ESPON 2006 PROGRAMME

INVITATION TO RESTRICTED TENDER

IDENTIFICATION OF CALL FOR TENDERS:

ESPON PROJECT 2.1.4.

ESPON 2006 PROGRAMME under Interreg III, art. 53.

"Territorial trends of energy services and networks and territorial impact of EU energy policy".

COMPOSITION OF CONSORTIUM:

PROJECT LEADER:

CEEETA – Centro de Estudos em Economia da Energia dos Transportes e do Ambiente, PORTUGAL

MEMBERS OF CONSORTIUM:

CENERGIA – Energy Consultants, DENMARK
SOFTECH - Energia Tecnologia Ambiente, ITALY
CIRIUS – Centro de Investigações Regionais e Urbanas, PORTUGAL
IGP – Instituto Geográfico Português, PORTUGAL
UMM - University of Mining and Metallurgy, POLAND

10TH January 2003

Table of Contents

Executive sumary, 3
Companies Profile, 5
Introduction to technical proposal, 49
I – Technical framework, 50
1. The European territorial cohesion, 50
2. The instrumentsof energy policy at national or Community level, 52
3. Assessing the impact of the energy system on local development – tools, indicators, policy guidelines, 67
4. Energy sector and regional development, 69
5. Terms of reference interpretation, 70
6. Concepts and methodologies, 71
   6.1. Spatial pattern and territorialtrends of energy supply and demand, 71
   6.2. Territorial impact assessment of energy policies, 71
      6.2.1 Comprehensive analysis of territorial impact, 71
      6.2.2 Case studies, 72
      6.2.3 Key players interviews, 73
      6.2.4 Decision parameters, 73
   6.3 Regional typology, 73
7. Information sources, 75
8. Interaction with other ESPON projects, 76
9. Expected results, 77

II – Work Program, 81
1. Work program development and tasks, 81
2. Project timetable, 93
3. description of partnership, organisation and communication flow within the consortium, 94
4. Experts work assignment, 95
5. Financial proposal, 96
6. Expert work load, 97
7. Costs per phase, 99
8. Other costs, 100

Annex 1 – Information sources, 101

Executive Summary

This proposal has been built upon the TOR for the restricted call for tender No. 2002.ESPON.2.1.4 for lead partners on a project on TERRITORIAL TRENDS OF ENERGY SERVICES AND NETWORKS AND TERRITORIAL IMPACT OF EU ENERGY POLICY.

The Consortium established to perform the above mentioned research project has gathered extensive and deep knowledge on the subjects of the tender, as well as extensive and deep experience in similar projects. See the **presentation of Consortium partners and the Curricula** of team members (Chapter "Company profile").

Focusing especially in energy sector experts, the work team for the project has also deep **expertise in regional policy issues** and ESDP in particular. By this a blend of different professional capabilities and **different national origins** (**4 countries**, including one from enlargement candidates - Poland) seems to be a good recipe for success in the consortium.

Also particular care has been placed in including in the team **expertise in the energy sector** enterprise levels, because liberalization outcomes will depend very much on the behaviour and forms of adaptation by energy producers and distributors and of new regulation rules. Specific **expertise on government behaviour and policy making processes at EU and national level** are considered assets on the experts team.

Focusing on a subject ill covered by past research: the relations among **energy network and services, energy policies and regional development, innovative approaches are key issues** for research success. For this purpose some **suggestions of modelling principles** and **indicators** are provided in the proposal that allow a clear understanding of the research guidelines and framework the Consortium intends to use (See in particular Point 6 – Concepts and methodologies of Part I and Point 1 – Work program development and tasks of Part).

A **provisional description of data sources**, besides those already provided in the TOR are presented in Annex I of the proposal.

The project is aimed to **cover 29 countries** (EU 27 plus Norway and Switzerland).

A few **suggestions of territorial and energy sector indicators are provided** in the proposal, that must be considered as broad guidelines to be further developed within the research project core activities themselves (See Point 3. Assessing the impact of the energy system on local development – tools, indicators, policy guidelines on Part I).

The **basic structure of the database to be developed to support the research** project is presented in Point 3 and 6 of the proposal.

The **approach to recommendation development is mainly a policy maker practical one**. This is better explained throughout the proposal and specifically in Point 9.

A **close interaction and networking with ESPON Coordination Unit and other ESPON projects** is proposed all along the research project development. Point 8 provides this information that can also be found on the work program.

The **work program provides detailed research definition set** on four Phases and 40 tasks, with expert and time allocation (see Work Program in Point 1 of Part II of the proposal).

A detailed **calendar of task implementation**, meetings and delivery of products is presented in the proposal. The **expert allocation to the tasks** is also presented.

The **quality of the team** employed and its extensive experience in **international networking projects** is evident in the **presented CVs**.

Besides the identified experts, a number of junior researchers with adequate training and experience at Master level.

For all these reasons we think that the proposal clearly qualifies the consortium for the project development.

Introduction to Technical Proposal

ESPON action 2.1.4., under the title *"Territorial trends of energy services and networks and territorial impact of EU energy policy"*, is defined as a thematic project. As such strong coordination with the other projects is requested and will be envisaged by the technical team.

The terms of reference (TOR) on ESPON action 2.1.4. already present a detailed discussion of the energy factors influencing regional development (see ii), pages 3 and 4).

The general objectives of the ESPON project and the primary research issues envisaged, as mentioned in the TOR (iii and iv), are also in the core of this proposal. The close co-operation with projects 1.2.1. and 1.2.2. in what the concepts on effects of networks will also be addressed.

The technical proposal will take into consideration the following aspects:

i) The presentation of the core of the project, which deals with the territorial development impact of a sectoral policy;
ii) A survey of the energy policy in the European space;
iii) The careful selection and characterization of the most effective policy guidelines, development tools, indicators and criteria to assessing the impact of the energy sector on local development;
iv) The evaluation of the energy sector and its connection with the environment and the local development;
v) The correct interpretation of the Terms of Reference;
vi) The definition of the correct concepts and methodologies,
vii) The quick access to information sources and to privilege the interaction with other ESPON projects;
viii) The pre-definition of the most interesting targets and expected results.

A thorough work program is also already defined in order to better co-ordinate the project implementation.

I TECHNICAL FRAMEWORK

1. The European territorial cohesion

The *Second Report on Economic and Social Cohesion* describes the main features of Europe's current status in terms of spatial development, i.e. a very centralised territory with huge development disparities among different regions.

Conditions of accessibility are intimately related with a marked polarization of the European territory. In the 15 Member-States plus the accession countries, *Central Regions* (i.e. the North Yorkshire/ Franche-Comté/ Hamburg triangle) have the highest accessibility index and are the main pole of economic concentration in Europe. Though they cover only 14 percent of the territory, these regions concentrate 33 percent of the population and 47 percent of the GDP of the EU-27. On the contrary, *Peripheral Regions* represent 65 percent of the territory but only 41 percent of the population and 21 percent of the GDP. Heavy concentration of economic activity in the Central Regions has increased negative effects by overloading their infra-structure, namely causing transport bottlenecks and a stronger environmental pressure. In the long term, the absence (or the weakness) of other development poles may put the competitiveness of the Union at jeopardy, especially if one takes stock of the report's comparison with the USA—who, in a less concentrated territory, have four world-scale poles of development gathering 49 percent of the nation's population and 54 percent of its GDP.

While Central Regions rely on a strong and polycentric urban framework, the geography of Peripheral Regions is marked by rural areas with small to medium-sized cities under the influence of a large metropolitan area—which retain the essential components of economic activity. The economic dynamism of these metropolises increasingly depends on their integration into global networks and they run the risk of losing their connections with the respective territory.

In Central Regions, the GDP per head is twice as high as in Peripheral Regions and productivity 4 times higher. In this area, 89 percent of the population live in regions with a GDP per head higher than the EU-27 average. Conversely, in Periphery 82 percent of population live in regions with a GDP per head lower than said average. Development disparities between Europe's different regions, as evidenced by these figures, are a well-established fact. Ten percent of the population live in regions where the GDP/h is 31 percent of the EU-27 average and 25 percent in regions where the GDP/h is 75 percent of said average.

Two diverging paths have marked the evolution of regional disparities within the EU-15. On the one hand, there is a clear convergence among the Member-States, namely as the Cohesion Countries approach the EU average, with regional disparities also slightly lessened at the EU level). On the other hand, no clear improvement of regional disparities within each country and, especially after 1995, the regional disparities widened in several countries, perhaps indicating that development processes recently became more polarized, concentrating in a few poles marked by rapid development.

Enlargement will substantially widen Europe's regional disparities. In the EU-27, regional disparities will become twice as large as the ones in the EU-15. Differences will become clearer between three groups of States with markedly distinct levels of development, i.e. (a) the current EU-15, excluding Spain, Greece and Portugal, with a global GDP/h that exceeds the EU average by 20 percent, (b) Spain, Portugal, Greece, the Czech Republic, Cyprus and Slovenia, whose GDP/h will globally correspond to approximately 87 percent of the EU-27 average, and (c) the remaining accession countries, with a GDP/h that globally represents 40 percent of the future EU average.

Community action aimed at organising the European space has relied mainly upon the Structural Funds and the Trans-European Networks (Transport, Telecommunications and Energy). In particular the use of Structural Funds has significantly helped the Cohesion States converge towards the EU average. The impact of Trans-European Networks is less visible, mainly because the execution of top-priority projects has been seriously delayed in the field of transport.

Territorial development however is a complex process indeed. It has a cumulative nature and is very sensitive to (i) structural factors that remain unchanged in the medium term—e.g. territory resources, urban fabric, demographic variables, etc., (ii) the structure of economic activities, (iii) the quality of human capital, (iv) infrastructure endowment, and (v) other drivers forces. Therefore we cannot go on basing the development of the European territory only on explicitly territory-scaled policies. Five other areas of Community action, in addition to Structural Funds and Trans-European Networks, will be critical to vitalise Europe's territorial dynamics:

- The construction of the Single Market, inasmuch as it results in improved mobility of production factors, people and commodities. Ongoing processes in the fields of services and transport may prove particularly relevant.
- The competition policy directly associated with the construction of the single market, inasmuch as it regulates state aid aimed at influencing the geographical distribution of economic activities. We know that this policy favours the process of business re-location, in some cases to areas outside the EU.
- The Common Agricultural Policy, CAP, due to the inter-region income transfer involved and its impact on rural development.
- Human resource & knowledge development policies (employment, training and R&D policies) with a growing focus on territoriality and mobility.
- The environment policy, mainly by defining protected areas and enforcing the environmental impact assessment of large projects and spatial planning.

The multi-dimension nature of territorial development was at the root of the concerns leading to the drafting of ESDP: «***Considering the existing regional disparities of development and the – in some cases - still contradictory spatial effects of Community policies, all those responsible for spatial development should appreciate the policy guidelines for spatial development***». ESDP emerged from the need of interconnecting the objectives of Cohesion, Sustainability and Competitiveness with a view to setting up a political reference framework that co-ordinates all policies impacting on the territory. In this regard, ESDP is a compromise between the three fundamental guiding principles of

- *Development of a balanced and polycentric urban system and a new urban-rural relationship;*
- *Securing parity of access to infrastructure and knowledge;*
- *Sustainable development, prudent management and protection of nature and cultural heritage*

Each of the above principles is the backbone of policy options that may be rendered operational by different institutions.

As reference framework, ESDP has two practical implications. On the one hand, community policies (in this case the energy policy) must henceforth be analysed in the light of all dimensions of territorial development, inasmuch as their results increasingly depend less on the efficiency of isolated policies and more on the accomplished fecundity of policy combination.

On the other hand, the references of such analysis should be the territorial development options explicitly defined in ESDP.

2. The instruments of energy policy at national or community level

INTRODUCTION

"A review of the overall situation is needed today in order to outline the potential solutions which will enable the trans-European networks to continue to fulfill their economic and social role, while still adapting to the changes they face: infrastructure saturation due to the dramatic upsurge in demand, opening up of markets, technological developments, the drying up of public funding as well as the rapid increase in infrastructure development costs due to heightened concerns for security, environmental protection and the incorporation of new technologies and lastly the private sector resistance to uncertainty towards project validation, decisions and timescales. […] Over the next 20 to 30 years, the EU's energy needs are expected to undergo major changes both in quantity and quality. While growth in demand by 2020 will be approximately 10-15% in the current EU Member States, it could be more than 40% in the candidate countries". (*European Commission, DG Energy and Transport, 2nd Annual European Energy and Transport Conference – Building Energy and Transport Infrastructures for Tomorrow's Europe, Conference Program Announcement, Barcelona, November 11-13th, 2002.*)

Energy prospects for 2020

Current EU Member States	
Total consumption	+ 10 – 15%
Electricity	+ 35%
Natural gas	+ 60%
Renewable energy	+ 60%
Nuclear energy	- 20%
Candidate countries	
Total consumption	+ 40%
Electricity	+ 80%
Natural gas	+ 150%
Imported Energy	
1998	50%
By 2020	> 70%

Source: *European Commission, DG Energy and Transports, 2nd Annual European Energy and Transport Conference – Building Energy and Transport Infrastructures for Tomorrow's Europe, Conference Program Announcement, Barcelona, November 11-13th, 2002*.

In the Green Paper "Towards a European Strategy for Energy Supply" the European Commission highlights Climate Change as a challenge for the European Union within the Kyoto Protocol. Energy policy has a leading role in the accomplishment of this commitment, as the Green Paper also draws a strategy based on security of supply, economic development, market liberalization and environmental protection.

The progressive opening up of the energy market exposed in the gas and electricity Single Market Directives must therefore be compatible with environmental objectives. In particular, the competitive framework should support the Member States efforts to raise the participation of renewable energies within the energy supply mix, in accordance with the targets defined within the European Directive on electricity generation based on renewable energy resources[1], as well as to manage gas and electricity demand in a way to attain the Kyoto Protocol.

An overview on the current energy supply system of the European Union is worrying, as it is extremely dependent on external resources, which is leading to a policy dedicated to reduce the risks associated to the energy supply dependence.

[1] Directive 2001/77/EC of The European Parliament and of the Council of 27th September 2001, on the promotion of electricity produced from renewable energy sources in the internal electricity market.

- What is the potential volume of gas production in Europe? What share of future requirements will have to be met by imports?
- Does EU need to increase the number of external gas suppliers? How can EU promote and ensure the security of such imports?
- How can we ensure that interconnection capacities are solid enough to guarantee the smooth running of the internal market and improved security of supply?

STRATEGIES ON ECONOMIC AND SOCIAL COHESION

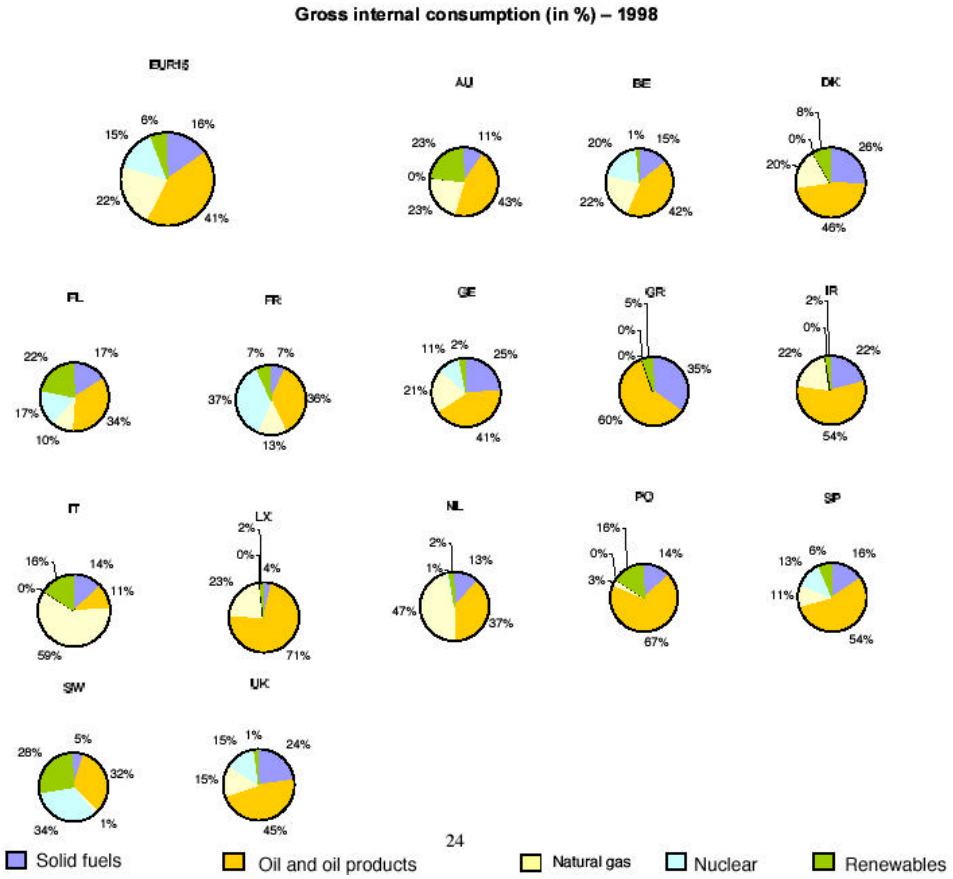
The main concern within the energy and environment fields, within EU, together with the accession countries should pass through a strategy for integrating the main objectives of social and economic cohesion and energy policy. And, simultaneously to use the latter as a tool for cohesion reinforcement. This strategy should then cover the:

i) Revision of the relations between energy and development, having in mind that the energy policies have a decisive impact over social and economic cohesion. In particular, the access to diversified energy and to energy quality at a reasonable price is one of the conditions for strengthening cohesion.

ii) Analysis of the global coherence between the energy policy objectives at EU level and the ones of cohesion, in a way to show that accompanying actions are necessary in order to assure that coherence is guaranteed concerning the group of energy infrastructures, energy efficiency and the valorization of the endogenous energy potential.

iii) To show that the accompanying measures should be outlined within a global approach, namely in connection with other cohesion policies: regional development, common agricultural policy, environment, transports, social and research.

iv) Definition of axis for these accompanying actions:
- Energy/cohesion axis: the one that should have included the cohesion dimension of the energy policy through the development programs: SAVE, ALTENER, Intelligent Energy for Europe, regional and urban energy programs, through the internal energy market and putting in place actions at the trans-European networks.
- Other energy/cohesion/policies through financial instruments which incorporate energy projects within the regional development programs three fold:
  - **Energy in the rural areas** and in **ultra-peripheral regions**, where the improvement of access to energy and the valorization of endogenous potentials are important factors of economic activities diversification;
  - **Energy city-environment**, justified on the interactions between energy environment and economy and their impacts on quality of life. The less developed towns and regions have difficulties in energy supply and have often not much attention paid to energy management. In this order, it should be given a special attention to the planning, building and maintaining the energy distribution infrastructures (gas, electricity and heat), and the exploration of local energies namely renewables and solid waste.
  - **Cross-border**, because it is necessary to coordinate actions between regions and countries, in order to allow rational management of energy transport and distribution networks and better improve the endogenous potential.



The current tendencies of energy demand stress the need to new actions in the field of demand side management and energy efficiency, in a way to reduce the consumption and green house gas emissions without compromising the economic growth. That calls for the involvement not only of the actors of the energy systems but also of the communities leaders and managers.

SHORT OVERVIEW ON ACCESSION COUNTRIES

Most of the accession countries have developed heavy industry and are characterized by being very energy intensive and polluting. Coal is one of the most important fossil fuels in terms of abundance of resource. However, Poland has also some significant natural gas reserves. In strategic terms, crude oil and natural gas from Russia, that is piped to Western Europe, passes through the Visegard region. The natural gas that passes through Slovakia represents about 25% of the natural gas consumed in western Union and about 70% of the Russian natural gas exported to Western Europe.

The CENTREL electricity system links Czech Republic, Slovakia and Hungary and, since 1995, it is connected to the Western Europe's system. Both north-south and east-west connections are being expanded, as part of the EU's trans-European energy network project.

With regard to the environmental concerns, one of the measures under consideration in the regions is the gradual replacement of coal for natural gas, namely for electricity generation, in order to meet the international commitments.

- Will there be a boom in electricity generation from natural gas?

Most of the refineries in the area, which were built in the 1960's and 1970's, need modernization, in order to meet the current shift in demand towards lighter and "environmentally friendlier" products.

Only Poland has the largest electricity generating system in Central and Eastern Europe, with an installed capacity of about 30 GW in 1999. Most of Polands' electricity comes from out-dated coal-fired plants.

Renewable energies play a very low profile in the area, with some small hydro power plants. However, some wind farms are starting to be planned and implemented, with already a few MW installed.

Since 1989 the European Commission has made available over €700 million for nuclear safety programs in Central and Eastern Europe and the former Soviet Union, predominantly through PHARE and TACIS programs. Closures were stated as a priority policy objective for the EU and the G7. However, not much have been seen to the implementation of these priorities.
The enlargement of the EU raises the key question of just how safe reactors in new countries must be. Several Commission documents call for the potential extension of the EURATOM loan facility and, the possibility of new funds would be available for the modernization of reactors.

- Following Finland's decision to build a new nuclear reactor, is nuclear energy likely to find favor again?
- Is there a clear picture what for would funds be used in? Closure of reactors or modernization of reactors?
- Would it be fair for those regions to export "dangerous" electricity throughout the Union?

THE CONTRIBUTION FROM RENEWABLE ENERGIES

The European Commission and the Member States started to bear in mind that without a significant participation of renewable energies and without a strong development of energy efficiency, the commitments in the framework of the Kyoto Protocol and the reduction of greenhouse gases will be in question.

In 1997, the European Parliament and the Council of Ministers adopted already the White Paper on Renewable Energies (Energy for the future: renewable energy sources – COM 97, 599 of 26.11.1997). At EU level was fixed an objective of duplicating the renewable energy contribution to the energy balance from 6% to 12% (between 1997 and 2010), and to raise the production of electricity from renewables from 14% to 22%, also until 2010. This last intention was then exposed on the Renewable Energies Directive, which supports the electricity production by renewable energies.

País	% Electricity produced from renewable energies 1997	% Electricity produced from renewable energies 2010
Belgium	1,1	6,0
Denmark	8,7	29,0
Germany	4,5	12,5
Greece	8,6	20,1
Spain	19,9	29,4
France	15,0	21,0
Ireland	3,6	13,2
Italy	16,0	25,0
Luxemburg	2,1	5,7

Holand	3,5	9,0
Austria	70,0	78,1
Portugal	38,5	39,0
Finland	24,7	31,5
Sweden	49,1	60,0
UK	1,7	10,0
EU	13,9	22,0

When the White Paper was edited, the more recent consolidated statistical data respected to 1995. In that year, the contribution from renewable energies to the internal energy gross consumption of the EU was of 5,4%, mostly electricity. In 1997, it raised up to 5,8%, staying very close to the 6% estimated for that year in the White Paper. It was not verified a stronger growth of renewable energies as there was a deficit in competitivity, when compared to the traditional energy sources. The justification to this fact may be found on the real low in oil prices (between 1985-1995), in productivity gains in the energy sector companies (where merit could be placed on the opening of the sector), and to the electricity sector - in the emergence of combined cycle associated to a production overcapacity. The importance of renewable energies in each Member-State varies considerably according to the policies practiced through the years, and more recently in the measures taken to promote renewable energies.

The production costs of making available renewable energies are, most of the time, in the current economic structure, higher than the traditional forms of energy. This non-competitivity is, sometimes, related with the specificities of the fuel cycle (e.g. insufficient technical maturity, high financial costs, as a consequence of investments being capital-intensive) but, most of the time, it results from the non-internalization of the environmental costs in the conventional solution. On the other hand, it should be added the support that some fuel cycles benefit and have been benefiting during some decades: nuclear, coal, and natural gas at the level of Research and Development Programs as well as subventions to investment. Over the last 30 years, RD&D Programs of the EU have concentrated more than 60% of the resources allocated to nuclear fuel-cycle and less than 15% to the renewable energies fuel cycles. At Member States level, the actions in support to coal, nuclear and public financing to gas and electricity grids and networks, were seriously more important than those in favor of renewable energies.

Renewables are “regional” in terms of being decentralized and with a “local” impact, in the sense of the valorization of the resource. They are a source of income to the communities (through the payment of royalties, diverse taxes, and commercial income), as well as job creator, contributing to one of the main objectives of Social and Economic Cohesion of the EU, as defined in the Treaties. This consideration is either applicable to the electricity and heat generation (through the use of solar thermal energy and biomass, etc.).

However, one of the characteristics of electricity produced by renewable sources (or at least from that which is not from thermal origin as bio-electricity), is its uncertain availability, associated to the resource and the impossibility to store electricity. Each project will sell, therefore, small uncertain quantities of electricity in competition with the large hydro or thermal power plants.

In this order it is necessary to create a specific framework for the electricity generation from renewables. Several policies are in place in the EU Member States:

1) Purchase obligation by the electricity grid of all the electricity generated (*feed-in tariff*), based on a long-term contract (being possible or not, to vary the price, during time, but all the variations should be determined beforehand). The regulatory framework determines how the over-costs are shared between the energy market actors. This system is giving proofs of its efficiency, being the price an essential element, which may be calculated in the basis of the positive induced externality value, added to the price market. Spain, Germany and Portugal are examples of application of this mechanism.

2) The mechanism of the creation of a market share to the "renewable electricity" (by the global quota or by fuel cycle), promotes the organized competition between producers. This system was used in UK and France. It may seem the most close to the market logics, however the results were not very positive in the UK and disastrous in the case of France, as there was a big gap between the presented projects, the approved ones and the realized ones. The mistakes might have been made at the elaboration of the terms of reference, as well as on the evaluation process, projects were chosen according to the logics of market and not according to the guarantee of implementation.

3) The creation of green certificates is another possible model which is now receiving a strong interest. In this system the incentive to development of renewable energies is based on the market, given that the energy produced is sold at the current market prices. The "renewable electricity" producers receive also a "green certificate" for its production, giving them the opportunity to get an additional amount of money through the selling of those certificates in the respective markets. As an example, the certificates in the Swedish scheme are called "elcertifikat" or "electricity certificates". Electricity production from photovoltaics, wind power, biomass, geothermal energy, wave energy and small-scale hydro (under 1.5 MW, some exceptions exist) are eligible for electricity certificates. For each MWh of electricity produced from these sources a certificate is issued. The system is a quota-based system, meaning that a quota obligation is placed on all electricity consumers. The quota obligation, ranging from 7.4% in 2003 to 16.9% in 2010, obliges consumers to have this percentage of their electricity consumption as "renewable" through certificates. In practice, the quota will be handled by the electricity distributing companies. Energy-intensive industry are exempted from the obligation in the initial phases of the scheme. Whether or not they will have an obligation in the future is under consideration. The certificate price will be set on the market. However, there is a minimum price and a penalty level. The minimum price is the buy-out price at which the government promises to buy the certificates from the producers. This starts at 60 SEK/MWh in 2003 (about € 6.6) and is lowered year by year. There is also a penalty level for the electricity consumer that does not show enough certificates. The penalty level, in the latest proposal, is at 175 SEK/MWh (EUR € 19.2) in 2003 and 240 SEK/MWh (€ 26.3) in 2004.

The last element is electricity labeling, which will enable European consumers to get detailed information about the origin of their electricity. Suppliers will have to specify in bills and promotional materials the contribution of each energy source.
The European Commission will be asked to report by January 2006 on experience with market liberalization. It could, if necessary, propose further measures to ensure full independence of network operations and effective, non-discriminatory network access, as well as make recommendations on how electricity labeling is implemented.

Country	Scheme	Objective
Germany	Fixed Tariffs	Directive: 12,5% electricity from renewables in 2010.
Austria	Fixed Tariffs Tradable Green Certificates	Directive: 78,1% electricity from renewables in 2010. 8% hydro < 10MW in 2002; and 4% from the rest in 2007.
Belgium	Tradable Green Certificates	Under discussion in Brussels region. Wallon region: 5% of electricity from renewables in 2005 and 12% in 2010. Flemish region: 3% in 2004 up to 5% in 2010.
Denmark	Tradable Green Certificates	20% electricity from renewables in 2003. Directive: 29% electricity from renewables in 2010.
France	Fixed Tariffs	21% electricity from renewables in 2010.

Ireland	Fixed Tariffs (call for tenders)	500 MW of additional capacity up to 2005 – duplicates the amount of electricity produced from renewables. Directive: 13,2% electricity from renewables in 2010.
Italy	Tradable Green Certificates	Directive: 25% electricity from renewables in 2010.
Holand	Tradable Green Certificates	Directive: 9% electricity from renewables in 2010.
Northern Ireland	Fixed Tariffs (call for tenders)	NFFO 45MW in 2005
Portugal	Fixed Tariffs	39% electricity from renewables in 2010.
Spain	Fixed Tariffs (premium)	Directive: 29,4% electricity from renewables in 2010 (including large hydro).
Sweden	Tradable Green Certificates	60% electricity from renewables in 2010.
UK	Tradable Green Certificates	3% untill 2003; 5,5% 2005/6; 10% in 2010/11.

It should be noted that the most important Member States registered progresses correspond to the sectors to which was developed an adequate policy. For example, the support programs that made increase the penetration of solar thermal energy in the German and Austrian markets, even though these countries have a smaller potential when compared to the southern countries. The same applies to wind energy, as Denmark, Germany and Spain verified strong progresses.

Area of installed solar collectors per country, per year

Portugal	5 000
Austria	170 000
Denmark	15 000

Source: General Directorate for Energy, *Energia Portugal 2001*, Lisboa, 2002.

In the German case it was also announced that a special program to solar photovoltaic energy was in place with the target of installing 100,000 roofs in six years (starting in 1999), what corresponds to a total installed capacity of 300 MW.

Source: European Wind Energy Association (www.ewea.org), 2002.

In this order it is expected that in total, and in the 2020 horizon, the participation of renewable energies in the energy balance will be heightened, with special remark to wind energy.

Annual growth of renewable energies in EU

	1995-2010	2010-2020	Annual growth (%) 1995-2020
EU Gross consumption	1,4	1,2	1,3
Hydro	0,4	0,8	0,6
Wind	19,8	7,4	14,7
Solar	7,1	4,3	6,0
Geothermal	2,3	-1,3	0,8
Biomass-waste	1,2	0,7	1,0

Source: Dresdner Kleinwort Benson; Power Generation in the 21st Century, June 2000.

As demonstrated before, one of the tools proposed to Member States, and which promotes the participation of renewable energies, is the introduction of energy labeling to consumers and green certificates to the utilities. This instrument forces the market actors at the supply side to

provide a certain amount of electricity produced from renewable energy sources. On the other hand the CO_2 emissions trading scheme will soon be a reality, as an instrument developed within the framework of the Kyoto Protocol.

The emissions trading scheme has its start foreseen to 2005 and will hold about 5,000 European companies from energy and industry sectors, which corresponds to more than 46% of all the European emissions of carbon dioxide. With this Directive, it is expected that from 2005 corrections will be made to the non-accomplishment of the Kyoto Protocol by the majority of the European countries. This system will contribute to a practical aprentisage to the 2008 international emissions trading market – defined in the Kyoto Protocol. It is expected that the reductions may amount to 35%, corresponding to an economy of more than 1,300 million euros per year until 2010, in EU.

The Kyoto Protocol: CO_2 emission targets in Europe (5 year average 2008-2012).

Country	**%**
Luxemburg	-28
Denmark	-21
Germany	-21
Austria	-13
UK	-13
Belgium	-8
Italy	-7
Holand	-6
France	0
Finland	0
Sweden	4
Ireland	13
Spain	15
Greece	25
Portugal	27

THE QUESTION OF THE INFRASTRUCTURES

The mechanisms expressed above will put pressure on demand management as well as on the construction of additional and/or replacement of power plants and infrastructure and interconnection capacity reinforcement.

Building the internal market in energy and transport depends on networks involving extremely costly infrastructure. Free non-discriminatory access to infrastructure and its efficient use are indispensable conditions for opening up of the energy sector. The infrastructure managers have a key role to play in maintaining and developing infrastructure, optimizing its use and providing a high level of public service. A regulatory framework is already in place at European, national and even regional level, to guide the actions of infrastructure managers.

In order to optimize the use of the networks, the following should be concerned:

- Transparent use of the network and available capacity;
- Least possible discrimination by the market players;
- Cross-border tariffs should be based on the non-discriminatory principles and taking costs into account, transparency and simplicity.

The rules for allocating scarce, costly energy infrastructure capacity are very recent or still to be finalized. Identifying existing capacity and making information on capacity public and transparent is an essential part of any attempt to organize the allocation capacity.

The energy market opening should also assume the maintenance and improvement of the public service to the consumer in all aspects related to supply, as reflected in the new article 16 of the Treaty. The creation of a Single Market will not necessarily correspond to a massif privatization process but to a regulated competition, with quality of service improvement, resolution of congestions, reduction of emissions and accidents objectives. Obviously, these objectives impose activities like a better use of resources (natural, technological and of infrastructures), modernization of supply services and the growing concern by the environment.

- How can we ensure that European infrastructure capacity is maintained, optimized and reinforced by market mechanisms? Should investment in energy infrastructure be coordinated at European level?

National and regional gas and electricity markets have diverse technical characteristics which may present real barriers to the free cross-border movement of gas and electricity. Even the quality of the product is affected by technical differences. In Europe there are differing levels of gas quality, different operational practices and different safety and security standards, as well as the different systems for balancing energy input and output in a network which are applied by the industry and by the operators across the European Union. These are not problems that can be solved by exchange alone. There has until now been no schematic approach.

- What are the main technical barriers faced by the new entrants? Who should bear the costs of removing barriers?
- What is the industry's view on the dividing line between technical cooperation and competition?

The change of paradigm to which we are currently assisting should pass through a deep thought on the Member States capacity to manage and invest in the energy sector. The European policy is currently promoting liberalization and unbundling in a non-discriminatory and efficient way. In this order it is urgent the change of planning tools and strategies of infrastructures.

- What impact will supply and energy demand management have on infrastructure needs? - Will market mechanisms be sufficient to generate additional capacity?

In liberalized markets, like the energy market, the potentially high costs of poor investments decisions must be avoided by setting in place a transparent planning system allowing for consultation of interested parties. The system should also ensure equal access to rare resources as space and energy are fast becoming.

- How are the European gas and electricity markets going to develop? What are the decisive factors in that development?

THE QUESTIONS OF FINANCING

In the energy sector, most of investments are expected to come from private companies and financial institutions. European financial aid schemes may have a catalyzing effect in some cases. The important thing is to create a climate favorable to investment. Charging for network use must enable the networks to be developed. The role of the state authorities is thus, primarily, to establish the political and legal frameworks needed for the network to develop, in particular by promoting the major gas supply infrastructure projects in and outside the EU.

- What is the best use of EU funding, particularly given the prospect of enlargement? What kind of projects, corridors or regions should the European funding focus on?
- What Community budgets should the next EU Financial Perspectives set aside to fund infrastructures (trans-European network budget, cohesion funds, Instrument for Structural Policies for Pre-Accession?

- What type of infrastructure development aid should come from the public sector?
- What are the obstacles to investment in, and financing of, energy infrastructure?
- How useful can capacity reservation and long-term purchase contracts be in funding new energy sector investment?

THE QUESTION OF THE DISTRIBUTED GENERATION

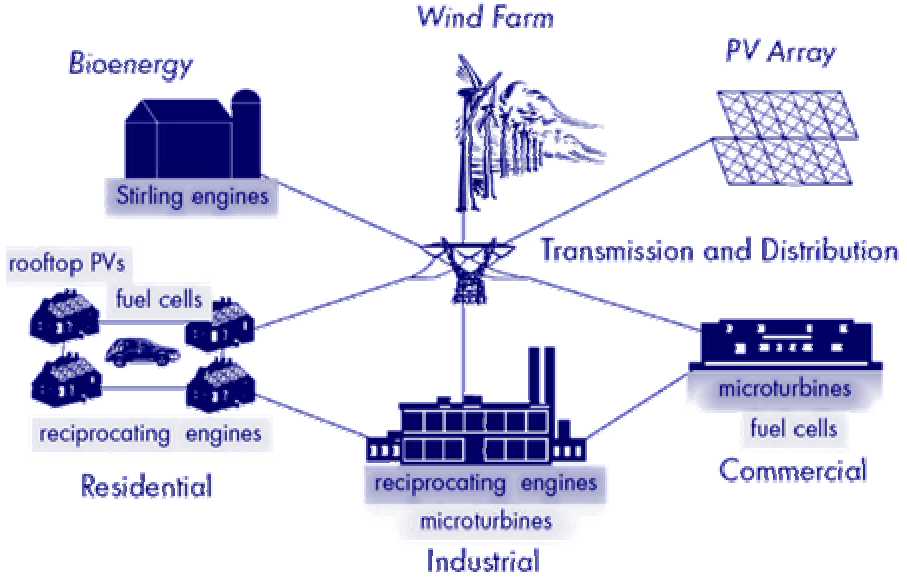
Distributed generation, renewable or cogeneration will not serve as a solution in itself to the networks congestion and in production, but will contribute significantly to the positive environmental and economic impact of the sector.

Powerful integrated energy networks form the essential structure of the Single Market and are condition for security of supply. The current EU energy market (gas and electricity) is relatively poorly connected as interconnections between Member States are subject to several difficulties, both technical (limited capacity) and geographical.

Strengthening networks and decentralizing production will go someway towards overcoming such structural deficiencies.

Fast technological evolution to which we are assisting tends to decentralized generation. Technological yields are growing and the vulnerability to the nature priciples are more easily overcome, when we assume that post-carbon economy is at door and the use of hydrogen, as the most abundant element on Earth, may rapidly be a source of energy to be used by the universe of technologies at dawn.

Options for the energy system in the 21st Century.

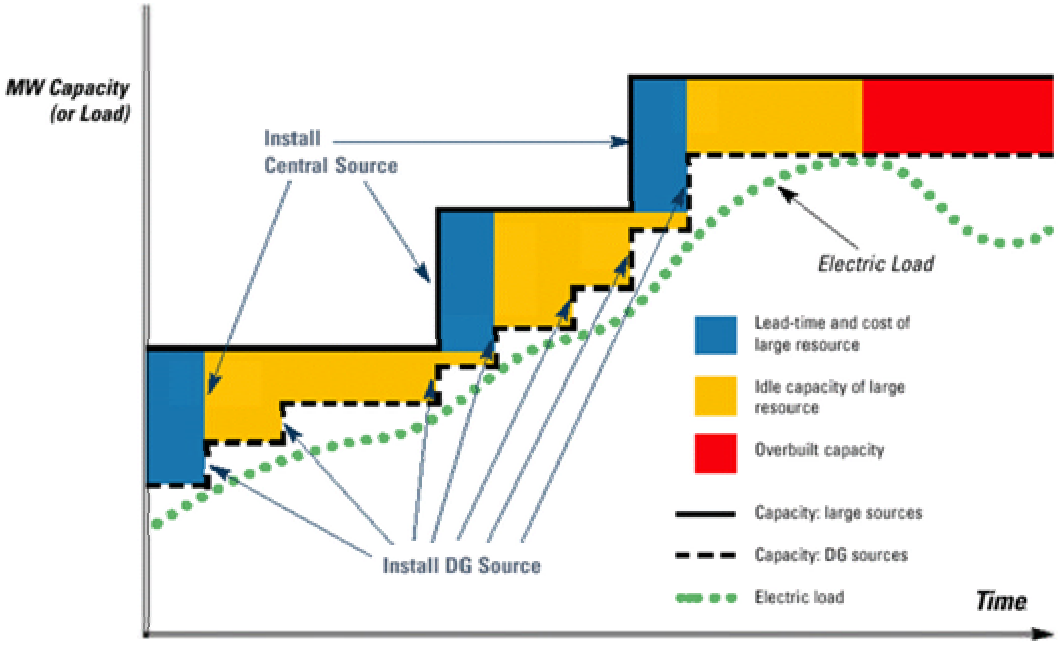


Source: DUNN, Seth; *Micropower – The next electrical era*. Worldwatch Institute, 2000.

Distributed generation (DG) jumps several levels in the value chain and heavy investments could be avoided or postponed in large central power plants or grids. Small DG technologies represent small amounts of generation capacity added to the system and which could be gradually introduced. This may avoid or postpone investments in combined cycle power plants which take years to be built, and with an investment cost per kW decreasing in time. Moreover, these systems avoid grid losses as energy is generated in the place where it is needed (close to consumer).

Nowadays portability and miniaturization of the generation systems is often compared to what has happened in the world of communications with the happening of cellular phones, information systems and the internet.

Flexibility in increasing installed capacity



Source: SWISHER, Joel N.; *Cleaner Energy, greener profits: fuel cells and cost effective distributed energy resources*. Rocky Mountain Institute, 2002.

SUMMARY AND CONCLUSIONS

The consortium, as it is formed now (including partners from Portugal, Italy, Denmark and Poland), could be somehow peripheral within the EU context. Although this might be regarded as a drawback in terms of development, it could be an advantage on this specific work as we have the perfect knowledge to what is representative in terms of energy markets development, access to grids and networks, as well as renewable energies development and the importance of energy efficiency and energy saving. The members of the consortium are very familiar to the questions and implications of being far from the main conventional energy sources and infrastructures, and its implications on industrial and social development, and know how to give value to the local decentralized energy planning, based either on the renewable energies development and on rational use of energy tools.

Bellow are raised several issues which should be looked at but having in mind that not only electricity and gas is being addressed. Solar energy (both active for water heating and integrated in the architectural concerns), geothermal and biomass use for heating purposes are of strong importance in terms of regional development and which should not be forgotten. (Based on a presentation of Claude Turmes, MEP Green/EFA, coordinator of energy policy. "Next steps to a green EU energy policy". 2002).

The EU is now focusing its energy policy within a greener context, whose main drivers are:

- The complete liberalization and the implementation of the Internal Single Market (gas & electricity);
- To fulfill the Kyoto Commitments;
- To enhance the security of supply debate;
- Redefine the policy towards nuclear energy.

Within the liberalization of the internal markets the opportunities are:
- lowering of reserve capacities (less pollution);
- more transparency (also on nuclear investments);
- higher economic efficiency and lower prices;
- window of opportunity for internalisation of costs, and risks

The green challenges in the liberalization debate are:
- To prevent market domination by a small group of oligopolies;
- to prevent market distortion against sustainable energy production;
- to protect small consumers and guarantee universal services;
- to guarantee short term and long term security of supply;
- to address the job question.

To prevent market domination, the following actions should be undertaken:
- Separate grid from production and sales activities (legal, ownership unbundling);
- regulate access to decommissioning funds;
- strengthen the role of national regulators;
- strengthen national and EU competition policies;
- favour small local utilities.

To prevent market distortion against sustainable energies, the following actions should be undertaken:

- Fair access to the grid;
- bonus for decentralized (avoided costs principle);
- lower technical and administrative hurdles;
- Fair production costs;
- Stop subsidies to fossil and nuclear;
- Full internalization of external costs;
- Compensation for sustainable energies until full internalization.

In order to protect small consumers, it should be kept in mind the following:

- Give small consumers market power;
- Favor aggregation of small consumers;
- Facilitate switching of customers;
- Allow a price cap in the first years of a market;
- Guarantee labeling of all electricity.
- Guarantee universal service.

Guarantee security of supply:

- Guarantee sufficient investments in the grids;
- Strict monitoring of demand and supply;
- Invest in demand side;
- Mutual reserve system (national/EU);
- Prevent speculation;

Energy “savings”: the priorities of the priorities:

- The Energy Intelligent Europe Initiative;
- Stabilize and reduce electricity use;
- EU directives on minimum standards for appliances, buildings, cogeneration;
- EU and national labeling and information initiatives (EU agency for efficiency);
- Reduce need for heating and cooling based on the use of conventional fuels;
- EU and national legislation;
- Demand side management of transportation (public) and use of clean fuels.

100% Renewables: next steps:

- Transposition into national laws of EU directive on renewables in electricity;
- Bring off-shore wind to the Trans-European Network schemes;
- Stimulate renewables in adhesion countries;
- Revision of EU state aid rules for environment;
- Allowance for technological innovations;
- Promote biomass and solar for heating and cooling;
- New EU target for 2020 (25% of all energy).

Gas as an energy of transition:

- Favor gas in electricity production, reduce gas in other uses;
- priority for co-generation - new EU directive;
- refit existing central heating systems in Eastern Europe (loan facilities);
- promote cogeneration based on biomass;
- allow biogas to the gas grids;
- full liberalization of gas market and allowance for gas investments in TEN.

Nuclear

- Develop scenarios showing the nuclear is not necessary;
- EURATOM: 50 years (1957 - 2007) is enough;
- Integrate EURATOM into the existing EU Treaty;
- abolish objective and instruments for promotion of nuclear;
- keep safety related provisions;
- prevent exemptions to internal market rules for nuclear (security of supply);
- develop a green strategy against life-time extension;

What is the role of a city?

- City as a planning authority - building regulations/transport/spatial planning/CO_2 targets;

- City as a energy actor - electricity grid/gas pipes/central district heating - power producer;
- City as a client - purchase green-CHP electricity/green gas;
- City a facilitator and awareness raiser - green buildings/green purchase/facilitator;
- educating and marketing.

Priorities for a City

- Every new building is a potential energy producer;
- reducing heating/cooling needs through intelligent architecture and integrated planning;
- Integrate renewables or CHP;
- Professional building management;
- Every existing building is a “gold” mine for CO_2 reduction and jobs;
- Reduce electricity consumption;
- Reduce air conditionning;
- Reduce electricity consumption of devices (minimum standards - « bulk » purchases - awareness and incentives);
- Decentralise energy production;
- Decentralized (CHP) and solar (TH +PV);
- Use energy from separated waste;
- Buy green.

How to get there?

- Energy is always important even when there is no war for oil;
- Environment is always important even when there is no “Prestige”
- Clear targets and monitoring through democratic discussion and scrutiny;
- Partnerships with local population, with NGOs and progressive business;
- Join EU programs like SAVE/ALTENER.

3. Assessing the impact of the energy system on local development – tools, indicators, policy guidelines

The project shall consider all kinds of energy supply, including production, transport and distribution sub-systems and the respective impacts on land use, competitiveness of the economy and citizens welfare.

Key aspects to be analysed are the infrastructure facilities available at territorial level, the energy supply associated to each region (country energy balances) and the energy consumption levels as proxies for welfare. The organisation of the markets and the environmental implications of the energy sector are important questions now being considered at world level.

Energy policies adopted by governments at national or local level can influence energy supply and demand. The globalisation paradigms are of the utmost importance for a comprehensive understanding of the main trends in the energy field.

The following items of the energy sector will be considered for data base definition and information collection. Appropriate indicators will also be defined as means to isolate specific relationships between energy policies, environment and regional development ("act local, think global").

Some of the information is available only at national level but whenever possible a more disaggregated perspective will be considered. On this aspect we rely on information and results now being produced by other ESPON projects.

The following information will be collected to feed in the database:

1. Centralized energy production

   1.1 Electricity
   Type of power plant (hydro, natural gas, coal, nuclear, ...), installed capacity (MW)
   Production in GWh
   1.2 Refinaries – Capacity (ton)
   1.3 Oil
   Potential reserves, extracted volume
   1.4 Natural gas
   Potential reserves, extracted volume
   1.5 Coal
   Potential reserves, extracted volume

2. Decentralized energy production

   2.1 Wind farms
   Production (GWh) and installed capacity (MW)
   2.2 Cogeneration
   2.3 Geothermal power plants
   2.4 Solid waste power plants (with electricity production)
   2.5 Small hydro
   2.6 Biomass heat and power plants
   2.7 Solar energy

3. Transmission (Networks) and energy storage

   3.1 Natural gas networks
   3.2 Electricity grids (per voltage level)
   3.3 International connections
   3.4 Terminals (coal, natural gas, oil and refined products)

4. Energy consumption

4.1 Primary and final energy balances

5. Quality of electricity service providence

5.1 Annual number of interruptability hours

6. Final consumer energy prices
(for consumer types to be defined)
6.1 Electricity (LV; MV; HV)
6.2 Natural gas
6.3 Oil derivates

7. Accomplishment of the Kyoto Protocol objectives in 2000
8. Employment in the energy sector
9. Energy sector's Gross added value (national accounting)
10. Rational use of energy policies
11. Renewable energy policies

The information sources vary from country to country. EUROSTAT, The International Energy Agency (IEA), services from the EU, energy utilities and regulation agencies are among some of the main sources. For general economic and demographic information we rely on information collected and produced by other ESPON projects (see annex I for information and sources available at OECD level.

SOME MAIN FIGURES FOR ENERGY SECTOR CHARACTERIZATION

i) Energy productivity
GDP/primary energy
GDP/Final energy

ii) Development figures
Final energy/inhabitants
Inhabitants served with electricity

iii) Dependence level
Energy imports/Final energy consumption

iv) Employment sector importance
Employment in the e energy sector/Total employment

v) Relevance of the energy sector in the GDP
GDP Of the sector/National GDP

vi) Service quality
Number of hours of electricity interruption providence

vii) Relative energy prices
Per country, between countries, with or without purchase parity correction.

OBS: With exception to the location of infrastructures, which might be regional, the information on national accounting and global consumption only exists at national level.

4. Energy sector and regional development

Energy's importance to regional development has not deserved enough attention. The traditional framework of spatial reference—made up of national territories, technologies essentially relying on electrical energy that can be transported - led people to view energy as something ubiquitous, with no major impact on decisions made regarding business location and conditions of competitiveness.

Evolution towards a new supra-national framework, the growing importance of new energy sources and the re-structuring of markets—with the presence of new operators - all contributed to clearly evidence the current disparities between European regions in terms of prices and conditions of access to energy, which has thus become a key driver for territorial development.

In what concerns energy, five issues deserve attention:

a) Price changes—marked by a trend towards reduction and resulting from market liberalization and European network integration will have different impacts on the competitiveness of economic activities in each territory. Such impacts will be stronger in territories with a more energy-intensive economy.

b) Persistent market segmentation factors (e.g. taxation), the entry of new operators in the market and uneven conditions of access to different energy sources (e.g. unavailable access to natural gas) will maintain the existing large price gaps between different regions, impacting on corporate competitiveness and on decisions made in connection with business location.

c) Different prices and environmental conditions resulting from energy production and use will impact on location decisions made by the households, in contexts marked both by growing mobility and tele-work opportunities.

d) As ESDP states, energy production and transmission may impact on land use, while energy distribution and energy-use technologies may influence territorial development due to the user-behaviour changes induced.

e) ESDP also states that renewable energies may have a significant potential for the development of certain regions—particularly in rural areas.

However the relation between regional development and energy policy vectors is not always obvious. We may encounter examples of investments in energy infrastructures in a certain region that have but a very small impact at regional level. Wind farms is one example: equipment production and exploitation are not supposed to have very important local effects. The main impacts of this renewable source are the global emission reductions.
Whenever possible a correspondence among energy activity and impacts (employment, national and regional value added, taxes, quality of service, positive factors for location of economic activities) will be produced and measured.

5. Terms of Reference interpretation

The rationale behind the drafting of the technical proposal consists of our understanding of the objectives of the research project detailed below. Its assumptions stem from the wording of the Terms of Reference, as part of the working programme of the European Spatial Planning Observatory Network (ESPON).

The first assumption is the focus on *territory*, rather than *sector.* Since our purpose is to analyse the relationship between energy and territorial development, territorial dimension must take precedence over sectoral requirements. Consequently our analysis of the energy sector shall take in account only the relevant elements for spatial development.
In line with our interpretation of the terms of reference, our work must address five main issues, as follows

1. Analyse the territorial trends of energy supply & demand and their spatial pattern, while identifying indicators and mapping methods for quantifying and representing them, taking in account the progress and results of projects currently developed in the framework of ESPON;

2. Design and carry out a territory impact analysis of the energy policy, seeking to quantify impacts from energy-related spatial development policies and identify a set of parameters that may apply to policy decision-making;

3. Define a typology of regions in terms of infrastructures and energy services, with reference to the database and processing techniques. Such typology should clearly define the relationship between energy and polycentric development and identify the regions that are seriously affected by the spatial trends in the field of energy;

4. Identify ESDP options relevant to the energy policy and submit proposals to make them operational and ensure their territorial diversification;

5. Identify the infrastructures and energy services required to provide development conditions to the most backward regions and to those regions marked by specific handicaps (i.e. islands, mountains).

In our view, the proposed tasks are suitable for the results defined above as targets.

6. Concepts and Methodologies

6.1. Spatial pattern and territorial trends of energy supply and demand

This section analyses in depth the spatial pattern of the energy sector, inter-regional disparities in services and networks and spatial trends in energy supply and demand.
Such analysis is particularly focused on the following themes:
a) Supply

- price (with separate reference, if possible, to taxes and subsidies);
- energy dependence / independence;
- quality and reliability of supply;
- diversification of energy sources;
- weight of renewable energy sources

b) Demand

- energy-intensiveness of the economy;
- per capita consumption;
- evolution of the most energy-intensive sectors of the economy;
- evolution of the transport sector.

c) Underlying factors

- local energy sources;
- investment in energy infrastructures;
- market reform.

In line with the above indicators, an appropriate set of indicators for analysing the energy policy impact (causes and effects) on regional imbalances shall be proposed in the first progress report.

Analysis shall be made at country-level and NUTS II-level. Essentially important will be the creation of a base of comparable data at the NUTS II level, for characterizing the energy spatial pattern in each driver mentioned above. Database structure design must secure links to other databases developed in the framework of ongoing ESPON projects.
Trend analysis at the level of NUTS II will depend on the indicators that can be obtained, referred to significant time periods, from national and EU entities. Energy sources and networks will be represented on a geographically referenced base. Special attention will be paid to the institutional organisation of the markets, the way in which changes occurred in this domain have improved service quality and attracted new operators and the evolution prospects that may be forecasted.

6.2. Territorial impact assessment of energy policies

Our methodological option is for a methodology that is both simple and controllable and can produce results with restricted information. We shall however take in account the potentialities and results of a few sophisticated models currently developed in other domains (e.g. in the framework of the IASON project on investment in transport).
The selected approach seeks to (i) identify the relationship between energy policies and territorial development, (ii) qualify the nature of such relationship by approaching “case studies” on regions that recently changed their conditions of energy supply, and (iii) propose a set of parameters that can be used by decision makers (in the fields of energy and territorial development).

6.2.1. Comprehensive analysis of the territorial impact

We assume the existence of a relationship among the following five “blocks”:
(i) The *energy supply* block:

- energy sources;
- energy infrastructures;
- operators and market framework

(ii) The *quality and type of servic*e block, including

- price
- reliability of supply

(iii) The *environment* block, inasmuch as the conditions of energy production, distribution and use are concerned

(iv) The *enterprises* block, including

- location decisions
- conditions for competitiveness

(v) The *household* block, including the family residential options and the impact of energy policy on household's well-being.

The proposed methodology assumes that a relationship between the spatial evolution of these five blocks can be tested. Tests on the modelling of this relationship will be performed if indicators are available for a pertinent (NUTS II, or equivalent) territorial base.
Special attention will be paid to the relations between supply, service and enterprises, assessing

a) the impact on energy supply of community investments, by checking (namely by means of statistical regression methods) if there is a relationship between investments made with EU funds, on the one hand, and the evolution of prices, energy reliability and the share of renewable energy sources, on the other hand. We shall also take in account the conclusions of assessment studies on energy-targeted community programmes developed in the CSF context.

b) the relationship between energy supply and territorial re-structuring, by checking if there is a spatial relationship between the growth of energy-intensive sectors of the economy and the conditions of supply (mainly price) in different regions.

c) the impact of energy on location decisions, by checking at least if there is a relationship between the location of some types of IDE with different levels of energy intensiveness and the regional distribution of energy prices.

6.2.2. Case studies

Access to energy recently underwent deep changes in some regions. This happened in Portugal with the introduction of natural gas, through the creation of regional operators.
Five case studies from the European Space will be selected for an in-depth analysis of impacts resulting from change occurred at three levels, i.e. (i) changed market organisation, (ii) interconnection of the Trans-European Networks, and (iii) reduction of energy prices. Depending on the cases, such studies should clarify issues such as (1) the relations between market structure, prices and services, (2) the impact of prices on location decision-making and land-use planning, (3) the costs of adaptation to new energy sources, (4) the impact of new networks on marginalized regions.
Case studies to be made, in the light of regional development, will be the following

i) renewables, emissions control and self reliance
ii) TEN-E impact, namely natural gas availability
iii) market liberalization
iv) networking reinforcement
v) distributed generation and its impacts on infrastructures management

Portugal, Spain and England may be the reference for this case studies but other countries/regions may be chosen for analysis.

6.2.3. Key players' interviews

Alongside case study development, a number of interviews with key players in energy sector and energy policy will be conducted.

This panel of interviewees could also be used to develop a Delphi process on key issues of the project as a mean to get a more sustained assessment of relation among: energy networks and services; energy policies and trends; regional development.

6.2.4. Decision parameters

We want to create a set of indicators, referring to pertinent territorial units, that decision makers can use as indicative parameters of the potential effects of policy measures.
Particularly important are the indicators regarding

- I1- the multipliers of investments in energy infrastructures;
- I2- the energy intensiveness of GDP growth
- I3- the impact of energy prices on the competitiveness of the economy
- I4- the environmental impact of investments and energy consumption.

The above indicators should provide general guidance on energy needs associated with the evolution of regional economies, as well as on the economic and environmental impacts of decisions made in the field of energy.

6.3. A regional typology

Pertinent regional typologies—particularly those relevant to Structural Fund eligibility, will be the reference of our analysis.

But our proposed regional typology will have a prospective content referred to energy issues. This means that we want this typology, for example, to enable the identification of (i) economically dynamic and energy efficient regions, (ii) regions where energy is a bottleneck impeding development, (iii) regions with a strong potential for alternative energies, or (iv) regions that are more influenced (either positively or negatively) by energy trends. Said typology will also take stock of territorial dynamics, particularly with regard to the polycentric dimension (or not) of territorial development.

To this effect, our regional typology will result from crossing at least three dimensions, i.e. spatial organisation, economic dynamics and energy. We want to use indicators that take into account the current situation and evolution of regions, namely indicators that concern

a) spatial organisation
   - population density
   - urban fabric (metropolitan regions, urban areas, densely populated rural areas, etc.)
   - growth dynamics in urban areas
   - economic functions of urban areas

b) the evolution of regional economy
   - GDP growth (convergence or divergence with the EU average)
   - evolution of economic sectors, according to a typology that takes in account labour intensiveness, technology intensiveness and energy intensiveness
   - the relative weight of the "energy sector" (scope to be defined) in regional economy

d) the energy dimension
   - energy demand and supply (according to the indicators resulting from 6.1)
   - environmental costs associated with the access to and use of energy
   - endowment of energy infrastructures and their weaknesses

NUTS II will be the reference of this typology, which requires the creation of an appropriate database. We shall use a methodology that combines data processing methods (cluster analysis, factorial analysis, etc.) with qualitative considerations, namely to take stock of energy interdependence among different regions.
The resulting typology will be instrumental to

- analyse the challenges facing each type of region and its dynamics, stressing the respective strengths and weaknesses;
- identify regions whose development is linked to specific energy-sensitive drivers;
- determine to which extent regions may be affected by foreseen energy scenarios;
- propose a further operationalisation and territorial diversification of the ESDP guidelines deemed pertinent in relation with energy.

The mapping of urban structures, economic dynamics and energy indicators will help clarify the impacts of energy on regional development.

The three analyses regarding the energy policy foreseen by the ESPON project are all methodological supported by a GIS core enabling a true spatial balance between the different territories and an effective spatial analysis.
To prepare the GIS core it will be used boundaries generated from the integration of EUROSTAT datasets with SABE project datasets from EUROGEOGRAPHICS (http://www.eurogeographics.org) assuring that the results from this project can be integrated with other EU projects using the same European data standards.
To better visualize the thematic maps produced during the spatial analysis, there will be some layers of reference data under the information plotted. The preparation of the GIS structure for this purpose will be done according with the recommendations from the INSPIRE initiative being prepared by the EC through the DG Environment and probably using datasets from the EuroGlobalMap project from EUROGEOGRAPHICS.

7. Information sources

This project has a positive starting point in terms of information. Issues regarding spatial availability of information have already been identified by other projects (e.g. ESPON's 2.1.1 project, the IASON project) and solutions proposed to address them.
Notwithstanding we need to do heavy database-construction work, particularly in connection with energy-specific issues. Specific work is required to

- analyze information worked by other projects, assess its pertinence and conditions of use;
- set up a minimum indicator base (for each methodology point) at the NUTS II level, by resorting to EUROSTAT, the national institutes for statistics and other information sources;
- make contact with government agencies and regulators responsible for the energy sector, asking them to provide the data used in the framework of their (energy) studies and plans..

To this effect it may be useful to contact the local agencies created all over Europe in the framework of the SAVE Programme. Such contact is also relevant to our scope, insofar as we want to establish to which extent the creation of said agencies—as an energy policy measure—vitalised the sector's development in terms of energy availability, quality and price.

8. Interaction with other ESPON Projects

Interaction, coordination with other ESPON projects is of key importance for the success of the project research.

From those ongoing projects the following are specially relevant towards the objectives of ESPON Project 2.1.4:

> Project 1.1.1 - *The role, specific situation and potentials of urban areas as nodes in a polycentric development (2002-04)*
>
> Project 1.2.1 - *Transport services and networks: territorial trends and basic supply of infrastructure for territorial cohesion (2002-04)*
>
> *Project* 1.2.2 - *Telecommunication and energy services and networks: territorial trends and basic supply of infrastructure for territorial cohesion (2002-04)*
>
> Project 2.1.1 - *Territorial impact of EU transport and TEN policies (2002-04)*)

Besides projects under priority 3 and 4

> Project 3.1 - *Integrated tools for European spatial development (2002-04)* and
>
> Project 4.1 – *Data Navigator*

are of key importance in providing tools and data to develop the research methodologies proposed here.

To achieve this aim of deep coordination we will have a project responsible for coordination contacts, under the direct supervision of Project's general coordinator that will be available for permanent interaction with other projects and the ESPON management structure.

This person will prepare with ESPON management structure a framework of collaborative tools to be use in project cooperation. He will also be responsible for intra-team relation to ensure that all levels of cooperation run in a smooth, coordinated and streamlined way all along the project duration.

9. Expected Results

The project is expected to produce results at several levels that are outlined under the following points.

General objectives

According to the TOR of the tender, he general objectives of the research project should cover the topics listed bellow:

i) To develop methods for the territorial policy impact assessment of energy policies
ii) To identify the spatial structure of EU territory regarding energy networks and services and to gain information on EU effects of spatially relevant development trends. This will imply empirical, statistical and data analysis.
iii) To define concepts and territorial indicators, typologies and instruments linked to polycentrism: accessibility, polycentric development, environment, urban areas and territorial impact regarding the relation between energy supply, networks and services and territorial development. Special attention should be placed on islands and ultra-peripheral regions.
iv) To investigate the influence of energy policies on spatial development at relevant scales
v) To screen the interplay of EU and sub-EU policies on energy sector, providing best examples for implementation.
vi) To define instruments to improve spatial co-ordination of energy policies.
vii) To develop possible orientations for policy responses
viii) To develop tools for diagnosis and observation, long-term scenarios generation, evaluation and assessment procedures.

For that purpose the project must address **four basic research lines**:

a) The characterization and mapping on energy networks and supply facilities in an enlarged Europe (27 countries) and in the neighbouring countries (mainly Norway and Switzerland);
b) The development and application of a very focused methodology for territorial typology (whenever possible at NUTS 2 level or bellow) regarding energy networks and services and possible development trends on energy demand and supply:
c) The development of assessment and evaluation models for the relation between energy networks and services and local development;
d) The development of analytical and evaluation models for the relation between energy policy at the European, National and Regional levels and the territorial development patterns. For this purpose ESDP, TEN, environmental concerns and liberalization of the markets must be key frameworks to be considered.

These lines will cover the **primary research issues** identified in the TOR and that are:

- Identification, gathering of existing and proposal of territorial indicators and data and map-making methods to measure and display (1) the basic supply of energy infrastructure and networks, including related services, (2) the trends and impacts of the development of energy infrastructure and networks, including related services.
- Operationalization of the policy options developed in the ESDP relevant for a territorial impact analysis of the energy policy, and development of a methodology for impact analysis at EU scale;
- Conceptualisation and elaboration of a territorial impact analysis for energy policy;
- The most important features of the present infrastructure networks and supply of services with regard to territorial issues, i.e. the spatial pattern of supply and demand of different energy sources;
- Specific typologies and territorial patterns in energy infrastructure and networks, including related services (referring to the typologies used in particular by the ongoing ESPON

project 1.1.1 on polycentrism and with regard to typologies of regions within other ESPON projects);

- The most relevant energy supply and services of general interests, referring to migration and regional development potential, which influence the development of territories and regions lagging behind, as well as territories and regions with peripheral locations or specific features (structurally weak areas, islands and mountain areas);
- The territorial trends in energy supply, in particular in relation to sustainable flows of sustainable energy provision within Europe;
- The importance of energy supply as a location parameter for investments and the economic development of cities and regions;
- The correlation between trends in energy supply and a polycentric development model, including identification of an operational benchmarking system that could be applicable with regard to the data and indicators available;
- A further operationalization and territorial diversification of the policy aims and options adopted in the ESDP, including an adaptation to the territorial diversities within an enlarged EU.

Project outputs

The TOR are very specific as to the outputs and timetable expected for the research project. It must be clearly stated that data availability and interplay with other ongoing projects under in course are of key importance for the success of the research. At the moment of proposal preparation information available is still very incomplete.

The project outputs expected in the TOR are as follows.

First Interim Report (March 2003)

This report will have the following contents:

a) Proposal on indicators and necessary data after a precise analysis of the availability and comparability of data at Community level. For these analyses, the results of the study programme and the results of the ESPON projects in course, in particular under priority 3.1, should be taken into account. This task should also define the appropriate geographical level and technology required for data collection, taking into account the availability of the data. A first detailed and comprehensive list of main statistical and geographical data to be collected from EUROSTAT, the EEA and National Statistical Institutes and National Mapping Agencies;

b) First outline on concepts and the methodology of the impact analysis and the structure of the description of the sector policy.

Second Interim Report (August 2003)

This report will have the following contents:

c) Working report on interim results of the research undertaken so far giving an outline analysis /diagnosis (including databases, indicators and maps) of (points 2 &3 terms of reference):
   - the energy sector in an enlarged Europe (27 countries) as well as the neighbouring countries (mainly Norway and Switzerland), and the energy policy at Community and national level,
   - the existing territorial imbalances and regional disparities in energy services and networks on the basis of available territorial indicators, including Europe-wide maps showing the existing spatial structure of different energy infrastructure networks and services, as far as possible related to the degree of polycentrism, areas facing

problems of lagging behind and the accessibility to different parts and types of territories within Europe
- provisional results on the spatial effects at EU level and in Member States in terms of the economic relocation and other spatial criteria (significance of energy networks as location parameter for mobile investments);

d) Development of the database, indicators and map-making considering the progress of the other research projects;

e) A second revised and extended list of further indicators to be collected mainly from EUROSTAT, the EEA and National Statistical Institutes and National Mapping Agencies;

f) Presentation of the methods for the territorial impact assessment (co-ordination with impact studies required);

g) Definition of appropriate indicators, typologies and instruments to detect regions and territories most negatively and positively affected by the identified trends with special reference to accessibility, polycentric development, environment, urban areas, structurally weak areas, and new methodologies to consider territorial information;

h) Presentation of hypothesis on the territorial effects of relevant measures of the investigated policy;

Third Interim Report (August 2004)

This report will have the following contents:

i) Application of the methodology, analysis of the hypothesis previously developed;

j) Presentation of a comprehensive working report on results of the research undertaken giving an analysis /diagnosis (including databases, indicators and maps) of:
- the energy sector in an enlarged Europe (27 countries) as well as the neighbouring countries (mainly Norway and Switzerland), taking into account Community and national policies,
- the existing territorial imbalances and regional disparities in energy services and networks and as well as
- results on the spatial effects at EU level and in Member States in terms of the economic relocation and other spatial criteria;

k) Conclusions and recommendations on the improvement of sector policies and instruments considering territorial governance (point 5 and 6 of terms of reference);

l) Conclusions and recommendations on the institutional aspects of the spatial co-ordination of EU and national sector policies.

Final Report (December 2004)

m) Improvement of the methodology and the analysis taking into account the results of the third interim reports of the other projects in particular with regard to the candidate countries;

n) Comprehensive presentation of territorial impacts related to an enlarged European Union (27 countries) as well as the neighbouring countries (mainly Norway and Switzerland);

o) Formulation of conclusions and recommendations of possible thematic policy adjustments regarding sector policies in order to avoid unintended spatial effects in relation to the ESDP and the future structural Funds and cohesion policy;

p) Definition of institutional settings and instruments, which could support a better co-ordination and coherence of sector policies towards spatial concerns considering territorial governance;

q) Presentation of new territorial indicators and EU databases including candidate and possibly neighbouring countries;

r) Formulation of the further research necessary in the energy policy field.

General considerations towards project results and achievement strategy

It is understood that the achievement of results within ESPON projects like this will have to observe two key guidelines that may be considered all along the conceptual and research work to be done:

One – That the aim of the project is to work on assessment methods, based on operational assessment methods, oriented towards **the needs of the decision makers**. Therefore the deliverables of the research project should be highly operational and coordinated in order to fit in the relevant political agenda.

Two – The project should draw, as far as possible, in the closest possible **coordination of effort with other relevant ESPON projects** as to avoid duplication of efforts and ensure that theoretical and practical consistency is obtained within a reasonable reach.

The project outcome shall be able to cover the following structure of objectives as stated in the TOR of the tender.

1. Elaboration of an appropriate methodology for the impact analysis/assessment of the energy policy

2. Presentation of energy policy with reference to the territorial dimensions and the governmental level responsible

3. Data, spatial concepts and indicators
    - 3.1. Spatial concepts
        - 3.1.1. Territorial typologies
        - 3.1.2. Relation to other important territorial typologies
        - 3.1.3. Polycentric development and energy supply
        - 3.1.4. Indigenous Development, Diverse and Productive Rural Areas
        - 3.1.5. Basic supply
        - 3.1.6. Sustainable territorial development and energy provision
        - 3.1.7. Productivity and location parameters
    - 3.2. Data, indicators and mapping
        - 3.2.1. Indicators and data
        - 3.2.2. Mapping

4. Quantification and analysis of the effects of the energy policy on the balanced and sustainable development of the territory
    - 4.1. Quantification of the effects of the energy policy
        - 4.1.1. Demographic indicators
        - 4.1.2. Regional economic strength
        - 4.1.3. Labour market, training and education
    - 4.2. Setting the link to spatial concepts
    - 4.3. Location decisions and basic supply
    - 4.4 Location decisions of private companies and infrastructure
    - 4.5. Basic supply for energy services
    - 4.6. Self reliant regions – sustainable regions
5. Orientations for policy recommendations

II - WORK PROGRAM

1. Work program development and tasks

The basic structure of the project will have to be drawn around the timetable set on the TOR for the tender.

The Work program will be organized in tasks that will be outlined and that will be the basic unit for work organization (time and resource allocation). Each task shall provide also an output.

In the end a Gant Chart is provided for the project development.

The task duration provided is mainly for resource allocation and project management purposes. All tasks can be reopened if the need arises in other steps of the research as all issues are interrelated. It must be considered that Phases are Work Packages that can also be taken as a bulk, as product orientation (Interim and Final Reports) are the primary and more important targets of work load organization.

This project structure can be adjusted to the development of other ESPON Projects from which inputs are expected and suggestions from the ESPON project management unit can also be accommodated to some extent.

Project Phases and Tasks

The project would be developed in four phases; each one will provide an output in the form of a report as required by the TOR.

Phase I – Methodological fine tuning and first data availability evaluation

Duration: from 03/02/2003 to 31/03/2003 (41 working days; 8 weeks)

This is a preliminary phase of the research project, where the basic framework will be established and agreed with the ESPON Coordination Unit.

Information gathering about other relevant ESPON projects is a priority, as well as the establishment of collaboration methods among all research players (CEEETA's team members and partners, ESPON Coordination Unit, other ESPON Project Team contact points, data potential suppliers).

This phase is aimed at the production of the First Interim Report. As per the TOR this report will provide:

a) Proposal on indicators and necessary data after a precise analysis of the availability and comparability of data at Community level. For these analyses, the results of the study programme and the results of the ESPON projects in course, in particular under priority 3.1, should be taken into account. This task should also define the appropriate geographical level and technology required for data collection, taking into account the availability of the data. A first detailed and comprehensive list of main statistical and geographical data to be collected from EUROSTAT, International Energy Agency, EEA and National Statistical Institutes and National Mapping Agencies;

b) A definition of the geographical data layers to be used on the GIS project.

c) First outline on concepts and the methodology of the impact analysis and the structure of the description of the sector policy.

To achieve this, the following Tasks 1 to 13 will be performed:

Task 1 – Inception Meeting

Task description:

Meeting of the coordination of the Research Team with the ESPON Coordination Unit to start the project.
The objectives of this meeting are:

i. Analysis of the proposal and proposed methodology;
ii. Information exchange about the other ESPON projects development;
iii. Setting a communication framework between ESPON and the project team;
iv. Exchange of information about collaboration among ESPON projects;
v. Data availability assessment;
vi. The definition of the first steps of the project.

Duration: 1 day (in Luxemburg), 3 team members.

Predecessors (if any): none

Task 2 Definition of key concepts and indicators related to energy systems (energy networks, markets, prices and services

Task description:
This task will allow the definition of the key concepts and indicators to be used within the research to characterize energy sector and policies, namely networks and services. Work will be based on the first approach presented in this proposal. It will be based on desk research and network collaborative work among the research team.

Outputs (if any): Internal working paper

Duration: 5 days (1 week)

Task 3 Definition of key concepts and indicators on local and regional development

Task description:
This task will set out the key concepts and indicators of local and regional development to be used during the research. It will be based on desk research and network collaborative work among the research team.

Outputs (if any): Internal working paper.

Duration: 5 days (1 week)

Task 4 Information gathering about other ESPON relevant projects (first reports analysis and contacts)

Task description:
Information on other relevant ESPON projects (see point 8 of the proposal) that can provide inputs for the project and be part in collaborative processes. Desk research and e-mail contacts with other ESPON relevant projects.

Outputs (if any): Draft notes to the working team. Eventually exchange of information with other project leaders.

Duration: 15 days (3 weeks)

Task 5 Update of assessment and evaluation models for policy impact evaluation

Task description:

This task is intended to provide an update (*state of the art*) in the development and use of assessment and evaluation models for sectoral policies that can be used in the research.
The access points referred in the TOR would be primary targets, but a more thoroughly bibliographical research will be made.
Desk research and informal interviews (personal, phone and email) will be used.

Outputs (if any): Internal working paper

Duration: 15 days (3 weeks)

Task 6 Update of territorial typologies and classification methodologies

Task description:
This task is intended to provide an update (*state of the art*) in the use of typologies and classification methodologies for sectoral analysis.

The access points referred in the TOR would be primary targets, but a more thoroughly bibliographical research will be made.
Desk research and informal interviews (personal, phone and email) will be used.

Outputs (if any): Internal working paper

Duration: 15 days (3 weeks)

Task 7 Outline of energy and territorial development policies in the relevant territory

Task description:
A first brief assessment of energy sector and territorial development policies to be considered in the study at regional (relevant cases), national and European levels will be outlined, to support the following steps of the project. A special focus will be placed in the analysis of the ESDP options relevant to the territorial impact of energy.
Desk research and informal interviews (personal, phone and email) will be used.

Outputs (if any): Internal working paper

Duration: 20 days (4 weeks)

Task 8 Modelling of possible interactions between energy policy (for example, energy networks, renewables and energy services) and local development

Task description:
This task is intended to provide the first working hypothesis to be used during the research about interactions among energy sector and policies and local and regional development. Some of its content is already outlined in this proposal and will be expanded and refined. This will allow to define a set of endogenous and exogenous variables to be used during the modelling and policy assessment exercise.
It will be based on desk research and network collaborative work among the research team.

Outputs (if any): Working paper

Duration: 15 days (3 weeks)

Task 9 Data exploration and Information System Outline

Task description:
This task is intended to define the backbone of the Project's information system (database) that support modelling proposed in Task 8. This task relies also on experience and results acquired in other ESPON projects in what concerns data base structure and socio-economic information collected to be used in other research projects.

Outputs (if any):

Information System Structure;
Indicators and Data Requirements;
First Data Outputs.

Duration: 30 days (6 weeks)

Task 10 Definition of appropriate geographical level for policy impact evaluation

Task description:
Based on working hypothesis and the first assessment of data availability an appropriate geographical level for policy impact evaluation will be defined. Together with this it will be established the structure of geographical data layers needed for the GIS project.

Outputs (if any): Internal working paper.

Duration: 10 days (2 weeks)

Task 11 First interim report drafting

Task description:
This task will provide the First Interim Report due on March the 31st 2003.
The drafting will be based on the internal working papers provided by the preceding Tasks.
A team meeting in Lisbon will be held with members of the consortium.
Outputs (if any): Draft First Interim Report

Duration: 10 days (2 weeks)

Task 12 Draft first interim report delivery

Task description:
Delivery of the report to the ESPON Coordination Unit.

Schedule: 31/03/03

Task 13 First interim report discussion

Task description:
This task will allow discussion of the First Interim Report with the ESPON Coordination Unit.
It will include a meeting in Luxembourg with the project Coordinators.

Outputs (if any): First Interim Report.

Duration: 2 weeks

Phase II – Outline analysis and diagnosis

Duration: from 01/04/2003 to 31/08/2003 (109 working days; 22 weeks)

The second phase of the research project is oriented to get further down in the preparation of the framework for the work and the first assessment of issues targeted. It will set the ground for the next phase where the throughout assessment and evaluation will be conducted. This phase is, then, of key importance in the overall results to be achieved as most of the concepts, indicators, data and hypothesis to be used will now be established (despite the possibilities of try and error still open to be developed in the third phase).

This phase is aimed at the production of the Second Interim Report. As per the TOR this report will provide:

c) Working report on interim results of the research undertaken so far giving an outline analysis/diagnosis (including databases, indicators and maps) of (points 2 & 3 of the terms of reference):

- the energy sector in an enlarged Europe (27 countries) as well as the neighbouring countries (mainly Norway and Switzerland), and of the energy policy at Community and national level;
- the existing territorial imbalances and regional disparities in energy services and networks on the basis of available territorial indicators, including Europe-wide maps showing the existing spatial structure of different energy infrastructure networks and services, as far as possible related to the degree of polycentrism, areas facing problems of lagging behind and the accessibility to different parts and types of territories within Europe;
- provisional results on the spatial effects at EU level and in Member States in terms of the economic relocation and other spatial criteria (significance of energy networks as location parameter for mobile investments);

d) Development of the database, indicators and map-making considering the progress of the other research projects;

e) A second revised and extended list of further indicators to be collected mainly from Eurostat, the International Energy Agency, the EEA and National Statistical Institutes and National Mapping Agencies; by summer 2003 (the latest);

f) Presentation of the methods for the territorial impact assessment (co-ordination with impact studies required);

g) Definition of appropriate indicators, typologies and instruments to detect regions and territories most negatively and positively affected by the identified trends with special reference to accessibility, polycentric development, environment, urban areas, structurally weak areas, and new methodologies to consider territorial information;

h) Presentation of hypothesis on the territorial effects of relevant measures of the investigated policy;

To achieve this, the following Tasks 14 to 23 will be performed:

Task 14 Data gathering and Information System Build Up (first approach)

Task description:
A first thoroughly data research will be essayed to fulfil the requirements of the Project Information System (data base).

Outputs (if any): Project Data Base (1st version)

Duration: 60 days (12 weeks)

Task 15 Data exploration

Task description:
During this task the first essays of exploitation of data available will be performed in order to achieve the characterization of the energy sector and the preliminary testing of formulated hypothesis.
Some mapping essays will also be delivered.

Outputs (if any): Internal working paper.

Duration: 40 days (8 weeks)

Task 16 Characterization of the energy sector and energy policies in the reviewed countries

Task description:
During this task a first thoroughly characterization of the energy sectors (infra-structures, networks and services) will be performed along with an outline of the relevant energy policies in practice and trends. Special emphasis will be placed in the assessment of the different policy levels: local, regional, national and EU; its relation with energy sources and networks.

Outputs (if any): Internal working paper

Duration: 20 days (4 weeks)

Task 17 Price level variations assessment

Task description:
A special care will be placed in the assessment of policy and structural impacts on the price level of energy at territorial level within the countries overviewed by the study. The price of energy is considered a key issue on the relation among energy sector structure and policies and regional development, both from the enterprise location decision and technological choices and family settlement decisions. Price mapping (structure and trends) will also be developed in this task.

Outputs (if any): Internal working paper.

Duration: 20 days (4 weeks)

Task 18 Territorial imbalances and regional disparities in energy services and networks and synthesis mapping

Task description:
This task will provide a first assessment of a macro evaluation of imbalances and disparities in energy services and supply, oriented towards the creation of territorial typologies and mapping presentations. Demand and supply logics, as well as infrastructure charting will be a key issue in this task that will support further refinements at later stages of project development.

Outputs (if any): Internal working paper

Duration: 20 days (4 weeks)

Task 19 Preliminary evaluation of trends in energy policies, energy supply and local development

Task description:
This task will deal specifically with the preliminary evaluation of trends in energy policies (at local, regional, national and EU levels), energy supply (mainly energy sources, self reliance and emission reduction) and local development (on economic activity profile, per capita income, per capita energy consumption, energy productivity and energy GDP intensity and population trends). Some preliminary mapping and typology will be essayed.

Outputs (if any): Internal working paper

Duration: 20 days (4 weeks)

Task 20 Identification of new data needs

Task description:
Based on results and needs identified in Tasks 14 to 19, new data needs will be identified to be used at latter stages of the research project, namely in Phase III of the project.

Outputs (if any): Draft paper to be included in the Second Interim Report

Duration: 5 days (1 week)

Task 21 Second interim report drafting

Task description:
This task will provide the Second Interim Report due on August the 31st 2003.
The drafting will be based on the internal working papers and drafts provided by the preceding Tasks.
A team meeting in Lisbon will be held with members of the consortium.

Outputs (if any): Second Interim Report

Duration: 10 days (2 weeks)

Task 22 Draft second interim report delivery

Task description:
Delivery of the report to the ESPON Coordination Unit.

Schedule: 31/08/03

Task 23 Second interim report discussion

Task description:
This task will allow discussion of the Second Interim Report with the ESPON Coordination Unit. It will include a meeting in Luxembourg with the project Coordinators.

Outputs (if any): Second Interim Report.

Duration: 2 weeks

Phase III – Methodology implementation

Duration: from 01/09/2003 to 31/08/2004 (262 working days; 52 weeks)

Phase III is the core of the research work to be undertaken. All issues addressed in previous tasks (1 to 23) will be reassessed and analysis will be deepened. In this phase the evaluations and assessments will be targeted towards conclusions and recommendations, that are to be drawn for decision making orientation.

This phase is aimed at the production of the Third Interim Report. As per the TOR this report will provide:

i) Implementation of the methodology, analysis of the hypothesis previously developed;

j) Presentation of a comprehensive working report on results of the research undertaken giving an analysis/diagnosis (including databases, indicators and maps) of (complete report on points 2, 3, 4):

- the energy sector in an enlarged Europe (27 countries) as well as the neighbouring countries (mainly Norway and Switzerland), taking into account Community and national policies,
- the existing territorial imbalances and regional disparities in energy services and networks and as well as
- results on the spatial effects at EU level and in Member States in terms of the economic relocation and other spatial criteria;

k) Conclusions and recommendations on the improvement of sector policies and instruments considering territorial governance (point 5 and 6 of terms of reference);

l) Conclusions and recommendations on the institutional aspects of the spatial co-ordination of EU and national sector policies.

To achieve this, the following Tasks 24 to 34 will be performed:

Task 24 Analysis of other ESPON projects - Second Interim Reports

Task description:
The in-depth analysis of other relevant ESPON Projects (specially 1.1.1, 1.2.1, 1.2.2 and 2.1.1) are very relevant now, as means of information refinement and data sharing among projects and as means of methodological refinements and conceptual consistence.
This phase will include deskwork on report reading and analysis, but also informal contacts with project responsibles to share information and cross criticism of ongoing work.

Outputs (if any): Internal working paper

Duration: 10 days (2 weeks) with some extension possible as side-kick procedure for next tasks.

Task 25 Policy case study development

Task description:
In our research methodology the relation among energy sector and policies and regional development will be achieved by three analytical methods:

- clustering and factorial analysis, as means of diagnosing structures and trends;
- econometric methods as means of setting out cross section and time dependent relations among selected variables;
- policy impact case studies.

The first two methods will primarily be part of characterization and diagnosis tasks set beforehand and further down this project description

We have, although the strong intuition that case studies will be very much appropriated to address especially relevant issues that are the core of our research project. The envisaged issues here are:

vi) renewables, emissions control and self reliance
vii) TEN-E impact, namely natural gas availability
viii) market liberalization
ix) networking reinforcement
x) distributed generation and its impacts on infrastructures management

For this a set of at least 6 to 9 case studies will be performed, desirably two/three focused at each issue and that may cover relevant territorial span of the research.

We expect that policy impacts could become more evident (and more evaluation material would be available on local sources) and could afterwards be tested with macro econometric tools depending on data availability and consistency).

Also qualitative assessment will be possible using case study methodologies, that in our view is of primary importance for policy assessment and impact evaluation.

Outputs (if any): Internal working paper

Duration: 100 days (20 weeks)

Task 26 Key players' interviews

Task description:
Alongside case study development, a number of interviews with key players in energy sector and energy policy will be conducted.

We expect that a total of 40/50 interviews would be carried out using both person to person method and email questionnaires where appropriate.

This panel of interviewees could also be used to develop a Delphi process on key issues of the project as a mean to get a more sustained assessment of relation among: energy networks and services; energy policies and trends; regional development.

Outputs (if any): Internal interview report; Delphi report; internal synthesis working paper.

Duration: 90 days (18 weeks)

Task 27 Information system conclusion

Task description:
This task will fulfil the requirements of the information system based on needs identified in Phase II and data availability.

Outputs (if any): Research data base

Duration: 60 days (12 weeks)

Task 28 Deepening of methodology application

Task description:
During this phase a through application of the methodology and analytical tools will be delivered as means to support the next 4 key tasks.
This task will allow to: finish the diagnosis and characterization of energy sector and policies; assessment of regional development issues related to energy sector and policies; hypothesis testing.

Outputs (if any): Internal working paper

Duration: 100 days (20 weeks)

Task 29 Development of specific territorial typologies relating development and energy networks and policies

Task description:
This task will provide specific research and results on adequate concepts and methods for specific territorial typologies relating development and energy networks.
Special care will be placed on co-ordination with other typology concepts used within the EU and other ESPON Projects.

Outputs (if any): Internal working paper

Duration: 40 days (8 weeks)

Task 30 Mapping

Task description:
During this task mapping will be provided for the results of preceding task 29. Special care will be placed in the consideration of mapping exercise as a mean of policy maker's information tool. More than just making maps the project's priority will be on creating a coherent

geographical information structure, that together with the appropriated analysis tools will provide an evaluation and decision support tool for policy makers.
A special focus will be planed in the operationalisation and territorial diversification of policy objectives and options adopted in ESDP.
Outputs (if any): Internal working paper

Duration: 40 days (8 weeks)

Task 31 Conclusions and recommendations drafting

Task description:
This task will provide a first version of the project conclusions and recommendations.
Some preliminary validation could be made using the panel provided by Task 26, in order to get along side some assessment of expected results of provided recommendations.

Outputs (if any): Internal working paper

Duration: 40 days (8 weeks)

Task 32 Third interim report drafting

Task description:
This task will provide the Third Interim Report due on August the 31st 2004.
The drafting will be based on the internal working papers and drafts provided by the preceding Tasks.
A team meeting in Lisbon will be held with members of the consortium.

Outputs (if any): Third Interim Report

Duration: 10 days (2 weeks)

Task 33 Draft third interim report delivery

Task description:
Delivery of the report to the ESPON Coordination Unit.

Schedule: 31/08/04

Task 34 Third interim report discussion

Task description:
This task will allow discussion of the Draft Third Interim Report with the ESPON Coordination Unit.
It will include a meeting in Luxembourg with the project Coordinators.

Outputs (if any): Third Interim Report.

Duration: 2 weeks

Phase IV – Final results, conclusions and recommendations

Duration: from 01/09/2004 to 31/12/2004 (88 working days; 18 weeks)

This Final Phase is basically a refinement phase of the research results obtained beforehand and a period of deep collaboration among different ESPON Projects to ensure consistency and political practical meaning of the overall Program.

This phase is aimed at the production of the Final Interim Report. As per the TOR this report will provide:

m) Improvement of the methodology and the analysis taking into account the results of the third interim reports of the other projects in particular with regard to the candidate countries;

n) Comprehensive presentation of territorial impacts related to an enlarged European Union (27 countries) as well as the neighbouring countries (mainly Norway and Switzerland);

o) Formulation of conclusions and recommendations of possible thematic policy adjustments regarding sector policies in order to avoid unintended spatial effects in relation to the ESDP and the future structural Funds and cohesion policy;

p) Definition of institutional settings and instruments, which could support a better co-ordination and coherence of sector policies towards spatial concerns considering territorial governance;

q) Presentation of new territorial indicators and EU databases including candidate and possibly neighbouring countries;

r) Formulation of the further research necessary in the policy field.

Task 35 Analysis of other ESPON projects Third Interim Reports

Task description:
The in-depth analysis of other relevant ESPON Projects (specially 1.1.1, 1.2.1, 1.2.2 and 2.1.1) are very relevant now, as means of information refinement and data sharing among projects and as means of methodological refinements and conceptual consistence.
This phase will include deskwork on report reading and analysis, but also informal contacts with project responsibles to share information and cross criticism of ongoing work.

Outputs (if any): Internal working paper

Duration: 10 days (2 weeks) with some extension possible as side-kick procedure for next tasks.

Task 36 Methodology and data improvement

Task description:
During this task any methodological refinements and improvements recommended by projects discussion with ESPON Coordination Unit and other ESPON Reports analysis will be identified.

Outputs (if any): Modifications on Third Interim Report's Draft Paper

Duration: 20 days (4 weeks)

Task 37 Refinement of assessment, analysis, conclusions and recommendations

Task description:
Application of the identified Refinement of assessment, analysis, conclusions and recommendations.

Outputs (if any): Draft papers on relevant subjects.

Duration: 40 days (8 weeks)

Task 38 Final report drafting

Task description:
This task will provide the Draft Final Report due on August the 31st 2004.
The drafting will be based on the internal working papers and drafts provided by the preceding Tasks.
A team meeting in Lisbon will be held with members of the consortium.

Outputs (if any): Draft Final Report

Duration: 10 days (2 weeks)

Task 39 Draft final report delivery

Task description:
Delivery of the report to the ESPON Coordination Unit.

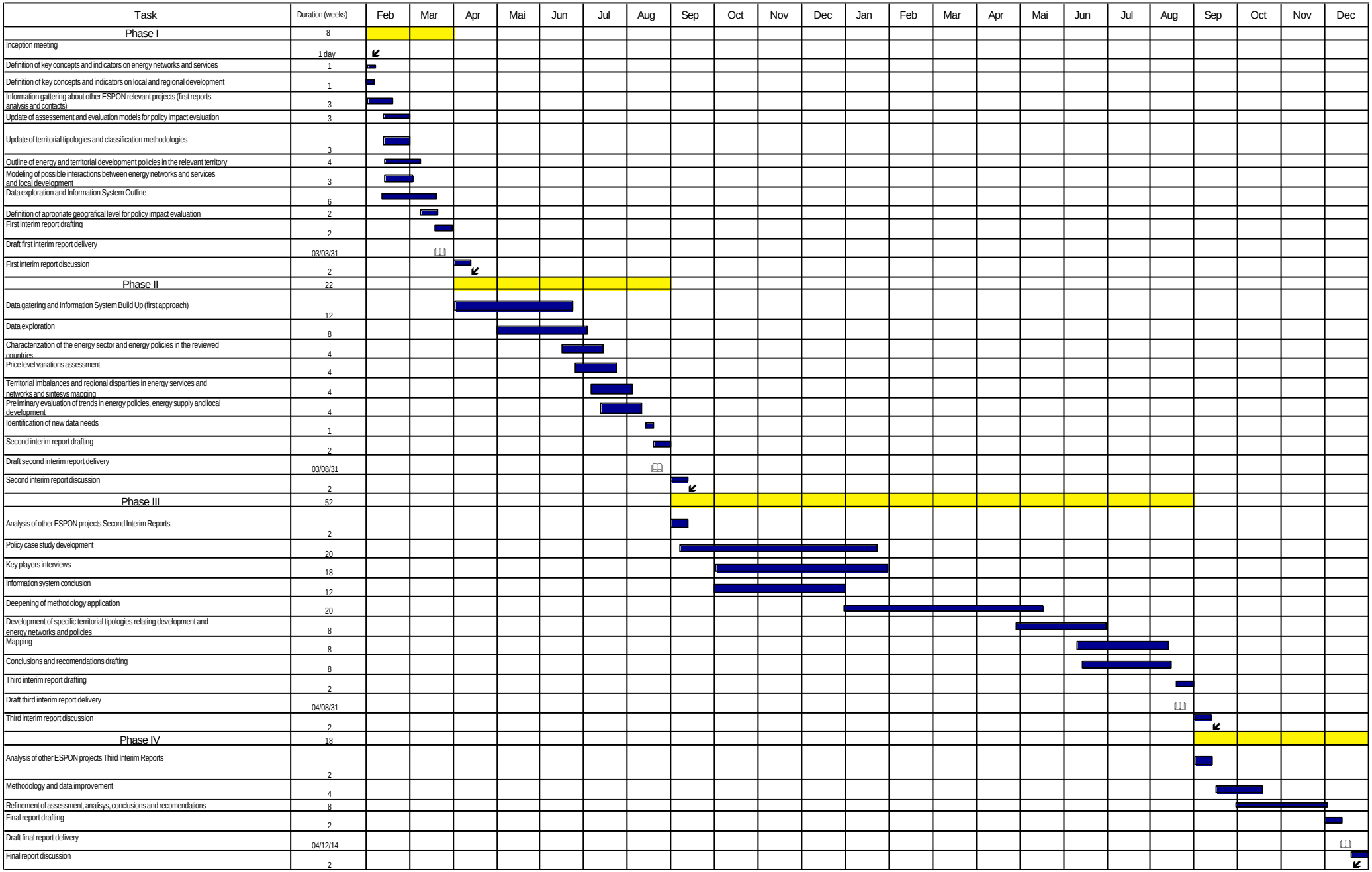
Schedule: 14/12/04

Task 40 Final report discussion

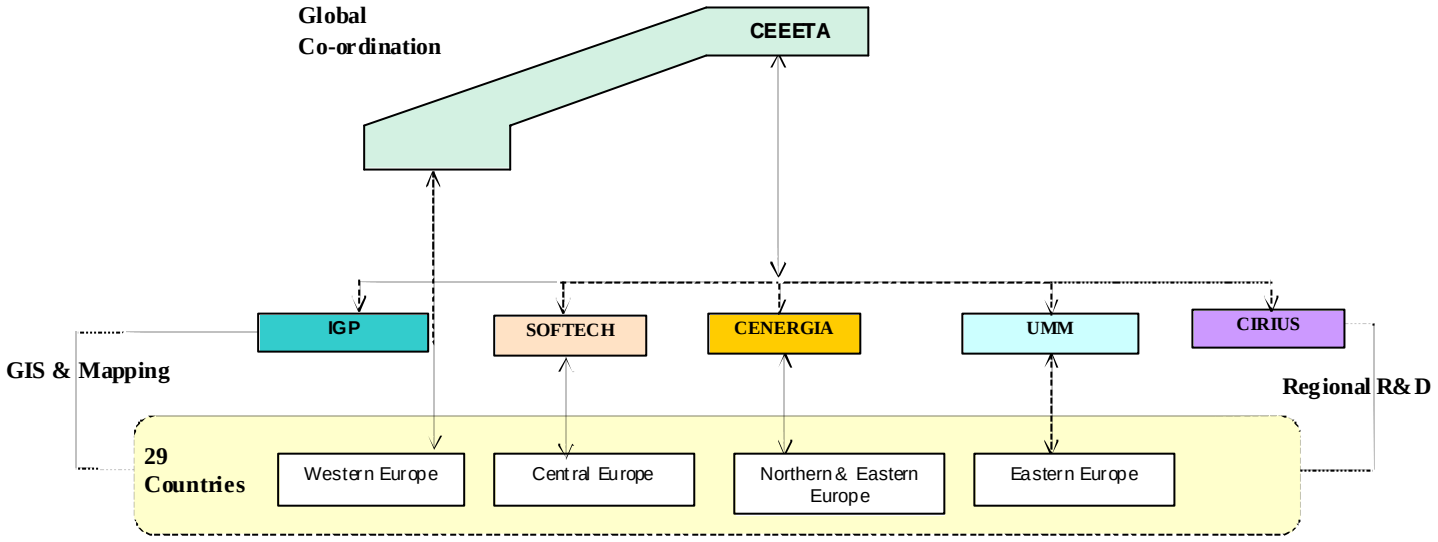
Task description:
This task will allow discussion of the Draft Final Report with the ESPON Coordination Unit. It will include a meeting in Luxembourg with the project Coordinators.

Outputs (if any): Final Report

Duration: 10 days (2 weeks)


Task
Duration (weeks)
Feb
Mar
Apr
Mai
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Mai
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Phase I
8
Inception meeting
1 day
Definition of key concepts and indicators on energy networks and services
1
Definition of key concepts and indicators on local and regional development
1
Information gattering about other ESPON relevant projects (first reports analysis and contacts)
3
Update of assessement and evaluation models for policy impact evaluation
3
Update of territorial tipologies and classification methodologies
3
Outline of energy and territorial development policies in the relevant territory
4
Modeling of possible interactions between energy networks and services and local development
3
Data exploration and Information System Outline
6
Definition of apropriate geografical level for policy impact evaluation
2
First interim report drafting
2
Draft first interim report delivery
03/03/31
First interim report discussion
2
Phase II
22
Data gatering and Information System Build Up (first approach)
12
Data exploration
8
Characterization of the energy sector and energy policies in the reviewed countries
4
Price level variations assessment
4
Territorial imbalances and regional disparities in energy services and networks and sintesys mapping
4
Preliminary evaluation of trends in energy policies, energy supply and local development
4
Identification of new data needs
1
Second interim report drafting
2
Draft second interim report delivery
03/08/31
Second interim report discussion
2
Phase III
52
Analysis of other ESPON projects Second Interim Reports
2
Policy case study development
20
Key players interviews
18
Information system conclusion
12
Deepening of methodology application
20
Development of specific territorial tipologies relating development and energy networks and policies
8
Mapping
8
Conclusions and recomendations drafting
8
Third interim report drafting
2
Draft third interim report delivery
04/08/31
Third interim report discussion
2
Phase IV
18
Analysis of other ESPON projects Third Interim Reports
2
Methodology and data improvement
4
Refinement of assessment, analisys, conclusions and recomendations
8
Final report drafting
2
Draft final report delivery
04/12/14
Final report discussion
2

Description of partnership, organisation and communication flow within the consortium



CEEETA will be the leader and global co-ordinator of this project. CEEETA will be the global decision-maker and responsible for quality control of the whole project.

Several other second level decision-makers were chosen with the agreement of CEEETA in order to be the co-ordinators of the information collection and research work to serve as input to databases. They will be also responsible for giving assistance to the other members of consortium on methodological, analysis and diagnosis approach. CIRIUS will be responsible for regional R&D coordination in close collaboration with CEEETA. IGP will be responsible for coordinating tasks related to GIS and mapping, as well as in close collaboration with CEEETA.

CEEETA will develop a democratic style of leadership. All working political and decision issues will be handled by the group and encouraged by the leader.

Meetings are scheduled during the time frame of the project and frequent contacts by phone and email will be the routine of the project development.

Experts work assignment

Intitution	Experts	Acronim	Role in the project
CEEETA -P			
	Eduardo Oliveira Fernandes (coordinator)	EOF	Project coordinator. Scientific supervisor
	Álvaro Martins	AGM	Energy sector and environment scientific coordinator
	Carlos Pimenta	CP	Energy sector and environment policy advisor
	Luís Gomes Centeno	LGC	Development policies and evaluation methdoligies expert. Information system coordinator.
	Gabriela Prata Dias	GPD	Energy sector expert. Executive coordinator
CIRIUS - P			
	António Mendes Baptista	AMB	Regional development thematic coordinator
	Brandão Alves	BA	Regional development scientific expert
INSTITUTO GEOGRÁFICO PORTUGUÊS - P			
	Rui Pedro Julião	RPJ	Geographical Information Systems Coordinator
CENERGIA ENERGY CONSULTANTS - DK			
	Peder Pedersen	PP	Renewable and dwelling energy expert
	Ove Christen Mork	OCM	Sustainable and urban energy strategies expert
	Anne Rasmussen	AR	Eastern and Central Europe Countries Expert
UNIVERSITY OF METALLURGY AND MINING - PL			
	Adam Gula	AG	Energy policy and Eastern and Central Europe Countries Expert
	Wojciech Suwala	WS	Energy Economics expert and information system correspondant
SOFTECH - ENERGIA TECNOLOGIA AMBIENTE - I			
	Roberto Pagani	RP	Energy sector and local development expert
	Giogio Gallo	GG	Renewable expert and information system correspondent