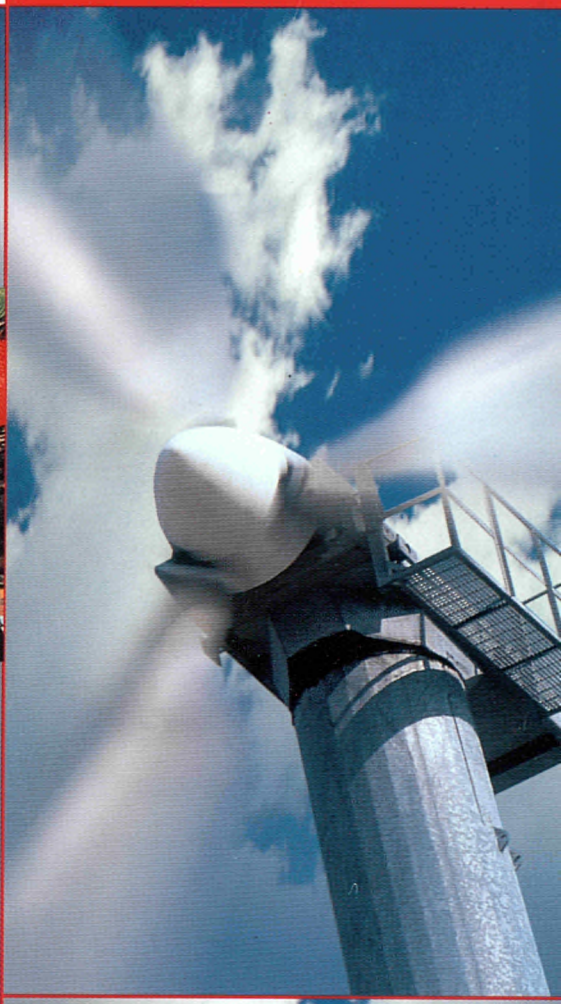
EUROPEAN COMMISSION

THERMIE

The demonstration component of the JOULE-THERMIE Programme



International Co-operation on Energy Technology

Sectoral Report 1995-98

Directorate General for Energy (DG XVII)

Published by the EUROPEAN COMMISSION

Directorate-General XVII Energy / B-1049 Brussels

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 1998

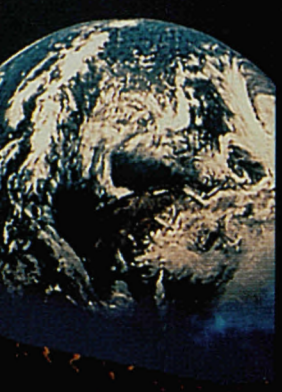
ISBN 92-828-3798-X

Printed in Italy

THERMIE INTERNATIONAL CO-OPERATION

THERMIE SECTORAL REPORT

Overview of THERMIE activities 1995-1998



CONTENTS

WHAT IS THERMIE?

JOULE-THERMIE was launched in 1995 as the European Union's first 'integrated' programme, bringing together the resources of the Directorates-General XII (Science, Research and Development) and XVII (Energy). This programme is part of the Fourth Framework Programme of Research and Technological Development (RTD), one of the most extensive research initiatives available to European companies and research organisations. The aim is to support the wider utilisation of non-nuclear energy technologies from research and development, through demonstration, towards the goal of the penetration of these systems into the market place both in the European Union and world-wide. The programme runs until 1998 and has a total budget of 1,030 MECU, of which 566 MECU are allocated to the THERMIE demonstration component of the programme.

Energy is fundamental to the existence of society, as without it industry, commerce and civil society cannot function. Fortunately, the earth is endowed with considerable energy-giving resources, mainly in the form of fossil fuels, such as oil, gas and coal. These are, however, unevenly distributed globally and are finite, so their use raises questions regarding security of supply and environmental sustainability. The JOULE-THERMIE programme supports research and technological development aimed at addressing these issues through the demonstration of technologies which enable us to reduce our energy demand, and to use what we need more cleanly and efficiently.

THERMIE focuses on the targeted demonstration of clean, efficient, cost-effective, and environmentally-friendly energy technologies. These consist of renewable energy technologies, technologies for the rational use of energy in industry, buildings and transport, technologies for a clean and more efficient use of solid fuels and for a better exploration, distribution and transport of hydrocarbons. THERMIE is designed to help reduce the cost of technologies and improve their performance in order that they penetrate the market. It supports actions to prove the technological and economic viability of these technologies and promotes their wider replication and market penetration both within the EU and beyond, particularly in the countries of Central and Eastern Europe and the developing world.

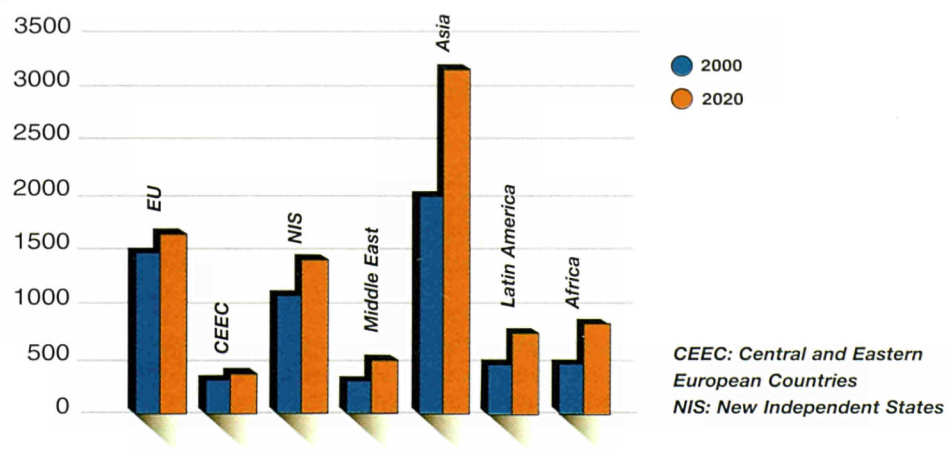
A key element of THERMIE today is that its activities must consider and respond to the real needs of market actors and the final consumer. It is not enough that technologies are developed and successfully demonstrated. A primary objective of the programme is to ensure that technological improvements are truly relevant to the needs of industrial, commercial and domestic society. This will help to ensure the availability of reliable, environmentally-acceptable and durable energy services (such as heating, lighting, transport or industrial processes) at affordable cost. By doing so, industry and society are able to reap the many benefits of the new technologies in terms of environmental protection, improved competitiveness, growth and employment. The final call for proposals under THERMIE was made at the end of 1997. The programme ends in 1998, after which a new programme will be developed as part of the Fifth Framework Programme.

EXTENDING THE WORK OF THERMIE TO INTERNATIONAL MARKETS

THERMIE has increasingly supported international co-operation actions with non-EU countries to accelerate improvements in energy technologies world-wide. This co-operation helps to address global environmental concerns, contributes to sustainable development and promotes European excellence in energy technology RTD to world-wide markets.

Despite energy efficiency gains in both the supply and demand sectors, demographic and economic growth is leading to a steady increase in world global energy consumption that is predicted to grow by some 1.6% per year, from an estimated 8.4 btoe in 1995 to about 13 btoe in 2020. The growth occurs in all regions of the world, but is greatest in newly industrialised regions of Asia and the developing world with high levels of economic growth.

Figure 1: Energy Consumption Forecast by Region, 'Conventional Wisdom' Scenario [1]



This expansion implies an expanding demand for energy goods and services to meet energy supply needs. At the same time, it will be crucially important to provide energy efficiency technologies on the user side to help to reduce the disparity between supply and demand in the mid- and long-term and to reduce environmental damage.

1. *European Energy to 2020 - A Scenario Approach, European Commission, 1996.*

Consolidating RTD policy objectives and energy policy objectives

Research and technological development investments are increasingly exploited in a wider international context. International co-operation is fundamental to Europe's current and future approach to RTD. The Fourth Framework Programme spells out overall goals for international RTD co-operation: strengthening European competitiveness and developing technologies for future markets; promoting responsibility and conducting RTD on major problems of the 21st century; contributing to sustainable growth for developing countries; and finally, ensuring mutual benefits are obtained by all co-operating participants when sharing information[2].

These goals are supported through a series of Communications formulating specific strategies for RTD co-operation between the European Commission with Developing Countries, Industrialised Countries, Associated Countries of Central and Eastern Europe and Emerging Economies.

Addressing environmental concerns

The energy implications of climate change are very significant as global emissions of CO_2 are predicted to increase substantially over the next two decades. About three quarters of this increase will originate from developing countries due to population growth and increased industrialisation. It is essential that the demands for new energy capacity are balanced with efforts to maximise environmental protection.

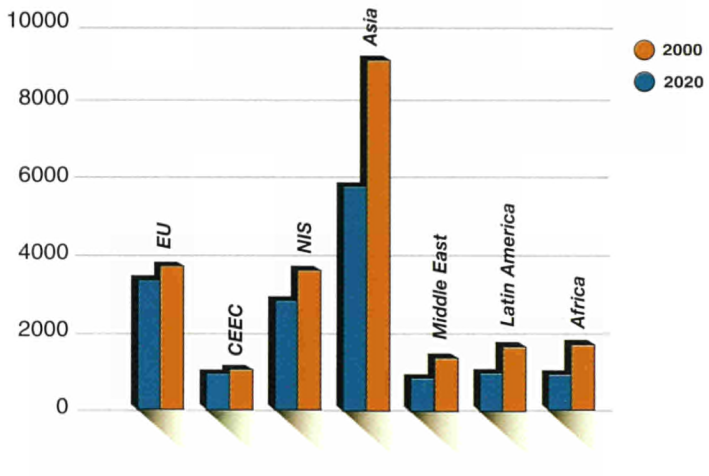
The significance of energy's contribution to climate change is recognised by the global political community. At the world conference on climate change in Kyoto, the EU was one of the strongest supporters of tough but realistic targets for CO_2 reduction – subscribing itself to a reduction of CO_2 emissions of 8% below 1990 levels during the commitment period.

Europe is in a strong position to offer clean and efficient energy technologies that can provide cost-effective and environmentally-sound solutions for the world's energy demands. Assistance to developing and emerging economies from THERMIE encourages the uptake of sustainable technologies in both the demand and the supply side. This integrated approach will therefore encourage solutions that tackle the need for the growing energy demand at the same time as encouraging the implementation of energy-efficient technologies to minimise energy demand growth over the mid- and long-term.

---

2. Communication from the Commission to the Council and the European Parliament: "Perspectives for International Co-operation in RTD", COM(95)489 final.

Figure 2: CO_2 Emission production forecast by region, 'Conventional Wisdom' Scenario [3]

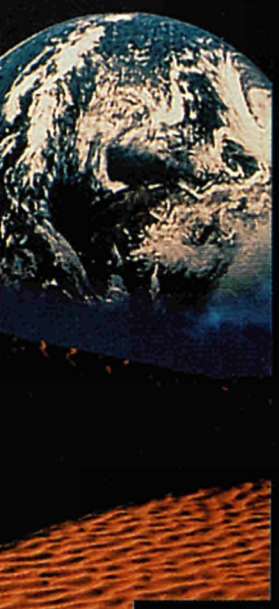


Strengthening the competitiveness of European industry

The liberalisation of energy markets and the increasing globalisation of economies offer expanding market opportunities for Europe's energy technology industries, but at the same time represent a challenge because of increasing competition, in particular from Japan and the US. In the future, the competitiveness of European firms will be increasingly governed by their ability to succeed in a global marketplace, helping to achieve the widest possible deployment of effective technological development.

Bearing in mind that for many technologies, the major growth markets lie outside Europe, THERMIE support provides non-European countries with access to information and experience on the best energy technology options and helps to encourage developing and emerging economies to select sustainable technologies. This approach also helps to improve the competitiveness of European energy technology companies in non-EU markets by facilitating their access to these markets and reducing the often substantial risk factors.

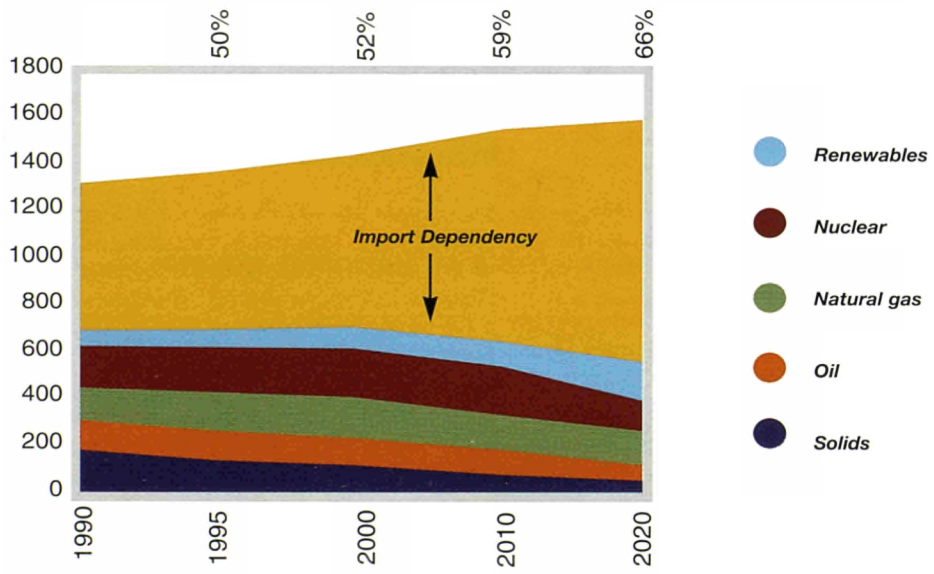
3. *European Energy to 2020 - A Scenario Approach, European Commission, 1996.*



Securing efficient and economic energy supply

Despite progress in the last decade, the European Union will be increasingly dependent on outside markets for the majority of its energy supply. New energy technologies and improved energy services can help to minimise the impact of rising fuel prices resulting from high global energy demand, and help to reduce the import dependency. In this context, co-operation with non-EU energy producing countries remains essential to safeguard supply security, but also with non-EU consuming countries in order to ensure the stability of world energy markets.

Figure 3: Energy Demand Forecast for the European Union, 'Conventional Wisdom Scenario[4]



4. *European Energy to 2020 - A Scenario Approach, European Commission, 1996.*

Mutual benefits: addressing the needs of the markets

THERMIE's international co-operation actions aim to ensure the provision of appropriate technological solutions to meet the needs of the target country or region. In particular, THERMIE emphasises:

- coherency with energy policy guidelines of the European Union and the target country;
- acceptance of the activities by and involvement of relevant local partners;
- direct co-operation between producers and users of technology;
- seeking solutions for local end-use needs, including electrification, cooling, heating, water pumping, energy efficiency gains for industries etc;
- follow-up measures to support the technology transfer activities.

These principles ensure a flexible market oriented approach based on the needs of the recipient country or region, rather than an inflexible single-doctrine approach. It also helps to ensure that relevant socio-economic issues are taken into account, thus helping social benefits to take place when the energy profile or supply to local communities or industries is improved.

Establishing strong international partnerships and networks

International co-operation also helps to establish strong partnerships and networks between entities in the EU and in third countries. These partnerships help countries or regions to benefit from the shared experiences and information provided from their links with the EU, and assist in the more rapid uptake of new and appropriate technologies where they are needed. Three networks have been set up with THERMIE support, in Central and Eastern Europe (the FEMOPET network), Southeast Asia (the ASEAN Renewable Energy Network) and Southern Africa (the Southern Africa Renewables' Network).

DIS-1060-96-UK/FR/AT/GR/DE
The ASEAN Renewable Energy Network

A pilot project investigated the potential and opportunities for an ASEAN Renewable Energy Network during 1997 and 1998, concluding that despite the economic crisis in the region, there is strong local support for implementing renewable energy projects. A first operation phase, to be launched by the end of 1998, will focus on energy applications for rural areas in five countries (Indonesia, Malaysia, Philippines, Thailand, Vietnam). Agencies from those countries will work with European partners for networking, exchange of experience and information dissemination, as well as investigating the options for developing a self-sustaining network in the future, to which other partners from the region may join.

MEANS OF IMPLEMENTATION

Types of activities supported

THERMIE activities in non-EU countries represent a natural extension to those carried out in the European Union. For most of the target regions, THERMIE supports essentially dissemination activities, helping to identify and target appropriate energy technology markets in third countries. These activities aim to overcome barriers to industrial co-operation with those markets, adapting experiences in the European Union to reflect local needs and opportunities and ensure mutual benefit.

The type of activities supported include:

- market potential assessment studies
- feasibility and bankability studies
- conferences, seminars, exhibitions
- technical workshops, business missions
- opportunity guides and publications
- training schemes
- networking.

These activities were initiated by multi-national teams of organisations active in the energy field (energy agencies, industry, engineering offices, consultancies, institutes, NGOs, etc.) in response to an open call for proposals, issued in 1994 and valid until December 1997.

Opportunities for non-EU organisations to participate

- All non-Member States that are associated with the Fourth Framework Programme – Iceland, Liechtenstein, Norway, Israel – have been given the possibility of full participation in THERMIE and receive Community funding.

- For other non-Member States, the level of benefit has varied according to the country/region. In particular, the programme has been opened on a project-by-project basis to:
  - 1. Non-EU European countries (Cyprus, Malta, Turkey, Central and Eastern European Countries and European Countries of the former Soviet Union). Limited financial support has been made available for organisations from these countries through the INCO programme budget allocated to THERMIE for this purpose.
  - 2. Canada, South Africa, Switzerland, as well as intergovernmental organisations such as the UN. Their participation has to be financed by the resources of the organisation concerned.

- Entities from non-European countries of the former Soviet Union and developing countries have been allowed to participate in THERMIE as contractors in their own right. Nevertheless they can join in THERMIE actions, for example through subcontractual schemes, in order to ensure that local needs are met and that results are usefully used by relevant local players.

EU-South Africa Science and Technology Co-operation Agreement

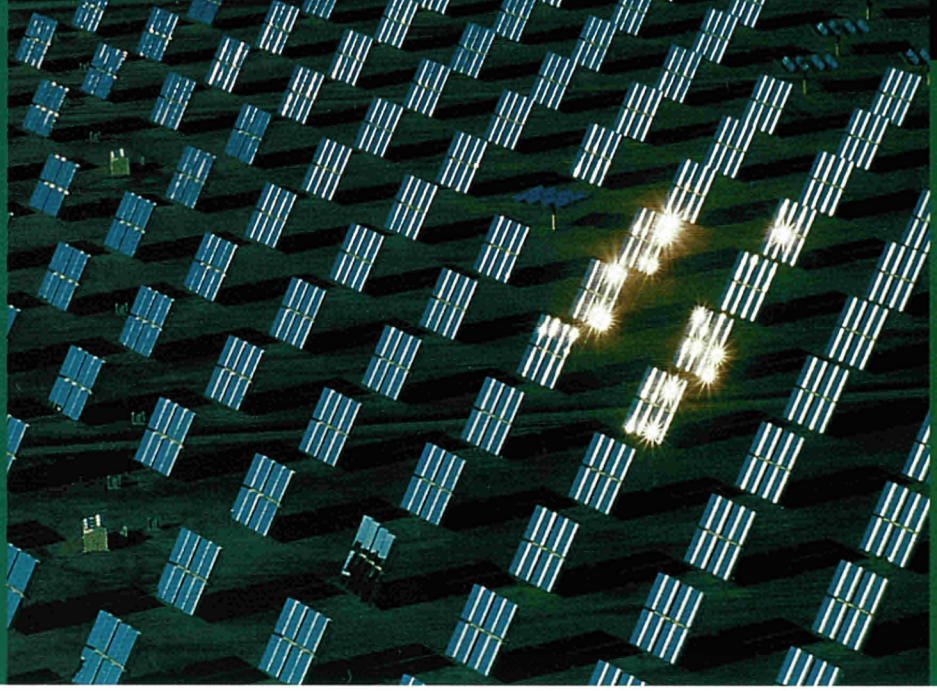
The S&T Co-operation Agreement between the EU and the Republic of South Africa, signed in 1996, aims to encourage and facilitate co-operation between the two parties in research, technological development and demonstration. This agreement enables South African legal entities to participate in RTD projects related to the Fourth Framework Programme, and a reciprocal participation by EU entities in South African projects in similar areas of RTD.

Links with other EC programmes and international initiatives

Many other programmes and financial institutions also offer aid and assistance to third countries in related fields to those of THERMIE. THERMIE ensures close co-ordination and collaboration with other Community programmes to ensure that duplication of effort is minimised and the greatest impact achieved from the funding provided. Such co-ordinated support helps to tackle not only energy technology issues but also policy framework and financial/technical assistance issues.

These programmes include: the INCO programme for RTD co-operation with third countries and international organisations (DG XII); the SYNERGY programme for international co-operation in the energy policy field and institutional building (DG XVII); the technical assistance/economic co-operation programmes that devote part of their important budgets to energy activities, like PHARE, TACIS, MEDA, or that are exclusively energy oriented like ALURE and COGEN (DG I); as well as the ACP development co-operation activities implemented within the Lomé Convention (DG VIII).

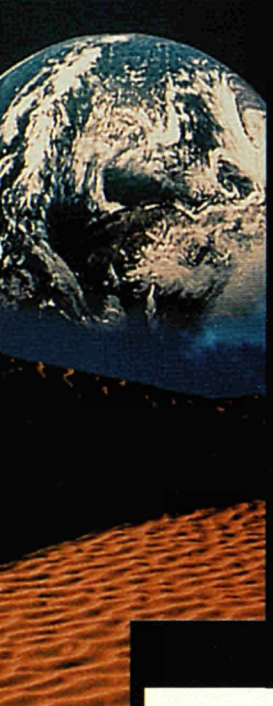
THERMIE activities in third countries aim to support the introduction of locally adaptable advanced energy technologies and, thereby, to facilitate the access of such countries to the technology and knowledge available in Europe. However, THERMIE is not designed to fund demonstration projects outside the EU and cannot provide finance for installing technologies in those markets. Its ability to achieve concrete results in these regions therefore depends to a large extent on the maintenance of regular contacts and close co-operation with partners that are able to provide this type of direct financing. Besides private investors, THERMIE partners include institutions like the European Bank for Reconstruction and Development (EBRD) and the World Bank, with whom joint activities designed to overcome financial barriers to market penetration of energy technologies have been developed in outside markets.



Programmes at Member State level for energy co-operation with third countries are also numerous. These offer opportunities for widespread European co-ordination, and for co-financing of THERMIE activities by Member States.

DIS-150-95-UK/DE and DIS-1733-98-UK/DK Collaboration with the EBRD

In a 1995 project, an EU consortium identified 'bankable' energy efficiency projects, in line with EBRD's sectoral priorities in the Czech and Slovak Republics. This action, co-funded by the Bank, identified projects worth 30 MECU eligible for EBRD Energy Saving Funds set up jointly by the EU and EBRD and, in one case, by a private investor. A follow-up replication action in 1998 focuses on Ukraine, Russia and Central Asian countries where the potential for energy efficiency investments are vast, especially in the industry and district heating sectors.



PROGRESS TO DATE FOUR YEARS IN FIGURES

THERMIE has taken a phased approach towards activities targeted at third countries. This approach starts with the identification of successful and relevant European technologies, followed by an assessment of the market potential for the penetration of those technologies, especially those demonstrated with THERMIE support, and then a focus on actions to reduce or eliminate barriers to industrial co-operation in order to facilitate the access to foreign markets. The emphasis over the first two years of the programme (1995-1996) was on market analysis and the development of tools to promote EU technology and know-how. The initiatives supported during 1997-1998 built on these previous activities, and broadened horizons. They aim to achieve specific and tangible results, following on from initial market studies. The predominant type of action supported was an event combined with a study, publication, seminar/workshop and/or business mission.

Table 1: Number of actions supported in each region

Region	1995	1996	1997	1998	Total
Central and Eastern Europe	18	15	8	8	49
NIS	11	4	9	6	30
Mediterranean Basin	3	8	3	4	18
Latin America	6	10	7	5	28
Asia	9	7	10	8	34
Africa	4	4	5	3	16
Cross-regional Activities	2	11	3	3	19
Total	*53*	*59*	*45*	*37*	*194*

Table 2: Number of actions supported by sector

Sector	1995	1996	1997	1998	Total
Fossil Fuels	19	21	11	7	58
Rational Use of Energy	6	12	9	7	34
Renewable Energy Sources	12	16	22	18	68
Trans-sectoral and Strategic Activities	16	10	3	5	34
Total	*53*	*59*	*45*	*37*	*194*

Table 3: Budget allocation per region ('000 ECU) (1995-1998)

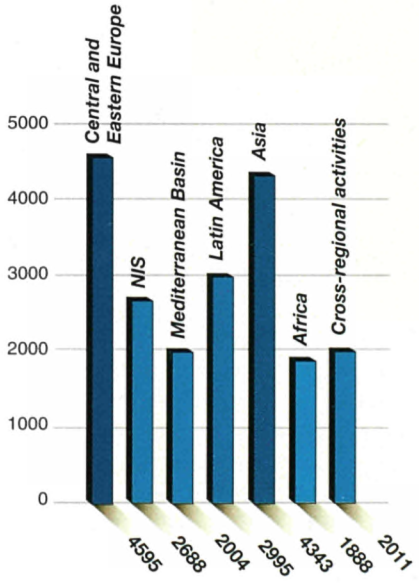
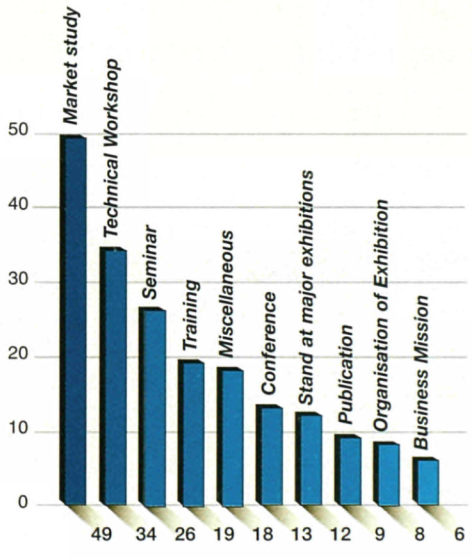


Table 4: Type of actions supported (1995-1998)



CURRENT STATUS OF THERMIE INTERNATIONAL CO-OPERATION ACTIVITIES

Activities in Central and Eastern Europe

The energy challenges facing Central and Eastern European countries (CEECs) as they strive to improve their economies are considerable. In 1995, the energy intensity of these countries was three times higher than that of Member States' performances. Predictions suggest that this difference will still be 50% higher in 2020 despite energy intensity gains expected from energy pricing reforms and technology investments. Primary energy demand, on the other hand, should recover to somewhat above 1990 levels by 2020. Due to the region's heavy dependency on imported fuel, there is a great interest in opportunities to increase energy efficiency, in the cleaner use of fossil fuels and in renewable energies. Environmental protection issues are a further reason for improving the use of energy resources as a major part of air pollution and land deterioration is caused by energy production and poor efficiency of energy consumption processes. CO_2 emissions are set to increase from 1995 to 2010 by 35%. Although countries of Central and Eastern Europe will not be forced to cut their emissions, forecasts show that CEECs many only succeed in reaching their Kyoto commitments by a margin of less than 1%.

Reforms made in most CEECs over the past four years towards industrial restructuring and privatisation opened up vast opportunities for energy technology transfer. New energy technologies play a vital role in tackling energy efficiency and environment requirements imposed by the accession process, such as the development of energy efficiency and fuel quality standards.

Enlargement process towards Central and Eastern Europe

On March 25, 1998, the European Commission approved Accession Partnerships (APs) for the ten applicant countries of Central and Eastern Europe and Cyprus. These are a key part of the enhanced pre-accession strategy to guide the applicants towards EU membership. Each AP supports the applicant country in its preparations for membership by setting out both the priority areas for further work identified from the Commission's Opinions and the financial assistance from the EU available to help tackle these problems. Objectives include primarily the energy and environment areas.

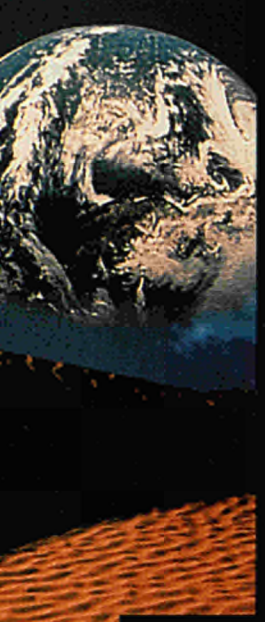
THERMIE benefits in the region have been optimised by targeting most actions on the ten **Associate CEECs** that are part of the inclusive enlargement process, namely **Hungary, Czech Republic, Slovakia, Slovenia, Bulgaria, Romania, Poland, Estonia, Latvia and Lithuania**. In parallel, co-ordination with Commission programmes (e.g. PHARE and SYNERGY) and other EU energy initiatives (e.g. the Energy Charter Treaty) has been ensured in order to maximise the impact of actions with regard to EU energy policy objectives. The most recent initiative was the Memorandum of Understanding signed on March 30, 1998 by the European Commission, EIB, EBRD and World Bank, mobilising available resources from the EU and International Financing Institutions to support accession of CEECs.

During 1995-98, THERMIE has supported 49 actions in Central and Eastern Europe, some of which cover part of the former Soviet Union. These actions have focused on technology market assessments and the dissemination of information to create local awareness and to facilitate market actors' decisions to incorporate efficient EU technologies. Emphasis has been placed mainly upon RTD energy efficiency issues and on renewable energy dissemination projects.

In the **Baltic States** and **Poland**, the focus has been on promoting energy technology transfer in various end-use sectors such as district heating systems, heat recovery, alternative energy sources and clean coal utilisation. Various opportunities for technology investments have been developed in the Baltic States, in particular in the fields of district heating and co-generation utilities. The coal sector was the main focus of THERMIE activities in Poland.

STR-239-95-DK/B/D/LUX/IRL
Promoting energy technology transfer in the Baltic region

This action comprised seven workshops/seminars throughout the Baltic region, where EU and local suppliers gave technical overviews on the need for performance technologies and equipment (e.g. wood processing and small hydro technologies), to local public sector and industrial delegates. Site visits gave opportunities for technology transfer and joint ventures discussions between EU and local suppliers. New partnerships formed as a result of these events include the Polish small hydro power company WAFAPOMP with the Finnish WTP as well as initial contacts between the Austrian Voest Alpine and ZRE Brodek regarding co-operation arrangements.



In **Central European countries** special emphasis has been put on actions for financing the transfer of technologies. For instance support was given to a project to promote modern financial instruments – Third Party Financing, Energy Service Companies – in Slovakia. With the Energy Efficiency Unit of EBRD, THERMIE also supported an initiative to identify 'bankable' projects in the Czech Republic and Slovakia, involving potential EU manufacturers willing to export their products. This work has now been extended to Russia and the Ukraine where mechanisms to fund energy efficiency projects and access to information are still a considerable challenge.

The **Black Sea Region** has also been a target area for THERMIE activities in CEECs. THERMIE has supported assessment studies demonstrating the need for the transfer of EU technological skills and know-how in Bulgaria, Romania and the Republics of the former Yugoslavia. Obsolete technologies are an obstacle to compliance with 'Community acquis' in Bulgaria and Romania. THERMIE has supported a series of technology assessment studies and promotional events designed to demonstrate the advantages offered by selected EU technologies to match the local industry needs.

STR-259-95-EL/PT
Identification of sectoral priorities for technology investments in the Balkan countries

This project provided an overview and assessment of THERMIE and other programmes' activities in five Balkan countries: Bulgaria, Romania, Albania, Croatia and FYROM. It was supplemented by a series of field missions including meetings with local energy authorities and industrialists. As a result of the workshop that closed this project, recommendations were made and categorised as high or medium to low priority for future demonstration/dissemination activities matching most pressing needs. The Balkan FEMOPET will now build on this work, while follow-up THERMIE dissemination projects target specific issues (e.g. "financing possibilities for the application of clean coal technologies in the Balkan countries").

The Energy Charter Treaty

The Energy Charter Treaty (ECT) is the legal framework that embodies the principles of the European Energy Charter, an initiative launched by the European Council in Dublin in 1990 for energy co-operation with Eastern Block countries. The Charter's objectives are: to stimulate economic growth through liberalisation of investment and trade between energy producers and consumers; to promote energy co-operation on the basis of market economy, serving mutual interests and respecting non-discrimination; to support structural reforms and modernisation of the energy sector in countries in transition, and to facilitate access to and transit of energy resources. The Treaty came into force on 16 April 1998 and so far 49 States and the European Community have signed the ECT. Ukraine and the Russian Federation should soon join this group.

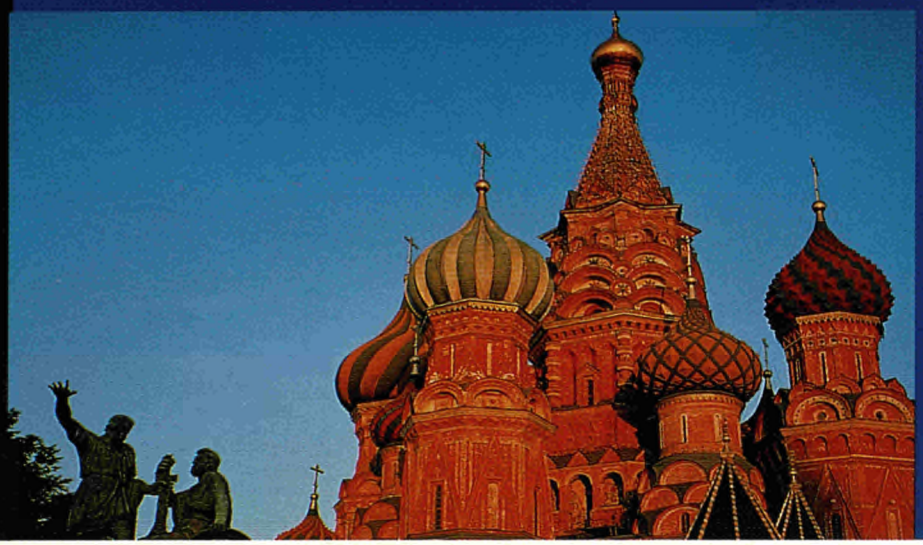
In addition to dissemination actions, THERMIE has also created the **FEMOPET Network** – Fellow Members to the OPET Network (Organisations for the Promotion of Energy Technologies) – in candidate countries of Central and Eastern Europe. The FEMOPETs are an extension of the existing OPET Network in those countries. The FEMOPET Network aims to contribute to the opening of CEEC markets to wider European co-operation in energy RTD and to foster market penetration of successful new and innovative energy technologies, in particular those supported through the JOULE-THERMIE programme. The network was established at the end of 1997, and comprises 13 organisations established in all accession countries of CEECs. It may be extended to include Cyprus in late 1998.

The FEMOPET Network's objectives

The objectives of the FEMOPET Network are seven-fold:

- To assess the real needs of market actors in order to encourage them to utilise clean and efficient energy technologies in their day-to-day operations, businesses and environment;
- To develop and implement a focused and targeted set of tasks which respond to the real needs identified, in the most cost-effective manner possible;
- To achieve concrete results, to understand the impact of the tasks and to 'measure' the successes of the activities;
- To publicise and promote the achievements of these tasks to a wider audience in order to replicate the successes in as extensive and rapid a manner as possible;
- To ensure that the information and experience produced through the Network's activities and in JOULE-THERMIE is disseminated throughout the Network as a whole, and to other programmes and initiatives at the level of the EU, the Member States and internationally;
- To integrate and co-ordinate with the European and national/regional energy RTD infrastructure, including other European networks (supported under SAVE, INNOVATION, ALTENER, SYNERGY, etc.).

Opening of FEMOPET Lithuania, June 1998, Kaunas.



Activities in the New Independent States

The Community of New Independent States (NIS) includes 12 Republics[5]. Since the disintegration of the Soviet Union, the Republics of the Community of New Independent States have been facing serious political and economic difficulties which have gravely affected the energy sector. Today, energy intensity levels four times higher than the EU, lack of investments, lack of new technologies to maintain and develop the national fuel and energy supply systems and the low technical level of the major production installations are the main features that characterise the present critical situation in the NIS energy sector.

In this respect, strengthening of activities was given priority in the light of the enormous potential for energy conservation in the region, with a special focus on Russia, Ukraine and Central Asia. During 1995-98, THERMIE has supported 30 actions in the NIS. Projects have mainly included workshops on maintenance of equipment and safe technological management training in the fields of oil and gas production, promotion of efficient heat technologies, identification of energy-efficient projects in the field of district heating and promotion of solar technologies. THERMIE supported 25 actions in the Russian Federation and Ukraine, some covering other republics such as Belarus. These included workshops on effective oil and gas recovery techniques and safety and field management techniques and energy efficiency measures in the industry, district heating and transport sectors.

DIS-138-95-UK/IT/NL, DIS-1015-96-FR/UK, DIS-1257-97-FR/DE/UK
Oil and Gas Exhibition 1995-1996-1997, Tyumen, Russia

This is an important annual event at which oil and gas innovative technologies from all over the world are promoted. THERMIE participation helps to strengthen long-term relations between EU and Western Siberian energy suppliers. Several EU companies (ROOSCOR Int. BV. from The Netherlands, SERCEL from France, MESSER Griesheim from Germany) exhibited at the THERMIE stand and participated in business meetings arranged by the contractors and Commission officials. Through this event, Western European companies have been able to assess the opportunities for investments and exploration/production activities in the Tyumen region, to promote EU capabilities in oil and gas technologies, and to develop European-Siberian joint ventures.

5. Russia, Ukraine, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan and Uzbekistan.

An EC-Russia Scientific & Technological Agreement

In 1997, the Commission was given a mandate to negotiate a S&T Agreement with the Russian Federation. On the Russian side, an inter-ministerial authorisation for negotiating the Agreement was given in mid-1997. The goal of the negotiations is to conclude an agreement for co-operation in the sectors covered, on the EU side by the European Community's Fifth Framework Programme for RTD (1998-2002) and, on the Russian side, by federal programmes implementing priorities of S&T development. The agreement follows similar successful existing Agreements with Canada and South Africa. The terms of the Agreement should be finalised in principle by the end of 1998 for an initial period corresponding to the duration of the Fifth Framework Programme.

Central Asia is another priority area for THERMIE. Western oil and gas companies have been investing in the region massively over the last four years, and the TACIS programme supported a number of energy projects in Uzbekistan, Kazakhstan, Kyrghyzstan and Turkmenistan in the oil and gas sectors. Rational use of energy in industry is also very important for NIS in Central Asia. An on-going THERMIE project is assessing district heating companies and municipalities' utilities to identify energy efficiency projects. The results from this work will pave the way for targeted training and promotion activities.

Finally, Central Asian countries offer abundant possibilities for the extensive use of renewable energy sources due to local climatic conditions.

DG XVII's participation in the implementation of the INCO programme has supported co-financing and supervision of 16 renewable energy demonstration projects in CEEC and NIS since 1995.

ICOP-DEMO-4068-98-FR/UZ/PT/KZ
5 kW hybrid solar-wind demonstration project for electricity supply to remote sites

The objectives of the project are to install a system in Bekabad, Uzbekistan, for electricity supply based on the combined use of solar and wind energy linked to a battery storage. By 2000, design guidelines and technical specifications will be available to allow the replication of such systems in the Central Asian region. A database on the potential of such systems in the Eastern partners' region will also be an important output of the project to encourage a greater penetration of RE systems in their energy landscape.

Photo ISOFOTON, ES

Activities in the Mediterranean Basin and Gulf Region

The **Mediterranean region** supported through THERMIE lies from Tunisia and Algeria in the west through to the Arab states and Gulf countries and Turkey in the east. For twelve countries of the Mediterranean region[6] there is a common framework for co-operation through the Euro-Mediterranean Partnership, which covers, amongst other priority themes, the energy sector. These countries have significant potential in terms of natural resources, especially oil and gas, but also have very varied renewable resources and hence varying requirements for energy technology co-operation.

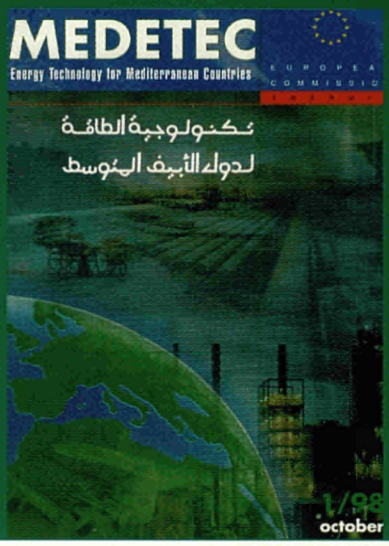
Though with only moderate energy consumption levels at present, the energy demand particularly for electricity in these countries is expected to triple between now and 2020 up to 458 Mtoe. Particularly, electricity demand is expected to increase five-fold, requiring investments up to more than 100 billion ECU. An important trend will be the switch to natural gas, in particular for combined cycle technology, but renewable energy sources also offer a great potential still to be exploited.

The Framework of the Euro-Mediterranean Partnership and its energy dimension

A new impetus to the Euro-Mediterranean Partnership was initiated through the Barcelona Conference in 1995, which defined the framework for the creation of an area of peace and stability, an economic area based on free trade and the development of economic and financial co-operation, the latter mainly through the MEDA Programme and EIB loans.

Energy has been recognised as one of the co-operation areas and the Ministerial Conference of Trieste in 1996 stressed the need to provide for enhanced energy co-operation and to define guidelines for the partnership. The Euro-Mediterranean Energy Forum, launched on 13 May 1997 and co-ordinated by DG XVII, provides an active tool for the continuity of the dialogue between all partners as well as the promotion of regional projects. In May 1998, the Euro-Mediterranean Conference of Energy Ministers agreed on three energy objectives, namely: security of supply, competitiveness and protection of the environment. The Ministers also adopted a five year Action Plan for the Euro-Mediterranean Energy Forum, to work in the areas of institutional, legislative and industrial co-operation.

6. Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Palestinian Authority, Syria, Tunisia, Turkey.



THERMIE supports best use of available resources by providing information on state-of-the-art of European technologies, in particular in energy efficiency and renewable energies.

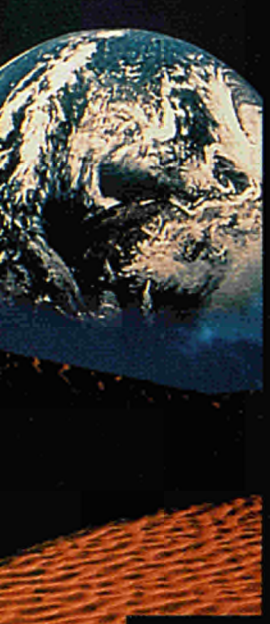
Information needs for energy market actors in the region are of prime importance. As a result, the 'Mediterranean Energy Information Network' has been established to monitor the energy sectors and energy projects of the individual countries. Another information action, the 'MEDETEC initiative', is a magazine for energy technology information exchange from and to the Mediterranean region.

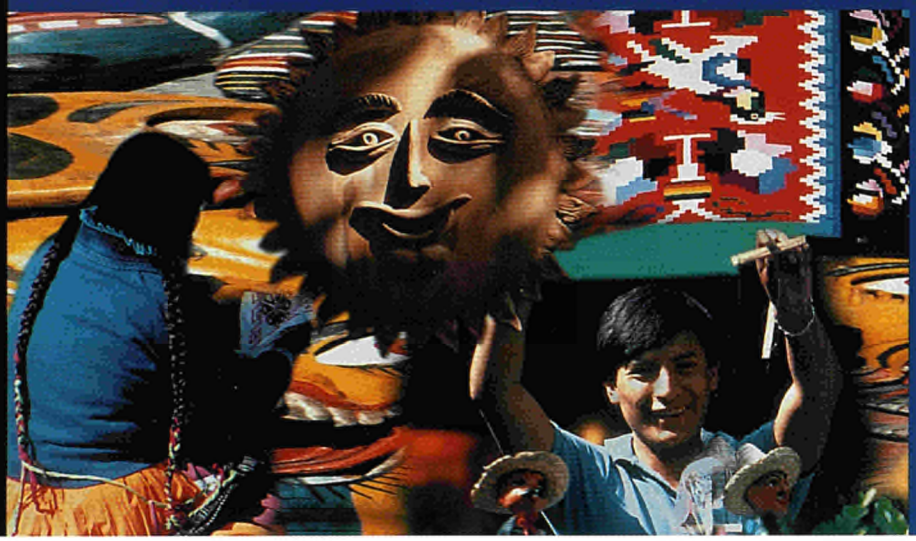
Renewable energy technologies are promoted through studies, workshops and exhibitions. Areas of cross-regional concern such as desalination and innovative financing options have been addressed by targeted initiatives. Industrial co-operation has been supported through a range of activities, such as two workshops in Palestine on PV technologies for water pumping and bioclimatic architecture that were held in 1997. Despite the sensitive situation of the region, these resulted in agreements to transfer EU technologies to Palestine in the field of solar water heating and greenhouse/space heating.

THERMIE activity with the **Gulf Region** has been largely focused on transfer of cost-efficient and advanced European oil and gas technologies. In addition to supporting the presence of the European industrial players at major exhibitions, targeted initiatives for an enhanced involvement with the Gulf Co-operation Countries have been initiated by European industrialists with THERMIE support.

SME-800-96-NL/UK
EU-Gulf Co-operation Council Conference on advanced oil and gas technology,
Bahrain, October 1997

The export market for European oil and gas companies to the Middle East is significant. However, they must market themselves strongly in the region because of competition, particularly from North American companies. In this context, THERMIE supported a large conference on European Oil and Gas Technologies in Bahrain, within the framework of the GCC-EU Co-operation agreement. This successful event helped to promote significant export opportunities for European technologies in this important hydrocarbon region, and cemented relations between the EU and the states of the GCC.





Activities in Latin America

With 350 millions inhabitants, Latin America is a rapidly expanding market for energy technologies. The picture differs greatly from country to country, but there are nonetheless a number of common points: strong economic growth, rising levels of total energy consumption (2.5% average annual rise is predicted to 2020), and a general trend towards liberalisation of energy markets. Rather than aiming to expand generation capacity, most Latin American energy policies are likely to focus on restructuring, privatisation and energy efficiency, requiring that energy must be priced at actual costs and social subsidies transparent. Clearly there are great opportunities for clean and efficient energy technologies to meet the rising energy demands from this region.

THERMIE has provided support to 28 actions in the region, either directed at the needs of the whole continent or specific regions, (such as with the Mercosur[7] countries or with Caribbean nations) or with individual countries or a small group of combined countries sharing similar problems and providing similar opportunities for EU technologies.

THERMIE activities reflect the great disparities between countries regarding the availability of indigenous fossil energy sources, as well as the lack of adequate infrastructures. THERMIE has supported market assessment studies, conferences and workshops to review and promote the energy opportunities for the region from the available resources. These include in particular oil and natural gas in the Mercosur countries and Chile, and renewables, especially biofuels in Brazil, wind in Argentina and biomass in Colombia. The studies also investigated opportunities for integration of energy markets between countries, such as electrical interconnection between Latin America and Caribbean countries and the market opportunities for EU technologies.

THERMIE initiatives on energy efficiency have targeted potential decision-makers and specific technologies. These have included an information campaign and practical demonstration of Monitoring and Targeting systems in Brazil jointly funded with the World Bank, the promotion of EU technologies for co-generation in hospitals in Argentina and, more recently, an integrated action to stimulate EU-Cuba co-operation in energy efficiency in the hotel sector.

7. *Argentina, Brazil, Uruguay, Paraguay.*

Photo Wagner & co, DE

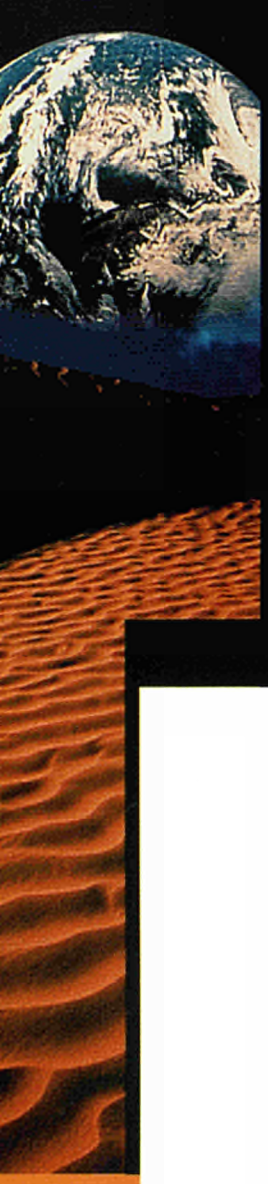
For renewable sources of energy, political and legislative changes are needed before the large potential resources are likely to be realised. However, it is increasingly recognised that renewables offer opportunities to meet many of the energy demands in the region, especially for rural power and to address environmental improvements. In this field, THERMIE has encouraged the consideration of sustainable development issues, for example through a study into sustainable cities in Argentina based on solar-PV technologies, an action to develop the solar thermal market in Brazil and the support for a techno-economic feasibility study to exploit biogas from a refuse dump in Colombia. Finally, rural electrification from renewables technologies has been investigated in Amazonia-Brazil, isolated areas in Argentina and in Ecuador in co-operation with the United Nations.

DIS-1208-97-ES/DE
Using biogas technologies in Medellin, Colombia

A previous THERMIE-funded study in 1995 demonstrated good prospects for the use of renewable energy sources in the Antioquia region in Colombia, especially in energy recovery from municipal solid waste. This project supported a techno-economic feasibility study of the largest landfill in Medellin and assessed the potential for using the biogas generated from the site, estimated to have a gross energy potential equivalent to 42,000 tonnes of oil per year, or about 65 GWh/year of electricity. The Colombian company Empresas Publicas de Medellin, co-financier of this action, will now develop the project using EU technology. A follow-up THERMIE action in 1998 will disseminate the results of the Colombia action through a seminar targeted at Latin American decision makers at municipal level, to encourage replication of the project in other countries.

SME-911-96-DE/ES/PT
Stimulating the transfer of European upstream oil and gas technologies to Mercosur

The Mercosur states have a considerable volume of geophysical data which could be exploited with further processing and for which many EU technologies and approaches developed by SMEs are applicable. This action supported two workshops in the region focusing on EU technologies for frontier exploration and for the upgrading of geophysical data, and a fact-finding mission in Brazil on environmental protection during drilling. These actions provided a platform for European companies to introduce new and innovative technologies to a technical audience from a vast opening and liberalising market.



Activities in Asia

The Asian region spans three major markets for energy technology co-operation: China, India and ASEAN, emerging as one of the world's largest markets for energy technologies. Whilst varying in their level of development and energy market patterns and in particular their different level of energy technology development, they have crucial elements in common: high economic and demographic growth rates and a rising energy demand, especially for electricity. Most Asian countries face infrastructural gaps, resulting in electricity shortages and losses, as well as poor network connections and non-electrified rural areas.

Asia is expected to consume about 50% of world energy production by 2020, associated essentially with the expansion of the power sector, thus offering a major market for EU clean and efficient technologies. This rapid expansion has significant environmental implications – by the turn of the century, Asia will account for more than 25% of world energy-related CO_2 emissions. This is expected to increase to over 30% by 2020 without further policy intervention. Clean coal technologies for electricity production, energy efficiency and opportunities from renewables form the basis of support provided by THERMIE to 34 actions in Asia, which are closely in line with the EU-Asia co-operation strategy for energy.

"Europe-Asia Co-operation Strategy for Energy" – the first sectoral policy initiative with Asia

In July 1997, the European Commission adopted a document defining strategic objectives for energy co-operation with Asia. This aimed to strengthen the security of supply, reinforce the participation of European industry in the Asian energy market and protect the global environment, through:

- modernising the electricity sector;
- introducing clean coal technology;
- promoting energy efficiency in all economic sectors;
- supplying energy to rural areas, in particular based on renewable energies, and
- increasing the use of natural gas.

China

With a quarter of the world's population, China is clearly a giant energy market. Despite the low levels of per capita wealth, China is still the world's largest consumer (and producer) of coal, the region's largest producer and second largest consumer of oil, and the world's second largest producer and consumer of electricity. Even gas, currently a marginal fuel in China, has an enormous market potential due to China's local environmental problems. The production and distribution of energy will be one of China's greatest challenges in coming years, together with reducing the environmental pollution resulting from its rapid economic growth. This includes minimising the increase in its carbon emissions: China accounts for about 13% of world's carbon emissions, and is expected to account for 90% of the world total by 2015, ranking second behind the USA.

China-EU Renewable Conference, September 1997, Beijing

In the Ninth Five-Year Plan (1996-2000), China plans to increase total energy production by about 9% and improve energy efficiency by 5% annually, in particular in the transport and building sectors. Coal and electric power industries are among the 15 industries targeted for technological upgrading. Emphasis is on power development based on coal, oil and gas exploration, and the development of new sources of energy, especially for rural electrification.

Along with these priorities, the 13 actions co-financed by THERMIE have focused predominantly on:

- the market opportunities for EU renewable energy technologies, in particular wind, biomass, solar and small-hydro, through comprehensive assessments and promotion of those key technologies having the greatest potential. This has included publishing of Opportunity Guides; organising business missions and target workshops; supporting EU industry participation in key energy events; and carrying out project feasibility studies in biomass and small-hydro.
- industrial co-operation for the transfer of clean fossil fuels technologies, in particular flue gas desulphurisation technologies in Chinese coal fired power plants, upstream oil and gas technologies and technologies for waste management and environmental protection during drilling.
- promotion of energy-efficient technologies in the buildings sector, in particular through experts' assistance to Chinese policy makers for the definition of specifications in future energy technology applications in buildings.

These actions have raised the awareness of EU decision makers of the huge market opportunities existing in China and provided important tools to overcome technical and non-technical barriers to market penetration. They have confirmed the long-term commitment of EU energy co-operation with China as it was underlined in the recent Commission Communication "Long Term Policy for China-Europe Relations". As a result, European manufacturers have been encouraged to consider collaborating with Chinese organisations. Some joint ventures have been set up or are planned in the near future, thus contributing to the reforms underway in China's energy sector.

SME-1904-98-FR/DE
Large scale decentralised rural electrification in China

This action aims to accelerate decentralised rural electrification using renewable energy in three Chinese provinces – Xinjiang, Inner Mongolia and Yunnan. China has been supporting various demonstration projects, which if successful should develop into large scale programmes. Conducted in collaboration with Chinese regional institutions, this study investigates organisational and funding factors necessary to establish a feasibility scheme for the electrification of 36 villages in the three provinces. These will be based on EU wind, PV and biomass technologies.

INDO-EU Seminar on Clean Coal, January 1997, New Dehli

India

India, as the seventh largest industrial economy in the world, represents one of the world's largest emerging markets. Its electricity demand is expected to rise to more than 200,000 MW in 2010 – which will require an installation of an additional 150,000 MW in the next decade. In addition, power shortfalls and transmission/ distribution losses need to be overcome to provide regular energy to the economic system.

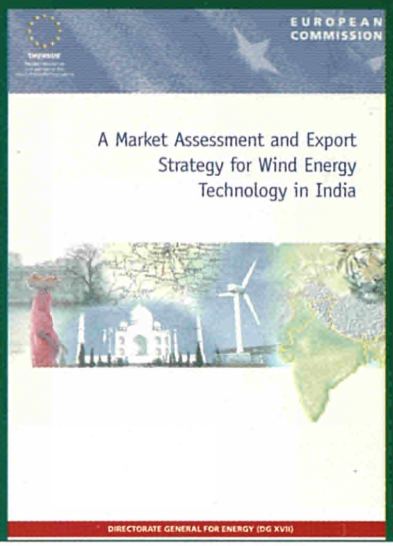
Energy production technology, based mainly on coal and the promotion and increase of renewable energy has been a central area for policy support, setting ambitious targets for capacity extensions and the provision of energy to rural areas for about 100,000 non-electrified villages. These targets offer substantial opportunities for European technology exports. Moreover, end-use application, in particular cleaner and more efficient vehicles and industrial applications, can contribute towards reducing the increasing demand and the slowly growing supply capacity.

Against this background, THERMIE has funded seven activities, in two main areas:

- clean coal technologies: supporting two high level conferences focusing on the environmental aspect of coal combustion and efficiency upgrading.
- renewable energies: focusing on solar PV technology, and on the promotion of European wind energy technology. Support for solar PV focuses on both the financing barriers and the technical/socio-economic barriers. For example, based on a previous project funded by DG XII (Research & Development), a feasibility study for a 1 MWp water pumping programme for two Indian states is being developed to prove the viability of PV at this scale.

DIS-426-95-DE/NL
Towards cleaner power production in India – First Indo-European Seminar on Clean Coal technology and thermal power plant upgrading, New Delhi, January 1997

The seminar gathered 300 Indian participants from ministries, institutions, State Electricity Board and independent power producers, and EU selected industrial representatives. The seminar focused on European experience in the field of coal technology developments. Both technical and economic aspects were highlighted, with the aim of encouraging cleaner use of coal in India. Technology focus was on clean coal combustion, coal homogenisation, environmental technology, ash deposition and utilisation, thermal power plant upgrading, renovation and lifetime extension and advanced coal fired power plant technology. Intensive discussions were held during the seminar and a post-event enquiry undertaken by the Associations for Large Power Plant Operators revealed that a large number of specific requests and direct industrial contacts have been initiated as a result of the seminar.



Asean

With a total population of about 400 million inhabitants, the ASEAN countries[8] represent an important market with, until recently, the highest growth figures in the world. The region embraces highly diversified economic situations, in particular after the recent economic crisis. Whereas the full extent of the impact of the economic crisis is not yet measurable, recent revised growth estimates still expect a fairly rapid recovery. In addition, energy market reforms such as enhanced liberalisation processes and network interconnections open up a large market for European technology suppliers.

In ASEAN, 13 actions were co-financed by THERMIE. Starting from general market assessments and definitions of marketing strategies for the whole region, more recent activities have been targeted at a single country to meet specific technology transfer requirements. They range from targeted technology promotion or tailor-made training packages to feasibility studies for demonstration projects supported by local authorities.

Europe's renewable energy industry is keen to expand into this region. This preference is shown through THERMIE's actions such as industrial exhibitions, feasibility studies for village electrification, and the establishment of networks such as the ASEAN-Renewable Energy Network. Energy efficiency is also important, especially where it is promoted through the national policies of the local ASEAN countries, such as in Thailand through the ENCON Programme for Energy Conservation Policy objectives, where THERMIE provided a training package on European energy conservation technology.

Vietnam-EU Technology Workshop, October 1996, Hanoi

8. *Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Vietnam.*

Activities in Africa

Sub-Saharan Africa has 9% of the world's population, but is responsible for only 2.5% of world economic activity measured by volume. Despite the great disparities among countries, in global terms the region consumes 2.7% of world commercial primary energy, as well as a large amount of biomass energy, principally fuelwood. The region has 2% of world proven oil reserves, 3% of world gas and 6% of its coal. There is massive hydro power potential, together with extensive solar irradiation. However, in spite of the extensive primary energy resources, the region's per capita commercial use is the lowest in the world.

The main issue affecting Sub-Sahara Africa is supply – how to ensure adequate, reliable, environmentally-acceptable and economically-sustainable supplies to a region which has not only the lowest per capita income in the world but also the fastest growing population, at over 3% per annum. The region shows an urgent need for new initiatives, namely:

- sustain fuelwood supplies and plan and develop rural afforestation programmes;
- inject massive local and international capital and technology in the energy sector;
- introduce incentive energy policies and institutional measures that enhance energy efficiency, encourage the clean and efficient use of indigenous resources and reduce the environmental threat caused by coal burning and domestic and bush fires.

In line with these major challenges and opportunities, the 16 THERMIE supported activities have highlighted those energy technology fields where the EU is best positioned to make an effective contribution to the sustainable development of the region and where EU industry is most likely to benefit from the opportunities. Actions have focused on two major distinct geographical blocks: African islands, in particular Cape Verde, and the southern Africa community.

On **Cape Verde**, renewable energy technologies for rural electrification will be promoted through a feasibility study for the optimisation of power supply system on islands. This action, launched in 1998, is expected to attract international funding and will result in the implementation of advanced European systems on Santo Antao island, which can be easily replicated elsewhere in the region.

In **Southern Africa**, the International Solar Energy Society Conference in Harare, September 1995, highlighted the substantial opportunities for EU clean and efficient technologies. With strong support and commitment from local authorities in southern Africa, THERMIE actions have centred on the promotion of EU renewable energy technologies, principally for rural electrification, energy-efficient technologies in the industry sector and on clean coal technologies mostly in South Africa.

Photo Neale Consulting Engineering Ltd, UK

This support has in particular encouraged a greater awareness of the region's high potential for benefiting from new, clean and efficient energy technologies. As part of this awareness raising, THERMIE supported a high level energy conference during 1997, "Sustainable Energy Development in Southern Africa". This event provided a unique opportunity for discussions on the critical success factors for effective energy technology programmes and strategies and culminated in the definition of a strategy for technology co-operation in the fields of renewables, energy efficiency in industry and clean coal.

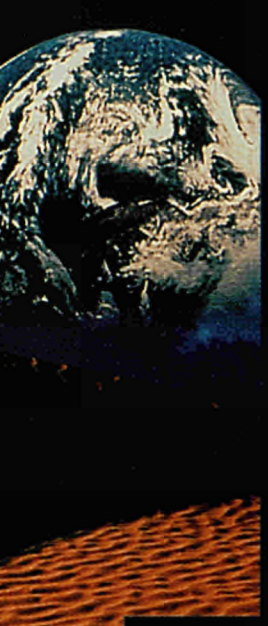
In view of the important financial constraints for project implementation, the involvement of international/regional financial institutions has been an important feature of all THERMIE activities in the region. A THERMIE action in 1995 helped to establish the mechanisms for co-operation with international funding organisations and multilateral development banks able to offer such funds in the region.

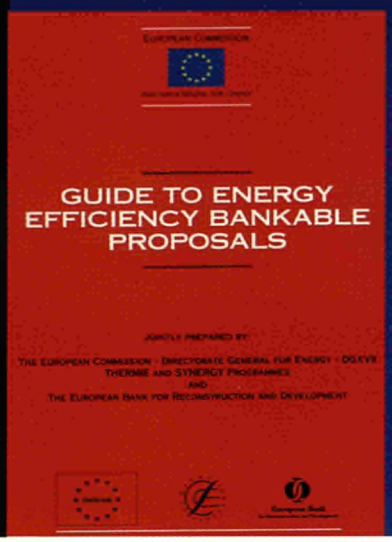
DIS-708-95-UK/DE and DIS-1190-97-UK/DE
The Southern Africa Renewables' Network

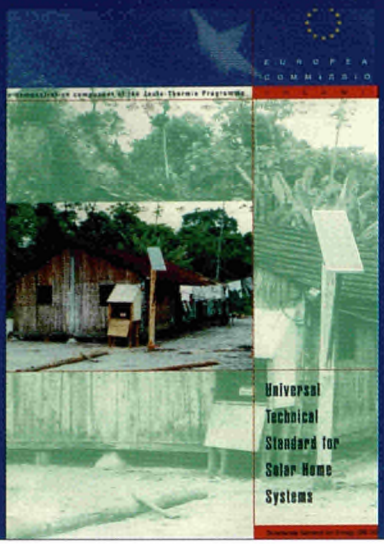
The first Southern Africa Renewables' network integrates organisations with the relevant expertise in Botswana, Lesotho, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe. Its aim is to accelerate the uptake of renewable energy technology in Southern Africa. The network is carrying out technology assessments and dissemination activities to identify opportunities for EU/southern African partnerships to implement renewable schemes in the region, transfer information and know-how between the EU and Southern Africa, and encourage the involvement of private sector industry and finance.

DIS-1393-97-UK/NL/ZA
Clean Coal Technologies for South Africa

Coal dominates South Africa's energy scene with over 73% of energy use. As signatory to the Framework for Climate Change, South Africa has to investigate mitigation options for greenhouse gases and these include clean coal technologies. The aim of the action is to disseminate information to South African decision makers about European expertise and technologies that can help in addressing this major challenge. A guidance document for use by both government and industry will be produced, which will build on the future energy scenarios for South Africa and investigate the possible barriers for the uptake of EU clean coal technologies. Following the signature of the S&T Co-operation Agreement with South Africa, this action is conducted in partnership with ESKOM, the electricity utility.







Cross-regional activities

A number of energy-related issues have implications which are common for a range of countries or are of strategic value for policy makers cross-regionally.

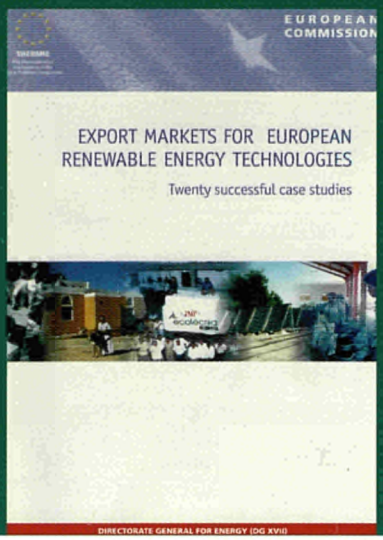
This is particularly the case for the development of renewable energy technologies where deployment has accelerated in recent years. Even higher levels would be possible in the future, given a much greater level of awareness about the potential of renewables, the development of commercial frameworks, technological advances to achieve cost reductions and a better understanding of the remaining barriers. World-wide markets will provide the main basis for the development of European technologies, to maintain and expand their market position and to contribute to local sustainable development.

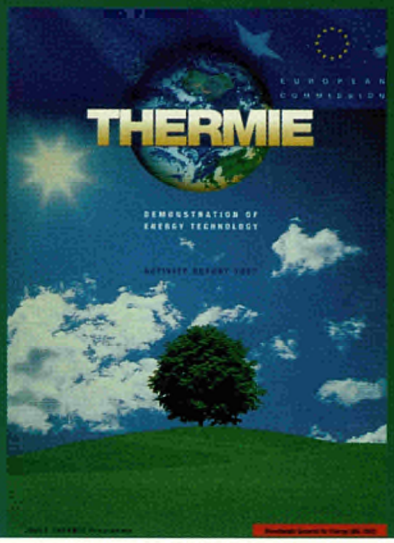
Current and future RES deployment in EU and world markets, ATLAS study[9]

RES deployment in specific units	EU 1995	World-wide 1995	EU 2010	World-wide 2010
Wind (MW installed capacity)	3,375	6,173	17,500	37,700
Solar PV (MWp)	52	375	2,000	6,300
Solar thermal heating (million m2)	6	28	20	90
Small-scale hydro (MW installed capacity)	9,000	27,950	11,360	55,000
Biomass electricity (GWh/y)	13,600	128,000	27,000	290,000

A number of THERMIE funded initiatives have aimed to raise awareness and tackle common problems related to renewables deployment. In particular for emerging economies and developing countries, work has focused on strategy studies covering cross-regional aspects such as financing barriers, solutions for large decentralised electrification schemes, and socio-economic assessments of demonstration projects. THERMIE also helps to develop quality standards, such as the recent 'Universal Standard for Solar Home Systems' which provides a basis for technical quality assurance for donors and investors.

9. *ATLAS - Energy Technology – The next steps, Study commissioned by the European Commission, DG XVII, 1998.*





DIS-735-96-UK/DE/ES/A
Awareness raising and building of confidence: Export Markets for European Renewable Energy Technology

Twenty case studies were compiled to show how EU companies are exporting renewable technology to emerging economies and developing countries. The studies have been distributed to key actors such as financing institutions, European industry, local development administrations and NGOs. They feature both public and private sector clients and different types of end-use applications to show how vital needs such as water heating, rural electrification, water pumping and refrigeration have been met by renewable technologies.

STR-811-96-FR/ES
Tackling the order of magnitude for decentralised rural electrification: Methodology for setting up large decentralised electrification programmes

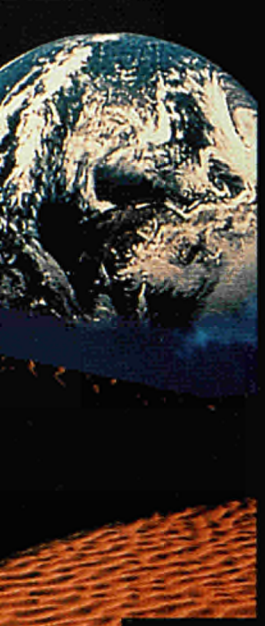
Based on the outcomes of a high-level symposium in Marrakech in November 1995, this study developed a comprehensive screening methodology as an advisory tool for stakeholders for decentralised rural electrification, to evaluate whether a proposed rural electrification project or programme layout is likely to be successful. The tool was piloted in four countries – Vietnam, Benin, Paraguay and Ecuador – resulting in a comprehensive recommendation package for these countries.

STR-1100-96-UK/PO/FR/ES/NO
Financing of renewables in world markets – critical success factors for novel financing mechanisms

This study analysed the effectiveness of financing mechanisms used in the deployment of renewable energy projects in developing countries and emerging economies. Based on a series of case studies, thorough consultation with major international and national financing institutions/initiatives (GEF, UNDP, IADB, EIB), a set of recommendations for innovation in financing mechanisms was prepared and presented at an international seminar on novel financing mechanisms in London, February 1998.

In addition, it has been recognised that joint efforts in the field of renewable energies with supra-national institutions or initiatives can provide significant benefits. Thus THERMIE contributed to the running of the UNESCO summer schools on solar electricity for rural and remote areas.

Finally, European industry benefits by working together to promote its capabilities in world markets and trade fairs. THERMIE supports the attendance of European industry – in particular for sectors where SMEs are predominant and thus not likely to present themselves individually – at major world conferences such as pollution control/environmental monitoring fairs, at oil and gas technology exhibitions and at the World Geothermal Congress in the year 2000.



FUTURE PERSPECTIVES

The successes of the international co-operation activities carried out to date under THERMIE and other EC international programmes confirm the important role that these activities play in furthering the expansion of cost-effective, clean and efficient energy technologies world-wide.

The European Commission's involvement with countries outside of the present Member States will continue and develop into the forthcoming Fifth Framework programme (1998-2002).

The issues surrounding global climate change problems, reinforced by the international community through the Kyoto Protocol, will continue to be a first priority for international co-operation in order to tackle cross-border environmental issues that arise from energy production and use. The coupling of these issues has been recognised in the course of the preparation of the Fifth RTD Framework Programme, which foresees a new alliance of energy and environment issues in a thematic programme entitled 'Preserving the Ecosystem'. Both supply technologies, including the emerging decentralised power markets, and clean energy services will offer appropriate solutions for beneficial technology transfer, contributing in turn to overall energy supply constraints.

At the same time, these implications present significant opportunities for European companies to expand their markets for exports, technology transfer and joint ventures.

International activities will build on the results achieved so far through co-operation activities in the different regions, with the aim of achieving replication on a large scale. This will encourage direct industrial co-operation and motivation, raise awareness and sensitivities in the regions, and assist actors to invest in full-scale energy technology projects. It will also take account of the varying levels of economic development, technology status and needs, in order to provide socially viable technology transfer. To this end, THERMIE's involvement with non-EU countries will continue to encourage technology uptake not only in the short term but also to ensure that the implementation of clean and efficient technologies is encouraged and supported over medium- and long-term timescales.

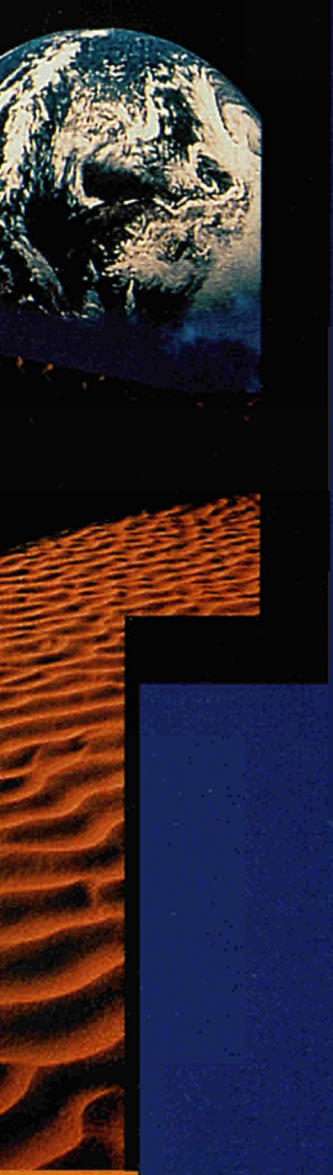
Co-operation with neighbouring countries – Central and Eastern Europe, in particular the pre-accession states – will focus on developing their importance as markets for European technologies, and ensuring security of supply and stabilisation of economies. Poland, Hungary, Czech Republic, Slovenia, Slovakia, Estonia, Latvia, Lithuania, Romania, Bulgaria and Cyprus are offered association with the Fifth Framework Programme. The Mediterranean basin will also play a major role, not only as an expanding market opportunity but also as an important fuel supply source for EU Member States.

Work with developing and emerging economies will concentrate mainly on clean power production including the use of new and renewable energy sources, promotion of cleaner and more efficient end-use technology for industry, urban transport and building constructions and assistance for sustainable technology prioritisation. Negotiations are on-going for concluding co-operation agreements with certain emerging economies, namely China, Brazil and India. Scientific and Technical Co-operation Agreements will guarantee reciprocal access to the countries' RTD programmes.

The involvement of third countries in the RTD International Co-operation programme (INCO) will continue under the Fifth RTD Framework Programme. This programme will support scientific co-operation addressing problems not covered by the other programmes, but which are of relevance to certain world regions and where the Community has a special interest as well as the capacity to contribute to the solutions. INCO will address five distinct regions: countries candidates to adhesion to the European Union (10 CEEC and Cyprus), non-associated CEECs, European and non-European NIS, Mediterranean partner countries, developing countries and industrialised/emerging economies.

THERMIE will continue to work closely with market actors both from the European side and the target region, including technology manufacturers, industrial associations, utilities, architects, local and regional authorities and engineering offices, in its international co-operation activities to help to identify their needs and to implement solutions to their energy problems.

This two-phased approach, using technology-push and market-pull, helps to ensure that the recipient countries benefit from EC involvement as much as the EC and its industries benefit from their participation in shaping the future of the world's energy markets.



The OPETs

ADEME
27, rue Louis Vicat
F-75737 Paris
France
Manager: Mr Yves Lambert
Contact: Ms Florence Clement
Telephone: +33 1 47 65 20 41
Facsimile: +33 1 46 45 52 36
E-mail:
florence.clement@ademe.fr

ASTER-CESEN
Via Morgagni 4
I-40122 Bologna
Italy
Manager: Ms Leda Bologni
Contact: Ms Verdiana Bandini
Telephone: +39 51 236242
Facsimile: +39 51 227803
E-mail: opet@aster.it

BEO
c/o Projekttrager Biologie, Energie, Okologie
Forschungszentrum Jülich GmbH
D-52425 Jülich
Germany
Manager: Mr Norbert Schacht
Contact: Mrs Gillian Glaze
Telephone: +49 2461 615928
Facsimile: +49 2461 61 2880
E-mail: g.glaze@fz-juelich.de

BRECSU
Bucknalls Lane, Garston
WD2 7JR Watford
United Kingdom
Manager: Mr Mike Trim
Contact: Mr Mike Trim
Telephone: +44 1923 664540
Facsimile: +44 1923 664097
E-mail: trimm@bre.co.uk

CCE
Estrada de Alfragide, Praceta 1
P-2720 Alfragide
Portugal
Manager: Mr Luis Silva
Contact: Mr Diogo Beirao
Telephone: +351 1 4718210
Facsimile: +351 1 4711316
E-mail: dmre.cce@mail.telepac.pt

CLER
28 rue Basfroi
F-75011 Paris
France
Manager: Ms Liliane Battais
Contact: Mr Richard Loyen
Telephone: +33 1 46590444
Facsimile: +33 1 46590392
E-mail: cler@worldnet.fr

CMPT
Offshore Technology Park,
Exploration Drive
AB23 8GX Aberdeen
United Kingdom
Manager: Mr Jonathan Shackleton
Contact: Ms Jane Kennedy
Telephone: +44 1224 853440
Facsimile: +44 1224 706601
E-mail: j.kennedy@cmpt.co.uk

CORA
Altenkesselerstrasse 17
D-66115 Saarbrucken
Germany
Manager: Mr Michael Brand
Contact: Mr Nicola Sacca
Telephone: +49 681 9762 174
Facsimile: +49 681 9762 175
E-mail: sacca@sea.sb.eunet.de

CRES
19 km Marathonos Ave
GR-190 09 Pikermi
Greece
Manager: Ms Maria Kontoni
Contact: Ms Maria Kontoni
Telephone: +30 1 60 39 900
Facsimile: +30 1 60 39 911
E-mail:
mkontoni@cresdb.cress.ariadne-t.gr

Cross Border OPET- Bavaria-Austria
Wieshuberstr. 3
D-93059 Regensburg
Germany
Manager: Mr Johann Fenzl
Contact: Mr Toni Lautenschlaeger
Telephone: +49 941 46419-0
Facsimile: +49 941 46419-10
E-mail: fenzl.zreu@t-online.de

ENEA
CR Casaccia
S Maria di Galeria
I-00060 Roma
Italy
Manager: Mr Francesco Ciampa
Contact: Ms Simona Fumagalli
Telephone: +39 6 3048 4118
Facsimile: +39 6 3048 4447
E-mail:
enea_opet@casaccia.enea.it

Energy Centre Denmark
DTI
P.O. Box 141
DK-2630 Taastrup
Denmark
Manager: Mr Poul Kristensen
Contact: Mr Nils Daugaard
Telephone: +45 43 50 70 80
Facsimile: +45 43 50 70 88
E-mail: nda@dti.dk

ETSU
Harwell
Didcot
OX11 0RA Oxfordshire
United Kingdom
Manager: Ms Cathy Durston
Contact: Ms Lorraine Watling
Telephone: +44 1235 432014
Facsimile: +44 1235 432050
E-mail:
lorraine.watling@aeat.co.uk

EVE
Edificio Albia I planta 14,
C. San Vicente, 8
E-48001 Bilbao
Spain
Manager: Mr Jesus Mari Giori
Contact: Mr Juan Reig Giner
Telephone: +34 94 423 50 50
Facsimile: +34 94 424 97 33
E-mail: jreig@eve.es

FAST
2, P. le R. Morandi
I-20121 Milan
Italy
Manager: Ms Paola Gabaldi
Contact: Ms Paola Gabaldi
Telephone: +39 2 76 01 56 72
Facsimile: +39 2 78 24 85
E-mail: paola.gabaldi@fast.mi.it

GEP
45, rue Louis Blanc
F-92038 Paris, La Defense Cedex
France
Manager: Mr Michel Ningler
Contact: Ms Nadine Monpert
Telephone: +33 1 47 17 68 65
Facsimile: +33 1 47 17 67 47
E-mail: gep@gep-france.com

ICAEN
Avinguda Diagonal, 453 bis, atic
E-08036 Barcelona
Spain
Manager: Mr Joan Josep Escobar
Contact: Mr Joan Josep Escobar
Telephone: +34 93 4392800
Facsimile: +34 93 4197253
E-mail: edificis@icaen.es

ICEU
Auenstrasse 25
D-04105 Leipzig
Germany
Manager: Mr Albrecht Krause
Contact: Mr Alexander Schmidt
Telephone: +49 341 9804969
Facsimile: +49 341 9803486
E-mail: krause@iceu.manner.de

ICIE
Via Velletri, 35
I-00198 ROMA
Italy
Manager: Mrs Rosella Cicarelli
Contact: Ms Mariella Melchiorri
Telephone: +39 6 8549141-8543467
Facsimile: +39 6 8550250
E-mail: icie.rm@rm.icie.it

IDAE
Paseo de la Castellana 95, planta 21
E-28046 Madrid
Spain
Manager: Mr José Donoso Alonso
Contact: Ms Virginia Vivanco Cohn
Telephone: +34 91 456 5024
Facsimile: +34 91 555 1389
E-mail: vvivanco@idae.es

IMPIVA
Plaza Ayuntamiento, 6
E-46002 Valencia
Spain
Manager: Mr José-Carlos Garcia
Contact: Mr Joaquin Ortola
Telephone: +34 96 398 6336
Facsimile: +34 96 398 6322
E-mail:
ximo.ortola@impiva.m400.gva.es

Institut Wallon
Boulevard Frère Orban 4
B-5000 Namur
Belgium
Manager: Mr Francis Ghigny
Contact: Mr Xavier Dubuisson
Telephone: +32 81 25 04 80
Facsimile: +32 81 25 04 90
E-mail: iwallon@skypro.be

Irish Energy Centre
Glasnevin
IE-Dublin 9
Ireland
Manager: Ms Rita Ward
Contact: Ms Rita Ward
Telephone: +353 1 8082073
Facsimile: +353 1 8372848
E-mail: opetiec@irish-energy.ie

IRO
P.O. Box 7261
NL-2701 AG Zoetermeer
Netherlands
Manager: Mr Rosen Jacobson
Contact: Mr Rosen Jacobson
Telephone: +31 79 3411981
Facsimile: +31 79 3419764
E-mail: iro@xs4all.nl

LDK
7, Sp. Triantafyllou St.
GR-113 61 Athens
Greece
Manager: Mr Leonidas Damianidis
Contact: Ms Marianna Kondilidou
Telephone: +30 1 8563181
Facsimile: +30 1 8563180
E-mail: ldkopet@mail.hol.gr

NIFES
8 Woodside Terrace
G3 7UY Glasgow
United Kingdom
Manager: Mr Andrew Hannah
Contact: Mr Graham Howes
Telephone: +44 141 332 4140
Facsimile: +44 141 332 4255
E-mail: glasgow@nifes.co.uk

Novem
Swentiboldstraat 21, P.O. Box 17
NL-6163 AA Sittard
Netherlands
Manager: Mr Theo Haanen
Contact: Mrs Antoinette Deckers
Telephone: +31 46 42 02 326
Facsimile: +31 46 45 28 260
E-mail: A.Deckers@Novem.nl

NVE
P.O. Box 5091, Majorstua
N-0301 Oslo
Norway
Manager: Mr Roar W Fjeld
Contact: Mrs Marianne Kramer
Telephone: +47 22 95 93 23
Facsimile: +47 22 95 90 99
E-mail: rwf@nve.no

OPET Austria
Linke Wienzeile 18
A-1060 Vienna
Austria
Manager: Mr Guenter Simader
Contact: Mr Guenter Simader
Telephone: +43 1 586 15 24 ext 21
Facsimile: +43 1 586 94 88
E-mail: simader@eva.wsr.at

OPET EM
Swedish National Energy Administration
S-117 86 Stockholm
Sweden
Manager: Ms Sonja Ewerstein
Contact: Mr Anders Haaker
Telephone: +46 8 681 6554/9514
Facsimile: +46 8 681 9328
E-mail: sonja.ewerstein@stem.se

OPET Finland
Technology Development Centre Tekes
P.O. Box 69,
Malminkatu 34
FIN-0101 Helsinki
Finland
Manager: Ms Marjatta Aarniala
Contact: Ms Marjatta Aarniala
Telephone: +358 105215736
Facsimile: +358 105215908
E-mail: marjatta.aarniala@tekes.fi

OPET Israel
Tel-Aviv University
IL-69978 Tel Aviv
Israel
Manager: Mr Yair Sharan
Contact: Mr Yair Sharan
Telephone: +972 3 6407573
Facsimile: +972 3 6410193
E-mail: sharany@post.tau.ac.il

OPET Luxembourg
Avenue des Terres Rouges 1
L-4004 Esch-sur-Alzette
Luxembourg
Manager: Mr Jean Offermann (Agence de l'Energie)
Contact: Mr Ralf Goldmann (Luxcontrol)
Telephone: +352 547 711 282
Facsimile: +352 547 711 266
E-mail: goldmann@luxcontrol.com

OPET Norrland
Norrlandsgatan 13, Box 443
S-901 09 Umea
Sweden
Manager: Ms France Goulet
Contact: Mr Anders Lidholm
Telephone: +46 90 77 69 06
Facsimile: +46 90 16 37 19
E-mail: opet.venet@swipnet.se

Orkustofnun
Grensasvegi 9
IS-108 Reykjavik
Iceland
Manager: Mr Einar Tjörvi Eliasson
Contact: Mr Einar Tjörvi Eliasson
Telephone: +354 569 6105
Facsimile: +354 568 8896
E-mail: ete@os.is

PARTEX-CEEETA
Rua Gustavo de Matos Sequeira, 28 - 1 . Dt .
P-1200 Lisboa
Portugal
Manager: Mr Aníbal Fernandes
Contact: Mr Aníbal Fernandes
Telephone: +351 1 395 6019
Facsimile: +351 1 395 2490
E-mail: ceeeta@mail.telepac.pt

RARE
50 rue Gustave Delory
F-59800 Lille
France
Manager: Mr Pierre Sachse
Contact: Mr Jean-Michel Poupart
Telephone: +33 3 20 88 64 30
Facsimile: +33 3 20 88 64 40
E-mail: are@nordnet.fr

SODEAN
Isaac Newton s/n
Pabellón de Portugal - Edifico SODEAN
E-41012 Sevilla
Spain
Manager: Mr J.Antonio Barragán Rico
Contact: Ms Maria Luisa Borra Marcos
Telephone: +34 95 4460966
Facsimile: +34 95 4460628
E-mail: mborra.sodean@sadiel.es

SOGES
Corso Turati 49
I-10128 Turin
Italy
Manager: Mr Antonio Maria Barbero
Contact: Mr Fernando Garzello
Telephone: +39 11 3190833/3186492
Facsimile: +39 11 3190292
E-mail: sogint@tin.it

VTC
Boeretang 200
B-2400 Mol
Belgium
Manager: Mr Hubert van den Bergh
Contact: Ms Greet Vanuytsel
Telephone: +32 14 335822
Facsimile: +32 14 321185
E-mail: opetvtc@vito.be

Wales OPET Cymru
Dyfi Eci Parc
Machynlleth
SY20 8AX Powys
United Kingdom
Manager: Ms Catherine Peasley
Contact: Mr Rod Edwards
Telephone: +44 1654 705000
Facsimile: +44 1654 703000
E-mail: opetdulas@gn.apc.org

The FEMOPETs

Black Sea Regional Energy Centre - BSREC
8, Triaditza Str.
BG-1040 Sofia
Bulgaria
Manager: Dr L. Radulov
Contact: Dr L. Radulov
Telephone: +359 2 980 6854
Facsimile: +359 2 980 6855
E-mail: ecsynkk@bsrec.bg

EC BREC - LEI FEMOPET
c/o EC BREC/IBMER
Warsaw Office
ul. Rakowiecka 32
PL-02-532 Warsaw
Poland
Manager: Mr Krzysztof Gierulski
Contact: Mr Krzysztof Gierulski
Telephone: +48 22 484832
Facsimile: +48 22 484832
E-mail: grewis@ibmer.waw.pl

Energy Centre Bratislava
c/o SEI-EA
Bajkalská 27
SK-82799 Bratislava
Slovakia
Manager: Mr Michael Wild
Contact: Mr Michael Wild
Telephone: +421 7 52 48 472
Facsimile: +421 7 52 48 470
E-mail: ececwild@mbox.bts.sk

Energy Centre Hungary
Könyves Kálmán Körút 76
HU-1087 Budapest
Hungary
Manager: Mr Andras Szalóki
Contact: Mr Doris Keszthelyi
Telephone: +36 1 313 4824
+36 1 313 7837
Facsimile: +36 1 303 9065
E-mail: doris.keszthelyi@energy.centre.hu

Estonia FEMOPET
Estonian Energy Research Institute
Paldiski mnt.1
EE-0001 Tallinn
Estonia
Manager: Mr Villu Vares
Contact: Mr Rene Tonnisson
Telephone: +372 2 45 0303
Facsimile: +372 631 1570
E-mail: femopet@femopet.ee

FEMOPET Hungary OMIKK
c/o National Technical Information Centre and Library OMIKK
Muzeum Utca 17
HU-1088 Budapest
Hungary
Manager: Mr Gyula Nyerges
Contact: Mr Gyula Nyerges
Telephone: +36 1 338 4803
Facsimile: +36 1 3382232
E-mail: nyerges@omk.omikk.hu

FEMOPET Romania ENERO
8, Energeticienilor Blvd.
RO-79619 Bucharest 3
Romania
Manager: Mr Alexandru Florescu
Contact: Mr Christian Tintareanu
Telephone: +401 322 0917
Facsimile: +401 321 2790
E-mail: crit@mail.gsci.vsat.ro

FEMOPET LEI - Lithuania
c/o Lithuanian Energy Institute
3 Breslaujos Str.
LT-3035 Kaunas
Lithuania
Manager: Mr Romualdas
Contact: Mr Sigitas Bartkus
Telephone: +370 7 35 14 03
Facsimile: +370 7 35 12 71
E-mail: felix@isag.lei.lt

FEMOPET Poland KAPE-BAPE-GRAPE
c/o KAPE
ul. Nowogrodzka 35/41 XII p.
PL-00-950 Warsaw
Poland
Manager: Ms Marina Coey
Contact: Ms Marina Coey
Telephone: +48 22 62 22 794/795/797
Facsimile: +48 22 62 22 796
E-mail: kape4@pol.pl

FEMOPET Slovenia
c/o Jozef Stefan Institute
Energy Efficiency Centre
Jamova 39
SL-1000 Ljubljana
Slovenia
Manager: Mr Boris Selan
Contact: Mr Tomaz Fatur
Telephone: +386 61 1885 210
Facsimile: +386 61 1612 335
E-mail: tomaz.fatur@ijs.si

Latvia FEMOPET
c/o B.V. EKODOMA Ltd
Zentenes Street 12-49
LV-1069 Riga
Latvia
Manager: Ms Dagnija Blumberga
Contact: Ms Dagnija Blumberga
Telephone: +371 721 05 97/
+371 241 98 53
Facsimile: +371 721 05 97/
+371 241 98 53
E-mail: ekodoma@mail.bkc.lv

Sofia Energy Centre Ltd
51, James Boucher Blvd.
BG-1407 Sofia
Bulgaria
Manager: Ms Violetta Groseva
Contact: Ms Violetta Groseva
Telephone: +359 2 96 25158
Facsimile: +359 2 681 461
E-mail: ecencentre@enpro.bg

FEMOPET Czech Republic
c/o Technology Centre AS CR
Rozvojova 135
CZ-165 02 Prague 6
Czech Republic
Manager: Mr Karel Klusacek
Contact: Mr Radan Panacek
Telephone: +420 2 203 90203
Facsimile: +420 2 325 630
E-mail: klusacek@tc.cas.cz

For further details about the OPET Network please contact:

OPET-CU
13b Avenue de Tervuren
B-1040 Brussels
Belgium
Manager: Mr John Butson
Contact: Ms Jana Hainsworth
Telephone: +32 2 7438930
Facsimile: +32 2 7438931
E-mail: OPET_CU@ecotec.com

or visit the OPET Web site:
http://www.cordis.lu/opet/home.html

European Commission
International Co-operation – Sectoral Report 1995-1998
Luxembourg: Office for Official Publications of the European Communities
1998 – 36 pp. – 21 x 27.9 cm
ISBN 92-828-3798-X

12 15 CS-14-98-647-EN-C

NOTICE TO THE READER

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (http://europa.eu.int).

The overall objective of the Community's Energy Policy is to help ensure the security of energy supplies for European citizens and businesses at competitive prices and in an environmental compatible way. DG XVII initiates, coordinates and manages energy policy actions at European level in the fields of solid fuels, oil and gas, electricity, nuclear energy, renewable energy sources and the rational use of energy. The most important actions concern the security of energy supply and international cooperation, the integrity of energy markets, the promotion of sustainable development in the energy field and finally the promotion of energy research and technological development through demonstration projects. DG XVII manages several programmes such as SYNERGY, SAVE, ALTENER and THERMIE. More information is available on DG XVII's pages on EUROPE, the Commission's server on the World Wide Web.

The European Commission
Directorate-General for Energy DG XVII
200 rue de la Loi
B-1049 Brussels
Belgium

Fax: +32 2 2950577
Internet: http://europa.eu.int/en/comm/dg17/dg17homepage.htm

OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES
L-2985 Luxembourg

ISBN 92-828-3798-X