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The Potential of European Cities for Sustainable Evironmental/Energy Policy

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1. INTRODUCTION

In recent years the interest in urban environmental and energy policies has shown a remarkable rise. After the era of nation-wide and/or sectoral energy policies it has been realized that cities and regions form important focal points for integrative and effective energy savings strategies with a view on both economizing on resource expenditures and improving environmental quality. Cities and regions are usually fairly coherent administrative units, have often a joint energy production unit, have a direct interest in resource and environment issues and have usually an abundance of statistical material. As a consequence, urban and regional energy planning is gaining increasing importance as an effective strategy for ensuing ecologically sustainable economic development, as advocated in the Brundtland report (see also Juul and Nijkamp, 1988, and Nijkamp and Volwahsen, 1990). Cities offer a wide variety of energy and environmental strategies. In addition to the national level, regional and local energy measures often turn out to be indispensable additions to the national policies. Moreover, some problems are typical local in nature and therefore they may preferably be dealt with at the local level.

Demonstration, information, consultancy and individual assistance are usually the non-price ingredients for energy policy schemes in a decentralized setting. To ensure sufficient impact these instruments should be easily accessible for the target groups. In practice this often means that the implementation of these instruments should - whenever possible - be realised at a regional or local level.

The institutional setting in which the energy system operates is of paramount importance to the feasibility and effectivity of any local energy policy. Therefore special attention will be given in our paper to the institutional aspects, with special reference to the horizontal integration and vertical separation of energy systems in Western Europe.

In order to obtain better insight into the local potentials the EC commissioned a cross Community review study concerning urban energy policy in all member countries in the framework of the CITIES programme of the EC. The present paper discusses the principal features encountered in this cross Community review study. Section two will highlight the motivation for the study. Next, some statistical information will be given concerning the economic structure and the energy consumption of the participating cities. In Section 4 the main urban energy policy issues are reviewed, while section 5 presents various cases implemented in several participating cities. section 6 discusses the importance of the institutional framework, while the final section 7 contains some evaluation remarks.

2. MOTIVATION FOR THE STUDY

Until very recently, the efficient use of energy did not seem to be an acute issue from the point of view of availability of energy resources. Presently the Gulf-crisis has proven that this was a typically short sighted viewpoint. The geographical and often political imbalance between spatial concentrations of oil supply and demand may be expected to be a continuous source of global oil market disturbances; hence reliable alternative sources - definitely including savings - remain a sound strategic energy policy option. Besides this consideration of energy availability we may add the important environmental concerns. Moreover, as long as fossil fuels dominate the energy mix, the exhaustibility of these resources should not be neglected, in particular in view of strongly rising extraction costs. Finally, in a competitive European economy cost efficient production is of utmost importance, so that energy consumption will remain a major concern in the economic activities of firms in the next decades.

Towns are by definition centres of economic activity. Given that a concentration of activities implies a concentration of energy supply, urban areas seem to be a suitable geographical entity as a focus for energy policy (next to the international, national and regional level). Admittedly, large energy consuming industries have usually relocated themselves from the core areas to the urban fringe, but that leaves the notion of urban areas as large concentrations of (direct and indirect) energy users (both for production and consumption) essentially unaffected.

Energy policy objectives may - at least partly - be achieved by means of national instruments, e.g., the manipulation of prices. For instance, the improvement of energy efficiency will certainly be stimulated by a rise in energy costs. Also the introduction of new major energy sources, such as nuclear energy, is usually a national policy item. However, both the residential sector and small and medium sized firms need more stimuli than just price incentives to ensure that they are actually participating in energy efficiency actions. Environmental policy has - in comparison to energy policy - to rely also strongly on non-price instruments, such as national - or preferably international - standards. Regarding the motivation of target groups environmental policy has to take into consideration the local environmental, social and economic situation. Therefore, decentralisation of the implementation of environmental policy schemes is at least as strong a prerequisite as it the case for energy policy schemes.

Furthermore, this decentralisation argument also has an important function in a bottom-up policy strategy, as it will usually require less efforts to involve and to motivate local inhabitants and interest groups for energy conservation and environmental programmes.

In summary: the following points support the establishment of and policy support for urban energy policy schemes:

- the city is a centre of economic activity and consequently a concentration of energy supply
- local authorities have more insight and capabilities to shape the urban energy policy in a way that is custom-made to the local situation
- establishment of local energy policies facilitates the involvement of the local population, and hence motivation and public support is easier to receive
- the municipality is often a more suitable entity as regards data collection, statistical analysis and political competence.

In line with the considerations mentioned above, the Commission of European Communities has recognized that the decentralisation of the implementation of energy and environmental policy schemes to the urban level is potentially an important contribution to the fulfilment of national and Community energy policy targets. From 1983 to 1988 the Community has managed a programme to support regional energy studies in all member states. These studies served to provide a more efficient energy planning framework for the own region as well as an example to other regions. However, it was felt that in many circumstances the implemention of energy measures should preferably be further decentralized toward the local (e.g. urban) level in order to achieve sufficiently substantial efficiency improvements. Therefore the Directorate-General Energy of the Commission has defined a new programme aimed at the support of energy programmes in cities. This is the so-called CITIES project, where the acronym CITIES stands for Community Integrated Task for the Improvement of Energy & Environmental Systems in Cities.

Twelve cities, one from each member state, have agreed to participate in a cross-European urban energy survey and to provide active policy support for the fulfilment of these goals.

In alphabetic order these cities are:

Amsterdam	- The Netherlands
Besançon	- France
Braganca	- Portugal
Cadiz	- Spain
Dublin	- Ireland
Esch/Alzette	- Luxembourg
Ghent	- Belgium
Mannheim	- Germany
Newcastle	- United Kingdom
Odense	- Denmark
Thessaloniki	- Greece
Torino	- Italy

Each of these cities has produced a report focusing on successful examples of urban energy policy in the city concerned. This paper will mainly highlight some important themes that emerge from the cross Community study.

3. ENERGY CONSUMPTION IN EUROPEAN CITIES AND COUNTRIES

The population of the participating cities varies from just 30,000 (Esch/Alzette and Braganca) to more than 1 million (Torino). Some municipalities cover more or less the entire metropolitan area, such as Gent, Odense and Besançon. Others, however, are a (dominant) part of a larger conurbation. This holds especially true for Torino, Thessaloniki, Mannheim and Amsterdam. This feature may be important as regards the interpretation of energy statistics, such as consumption per capita. Yet, in most cases the figures presented in this section apply exclusively to the participating municipalities. However, for Thessaloniki and Dublin all figures apply to the agglomeration and for Newcastle a part of the figures apply to the region. The economic structure of the various cities differs substantially. For instance, Torino and Mannheim have large industrial sectors, whereas Amsterdam is extremely service-oriented. An overview of economic key data (as far as available at present) is provided in Table 1.

Table 1. Economic Key Data of 11 Participating Cities

			economic structure (% of labour force)		
city name	population (x 1000)	area (km^2)	industry & building	services commercial	other
Amsterdam	720	126	19	52	29
Besançon	120	65	23	34	43
Cadiz	150	11	25	75	
Dublin	990				
Esch/Alzette	25	14	57	43	
Gent	231	156	33	31	36
Mannheim**	300	145	49	19	32
Newcastle**	286	103	31	32	37
Odense	175	102	32	35	33
Thessaloniki*	706	137	37	63	
Torino	1002	100	41	30	29

*)figures apply to agglomeration
**)labour fractions apply to region

Promotion of energy efficiency has been pursued for more than a decade in all member countries of the Community. Compared to ten years ago most countries have achieved some de-intensification of their economies. Per value unit of output energy consumption decreased with about 10% between 1900 and 1987 [1]. However, the ratio of final consumption to gross consumption lowered in these years. Thereby indicating the rising share of intermediate energy consumption, in

[1].Based on Eurostat, Energy Statistics 1988.

particular for electricity generation. This may be regarded as a long term concern. The decrease of overall energy intensity in the European economies has been mainly brought about by conservation measures concerning combustion and heating. These conservation efforts were clearly set in motion by the high energy prices in the beginning of the eighties. Due to the low energy price levels in the last years we have seen few new efforts for energy conservation apart from new embodied (autonomous) technological progress. On the other hand we may witness a steady increase of the share of electricity in final demand. If savings on electricity continue to be relatively small and if improvements of the generation efficiency proceed slowly, the increase of electricity consumption may be expected to cause the overall energy intensity to rise again.

Although most countries managed to decrease the energy intensity of their economies, significant differences in the level of energy intensity still remain. Denmark appears to have the lowest intensity (little heavy industry), followed by France and Italy (favourable climate). The Benelux countries have rather energy intensive economies (chemical industries, steel and aluminium). From an ecological point of view energy intensity in economic terms is not always very meaningful, as the impacts on the environment depend inter alia on the specific kinds of energy used, the volume of abatement facilities and the spatial concentration of the energy consumption. In order to provide somewhat more insight into this phenomenon Figure 1 compares the energy consumption per capita in the various EC member countries and some particpating cities as well[2]. Notice that the energy consumption for transport is excluded, as this appeared difficult to assess at the city level. In summary: the prevailing climate and the level of industrialisation largely determine the energy consumption levels per capita in different countries.

The different stages of urbanisation among European countries are also related to remarkable differences between urban and national consumption levels as depicted in Figures 1. Notice that in Besançon and Thessaloniki the per capita consumption levels are beyond the national levels, while in Amsterdam the opposite is true. Clearly this may be largely explained by the different economic structures of the cities concerned. Yet, Torino - an industrial city - illustrates (Figure 1) how careful these generalisations should be interpreted.
Finally, Figure 2 illustrates the per capita levels of electricity consumption for the twelve cities and their related countries. Compared to Figure 1 Mannheim and Torino are more intensive than the country average. The extreme electricity orientation of Besançon is remarkable. Probably this may be explained by a high penetration of electric heating. Perhaps to a lesser extent, electric heating explains the shifts of Mannheim and Torino compared to Figure 1.

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[2]. Total Final Energy Consumption at the City level could only be obtained for some cities. Especially, energy consumption of transport is difficult to assess at this level. More generally, energy statistics concerning the urban level are particularly reliable for network provided energy carriers.

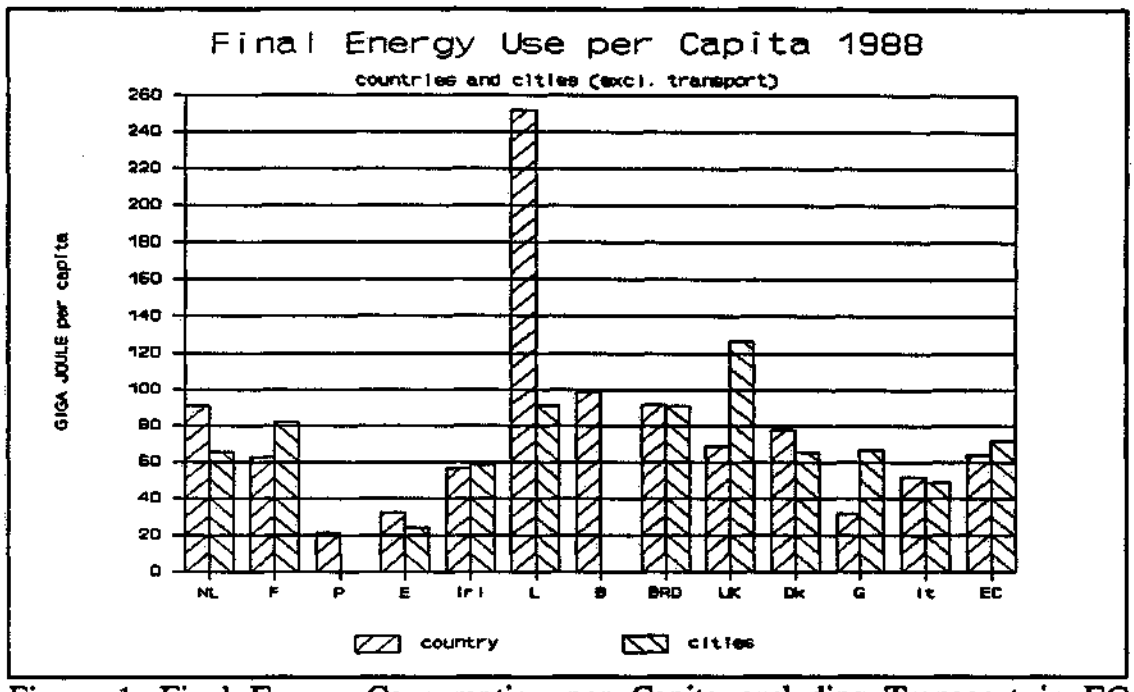


Figure 1. Final Energy Consumption per Capita excluding Transport in EC Countries and Participating Cities

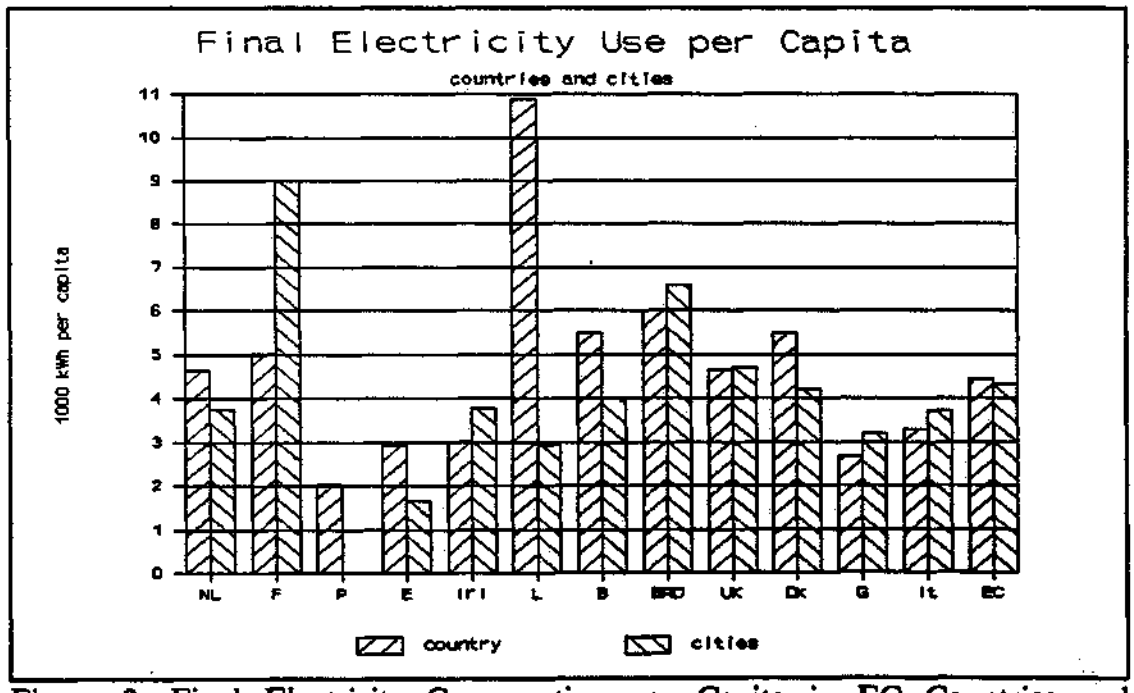


Figure 2. Final Electricity Consumption per Capita in EC Countries and Participating Cities

4. AN OVERVIEW OF ISSUES IN URBAN ENERGY POLICY

During preparatory talks with the various city teams and supported by various publications on energy (inter alia, Europlan, 1988; Lundqvist, 1989) the following policy areas were identified as largely making up the urban energy policy 'space':

. urban energy supply systems (UESS), e.g., district heat systems based on combined heat and power units;
. urban waste management (UWM) e.g., urban waste recycling schemes;
. urban transport systems (UTS) e.g. promotion of public transport, traffic flow management;
. information, communication and marketing (ICM) e.g., customized consultancy on insulation for/by small consumers;
. management of municipal building and vehicle stock (MBVS) e.g., measuring, data collection, targets,monitoring of energy use in public buildings;
. development of integrative urban energy concepts (IUEC) e.g., the balancing of economic, social and energy concepts (IUEC) environmental costs and benefits of offering connections to two or more alternative energy networks

Twelve cities participate in the CITIES programme. Table 2 below shows the choice of energy policy areas made by twelve of the participating cities. This choice does by no means imlpy that the city concerned is not active in other entries of the table. One policy area may cover more than one project in a city, while some projects are related to several policy areas.

Energy management of the municipal capital stock is common practice in all participating cities, but is discussed at length in only a few reports. It may be regarded as the lower bound of a local energy policy. Obviously, a municipality should at least be capable of improving the efficiency of its own buildings and equipment. Usually this serves two objectives. First it reduces the operating costs of the municipal capital stock and second it serves as a good example to local firms and citizens.

The upper bound for local energy policy is an effective local management of the energy supply systems. In case of local management of the energy supply system, the municipality (or its energy subsidiaries) has the opportunity to shape the system in a way that is optimal in terms of local environment, efficiency and reliability. Clearly, it should be acknowledged that sometimes the surplus revenues of local energy companies are used to cover unfortunate financial deficits in municipal budgets, although this is not reported in the documents of participating cities.

Table 2 An overview of programmes and projects discussed in twelve city reports per policy area

	UESS*	UWM	UTS	ICM	MMCS	IUEC
Amsterdam	*			*		
Besançon			*		*	
Braganca	*					
Cadiz	*					
Esch/Alzette	*				*	
Ghent	*	*			*	
Dublin	*					
Mannheim	*					*
Newcastle		*		*	*	
Odense	*			*		
Thessaloniki		*	*			*
Torino	*					

*) UESS - urban energy supply systems; UWM - urban waste management; UTS - urban transport systems; ICM - information, communication and marketing; MBVS - management of municipal capital stock; IUEC - integrative urban energy concepts.

In countries with strongly centralised (i.e., national) energy supply companies, cities often do not have much influence on the local supply system. Consequently, the municipalities concerned appear to focus their energy policies on other fields where they are capable to exert significant influence. On the one hand, a municipality may decide to create local energy consultancy agencies aimed at the support of small commercial and residential energy consumers. By doing so it circumvents to a large extent the monopoly power of national energy companies.

On the other hand, in cases where a municipality chooses not to challenge the other major actors, it usually prefers to deal with issues that have a derived impact on energy consumption and the environment. Urban transport systems appear to be a popular alternative, although spectacular results are only rarely found. Nevertheless, the urban transport system is undoubtedly a meaningful option, as the transport sector happens to be an important energy consumer in urban areas (approximately 25%). Moreover, the environmental consequences are substantial in terms of both pollution and space. Generally the energy and environmental aspects of urban transport policies result in the stimulation of public transport, the exclusion of private cars in some inner city areas, the

creation of park and ride facilities near main gateways to the city, the encouragement to use clean engines (preferably electric), and demonstration projects concerning the introduction of environmentally less unfavourable (public or para-public transport) vehicles.

5. SOME CASE STUDIES
5.1 URBAN WASTE MANAGEMENT

Due to its inherent lack of appeal and the concomitant low social value given to work related to refuse processing, both individuals and institutions have tended to neglect the processing of waste. For a long time it was common practice throughout Europe just to deposit the waste at the urban fringe in large pits. Due to the growth of cities, the increase of individual wealth and the expansion of industrial output, the 'production' of urban waste has grown to enormous quantities. Sooner or later, national and local authorities realized that this practice could not be continued forever. Initially numerous local authorities resorted to rather evasive solutions. For instance, the refuse was transported to remote areas or it was burnt in large combustion units lacking any filtering. Clearly these 'solutions' merely transferred the problems to other regions or to another part of the biosphere.

In order to establish real solutions the value of waste as well as the disvalue (costs) of environmental pollution have to be recognized. It turned out that as soon as this was the case, a range of technical solutions became feasible. All these solutions have the following characteristics in common:
- identification of the components that make up the refuse
- separation of components in order to recycle components (e.g. paper, glass, various metals, biological refuse)
- isolation of environmentally hazardous components (e.g. batteries)
- volume reduction of remaining unrecyclable components causing as little environmental damage as possible.

In fact, prior to the above mentioned steps a comprehensive waste policy should also pay attention to the 'production' of waste. That is, industries should be encouraged to use recyclable non-noxious materials and both producers and consumers should be encouraged to produce as little waste as possible. Yet, these waste prevention measures require a lot of co-ordination (between industries, etc.). Therefore such measures may preferably be dealt with at the regional or national level. In many of cases even international co-ordination may be necessary (viz. the Montreal agreement on CFC's).

As there are so many producers of waste the organisation of urban waste management is not a very easy task, especially as regards the motivation of citizens, firms and institutions to participate in a disciplined and environment-

friendly way. In this respect the separation and isolation seem to be key issues for successful urban waste management.

Newcastle upon Tyne has developed an advanced method to process a kind of pelletised fuel out of urban refuse. According to the Newcastle report these refuse fuel pellets turn out to be cheaper than any other combustion fuel. However, initially the production process for the pelletised fuel encountered many problems especially with regard to a reliable separation of the usable elements from the collected waste. Separation at the source, that is at home, office, etc., seems to be a valid strategy to prevent difficulties with the separation in subsequent stages of waste processing.

In this respect, the Belgian city of Ghent has made much progress as regards its treatment of refuse. It has established a sophisticated separate collection of the various waste components. Since 1988 four public refuse container parks are operated, that allow the separated collection of glass, paper, tires, construction and demolition waste, biological waste, oil and oil products, and metal wastes. In addition to these waste collection parks, there exists a door-to-door collection service for paper and glass. Furthermore, there are several collection networks for crown caps, batteries and mercury thermometers. In order to attain high retention rates for recyclable components, several information bulletins are regularly distributed among households and companies.

Since 1964 the municipality operates compost units to treat household refuse. More recently (1985) the municipality installed a pilot fermentation plant, which produces bio-gas from household refuse. Another kind of bio-gas generator has been installed with a large hospital. For the near future a reorganisation of the incineration of urban waste in Flanders should be effectuated. The new refuse combustion plants, of which one is to be located in Gent, are designed to produce electricity.

5.2 INFORMATION, MOTIVATION AND PRICE INCENTIVES

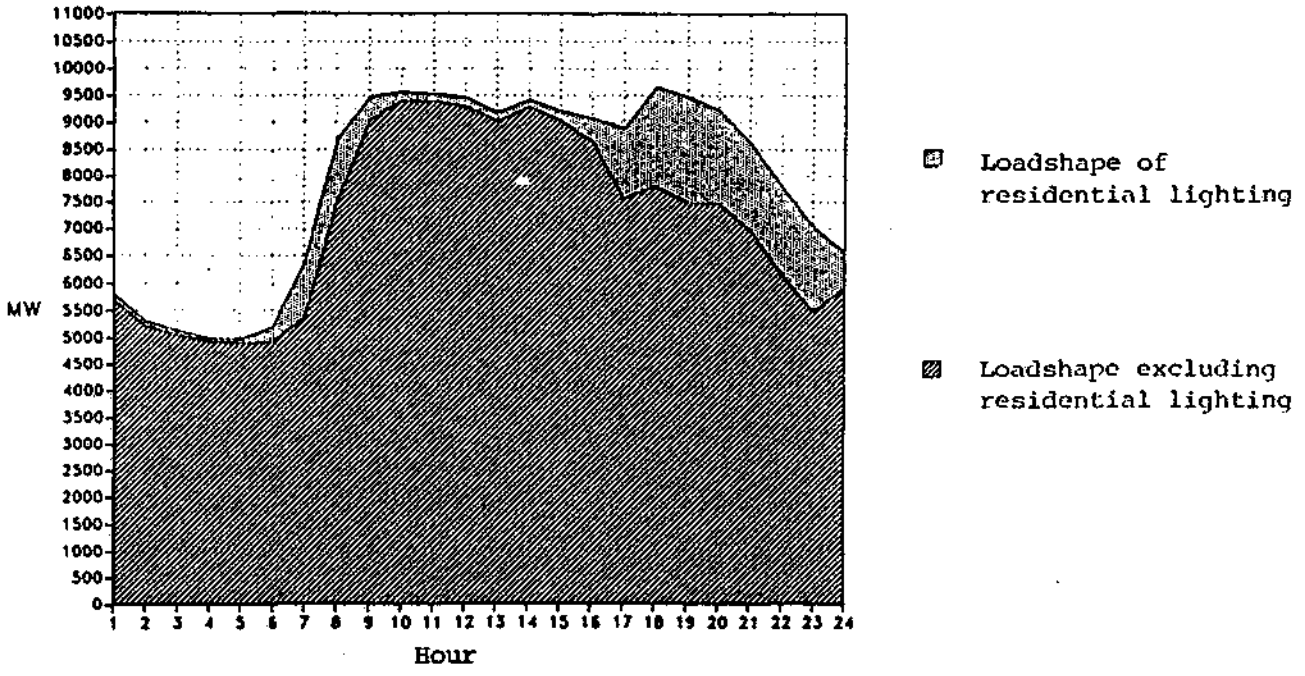
Households and small enterprises often do not have sufficient knowledge about effective ways of improving the energy efficiency in homes, shops and offices. Therefore price incentives have to be accompanied by information and consultancy instruments. Information may be given both via mass-media such as (local) television and newspapers and by means of personal advice to individual consumers. Most countries in the Common Market have national energy information and energy consultancy agencies. Fortunately, more and more cities or other local (energy) authorities are establishing local energy information and consultancy agencies as well. Sometimes these agencies are part of the municipal information department, but in most cities the consultancy and information task is delegated to the local energy company. However, the delegation of this task to the local energy company requires that the promotion of an efficient use of

energy should be defined as an official company task. The motivation of the local energy company to promote energy savings will be significantly enhanced if the local energy company deals only with distribution and not with energy production and/or if the local energy company operates according to an overall energy plan including efficient production, transport and use of energy. A recent phenomenon in several cities is the very active marketing toward households in conjunction with an enlargement of the scope of energy consultancy services, including, for instance, mediation in case of debts to the energy company.

In conjunction with informing the public most municipalities have made enormous efforts to improve the efficiency of their own capital stock. One should not forget that the municipality itself is an important energy consumer. In order to be effective these internal energy efficiency programmes require a thorough organisation of information flows. Initially general guidelines were issued, while subsequently many municipalities started to monitor energy budgets. In order to explain differences in energy consumption ratios between departments, buildings etc., detailed metering schemes were installed. The logical next step was to move from automatic metering to automatic control. Consequently, nowadays a lot of municipal buildings are fitted with energy management devices, contributing to an impressive increase of the energy efficiency. For instance, the energy consumption for heating in all municipal buildings (including schools) in Besançon in 1989 is 67% of the amount of energy needed in 1979. The investments in energy efficiency appear to be very cost effective. The accumulated investments in Besançon since 1979 amount to 20 million FF, while the accumulated energy savings since 1979 represent a value of 33 million FF.

Time of day rates are the most well known instrument to bring about changes in the load shape of an electricity network. Numerous studies have been published on this subject (see inter alia Sexton et al,1987; Train et al,1987). On the other hand, the assessment of an appropriate rate structure as well as an appealing introduction to the consumer are quite complicated activities. The Amsterdam Municipal Energy Company has found an interesting opportunity to accomplish both some leveling off of the early evening peak and saving electricity in households. Because of earlier residential consumption surveys it was relatively easy to identify residential lighting as one of the important contributors to the evening peak. This is illustrated in Figure 3 below. This figure represents a diurnal load shape of the national grid; in Amsterdam the early evening peak is more outspoken.

Figure 3. The Load Shape of the Dutch Electricity Network on Thursday, January 21, 1988



Source: Sep, 1989.

Before the action started, energy saving lamps (SL and PL) had hardly penetrated the household market. This poor penetration rate is largely attributed to the relatively high initial costs of SL and PL lamps compared to conventional light bulbs (Hfl. 20.- to Hfl. 30.- and Hfl. 1.-, respectively). The resulting long pay back times discourage most people to buy such lamps. Therefore, the Amsterdam Municipal Energy Company arranged with several electric bulb producers and relevant local retail organisations to issue a special offer to households. Households were enabled to buy a limited number of SL or PL bulbs against a reduced price during a period of six weeks. The customers could choose for either direct payment or payment by cheque issued by the Energy Company. In the latter case the cheque had to be repaid by adding the costs to the next ten monthly bills. Assuming direct payment of the lamp the approximate break-even point compared to the ordinary light bulb is 22 months. About 150,000 lamps were sold, most of them by direct payment. The Energy Company expects a reduction of aggregate annual demand of approximately 11 GWh. Further stimulating actions for the promotion of this kind of lamps are foreseen.

6. THE SIGNIFICANCE OF THE INSTITUTIONAL FRAMEWORK

As indicated above, the institutional setting in a country determines to a large extent the maximum 'policy space' available for an urban energy and environmental policy. Based on the information from the twelve city reports two aspects are identified as being of particular importance. These are the degree of (de-)centralisation of the management of energy systems as well the ownership status of the energy systems. A large variety exists among member countries of the European Community. An overview for both aspects for various member countries is given in table 3 below.

Generally, countries to have specific institutional and organisational forms for their energy systems. However, mixed situations may exist as well, for instance, when one energy system is primarily nationally managed, while another system is mainly locally managed. Furthermore, some energy supply systems, e.g. the high-voltage electric power transportation grid, have necessarily a national status.

In Denmark integration of production and distribution is often established at the local (urban) level. The same concept exists in several German cities. However, also regional power companies exist. Usually these are private companies, though a significant part of the shares may be owned by local or regional administrations. Sometimes the integration at the urban level includes district heat and natural gas distribution. Recently production and main transport of electricity and natural gas in Holland is completely separated from distribution.

Table 3 Degree of centralisation and ownership status in various EC member countries (the prevailing situation in each country is displayed)

	Electricity production	distribution	Natural Gas main transport	distribution
Belgium	private-central	ppp-regional	ppp-central	public-local
Denmark	public-local	public-local	public-central	public-local
Germany	*private-regional	*private/public-regional/local	*private-regional	*private/public-regional/local
Greece	public-central	public-central	public-central	public-central
France	public-central	public-central	public-central	public-central
Italy	*private/public-central/local	public-local	*private-central	public-local
Holland	*private-regional	*private/public-regional/local	ppp-central	*private/public-regional/local
U.K.	public/private-central	private-regional	private-central	private-central

ppp - public private partnership
an asterisk (*) before 'private' denotes ownership of shares by public authorities

In various countries, (through merger and by-out) horizontally integrated regional or urban distribution companies have been created taking care of electricity, natural gas and district heat (if present). As far as energy companies are private, (e.g. all power production companies and various regional distribution companies), shares are owned by the regional and local authorities concerned. France and Greece have completely centralised vertically integrated public energy companies covering virtually the whole country. In Belgium the production of electricity is mainly a private business, but the distribution of both gas and electricity shows various alternatives including joint ventures between public and private institutions (public private partnership). If the electricity supply industry will be privatised like the other components of the British energy system, the U.K. undoubtfully will have the most privately owned energy networks. Notice that the natural gas grid is operated within one nationwide organisation, while the power distribution sector is organised on a regional basis. Italy shows a quite hybrid picture: on the one hand there is a very large state owned energy holding company including production, main transport and distribution of electricity and natural gas; on the other hand there exist various regional or local (urban) distribution companies for electric power, district heat and natural gas. Some of these local companies also possess electric generation power.

In all countries strategic planning and research for the various energy systems is carried out by national organisations or by a co-operation of regional and local companies. In some countries, like the U.K. and Holland, the production (extraction) of natural gas is operated by private - not state owned - international firms, such as BP, Exxon and Royal Dutch/Shell. In other countries, such as Italy, this is done by state owned companies. In wholly centralised systems such as in France and Greece, electricity distribution companies are usually not allowed to operate small scale generation units (including district heat). In the decentralised or separated systems distribution companies usually have this right and make use of it. The arguments to install small scale local power units are manifold, such as local optimisation of supply, peak shaving, countervailing power vis-a-vis the large power supply companies, demonstration and experimental purposes and environmental considerations. Clearly, these arguments may be mutually complementary.

From the case studies in the preceding section as well as from the information above we infer that scale economies in the electricity sector require much larger generation companies than distribution companies. Consequently, the electricity supply industry is usually organised on a national or regional level, while - due to recent decentralisation tendencies - distribution companies operate often at a local or regional scale. Moreover the separation of production and production enhances competion in a managable way and opens up better opportunities for energy saving measures.

Undoubtedly, privatisation is developing most strongly in the U.K. The regional electricity companies in, for instance, Germany, Belgium and The Netherlands

also have - in varying degrees - a private sector character. In these cases regional and local authorities ensure their influence by (complete or partial) ownership of the shares. Still there is an important difference between the management of the wholly privatised energy companies in the U.K. and the Limited companies in Germany, Netherlands and Belgium. The latter companies will usually be able to attract external capital by paying normal long term market interest rates and sometimes even lower. In the U.K. however, the energy companies have to compete fiercely with other investment alternatives, which implies currently real rates of return of about 15%. Consequently, British energy companies are very reluctant to invest and on the other hand they have to be very keen on a high utilisation level of their capital stock. Under certain conditions such incentives may frustrate energy conservation strategies. For instance, so called 'valley filling' for electricity companies may be an attractive option. In those cases where this 'valley filling' is achieved by attracting new demand in stead of shifting demand - and especially in case of substituting natural gas or district heating -, this practice is incompatible with long term energy efficiency programmes.

The state of the local economy is of course an other important restriction on the actual possibilities to carry out local energy programmes. Even if the 'policy space' is available and benefits are evident, other local problems may be perceived more important to the municipality. For instance, several large cities suffering from urban and concomitant social decay prefer to focus their efforts on the improvement of the social and economic situation of the population in those parts of the city concerned (see inter alia Nijkamp and Perrels, 1990). These efforts may include energy measures such as insulation in order to cut heating costs. Remarkably enough, the same kind of priority options may arise in economically extremely successful cities. Usually the growth of the metropolitan area induced by the economic thrift absorbs most attention of the municipality. Moreover many municipalities do not dare to risk any decline in urban growth by introducing measures aimed at the improvement of the energy efficiency and/or the environment.

Yet, apart from the long term benefits, the short and medium term benefits of comprehensive energy programmes should not be underestimated, both in financial and enviromental terms, especially if this includes the lifting of institutional impediments. For instance, the reorganisation of the utility sector in the Netherlands has clearly contributed to a situation that allowed (and allows) for efficiency improvements in the electricity supply sector as well as stimulated the establishment of energy efficiency programmes by the local and regional energy distribution companies.

7. CONCLUDING REMARKS

The cross Community review of urban energy projects has revealed that virtually every city recognizes the importance of local energy policy. Yet, the policy space is very much influenced by the institutional organisation of the energy systems and responsabilities concerning security of supply, price level, environmental standards, etc. The responsabilities just mentioned are usually a national matter and may be influenced depending on the degree of market functioning and the ownership and taxation of exhaustible resources, such as fossil fuels.
Given any national energy policy framework, additional local and regional energy plans seem always necessary to offer a detailed implementation framework in addition to often rather general formulated national policy goals (e.g. an overall efficiency improvement of 20%).

As regards the institutional organisation scale economies may be a sensible indicator, as far as they are separately assessed for constituent parts of the system, i.e. generation, distribution, etc. The separation of generation (or main transport) from distribution may be accompanied by integration of the distribution of several network provided energy carriers at the local level. In other words vertical integration is to some extent substituted by horizontal integration. As regards the ownership status, there is some tendency to forms of private companies, although public influence remains decisive in most cases except for the U.K.

The various cases presented here underscore the importance of a comprehensive approach of every project. Though a concrete project may aim at specific goal related to a particular aspect of the energy market, it always involves other items included in the list of most crucial issues presented in section 4. For instance, information and communication including updating and feedback are relevant aspects for any project.

The overall conclusion from this document is that urban energy policy may be an effective strategy in the framework of both economizing on energy costs and improving urban environmental quality.

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