

**ENERGY CHARTER PROTOCOL ON ENERGY EFFICIENCY
AND RELATED ENVIRONMENTAL ASPECTS (PEEREA)**

IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES



CROATIA



ENERGY CHARTER SECRETARIAT

In-depth Review of Energy Efficiency Policies and Programmes of the Republic of Croatia

Energy Charter Protocol on Energy Efficiency
and Related Environmental Aspects (PEEREA)

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ENERGY CHARTER SECRETARIAT

INTRODUCTION

The Energy Charter Treaty was signed in December 1994 and entered into legal force in April 1998. To date the Treaty has been signed or acceded to by fifty-one states.¹ The Treaty was developed on the basis of the European Energy Charter of 1991. Whereas the latter document was drawn up as a declaration of political intent to promote East West energy co-operation, the Energy Charter Treaty is a legally binding multilateral instrument covering investment protection, liberalisation of trade, freedom of transit, dispute settlement and environmental aspects in the energy sector.

The Energy Charter Conference, the governing and decision making body for the Energy Charter Treaty, meets on a regular basis normally once a year to discuss policy issues affecting East West energy co-operation, review implementation of the provisions of the Treaty, and consider possible new instruments and projects on energy issues. All states who have signed or acceded to the Treaty are members of the Conference. Regular meetings of the Conference's subsidiary groups on transit, trade, investment and energy efficiency and environment are held in between Conference meetings.

THE ENERGY CHARTER PROTOCOL ON ENERGY EFFICIENCY AND RELATED ENVIRONMENTAL ASPECTS

The Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) is a legally binding instrument that was signed together with the Energy Charter Treaty in December 1994 by the same 51 states that signed the Treaty itself. It requires its Signatories to formulate energy efficiency strategies and policy aims, to establish appropriate regulatory frameworks, and to develop specific programmes for the promotion of efficient energy usage and the reduction of harmful environmental practices in the energy sector.

Implementation of PEEREA is kept under review and discussion by the Energy Charter Working Group on Energy Efficiency and Related Environmental Aspects. A key feature of the Working Group's activities is the development of a series of in depth reviews of individual states' energy efficiency policies and programmes. Recommendations to the authorities of the states concerned resulting from these in depth reviews are presented to the Energy Charter Conference for discussion and endorsement.

For further information on PEEREA and the in depth energy efficiency review series, contact Mr Tudor Constantinescu at the Energy Charter Secretariat in Brussels (Tel: +322 775 9854).

¹ *Albania, Armenia, Australia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, European Communities, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Mongolia, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The Former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan.*

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EXECUTIVE SUMMARY

BACKGROUND

Croatia is a country with an economy in transition, located in South-East Europe. Croatia has a population of 4.437 million and a surface area of 56 538 km². After declaration of independence from Yugoslavia in June 1991, armed conflicts severely affected the economy, which subsequently showed strong recovery. Croatia is a candidate for EU membership since June 2004.

Preparing for accession to the EU the policy priorities in the energy sector are to continue alignment with the *acquis communautaire* for the internal energy market, improve energy efficiency, promote renewable energy sources, ensure nuclear safety and strengthen the administrative capacity. This includes the adaptation of new and existing energy legislative measures to be in conformity with relevant EU directives.

Although a producer of oil and natural gas and endowed with hydroelectric resources, Croatia is an importer of primary energy (oil and gas) and electricity. In addition to onshore oil and gas production fields, Croatia has recently started offshore production of natural gas. Electricity is mainly produced from hydro and thermal power plants. Croatian energy networks fulfil an important role in the transit of oil, gas and electricity. Main primary energy inputs in 2002 were crude oil and petroleum products, followed by natural gas, coal, hydropower and renewables and waste. Consumption of electricity and natural gas is expected to increase during the coming years.

The Croatian energy sector has characterised by majority state ownership, with the exceptions of natural gas distribution and retail sales of oil products. Main players are HEP (Hrvatska elektroprivreda - the Croatian Electricity Company) and INA (Industrija nafte - "Oil Industry" - the Croatian Oil and Gas Company), who are both in the process of privatisation, following specific legislation issued in March 2002. HEP operates as a group of "legally independent affiliated companies" and is the sole supplier of captive customers. INA is a vertically integrated oil company, comprising the activities of exploration, production, refining, wholesale, distribution and retail. INA is also in charge of natural gas exploration, production and import, while distribution of natural gas is done by private and/or municipality owned local companies.

ENERGY POLICY SETTING

The Ministry of Economy, Labour and Entrepreneurship (MELE) is in charge of the energy sector and as such is responsible for formulating energy policy and strategy and drafting energy sector legislation.

The principal objectives of the energy policy of Croatia are stated in the Energy Sector Development Strategy, which was adopted by Parliament in March 2002. The objectives are: (i) increased energy efficiency, (ii) security of energy supply,

(iii) diversification of energy and sources, (iv) utilisation of renewable energy sources, (v) realistic and market-related energy prices and development of energy market and entrepreneurship and (vi) environmental protection. The Strategy sets goals and policies for energy efficiency and the use of renewable energy and defines basic directions and principles on issues like: energy production and environmental protection; private ownership in the energy sector; energy sector financing, legislation and regulation. As a general principle, the Strategy seeks a balance between market and government intervention.

In accordance with the Energy Sector Development Strategy, Croatia has introduced a comprehensive framework of energy legislation, which specifies: (i) the opening of the energy market, (ii) the establishment of a regulatory body, (iii) public service obligation and (iv) the restructuring of HEP and INA. The following laws were all promulgated in July 2001: the Energy Law; the Law on Electricity Market; the Law on Gas Market; the Law on Oil and Oil Products Market, and the Law on Regulation of Energy Activities, establishing the Croatian Energy Regulatory Council (CERC) as an independent legal entity.

While the Energy Sector Development Strategy and the legal framework clearly set out the path towards energy sector reform, it appears that there are still some barriers to effectively introduce competition to the electricity and natural gas markets. Several pieces of secondary legislation, like market codes and rules for access to the electricity and gas networks have been issued or are under preparation.

ENERGY EFFICIENCY POLICIES AND PROGRAMMES

Concerning end-use energy efficiency and related areas like renewable energies and cogeneration, some important steps have been initiated, like proposed legislation on a minimum share for renewable energy, regulated feed-in tariffs for electricity from renewables and cogeneration, as well as energy efficiency labelling and minimum energy performance standards for household appliances, energy efficiency requirements for buildings and state subsidies for end-use energy efficiency measures, e.g. in the building sector.

Following the new Building Act of October 2003, the Draft Rulebook on Energy Saving and Thermal Protection of Buildings, which defines the requirements to be fulfilled when designing new and renovation existing buildings, has already passed public enquiry and is expected to come into force beginning of 2005. So far, the Rulebook only refers to the building envelope. New legislation, which would provide an integrated approach including also heating systems, as stipulated in the EU Directive 2002/91/EC on the Energy Performance of Buildings, is under study.

Specific problems in the building sector are the proper implementation of building codes and the requirement of unanimity among owners to introduce individual metering and other measures to improve energy efficiency in multi-ownership buildings, in accordance to the law on real estate property rights.

Electricity and gas tariffs for the public service segment are regulated by the Croatian Energy Regulatory Council according to the principles defined in the legal framework and pertinent secondary regulation. It is a "cost of service" or "cost-plus" regulation. Price distortions remain in the area of electricity and district heating. In particular district heating tariffs still include (cross-)subsidies, an issue that will be addressed in the new district heating law, which is under parliamentary procedures.

Funds for helping to attain the minimum shares of renewable energy sources in the supply of electric energy according to the proposed legislation shall be collected through a small fee on all electricity consumption.

Since 1997, twelve so-called National Energy Programmes were initiated and later included in the Energy Sector Development Strategy. These programmes are:

- PLINACRO - Croatian gas pipeline installation programme
- KOGEN - cogeneration programme
- MIEE - industrial energy efficiency network programme
- MAHE - small hydro-electric power plants construction programme
- SUNEN - solar energy utilisation programme
- BIOEN - biomass and waste utilisation programme
- ENWIND - wind energy utilisation programme
- GEOEN - geothermal energy utilisation programme
- KUENbuildings - energy efficiency in building construction programme
- KUENcts - energy efficiency in centralised heating systems programme
- CROKOK - energy development of islands (2000)
- TRANCRO - energy efficiency in transport programme (2001)

In 2002 and 2003, the National Energy Programmes have been supported by the Ministry of Economy, Labour and Entrepreneurship with HRK 2.8 million (€ 380,000) annually. For 2004, a special budget of HRK 6 million (€ 815,000) was earmarked for energy efficiency and renewable energy projects.

In general, the National Energy Programmes are so far mainly focused on studies, the development of strategy and policy instruments, preparatory work on legislation, energy audits, training activities and campaigns, networking activities and - in some cases - pilot and demonstration projects, in particular in buildings and transport.

The Environmental Protection and Energy Efficiency Fund was established by law in 2003, becoming effective as from January 1, 2004. According to the Law, the Fund shall secure funding of the preparation, implementation and development of programmes and projects in the fields of: (i) preservation, sustainable use, protection and improvement of the environment, and (ii) energy efficiency and use of renewable energy resources.

The resources for the Fund financing are specific-purpose revenues from charges imposed on emissions of CO₂, sulphur and nitrogen oxide; charges for the use of the environment for buildings and building complexes; charges on waste disposal, as well as a special environmental charge on the registration of motor vehicles, which is levied at the time of the registration of the vehicles. Other resources may come from budgets of regional and local governments and international co-operation programmes. Total expected revenues of the Fund in 2005 are about € 45 million, compared to approximately € 25 million in 2004.

As part of the “energy efficiency project” supported by the World Bank in the framework of the Global Environment Facility (GEF), an energy service company (ESCO) was established within the HEP Group. The objective of the project is to establish an economically and environmentally sustainable market for energy efficiency projects and services, by creating HEP ESCO as a core developer of energy efficiency projects and initiating financing of ESCO projects from domestic banks.

The Government entity responsible for energy efficiency is the Ministry of Economy, Labour and Entrepreneurship (MELE), in particular the Energy Department and its Division for Renewable Energy and Energy Efficiency. MELE coordinates its activities with other ministries, involved in energy-related issues.

The Energy Institute “Hvroje Požar” (EIHP) has a central role as think-tank for the Croatian energy sector. EIHP is owned by the State with the status of a public scientific institution. The Institute has a public mandate and sees itself as a moderator of public-private partnership. EIHP is in charge of the management and coordination of the National Energy Programmes. Other organisations active in promoting energy efficiency and renewable energies include regional authorities (energy offices, officials, specialists, experts, etc.), local authorities, engineering companies, consultants, constructors, ESCOs, university institutes, professional associations and NGOs.

To replace this rather loose, non-structured organisation, EIHP envisions a more structured organisation, which would include a National Energy Agency, acting on behalf of the Government, regional energy agencies, local energy centres and implementation centres. In this proposal, EIHP would assume the central role of the National Energy Agency.

Croatia ratified the UNFCCC in 1996, committing itself to maintain greenhouse gas emissions at 1990 levels. Croatia has signed the Kyoto Protocol in 1999 as an Annex I Party, but has not yet ratified it. According to the Protocol, Croatia would have to reduce its CO₂ emissions by 5% in relation to the base year over the commitment period from 2008 - 2012. Considering the very low initial level of emissions, this is considered an extremely difficult task, when taking into consideration past and present economic growth and the fact that new generation capacity has to substitute (thermal) capacity shared with other republics of former Yugoslavia. For these reasons, Croatia is negotiating an increase of GHG-emissions regarding the base year, referring to Article 4.6 of the Convention. Energy efficiency measures are expected to play an important role in Croatia’s strategy to comply with its future obligations under the Kyoto Protocol.

GENERAL ASSESSMENT

Accession to the European Union is the main driver of energy sector reform in Croatia. In this context, Croatia is adapting its energy legislation according to the relevant EU Directives, also in the field of energy efficiency and renewable energy. While specific legislation and regulation in these areas has been initiated, many of the proposals still await adoption by the legislator and implementation.

The National Energy Programmes are of high technical quality and provide a sound basis for further promotion of energy efficiency and renewable energies in Croatia. They would however require higher funding levels, taking into consideration the need to implement more demonstration projects and to stimulate implementation of energy efficiency measures by market actors.

The Environmental Protection and Energy Efficiency Fund could assume an important role in this context, in accordance with its mandate to support energy efficiency and the implementation of the National Energy Programmes, establishing transparent rules for financial incentives.

The establishment of an appropriate, more structured organisational framework for the promotion of energy efficiency appears to be another priority. The agency model proposed by EIHP would offer many advantages, provided that its organisational structure and modus operandi would be participative, making use of existing organisations, human resources and intermediaries.

The further development of energy service companies will depend on the creation of an enabling environment for both end-use energy efficiency measures and efficient and renewable based energy production. Funding mechanisms for energy efficiency and renewable energy programmes and projects and financial incentives will play an important role in complementing appropriate legal and regulatory frameworks.

Based on the findings of the review team, this report provides a series of recommendations to the Government of Croatia, which - in addition to general recommendations - relate to areas like: energy efficiency policies, strategies and programmes; the legal, regulatory and institutional frameworks of energy efficiency; energy market and prices; energy efficiency funding and fiscal policies; specific programmes and instruments; cogeneration, district heating and renewables; data collection and monitoring; information and awareness, and energy efficiency and environmental policies.

IN-DEPTH REVIEW OF ENERGY EFFICIENCY POLICIES AND PROGRAMMES OF CROATIA

1. INTRODUCTION TO THE PEEREA REVIEW

In September 2004, a team of representatives from the Working Group of the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects reviewed the energy efficiency policies and programmes of Croatia.

The role of the in-depth energy efficiency review undertaken on a peer basis by the Working Group is to enhance the level of co-operation amongst contracting parties (Article 3.1). The in-depth review is also used to assess progress, promote continuous dialogue and transfer information.

The review team comprised Mr. Jean-Christophe Füg of Switzerland who chaired the review, Mr. George Cassar of Malta, Mr. Boris Selan of Slovenia and Mr. Mihai-Marius Voronca of Romania. Mr. Tudorel Constantinescu of the Energy Charter Secretariat and Mr. Wolfgang Lutz, consultant to the Secretariat, supported the review team.

Organisations visited during the visit are shown in Annex 4.

The review team wishes to express its thanks to all Croatian participants, who met with the Team. Special thanks go to officials of the Ministry of Economy, Labour and Entrepreneurship and the Energy Institute "Hrvoje Požar", who also undertook the preparation of the mission, completing the PEEREA questionnaire and providing background papers and other information.

The report is based on material provided by Croatia as well as data and analyses from various other sources, including the IEA, OECD, UNFCCC. Statistical data presented are the most up-to-date data available.

2. OVERVIEW

Croatia is a country with an economy in transition, located in South-East Europe, bordering Slovenia to the north and the west, Hungary to the north, Bosnia and Herzegovina to the south and northeast and Serbia-Montenegro to the east. Croatia has a continental coastline of 1777 km with the Adriatic Sea, in addition to a large number of islands. The peculiar geographical shape of the country is reflected in its division into two distinct geographical areas: the Pannonian and Peri-Pannonian lowland and hills of eastern and north-western Croatia, including Slavonija and Baranja in the east and the Adriatic coastal area, divided into the northern area of Istria and the southern area of Dalmatia.

Croatia has a population of 4.437 million and a surface area of 56 538 km². The capital is Zagreb, with approximately 770 000 inhabitants. Other major cities are Split, Rijeka, Osijek and Zadar.

Figure 1: Croatia



Croatia declared its independence from Yugoslavia in June 1991. Armed conflicts between 1991 and 1995 severely affected the economy, which subsequently showed strong recovery. Today, the economic performance of Croatia is comparable to that of new member states of the European Union, like Poland and Latvia, and Croatia is a candidate for EU membership since June 2004.

GDP per capita was US\$ 5 440 in 2002, compared to US\$ 4 895 in 1999 and US\$ 4 058 in 1995 (using exchange rates). GDP growth rate was 4.6% in 2002. The inflation rate has been an average of 3.3% over the past 5 years. Unemployment was 14.4% in 2002.

Table 1: Development of GDP and inflation, 1992 - 2002

Indicator	Unit	1992	1995	1999	2000	2001	2002
GDP using exchange rates	billion US\$ 1995	18.083	18.811	21.625	22.243	23.081	24.288
GDP using PPP	billion US\$ 1995	29.374	30.557	35.128	36.131	37.494	39.453
Real GDP growth rate	%	-11.7	6.8	-0.9	2.9	3.8	5.2
Inflation rate (annual average)	%	n.a	3.7	4.4	7.4	2.6	2.3

Sources: IEA, Croatian sources

In 2003, 62.1% of GDP came from services, 30.0% from industry and 7.9% from agriculture (estimates). The main trading partners are Italy, Bosnia and Herzegovina, Germany, Slovenia, Austria, France and Russia. Major export products are transport equipment (ships), mineral oils, electrical machinery and appliances, textiles, and machinery and equipment; major import products are machinery and equipment, oil products, vehicles, electrical machinery and appliances and plastics. In 2003, exports amounted to US\$ 6.16 billion and imports to US\$ 14.20 billion, i.e. the trade balance is negative.

According to the Council Decision on the principles, priorities and conditions contained in the European Partnership Agreement with Croatia, priorities for accession to the EU in the energy sector are to "continue alignment with the acquis on the internal energy market (electricity and gas), improve energy efficiency, promote renewable energy sources, build up oil stocks to ensure adequate security of supply, ensure nuclear safety and radiation protection; strengthen administrative capacity in all these areas." According to the "National Programme for the Integration of the Republic of Croatia into the European Union - 2004" of the Croatian Government, main fields of action in the energy sector are the reforms of the legal and institutional framework, energy market liberalisation and integration and nuclear safety. The "Plan of Harmonisation of the Legislation of the Republic of Croatia with the acquis communautaire" foresees the harmonisation of new and existing energy legislation with relevant EU directives.

Croatia ratified the Energy Charter Treaty in 1997 and PEEREA in 1998.

Although a producer of oil and natural gas and endowed with hydroelectric resources, Croatia is an importer of primary energy (oil and gas) and electricity. The import dependency for electricity was 53% in 2000.

In addition to 50 onshore oil and gas production fields, there is also offshore production of natural gas. There are two oil refineries located in Rijeka and Sisak, which process domestic and foreign crude oil. The JANAF Adriatic oil pipeline provides access to oil from Russia and from the Mediterranean via the deep-sea port at Omišalj.

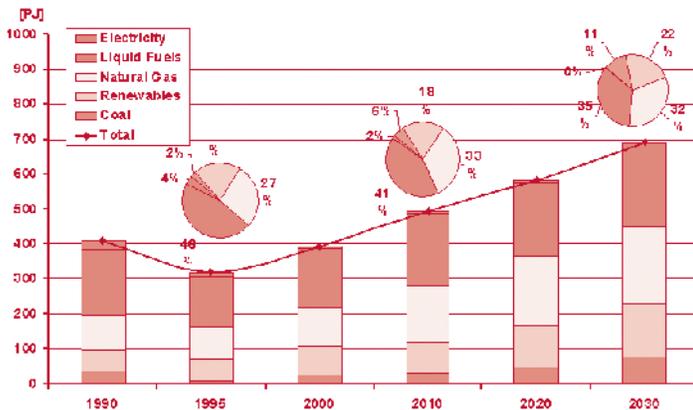
National gas production of Croatia has been steadily decreasing since 1990. In 1999, offshore production began at the gas field Ivana in the Northern Adriatic. Forecasts indicate an increase in Croatian gas production until 2010 to production covering half of the gas use. Gas imports are from Russia via Slovenia.

The installed electricity generation capacity is mainly hydro (2 076 MW) and thermal (1 729 MW), with almost 58% of the electricity produced from hydro and 42% from thermal power plants (2003). The Croatian electricity company HEP owns also 50% of the 632 MW Krško nuclear power plant which is located in Slovenia, and owns, respectively has special supply arrangements to receive electricity from coal-fired thermal power plants on the territories of Bosnia and Herzegovina and Serbia, with a total capacity of 650 MW. There are plans to add new power plants (mainly natural gas and coal-fired and hydroelectric) during the coming years, which will probably be independent or joint-venture generation projects. The thermal power plant Plomin 2 is a joint venture between HEP and RWE. While the Croatian electricity system is still a winter peak system, increased use of air-conditioning particularly in the tourist sector could result in a summer peak.

In general, the Croatian energy networks have an important role in the transit of oil, gas and electricity.

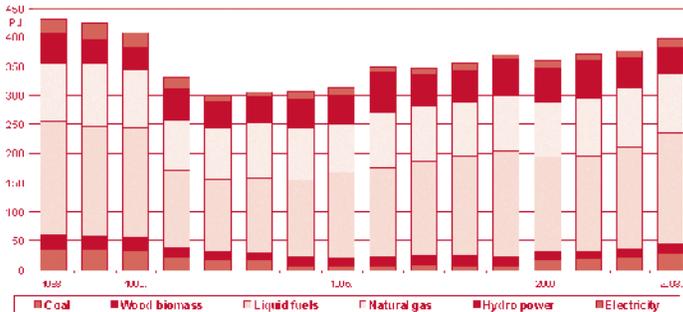
The country's main primary energy inputs in 2002 were crude oil, NGL and petroleum products with 4.2 Mtoe or 51.2%; natural gas with 2.4 Mtoe or 28.8%; coal with 0.6 Mtoe or 7.1%, hydropower with 0.5 Mtoe or 5.6% of TPES, and renewables and waste with 0.3 Mtoe or 3.6%. Total final energy consumption in 2002 was distributed as follows: industry 1.8 Mtoe or 29.7%, residential sector 1.7 Mtoe or 28.7%, transport sector 1.7 Mtoe or 27.8%, services 0.6 Mtoe or 9.6 % and agriculture 0.3 Mtoe or 4.2 % of TFC (excluding non-energy use).

Figure 2: Total primary energy supply 1990 - 2030



Source: EHP, 2004

Figure 3: Total primary energy consumption according to energy carriers, 1988 - 2003



Source: EIHP, 2004

Both TPES and TFC have been rising steadily since independence in 1991. Amongst the products oil use has been increasing the most while natural gas consumption has remained rather constant. Natural gas is currently distributed only in the northern and eastern part of the country, while gas distribution in the eastern and southern regions is still in the planning phase, respectively under consideration. The number of gas users has grown to 447 000 in 2003 (including a smaller number of users of town gas and LPG). Electricity consumption has been rising since 1991, with a minor decline in 1999. Consumption of electricity and natural gas is expected to increase during the coming years, also due to the planned expansion of natural gas distribution to Dalmatia.

Over the past ten years, the energy intensity of the Croatian economy has remained rather constant, while the energy consumption per capita has substantially increased (see Annex 1).

The Croatian energy sector is characterised by majority state ownership, with the exceptions of natural gas distribution and retail sales of oil products. Main players are HEP (Hrvatska elektroprivreda - the Croatian Electricity Company) and INA (Industrija nafte - "Oil Industry" - the Croatian Oil and Gas Company), who are both in the process of privatisation, following specific legislation in March 2002.

Since July 2002, HEP operates as a group of "legally independent affiliated companies": HEP Production, HEP Transmission, HEP Distribution, HEP Supply, HEP Gas and HEP District Heating. According to the Law on the Electricity Market, HEP is the sole supplier of captive customers, i.e. that most of HEP's activities are characterised as public service. The privatisation of HEP will be made according to the HEP Privatisation Law, which foresees the sale of a minority share to domestic or foreign investors, while further shares are to be sold partly through public offering and partly to (former) employees respectively transferred without payment to war veterans.

INA is a vertically integrated oil company, comprising the activities of exploration, production, refining, wholesale, distribution and retail. INA extracts oil from 31 fields; operates refineries in Rijeka and Sisak (in addition to two lubricant product plants), and has a sales network with 378 petrol stations inside and outside Croatia.

INA is also in charge of natural gas exploration, production and import. Activities include the extraction from 19 gas fields, more than 2 000 km of high pressure gas pipelines, 7 500 km of distribution network and an underground storage facility. Distribution of natural gas is done by private and/or municipality owned local companies.

The transport of crude oil and of natural gas is managed by state-owned companies: JANAF and PLINACRO respectively.

3. MAIN ENERGY POLICY HIGHLIGHTS

The Ministry of Economy, Labour and Entrepreneurship (MELE) is in charge of the energy sector and as such responsible for formulating energy policy and strategy and drafting energy sector legislation.

The principal objectives of the energy policy of Croatia are stated in the Energy Sector Development Strategy, which was adopted by Parliament in March 2002 for the following 10 years. The objectives are:

- (i) increased energy efficiency,
- (ii) security of energy supply,
- (iii) diversification of energy and sources,
- (iv) utilisation of renewable energy sources,
- (v) realistic and market-related energy prices and development of energy market and entrepreneurship,
- (vi) environmental protection.

In the context of the strategy have been developed several energy sector development scenarios, assuming a 5 percent growth rate of GDP (in addition to low growth and high growth scenarios) and various degrees of penetration of new energy technologies, state intervention and incorporation of environmental concerns. The three scenarios (denominated S1, S2 and S3 in Figure 4) are:

- (i) Current technologies without state incentives. The assumptions underlying this scenario are a slow rate of penetration of new technologies into the energy sector and an inadequate level of government intervention with regard to institutional and organisational reform of the energy sector and a lack of incentives for energy efficiency, the use of renewable energy resources and environmental protection (S1).
- (ii) New energy technologies with state incentive mechanisms. This scenario assumes that political and economic integration of Croatia in the European Union will result in positive economic effects and technology transfer, and that active and efficient public incentives will be made possible (S2).
- (iii) Environmental scenario. As an underlying assumption the global economy is oriented predominantly toward energy efficient technologies and the use of renewable energy sources (including hydrogen) by 2010, which implies a reduction of the use of fossil fuels. Such global developments are supposed to impact the Croatian economy and energy sector by 2015 (S3).

The national energy sector development strategy has been developed for a time horizon until 2030, with a planning horizon until 2010. Figure 4 shows the effects in the scenario of energy sector reforms and active government policies, aimed at creating incentives for energy efficiency and a greater use of renewable energy sources, on the medium on long term energy demand.

In addition to the principal objectives and scenarios, the Energy Sector Development Strategy formulates goals and policies for energy efficiency and the use of renewable energy, defines basic directions and principles on issues like: energy production and environmental protection; private ownership in the energy sector; energy sector financing, legislation and regulation, and presents possible reform routes of the Croatian energy sector. The strategy proposed includes restructuring of the state-owned companies INA and HEP, the establishment of a new legislative and institutional framework and the determination of market rules and public service obligations.

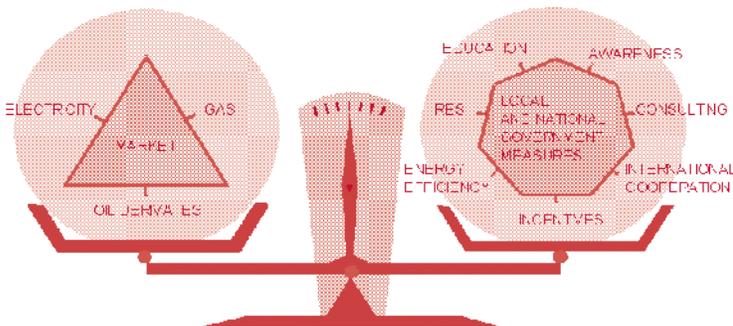
Figure 4 Total energy demand for different scenarios



Source: EIHP, 2004

As a general principle, the Strategy seeks a balance between market and government intervention (figure 5).

Figure 5: Balance of market and government intervention



Source: EIHP, 2004

Many of the issues addressed in the Energy Sector Development Strategy have been implemented or at least initiated, like the restructuring and privatisation of the electricity and oil and gas sectors (see Section 2), the development of a legal and regulatory framework (see below) and the implementation of specific programmes for the promotion of energy efficiency and renewable energies (see Sections 5 and 6).

The legislative framework specifies: (i) the opening of the energy market, (ii) the establishment of a regulatory body, (iii) public service obligation and (iv) the restructuring of HEP and INA. The following laws were all promulgated on 24th July 2001:

- The Energy Law, which deals with fundamental issues in the energy sector and stipulates, i.a., the role of the Energy Sector Development Strategy as the basic energy policy document, requirements to obtain licences for participating in the energy market, the principles of the energy market and of public service, and the principles of energy prices and tariffs.
- The Law on Electricity Market, which defines the organisation of the electricity market, including tariffs and eligible customers. The Law defines the conditions under which new actors may enter the generation market (including independent generation of heat and power and generation from waste and renewables), the regulated access by third parties to the transmission and distribution networks, as well as the status of the Croatian Electricity Company HEP in the process of energy sector reform.
- The Law on Gas Market, which determines the activities to be performed as market activities or as public service, the responsibilities of gas suppliers and the conditions for access of third parties to the gas network, according to the principle of negotiated access. The Law also defines the conditions of market-entry of gas distribution companies.
- The Law on Oil and Oil Products Market, which introduces the free market principle in the oil sector, defining also negotiated access by third parties to the transport system.
- The Law on Regulation of Energy Activities, establishing the Croatian Energy Regulatory Council as an independent legal entity and defining its mandate and responsibilities.

The Laws on Privatization of HEP and INA were subsequently promulgated on 19th March 2002.

The new legal framework defines the present and future structure of the Croatian energy sector. Important characteristics of this new framework are:

Gradual market opening

In accordance with the Law on Electricity Market, all costumers with an annual consumption > 40 GWh are eligible consumers who have a free choice of a supplier. At the moment this status applies to 15 large consumers representing 9% of the total electricity consumption of the country have this status. In 2005, the market

will be opened to all customers on medium and high voltage (mainly industrial customers), in 2006 to all customers over 30 kV and in 2007 to all customers. Eligible natural gas customers were in 2004 are at present all those using gas for electricity production, cogeneration or with a consumption > 100 million m³ per year. Thresholds will be reduced to 10 million m³ per year in 2005, 1 million m³ per year in 2006 and 10.000 m³ per year in 2007.

Organisation of the electricity market

According to the Electricity Market Law, the production of electricity and supply to eligible customers shall be carried out as market activities, while the electricity supply to tariff customers, transmission and distribution of electricity, electricity supply, the management of the electricity supply system and the organisation of the electricity market are performed as public services.

There is third party regulated access to the transmission and distribution networks. HEP is the sole supplier of electricity to tariff customers, entitled by the Law to carry out the following activities: generation of electricity for tariff customers; transmission and distribution of electricity; supply of electricity to tariff customers; operation and control of the electricity system, and organisation of the electricity market (via related legally independent companies of the HEP Group).

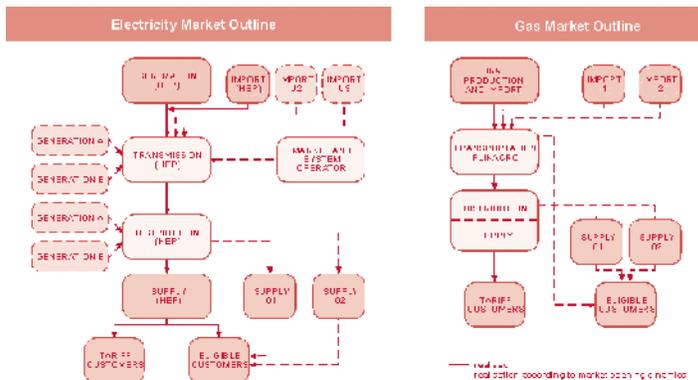
Eligible customers have the right to opt either for the captive market segment (with regulated tariffs) or to participate in the eligible market segment. So far, eleven traders, three producers and one supplier have received a license to operate on the market. At the moment there are no bilateral contracts registered by the Market Operator. It also appears that almost 100% of all electricity supplied to consumers in Croatia is still from the public market segment.

So-called privileged producers include independent power producers (IPPs) who operate cogeneration plants or facilities utilising waste and renewable energy sources. According to the Electricity Market Law, tenders submitted to the Market Operator (see below) by privileged producers shall be given preference, "under at least equal conditions currently effective on the organised market". Also tenders from producers that use domestically produced feedstock, shall be given preference.¹ Privileged producers are also entitled to buy gas from the wholesaler INA at the price for eligible gas consumers.

Several pieces of secondary legislation have been adopted, or are in the process of adoption, like the Electricity Market Code, the Grid Code, Rules for Connection to the Network and Transmission and Distribution Network Fees.

¹ *Producers that use domestically produced feedstock for power generation in an amount not exceeding 15% of total feedstock consumption within a calendar year, according to the Croatian Energy Balance.*

Figure 6: Present and future organisation of electricity and natural gas markets



Source: EIH, 2004

Organisation of the gas market

According to the Law on the Gas Market, gas distribution is a market activity based on a concession granted by the respective regional or local self-government (upon public bidding), while gas supply and transport are public service activities, with third party access to be granted on the basis of negotiations.

The Law defines the status of eligible customers, as well as the obligations of the gas suppliers, transport and distribution companies. At the moment, INA is the only gas supplier, both to tariff and eligible consumers, while transport is done by state-owned PLINACRO. Responsibility for the long-term planning and development of the gas transmission system is with the Ministry of Economy, Labour and Entrepreneurship.

Several pieces of secondary legislation have been issued or are under preparation, regarding issues like gas distribution, network rules for access to the gas transport system, tariff system for supply and transport of gas to tariff and privileged customers, etc.

Organisation of the oil market

According to the Law on Oil and Oil Products Market, all activities are based on free market principles. Operators of oil transport facilities are obliged to grant third party access on a negotiated basis.

Creation of the Croatian Energy Regulatory Council

The Croatian Energy Regulatory Council (CERC), created in 2002, is in charge of supervising the energy sector, including the regulation of public service tariffs and issuing licences.

Among the responsibilities of CERC are: supervision of all non-competitive energy activities, including system and market operation, transmission and distribution, and of public service activities for captive customers; issuing licences for market participants (except producers with installed capacity less than 5 MW); issuing certificates to eligible producers, giving opinion on the tariff system for captive customers issued by the Government; controlling the application of the tariff system and establishing fees for transmission and distribution of electricity, transport and distribution of natural gas and transport of oil. CERC appears to have little rather low influence on the tariff system, despite the fact that it according to the Law is one of its core activities. In general, CERC's task is to ensure a transparent and impartial performance of energy-related activities, proper functioning and operation of the market, consumer protection, settling disputes between energy subjects, and issuing of market, plant, system management and distribution rules, etc. The Council has five members, who are appointed by Parliament. In performing its public function, CERC issues administrative decisions.

Creation of the Croatian Independent System and Market Operator

The Electricity Market Code of 2003 defines the activities of the Croatian Independent System and Market Operator (CROISMO). Main tasks of CROISMO, who is part of the HEP Group, are: to organise and operate the electricity market; to establish the merit order for meeting the demand; to provide clearing and settlement of balancing energy, and to provide electricity from eligible producers and sell it to the tariff supplier HEP.

Apparently, CROISMO has a key position in the Croatian electricity market being, as the main interface between actors in both the captive and the eligible market segment, including "balance groups". This seems to be also the case - albeit not based on a public mandate - for HEP Trade, another company of the HEP Group. The transfer of HEP shares in CROISMO to the State is required by the Electricity Market Law.

Restructuring and privatisation of HEP and INA

According to the Energy Law and the Electricity Market Law, HEP is required to legally unbundle its activities. The Law on Privatisation of HEP defines the privatisation procedures, taking into consideration the need for supplementary legislation upon Croatia's accession to the European Union. The Law on Privatisation of INA stipulates that the subsidiaries within the INA Group (i.e. the vertically integrated company INA d.d. and its wholly owned subsidiaries) may not be privatised separately. The Law defines privatisation procedures and addresses the need of supplementary legislation upon EU accession.

According to the INA Privatisation Law promulgated in 2002, a 25% plus one share was sold to the strategic investor MOL of Hungary in 2003. The sale and distribution of further shares corresponds to the stipulations defined for the privatisation of HEP.

The Government retains ownership of 51% of HEP and 25% plus one share of INA shares until Croatia's accession to the EU.

While compliance with relevant EU Directives, in particular the electricity and gas market directives 96/92 and 98/30, has been the main guideline in elaborating the new framework of energy legislation, revisions and adaptations appear to be necessary, also because of further evolution of EU legislation.

Specific legislation concerning energy efficiency and renewable energies will be dealt with in the following sections of this report. The legal framework foresees incentives for energy efficiency from the Fund for Environment Protection and Energy Efficiency (see Section 7), from state aid (subsidies for manufacturing energy efficient and renewable energy equipment according to the Law of State Aid) and via feed-in tariffs for electricity.

Croatia participates in the Athens Process for a South East European Energy Community, which aims at the establishment of regional markets for electricity and gas in South East Europe.

4. ENERGY PRICING AND TAXATION

Electricity and gas tariffs for the public service segment are regulated by the Croatian Energy Regulatory Council (CERC) based on the principles defined in the legal framework and pertinent secondary regulation, according to the principle of "cost of service" or "cost-plus" regulation, allowing for a reasonable period of time for the return of investments. Regulated tariffs are applied to the whole supply chain, with the exception of production for and supply to the so-called privileged customers.

According to the Law on Electricity Market, the CERC is in charge of setting electricity transmission and distribution fees upon the proposal by the grid owner. According to CERC, some fundamental aspects for definition of the fees (asset base, rate of return of investments) still need clarification. As CERC stated in its annual report for 2003, "it is necessary to issue all the prescribed tariff systems on the basis of the Energy Law as soon as possible".

Prices of gas supplied to distributors and directly supplied industrial consumers are based on a weighted value of imported and domestic gas, including the supplier's profit. Prices can be changed quarterly upon INA's request and approval by CERC. According to the present Law of Municipal Economy, so far, the public or private owners of local gas distribution networks are in charge of setting prices for distribution.

End-use electricity tariffs are differentiated according to consumers' categories, i.e. high voltage consumers (• 110 kV), medium voltage consumers (1 kV - 100 kV) and low voltage consumers (residential, non residential, public lighting).

Prices for district heating are differentiated between residential and office clients and include energy and demand charges. District heating prices will be regulated in accordance with the Bill of Production, Distribution and Supply of Thermal Energy, which is still under Parliamentary procedures.

Prices of oil products are determined once a week, based on international market prices, US\$ exchange rates and other cost factors.

While, according to the information received from the Ministry of Economy, Labour and Entrepreneurship, the gas price reflects the cost of gas production, transport and distribution; price distortions remain in the area of electricity and district heating. In particular district heating tariffs still include (cross-)subsidies, an issue that will be addressed in the new district heating law (see Section 5).

All energy products are subject of the single VAT rate of 22%; it is intended to introduce a CO₂ charge in 2005 (see Section 7).

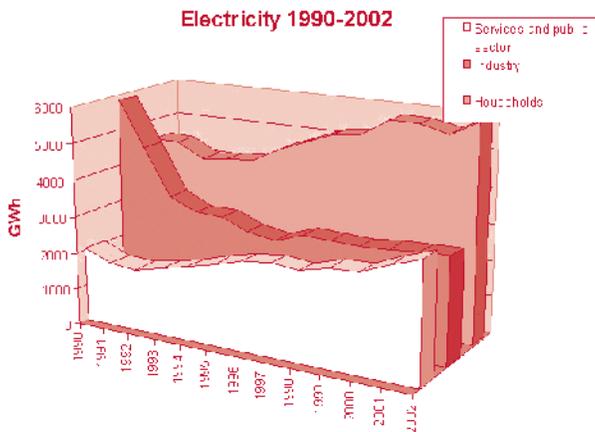
5. END-USE SECTORS

The total final energy consumption (TFC) in Croatia in 2002 was 6 230 Mtoe, which was distributed as follows among sectors:

- Industrial: 1 796 Mtoe (28.8%)
- Residential: 1 736 Mtoe (27.9%)
- Services: 582 Mtoe (9.3%)
- Transport: 1 679 Mtoe (27.0%)
- Agriculture: 257 Mtoe (4.1%)
- Non-energy use: 180 Mtoe (2.9%)

Figures 7 and 8 show the development of electricity and heat consumption of the industrial, residential and service sector between 1990 and 2002.

Figure 7: Electricity consumption in industry, residential and services sector



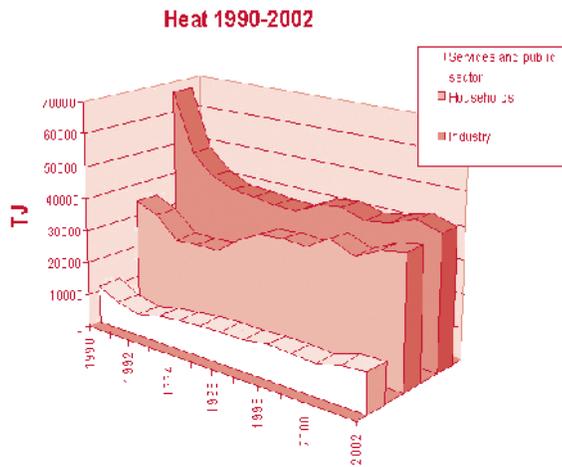
Source: EIHP, 2004

Industry

Industry is still the major energy-consuming sector in Croatia. Important energy consumers are the chemical and petrochemical industry, non-metallic minerals and the food industry. Other important branches are shipbuilding, metal industry, electrical manufacturing and textiles industries.

According to the results of the MIEE Programme (see Section 6), economically justified integral energy efficiency measures, with appropriate support, could achieve savings in thermal energy of about 6 000 - 8 000 TJ/year and about 500 GWh/year of electricity. According to the First National Communication to UNFCCC, industry could save up to 7.5% of electricity by improving electric motors.

Figure 8: Heat consumption in industry, residential and services sector



Source: EIHP, 2004

Residential

The housing building stock in Croatia comprises approximately 1.42 million permanently occupied dwellings, with an average surface of 71 m². 30.2% of the dwellings are in buildings, which are older than 40 years, 44.2% in buildings which are between 20 and 40 years old and 25.6% in buildings whose age is less than 20 years. 54% of the dwellings are in single-family houses, while 46% are in multi-dwelling houses. In addition, there is also a rather high number of 239 000 dwellings which are not permanently occupied.

The new Building Act of 17 October 2003 defines energy economy and heat retention as “essential requirements” for construction works, stipulating that “the construction works and its heating, cooling and ventilation installations must be designed and executed in such a way that the amount of energy required in use relative to the climatic conditions of the location be equivalent to the level prescribed or lower while the occupants of the construction works be provided with adequate heating conditions.”

The Draft Rulebook on Energy Saving and Thermal Protection of Buildings has already passed public enquiry and is expected to come into force beginning of 2005. It will replace the existing Rulebook of 1987.

The new Rulebook sets technical requirements with respect to energy savings and thermal protection that are to be fulfilled when designing new and renovating existing buildings. Requirements for new constructions include: maximum annual heat requirements, maximum heat transmission losses, protection against solar radiation in summer to prevent overheating of the building, air tightness and ventilation, maximum heat transfer coefficients for elements of the building envelope as well as special provisions for buildings using renewable energy for heating. For

new buildings the Draft Rulebook requires a Certificate of Heat Requirements for Building Heating. The Draft Rulebook also includes specific requirements for major reconstructions or renovations of existing buildings. Installation of thermostatic valves is mandatory.

The Draft Rulebook refers to various European standards (EN), which are homologated as Croatian standards. So far, the Rulebook only refers to the building envelope. New legislation, which would provide an integrated approach including also heating systems, as stipulated in the EU Directive 2002/91/EC on the Energy Performance of Buildings, is under study in the framework of the KUENbuildings programme, mentioned below.

It appears that the implementation of building codes is a major problem. In particular in rural areas, including the eastern part of the country mostly affected by the armed conflict of the nineties, many houses are still built or modified without a permit, with a primary focus on mechanical resistance and less attention on energy economy.

Like in other former socialist countries, energy efficiency in large apartment buildings, mainly erected in the period 1955 - 1975, is a major concern. In addition to low quality of the building structure and insufficient maintenance, introduction of individual metering and other measures to improve energy efficiency in multi-ownership buildings are still subject to unanimity among owners, accordant to the law on real estate property rights.

The Ministry of Environmental Protection, Physical Planning and Construction and the Energy Institute "Hrvoje Požar" cooperate in the programme on energy efficiency in building construction KUENbuildings (see also Section 6). The plan for scientific and research work in the period 2004 - 2006 within this programme foresees several activities, including: (i) development of expert manuals and publications on energy management in the housing and public sectors, aimed at various target groups; (ii) studies directed at measures to reduce adverse environmental impacts of energy use in buildings; (iii) expert documents for the development of further regulations on thermal protection and energy saving in building construction; (iv) pilot and good practice projects; (v) analysis of energy saving potentials in public buildings and housing construction, and (vi) promotional and publicity activities.

Services

Energy consumption in the service sector has been rising continually since 1992, both in absolute terms (by 103% between 1992 and 2002) and in relative terms: specific energy consumption in relation to floor area increased by 34%, per employee by 4% and in relation to value added 37%.

Energy savings potentials in the services sector for heat and electricity are typically between 10% and 30%, for certain end-uses even higher. According to the results of the MIEE Programme (see Section 6), achievable, economically justified savings in the services and public sector could be about 3 000 TJ/year in thermal use and about 500 - 700 GWh /year of electricity use.

Transport

Almost 89% of energy consumption in the transport sector is in road transport, with 4% in air transport, 3% in railways and 2% in internal navigation.

According to the findings of the TRANCRO Programme (see Section 6), there is a high potential for fuel savings by replacement of older vehicles. The average age of private cars in Croatia is 9.7 years, while the average age of the total fleet is 10.2 years.

There is a law on eco-testing of road vehicles, which are also subject to environmental charges levied at the time of registration (see Section 7).

District heating

There are three large district heating systems in Croatia, in the cities of Zagreb, Osijek and Sisak. The owner of these systems is HEP District Heating (HEP Toplinarstvo d.o.o. and HEP Toplinarstvo Sisak d.o.o.).

The district heating system of Zagreb supplied in 2003 1 578 GWh of hot water and 751 GWh of steam to customers and produced 1 735 GWh of electricity. It operates two central CHP plants (including a new combined cycle cogeneration plant). The system includes approximately 2 000 heating stations and several small decentral heating plants. Billing is based on metering at each heating station. Losses in heat distribution were high in the past and have been gradually reduced.

District heating competes with natural gas as heating fuel. At the moment, market shares in Zagreb are about 35% district heating, 35% natural gas and 30% other fuels.

District heating prices will be regulated in accordance to the Bill of Production, Distribution and Supply of Thermal Energy, which is under parliamentary procedures.

Renewable energy

As stipulated in the Energy Law, the Government has proposed a Decree on the Minimum Share of Renewable Energy Resources in the Supply of Electrical Energy, which foresees an obligation for public suppliers to produce 900 GWh of electricity from renewable sources (excluding hydro power plants > 5 MW) in 2010 (approximately 5% of the total electricity production forecasted). The funds for meeting this minimum share shall be collected through a fee from all electricity consumers, initially set at HRK 0.0041 (€ 0.0005) per kWh.

Another piece of secondary legislation proposed stipulates a special tariff system (feed-in tariffs) for electricity generation from renewable sources and cogeneration.

A first wind park has been constructed by the Croatian-German company Adria Wind Power on the island of Pag. The wind farm comprises 7 turbines with a total installed capacity of 5.95 MW. The electricity production of approximately 15 GWh/year will be sold to HEP Trade, at a rate corresponding to 90% of the average selling price to end consumers.

6. ENERGY EFFICIENCY POLICIES AND PROGRAMMES

Since 1997, twelve so-called National Energy Programmes were initiated and included in the Draft Energy Sector Development Strategy of 1998. These programmes are:

- PLINACRO - Croatian gas pipeline installation programme
- KOGEN - cogeneration programme
- MIEE - industrial energy efficiency network programme
- MAHE - small hydro-electric power plants construction programme
- SUNEN - solar energy utilisation programme
- BIOEN - biomass and waste utilisation programme
- ENWIND - wind energy utilisation programme
- GEOEN - geothermal energy utilisation programme
- KUENbuildings - energy efficiency in building construction programme
- KUENcts - energy efficiency in centralised heating systems programme
- CROTOK - energy development of islands (2000)
- TRANCRO - energy efficiency in transport programme (2001)

In 2002 and 2003, the National Energy Programmes have been supported by the Ministry of Economy, Labour and Entrepreneurship with HRK 2.8 million (€ 380,000) annually. For 2004, a special budget of HRK 6 million (€ 815,000) was earmarked for energy efficiency and renewable energy projects. The Energy Institute "Hrvoje Požar", a public scientific institution, is in charge of management and coordination of the National Energy Programmes, in co-operation with a network of experts and collaborating organisations. The annual budget of the Institute assigned to its activities in the field of energy efficiency and renewable energy is approx. HRK 3.5 million (€ 480,000).

According to the information received from the Ministry of Economy, Labour and Entrepreneurship, the Programme of Implementation of the Energy Sector Development Strategy and the National Energy Programmes follow the guidelines defined by various EU directives, in particular in the fields of renewable energy and energy efficiency of buildings and appliances.

The energy saving potential in the building sector is estimated at 22% by 2010. The Energy Efficiency in Buildings Construction Programme - KUENbuildings - aims at promoting renewable energy and energy efficiency in the building sector, focusing on the design, construction and use of existing and reconstruction of existing buildings. KUENbuildings also includes work on legislation in the building sector, including the new Regulation on Energy Savings and Thermal Protection in Buildings and harmonisation with EU regulations (see Section 5). Under preparation are also regulations on subsidies for sustainable construction and on the implementation of measures for energy savings and thermal protection of buildings.

In the framework of this programme, several pilot projects were implemented, among these the energy optimisation of the office building of EIHP, of an office building of HEP and of a technical school in Zagreb, as well as of an infant nursery in Osijek, resulting in energy savings between 65 and 74%. Another planned pilot project concerns an energy independent ecological house (without active heating system) for rural tourism on Croatia's islands. KUENbuildings also includes promotional and educational activities

The Industrial Energy Efficiency Network Programme - MIEE - aims at energy efficiency improvements in industry and in targeted consumers in the services sector (mainly hotels and other tourist facilities) and public services (hospitals, schools, nurseries, government buildings, etc.). Initial activities in industry have focused on wood processing and food, construction materials and chemical industry.

Typical activities in the industrial sector include: analysing potentials for energy efficiency measures, cogeneration, waste utilisation and fuel substitution. An integral benchmarking project is under preparation. In the services sector, financing models for energy efficiency investments have been developed in addition to analysis of potentials for energy efficiency and cogeneration. For the public sector, in addition to an energy auditing scheme, an outsourcing model and ESCO models for energy efficiency projects have been developed.

The MIEE Programme has established a network linking energy professionals from individual companies and providing them with services and information.

The Cogeneration Programme - KOGEN - aims at the promotion of cogeneration, diversification of energy supply and to increase the use of natural gas. Industrial cogeneration accounts currently for 6.1% of the national electricity generation, but its share is expected to increase. Major barriers are related to energy legislation and tariffs, financing modalities, availability of natural gas and administrative procedures. KOGEN also focuses on the promotion of cogeneration in the buildings sector and on industrial cogeneration using biomass.

The Energy Efficiency in Transport Programme - TRANCRO - is headed by the Ministry of Sea, Tourism, Transport and Development and coordinated by EIHP. The Programme is supported by various other ministries and energy sector and transport companies.

TRANCRO has so far been developed in three phases. Phase 1 was developed in 2002 and included the elaboration of a database and prognosis of mobility demand, fuel consumption and CO₂ emissions in the transport sector. Phase 2, realised in 2003, included an overview of technical developments in the transport sector, analysis of cost-effectiveness of different energy efficiency measures and the analysis of alternative fuel projects including natural gas vehicles. The results of Phase 2 indicate that there is a large saving potential by replacement of older vehicles and by non-technical measures.

In its third Phase, which is currently under development, there focus is on the development of an inventory of energy efficiency measures in transport in various stages of development and implementation, on the preparation of pilot projects (including natural gas and bio diesel) and on marketing and education.

The Energy Efficiency in Centralised Heating Systems Programme - KUENcts - focuses on the development and improvement of centralised heating systems, in particular the improvement of existing systems.

Several National Energy Programmes (BIOEN, SUNEM, ENWIND, GEOEN, MAHE) focus on renewable energies.

In general, the National Energy Programmes are so far mainly focused on studies, the development of strategy and policy instruments (in order to eliminate barriers and to create an enabling environment), training activities and campaigns and - in some cases - pilot and demonstration projects.

Scientific research and technological investigation in the area of energy efficiency and renewable energy sources are supported by programmes of the Ministry of Science and Technology.

Croatia has a complex energy legislation that was adopted in mid 2001 and was under revision in 2004. The aim of the recent changes is to strengthen the legal framework in order to encourage private investments in new renewable energy production.

Around 50 acts of secondary legislation are currently in preparation from which several are of importance to renewable energy and energy efficiency: an Ordinance on a minimum share of renewable energy sources, an Ordinance on the conditions for obtaining the status of a privileged electricity producer, an Ordinance on energy efficiency labelling, and a Programme of energy efficiency of the Croatian Government. In general, the proposed regulation is in line with relevant EU rules, e.g. the directives on energy efficiency labelling of household appliances and lighting equipment and minimum energy performance standards for cold appliances. A new Construction Act foresees the use of revenues in the state budget for incentives for the use of renewable energy sources in buildings (including passive heating and cooling and natural ventilation), via the proposed Ordinance on Sustainable Construction. A Manual on Energy Management in Public Buildings is under preparation.

Croatia cooperates in the field of energy efficiency and renewable energy with the European Union (CARDS Programme), the Global Environment Facility (via the World Bank and UNDP), and with bilateral and regional initiatives (see Section 7).

7. ENERGY EFFICIENCY FINANCING

ENVIRONMENTAL PROTECTION AND ENERGY EFFICIENCY FUND

In 2003, the Environmental Protection and Energy Efficiency Fund was established by law (Law on Environmental Protection and Energy Efficiency Fund), becoming effective as from January 1, 2004. According to the Law, the Fund shall carry out activities for the purpose of funding the preparation, implementation and development of programmes, projects and similar undertakings in the fields of: (i) preservation, sustainable use, protection and improvement of the environment, and (ii) energy efficiency and use of renewable energy resources. It is envisaged that the Fund provide assistance for the preparation and implementation of programmes and projects, which are in accordance with the National Environmental Protection Strategy, the National Plan of Environmental Actions, the Energy Sector Development Strategy, the Programme of Implementation of the Energy Sector Development Strategy and international agreements. The Fund also seeks leverage with funds from foreign countries and international institutions.

The law has established the Fund as an extra-budgetary Fund with status as a legal person and vested with public authority. The Members of the Fund's Management Board are representatives of the Ministries responsible for environment protection, energy and finance; the Croatian Parliament; the Croatian Chamber of Economy and one expert in environmental protection.

The resources for the Fund financing are specific-purpose revenues from charges imposed on emissions of CO₂, sulphur and nitrogen oxide; charges for the use of the environment for buildings and building complexes; charges for waste disposal, as well as a special environmental charge for motor vehicles, which is levied at the time of the registration of the vehicle. Other resources may originate from budgets of regional and local governments, international co-operation programmes, and other sources in accordance with the Law. Total expected revenues of the Fund in 2005 are estimated at approximately € 45 million, compared to approximately € 25 million in 2004.

Among other purposes, the resources of the Fund will be used for protecting, preserving and improving the quality of air, soil, water and sea; for mitigating climate change and for protection of the ozone layer; remediation of landfills, waste reduction, treatment and processing; cleaner manufacturing processes; protection of biological and landscape diversity; implementing the National Energy Programmes; promotion of renewable energy sources, sustainable construction and cleaner transport, and promotion of educational, research and development studies, programmes, projects and demonstration activities.

The resources will be disbursed as loans, interest rate subsidies, grants and donations, in general on the basis of public tenders invited by the Fund. The Management Board of the Fund annually adopts a work programme and financial plan, which will separately show programmes and projects, as well as financial resources, for the field of environmental protection and the field of energy efficiency

and renewable energy, as stipulated in the Law. The Fund will also adopt a four-year work programme, in accordance with the relevant Government strategies and action plans.

So far, the main focus of the Fund has been on the improvement of waste landfills, while targeted tenders for projects concerning CO₂ emission reduction and clean production are under preparation. The Fund intends to increase its staff from 15 to 26 persons.

THIRD PARTY FINANCING, ENERGY SERVICES AND DEMAND-SIDE MANAGEMENT

As part of the “energy efficiency project” supported by the World Bank in the framework of the Global Environment Facility (GEF), an energy service company (ESCO) was established within the HEP Group. The objective of the project is to establish an economically and environmentally sustainable market for energy efficiency projects and services, by creating HEP ESCO as a core developer of energy efficiency projects. The financing of the project (US\$ 40 million over six years) is provided by loans from domestic banks and the World Bank, a GEF grant, equity contributions from HEP and refinancing from HEP and HEP ESCO.

HEP ESCO d.o.o., which is fully owned by HEP, is active since September 2003. Its purpose is the development, realisation and financing of energy efficiency projects on an open market base, based on the return of investment from energy savings achieved. Main targets of HEP ESCO’s activities are: industry, public lighting, heating systems, cogeneration plants and energy saving in buildings (public, service and residential sector), like: hospitals, schools, universities, hotels, office buildings, shopping centres, and medium and large residential buildings. So far, one project has been completed in a school, while preparatory activities like investment grade audits and walkthrough audits have been realised in various areas. HEP ESCO reported that interest has so far been shown mainly in the public sector, including public lighting.

The main goal of the project is to initiate financing of ESCO projects from domestic banks, in order to provide the financial basis for a growing ESCO market in Croatia. The stated objective of the HEP Group is to improve customer relations in a future competitive market through energy services, to secure employment of their own personal and to contribute to the corporate goal of environmental protection.

HEP has also been active in specific demand-side management activities, in particular in load management by influencing residential costumers in the Istria region. Customers, who participate in the scheme on a voluntary basis, receive a 10% discount on their tariffs for allowing HEP to influence their load by switching off thermal appliances for heating and hot water preparation during peak hours. The system requires separate metering and connection of the appliances concerned.

In addition to the HEP ESCO project, two more GEF projects are carried out in cooperation between the Croatian Government and UNDP.

The UNDP/GEF project "Croatia - Removing Barriers to Improving Energy Efficiency of the Residential and Service Sectors" focuses on the application of energy saving and demand-side management measures in households and in the service sector - mainly tourism. The project consists of two sets of activities: (i) the creation of adequate prerequisites for the improvement of energy efficiency in the tourism sector - basically a guarantee programme to support financing of energy efficiency projects by domestic financial institutions to spread their credit risk, and encouraging banks to offer more finance on attractive terms to energy efficiency projects, incorporating the value of energy cost savings into the end-user's ability of loan repayment, and (ii) improving energy efficiency through the application of DSM measures in households, by promoting the market for compact fluorescent light bulbs (CFLs), via specific marketing campaigns, including advertisements, price reductions by market aggregation, partial sales guarantees for bulk delivery and expanded distribution channels.

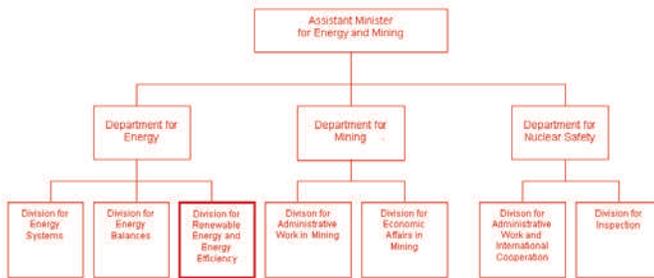
The project has been effective since September 2004, MELE being the national executing agency and EIHP coordinating the project.

The second UNDP/GEF project ("Croatia - Renewable Energy Resources Project") concerns the development of a policy framework and financing vehicles for renewable energy. Executing agencies will be the Ministry of Finance, the Croatian Bank for Reconstruction and Development - HBOR, and HEP. The project has been approved by the GEF Council.

8. ORGANISATION OF ENERGY EFFICIENCY ACTIVITIES

The Government entity responsible for energy efficiency is the Ministry of Economy, Labour and Entrepreneurship (MELE), in particular the Energy Department and its Division for Renewable Energy and Energy Efficiency (see Figure 9). MELE coordinates its activities with other ministries, involved in energy-related issues, like the Ministry of Environmental Protection, Physical Planning and Construction; the Ministry of Agriculture, Forestry and Water Management; the Ministry of Sea, Tourism, Transport and Development, and the Ministry of European Integration.

Figure 9: Organisational Structure of the Directorate for Energy and Mining of the Ministry of Economy, Labour and Entrepreneurship (MELE)



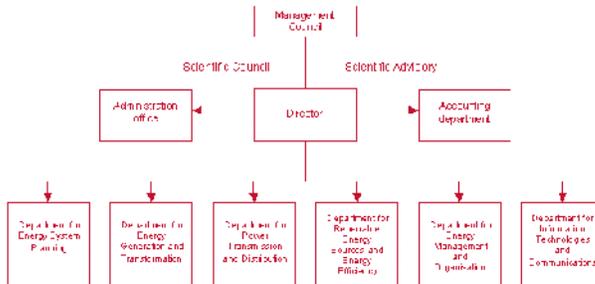
Source: MELE, 2004

The Energy Institute "Hvroje Požar" (EIHP), originally founded in 1953, assumes a central role as think-tank for the Croatian energy sector. EIHP is owned by the State and has the status of a public scientific institution. The Institute has a public mandate and sees itself as a moderator of public-private partnership. Part of its mission is "planning and implementation of energy sector reform in Republic of Croatia".

The Institute has six departments as shown in Figure 10. EIHP mainly provides services for the energy sector, the national government - in particular MELE, CERC - as well as counties and cities. EIHP has about 60 employees and an annual turnover is above € 3 million per year. The institute is well connected to international institutions and organisations and participates in international and European networks and projects.

On behalf of the Government, EIHP is implementing the so-called National Energy Programmes (see Section 6), under specific contracts with MELE (government contracts).

Figure 10: Organisational Structure of EIHP



Source: EIHP, 2004

In general, typical activities of EIHP include: energy sector development studies, forecasting and planning; advice to the Government on energy market restructuring and legislation; tariff studies; studies in the district-heating sector; electric transmission and distribution system analysis and planning, and various activities in the framework of the National Energy Programmes.

In the field of energy efficiency, EIHP supports MELE in drafting energy laws and secondary legislation, carries out pilot and demonstration projects in industry services and households, participates in international R&D projects and networks, and is active in education and public opinion surveys. Energy efficiency related activities in the framework of the National Energy Programmes have been addressed in Section 6.

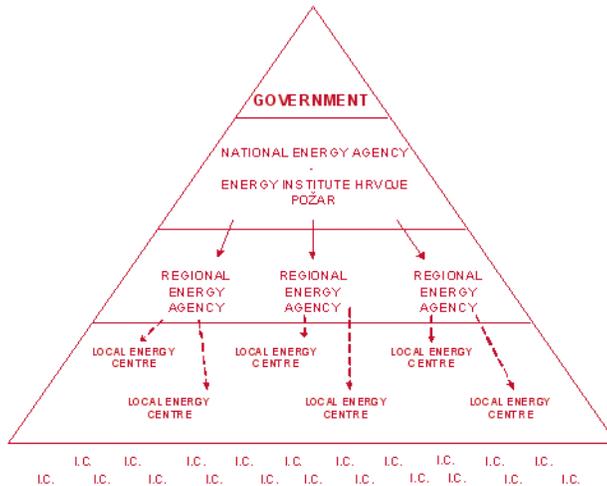
Other organisations active in promoting energy efficiency and renewable energies include regional authorities (energy offices, officials, specialists, experts, etc.), local authorities, engineering companies, consultancies, constructors, ESCOs, etc. There are also several university institutes involved in energy efficiency related activities, as well as professional organisations, like the Croatian Energy Society and the Croatian Solar Energy Association.

Non-governmental organisations appear to be mainly focused on issues related to the environment and to civil society. Some NGOs, like Friends of the Earth Croatia (Green Action) are involved in awareness raising and community action campaigns. Green Action also runs the Energy and Climate Programme, which includes the Solar Academy for South-East Europe.

Instead of this rather loose, non-structured organisation, EIHP envisions a more structured (hierarchical) organisation, with a central role for a National Energy Agency.

Figure 11 illustrates this proposal, which would include the National Energy Agency, acting on behalf of the Government, regional energy agencies, local energy centres and implementation centres ("I.C."). In this proposal, EIHP would assume the role of the National Energy Agency.

Figure 11: Model of future organisation of energy efficiency activities proposed by EIHP



Source: EIHP, 2004

Arguments in favour of an “agency model” refer to: better information flows between national, regional and local levels; consistency of energy policy and strategy implementation; providing an organised system of support, access to information and capacity building to actors active on the local level.

Regional Energy Agencies and Local Energy Centres are considered as ideal intermediaries between project developers, financial institutions and “implementation centres”. The idea is to establish one Regional Energy Agency for about one million inhabitants, i.e. 4-5 agencies, and that they would also engage in regional energy planning, the identification and preparation of energy projects and provide consultancy to county and local authorities. Local energy centres would be established at the level of cities and communities and would be in charge of implementing national and regional energy policy at that level. An important activity would be counselling of the local population and of local authorities, the development of action plans and the organisation of promotional and information activities. They would act as focal points with ESCOs and private companies and be in charge of capacity building at the so-called “implementation centres”. Implementation centres would be construction, engineering and consultancy firms concerned with the implementation of projects. They would not be part of the agency network.

The expectation is that the “agency model” would help to transform the national energy policy and strategy into operating programmes and projects at lower levels and support the development of the energy market and of energy planning at national level, e.g. by capacity building and education. The National Energy Agency would act as an “intermediary between the State and agencies at a lower hierarchical level” and would “define guidelines for activities to be undertaken at lower hierarchical levels”.

9. ENERGY EFFICIENCY AND THE ENVIRONMENT

Environmental protection is under the competence of the Ministry of Environmental Protection, Physical Planning and Construction. The basic legal and strategic documents are the Law on Environmental Protection of 1994 (revised in 1999) and the National Environmental Strategy and National Environmental Action Plan of 2002.

The Environmental Protection and Energy Efficiency Fund, presented in Section 7, foresees providing incentives for the preparation and implementation of programmes and projects which are in accordance with the National Environmental Protection Strategy, the National Plan of Environmental Actions, the Energy Sector Development Strategy, the Programme of Implementation of the Energy Sector Development Strategy and international agreements.

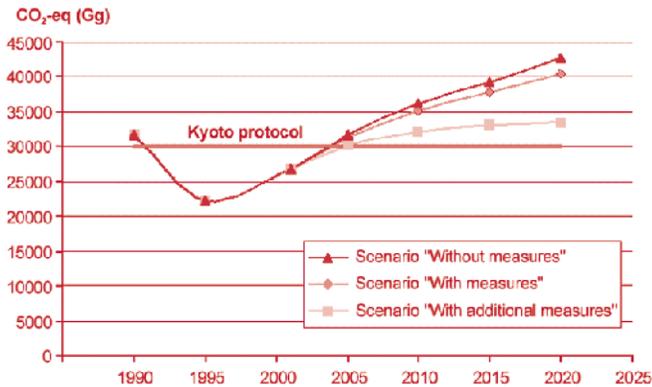
Croatia ratified the UNFCCC in 1996, committing itself to maintain greenhouse gas emissions at 1990 levels. Croatia has signed the Kyoto Protocol in 1999 as an Annex I Party, but has not yet ratified it.

According to the Protocol, Croatia would have to reduce its CO₂ emissions by 5% in relation to the base year, over the commitment period from 2008 - 2012. Considering the very low initial level of emissions, this is considered an extremely difficult task, taking into consideration past and present economic growth and the fact that new generation capacity has to substitute (thermal) capacity shared with other republics of former Yugoslavia. Another issue is the attribution of the capacity of the Krško Nuclear Power Plant, of which 50% is owned by HEP.

For these reasons, Croatia is negotiating an increase of GHG emissions regarding the base year. The negotiations refer to Article 4.6 of the Convention, which offers a certain level of flexibility to countries in transition in meeting their commitments under the Convention. The aim of the Croatian Government is to conclude the negotiations before COP 10, which is due to take place in December 2004.

In general, the level of GHG emissions in Croatia is relatively low, due to high shares of hydro and nuclear power and cogeneration in electricity generation, a relatively high share of biomass and a very low share of coal in TPES. GHG emissions will however continue to increase because of economic growth and the subsequent increase in energy consumption, which will also require new thermal generation capacity.

Figure 12: GHG emission projections to 2020



Source: Ministry of Environmental Protection, Physical Planning and Construction, 2004

The First National Communication to UNFCCC has been submitted in 2001. In the energy field, Croatia is implementing various policies and measures, which are summarised in Table 2.

The Fund for Environment Protection and Energy Efficiency receives charges on emissions of sulphur and nitrogen oxides and will receive charges on CO₂ emissions. The level of this CO₂ charge is under discussion. Energy consumers who have realised investments in emission reduction might be subject of a reduced CO₂ charge in the year following the investment.

A Joint Implementation Unit has been established in the recently created Environmental Protection Agency. A memorandum of understanding for pilot projects has been signed with the Netherlands and other countries (Austria, Denmark Germany) have expressed similar interest. So far, however, no pilot projects have yet been realised.

The EU Integrated Pollution and Control (IPCC) Directive 96/61/EC has not yet been transposed; this is expected to be postponed until 2006.

Table 2: Policies and measures under development and implementation in the energy field

Short Description of policy and measure	Type of measure
Restructuring of energy sector	Regulation/Economic
Privatisation of two main public energy companies	Regulation/Economic
Establishment of Energy Efficiency and Environment Protection Fund	Economic
Introducing subsidies for renewable energy	Regulation
Introducing standards and labelling for energy efficiency	Regulation/Voluntary
Croatian National Energy Programmes (11 Programmes)	Research/Development
Introduction of DSM in Croatian National Electricity	Voluntary
Removing Barriers to Energy Efficiency in Residential and Service sector	Economic
Croatian Renewable Project	Voluntary
Croatia National Electricity Gas Scenario Development till the year 2010	Voluntary
Upgrading of Nuclear Power Energy Production	Voluntary
Gas Network expansion in North Croatia	Voluntary
Project of gas exploration and networking in South Coastal Croatia	Voluntary
Promoting small hydro and wind power by independent producer	Voluntary
International Power Transmission Lines Construction	Voluntary
Environmental Impact Assessment	Administrative
Air pollutant emission limitation	

Source: Ministry of Environmental Protection, Physical Planning and Construction, 2004

10. ASSESSMENT OF PROGRESS

GOVERNMENT POLICY AND STRATEGY

Accession to the European Union is the main driver of energy sector reform in Croatia. In this context, Croatia is adapting its energy legislation according to the relevant EU Directives, also in the field of energy efficiency and renewable energy.

Increased energy efficiency and utilisation of renewable energy sources are among the objectives of the National Energy Development Strategy, which sets out the path towards energy sector reform in line with the accession criteria. A new legal framework of the energy sector, National Energy Programmes, the creation of the Environmental Protection and Energy Efficiency Fund are important elements of this strategy, which is characterised by a focus on both market forces and Government intervention in favour of sustainability goals.

MARKET LIBERALISATION AND ENERGY EFFICIENCY

The process of liberalisation of the electricity and gas markets was set out in the energy sector legislation of 2001. Main principles of the legal framework are: unbundling of energy sector enterprises, market opening, the creation of independent system and market operators and the creation of an independent regulator. While some amendments and further secondary legislation will be required, and some issues like the scope of responsibilities of the regulator are subject of controversy, it may be stated that the legal framework is clear in regard to the major lines of action required.

Taking into consideration the present position of major market actors, as well as the fact that Croatia is a relatively small country with also limited energy markets, the process of market liberalisation is impacted by the need to meet the requirements of the *acquis communautaire*, the challenge of a future South-East European energy market and eventually integration in the EU energy market, vested interests of actors and political considerations.

From an energy efficiency point of view, it appears important to create favourable conditions - or at least a level playing field - for the effective participation in the market of actors like: producers and suppliers of green energy, cogenerators, and energy service companies.

Concerning end-use energy efficiency and related areas like renewable energies and cogeneration, some important steps have been taken, like the proposed legislation on quota for renewable energy, regulated feed-in tariffs for electricity from renewables and cogeneration, as well as energy efficiency labelling and minimum energy performance standards for household appliances, energy efficiency requirements for buildings and state subsidies for end-use energy efficiency measures, e.g. in the building sector. Many of these proposals still await adoption by the legislator and implementation.

The “balanced approach” defined in the National Energy Sector Development Strategy, relying on both market forces and Government intervention, appears to be the appropriate strategy to effectively promote energy efficiency and renewable energies.

ENERGY EFFICIENCY PROGRAMMES AND FUNDING

The “National Energy Programmes”, initiated by the Government since 1997 and coordinated by the Energy Institute “Hrvoje Požar” (EIHP), have been important activities to promote energy efficiency, renewable energy and other sustainable energy options, in accordance with the National Energy Sector Development Strategy. The National Energy Programmes reveal high technical quality and provide a sound basis for further promotion of energy efficiency and renewable energies in Croatia. The mix between energy sector development and policy studies, preparatory work for energy sector legislation, pilot and demonstration projects, moderation among actors and education and awareness raising activities is another indicator for the relevance of the twelve programmes.

So far, the level of funding of the National Energy Programmes has been limited in scope and impact, with typical funding levels of < € 50,000 per year by programme. It appears to be essential to expand the scope and funding of the programmes, in particular with regard to demonstration projects and implementation of energy efficiency measures by market actors.

The creation of the Environmental Protection and Energy Efficiency Fund could be an important step towards more adequate funding levels of the National Energy Programmes and the availability of financial incentives for energy efficiency and renewable energy projects. It will be very important, in this context, to include energy efficiency and renewable energies in the medium-term and annual work programmes of the Fund and to establish transparent rules for the assignment of the financial incentives stipulated. The Fund might also consider linking the use of the revenues received from the charges on CO₂, sulphur and nitrogen oxides to activities in the corresponding area, i.e. that revenues from the planned CO₂ charge could be used primarily for projects resulting in reductions of CO₂ emissions.

ORGANISATION OF ENERGY EFFICIENCY ACTIVITIES

The proposal of the Energy Institute “Hrvoje Požar” (EIHP) to introduce an “agency model”, including a national energy agency, regional energy agencies and local energy centres, responds to the need to close the gap between policies and programmes of the national government and the implementation on the regional and local energy efficiency markets. Decentralisation is an important prerequisite in order to reach end-users and actors involved in providing energy efficiency services.

In building the agency network, existing organisational structures and human resources (like existing energy and technical departments at municipalities) should be integrated to the extent possible. The network should also be open for integrating

other institutions, like service providers, NGOs, consumer organisations, professional organisations (like architects and craftsmen), housing cooperatives, regional and local chambers of commerce, etc. Energy companies should be encouraged to establish information centres for customers in their regional and local offices. While agencies would provide the backbone of the network, the organisational structure and modus operandi should not be hierarchic, but participative, making use of existing intermediaries, and integrating also the so-called "implementation centres" in the network as active allies.

With regard to EIHP's proposal to assume the role of the National Energy Agency, it appears to be important to - at least internally - separate the functions of think tank and policy advisor, from the new task of promoter and implementer of government policies and programmes. While the size of the market and the early stage of energy efficiency activities in Croatia, suggest concentration of forces, the separation of both activities might be appropriate in the medium term.

The foreseen role of the energy agencies would be reflected in public ownership and funding, probably from the Environmental Protection and Energy Efficiency Fund. Complementary funding from commercialisation of services might be considered, taking into consideration the mandate of the centres to activate the market, which implies a supporting role to an emerging market of private service providers.

ENERGY SERVICES, COGENERATION, DISTRICT HEATING AND RENEWABLE ENERGY

Energy services companies (ESCOs) can have an important role in promoting energy efficiency in liberalised energy markets to the extent that the regulatory framework provides an enabling environment, i.e. by securing a demand for such services from the consumers and at the same time providing a motivation for existing and new companies to enter this market.

The "energy efficiency project" supported by the World Bank via the Global Environment Facility (GEF) has initiated HEP ESCO as a first (utility based) energy service company in Croatia. It could play a major role in stimulating an emerging energy service market. Sharing experience and incentives with potential private ESCOs appear to be important for securing the sustainability of the efforts.

The expansion of natural gas supply to all parts of Croatia and the availability of biomass fuels suggest an important potential of cogeneration and in the services and public sectors. The implementation of appropriate regulations, both with regard to feed-in tariffs and to administrative procedures, appears to be essential in order to fully develop this potential.

District heating based on combined heat and power is like industrial and small-scale cogeneration an efficient supply of thermal and electrical energy. The new district heating law will eliminate cross-subsidies in district heating and require district heating companies to operate under market conditions.

In order to be economically attractive, renewable energy still depends on incentives like subsidies, regulated feed-in tariffs, etc. Promotional activities supported by the Environmental Protection and Energy Efficiency Fund and the proposed regulation for electricity supplied from renewables appear to be adequate measures.

ENERGY PRICING AND TAXATION

The Government's policy aim is to eliminate subsidies and cross-subsidies for all energy carriers. At the same time the stimulation of energy efficiency, renewable energy and cogeneration will require financial incentives, both from the state budget and by providing favourable conditions for sales to the market of cogenerated and electricity produced from renewables.

Tax and fiscal incentives to stimulate investments in energy efficiency and renewable energies are a widely used instruments in many countries and might also be of specific interest for Croatia.

The planned CO₂-charge is an important step towards the internalisation of environmental effects of the use of fossil fuels and the stimulation of energy efficiency projects, via the Environmental Protection and Energy Efficiency Fund.

ENERGY EFFICIENCY AND ENVIRONMENTAL POLICIES

Energy efficiency is an important and low-cost option to achieve environmental objectives, in particular the reduction of CO₂ emissions. Energy efficiency measures are therefore an important element in the deliberations of the Ministry of Environmental Protection, Physical Planning and Constructing in the framework of UNFCCC and are therefore expected to play an important role in the climate action plan which will be elaborated following the conclusion of the current negotiations according to Article 4.6 of the UNFCCC Convention.

Independent of the outcome of these negotiations, such a strategy will enable Croatia to comply with its future obligations under the Kyoto Protocol in a timely and cost effective manner. Funding of energy efficiency programmes and projects should therefore be a priority in the operations of the Environmental Protection and Energy Efficiency Fund.

11. RECOMMENDATIONS

Based on the findings of the Review Team and on the assessment of progress the following recommendations are provided to the Government of Croatia:

GENERAL RECOMMENDATIONS

The Government should take further steps towards market reform and introduction of competition throughout the energy cycle while ensuring that energy efficiency opportunities on the demand-side are tapped.

The Government should consider improvements in energy efficiency as an important way of addressing legitimate concerns regarding the high energy import dependency of the country and at the same time improving the competitiveness of the industrial sector.

The Government should ensure that public finance procedures at all administrative levels are reformed in such a way that public entities are motivated to engage in energy efficiency investments, also by budgeting energy efficiency measures and allowing entities to retain part of the saved energy expenditures.

ENERGY EFFICIENCY POLICIES, STRATEGIES AND PROGRAMMES

The Government is encouraged to define energy efficiency objectives and targets, both at national and sectoral level (i.a. tourism, industry, households).

The Government should expedite the elaboration of the Programme of Implementation of the Energy Sector Development Strategy (action plan). For the first three year period, this action plan should set out: (i) a timetable for enactment of energy efficiency related legislation and regulation, (ii) institution building, (iii) a framework budget and (iv) priority actions and measures.

The Government should pursue the development of the “national energy programmes” with particular emphasis on demonstration and implementation.

LEGAL AND REGULATORY FRAMEWORK

The Government should take the necessary action to enforce the implementation of the existing energy efficiency related legislation and regulation.

The Government should accelerate the completion of the legislative process by developing and implementing the necessary secondary legislation, which should be in line with the *acquis communautaire* in the area of energy efficiency.

The Government should amend the law, which covers real estate property rights to allow for energy efficiency upgrades and introduction of individual metering in multi-ownership buildings to be carried out by majority decisions of the owners.

INSTITUTIONAL FRAMEWORK

The Government should strengthen its capacity in energy efficiency policy formulation and implementation, both at ministerial and at implementing agency level, also by improving coordination between various ministries.

The Government should ensure a better coordination between the various organisations that influence energy efficiency policies and programmes and support a more active role of the civil society including NGOs, professional and consumers associations.

ENERGY MARKET AND PRICES

The Government should strengthen the capacity and role of the Croatian Energy Regulatory Council notably in relation to tariffs approval and access to the networks.

The Government should pursue energy price reform for all grid-based energies with a view to eliminate existing subsidies and cross-subsidies between the various categories of consumers and energy carriers.

ENERGY EFFICIENCY FUNDING AND FISCAL POLICIES

The Government should make sure that the various energy efficiency programmes have an appropriate budget allocated in order to secure proper implementation and impact on the market.

The Government should secure that the Environmental Protection and Energy Efficiency Fund operates on the basis of transparent criteria, which reflect both cost effectiveness and environmental considerations.

The Government should analyse the opportunity to introduce fiscal incentives for energy efficiency investments.

The Government should ensure that the experience of HEP ESCO is widely disseminated so as to stimulate demand for energy efficiency services and the creation of private energy service companies.

SPECIFIC PROGRAMMES AND INSTRUMENTS

The Government should systematically favour energy efficient options in its procurement activities.

Given the high share of buildings in total energy consumption, the Government should develop a programme for energy efficiency improvement and management in public buildings to serve as an example for the entire sector.

Building upon the achievements of the MIEE Programme, the Government should further promote capacity building in the field of energy management in industry.

The Government should secure that policy makers in the area of transport at national and local level incorporate energy efficiency considerations in their mobility plans.

The Government should consider introducing high energy efficiency standards and use of renewable energies in ECO label for tourist facilities.

COGENERATION, DISTRICT HEATING AND RENEWABLES

The Government should continue to develop and promote legal and fiscal frameworks for cogeneration and renewables; this may include feed-in tariffs and purchasing obligations.

The Government should secure the sustainability of the district heating systems through appropriate tariffs and through securing synergies with measures promoting renewables and CHP.

The Government should assess the viability of using waste incineration as a source to produce electricity and heat.

DATA COLLECTION AND MONITORING

The Government should further encourage collection of data required to establish energy efficiency indicators and to monitor improvements in energy efficiency.

INFORMATION AND AWARENESS

The Government should set up a programme for raising awareness of energy efficiency opportunities in various end-use energy sectors.

Tariff increase announcement should be accompanied by an information campaign on how to offset the price increase by energy efficiency measures.

ENERGY EFFICIENCY AND ENVIRONMENTAL POLICIES

The Government should speed up the elaboration of a Climate Action Plan, which adequately reflects the potential for energy efficiency improvements, irrespective of when agreement will be reached on Croatia's Kyoto target.

ANNEXES

ANNEX 1: ENERGY SITUATION IN CROATIA

Table A1.1. Energy Balance for Croatia

Indicators	Unit	1992	1995	1997	2000	2001	2002
Total Primary Energy Production	Mtoe	4.346	4.187	3.596	3.580	3.747	3.706
Net imports	Mtoe	2.367	2.933	4.391	4.194	4.183	4.517
Total Primary Energy Supply (TPES)	Mtoe	6.174	7.120	7.986	7.774	7.931	8.222
Total Final Consumption (TFC)	Mtoe	4.926	5.345	6.108	6.074	6.095	6.230
Total Electricity Consumption (TFC)	TWh	10.194	10.699	12.543	12.666	12.870	13.370

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries

Table A1.2. Basic Indicators

Indicators	1992	1995	1999	2000	2001	2002
Population (million)	4.780	4.635	4.418	4.446	4.462	4.465
GDP (billion 1995 USD)	18.083	18.811	21.628	22.243	23.081	24.288
Primary Energy Intensity (TPES/GDP) Mtoe/billion 1995 US\$	0.371	0.378	0.366	0.344	0.337	0.339
Final Energy Intensity (TFC/GDP) Mtoe/billion 1995 US\$	0.27	0.28	0.28	0.27	0.26	0.26
Electricity Consumption per Capita	2132.6	2308.3	2839.1	2848.9	2884.4	3075.0

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries

Note: GDP using exchange rates

Table A1.3. Total Primary Energy Supply (TPES) (Mtoe)

	1992	1995	1999	2000	2001	2002
Crude, NGL, Petroleum Products	3.323	3.984	4.504	3.911	4.009	4.209
Gas	2.106	1.934	2.189	2.209	2.314	2.370
Coal	0.415	0.181	0.234	0.432	0.480	0.584
Nuclear	0.000	0.000	0.000	0.000	0.000	0.000
Hydro	0.373	0.4530	0.567	0.507	0.563	0.461
Combustible Renewables & Waste	0.257	0.267	0.333	0.373	0.292	0.292
Electricity Trade	0.240	0.301	0.203	0.344	0.271	0.303
Total supply	6.714	7.120	7.986	7.774	7.931	8.222
Energy Production/TPES	4.346	4.187	3.596	3.580	3.747	3.706
Energy Production/TPES	0.647	0.588	0.450	0.461	0.472	0.451
TPES/capita (toe/capita)	1.405	1.536	1.808	1.749	1.777	1.841

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries

Table A1.4. Total Final Energy Consumption (TFC) by End-use Sector (Ktoe)

Sectors	1992	1995	1999	2000	2001	2002
Residential	1.224	1.407	1.705	1.670	1.671	1.736
Industry	2.089	1.988	1.914	1.929	1.883	1.796
Services	0.287	0.433	0.478	0.474	0.545	0.582
Transport	0.984	1.218	1.567	1.564	1.580	1.679
Agriculture	0.224	0.201	0.284	0.293	0.276	0.257
Non-Energy Use	0.117	0.098	0.160	0.145	0.140	0.180
Total (TFC)	4.926	5.345	6.108	6.074	6.095	6.230
TFC/GDP toe/1000 US\$	0.27	0.28	0.28	0.27	0.26	0.26
TFC/capita	1.03	1.15	1.38	1.37	1.37	1.40

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries

Note: TFC includes non-energy use

Table A1.5 CO₂ Emissions

	1992	1995	1999	2000	2001	2002
Total CO ₂ emissions Mt/year	15.29	15.91	18.43	17.76	18.61	n.a
Residential sector Mt/year	1.34	1.62	2.06	1.92	2.09	n.a
Manufacturing industry and construction Mt/year	3.88	3.59	3.56	3.65	3.69	n.a
Transport Sector Mt/year	2.88	3.39	4.49	4.49	4.58	n.a
Other sectors Mt/year	0.99	1.19	1.50	1.48	1.53	n.a
Share transformation, extraction and refining Mt/year	6.20	6.11	6.82	6.22	6.72	n.a
Total CO ₂ /GDP kg CO ₂ per US\$ 1995	0.85	0.85	0.85	0.79	0.79	n.a
Total CO ₂ /capita tonnes/inhabitant	3.20	3.43	4.21	4.06	4.25	n.a
Total CO ₂ /TFC tonnes/toe	3.10	2.98	3.02	2.92	3.05	n.a

Source: IEA

Note: Total CO₂ emissions (sectoral approach)

ANNEX 2: SELECTED END-USE DATA TABLES

Table A2.1 Final Energy Consumption of the Residential Sector by Energy Source

	1992	1995	1999	2000	2001	2002
Total	1.224	1.407	1.705	1.670	1.671	1.736
a. Electricity Mtoe	0.348	0.397	0.494	0.493	0.478	0.512
b. Heat Mtoe	0.129	0.136	0.145	0.129	0.150	0.147
c. Petroleum products Mtoe	0.253	0.285	0.306	0.308	0.329	0.368
d. Gas Mtoe	0.220	0.316	0.470	0.410	0.463	0.454
e. Coal Mtoe	0.018	0.008	0.012	0.010	0.005	0.008
f. Combust. Renew. & Waste Mtoe	0.256	0.264	0.278	0.320	0.245	0.248
g. Others Mtoe	0.000	0.000	0.000	0.000	0.000	0.000
Floor Area 10 ⁶ m ²	110.9	117.9	128.0	130.6	133.3	136.4
No of dwellings	1.58	1.61	1.64	1.65	1.66	1.70

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries, Croatian sources

Table A2.2 Final Energy Consumption of Services (commercial and non-commercial) by energy source

	1992	1995	1999	2000	2001	2002
Total	0.287	0.433	0.478	0.474	0.545	0.582
a. Electricity Mtoe	0.144	0.192	0.226	0.231	0.257	0.280
b. Heat Mtoe	0.021	0.021	0.020	0.026	0.030	0.033
c. Petroleum products Mtoe	0.062	0.107	0.128	0.131	0.146	0.163
d. Gas Mtoe	0.058	0.109	0.100	0.081	0.109	0.102
e. Coal Mtoe	0.002	0.005	0.003	0.004	0.003	0.004
f. Combust. Renew. & Waste Mtoe	0.000	0.000	0.000	0.000	0.000	0.000
g. Others Mtoe	0.000	0.000	0.000	0.000	0.000	0.000
Floor Area 10 ⁶ m ²	24.1	26.4	29.7	30.4	31.3	32.2
No of employees million	0.660	0.626	0.661	0.658	0.665	0.684
Value added 10 ⁶ US\$	11067	11513	13309	13801	14354	15133
FC per surface GJ/m ²	0.449	0.687	0.674	0.653	0.729	0.757
FC per employee GJ/employee	18.21	28.96	30.28	30.16	34.31	35.62
FC/value added GJ/10 ⁶ US\$	1085.71	1574.60	1503.60	1437.92	1589.62	1610.25

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries, Croatian sources

Table A2.3 Final Energy Consumption of the Industry Sectors by Energy Source (2002)

Total	0.080	0.000	0.000	0.529	0.818	0.000	0.000	0.000	0.000	0.048	0.268	0.053	1.796	9457	0.190
Construction	0.000	0.000	0.000	0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.100	1699	0.059
Other	n.a	0.000	0.037	0.041	0.000	0.000	0.000	0.000	n.a	0.065	n.a	0.205	3847	0.053	
Non-metallic minerals	0.054	0.000	0.185	0.182	0.000	0.000	0.000	0.000	0.000	0.053	0.001	0.476	464	1.026	
Pulp & paper print	0.000	0.000	0.004	0.046	0.000	0.000	0.000	0.000	0.004	0.026	0.000	0.081	614	0.132	
Food and tobacco	0.021	0.000	0.058	0.109	0.000	0.000	0.000	0.000	0.000	0.039	0.015	0.242	1524	0.159	
Non-ferrous metals	0.000	0.000	0.005	0.003	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.016	42	0.381	
Chemical and Petrochemical	0.000	0.000	0.140	0.413	0.000	0.000	0.000	0.000	0.000	0.042	0.016	0.611	986	0.620	
Iron and Steel	0.004	0.000	0.002	0.011	0.000	0.000	0.000	n.a	0.010	n.a	0.028	51	0.784		
Mining	0.000	0.000	0.019	0.013	0.000	0.000	0.000	n.a	0.004	0.000	0.036	247	0.146		
	Mtoe	1995US\$ x 10 ⁶	Ktoe/US\$ x 10 ⁶												
Coal															
Crude Oil															
Petroleum Products															
Gas															
Nuclear															
Hydro															
Geothermal, solar etc															
Comb. Renewables & waste															
Electricity															
Heat															
Total															
Value added per sector															
FC/value added															

Sources: OECD - IEA Statistics, Energy Balances of Non-OECD Countries, Croatian sources

NB: industry non-energy use is not added to TFC

Table A2.4 Number and structure of housing stock (2001)

Number of households (in thousands)		Age distribution of dwelling stock	
Households	1877.1	0-10 years	8.4
Dwellings	1660.6	10-20 years	17.2
Dwellings (permanently occupied)	1421.6	20-30 years	23.1
- in family houses	767.2	30-40 years	21.1
- in multidwelling houses	654.4	40-50 years	11.9
Average surface (m ²)	71	50-100 years	8.3
		>100 years	10.0

Source: Croatian sources

Table A2.5 Transport Indicators (2001)

	Freight	Travel	Total
FC (Mtoe)	n.a	n.a	1.568
Tonne-km (x 10 ⁹)	141.44		141.44
TFC/10 ⁶ tonne-km	n.a		11.08
Person-km (x 10 ⁹)		6.008	6.008
TFC/10 ⁶ person-km		n.a	260.91
No of cars/10 ³ inhabitants	n.a	n.a	269

Source: Croatian sources

Table A2.6 Energy Balance in Transport Modes

		1992	1995	1999	2000	2001	2002
All transport modes	Ktoe	984	1218	1567	1564	1580	1679
Railways	Ktoe	51	46	49	46	47	48
Road	Ktoe	824	1012	1368	1380	1396	1490
Air Transport	Ktoe	27	91	91	77	76	74
Internal navigation	Ktoe	56	34	30	29	30	36
Pipeline Transport	Ktoe	0	1	0	1	1	2
Non-specified	Ktoe	27	34	29	31	29	29

Source: OECD - IEA Statistics, Energy Balances of Non-OECD Countries

ANNEX 3: ENERGY PRICES

Table A3.1: Energy Prices End-use Sectors, 2003 (€/unit)

	Steam Coal	Heavy fuel oil	Light fuel oil	Un-leaded gasoline (premium (BMB 98))	Diesel (Eurodiesel)	Natural Gas	Electricity
	tonne	tonne	tonne	litre	litre	m ³	kWh
Industry	27.9	100	0.26	0.72		0.211	0.0374 -0.0566
Households	69.7*		0.30	0.72	0.59	0.211	0.0725
Services	69.7*	100	0.26	0.72	-	0.216	0.0751
Electricity Generation	27.9	100	-	-	-	0.122	

Sources: Croatian sources

Notes: All prices are exclusive 22% VAT
End-user prices for industry depend on voltage level

* Brown coal / lignite

ANNEX 4: ORGANISATIONS VISITED BY THE REVIEW TEAM

The review team met representatives of the following organisations:

- Ministry of Economy, Labour and Entrepreneurship (Ministarstvo gospodarstva, rada i poduzetništva)
- Ministry of Environmental Protection, Physical Planning and Construction (Ministarstvo zaštite okoliša, prostornog uređenja i građenja)
- Ministry of European Integration (Ministarstvo europskih integracija)
- Croatian Energy Regulatory Council (Vijeće za regulaciju energetske djelatnosti)
- Energy Institute "Hrvoje Požar" (Energetski institut Hrvoje Požar - EIHP)
- Environmental Protection and Energy Efficiency Fund (Fond za zaštitu okoliša i energetske učinkovitost)
- Hrvatska Elektroprivreda d.d. (HEP)
- HEP ESCO d.o.o.
- HEP District Heating (HEP Toplinarstvo d.o.o.)
- Croatian Independent System and Market Operator (Hrvatski nezavisni operator sustava i tržišta d.o.o.)
- Industrija Nafte d.d. (INA)

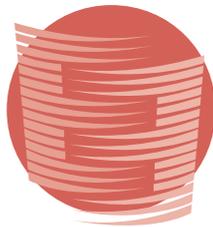
GLOSSARY

BIOEN	Biomass and waste utilisation programme
CARDS	Community Assistance for Reconstruction, Development and Stabilisation (EU assistance programme for the countries of the Western Balkans)
CERC	Croatian Energy Regulatory Council
CFL	Compact Fluorescent Lamp
CHP	Combined heat and power, also known as cogeneration
CO ₂	Carbon Dioxide
COP	Conference of the Parties to the Kyoto Protocol
CROISMO	Croatian Independent System and Market Operator
CROTOK	Energy development of islands programme
DSM	Demand-side management
ECO label	Environmental label
EIHP	Energy Institute "Hvroje Požar"
EN	European Standard
ENWIND	Wind energy utilisation programme
ESCO	Energy Service Company
EU	European Union
€	Euro
FC	Final Consumption
GDP	Gross Domestic Product
GEF	Global Environmental Facility

GEOEN	Geothermal energy utilisation programme
Gg	Gigagram
GHG	Greenhouse gas
GJ	Giga Joule
GWh	Gigawatt hour
HBOR	Croatian Bank for Reconstruction and Development
HEP	Croatian Electricity Company (Hrvatska elektroprivreda)
HRK	Croatian Kuna
I.C.	Implementation Centre
IEA	International Energy Agency
INA	Croatian Oil and Gas Company (Industrija nafte)
IPP	Independent power producer
IPPC	Integral Pollution Prevention and Control (Directive)
JANAF	Jadranski Naftovod, joint stock company (operator of oil pipeline system)
kg	Kilogram
km	Kilometre
km ²	Square kilometre
KOGEN	Cogeneration programme
ktoe	Thousand tonne of oil equivalent
KUENbuildings	Energy efficiency in building construction programme
KUENcts	Energy efficiency in centralised heating systems programme

kV	Kilovolt
kWh	Kilowatt hour
LPG	Liquified Petroleum Gas
m ²	Square meter
m ³	Cubic meter
MAHE	Small hydro-electric power plants construction programme
MELE	Ministry of Economy, Labour and Entrepreneurship
MIEE	Industrial energy efficiency network programme
MOL	Hungarian Oil and Gas Company
Mt	Million tonne
Mtoe	Million tonne of oil equivalent
MW	Megawatt
MWh	Megawatt hour
n.a.	not available
NGL	Natural Gas Liquids
NGO	Non Governmental Organisation
OECD	Organisation of Economic Co-operation and Development
PEEREA	Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects
PJ	Peta Joule
PLINACRO	Croatian gas pipeline installation programme
PLINACRO	PLINACRO d.o.o. (Croatian natural gas transportation company)
PPP	Purchase power parity

R&D	Research and Development
RWE	RWE Aktiengesellschaft
SUNEN	Solar energy utilisation programme
TJ	Tera Joule
toe	Tonne of oil equivalent
TFC	Total Final Energy Consumption
TPES	Total Primary Energy Supply
TRANCRO	Energy efficiency in transport programme
TWh	Terawatt hour
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US\$	United States Dollar
VAT	Value Added Tax



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Energy Charter Secretariat
Boulevard de la Woluwe, 56
B-1200 Brussels, Belgium

Tel: +32 (0) 2 775 98 00
Fax: +32 (0) 2 775 98 01
E-mail: info@encharter.org

www.encharter.org