
2 | Eco-innovation performance

The analysis in this section is based on the EU 27 Eco-innovation scoreboard (Eco-IS) for the year 2011. Eco-IS via its composite Eco-innovation index demonstrates the eco-innovation performance of a country compared with the EU average and with the EU top performers. Eco-IS is based on 16 indicators which are aggregated into five components: eco-innovation inputs, eco-innovation activities and eco-innovation outputs as well as environmental outcomes and socio-economic outcomes.

In comparison to the 2010 Eco-IS, Czech Republic’s composite index has slightly changed. The Eco Innovation Scoreboard (Figure 2.1) shows that the Czech Republic is at the 14th position among the EU27 Member States. The country’s performance is around 30% below the EU27 average. It has to be taken into account that eco-innovation is a newly developing area in the Czech Republic. It is also important to notice that the basket of indicators used in the 2011 scoreboard has been slightly modified than what was used in 2010.

Source: EIO, 2011
Figure 2.2 below shows the performance of the Czech Republic in each of the five components of the Eco-IS composite index.

**Figure 2.2 Components of the eco-innovation composite index for the Czech Republic, 2011**

The eco-innovation input index is based on the national indicators of Cleantech investment, R&D personnel, and environmental and energy R&D expenditure allocation. In this index the Czech Republic is around 20% below the EU27 average and even further behind the EU15 average.

According to the Cleantech Group (2010) records, €43.3m has been invested in green technology projects in the Czech Republic in 2007-2009. In this respect the country performs much better than other Eastern European Member states, but it is still far below the development in old EU Member States. Overall in this indicator the Czech Republic scores half of the EU average value.

According to the national statistics in 2008 the government's environmental and energy R&D appropriations and outlays are around 0.04% of GDP while the EU average is 0.05% and in the best performing countries like Spain and Finland it reaches 0.08-0.13% of GDP. The total R&D personnel and researchers in percentage of total labour force and total employment was at 1.44% in the Czech Republic in 2007, on the same level as the EU27 average (1.44%).

Overall it has to be noted that the main constraint in the sphere of eco-innovative inputs come from insufficient co-operation between R&D institutions and the private sector (Country brief, 2010). Also, the lack of venture capital and economic stimuli (subsidies, taxes, and amortization) is preventing progress in eco-innovation performance.
Eco-innovation activities
In 2010, the eco-innovation activities index was based on the statistics of companies with EU Eco-Management and Audit Scheme Certificates (EMAS) and their innovative performance aimed at material efficiency sourced from the community innovation survey (CIS, 2009). That time, the Czech Republic scored 70, which is 30 points below EU27 average level.

ISO14001 is much more popular than EMAS in the Czech Republic. The number of EMAS registered organisations is rather low (around 20% of the EU average). There were 4,684 companies certified by the ISO 14001 in 2009 (ISO Survey, 2009), which moved the Czech Republic to the 10th position in number of ISO 14001 certificates in the world in 2009. This year this statistic was captured in the sub-index and that put Czech Republic 71 points higher than the EU average.

In terms of innovations targeting at the reduction of material and energy use, for the period of 2006-2008, innovative enterprises in the Czech Republic indicated that their innovation contributed significantly to the reduction of material by 16% and energy by 18.4% input per unit output. In this indicator the country performs slightly above EU average level. The data are based on the Community Innovation Survey (CIS, 2008).

In the period 2006-2008, innovative firms in the country focused mainly on eco-innovation in the field of recycling of waste, water, and materials. The share of companies that have implemented this type of eco-innovation, has reached 42% of the total number of innovative firms. The second most frequently implemented eco-innovation was the reduction of energy consumption per work unit (30.8% of innovative enterprises). The least implemented form of eco-innovation was the reduction of CO2 emissions in the company (mentioned by 17.3% of innovative enterprises).

The relationship between the size of companies and their eco-innovation is determined by the following rule: the larger the enterprise the greater the initiative to introduce eco-innovation. The implementation of eco-innovations such as recycling of the waste water and materials held 54.4% by the large innovative enterprises, 46.5% by the medium-sized enterprises and 39.6% of small enterprises.

Eco-Innovation outputs
In 2011, the eco-innovation output index has been significantly modified and includes three indicators: eco-innovation related patents (OECD, 2008), publications (Scopus, 2011) and media coverage (Meltwater, 2011). This is the only index where the Czech Republic scores really low compared to the EU average.

The index of eco-innovation related patents (per mln pop) in 2008 reaches just 22 scores, and eco-innovation related publications (per mln pop) in 2010 reaches 30 scores. It is not surprising as applied research activities in the Czech Republic are not as advanced as in the Western European countries. However, it should be noted that R&D efforts in the eco-innovation topics are actively being promoted.

The indicator for eco-innovation related media coverage (per number of electronic media) in 2010 is zero. This is most probably due to the fact that the term "eco-innovation" is less popular than "cleantech" or other more specific technical terms. One can observe that eco-innovation related news does get coverage in the Czech published and electronic mass media.
Environmental outcomes
The sub-index of environmental outcomes consists of four major components: statistics on domestic material productivity, domestic water productivity, inland energy productivity, and GHG emissions intensity. The Czech Republic scores 68, while the EU27 average is 100 and leading country Luxembourg scores 145. Nevertheless, it is necessary to recognize that the performance of the Czech Republic in these indicators has generally been progressing over the last decade.

Water productivity of the country in the year 2001 was 8.79 €/m³ which is around 75% of the EU27 average (11.79 €/m³). Data for more recent years is not available therefore it is difficult to assess the trends since 2001. Based upon the information from MoEnv the water withdrawal had a decreasing trend since 2001, which could also affect the performance of CR in this indicator.

Material productivity (GDP/Domestic Material Consumption) in the Czech Republic in 2007 was 1.05 €/kg (EU27 level 1.51 €/kg). Nevertheless, based on the rather steep rising tendency since 2000 (0.73 €/kg), improvement of this component can be expected.

Energy productivity in 2008 was 4.78 €/toe, which is around 67% of the EU27 average (6.92 €/toe). This indicator has been improving over the last decade (e.g. in 1995 it was on the level of 2.67€/toe). Along with this improvement in energy productivity, the carbon intensity of the economy has been declining from 1.28 kgCO₂ equivalents per each euro of product in 1995 to 0.27 kgCO₂ eq/euro in 2008.

Socio-economic outcomes
In 2010, the socio-economic outcome index scored 129 points. This indicator is based on the performance of „eco-industries“ and includes export, employment and turnover statistics. Eco-industries include companies working in areas such as waste management, water supply and treatment, material recycling, renewable energy, air pollution, biodiversity, and soil, groundwater, noise pollution areas.

The country’s eco-industries’ export values were €183.22m in 2004 and in 2010 it reached €917m. The share of eco-industry goods in total export of the Czech Republic was about 0.8%; in comparison, the EU27 average performance in this indicator was 0.5% in 2010.

The share of eco-industry turnover in the GDP in 2008 was 2.78%. The share of eco-industry employment in the total Czech workforce was at 1.89% a bit higher than the EU average (1.49%) in 2008. This can be explained by increased investments (largely via the EU Structural Funds) and activities on upgrading the environmental infrastructure.
Established eco-innovation areas and markets

Even though the Czech Republic prepared and is implementing the necessary supporting activities for environmental technologies, it is at its beginning in the support of eco-innovations. Problems exist on both supply and demand side.

Industrial sectors where environmental technologies have been implemented cover mainly the following areas: energy efficiency, environmentally friendly generation of heat and electricity, environmentally friendly motor transport, sustainable water management, effective waste management, and nanotechnology.

Many eco-innovative activities are supported under the cleantech clusters and technology platforms. In 2005 the Czech government adopted National Cluster Strategy. Cluster initiatives were funded through EU structural funds, Operational Programme Industry and Enterprise, Clusters Support Programme (2005). In 2009 and 2010, the new Operational Programme - Cooperation have been launched. On clusters' establishment in the Czech Republic, €40m have been spent from the EU Structural Funds.

The development of eco-innovation in the Czech Republic is also highly related to R&D activities and in practice it is more connected to the growing implementation of the environmental technologies in different areas. In 1990, an association of science and technology parks began operation and since then has significantly contributed to improving the National Network of Science and Technology Parks and international cooperation in this area. The main accredited parks in the Czech Republic active in the area of clean technologies include the following: Třeboň Innovation Centre, Ostrava Science and Technology Park, Centre for Research and Use of Renewable Energy Sources, Inovacentrum TIC-CTU, and Technology Centre of the Academy of Sciences of the Czech Republic, Prague.

Eco-innovation markets

A comprehensive analysis of the eco-innovation market in the Czech Republic has not been done. However, there are estimates related to eco-industries including such areas as waste management, water supply and treatment, material recycling, renewable energy, air pollution, biodiversity, and soil-, groundwater-, and noise-pollution. The country’s eco-industries’ export values in 2010 reached €917m., which is 0.8% of the total export of the Czech Republic. The share of eco-industry turnover in the GDP in 2008 was 2.78%. The share of eco-industry employment in the total Czech workforce was 1.89% in 2008, which is equivalent to around 98 thousand job places.

Environment friendly motor transport

In the Czech Republic, the development and use of innovation in transport is various. Some innovation has already been applied to mass production. For example, more efficient combustion of fuels and catalytic systems, whereas the remaining portion especially hybrid engines is at a stage of increasing development.

Electric motor vehicles: The Czech Republic, for a long time, has been one of the leading manufacturers of trolleybuses, trams, and electric railway engines. ČAS – SERVICE a.s., in cooperation

---

1 on barriers to eco-innovations see in section 6
2 also discussed in section 2, “Socio-economic outcomes” sub-section.
3 The country’s GDP at market prices was €147,879 b. in 2008
with several organisations and research institutes, has developed and put into operation an electric bus that is based on Škoda’s trolleybus. The vehicle uses nickel-cadmium storage batteries that allow it to travel from 110 to 130 km and are charged in garages (CENIA, 2009).

The main benefit of the electric drive technology in transportation is zero emissions. At the same time, the likelihood of fluid release is minimized since they are used only in certain electric means of transport. The rate of usage of this technology in the Czech Republic is high with the exception of battery vehicles. New types of storage batteries and ultra-capacitors (higher capacity, faster charging, lower weight and smaller dimensions) increase the potential of using electro mobiles.

Legislative support currently exists only in the form of a vehicle excise duty. A vast supply of new passenger vehicles and lorries (with the exception of light-weight utility vehicles and single-track vehicles) and charging stations is lacking. The supply of other electric means of transport and operating infrastructure is sufficient.

**Hybrid buses:** The development of hybrid vehicles in the Czech Republic has advanced in the past two years. Most distinguished developers are Veolia Transdev a.s. and SOR Libchavy spol. s r.o. (CENIA, 2009). The car manufacturer SOR Libchavy, in 2010 - 2011 started launching buses equipped with a diesel engine, an electric drive and batteries. Such buses have a lower diesel oil consumption up to 10 litres per 100 kilometres and lower CO2 emissions by one-quarter compared to the vehicles with a classical drive.

**Skoda Octavia Green E Line - electric-powered vehicle**

Skoda’s first-ever electric-powered vehicle will demonstrate the company’s innovative potential and technological competence in this growing area. The first fleet of test vehicles is planned for 2011. The electricity for the Skoda Octavia Green E Line Concept is supplied by a modern lithium-ion battery. With a range-per-charge of 140 kilometres, the Škoda Octavia Green E Line comfortably meets the requirements of most everyday commuters in Europe. Located under the middle and rear parts of the floor and extending partly into the luggage compartment, the 26.5 kWh battery is made up of 180 lithium-ion cells (diameter 150 mm, length 650 mm) and weighs about 315 kilograms. However, the battery has almost no impact on the volume of the passenger and luggage compartments.

The Skoda Octavia Green E Line Concept is fitted with five comfortable seats, and its passenger compartment is identical with that of the Octavia Combi with a combustion engine.

With smart dashboard indicators, the driver of the Skoda Octavia Green E Line always stays in control. The computer screen provides continuous information including instant output, power consumption, battery charge and the remaining range. The navigation display describes the energy flow, i.e., informs the driver that the electric engine is being supplied with electricity or, on the contrary, that it is generating electricity as the car decelerates or goes downhill.

The look of the Škoda Octavia Green E Line Concept conveys the environmental-friendliness of its electric drive. Pearl-white exterior colour and elegant chrome-trim on both the front and rear of the vehicle as well as on the wheels create an impressive contrast with the glossy black roof with integrated energy-generating photovoltaic panels.

Škoda Auto has started in 2011 to create a test fleet of Octavia’s’ Green E Line with the objective of obtaining additional information relevant to the further development of the electric drive.
Sustainable waste management
In the recent decades consuming habits had changed a lot. Modern economies are growing and causing increase of waste production. The number of landfills is still declining and the capacity of remaining ones is constantly decreasing, so for the citizens, municipalities, and businesses it is quite complicated and more expensive to deal with waste. In the Czech Republic, further development of waste management is expected, namely in the field of waste processing, utilization, mineral biotechnologies, eco-efficiency, and recycling.

Further development of environmentally friendly waste management and use of environmental technology is supported by the novel Act No. 185/2001 on waste, which introduced a new hierarchy of dealing with waste. It emphasizes on waste prevention and for the first time clearly sets out the specific recycling targets for individual commodities of municipal waste. The hierarchy first of all will be fully implemented in the regional integrated systems of waste management.

It is worth to mention that some of the companies, municipalities, and even cities bind themselves to reduce the negative impact of their activities on the environment voluntarily, beyond the legally binding targets. In the waste industry, implementation of Environmental Management Systems (EMS) like ISO 14 000 or EMAS are not so popular anymore and these systems are replaced by the Certificate Expert in Waste Management. It is based on the German certificate Entsorgungsfachbetrieb, which is used successfully in Austria, Slovakia, Switzerland, Hungary, and Germany. In 2003 there was only one company with such a certificate, in 2009 there were already over 75 companies (CENIA, 2010).

Certification of products from waste is also quite developed in the Czech Republic (products from the waste, e.g. certified compost or certified alternative fuel from waste plastics, paper, rubber, textiles, wood, etc.), which guarantees compliance with strict standards.

Another well-accepted voluntary approach is ecological labelling. This Ecolabel can be seen only on a product that is environment-friendly during its whole life cycle. Ecolabelling in the Czech Republic is safeguarded by the National Program of Labelling Environment-friendly Products.

To avoid overflow of waste it is very important to have expert consulting companies or web pages that will help companies, municipalities and cities in decision-making process. Such important web portals are: www.enviweb.cz, www.tretiruka.cz
Small wastewater treatment plant separating sludge by using a submerged membrane module

Development of activation wastewater treatment plant with submerged membranes useful for the treatment of wastewater from small sources of pollution. The technology of wastewater treatment using submerged membrane for a separation of activated sludge from the treated water is very powerful, causing a high quality of runoff, ensuring hygienization of water, i.e. removal of viruses and bacteria. The project was implemented under the TANDEM program to support science and research and dealt with the choice of material of membranes, verification of their permeability, the mode of operation, washing, and regeneration. The development was ensured by the ENVI-PUR, s.r.o. company – provision of supply capacity, ensuring the trial operation, laboratory tests - together with Brno University of Technology.

Source: www.envi-pur.cz/?page=membranove-upravny-vody


Sustainable energy system development

Improving environmental performance of thermal power plants: The Czech Republic places emphasis on the sustainable development of energy and importance is especially given to the type of technology used. Much attention is paid to the consequences for the environment that all energy generation process will have. Reductions of emissions, de-sulphurization, and de-nitrification of thermal power plants and large heat stations have already occurred in the Czech Republic. Recently, innovations in equipment are happening at a rapid pace. The purpose of these innovations is to reduce emissions through more efficient generation.

Small-scale hydropower generation: As it is widely known, the construction of large dams significantly impacts the landscape and local ecosystems; it also changes microclimatic conditions in surrounding areas. Therefore, in the Czech Republic the development of technologies for small water heads and small hydro power plants is broadly supported as their influence on waterways and water ecosystems is quite low. Thus, water energy is an energy source being looked at by small investors to deliver electricity. Such projects are eligible for financial grants known as green bonuses. In the Czech Republic, around 536 small hydro power plants exist and this number is still increasing. ČKD Blansko Holding a.s., delivers turbines not only for the Czech Republic, but for the whole of Europe, Asia and America. It is one of the most important producers of turbines and equipment for small hydro power plants. The company produces all types of turbines and also has its own research department studying water equipment. There are only a handful of organizations in this field worldwide (CENIA, 2009).

Wind power plants: At the end of 2008, the Czech Republic had 149.7 MW of electricity from wind power plants. It is expected that further development will continue in the coming years. For investors, it is a popular energy source with a short construction time. Today, wind power plants are being constructed throughout the entire country. Both large corporations, such as ČEZ, a.s. and JT Group s.r.o., and small entities are investing in this technology. As of June 2008, 52 wind power plants were installed. These big
projects include Pchery in Kladensko (2 x 3 MW), a wind park in Stříbro in Tachovsko (13 x 2 MW) and in the surroundings of the Dukovany nuclear power plant (9 x 2 MW) (CENIA, 2009).

Biomass combustion: In the Czech Republic, big energetic and ecological expectations are put upon biomass. It has the greatest potential for technical use on a short horizon in the Czech Republic. Co-combustion of biomass and coal in large power plants with a share of biomass up to 30% has proven useful on a large scale. Coal heat and power plants count on the use of biomass with a co-combustion share up to 50% after technical adjustments (CENIA, 2009). Medium and large combustion sources significantly share in the combustion of biomass; 186 combustion sources were registered as of June 2008. Nevertheless, some technologies being used are unique. An example is the thermal oil boiler for wood chips with an ORC4 module being used by Žatecká Teplárenská a.s. The boiler uses organic hydrocarbons instead of classical water steam for driving its turbine. Oil heated to nearly 300 °C is the source of hydrocarbons. The technology shows minimal emissions of contaminants into the atmosphere compared to combustion equipment of the same output.

Other renewable energy sources have their share in deliveries of centrally supplied heating in the country. Biomass, biogas, and geothermal heat from heat pumps are used both for larger systems for supplying heat and for small systems or single-home systems. In contrast, solar collectors for hot water heating are almost exclusively used for individual buildings and single family houses.

Třebíč, Biomass Heating Plant

Already in 2001 TTS Energo, s. r. o. (Třebíč) started considering renewable sources for the production of heat. Currently the company operates a unique heat delivery system. From three main sources they supply heat and hot water to the majority of the inhabitants of Třebíč. It secures the supply of heat for households, primary schools, kindergartens, Třebíč hospital, Vltavínská health centre, care homes, manufacturing firms and other customers. Supplies of heat are made up to 90% from a central heat source for more than 9,700 households. In the heating plants TTS burns bio-mass mainly in the form of wood chips and bales of straw. Used biomass is mainly the waste. By combusting bio-mass TTS works exclusively at a very high level of efficiency, which results from the use of modern boiler technology and the other equipment, headed by the new Swedish waste heat condenser. The price of heat energy from an HDS has been among the lowest in the Czech Republic for a long time, thanks to the creation of heat energy in a combined way and the use of domestic fuels in the best case, bio-mass. Remote heating has brought, and will continue to bring, cost savings to the consumer in comparison with other methods of heating.

Source: www.tts.cz

Energy efficiency and energy savings

In the Czech Republic, energy saving projects are supported by subsidy programmes of the State Environmental Fund, the Ministry of Industry and Trade and the Ministry for Regional Development. In April 2009, a new programme supporting renewable energy sources and energy savings in residential buildings was launched. This programme is financed with the sale of emission credits entitled Green for Savings. It is the largest environmental subsidy programme designated to Czech households in history. Its aim is to support selected measures implemented in residential buildings by individuals and other entities that own residential buildings. The measures will both immediately reduce CO2 emissions and start a long-term trend of sustainable construction. Individual sub-programmes are focused on external insulation of buildings, replacement of environmentally unfriendly heating with low-emission biomass sources and efficient heat pumps, installation of biomass sources and efficient heat pumps in new buildings, installation of solar and thermal collectors and development of passive houses under the Operational Programme Environment that has supported investment into the environment with more
than 37 billion CZK. The above funds also represent a major eco-innovation support in the Czech Republic. Energy labelling represents an important incentive for energy saving products.

**Nanotechnology for green purposes**

The Czech Republic has a growing interest in the area of nanotechnology, which is evident in the growing number of science institutes, universities and private entities that are dedicating themselves to this field. Most of them operate with unique technologies and achieve noteworthy research findings (czechinvest.org). There is a special Czech funding programme “Nanotechnology for Society”, supporting projects focused on nanotechnology.

Czech nanotech companies and research institutions specialise in a wide range of technologies and areas. Some of the technologies have a promising potential in addressing environmental problems and bringing a breakthrough solutions for green technologies. For example Nanospider technology, which is industrial production of nanofibres and derivatives, can provide alternative material for solar and wind energy technologies, and used in waste processing⁴. Technologies based on iron nanoparticles ensure excellent water treatment. Another nanotechnology developed by Czech nanotech companies allows surface and antibacterial treatments.

⁴ see also www.elmarco.com
New trends and emerging eco-innovation markets

The eco-innovation areas on the rise include hydrogen technologies, nano-technologies and production of nano-fibres, recycling for plastics, and innovation in transport. According to CENIA (2010) the primary task for the government is to create favourable conditions for developing a domestic market for eco-innovative products and services, to support science and research and their cooperation with the commercial area in order to increase the competitiveness of the Czech environmental products and services also on the foreign market. The report by CENIA shows that the eco-innovative developments in the Czech car industry, energy sector (production, transmission, and consumption), waste management, and construction (new materials, new technologies, etc.) can have a high market potential.

Innovation in motor transport

Since 1995, the implementation of environmentally friendly transportation helped to reduce CO2 emissions by more than 30%, but in the past decade, road transport volumes and outputs have increased significantly and future growth is expected. Transport is one of the biggest environment polluter in the Czech Republic. As innovation helps to mitigate emissions of greenhouse gases or even completely stabilise emissions of CO2, NOx, and HC, innovative pilot projects are developing in the field of sustainable transport.

There are several areas in sustainable transport that have been developed, but are not yet marketed or marketed very little due to the lack of legislative support, insufficient infrastructure, lack of alternative fuels, etc. Nevertheless, Skoda Auto a.s. have developed vehicles consuming fuels with high contents of organic components. Skoda Electric a.s. developed hydrogen-propelled bus and its main power source is fuel cell. Gradual use and expansion of such hydrogen drives are planned over a long-term, now it faces technical problems to keep hydrogen in a liquid state.

Low-rolling resistance tyres

Tyres with low rolling resistance contribute to the reduction in fuel consumption through the decrease in resistance during the tyres’ motion that mainly results from the deformation of wheels, tyres or the road. The potential of CO2 reduction with passenger vehicles that use low-rolling resistance tyres is estimated at approximately 3%. Barum Continental spol. s r.o., a Czech tyre manufacturer, guarantees a reduction in fuel consumption and noise level thanks to a decrease in rolling resistance with current models compared to the previous generation of tyres. Compared to the previous Eco model range, tyre rolling resistance has been successfully reduced by 20%. This type of tyre is used in GreenLine models by Škoda Auto a.s.

Intelligent distribution network development: Smart Grids

Intelligent networks are power and communication networks that will enable the flow of electrical energy between suppliers and customers in order to optimise the generation process, consumption and “energy storage” and operate the transmission and distribution networks in real time.

The Department of Telecommunication Engineering in the Faculty of Electrical Engineering of CTU in Prague is engaged in this research and development in the Czech Republic. Science and research are trying to answer the problems of energy being lost from the connection of large power plants to the high voltage transmission network after the transformation down to a lower voltage when energy is distributed to final consumers.

Smart Region project in Vrchlabi

In 2010, the company ČEZ, a.s. has launched an unique Smart Region project in cooperation with the town of Vrchlabi. In the framework of this project ČEZ, a.s. will equip roughly 4.5 thousands of households and enterprises with the "smart" meters of energy, infrastructure for electro-mobility, install elements of the automation and monitoring distribution network till the year of 2015.

Through the installations of smart meters ČEZ, a.s. tests new concept of management of consumption and production of electricity. In Vrchlabi, there will be installed elements of automation and monitoring of distribution network at the level of networks of low and high voltage and distributing stations, which allows to redirect the flow of energy in case of power blackout. The other component of the project is to develop infrastructure for electro mobiles. ČEZ, a.s. will set up several charging stations and provide the city with several electric vehicles.

Source: [www.futuremotion.cz/smartgrids/cs/vrchlabi.html](http://www.futuremotion.cz/smartgrids/cs/vrchlabi.html)

Picture source: [www.futuremotion.cz](http://www.futuremotion.cz)

Waste to energy

In the Czech Republic there are only 3 big incinerators, one in Prague, another one in Brno and a third one in Liberec. Incinerations in Prague and in Brno were adapted so heat energy is used more efficiently, now heat energy from waste is used not only for heating but also for production of electric energy.

The Liberec incinerator supplies all produced energy from waste to the energy system of Liberec. Besides there is a tested innovative use of waste carbon oxide for intensification of green algae growing which can afterwards be used in the food industry and cosmetics.

Nowadays the Czech Republic plans to build a few modern incinerators for communal waste that will use the waste heat for heating and electricity as well.

There are also developments focused on the production of solid alternative fuels from waste. Such fuels can be processed from otherwise unusable residues: after sorting plastics or paper and cardboard, textile or rubber, wood or residues after mechanical-biological treatments. It can be done after crushing and then by compression into pellets, that can be used, for example, in furnaces in the cement industry.

An example of a company that deals with obtaining energy from the selected components of the waste and bio-waste is Arrow line, a.s., which in cooperation with Technical University of Ostrava has
developed technology based on pyrolysis for energy recovery and disposal of sorted waste and biomass. This direction is particularly promising in the future as an important source of energy and raw materials (Arrow line, 2011).

### Production of solid alternative fuels from waste

Arrow line, a.s. the company that deal with obtaining energy from the selected components of the waste and bio-waste. It is done with the technology, which is developed in cooperation with Technical University of Ostrava and this technology is based on pyrolysis for energy recovery and disposal of sorted waste and biomass. This direction is particularly promising in the future as an important source of energy and raw materials.

Pyrolysis processing of organic matter is still a little appreciated method for sorted waste into energy solutions on the small and medium-sized level. The energy potential hidden in wastes of organic origin offer a better alternative to today’s highly advocated and much-favoured potentially scarce and difficult to process biomass. The principle of pyrolysis (dry distillation or coking) was known already in the 18th century, but never found higher use in waste disposal. The problem was primarily in the management process itself and the technical level of measurement and control of relevant variables such as temperature and pressure.

The products of pyrolysis are always: gas, liquid phase, solid carbon residue.

Arrow line, a.s. also deals with the applied research in the field of biomass use, Waste separation and wood chips in the process of pyrolysis. For this purpose was based cluster ENVICRACK - cooperative of research, implementation, and design firms and agencies together with the future users of the technology.


5  |  Public policy in support of eco-innovation

A number of policy measures have been adopted to facilitate eco-innovations in the country (see Figure 5.1 and Annex 1 for an overview of these policy measures). According to the assessment of ETAP roadmaps with regard to the eco-innovation potential (2009), the policy approach in the Czech Republic is mainly focused on the demand side and policy is based on instruments like regulations and standards. On the supply side the emphasis is put on the promotion of networks and partnerships, mainly by supporting cleantech clusters and technology platforms, complemented by support for R&D activities.

The state agenda in favour of eco-innovation first of all is focused on support of environmental technologies in the framework of the Environmental Technology Action Plan, ETAP\(^5\). In 2006, the Program on Environmental Technology Support in the Czech Republic was approved by the Czech government and in 2009 the Ministry of Environment of the Czech Republic prepared a document on the update of the Programme. The document stresses the issue of eco-innovation and suggested measures reflect the impact of the global financial and economic crisis. For the next period, the updated program proposes priorities for the reduction of emissions of greenhouse gases and air-polluting elements (with an emphasis on the integrated approach), and the reduction of the quantity of produced and discharged wastewater. The sector priorities are in energy production, transport, and manufacturing industry. The update proposes 17 specific measures at four levels of public administration. Problems in eco-innovation support exist on both the demand and the supply side (Updated Program on Support of Environmental Technologies, 2009).

Furthermore, according to the Updated Program the Czech Republic specifies the following areas where the support to eco-innovation should be higher: second generation of bio-fuels, hybrid automobiles, membrane technologies for water filtration, use of solar energy for air conditioning, decentralized management of water, automatic separation of secondary resources from waste, new materials for construction, and effective heat transfer.

In addition, some attention for eco-innovation is given in the Operational Program for Environment and the Operational Program for Entrepreneurship and Innovation.

Relevant public policies in the Czech Republic are focused on improving pollution control and end-of-pipe environmental technologies, also on promoting of energy efficiency and resource saving. Policy instruments and initiatives promoting radical and transformative eco-innovations resulting in systemic changes have not yet appeared in the policy agenda.

In the Czech Republic, climate change and energy issues are environmental policy priorities. Respectively, environmental innovations related to these areas receive more support. The largest number of policy instruments targets energy efficiency measures and renewable energy generation, followed by waste management, water, and air pollution control. This may be explained by the ongoing catching up process in terms of end-of-pipe technologies in the country. These priorities match the environmental challenges in the Czech Republic. This focus is also reflected in fast expanding R&D budgets in terms of outlays and budget appropriations for the improvement of energy efficiency. The measures are managed by the different ministries. A number of programmes have been implemented both at the European and national level to support eco-innovation and environmental technologies.

\(^{5}\)Main goal of ETAP is to remove the barriers to introduction and development of environmental technologies. Support to eco-innovation is regarded as one of the main objectives how to reach this goal. This objective includes also access of innovative small and medium enterprises to the risk capital. ETAP demands from the EU countries to raise the support to the eco-innovation through national programs on research and development or by other tools, for example financial. More or less explicitly declared support to eco-innovation is then a subject of further programs on the EU level, for example, Program of Eco-innovations in the framework of EU Competitiveness and Innovation Program.
According to the survey of resource efficiency policies (EEA, 2011), support for a more efficient use of natural resources is declared in all relevant policies of the Czech Republic, but as a general rule, its practical implementation often lacks data and instruments are needed for optimisation of materials flows. For example, practical support for an increase in the energy efficiency of production, which carries high potential in the Czech Republic, remains relatively low.

**Overall Policy Approach for Resource Efficiency** is supported by the following policies and strategies:

- **Raw Material Policy of the Czech Republic in the Field of Mineral Materials and Their Resources, 1999;**
- **The raw material policy is directly related to energy policy and, in terms of definition and solution**
of certain issues, the two are closely connected. The raw material policy does not contain and has not led to a separate national resource efficiency strategy or a dedicated action plan for the resource efficiency. The policy will be updated in 2011;

- Strategic Framework for Sustainable Development in the Czech Republic, 2010;

The topic of resource efficiency is a part of other strategies, particularly the Framework of Programmes on Sustainable Consumption and Production, which sets up the priorities in the field for the Czech Republic.

There are further environmental economy wide strategies and policies in the Czech Republic connected with the topic of resource efficiency:

- National Programme of Reforms (2011);
- Strategy for Education for Sustainable Development (2008) and its Action Plan (2011);
- National Programme to Abate Climate Change Impacts in the Czech Republic (2004) – to be updated in 2011;

Furthermore, the topic of resource efficiency is reflected in more strategies such as the Economic Growth Strategy or the Czech Environmental Technology Action Plan. Sustainable Spatial Development is embedded in the Spatial Development Policy.
6 | Main findings

6.1 Strengths and weaknesses of the Czech Republic in promotion of eco-innovations

The strengths of the Czech Republic in promotion of eco-innovations are in its developing environmental technologies. These technologies in the Czech Republic were pushed by several factors. The most common driver of eco-innovations in the country is the growing international demand for specific green technologies. EU and national funds invested in certain projects made possible success stories to raise commercial interest of technology producers.

According to CENIA (2009) the highest share of total investments in the field of environment, around 80%, occurred in the area of protecting climate and air and the handling of waste water. Most of the investments were held in technologies of the first generation. In the case of waste water, they are of a systemic nature. The Czech Republic has a strong interest in supporting the development and application of environmental technologies. In 2006, the government of the Czech Republic approved the Programme of Support of Environmental Technologies, which is the most important document in support of environmental technologies.

R&D activities are paid high attention, also from a funding point of view. Currently, in the Czech Republic there can be observed several technological parks, business incubators, and research labs that create solid ground for innovative companies to develop innovative products and approaches.

There is a direct financial support in the public sector that encourages the spreading of environmental technologies in facilities operated by the public sector and a higher demand on the public sector for environmentally beneficial products and services for eco-innovation.

An important stimulus is the appropriate management of state funded research and development projects. Support from public sources is also provided to citizens (e.g. subsidies for changes to heating or building insulation).

As for weaknesses, it can be said that the specific ministries of the Czech Republic have prepared and are implementing the necessary supporting activities for environmental technologies, but they are at the very beginning regarding the support of eco-innovations. There are problems on both the supply and demand side. Based on the surveys (Integra Consulting Services s.r.o., 2008) performed among small and medium-sized enterprises, the main barriers in the Czech Republic are as follows:

- The greatest problem on the demand side for eco-innovations is the fact that the public sector,
whose expenditures represent about 30% of the total final consumption, does not demand environmentally beneficial products or services to a sufficient degree. The problem is even more pronounced for households, whose share in the total final consumption amounts to almost 70%. Citizens who would be potentially interested in eco-innovative activities and potential consumers do not have sufficient market impulses;

- The state support for eco-innovations is neither systematic, effective, nor coordinated; the support shall be developed after the proposed update of the Programme of Support of Environmental Technologies in the Czech Republic starts to be implemented;
- The complexity and low transparency of environmental legislation and inconsistency of its implementation (insufficiently stimulating environment for establishment and demand for eco-innovative solutions) are the main barriers from a legislative point of view;
- The cooperation between research and development institutions and the private sector is not sufficient; the level of venture capital and economic stimuli (subsidies, taxes, and amortization) is very low.

Based upon the Flash Eurobarometer report (2010) the main three barriers perceived by the Czech entrepreneurs are: lack of funds within the enterprise, uncertain return on investment, uncertain demand from the market.

### 6.2 Opportunities and threats to eco-innovation in the Czech Republic

**Opportunities:** The Czech Republic has begun to consider eco-innovation as a means to achieve the environmental objectives and to increase the competitiveness of domestic companies. Eco-innovation creates new opportunities for business in many sectors — in the energy, construction, industry, transport and logistics, agriculture, food, tourism, extractive industries and in environmental protection (waste and water management). In addition to these areas it is expected that significant eco-innovation development will happen in the "green" chemistry, which is based on biotechnology and biomass.

Based upon the Flash Eurobarometer report (2010) the main three drivers perceived by the Czech entrepreneurs are: good business partners, expected future increases in energy prices, and current high material price.

The Updated Programme of Support of Environmental Technologies in 2009 can be the driver for eco-innovations. The measures proposed in the update will have a substantial positive impact on the fundamental elements of the environment. The measures will help to fulfil the international obligations that the Czech Republic has accepted or plans to accept in the environmental area (especially the obligations following from the package of climate and energy measures or national emission ceilings for some polluting substances). In addition, the proposed measures will strengthen the energy and partially resource sufficiency of the Czech Republic.

From an economic point of view, the proposed measures will strengthen the desirable and up to some level missing cooperation between R&D institutions and the private sector and will thus shift the Czech Republic closer to a knowledge-based economy. In addition, we can expect that new jobs will be created by strengthening the segment of small and medium-sized companies.
Many of the proposed measures in the Update will also mitigate the impacts of the current economic crisis. They are focusing on stimulating the demand for environmentally friendly products and services; on increasing the energy efficiency and utilizing renewable energy sources; developing new technologies; strengthening R&D institutions and their cooperation with the commercial sector; funding the development of eco-innovation; and facilitation of their transfer into practice.

**Threats:** According to CzechInno (2011), there are some problematic characteristics of the Czech economy that threatens eco-innovation. These are:

- weak sector of domestic firms - in many cases, Czech companies are not able to directly contact the end customers abroad, it does so with the help of other foreign companies;
- focus on decreasing expenses - most of the Czech companies see their competitiveness in increasing effectiveness and decreasing expenses, this leaves very small room for eco-innovation;
- The Czech Republic has many companies that are subsidiaries of a foreign entity - this results in the fact that innovative approaches and technologies are moved to the Czech Republic only partially, the fundamental technological approaches remain in the parent companies abroad.

The problems described above appear to be the natural development of an economy in transformation. These have consequences for Czech domestic firms. It is difficult for them to develop independently or compete with established foreign companies on demanding markets and enter new markets. This reality is also influenced by worse conditions for cooperation between companies and R&D institutions, which leads to a lower potential for the development of a knowledge economy. If these problems continue to exist in the long-run it can threaten the development of eco-innovation. On the other hand, companies can take these problems as opportunities or chances and concentrate on change and innovation in order to become competitive. Anyway, price competitiveness is losing its advantages nowadays in the Czech Republic.
References


**Eurobarometer, 2011,** Attitudes of European entrepreneurs towards eco-innovation; Analytical report.


**Czech Environmental Information Agency (CENIA).2009.** Environmental Technologies and Eco-innovation in the Czech Republic. Prague: CENIA

**Cleantech Group, 2010,** International data on venture capital investment in Cleantech projects.

**Czech Statistical Office:** Innovation activities of enterprises in the Czech Republic in 2006 -2008.2009.


**Integra Consulting Services s.r.o., 2008,** Pilotní průzkum potenciálu a bariér rozvoje ekoinovací umalých a středních podniků v ČR, Praha: Ministerstvo životního prostředí.

**ISO MSS certificates survey 2009, link:** http://www.iso.cz/


## ANNEX 1. Policy measures addressing eco-innovations in the Czech Republic

<table>
<thead>
<tr>
<th>Group of policy measures</th>
<th>Type of policy measure</th>
<th>Specific measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply side focus</td>
<td>Support for R&amp;D in public sector and industry</td>
<td>R&amp;D funding</td>
</tr>
</tbody>
</table>
|                         |                        | - Academy of Sciences; Ministry of Education, Youth and Sports provide funding to individual recipients, predominantly to universities and public research institutes;  
|                         |                        | - The main provider of competitive funding is the Czech Science Foundation which provides smaller grants for basic research and also the Ministry of Industry and Trade which funds predominantly experimental R&D projects with a potential commercial application;  
|                         |                        | - Czech Science Foundation (for basic research) and the Technology Agency (a new agency to be fully operational by 2011/2012 and to fund the applied R&D).  
|                         | Collaborative grants   | According to Erawatch (2010) apart from institutional and project-based funding no other modes of funding are used in the Czech R&D system.  
|                         | R&D infrastructure     | Investment for R&D infrastructure is provided through European structural funds, specific operational programs.  
| Fiscal measures         | Tax incentives for R&D and start-ups | VAT tax exemption for R&D projects, eligibility of sciences and research expenses for tax purposes.  

<table>
<thead>
<tr>
<th>Focus of policy measure (tick if relevant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic focus on eco-innovation</td>
</tr>
<tr>
<td>Resource efficiency improvement</td>
</tr>
<tr>
<td>Energy efficiency improvement</td>
</tr>
<tr>
<td>Reduction of emissions incl. CO2</td>
</tr>
<tr>
<td>Other relevant areas (e.g. renewable energy, etc)</td>
</tr>
<tr>
<td>Education, training and mobility</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
|                               | Advise/consulting for start ups, companies, entrepreneurs | - Enterprise Europe Network for the CZ, Technology Centre ASCR, Centre for Regional Development of the Czech Republic;  
- CzechInvest, Czechtrade;  
- The South Moravian Innovation Centre (JIC) is an agency that creates a favourable environment for innovative business in South Moravia, help early-stage businesses grow, create jobs and compete on the market, support collaboration between industry, R&D institutions and public administration bodies. |
|                               | Placement schemes for students | The Czech Republic takes part in ERASMUS-MUNDUS student exchange programme. |
|                               | Support for R&D workers recruitments |  |
| Networks and partnerships     | Competence centres, clusters, science-technology parks | - National Innovation Strategy, 2004, proposing to improve the entrepreneurial and investment environment, through industrial clusters, seed capital, spin-offs, and transfer;  
- The Association of Innovative Entrepreneurship of the Czech Republic (AIP CR) aims at the creation of prerequisites for the development of innovative entrepreneurship, i.e. research, development and innovations, technology transfer, new materials and technologies, building of science and technology parks and support of activities of innovative firms; |
<table>
<thead>
<tr>
<th><strong>DEMAND SIDE FOCUS</strong></th>
<th><strong>Regulations and standards</strong></th>
<th><strong>Technology platforms and innovation networks</strong></th>
<th><strong>Foresight and common vision building</strong></th>
<th><strong>Market intelligence and other forms of information sharing</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regulations, targets, cap &amp; trade schemes</td>
<td>Technology centres and business support services are supported through the system of programmes approved by a government resolution within the strategy of support to projects in progressive technologies and activities with high added value and strong export potential. Support is provided a number of cleantech clusters and technology parks in the field of renewable energy, energy efficiency, waste management, and nanotech (including green nanotech)</td>
<td>The Programme of Support of Environmental Technologies in the Czech Republic (national ETAP roadmap)</td>
<td>Association CzechInno has a mission to support innovative processes and effective technology transfer through information sharing, networking, provision of information in the field of science, research and innovation, and related services.</td>
</tr>
<tr>
<td></td>
<td>- limit values for pollution sources (e.g. emission limits for sources of air pollution); - global standards of environmental quality (e.g. pollution limits, requirements for water quality); - obligations for handling energy (e.g. pursuant to the Act No. 406/2000 Coll. on energy management); - technical requirements for operating equipment (e.g. sources of air pollution, water quality);</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

In the Czech Republic, the following tools are mainly used to support environmental technologies and eco-innovations:
- limit values for pollution sources (e.g. emission limits for sources of air pollution);
- global standards of environmental quality (e.g. pollution limits, requirements for water quality);
- obligations for handling energy (e.g. pursuant to the Act No. 406/2000 Coll. on energy management);
- technical requirements for operating equipment (e.g. sources of air pollution, water quality).
### Performance standards, labelling, certification

| Sources of water pollution, landfills, large industrial complexes; |
| - Quantitative requirements at the national level (e.g. the Kyoto obligation, national emission ceilings, reduction in the quantity of biologically degradable waste deposited into landfills). |
| The government provides tax reliefs and environmental taxes if polluting the air, dumping waste, releasing effluents, removing surface and subsurface water etc. are kept under the standards, regulations, limits, etc. But mainly for the producers. |

### "Green" public procurement of goods and services

| There are the following performance standards, labelling, etc.: |
| - Product standards (e.g. fuels, packaging); |
| - Obligations for handling certain commodities (e.g. chemical substances and agents, GMO, selected types of waste, packaging); |
| - Permits to operate equipment and to conduct activities influencing the environment according to the relevant laws on components of the environment (e.g. the Act on air protection, the Act on water, the Act on waste); |
| - Integrated permission (pursuant to the Act on the integrated prevention) |
| Labelling (national labelling system); |
| - Systems of environmental management (EMAS, ISO 14000); |
| - Projects of cleaner production; and |
| - Voluntary agreements. |

### Public procurement

| Public procurement includes: |
| - Government Resolution No. 720 on the proposal to support the development of the sale and usage of environmentally friendly products of 19 July 2000; |
| - Supporting structures and mechanisms for the application of voluntary tools, like labelling, systems of environmental management. |

### R&D procurement

### Technology Transfer

**Advisory support for technology adopters**

The Association of Innovative Entrepreneurship of the Czech Republic (AIP CR) aims at the creation of prerequisites for the development of innovative entrepreneurship, i.e. research, development and innovations, technology transfer, new materials and technologies, building of science and technology parks and support of activities of innovative firms.

**Financial or fiscal support for technology adopters**

The state budget, the State Environment Fund of the Czech Republic, EU structural funds – Operational Programmes, Technology Agency, Ministry of Industry and trade.

### Support of private demand

**Tax incentives for consumers**

Lower VAT rate for bio-fuels, energy subsidies

**Tax reductions for products and services (e.g. VAT reductions)**

**Demand subsidies (e.g. eco-vouchers, consumer subsidies)**

There are quite a lot of measures, activities, grants aimed at awareness raising and information dissemination in the Czech Republic on innovation and part of is eco-innovation as well.
About the Eco-Innovation Observatory (EIO)

The Eco-Innovation Observatory (EIO) is a 3-year initiative financed by the European Commission’s Directorate-General for the Environment from the Competitiveness and Innovation framework Programme (CIP). The Observatory is developing an integrated information source and a series of analyses on eco-innovation trends and markets, targeting business, innovation service providers, policy makers as well as researchers and analysts. The EIO directly informs two major EU initiatives: the Environmental Technologies Action Plan (ETAP) and Europe INNOVA.

Visit our website and register to get access to more information and to discuss all EIO reports, briefs and databases.

www.eco-innovation.eu