

# **Energy Efficiency Action Plan**

Policy Action Plan for Promotion of  
End-use Energy Efficiency  
in the Czech Republic to 2010

August 1999

Prepared for the World Bank, the Ministry of Industry and Trade, and  
the Ministry of Environment of the Czech Republic

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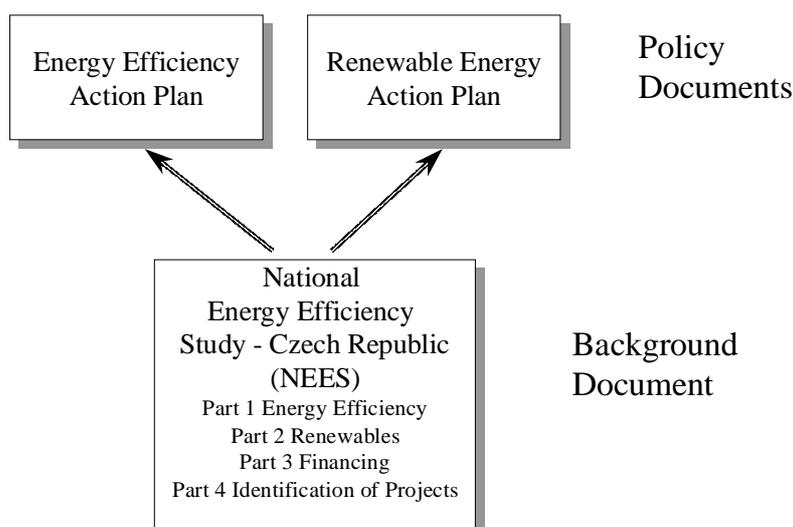
## FOREWORD

Energy efficiency and renewable energy production contribute to the three major goals of the national energy policy of the Czech Republic: overall competitiveness, security of supply and environmental protection. Therefore, the Czech government aims to promote these two sustainable options. The Energy Policy White Paper, which is being developed at the time of writing (June 1999), will provide the general framework for the future role of energy efficiency and renewable energy in the Czech Republic. In addition, it is necessary to develop specific policies.

The National Energy Efficiency Study aimed to support the Czech government in the formulation of energy efficiency and renewable energy policy. The Dutch government, the Czech Ministry of Industry and Trade, the Czech Ministry of Environment, and the World Bank supported the study. The project consortium consisted of the following Czech and Dutch institutes: SRC International CS s.r.o., March Consulting s.r.o., SEVEN, RAEN, Netherlands Energy Research Foundation ECN, DHV AIB and DHV Czech Republic, and the Foundation for Economic Research SEO of the University of Amsterdam. The project is carried out by the Netherlands Energy Research Foundation ECN under number 7.7209.

The National Energy Efficiency Study has resulted in the following documents:

1. The *Energy Efficiency Action Plan* focuses on promotion of energy efficiency in end-use (this report). The *Renewable Energy Action Plan* (separate report; ECN-C--99-064) deals with policy on promotion of renewable energy production. These two Action Plans provide policy makers in the Czech government with essential information on potentials, targets, budgets and recommended policy instruments. The core of the Action Plans is the list of concrete policy actions, ready for implementation.
2. The *National Energy Efficiency Study NEES* (separate report; ECN-C--99-063). This report is the background document to the two Action Plans. It contains detailed information on options and measures, potentials, barriers and policy instruments for energy efficiency and renewables. The main part is a detailed outline for a new energy efficiency and renewable policy. Also, it includes recommendations for financing schemes to overcome the investment constraints in the Czech Republic. Finally, a list of concrete projects is included to support project identification.



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## ABBREVIATIONS

AIJ/JI	Activities Implemented Jointly / Joint Implementation
CEA	Czech Energy Agency
d.r.	Discount rate
EKIS	Energy Consulting and Information Centre of CEA
EMAS	Eco Management and Audit Scheme
EPC	Energy Performance Contracting
ESCO	Energy Service Company
ESF	Energy Savings Fund (Phare)
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environmental Fund
LTA	Long Term Agreement
M&T	Monitoring and Targeting
MIT	Ministry of Industry and Trade
MoE	Ministry of Environment
MW	Megawatt
NEES	National Energy Efficiency Study
NGO	Non Governmental Organisation
PBP	Payback Period
RD&D	Research, Development and Demonstration
ROI	Return on Investment
SEF	State Environmental Fund
SEI	State Energy Inspectorate
SME	Small and Medium-sized Companies

## 1. POTENTIAL FOR ENERGY CONSERVATION

The end-use energy intensity in the Czech Republic is higher than in most EU member states. Consequently, a significant potential for energy conservation is available in the Czech Republic. Figure 1.1 shows the different potentials for end-use energy conservation in the period 1995-2010. The following definitions are used.

- The *technical potential* assumes the implementation of all technically feasible measures without taking their economic viability into account. This potential is very large; if all identified measures were applied, as much as 48% of the end-use energy demand is saved. The total investment costs would be CZK 3,000 billion, which is twice the annual GDP. The largest technical potential is found in the manufacturing industry, while the largest potential relative to the energy demand, is in households (65%).
- The *economic potential* reflects the societal and macro-economic perspective. It is calculated using the annuity method with two different discount rates: 10% and 5%. The total economic potential is 19% to 22%. The total investment costs would be CZK 140-220 billion, which is 8% to 13% of the annual GDP.
- The *market potential* reflects the micro-economic perspective of the investor. It is calculated using payback periods of 3 and 6 years. The market potential is lower than the economic potential, but even with a restricted payback period (PBP) of 3 years, a significant market potential of 13% is identified. The total investment costs would be CZK 73-123 billion, which is 6-8% of the annual GDP.
- The potential of *no-investment cost measures* is estimated at 6%. This potential is included in all other potentials and constitutes nearly half of the market potential.

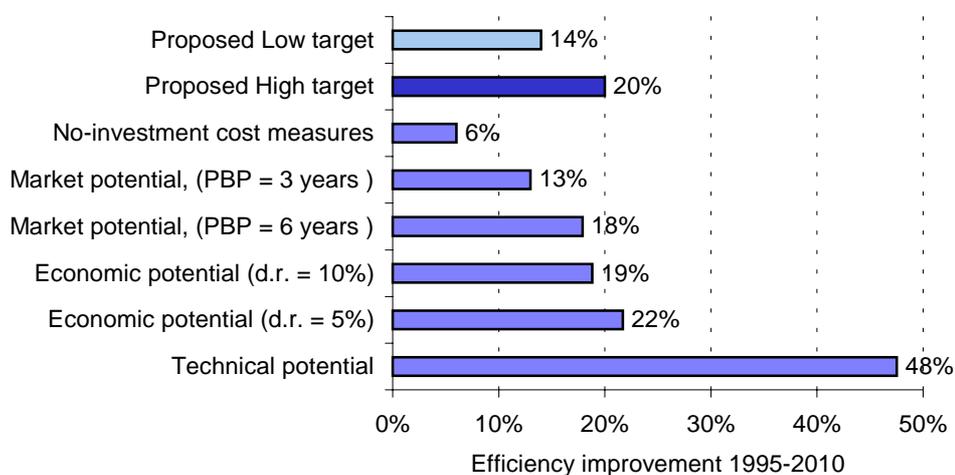


Figure 1.1 *Technical, economic and market potentials for energy conservation (efficiency improvement in % of end-use energy demand in the period 1995-2010) and targets (including the effect of sectoral restructuring of GDP)*

The analysis of sectoral energy demand and trends shows that the manufacturing sector, households, public and commercial services, and transportation are important sectors with respect to energy efficiency. Detailed information on the energy efficiency potentials and the economic assessment can be found in the National Energy Efficiency Study, the background document to the Action Plan.

## 2. POLICY TARGETS

The Czech government should set quantitative targets for end-use energy efficiency improvement. Without these targets, it is not possible to establish energy efficiency policy, nor is it possible to evaluate the success of the policy. In practice, policy targets on energy efficiency are always a political compromise, in which a great number of often-conflicting interests of government and other stakeholders in society are balanced. In the Czech Republic, no official targets have been adopted until now (June 1999).

To consider the impact of political compromise on the targets, two sets of targets are adopted in the NEES. The targets are based on estimates of the market potential and the economic potential, and can be used by the Czech government as a starting point for the discussion on official targets.

### *High target*

Table 2.1 shows the high and relatively ambitious target of 20% energy efficiency improvement in the period 1995-2010 or 1.5% on an annual basis. A part of this target can be reached through no-investment cost measures (6%) and structural changes in the economy (2%). The estimated direct investment costs are CZK 123 billion.

The breakdown to the contributions in individual sectors is also presented in Table 2.1. Although industry should have priority in the long term, currently energy efficiency is not the first priority in industry because of the difficult economic situation. In the short term, the public sector (state and public properties) should therefore have priority because in this sector the return on investment is more certain.

### *Low target*

When the government decides not to implement the strong energy efficiency strategy required to reach the ambitious target, a moderate strategy is better than no strategy at all. The corresponding low target is presented in Table 2.1 and amounts to 14% end-use energy efficiency improvement in the period 1995-2010, or 1% annually. The estimated direct investment costs are CZK 73 billion.

*Table 2.1 Targets for energy efficiency improvement in end-use*

Sector	Energy Demand 1997 [PJ]	Energy efficiency improvement by sector 1997-2010	
		[% of sector energy demand 1997]	
		Low target	High target
Manufacturing industry	452	13.5	21.2
Agriculture	47	7.4	7.4
Transport	136	5.8	6.6
Commercial and public services	129	12.1	16.6
Households	262	14.4	20.0
Municipal district heating systems	94	9.6	20.3
Sub-total	1,120	12.0	18.0
Changes in structure of GDP	-	2.0	2.0
Total	1,120	14.0	20.0

Figure 1.1 presents both targets together with the economic and market potentials (Chapter 1). The high target is close to the economic potential. The economic potential can never be realised completely, because not all barriers can be removed by energy efficiency policy. The low target is close to the market potential. The targets include the energy savings related to the expected changes in the sector structure (2%) as well as no-investment cost measures (6%).

## 3. ENERGY EFFICIENCY POLICY

### 3.1 Introduction

In the Czech Republic, different market barriers hamper the improvement of energy efficiency. In the National Energy Efficiency Study, the barriers have been identified and described in detail. The main barriers are summarised below:

1. A *lack of information and awareness* is a barrier in every end-use sector. There is a lack of information on the structure of the energy consumption patterns, the (non-financial) benefits of energy efficiency, existing financing schemes and available technologies.
2. There is a *lack of incentives* to take actions leading to energy efficiency. The most important reasons are the lack of information (and resulting high transaction costs), the financial rules in public sectors that do not allow the sector to benefit from energy savings (see Section 5.4); and the high project development cost. The transaction costs and the costs for project development are high because the awareness of potential benefits is low, and because the energy efficiency investments are less cost-effective than alternative investments.
3. The *low cost-effectiveness of energy efficiency projects* is due to the low energy prices for some consumer groups, resulting in insufficient revenues of energy efficiency projects. Other reasons are the high price of capital available and the high price of new (mainly imported) technologies.
4. The *difficult access to appropriate capital sources* is mainly caused by:
  - The scarce in-house capital.
  - The low creditworthiness of Czech investors.
  - Small size of most energy efficiency investments.
  - High risk perceived for energy efficiency investments and resulting higher price of capital.
  - Lack of experience of Czech investors with energy efficiency investments.
  - Lack of experience in development of bankable project proposals.
5. *Legal and institutional barriers* also play an important role. A major policy barrier to the promotion of energy efficiency in the Czech Republic is the absence of an Energy Policy and Energy Efficiency Policy document that would define the long-term objectives and strategy of the government in energy efficiency. As long as there are no consistent strategy and targets, there is also no basis for the involvement of other stakeholders.
6. The most important *technical barriers* are the following: the energy efficient technology is often not yet matured yet and the compliance with technological standards is difficult, because many manufacturers and builders have different priorities in designing and selling their refrigerators, pumps, buildings etc. Low energy prices have contributed to this. In addition, the industrial infrastructure must be mature and able to manufacture the energy efficient products according to demand and quality standards. The quality and reliability of new technologies, appliances and equipment needs to be ensured by increased research and development effort and demonstration projects.

The development of a new policy requires the assessment of all available policy instruments and the design of measures that specifically addresses the identified market barriers. A number of other criteria has been considered as well. This include the expected energy savings, the public and private resources required, the necessary institutional changes, harmonisation with the EU, and the conformity with the liberalisation of energy markets. A full account of the selection of policy instruments is given in Chapter 5 of Part I of the NEES background document.

### 3.2 Policy framework

A major barrier to the promotion of energy efficiency in the Czech Republic is the absence of an Energy Policy and Energy Efficiency Policy document that would define the long-term objectives and strategy of the government in energy efficiency. Two external commitments also contribute to the need for a policy framework for energy efficiency. First, by signing the Protocol to the Energy Charter on Energy Conservation and Related Environmental Issues, the Czech Republic has committed itself to draw up a programme to support energy conservation. This includes relevant legislative and regulatory measures as well as subsequent enforcement.

Secondly, one of the basic political objectives of the Czech Republic is accession to the European Union. Therefore, it is important that the new policy measures are consistent with the legislation of the EU. It contains appliance energy labelling, minimum efficiency standards for boilers and appliances, standards of heat losses of building shells and heat distribution systems, energy taxation and implementation of environmental management systems such as the Eco Management and Audit Scheme (EMAS) and ISO-14000 standards. In addition, the EU requires each Member State to have an Energy Policy that should include an Energy Efficiency Policy.

In the Energy Policy approved by the government in 1992 and in a recent proposal developed by the Ministry of Industry and Trade (MIT) in 1999, energy efficiency is given only limited attention. The government intends to finalise the Energy Policy document by the end of 1999 and to have the Energy Management Act in force in by end 2000. Figure 3.1 shows the relationship between the policy documents and acts.

A new 'Energy Efficiency Policy' document should formulate the government objectives and targets, and the set of policy measures to achieve these targets, including the role of other stakeholders in the economy. The document will commit the government to its targets and will be a necessary basis for the involvement of the other stakeholders, which must also support the policy. Full account should be taken of relevant European Union regulation and the commitment to the Energy Charter Protocol.

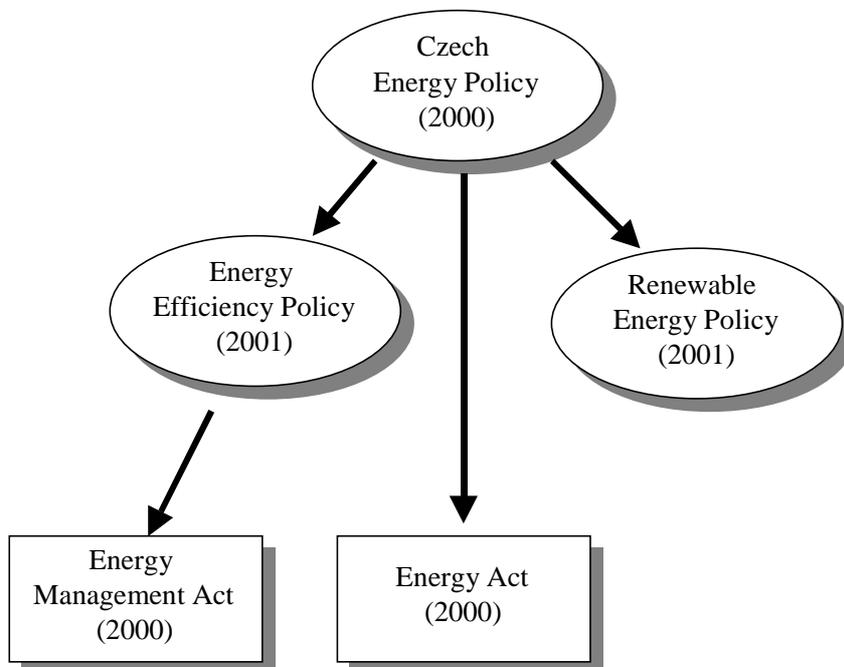


Figure 3.1 Overview of policy documents and acts including (recommended) date of enforcement

## Actions policy framework

1. 2000: The Ministry of Industry and Trade (MIT), in co-operation with the Ministry of Environment (MoE), will prepare a detailed policy document on energy conservation, the 'Energy Efficiency Policy'. The competence law will be strictly followed<sup>1</sup>. Preparation will require a budget of CZK 2 million.
2. 2000: The government and respective ministries (MIT, MoE) will intensify the co-operation with the EU and its Member States to benefit from the experience in policy making in the field of energy efficiency.
3. 2001: The Ministry of Industry and Trade will ensure consistency between the Energy Management Act and the Energy Efficiency Policy.
4. 2001: The Energy Efficiency Policy will be completed by the Ministry of Industry and Trade and approved by the government.

### 3.3 Legal framework

The Energy Management Act and the Energy Act will provide the legal framework for the energy efficiency policy (see Figure 3.1). The Energy Management Act will specify the rights and obligations of private and legal persons in production, transmission and consumption of energy, leading to an increase in effective use of energy in the Czech Republic and to environmental protection, stimulating a reliable energy supply, competitiveness and sustainable development. The Czech government furthermore states that the free market does not provide guarantees for an efficient use of energy and environmental protection. Therefore, the Energy Management Act has to support energy efficiency. The draft version of the Act contains the following main elements (see the NEES background document for a more detailed description):

- Obligation of energy audits in organisations with a certain energy use and source capacity. Exact standards for energy audits will be given in Decrees. For organisations in the public sector there is also an obligation to implement the audit results. However, the required funding has not been arranged. Individual sectors are expected to cover the costs of both the audit and its implementation. See also Section 5.4.
- Mandatory cogeneration of electricity and heat, if CHP is economically viable. This part of the act is, however, still under heavy discussion and could be limited to the obligation of carrying out an energy audit and considering CHP. See also Section 5.7.
- Introduction of standards and labels for electric appliances, boiler requirements and boiler operational standards.

As some elements of the Energy Management Act are still being discussed, it is recommended that the proposal of the Act be submitted for discussion to professionals within the energy efficiency sector before its wording is finalised and converted into a paragraph version for submission to the Parliament. Some of the proposals (e.g. introduction of compulsory energy audits) should be reconsidered before they are approved.

The new Energy Act will be adopted by the end of 2000. This Act regulates the trading of energy carriers, including the steps towards a liberalised energy market. It will define the responsibility of energy utilities concerning promotion of renewable energy and energy efficiency, including an obligation of purchase of power and heat from cogeneration and renewable energy.

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<sup>1</sup> Taking into account the current split of responsibilities given by the Competence Law, everything related to energy supply is the responsibility of MIT, but the Ministry of the Environment is active in this field as well. Current practice is that both Ministries elaborate common policy papers and present them to the government.

## **Actions legal framework**

1. 1999-2000: The Ministry of Industry and Trade will prepare the Energy Management Act for approval and organise a national discussion among professionals within the energy efficiency sector before its wording is finalised.
2. 3<sup>rd</sup> quarter of 1999: The recommendations of the Action Plan should be harmonised with proposed Energy Management Act and the corresponding decrees.
3. 2000: The new Energy Act and Energy Management Act will be approved with full power from 2001 on.

### **3.4 Institutional framework**

As mentioned before, a large economic and market potential for energy efficiency improvement is available, and even the potential of no-cost measures is considerable. However, various barriers are hampering the achievement of this potential. Therefore, this situation also calls for a strong institutional framework for energy efficiency as a solid common basis for improving energy efficiency in the Czech Republic. It is necessary to strengthen the role of a National Energy Agency as a central institution responsible for implementation and monitoring of energy efficiency policy. Furthermore, the capacity at the governmental level in the field of energy efficiency should be improved.

#### *National Energy Agency*

Currently, the major governmental body responsible for promotion of energy conservation is the Czech Energy Agency (CEA), while the State Environmental Fund (SEF) is also active in this field. The disadvantages of having these two agencies are the difficult co-ordination and the lack of independence from the different Ministries. This situation can cause overlapping measures and programmes, which is not cost effective. Therefore, the establishment of one single implementing Agency responsible for energy efficiency issues is recommended. The National Energy Agency should play a more advisory and co-ordinating role. For this purpose, the capabilities of the Agency should be increased and it should elaborate a business plan. The Agency should develop methodologies for auditing, including tools, schemes for financing, monitoring and targeting.

The following recommendations are made with respect to the structure and staffing of the National Energy Agency. The Agency should consist of three specialised departments:

- Programmes: energy efficiency analysis, development of annual national programmes, implementation of national programmes, selection and management of projects.
- Monitoring and evaluation: evaluation of project effectiveness, gathering of data, running information database on projects.
- External affairs: public relations, collaboration with EU and foreign institutions, management of the EKIS centres, operation of a web site and info line etc.

The managing (advisory) board should consist of representatives of different ministries (MIT, MoE, MF) and research and development institutions. The Managing Director should be a highly qualified manager with a technical background and fluent knowledge of at least two foreign languages.

According to the draft Energy Management Act, the major responsibilities of the Agency will be:

- Analysis of developments in energy efficiency, promotion of energy efficiency improvements and reduction of the impact on the environment.
- Development and implementation of the national programme for promotion of energy savings and renewables.
- Management of the national programme for promotion of energy savings and renewables.
- Distribution of government support to energy efficiency and renewables.

- Monitoring of projects supported within the programme.
- Promotion of awareness in the field of energy savings and renewables.
- Co-ordination of R&D activities in energy efficiency and renewables.
- Licensing of energy auditors and co-ordinating the list of auditors.

The Energy Management Act furthermore states that the Energy Agency is a budgetary organisation funded by the Ministry of Industry and Trade. The Minister appoints the director of the Agency. The Agency is obliged to inform the Parliament once a year about results of previous year programmes and about the proposed programme for the coming year.

#### *Extending professional background of ministries in energy issues*

On all ministries that operate large building stock, or are responsible for heat and electricity supply or distribute subsidies to energy savings, there should be at least one person responsible for energy issues. This person should have a relevant professional background. Currently, only a few ministries employ such experts. Their role will be to monitor the situation in energy consumption and efficiency, to prepare energy savings programmes, to prepare inputs in the government register of investments and to collaborate closely with the National Energy Agency on implementation of the energy conservation programmes in relevant sectors. The Ministries concerned are: the Ministry of Regional Development, Ministry of Agriculture, Ministry of Defence, Ministry of Interior, Ministry of Education, Ministry of Labour and Social Affairs, Ministry of Health, Ministry of Finance, Ministry of Culture, Ministry of Transport, Ministry of Justice.

#### **Actions institutional framework**

1. 2000: The Energy Management Act will introduce a new system with one National Energy Agency, which would co-ordinate activities in the energy efficiency field.
2. 2000-2005: The tasks of the National Energy Agency will be extended according to the recommendations above. The annual budget for this is approximately CZK 20 million.
3. 2001-2002: The staffing of the National Energy Agency will be adequate for the tasks to be carried out (including monitoring and evaluation of programmes). About 10 more people would be required with an annual budget of 5 million.
4. 2000: On all relevant ministries, at least one person with an appropriate professional background will be responsible for energy issues. The annual costs for hiring 10 people will be CZK 5 million.
5. 2002-2010: A large programme for financing energy efficiency improvement in public services will be organised and run by sectoral ministries (Education, Health Care, Defence, Internal Affairs, Finance, Justice and Social Affairs) with methodological support of the Energy Agency. The operational budget is estimated at CZK 5 million per year (10 people).

### **3.5 Monitoring and evaluation**

After developing a new energy efficiency policy, it is very important to monitor and evaluate the achieved results. This should be done on policy level as well as on the level of individual energy conservation programmes.

#### *Monitoring and evaluation of policy*

The Energy Efficiency Policy will need regular updates to adapt to changing external conditions and changing priorities. This is done on the basis of the actual development of energy consumption, which will indicate the success of the policy. Therefore a prerequisite for policy monitoring is an improvement of the quality and availability of statistical data.

### *Monitoring and evaluation of programmes*

Currently, the energy conservation programme of the Czech Energy Agency is annually evaluated by an independent organisation, which compares the invested costs with the achieved energy savings (the IEA methodology). Since the first evaluation in 1995, this has led to several improvements in the State support programme regarding both project results and administration.

This programme evaluation should be extended in the following ways:

- Increase the frequency of programme evaluation to six months rather than every year, aiming at the early detection of problems with new programmes.
- On the spot monitoring of subsidised projects. Choosing projects at random and verifying the actual results with anticipations.
- Evaluation of programmes with clients or participants including feedback on practical experiences with state organisations and the results of the programme.
- Involvement of the Czech Energy Inspection in evaluation of energy programmes as they have the necessary expertise and equipment.

### **Actions monitoring and evaluation**

1. 2000-2010: The Ministry of Industry and Trade will monitor the energy consumption on a yearly basis to be able to assess the progress of energy efficiency policy, and will report on the progress. The annual costs are estimated at CZK 3 million per year.
2. 2000: The EUROSTAT methodology of energy statistics will be implemented by the Czech Statistical Office and used for development of the national energy balance.
3. 2000-2002: The Ministry of Industry and Trade will separately evaluate the key measures in energy efficiency policy. The impact and costs of the policy measures and possible improvements will be assessed.
4. 2002-2010: The Energy Efficiency Policy Document of the Czech government will be updated every three to four years. The total costs for the period 2002-2010 are estimated at CZK 12 million.
5. 2000: The Ministry of Industry and Trade will elaborate a programme evaluation action plan with more attention to monitoring in the field and feedback of participants. The costs of elaboration of evaluation action plan are estimated at CZK 2 million.
6. 2002-2010: The Czech Energy Agency will carry out annual evaluations of programmes supporting energy efficiency. The estimated budget is CZK 1 million per year.



The introduction of emission charges should be considered. Emission charges involve payments that are directly related to the pollution caused. The results of a study on this issue, launched by the Ministry of Environment, will be available in the autumn of 1999.

### **Actions energy pricing and taxation**

1. 1999: The Ministry of Finance in collaboration with the Ministry of Industry and Trade and the Ministry of Environment will outline a plan for implementation of a consistent system of the removal of subsidies to the electricity and gas prices, as well as introduction of energy taxation.
2. 1999: The Ministry of Environment will investigate the effect of a new system of emission charges on energy efficiency, as well as the optimal way to design this system.
3. 2000: The Ministry of Finance and the Ministry of Labour and Social Affairs will study the consequences of the new pricing policy and provide possible compensation for low-income groups. The study should provide data on costs for the state budget. The costs of the study are estimated to be about CZK 1 million.
4. 2001-2003: Step by step revision of current legislation and approval of new legislation required for the introduction of energy taxation, and, possibly, emission charges.
5. 2004-2007: Arrangement of a nation-wide public awareness campaign for promotion of a new energy taxation system that should be carried out in the period of 3 years prior to implementation of a new tax. The estimated costs of such an awareness campaign are CZK 50 million.
6. 2008: Start of full implementation of the energy tax. Full implementation is expected to take about 10 years. No additional costs for the state budget are expected.

## **4.2 Fiscal measures**

Fiscal measures for energy conservation are increasingly important in many EU countries, and mainly replace subsidy schemes. Advantages of fiscal incentives are that they are equally available for all investors and make better use of the market mechanism. However, fiscal measures must be designed with care. The harmonisation with EU legislation should be checked. For the Czech industry, fiscal measures are important because they can improve the financial and economic state of the industry. Together with increased energy conservation, this could lead to new jobs.

Below, an overview is given of possible new fiscal measures. At the moment, it is not possible to recommend specific measures. Further research is needed. It is therefore recommended that the Czech government investigate the options on the short-term, to be able to introduce new fiscal measures at a later stage.

- Increase of the income tax relief for energy efficiency and recycling installations. The income tax base can be decreased to e.g. 20% of the purchase price, compared to the current 10%.
- Green investment scheme: income tax exemption on the interest received from a 'green' fund, compensating for the fact that the interest rate usually is lower than that offered by other accounts.
- Accelerated depreciation of environmental investments. This constitutes a corporate tax advantage to companies that invest in specific energy saving measures.

### **Actions fiscal measures**

1. 2000: The Czech Energy Agency in close collaboration with Ministry of Finance will investigate which fiscal measures can be applied and which actions are required for implementation. An impact on the state budget will also be evaluated. The investigation will require a budget of CZK 0.5 million to select appropriate fields and run a cost/benefit analysis.
2. 2000-2001: Changes of legislation required in the field of fiscal measures will be prepared by the government and approved by the Parliament.
3. 2001-2002: Introduction of fiscal measures. The impact on the state budget depends on the selection of the measures.

### **4.3 Information and awareness**

In all end-use sectors, the implementation of the existing energy saving potential requires an increased awareness of the benefits of energy efficiency, in particular the possibilities for energy costs reduction and environmental improvements. To realise the considerable potential of no-cost measures (good housekeeping), a change of behaviour is very important. There is a lack of information on the structure of the energy consumption patterns, the (non-financial) benefits of energy efficiency, existing financing schemes and available technologies.

The Czech Energy Agency has created a network of Energy Consultancy and Information Centres (EKIS) throughout the country. Other existing information centres are not co-operating (organisations of small and medium-sized enterprises, environmental NGOs, etc). In the Czech Republic, a nationwide information campaign on energy conservation has not been carried out since 1990.

### **Actions information and awareness**

1. 2000: The Energy Efficiency Policy developed by the Ministry of Industry and Trade will include a strategic awareness and marketing plan for energy efficiency. This plan should cover all target groups and use a wide variety of instruments. Utilities will also play a role in information dissemination to the public. The budget necessary for the development of such a plan is about CZK 2 million. The budget for implementation should be at least CZK 50 million for 5 years (2001-2005). After five years the plan will be evaluated and, if necessary, prolonged.
2. 1999-2000: The Ministry of Education, Youth and Sports will include energy efficiency information and awareness increase in the proposed 'Concept of Education and Development of Education System in the Czech Republic' and combine these activities with similar activities in the field of renewables. The implementation costs are estimated at CZK 20 million per year in the period 2000-2010.
3. 2000-2005: The tasks and staffing of the EKIS centres will extendedly be based on the strategic awareness and marketing plan. A better regional distribution of these centres will be arranged, providing easier access to their services in individual regions. The annual budget for running the EKIS centres in 2000-2010: CZK 50 million.
4. 2000-2001: CEA will investigate the possible overlaps and synergies between the EKIS network and other existing information centres, and will take action accordingly. This will reduce the costs of running the consulting system.
5. 2000: The web site of the Czech Energy Agency will be extended to include information on benefits, project development cycle, external assistance available, funds available, etc. The estimated annual budget required for updating and running the web site is CZK 3 million.
6. 2000-2010: All (energy) policy and legislation preparation will be accompanied by dissemination activities to prepare the parties that will be affected by the policy measures. The annual budget is estimated at CZK 5 million and the responsible body is the Ministry of Industry and Trade.

#### 4.4 Research, Development & Demonstration in energy efficiency

Technological development and innovation provide new opportunities for saving energy. For instance, significant savings can be realised through technological improvements of production processes in industry, more efficient boilers in buildings, etc. At the moment, no state programme exists for the stimulation of research and development in energy efficiency. The Czech Energy Agency, however, provides subsidies of up to 40% of investment costs for demonstration projects in the field of energy efficiency and renewable energy, and grants for finalisation of R&D projects. Given the extent of the research activities in other countries, RD&D priorities in Czech Republic should focus on demonstration projects and technology transfer.

##### **Actions RD&D**

1. 2000: RD&D goals in energy efficiency will be clearly defined by the National Energy Agency, making a regular monitoring and evaluation of RD&D efforts possible. The long-term strategy in this field will be developed, the budget will be set and the institutional framework will be created. The costs for this preparatory step are estimated at CZK 2 million.
2. 2001: The Ministry of Education and/or the Grant Agency of the Czech Republic will establish criteria for and introduce grants for R&D activities in energy efficiency. The programme will continue in the period 2001-2010. The annual budget is estimated at CZK 60 million.
3. 2000-2010: Apart from the support to R&D stated above, the majority of support will be on demonstration. The objectives will be stated in the Energy Efficiency Policy to assure consistency. The current annual budget of the Czech Energy Agency for demonstration in energy conservation will be increased to CZK 150 million in order to promote maturity of technologies.
4. 2000-2005: The Ministry of Industry and Trade and the Czech Energy Agency will arrange co-ordination of the RD&D activities in energy efficiency, including possibilities of co-financing EU programmes from Czech sources. This concerns in particular co-financing to participate in the SAVE II programme of the EU, and in the EU 5<sup>th</sup> Framework Programme. The annual budget will amount to CZK 100 million.
5. 2000-2005: The availability of energy saving technologies will be enlarged by promotion of demonstration projects and stimulating the co-operation of Czech industry with manufacturers in the EU and other countries.

#### 4.5 Joint Implementation

The marginal abatement costs of greenhouse gases in the Czech Republic are still relatively low compared to other OECD countries. This leaves a certain potential for Activities Implemented Jointly/Joint Implementation Projects (AIJ/JI). Several more or less successful AIJ/JI Pilot Projects were carried out in the Czech Republic in recent years. These and future projects have still to cope with several barriers especially concerning the lack of experience and novelty of the issue. Next to the increase of energy efficiency, AIJ/JI could bring several other benefits, such as technology transfer and the reduction of air pollution. As several UN FCCC Annex I countries have announced that they are willing to invest large sums of money into AIJ/JI, this can bring an important source of financing energy efficiency to the Czech Republic.

To host more AIJ/JI projects, the Czech Republic needs to develop its own AIJ/JI strategy, especially because the country's role as a host to AIJ/JI projects may be limited in the future. The Ministry of Environment, which is responsible for Activities Implemented Jointly/Joint Implementation, operates an AIJ/JI registration centre. The MoE, however, needs to adopt a JI strategy as a follow-up to the National Climate Policy, which has been negotiated by the government on May 17, 1999. This strategy could be based upon strategic variants proposed by the National Strategic Study (World Bank, 1998).

In addition, the MoE needs to develop an administrative framework to handle AIJ/JI projects, including transparent rules for reduction credits, project baselines and additionally criteria for AIJ/JI projects based upon international standards and procedures (UN FCCC). It is also important that one single institution, probably the MoE, will be responsible for AIJ/JI.

### **Actions Joint Implementation**

1. 2000: As a follow-up to the National Climate Policy, the Ministry of Environment will develop a detailed Joint Implementation Strategy of the Czech Republic. Budget: CZK 2 million.
2. 2000: The Ministry of Environment will develop an administrative framework to handle AIJ/JI projects. The costs for development of the framework are estimated at CZK 2 million.
3. 2000-2005: The government, in particular the Ministry of Environment, will be more active in finding Czech and foreign partners to be engaged in AIJ/JI projects.
4. 2000: An information campaign (conferences etc.) will be prepared and implemented by the Ministry of Environment for both parties. The budget is estimated at CZK 2 million.

## 5. ENERGY EFFICIENCY POLICY BY SECTOR

### 5.1 Industry

The manufacturing industry has the largest share in final energy consumption in the Czech Republic. The sector comprises about 7000 companies, of which the majority (2/3) has less than 100 employees. The largest industrial companies of more than 2000 employees consume about 80% of energy in this sector. The largest consumers of energy are the following branches: ferrous metallurgy, chemical industry and industry of mineral products with a total share of more than half of the total energy consumption in the manufacturing industry.

The economic and market saving potential in industry are considerable (27% and 11% respectively). In particular, efficiency improvements in heating systems, electricity consumption and measures to save process heat are already cost-effective. The three main barriers for energy conservation in industry are: i) the difficult and unstable economic situation of most domestic industries threatened by bankruptcies, which is not favourable for stimulating energy efficiency investments, ii) the lack of information about energy management, and iii) the weak financial position and lack of investment capital.

The current State programme for the support of energy savings and utilisation of renewable energy sources, which is managed by the Czech Energy Agency, includes an industrial programme. This programme also includes elements managed by the SEF or other bodies. The PHARE energy saving fund has awarded 13 loans for energy efficiency projects in industry during 1998 amounting to CZK 200 million (two thirds of the available funds).

#### *Short-term policy*

Given the current economic situation, short-term policy should aim at ensuring that the large potential of no/low cost measures is identified and implemented. For this purpose, the policy should focus on the following fields:

1. Providing information and raising awareness.
2. Reducing the transaction costs by providing financial support to feasibility studies and project development in the form of subsidies and expertise.
3. Improving access to commercial financing of energy efficiency projects, developing soft loan mechanisms and guarantee funds, and promoting the involvement of Energy Service Companies (ESCOs).
4. Introducing an energy efficiency programme into the industry revitalisation programme, which is currently being developed. In total, about five large Czech companies are expected to be involved. This provides a unique opportunity for an implementation of a pilot programme in which the revitalisation of the company would be combined with a targeted energy efficiency programme.

#### *Long-term policy*

Long term voluntary agreements between industry and the government in the field of energy conservation (LTA; also called covenants), have been used successfully in a number of European Member States. The partners in such an agreement are the government, represented by e.g. Ministry of Industry and Trade and the Ministry of the Environment, and industrial branch organisations, or individual companies. The target of the Agreement is to increase energy efficiency or to decrease emissions of CO<sub>2</sub>. Although the agreement is voluntarily, it clearly states the rights and liabilities of both parties.

The government should agree on providing the industrial partners with financial support. Restrictive measures that otherwise would be applied, should be lifted for those companies that join the Agreement. The following general conditions must be fulfilled for long-term voluntary agreements to be successful in the Czech industrial sector.

- The energy use of the branch has to be substantial, for instance more than 1 PJ. The participating companies must represent the largest share of the total energy consumption of the branch.
- A branch has to be homogeneous in terms of processes and products. The branch organisation must be well organised, in the sense that it has good contact with its members and can effectively provide them with information. The branch organisation must demonstrate commitment to active encouragement in compliance with the long-term agreement.
- There must be an independent organisation responsible for monitoring.
- There must be incentives for the companies to participate in the long-term agreements.

Furthermore, the role of the national industry, i.e. the availability and quality of local production of energy conservation technologies and services, should be intensified to provide cost-effective alternatives to imported technologies. Therefore, joint ventures between companies in the Czech Republic and EU countries for local production of energy efficient technology should be promoted. This can be done through CzechInvest (the Czech agency on promotion of foreign investments in the Czech Republic) and by providing favourable conditions for joint ventures.

A prerequisite for financing schemes and programmes to be successful is providing easy access to comprehensive information on these programmes. On the one hand, for instance, the web site of Czech Energy Agency should be extended. On the other hand, the government should provide industry with information on energy efficiency programmes in all sectors because this could provide business opportunities.

Finally, investments in industrial energy efficiency should be supported through debt financing schemes developed in co-operation with banks, either on the principle of interest rate subsidies or on the principle of the Phare ESF revolving fund. This will minimise the risk in fund allocation and misuse. The scheme has to suit requirements specific to energy efficiency investments such as the size, preferential interest rate, loan duration, etc.

### **Actions industry**

1. 1999-2000: The Ministry of Industry and Trade will prepare the integration of a targeted energy efficiency programme in the revitalisation programme in industry.
2. 2000-2002: The programme on energy efficiency in the revitalisation programme will be launched. The budget cannot be estimated now and should be investigated further.
3. 2000: The Czech Energy Agency will set up an information programme (including a web site) to increase the awareness on benefits of energy conservation, focusing on dissemination of information on demonstration projects, promotion of Energy Performance Contracting, energy cost management, project development and assessment for submission for finance. The annual budget is CZK 5 million in the period 2000-2010.
4. 2000: The Czech Energy Agency will start supporting the implementation of EMAS and ISO 14000, and the promotion of energy management systems combined with Monitoring & Targeting tools. The annual budget is CZK 20 million in the period 2000-2010.
5. 2001: The Czech Energy Agency will set up energy auditing and benchmarking programmes in consultation with the branch organisations. The programmes will include subsidies for energy audits, the analysis of data for benchmarking, and feasibility studies. The annual budget is CZK 100 million in the period 2001-2010.

6. 2001: The introduction of long-term agreements in industry will be prepared by the Ministry of Industry and Trade and the Ministry of Environment. In particular, the institutional framework will be set up. The budget is CZK 1 million.
7. 2000-2001: The Ministry of Finance will assess the impacts of the introduction of a tax relief on investment in specific energy conservation and renewable energy technologies.
8. 2000: A soft loan scheme will be prepared by the Czech Energy Agency on the basis of the experiences in the Phare ESF revolving fund. The budget for the preparation is CZK 1 million.
9. 2002: The soft loan scheme will be launched. The contribution of the State in the revolving energy efficiency fund is CZK 1 billion for 10 years.
10. 2000-2005: Joint ventures between companies in the Czech Republic and EU countries for local production of energy efficient technology will be promoted through CzechInvest and income tax exemption. The annual budget is CZK 20 million.
11. 2002: The first pilot long-term agreements will start. The government will provide support through co-financing energy audits. The budget is CZK 20 million in period 2002-2005 (CZK 5 million per year).

## 5.2 Residential sector

Households are the second largest group of end-use energy consumers. Currently, there are about 3.7 million dwellings in the Czech Republic, of which about 40% are detached single-family houses and the remaining 60% multi-family blocks of flats. Space heating accounts for about 71% of final energy consumption, domestic hot water for about 17 %, cooking for 6% and specific electricity consumption for 6%. There is a large gap between the huge technical saving potential (65%) and the market potentials at the current energy price level in households (15%). This gap is caused by the low cost-effectiveness of thermal insulation measures and more efficient appliances in particular. The removal of energy price distortions would substantially increase the level of the cost-effective energy saving potential in households (24%). Another important barrier is the owner/renter issue. This means that in some cases the people investing in the measure and those reaping the benefits are not the same. In the Czech Republic the energy costs are in theory paid in full by tenants. Investments in renovations of buildings are difficult to enforce by tenants because of a lack of incentives for the building owner. Energy efficiency policy for the residential sector should address the insulation of buildings, improvement of heating systems and the promotion of efficient household appliances.

### *Buildings*

Energy efficiency requirements for new and renovated buildings are included in several laws and other regulations. Most standards are harmonised with the EU standards within one year after its introduction in case the EU standard exists. New amendments are being prepared for the Building Code so that the relevant group of standards is explicitly stated in its executive decree. However, the enforcement and monitoring of building codes needs to be improved. For this, a monitoring system will have to be set up. In the long term, an integrated building standard such as the Dutch Energy Performance Standard (EPS) could be considered for new dwellings. The EPS not only takes into account the energy consumption for space heating, but it also includes hot water production, ventilation and lighting.

A rehabilitation programme for the existing building stock exists, but it only applies to a small segment of the total stock (Ministry of Regional Development). Furthermore, the Czech Energy Agency supports energy efficiency measures in apartment buildings and family houses. At the moment, there is no programme aiming at the individual owners of houses. These programmes should be extended and the budget increased.

Obligatory metering of heat already exists at the pipeline entrance of district heated houses. Metering of all separate apartments, as required in the draft Energy Management Act, would provide better information on energy consumption and also give the possibility to charge every customer according to its own use. However, this issue needs more elaboration, because metering equipment that would comply with required standards is not always possible and/or suitable.

In a new system of rent calculation, the difference in quality of houses must be reflected, based not only on energy efficiency criteria, but also housing characteristics. In the long term, energy labels for buildings (see below) could play a role here. Investments in technical measures, which improve the quality, like thermal improvements, must be covered by rents.

### *Heating systems*

As is outlined in the draft Energy Management Act, an appliance sold on the market should have a minimal level of efficiency. Also, boilers will have to be certified based on the requirements of the Act. The standards for heating equipment are not established yet (minimal efficiency, low emissions etc.).

### *Appliances*

There are no standards or labels for electric appliances at this moment. The Energy Management Act announces the introduction of labels and standards for electric appliances. Labelling is in preparation for those appliances that the EU has introduced labels for<sup>3</sup>. Appliance standards, in compliance with EU regulation<sup>4</sup>, require a minimum level of energy efficiency of specific household appliances.

## **Actions residential sector**

1. 1999-2002: The government will ensure the removal of energy prices distortions in households as a necessary condition for an increase of cost effectiveness of energy conservation measures. (See also Section 4.1).
2. 2000: A monitoring system will be set up by the State Building Supervision to ensure compliance to the existing building codes. Energy consumption standards will also be set for energy transmission in building components and other parameters. Similar but higher limits will be set for renovated buildings. The Ministry of Regional Development is in charge. The annual budget is CZK 10 million for the period 2000-2005.
3. 2000: A programme on energy savings aiming at individual owners of houses (both concerning the building envelope and heating systems) will be designed by the Ministry of Regional Development in close collaboration with the Czech Energy Agency. The programme will be preferably based on a soft loan scheme in combination with the construction savings. The annual budget for implementation will depend on financing scheme, but is estimated at CZK 200 million in the period 2001-2010.
4. 2000: The Ministry of Regional Development in collaboration with the Ministry of Finance will investigate the design of a new system of rent calculation in which the difference in quality of houses must be reflected and energy conservation is stimulated. Experiences from European Union countries will be used (e.g. the Netherlands).

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<sup>3</sup> Refrigerators - Directive 94/2/EC (21/01/94), Freezers - Directive 94/2/EC (21/01/94), Washing machines - Directive 95/12/EC (23/05/95), Households tumble dryers 95/13/EC (23/05/95), Dish washers- Directive 97/17/EC (16/04/97), Dryers - Directive 96/60/EC (19/09/96), Lamps (01/98).

<sup>4</sup> EU directives on energy efficiency requirements are applied to new hot-water boilers fired with liquid or gaseous fuels (92/42/EEC), to household electric refrigerators, freezers and combinations (96/57/EC). This concerns legislation, and was followed by negotiated agreements with manufacturers for minimum efficiency requirements of washing machines and televisions. In the near future energy efficiency requirements for electric water heaters and room air conditioners will be negotiated.

5. 2000: The Czech government will start a pilot project on labelling selected appliances in compliance with EU regulation and start a campaign for the promotion of labelling among producers/suppliers. This will prepare them for the implementation of the obligatory labelling, which will be introduced by the Energy Management Act. The annual budget is CZK 4 million in period 2000-2002.
6. 2000: Standards for heating equipment will be elaborated by the Czech Energy Agency (minimal efficiency, low emissions etc.) and set by the Energy Management Act.
7. 2001: The Energy Management Act will come into force. It includes the obligation of labelling of all appliances in compliance with EU regulation and will introduce appliance standards requiring a minimum level of energy efficiency of specific household appliances. It also includes an introduction of mandatory metering of energy consumption based on requirements of Energy Management Act. The monitoring of the Act implementation will be done by SEI.
8. 2002: A new system of rent calculation will be introduced that reflects the quality of housing and the energy performance (Ministry of Regional Development and Ministry of Finance).
9. 2002-2010: The subsidy scheme targeted on improvement of energy efficiency in houses occupied by socially weak households will be introduced to reduce subsidy on living costs and thus costs of Ministry of Social Affairs. The introduction of this scheme will be related to the reduction of economic impact of energy price increase. The annual budget is estimated CZK 100 million.
10. 2002-2010: The government support to the system of construction savings (retrofitting of residential dwellings by households) will be extended and the use of this way of financing will be widely advertised. If the current government subsidy is increased by 50% (i.e. to reach CZK 6,750 as maximum), the total available fund for loans would be substantially increased. The estimated annual additional costs for the State budget are CZK 1 billion.
11. 2005: The Ministry of Regional Development will prepare the implementation of new 'integrated' building standards, and start demonstration projects. The budget is CZK 5 million in the period 2005-2006.
12. 2005: The Ministry of Regional Development will investigate the feasibility of energy labelling for buildings. The budget is CZK 5 million in period 2005-2006.

### 5.3 Commercial sector

The tertiary sector, comprising the commercial and public sector, is the third largest end-use energy sector with a share of 13% of the total final energy consumption in the Czech Republic. Space heating accounts for about 49% of final energy consumption, hot water production for about 33%, and electricity consumption for 18%. The tertiary sector shows a technical saving potential of 43%, of which the economic and market potential is respectively 9% and 23%. The improvement of the heating system is cost-effective in most cases. Efficiency improvements of appliances and thermal insulation of buildings are not cost-effective in most cases, and require additional incentives.

Energy efficiency policy in the commercial service sector has the same short and long-term priorities as in the manufacturing industry (see Section 5.1). Given the current economic situation, short-term policy should aim at the identification and implementation of no/low-cost measures. For this purpose, the policy should focus on providing information and raising awareness, and providing financial support in form of subsidies to feasibility studies and project development. Furthermore, the government should facilitate the access to commercial financing of energy efficiency projects. The lack of in-house expertise in the sector can be overcome by involving Energy Service Companies (ESCOs).

In the long-term, like in industry, long-term voluntary agreements between the commercial sector and the government in the field of energy conservation (LTA; also called covenants), should be introduced (see Section 5.1 for a detailed description of this instrument). The preparation can begin at short notice. Instead of subsidies, which are inappropriate in this changing and still unstable sector, commercial financing schemes of preferential conditions should be applied.

### *Buildings*

Energy efficiency requirements for new and renovated buildings are included in several laws and other regulations. Most standards will be harmonised with the European Union standards within one year after its introduction. New amendments are being prepared for the Building Code so that the relevant group of standards is explicitly stated in its executive decree.

The enforcement and monitoring of building codes need to be improved. A monitoring system will have to be set up. In the long term, an integrated building standard such as the Dutch Energy Performance Standard could be considered for new dwellings. The EPS not only takes the energy consumption for space heating into account, but also for hot water, ventilation and lighting. The standards should be differentiated for the type of building e.g. offices, hospitals, schools, shops etc.

Furthermore, energy management systems in combination with monitoring and targeting (M&T) software tools can be promoted to identify mainly good housekeeping measures. The Czech Energy Agency together with branch organisations should play a role in supporting energy management by providing information and subsidies. In this way, the institutional framework for long-term voluntary agreements can be established at the same time.

### *Heating systems*

As is outlined in the draft Energy Management Act, an appliance sold on the market should have a minimal level of efficiency. Boilers will have to be certified based on the requirements of the proposed Energy Management Act. Exact standards for heating equipment still need to be implemented (minimal efficiency, low emissions etc.).

### *Appliances*

There are no standards or labels for electric appliances at this moment. The Czech Republic will follow EU regulation in labelling and standardisation of electric appliances. Furthermore, Act No. 22/1997 requires a minimal efficiency of products brought on the market by producers, importers and distributors. The Energy Management Act announces the introduction of labels and standards for electric appliances. Labelling is in preparation for those appliances that the EU has introduced labels for. Appliance standards, in compliance with EU regulation, require a minimum level of energy efficiency of specific office equipment.

## **Actions commercial sector**

1. 2000: A monitoring system (by State Building Supervision) will be set up to ensure compliance to the existing building codes. Energy consumption standards will also be set for energy transmission in building components and other parameters. Similar but lower standards will be set for renovated buildings. The Ministry of Regional Development is responsible.
2. 2000: The Czech Energy Agency will set up an information programme (including a web site) to increase the awareness on benefits of energy conservation, focusing on promotion of Energy Performance Contracting, energy cost management, project development and assessment for submission for finance.
3. 2000: The Czech Energy Agency will set up energy auditing and benchmarking programmes in consultation with branch organisations. The programmes will include energy audits and partially financed feasibility studies (with strict eligibility criteria). The annual budget is CZK 20 million.

4. 2000-2010: The Czech Energy Agency will provide subsidies to the implementation of energy management systems combined with monitoring and targeting tools. The annual budget is CZK 10 million in the period 2000-2010.
5. 2001: The Energy Management Act will introduce appliance standards requiring a minimum level of energy efficiency of specific office equipment and heating systems. Energy labels for appliances will be implemented in compliance with EU regulation. Metering of energy consumption in commercial buildings will be introduced.
6. 2002: The introduction of long-term agreements will be prepared (Ministry of Industry and Trade and the Ministry of Environment). The institutional framework will be set up (branch organisations, target, monitoring, etc.). The budget is CZK 3 million.
7. 2002-2003: The first pilot long-term agreements will start. The budget is CZK 4 million per year.
8. 2005: A soft loan scheme will be introduced. A revolving fund with initial instalment from the State budget of CZK 200 million will be implemented.
9. 2005: The Czech government will prepare the introduction of energy labelling for buildings. Budget: see residential sector
10. 2005: The Czech government will study the feasibility of introducing new 'integrated' building standards, start demonstration projects. Budget: see residential sector

#### 5.4 Public sector

The three largest consumers of energy in the public sector are education, health care and government, together accounting for more than one half of the consumption. The public sector should have priority in short-term energy efficiency policy for three reasons:

1. The public sector is easier to address by governmental policy than the private sector.
2. The state budget will directly benefit from costs savings from energy efficiency improvements.
3. Successful projects in the public sector will have a spin-off in the private sector.

The policy measures formulated for the commercial sector also apply to the public sector. However, a number of issues are specific to the public sector. These are described below:

- For public buildings Act No. 50/1976 Coll. as well as Act No. 22/1997 Coll. and adjacent Decrees apply. In the draft Energy Management Act, the organisations of the public sector are required to carry out an energy audit. At the same time, the Act includes the obligation to implement the audit results. However, funding for the auditing as well as for the implementation would pose a large problem for public organisations that try to fulfil the obligation. Therefore, state financial support must be provided and the access to other sources of financing must be facilitated. Progress has been made in enabling the involvement of Energy Service Companies (ESCO) in contributory organisations (energy performance contracting, EPC). Similarly, the financial rules need to be adjusted in the budgetary organisations to enable the use of the savings for repayments of investments and provision of incentives.
- The public sector owns many heat production plants. An inventory, categorisation and energy demand analysis should be carried out, before an investment programme to improve energy efficiency in these sectors is launched. Procedures for investment approval need to be revised and the investment departments should be involved in this process in this process Any new investment in the state sector or in reconstruction should be checked with regard to the energy efficiency improvements achieved.
- In-house expertise and knowledge of energy efficiency issues is very poor in the public sector. The capacity at all levels (national, regional and municipal) should be increased.

- The annual budget for implementation of cost-effective measures in the public sector will be very large, taking into account the current debt in maintenance and improving buildings and public facilities. Nevertheless, the implementation of all economically viable energy saving measures would not require any additional financing from the state budget as the energy costs savings will cover them.

### **Actions public sector**

1. 2000: A pilot project on mandatory energy auditing of public buildings by the Czech Energy Agency will be started. The budget is CZK 5 million.
2. 2000-2001: The Czech Energy Agency will introduce a common methodology for the obligatory registration of public buildings. This will include the development of the methodology, the collection of data and processing in all public sectors. Such census should be repeated every 10 years and can be combined with the census of population and housing. A pilot project will start. The budget is CZK 20 million.
3. 2000: A categorisation of energy efficient projects will be implemented in the Central Register of Investments operated by the Ministry of Finance. This will support the specification of financial requirements for these projects in preparation of the annual programmes of the Czech Energy Agency.
4. 2000-2001: The Czech Energy Agency will carry out pilot projects on implementation of the financing support scheme for energy efficiency improvement in public buildings in different sectors. The annual budget is CZK 100 million.
5. 2000: The Ministry of Finance will adjust the financing rules for budgetary and contributory organisations to enable debt financing of energy efficiency projects and energy performance contracting. The procedure and rules of debt financing and involvement of energy service companies in budgetary and contributory organisations will be specified.
6. 2000: Criteria for authorisation of energy service companies intending to operate in the public sector will be developed. The Czech Energy Agency will carry out the authorisation.
7. 2000: Rules for financing projects through energy performance contracting, will be developed and issued by the Czech Energy Agency.
8. 2001: The obligatory energy auditing of public buildings will be implemented (Energy Management Act). The annual budget is CZK 300 million for subsidies of the energy audits and the feasibility studies for the implementation of results.
9. 2002-2010: A large programme for financing energy efficiency improvement in public services will be organised and run by sectoral ministries (Education, Health Care, Defence, Internal Affairs, Finance, Justice and Social Affairs) with methodological support of the Czech Energy Agency. The Agency will co-ordinate in close collaboration with Ministry of Finance and sectoral ministries. The operational budget is CZK 5 million per year (10 staff members at CEA).

## **5.5 Transport**

Since 1990, the structure of the transport sector has changed considerably. A shift from rail transport to road transport for long distances has occurred. While the volume of freight rail transport decreased by 25%, road transport increased by nearly 50% in the period 1993-1998. Another trend is the growing use of private cars for transport instead of public transport. This trend is caused by to the income growth of some population groups of and the fast increase of the number of company cars. As a result, the energy consumption of both freight and passenger transport has increased significantly.

The main difference between the technical saving potential of 36% and the economic/market potential of 20% is a switch to public transport. This is a complex issue, because many societal factors play a role. Public transport is still relatively cheap compared to private car use. The main reasons are subsidised fares and the low service level. Increasing quality of public transport will, however, mean

higher prices and a switch to car transport. Large investments in public transport in combination with the current price level are probably not possible. The Ministry of Transportation has developed a transport policy that will stimulate public transport above private car use. This draft policy is now reviewed through a Strategic Environmental Assessment. This assessment not only analyses the environmental impacts, but also gives citizens, NGOs etc. the chance to participate in the decision-making process.

In general, instruments regarding private car use should make excessive car use and not car ownership more expensive. In the first place, subsidies to public transport should be spent on rail transport, since it is more energy efficient and has the lowest environmental impacts. Bus transport should be stimulated in those areas where no efficient rail transport can exist.

### **Actions transport sector**

1. 2000: The Ministry of Transportation and Telecommunication will adopt a transportation policy containing instruments to stimulate public transport.
2. 2000: The Ministry of Transportation and Telecommunication will include energy conservation in policy design and preparation, employing energy efficiency specialists.
3. 2000-2001: An energy efficiency strategy for the Czech Railways Company will be implemented, starting with audits carried out by independent consultants. The budget is CZK 20 million.
4. 2003-2005: Labels and standards for passenger cars will be implemented by the Ministry of Transportation, consistent with possible EU directives.

## **5.6 Agriculture**

Agriculture accounts only for a small share in the final energy consumption, despite the relative importance of this sector with respect to economic activity and employment. The sector consists of two basic branches, which substantially differ in activities: crop production and cattle-breeding. The energy consumption of crop production mainly comprises transport, drying and storage. Cattle-breeding however, requires energy mainly for space and water heating, and cooling. Additionally, energy is required in administrative buildings of large co-operative farms for space and water heating and electrical appliances.

The Czech Energy Agency operates a programme on promotion of energy efficient measures and renewables in agriculture. The programme is focused on technical measures for reduction of energy consumption in buildings, modification of technical equipment, implementation of small-scale cogeneration and utilisation of advanced agricultural technologies. Additionally, programmes of the Ministry of Agriculture focus on the utilisation of renewables and energy savings in farms.

Building codes, energy management systems, heating systems and appliances (standards and labelling) could also be applied in the agricultural sector. Another recommended instrument is the promotion of new comprehensive methods of crop production, which require less energy and have less harmful impact on the environment and replacement of current transport modes by new more energy efficient ones.

## Actions agriculture

1. 2000: Ministry of Agriculture will adopt an agricultural policy containing instruments to stimulate energy efficiency and utilisation of renewable energy in this sector.
2. 2000: Ministry of Agriculture will launch a study on possible implementation of advanced comprehensive processes of crop production with focus on possible reduction of energy consumption and impact on the environment (soil, water, air). The budget is CZK 2 million.
3. 2001: Introduction of the programme for support of implementation of advanced comprehensive processes of crop production. The annual budget is CZK 5 million.
4. 2001-2005: Introduction of the grant programme for replacement of existing tractors with more energy efficient ones. This will improve energy efficiency and promote local production of tractors. 20% subsidy to investment costs is proposed. The annual budget is CZK 200 million.

## 5.7 Combined heat and power production

Combined heat and power production (CHP) is an important energy efficiency measure. It can save up to 40% compared to separate heat and power production. Within the scope of the Energy Efficiency Policy, only CHP in municipal district heating systems, industrial applications, and small-scale applications are addressed. District heating is widely used in the Czech Republic as source of heat for apartment blocks and offices. The surplus heat from these heating plants can be effectively used for electricity generation. However, this is not the case in many smaller Czech towns. Combined heat and power generation (CHP) still presents a large energy saving potential.

Since 1991, the maximum price of heat has been increasing. Subsidies have been fully removed in 1998, causing a heat price that is now 3-5 times the 1991 level. For various reasons, district heating systems are currently less competitive with other heating options.

The benefits of CHP are widely recognised in the Czech Republic mainly for the environment (emissions decrease) and for overall energy efficiency in fuel utilisation. The Czech government already stimulates CHP installation through programmes of the Czech Energy Agency and of the State Environmental Fund.

The recent draft Energy Policy intends to support the cost-effectiveness of CHP installations in the future with the aim to optimise primary energy sources. A legislative framework that assures that electricity from CHP can be sold to utilities should be secured and included in the new Energy Act. As of 2002, the Energy Management Act will be adopted. This draft of this Act includes the following obligations: Heat suppliers above 5 MW (heat) who plan to reconstruct the installation are obliged to install CHP in case that an energy audit shows that the investment in CHP can be realised cost-effectively. At the same time, owners of a thermal electricity plant above 10 MW (electricity) who plan to reconstruct the installation are obliged to install CHP when cost-effective. This part of the Act is, however, still under heavy discussion and could be limited to the obligation of carrying out an energy audit and considering CHP.

The promotion of CHP should be a separate part of energy efficiency policy because it requires specific instruments and measures. Within the scope of the National Energy Efficiency Study it was not possible to elaborate a detailed policy for CHP. At the moment, studies are on-going that addresses this very issue<sup>5</sup>. The results of these studies should be used to elaborate the policy for CHP within the Energy Efficiency Policy (see Section 3.2).

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<sup>5</sup> Among which a SAVE funded project 'Analysis of Obstacles for CHP in the Czech and Slovak Republic' and a Phare multi-country study on small-scale combined heat and power production.

### **Actions combined heat and power production**

1. 2000: The Ministry of Industry and Trade will elaborate a comprehensive policy for the promotion of CHP, to be included in the Energy Efficiency Policy. Existing studies will be used. This will include an analysis of the impacts of the increase of the VAT rate for district heating. The budget for preparation of the policy is CZK is 1 million.
2. 2000: The Ministry of Industry and Trade will include the obligation of power purchase from co-generation in the new Energy Act.

## 6. THE FINANCING OF ENERGY EFFICIENCY PROJECTS

Lack of capital and other investment constraints are the major barriers for the implementation of energy efficiency projects in the Czech Republic. The lack of commercial financial resources and the lack of interest of private investors to fund these projects, is caused by the low rate of return on investment (ROI) of energy efficiency, the perceived high risk and the low awareness. Two main strategies can be followed to address these barriers; to provide state or international investment support, and to facilitate commercial financing.

In this chapter, recommendations are made for financing schemes for energy efficiency projects in the Czech Republic. The recommendations are structured according to type of financing scheme (state programmes, Phare Energy Saving Fund and commercial financing), as well as to sector (industry, residential sector, public sector and commercial sector). Finally, examples of projects are listed that can be used for the identification of eligible projects. Part III of the NEES provides more detailed information on financing.

### 6.1 Recommendations for financing schemes

#### *Commercial and ESCO financing*

The involvement of commercial financiers (banks and ESCOs) in energy efficiency financing can be promoted by targeted programmes. Two examples are:

- Sensitising commercial finance to energy efficiency investments. This programme is similar to and should build on the experience of the IFC/GEF programme in Hungary, and should consist of soft loan programme for energy efficiency investments, credit guarantees and technical assistance.
- Support Programme for Energy Service Companies (ESCO). The funding could come from the Global Environmental Fund (GEF).

#### *Phare Energy Saving Fund*

The Phare Energy Saving Fund (ESF) provides soft loans for bankable energy efficiency projects to creditworthy applicants. The debt service is mostly repaid from energy cost savings. Although the fund has proven to be successful, future funding has not been secured yet. To continue and extend the fund, potential new funding (e.g. the GEF/World Bank) has to be found and the scheme adjusted to accommodate the funders' requirements and needs. The ESF managing bank has preliminarily agreed.

#### *State programmes*

State programmes promoting energy savings implementation and renewables penetration are announced every year. The Ministry of Industry and Trade announces annual programmes for energy efficiency support, implemented and financed through the Czech Energy Agency. In 1999 a budget of CZK 300 million was earmarked. Programmes of the Ministry for Regional Development include subsidies up to CZK 1 million for building renovation and construction owned by municipalities and for infrastructure projects, financed by the municipality. State programmes to support small and medium size enterprises (SMEs) include energy efficiency projects. The Ministry of Environment manages the State Environmental Fund, which also provides support to investments in power and heat production and CHP installations to meet environmental targets.

In the future, the instrument of subsidies should be used very carefully. Any subsidy scheme could create difficulties and leave room, open for corruption. A general subsidy scheme from public budgets should focus only on a selected group, namely those that are financed from these budgets, in particular public services and socially weak population receiving money from the social security system. The specific recommendations for state programmes are presented in Chapter 5 of the Action Plan. These are summarised for the main sectors below.

As a first step, a strategy for financial state support scheme for energy efficiency improvement should be elaborated by the Czech Energy Agency in close collaboration with Ministry of Finance. Various sources of financing will be analysed (state budget, EPC, commercial banks, revolving fund, international financial institutions). The costs of the study and development of the financing strategy are estimated at CZK 2 million.

### *Industry*

In the industry the awareness of energy saving options is large, but motivation and scarce capital present a major barrier. The energy efficiency projects have low priority. Energy audits and implementation of management systems could identify the energy efficiency investments. Feasibility studies could translate the identified opportunities into a tangible business plan or project proposal. However, the development of energy saving options, their economic and financing appraisal and bankable project development, requires capacities mostly beyond the usual in-house capacities of most end-users. Therefore, in industry, in the short term, support should be focused mainly on 'soft' activities i.e. supporting the identification of energy efficiency projects and project development, aimed at the implementation of no/low-cost projects. In the longer term, a soft loan scheme should be established for industry.

### *Residential sector*

Lack of information, high investment costs and difficult access to finance are typical for the residential sector. The major share of energy is used for heating. For the existing building stock, a rehabilitation programme exists, financed by the Ministry of Regional Development, which only applies to a small segment of the total housing stock. The Czech Energy Agency supports energy efficiency measures in apartment buildings and family houses. These programmes should be continued and extended. A commercial bank mechanism is also available - the General Building Saving Bank provides soft loans for buildings renovation. New financial schemes addressing this sector, mainly low-income households, should be developed. These schemes should provide soft loans for improvement of the building envelope and the heating system.

### *Public sector*

In the short term, support of energy efficiency projects in buildings and in heat generation in the public sector should get priority. Support to this sector reduces the energy costs to the state and thus limits the need for financing from public sources. The major barriers in this sector are the lack of proper information, incentives, and in-house expertise. In the short term, financial support should be given to project identification and development (energy management, auditing etc.). A new financing scheme based on soft debt financing and state guarantees of repayments would help Czech banks to participate in the rehabilitation of the public sector. These sectors are also attractive to ESCOs. Energy Performance Contracting (EPC) based on the shared-cost approach should be promoted and facilitated in these sectors. The involvement of EPC is most appropriate, since its basic role is to provide comprehensive energy efficiency services to consumers including project finance, engineering, project management, equipment maintenance, monitoring and evaluation.

### *Commercial service sector*

In the commercial service sector, the barriers are similar to those in industry: unstable commercial environment, limited access to finance, and lack of information and in-house expertise in energy efficiency. Therefore, in the short term, financing should be focused on support to the identification of projects, in particular no- and low-cost opportunities, as well as to project development. The Czech Energy Agency should support part of the costs for the promotion and implementation of energy management systems, energy auditing, feasibility studies and project development (see Section 5.1). Also, the involvement of ESCOs in the commercial service sector should be facilitated (Energy Performance Contracting).

## 6.2 Sources of financing

Many sources of financing investments in energy efficiency and renewable energy projects are available in Central and Eastern Europe. Within the scope of this project, it was not possible to cover all sources. The following sources were considered:

- Commercial financing:
  - *Commercial banks*
  - *Energy Service Companies (ESCOs)*
- Development banks:
  - *International Finance Corporation (IFC)*. The IFC is a member of the World Bank Group and shares the primary objective: to improve the quality of the life of people in its developing member states. It finances projects in partnership with private investors with the objective to promote economic development.
  - *Global Environment Facility/World Bank (GEF/WB)*. GEF funds are directed toward measures that enhance and protect the global environment. The GEF covers the incremental costs of a project undertaken with global environmental objectives in mind. GEF focuses on large-scale projects, although programmes for medium-sized projects have been set up. The World Bank is one of the Trustees of the GEF Trust Fund and is responsible for the investment projects. It also seeks to mobilise resources from the private sector consistent with the GEF objectives.
  - *State support*. The Czech government aims to support energy efficiency and renewable energy through investment and interest support, because they contribute to the main objectives of Czech energy policy. Two types of the state support are considered here:
    1. *Direct state support* in the form of subsidies to investment costs, which is decided and allocated by the national Energy Agency on the basis of the objectives and expected benefits of the projects. This support should only be used if the stability of the recipient ensures that expected benefits will be achieved, and if it does not create unfair competition (i.e. state administration buildings and heating sources, public buildings, etc.).
    2. *Indirect state support* to financing mechanisms in the form of subsidies or contributions to the interest rate, or a special credit line on the principle of the Phare ESF. This allows for a reduced interest rate and longer loan duration. The support is managed by commercial banks and based on commercial principles and procedures. This support should be generally available to all applicants that propose eligible projects.

Energy efficiency and renewable projects show a wide range in rate of return, in risk, and in public benefits, in particular environmental. The financing sources considered have different requirements with regard to rate of return, acceptable risks, external public benefits and project size. On the one hand, commercial banks require the highest rate of return and the lowest risk, while GEF/WB and the State accept a lower rate of return and higher risks. On the other hand, the latter require positive public and environmental benefits. Table 6.1 shows the main requirements of the sources considered.

Table 6.1 *Main requirements of sources for investment or interest support*

	Rate of return	Risk	Public and environmental benefits	Project size
Commercial banks	High	Low	Not required	Medium to Large
Energy Service Companies ESCOs	Medium to High	Low	Not required	Small to Large
International Financing Corporation IFC	Medium	Low to Medium	Medium	Large
Global Environmental Fund / World Bank GEF/WB	Low to Medium	Medium to High	High	Large
Direct State support	Low to Medium	Medium to High	Medium to High	Small to Medium
Indirect State Support (interest rate subsidies, credit line)	Medium	Low	Medium to High	Small to Medium

### 6.3 Identification of projects

In this section, projects are identified that meet the requirements of the financing sources listed in the previous section. On the basis of these requirements, examples of energy efficiency projects have been allocated to the financing sources. The projects are described in detail in Part IV of the National Energy Efficiency Study. In some cases, the projects have been allocated to more than one donor. Table 6.2 gives the results.

Table 6.2 *Examples of projects and potential financing sources for financial investment or interest support*

Financing source	Projects
Commercial banks	<p>Industry: Air-conditioning units under ceiling of tall industrial halls</p> <p>Industry: Implementation of electronic speed control systems for electric drives</p> <p>Industry: Rehabilitation of thermal insulation in heat and hot water distribution</p> <p>Industry: Heat sources rehabilitation</p> <p>Industry: Implementation of electronic speed control systems for electric drives</p> <p>Agriculture: Insulation of pipes in heat distribution</p>
ESCOs	<p>Industry: Economiser after steam and hot water boilers</p> <p>Industry: Implementation of advanced efficient electric motors</p> <p>Industry: Utilisation of heat from cooling of stationary compressors for production of compressed air</p> <p>Industry: Waste heat recovery</p> <p>Industry: Small CHP &lt; 50 MW</p> <p>Commercial sector: Energy efficient lighting</p> <p>Public sector: Improvement in stand-alone heating in public buildings</p> <p>Public sector: Energy efficient lighting</p>
IFC	<p>Industry: Cogeneration, large CHP (&gt; 50 MW)</p> <p>Industry: Cogeneration, small CHP (&lt;= 50 MW)</p> <p>Industry: Heat pumps (absorption, compressor)</p> <p>Industry: Heat transformers</p>
GEF/World Bank	<p>Industry: Cogeneration, large CHP (&gt; 50 MW)</p> <p>Industry: Cogeneration, small CHP (&lt;= 50 MW)</p> <p>Municipal district heating: Retrofitting of heat distribution network</p> <p>Municipal district heating: Efficiency improvement and fuel switch of boilers</p> <p>Municipal district heating: Small-scale CHP (&lt; 50 MW)</p> <p>Public sector: Energy efficient lighting</p> <p>Public sector: Improvement in stand-alone heating in public buildings (schools, hospitals)</p> <p>Public sector: Improvement in stand-alone heating in public buildings (boilers)</p> <p>Public sector: Insulation of building shells</p> <p>Residential: Insulation of building shells in block houses</p>
Direct State support	<p>Public sector: Improvement in stand-alone heating in public buildings (low cost)</p> <p>Public sector: Improvement in stand-alone heating in public buildings (schools, hospitals)</p> <p>Public sector: Insulation of building shells</p> <p>Public sector: Energy efficient lighting</p> <p>Households: Energy efficient lighting</p> <p>Residential: Improvement in stand-alone heating in houses (boilers)</p>
Indirect State Support	<p>Industry: Implementation of advanced efficient electric motors</p> <p>Industry: Utilisation of waste heat</p> <p>Industry: Replacement of steam dryers by condensing dryers with utilisation of heat pumps in drying wood</p> <p>Industry: Waste heat recovery</p> <p>Agriculture: Insulation of floors on the terrain</p> <p>Agriculture: Heat exchangers for use of heat from stables</p> <p>Agriculture: Compressor heat pumps with electric motors and hybrid heat pumps</p> <p>Residential: Improvement in stand-alone heating in buildings (low cost)</p> <p>Residential: Insulation of building shells in family houses</p> <p>Residential: Improvement in stand-alone heating in houses (boilers)</p>

One should be aware that energy efficiency projects are often based on more than one technical measure. The project developer needs to consider all possible savings achievable. In practice, projects therefore often comprise a combination of different technical conservation measures, thus improving the rate of return. Often, non-energy measures, such as waste minimisation/utilisation, O&M cost minimisation, the increase of production capacity and improvement of product quality, are also included in the project as well. On the basis of this approach, which is typical for energy performance contracting, the Phare ESF fund and the Hungarian IFC/GEF programme set up the eligibility criteria. Both programmes select projects on the basis of the energy costs savings as a share of the overall cost savings of the project. The energy cost savings can often be maximised by implementing a combination of different measures. This results in an increase in rate of return and enables the repayment from the cost savings within a period that is acceptable for the commercial bank.

## 7. SUMMARY OF ACTIONS

Table 7.1 summarises the actions that were identified in the Energy Efficiency Action Plan. A distinction is made between those actions that have to be carried out within one year (short-term), the next five years (medium-term), and those actions that are planned for the longer-term. In the first column the Ministry or Agency in charge of the action is listed, while the other Ministries involved are in brackets.

Table 7.1 *Summary of actions for the implementation of the Energy Efficiency Action Plan*

Policy Field	Responsible (in co-operation with)	Short Term (2000)	Medium Term (2001-2005)	Long Term (2006-2010)
<i>Framework measures</i>				
Policy framework	MIT (MoE)	Development of Energy Efficiency Policy Document	Energy Efficiency Policy in force Update Energy Efficiency Policy	(Continuation)
Legal framework	MIT (CEA)	Organisation national discussion on Energy Management Act	Energy Management Act and Energy Act in force	
Institutional framework	CEA	Methodological support to the Ministries	(Continuation)	(Continuation)
	MIT	Co-ordination of National Energy Efficiency Programme Establishment of single implementing Agency for energy efficiency Assessment required resources (staff)	Increase staffing for energy efficiency policy making and implementation at the Agency and Ministries	(Continuation)
Monitoring and Evaluation	MIT/CEA	Set up policy monitoring and evaluation framework Introduce EUROSTAT statistics Evaluate energy efficiency programmes	Evaluate Energy Efficiency Policy Evaluate Energy Management Act	(Continuation)
<i>General actions</i>				
Pricing policy/energy taxation/emission levies	MoF (MIT/MoE)	Removal of energy price distortions	Removal of price distortions in households (till 2002) Preparation legislation for energy taxation and new system for emission levies	Full implementation of energy/environmental tax
	MoE	Investigation effects of energy taxation and emission levies on energy efficiency		
	Ministry of Labour and Social Affairs/Min. of Regional Development	Investigation social effects of tax reform		
Fiscal measures	MoF (MIT)	Investigation of fiscal measures promoting energy efficiency	Implementation of fiscal measures	(Continuation)
	Ministry of Regional Development, of Agriculture, of Defence, of Interior, of Education of Labour and Social Affairs, of Health, of Finance, of Culture, of Transport, of Justice.	Extending professional background of Ministries in energy issues	(Continuation)	(Continuation)

Policy Field	Responsible (in co-operation with)	Short Term (2000)	Medium Term (2001-2005)	Long Term (2006-2010)
Information and awareness	CEA	Development of national strategic awareness and marketing campaign	Implementation of awareness and marketing campaign	(Continuation)
	MIT		Provision of resources (budget/staff) to Agencies (EKIS)	
RD&D	MIT	Provide co-financing for EU RD&D programmes	Increase of grants in R&D in energy efficient technology	(Continuation)
Joint Implementation	MoE	Development of national climate policy document including a JI strategy		
<i>Actions by sector</i>				
Industry	CEA	Implementation of information campaign Support of implementation of energy management systems Set up energy auditing and benchmarking programmes Preparation of soft loan scheme for industry	Introduction of soft loan scheme for industry	(Continuation)
	MIT	Integration of energy efficiency in the industrial revitalisation programme Long-term voluntary agreements LTA pilot studies	Introduction of LTA in industry Development financial schemes in industry supporting LTA Promotion of joint-ventures	Monitoring and evaluation of LTAs
Residential sector	Ministry for Regional Development (State Building Supervision)	Development of monitoring system for building codes	Implementation of monitoring system for building codes	(Continuation)
	MIT (CEA)	Preparation for the introduction of Energy Management Act Pilot project appliance labelling	Energy Management Act in force Introduction of mandatory metering Introduction of appliance labelling Standards for heating systems	(Continuation)
	Ministry for Regional Development (MIT/CEA)	Development of a soft loan scheme for individual house owners	Introduction of a soft loan scheme	(Continuation)
	MIT		Extension of governmental support (subsidies) to construction savings programme when retrofitting houses	(Continuation)
	MIT (Ministry of Social Affairs, CEA)	Development of a subsidy scheme targeted at low income households	Implementation of subsidy scheme for low income households	(Continuation)
	Ministry for Regional Development (MIT/CEA)		Investigation of system of integrated building codes Introduction of a new system for rent calculation	New integrated building codes in force

Policy Field	Responsible (in co-operation with)	Short Term (2000)	Medium Term (2001-2005)	Long Term (2006-2010)
Commercial service sector	Ministry for Regional Development (State Building Supervision)	Development of monitoring system for building codes	Implementation of monitoring system for building codes	(Continuation)
	CEA	Implement an information campaign Support implementation of EMAS and energy management systems Setting up energy auditing and benchmarking programmes	(Continuation)	(Continuation)
	MIT	Preparation for introduction Energy Management Act	Energy Management Act in force Introduction mandatory metering Introduction of appliance labelling Standards for heating systems	(Continuation)
	MIT (CEA)	LTA pilot studies in the commercial sector	Introduction LTA in commercial sector Development of financial schemes in commercial sector	(Continuation)
	MoF (MIT, CEA)	Promotion of EPC/ESCO financing in commercial sector		
Public sector	MIT (CEA)	Pilot project on mandatory auditing of public buildings	Introduction of mandatory auditing	(Continuation)
	MIT (MoF)	Preparation of financial schemes for the public sector Facilitation of EPC/ESCO financing in the public section	Support programme (subsidies) for mandatory implementation of audit results	(Continuation)
	Ministry of Regional Development (CEA)	Introduction of common approach to registration of building stock	Improvement of statistics on building stock in the public sector	
Transport	Ministry of Transport	Adoption of transport policy containing measures promoting energy efficient and public transport	Implementation of new transport policy Preparation of labels and standards for cars	(Continuation)
Agriculture	Min. of Agriculture	Adoption of an agricultural policy containing measures promoting energy efficiency and renewables Study on advanced production processes in agriculture	Support programme for efficient production in agriculture Support programme for efficient agricultural vehicles	(Continuation)
CHP	MIT (MoE)	Include purchase obligation in Energy Act Discussion on the CHP obligation in Energy Management Act Development comprehensive CHP promotion policy	Implementation CHP policy	(Continuation)

## 8. REQUIRED STATE BUDGET

The implementation of a new policy would lead to changes in the current public budget. In this section, an rough indication is given of the required budget. The current budget for energy efficiency is about CZK 500 million and consists of the following components:

Table 8.1 *Budget available for the Programme of state support to energy conservation in 1999*

Part of Programme	Managed by	Available for EE projects [mill. CZK]
MIT	Czech Energy Agency	approx. 250
MoE	State Environmental Fund	approx. 220-250

An estimation was made of the required budget for each single action of the proposed Action Plan (see Table 8.2). The total contribution from the state budget for the implementation of the Action Plan is in range of CZK 21.6 billion for the period 2000-2010. The average yearly contribution from the state budget is approximately CZK 2 billion, which is about four times higher than the current budget. One should be aware that in the current budget only the CEA and SEF support programmes are listed, while in the budget of the Action Plan all other costs, e.g. personnel, are included also.

Based on the analysis of the potentials of energy savings, the total capital investment needed to achieve the target of 20% reduction of energy consumption till 2010, is estimated at CZK 220 billion. The required state support is therefore less than 10% of total expected investments.

Table 8.2 Overview of the contribution from the state budget in the period 2000-2010 (in millions CZK)

Action	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Policy framework	Preparation Energy Efficiency Policy document + study											2
Legal framework												
Institutional issues	Extended activities of Energy Agency											220
	Extending the staff of Energy Agency											55
	Methodological support of the CEA to the Ministries											45
	Extending professional background of Ministries in energy issues											55
Monitoring and evaluation	Monitoring the development of energy efficiency											33
	Update of Energy Efficiency Policy document											4
	Programme evaluation action plan											2
	Programme evaluation											9
Pricing and taxation	Study on consequences of new pricing and taxation policy											1
	Awareness campaign for promotion of a new energy taxation system											50
Fiscal measures	Study on fiscal measures											0.5
Awareness & information	Preparation of strategic awareness and marketing campaign											2
	Implementation of strategic awareness and marketing campaign											50
	Introduction of EE into education system											220
	Extending EKIS network activities											550
	Extending CEA website											33
Legislation preparation - dissemination activities											55	
RD&D	Preparation of long-term strategy											2
	Grants for R&D activities in energy efficiency											600
	Support to demonstration projects											1,500
	Participation in EU programmes (SAVE II, 5 <sup>th</sup> Framework programme)											500
Joint Implementation	Detailed Joint Implementation Strategy											2
	Finding Czech and foreign partners for AIJ/JI projects											2
	Development an administrative framework to handle AIJ/JI projects											2

Action	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Industry												
Information programme of CEA	5	5	5	5	5	5	5	5	5	5	5	55
Support of implementation of EMAS and ISO 14000	20	20	20	20	20	20	20	20	20	20	20	220
Auditing and benchmarking programmes	100	100	100	100	100	100	100	100	100	100	100	1,100
Preparation of the introduction of Long Term Agreements		1										1
Development of soft loan schemes - study	1											1
Launching soft loan scheme			1,000									1,000
Promotion of Joint ventures	20	20	20	20	20	20						120
Pilot LTA's			5	5	5	5						20
Residential sector												
Monitoring system for building codes	10	10	10	10	10							50
Soft loan scheme for households		200										200
Subsidy scheme on improvement of EE in houses occupied by socially weak households			100	100	100	100	100	100	100	100	100	900
Government support to the system of construction savings			1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	9,000
Pilot project of labelling	4	4	4									12
Study on introducing new 'integrated' building standards, demonstration projects					5	5						10
Investigation of feasibility of energy labelling for buildings					2	3						5
Commercial sector												
Auditing and benchmarking programmes	20	20	20	20	20	20	20	20	20	20	20	220
Support of energy management systems	10	10	10	10	10	10	10	10	10	10	10	110
Preparation of the introduction of LTA's			3									3
First pilot LTA's			4	4								8
Setting revolving fund					200							200
Public sector												
Pilot project on mandatory energy auditing	5											5
Pilot project on obligatory registration of public buildings	5	5										10
Introduction of obligatory registration of public buildings			20	20	20	20	20	20	20	20	20	180
Obligatory energy auditing of public buildings			300	300	300	300	300	300	300	300	300	2,700
Pilot projects on implementation of the financing scheme for energy efficiency improvement in public buildings		100	100									200
Transport												
Energy efficiency strategy for the Czech Railways company	10	10										20
Agriculture												
Study on reduction of energy consumption in crop production	2											2
Programme of support of advanced comprehensive processes of crop production		5	5	5	5	5	5	5	5	5	5	50
Grant programme for replacement of existing tractors with more energy efficient ones		200	200	200	200	200						1,000
<b>Total</b>	<b>587</b>	<b>1,145</b>	<b>3,383</b>	<b>2,271</b>	<b>2,478</b>	<b>2,150</b>	<b>1,907</b>	<b>1,911</b>	<b>1,907</b>	<b>1,907</b>	<b>1,961</b>	<b>21,600</b>

## 9. IMPACT OF THE ACTION PLAN

### 9.1 Environmental impact

Improving energy efficiency will substantially contribute to the abatement of several environmental problems related to energy production and supply, particularly environmental emissions to air caused by fossil fuel based energy supply, in particular CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub> and dust. The decrease in energy demand will lead to a decrease in emissions. Particularly, in the Czech Republic where energy supply is mainly based on lignite, the impact of energy conservation on emissions reduction is high. Emission reduction studies have identified energy conservation as one of the main cost-effective options for the Czech Republic with a large potential. The reduction of these emissions will abate global, regional and local environmental burdens. The most substantial result of achieving of the low target (14%) from the environmental point of view is the reduction of CO<sub>2</sub> emissions, which is estimated at approx. 14 million tons a year<sup>6</sup>. If the high target were achieved (20%), the emissions of CO<sub>2</sub> would be reduced with about 31 million tons a year.

### 9.2 Economic impact

A number of economic benefits can be identified. First, inefficiency in energy supply and demand leads to high expenditures for domestic energy production and imports. In the future, imports in the Czech Republic will increase. Increasing energy efficiency will decrease the expenditures for energy imports and decrease import dependency. Secondly, in industry, the penetration of energy efficient technology is often coupled with production increase. Therefore, energy efficiency and production efficiency go hand in hand. Increasing energy efficiency in energy-intensive industries will improve competitiveness. Based on the analysis of the potentials of energy conservation, the total capital investment needed to achieve the target is estimated at approx. CZK 73 billion (low target) and CZK 123 billion (high target). These investments are connected with other benefits as well as with avoided fuel costs.

### 9.3 Social impacts

Energy efficiency improvement and the related energy savings have social benefits. First, the share of energy expenditures in household budget in the Czech Republic is relatively high compared to the EU. The expected increase in household prices will put a heavy burden on low-income households. Implementing cost-effective energy conservation measures will decrease the energy expenditures. Secondly, the manufacturing and installation of new efficient technologies will require an extension of existing industry and services in this field. Although energy efficiency measures are generally less labour-intensive than the measures of the energy supply side (as for example renewable energy), in general, it can be expected that reaching the selected energy efficiency targets will lead to new jobs. The exact specification of social benefits related to the achievement of the targets is, however, beyond the scope of this study.

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<sup>6</sup> The exact quantification of the emission reduction resulting from energy efficiency improvement was not possible in the scope of the National Energy Efficiency Study. Therefore only an estimate of the reduction of CO<sub>2</sub> emissions, which is the most substantial benefit of achieving the targets, is presented. The decrease in CO<sub>2</sub> emissions was calculated based on emission coefficients of individual energy carriers and changes in structure of fuels and energy consumption in all relevant sectors. These changes were based on identified economically viable energy conservation measures according to selected criteria.