

# **Public Procurement of Energy Saving Technologies in Europe (PROST)**

**Report on the Country Study for Italy:  
Task 2a - Current Public Sector Purchasing, Building, and  
Replacement Practices  
Task 4b - PICO Feasibility Study**

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## Glossary

Statistics and official documents in Italy refer to different notions of the public sector. For the most we adopt a “functional interpretation” in which Public administration (PA) is used as an aggregate term to refer to :

Central administrations : those institutions whose principle activity extends across the country, for example Ministries, National Research Committee (CNR), *la Cassa dei depositi e prestiti*, *l'Agenzia per il Mezzogiorno*, National Statistics Office (ISTAT), Agency for New Technologies and Energy (ENEA)

Local administrations : those institutions whose activity is limited to a part of the country. For example regional and local authorities (Regions, Provinces, and Councils), local health authorities (ASL), public hospitals, other local bodies (universities, schools, housing authorities, local trade ....)

Welfare Institutions : those institutions which provide services and benefits financed through social security contributions. For example the national welfare institutes (*INPS*, *INAIL* , *ENPAS*)

According to which in this document Public administration and public sector are used interchangeably as one and the same.

## Executive Summary

End use energy efficiency within the Public administration in Italy is administered by three legislated requirements:

- Directors for the conservation and rational use of energy (commonly referred to as Energy Managers): Law 10, 1991, Article 19
- Purchase of Efficient Products and Components: Law 10, 1991, Article 26, comma 7
- Energy Plans: Law 10, 1991, Article 5

These requirements are born out of the 1988 National Energy Plan, which outlined the framework in which to develop national energy policy. With the principle objective of increasing national self sufficiency the NEP identified the rational use of energy as the first of five strategic national objectives. The application of these requirements predate the concepts of sustainability formalised with Agenda 21 and subsequently the Kyoto reduction targets.

More precisely the law requires:

- Managers for the Conservation and Rational Use of Energy (commonly referred to as Energy Managers) to identify actions, interventions and procedures necessary to ensure the promotion of the rational use of energy.
- the public sector to meet its service requirements by the application of efficient solutions in proprietary or rented properties where these prove technically feasible and economic.
- for regional and city authorities (with populations greater than 50.000) to evaluate energy saving potentials in the wider economy and to formulate objectives in order that these may be met. More recently the law has attributed to provincial administrations (which lie between the regional and city/town administrative levels) the voluntary task of developing programmes with which to realise the energy savings in accordance with the regional plans.

There are problems specific to application of all three themes. Common to all is the less than complete compliance with the minimum terms of the law. This is at its most pronounced with the nearly absolute non-compliance of Article 26 of Law 10, 1991 in respect of the need of PA to implement efficient solutions where these prove technically feasible and economic.

Generally it can be said that the PA has failed to translate the potential offered by the requirements into effective measurable energy savings. Electrical energy consumption in the public sector in Italy is currently growing at around 3,5 % per annum, roughly 1% above the general national aggregate growth rate.

Three reasons might be advanced to explain the failure to realise the first two requirements, in line with the original expectations held by the legislator, briefly:

➤ **Lack of Priority:** Energy efficiency is considered by top management (at times political level) principally as an environmental not an economic issue. This in part maybe understandable; energy costs within the PA as a whole account for only several percentage points (say 2 to 5 %) of the total annual operating budget for the public sector whereas personnel costs account for more than 80%<sup>1</sup>. Thus reductions in energy use, even significant, result in only marginal annual economic savings compared to total annual budgets of individual administrations. However though relatively small, in absolute terms the figures are significant estimable as not less than 1 400 million Euro<sup>2</sup> for the public sector as a whole in Italy.

Those Energy Managers which have for example achieved success have sought recognition for the strategic importance of their role from top management.

➤ **Lack of Technical Information and Formation:** in order to implement the legal requirement to implement energy efficient solutions (Article 26, Law 10/1991) where these prove technically feasible and economic, requires that staff charged with procuring are able to identify efficient solutions and can determine the nature of the energy savings which would result in respect of none efficient alternatives; information and procedures until now missing.

Energy Managers have a valuable role to play in this sense. However they offer (far) less than coverage, there is a general lack of formation, and even those informed suffer difficulties in reaching out and informing the wider organisation in which they work.

➤ **Lack of Investment Culture:** Public administration invests in society in the wider sense. Its mission statement is directed by service provision. Investments aimed at yielding direct future economic returns are not innate to this culture. This is reflected at decisional level, where priority is directed to improved service levels, and within administration, which lack the skills to undertake simple cost benefit analysis.

Which is not to say that the PA are not active in implementing energy efficiency solutions. There is an self-awareness of parts of the PA of its role as an agent able to lead the rest of the economy in innovative change. However the search for improved energetic productivity most often depends on self motivation and the cultural preparation of Energy Managers or individual functionaries within for example the Facility and Accounts Departments (as in the case of the City of Modena and the Provincial administration of of Milan).

Post Kyoto, six key actions to reduce GHG emissions in line with national target level defined by the burden sharing agreement were approved at national executive level in 1998. According to which, roughly 30% of the total reduction target is to be met by the rational use of energy in the industrial, tertiary and domestic sectors. As yet this has not been translated into more specific sectorial targets.

In the present scenario the Public administration, in the guise of regional, provincial and city administrations, is identified principally as an agent able to facilitate and organise change in the wider economy rather than as a privileged end user.

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1 In 2002 staff salaries will account for 86% of the total budget of the Public administration in Italy. The total cost of procured services (of which electricity and heating fuel represent only one item) will be in the region of 8%.

2 Considering energy costs as accounting for not less than 2% of the total annual operating budget in the Public administration in 2002 (71.768 million Euro).

Attempts have been made to strengthen the regional and city energy plans introduced with Law 10 1991 and which provide a number of Integrated Resource Plans across the national territory. With the *Protocollo di Torino*, agreed in June 2000, the 20 Regions of Italy agree to develop a common environmental and energy plan by the end of 2001. Recent legislation (Dgls 112, 1999) delegated provincial administrations the facultative task of developing Energy Programmes with which to realise the energy savings identified in the regional and city plans.

The regional and city energy plans and the provincial programmes address the wider economy. However they also provide a platform and a resource base from which to co-ordinate energy savings activities specifically in the public sector. If in part this is informally recognised with number of plans singling out the Public administration for special attention, in practice their presence is generally unknown of outside of the developing authority (provincial governments) and therefore they have limited influence on the procurement provisions of the other public authorities located on the provincial territory.

Procurement practices themselves vary notably between administrations, reflecting the freedom of financial management that these practice. Commonly budgets for investment in buildings (building systems and envelope), products necessary to run service group activities (e.g. computers and X-ray machines) and energy costs will be administered across three costs centres. It is likely that this administrative division reflects a division of responsibilities at management level, and top management may often equate with the cabinet of local government (thus political).

The degree to which this budget division creates barriers to energy efficiency in the form of split incentives depends on the size of the organisation. Ultimately investment and energy costs are likely to be considered globally as a single entity by top management. Particularly in smaller organisations this could well be a single individual; the mayor of a small town, the director general of an hospital. These managers are generally aware, if not keenly, on the need to reduce costs, and can direct changes to investment strategy with relative ease, provided a suitable *rationale*.

Even in larger public authorities it is not necessarily the case that by administering expenditure on a number of costs centres the organisation automatically forgives its responsibility to minimise overall, investment and running, costs. There is a self awareness of the professional staff of the need to run their respective departments to the benefit of the entire organisation. For example the Facilities Department of the Provincial Government of Milan operates a five year payback rule on the relative additional costs and subsequent energy savings resulting from adopting improved over standard efficiency solutions; even though the department is not the direct beneficiary of savings.

The inability to implement energy efficient solutions on a consistent basis is therefore not necessarily felt to be due to, what is at times, a nominal budget division. Much greater recognition is attributed to the lack of priority by top management, lack of relevant technical and administrative skills by staff and product knowledge, as considered above.

This said it must be recognised that the five year payback rule by the Facilities Department of the provincial administration of Milan probably represents an aberration within the general scheme of things. The disincentive to optimising expenditure over product and service lifetimes, caused by the division of investment and energy budgets is to some degree recognised, if not globally, and actions to overcome this barrier, if correctly placed, are necessary. Certainly the Energy Manager of the City of Modena, is working to unify budgets for investment and energy costs as a means to promoting the implementation of energy efficient solutions.

An other issue to consider when addressing actions to ensure energy efficient procurement is the the concentration of responsibility for procurement which differentiates building and product investments. Commonly the Facilities Department represents the principle reference point for all building stock investment decisions. However in the case of products: a plurality of actors from any number of service groupings can (though not necessarily) order purchases . Products maybe purchased singularly, or will be developed into an aggregate demand by the Accounts Department which may be supplied through a tender/bid process.

To influence the purchase of the large number of products purchase in *economia* requires reaching out and informing a large number of individuals. Accounts Departments tend to provide only budget control on spending decisions authorised by line management, not purchase quality control. It is also interesting to note that product energy efficiency is somewhat overlooked by public authority Energy Managers. This is probably as a result of an objective prioritising of energy saving interventions; with lighting and above all heating systems systems offering significantly greater saving potentials than those offered by improved energy efficient products. But probably also because in the case of heating and lighting systems the Energy Manager is faced with a single institutional interface: the Facilities Department.

An important and growing component of the product purchase process by the Public administration is the CONSIP central purchasing agency. Central government and central dependent agencies (*Le Amministrazioni centrali e periferiche dello Stato*) are obliged to purchase through CONSIP. All other public administrations, with-in the limits of transparency and free competition, have practically complete freedom in purchasing decisions.

However CONSIP is rapidly acquiring an important position in the supply chain, for example 80% of provincial and 30% of town administrations have now stipulated agreements. Part of the reason is that CONSIP alleviates its associated public administrations the difficult and burdensome task of establishing supply contracts with the private sector according to the transparency and within the best economic terms required by law. It seems likely that CONSIP will achieve a dominant position in the public procurement chain in the near future.

In awarding supply contracts for office equipment CONSIP is presently applying both the criteria of *lowest purchase price*, and the *economically most advantageous offer*. In the latter case this is for the moment defined principally in terms of after sales service provision. At the moment contracts do not take into consideration product energy efficiency or lifetime energy costs (though the procurement legislation permits this). However CONSIP is showing interest in developing the issue.

PICO is considered interesting above all in the context building refurbishment, but it is felt it does not intrinsically provide any advantage over existing administrative structures in resolving the major barriers currently impeding the uptake of energy efficient solutions. The establishment of the PICO structure would require the same priority recognition from top management as would formalising the payback requirements for efficient solutions in existing Facilities Departments. The latter solution might also offer advantages in terms of simplicity of implementation, both at the administrative level (no changes in structure) and top management (no change in budget responsibilities).

Thus if there is a general interest in the PICO proposal this is balanced by an equally pressing interest to ensure the correct application of existing legislation. This said, other than the lack of priority recognition for energy efficiency by top management, interviewed persons reported no legal or administrative barriers which should prevent the creation of a PICO structure.

The most common advantage seen in PICO, is an alternative agent to private sector service providers; facility managers or ESCO's. Though space heating service performance contracts are now quite widespread, equitable solutions were developed only after a number of years: a learning period which included acrimonious disputes with the service providers. Generally it is felt that there are problems in resolving contentious situations in favour of the PA when service providers are ready to seek judicial recourse and when problematic operators can remerge as future service providers through the "blind" tender/bid programme. It is not clear whether this is a completely objective assessment by functionaries, but there seems some wariness of turning to the private sector.

An alternative energy management model is also identified, which attempts to provide a more global management of energy issues than PICO. The two methods are not directly comparable in application, though they should address comparable issues in the process implementation in existing organisations (first and foremost the need for priority recognition from top of management).

The proposed Energy Control Unit (ECU) model, in part already realised in one city administration, in some ways looks similar to the PICO investment structure. An important advantage of the ECU solution, over PICO, is that it manages directly and therefore influences all building investments budgets predisposed by the council. In the PICO model, the agency would have to co-ordinate its improvement activities with the existing Facilities Department, both in the maintenance of existing stock and in the realisation of new structures.

On the other hand, given the proper mandate, and the necessary incentives (to be self sufficient in time) a PICO agent might likely be more aggressive in the search and introduction of efficient solutions. For as noted above the concept of investment to achieve direct near term economic is not innate to the public service culture. Even amongst the most active departments the realisation of efficient solutions is generally envisaged only within the limits of the annual allocated investment budgets without recourse to loans. In practice annual investment budgets might indeed represent the practical limits to the temporal realisation of interventions, for even the most active PICO agent would be limited in the resources available and the contemporary disturbance that he cause the public authority.

Procurement of products and services in the PA is estimated to be in the region of 54.600 million euro/year.

Electricity consumption by the PA in Italy accounts for 3-4% of the total national aggregate demand. (No information is available regarding liquid, solid or gas fuel consumption) . Growth of electricity consumption in by the public sector is currently in the region of 3-4% per year (1997-200), which is roughly 1% above the average growth rate for the economy.

## General Information on the Political, Legal and Economic Framework for Energy Efficient Public Procurement

### ***National Targets for energy Efficiency and/or Climate Protection in the Public Sector***

Under the Burden-Sharing Agreement, Italy is committed to reducing its GHG emissions to 6,5% of 1990 levels, to be achieved in the 2008/2012 period.

In 1999 a set of guidelines were approved at national executive level (CIPE, 1999) by which to meet these ends; summarised in Table 1. Roughly 30% of total GHG reductions are to be achieved by the reduction of energy use in the industrial/tertiary and domestic sectors on the basis of three sub-actions:

- 1.increasing the penetration of natural gas
- 2.promoting voluntary agreements for energy efficiency in industry
- 3.energy savings through end use efficiency improvements and improved management

**Table 1. Nationally agreed strategic actions to reduce GHG emissions in line with the Kyoto burden sharing agreement.**

| Action | National Action for Greenhouse Gas Reduction                         | 2002 | 2006 | 2008-2012 |
|--------|--|------|------|-----------|
| 1      | Increased efficiency of electricity generation plant                 | 0%   | 22%  | 21%       |
| 2      | reduction of energy consumption in the transport sector              | 28%  | 20%  | 19%       |
| 3      | Production of energy from renewable sources                          | 25%  | 16%  | 18%       |
| 4      | Reduction of consumption in industrial/tertiary and domestic sectors | 36%  | 26%  | 26%       |
| 5      | Reduction of emissions from non energy sectors                       | 11%  | 16%  | 17%       |
| 6      | Biomass absorption of CO2  | 0%   | 0%   | -1%       |
|        | Total  | 100% | 100% | 100%      |

The CIPE specifies voluntary agreements as the preferred means for achieving the specified targets (point 6 of "*Delibera CIPE 19/11/1998*").

Where CHG reduction objectives exist within the public sector, these have been developed autonomously by the specific authority. For example the *Provincia di Torino* is proposing a 6,5% reduction in GHG emissions in line with the national objective, though this still needs to be ratified by the ruling local government council. Also it is not clear whether the target will apply specifically to the real estate of the implementing provincial public authority, or to the wider economy in which the provincial council plays a coordinative role.

The 1998 decree *Mobilità sostenibile nelle aree urbane* introduces the objective for the PA to convert 50% of its vehicle fleet to gas or electric by 2003.

However the importance of the role the PA can play in leading the wider economy in innovational change has been in the past recognised. The National Energy Plan of 1988, which identifies the rational use of energy as the first of five strategic objectives for future energy policy, recognises in the energy demand expressed by the PA a useful tool in the realisation of the plans objectives (Article 4.34). A number of actions are proposed to improve end use efficiency in the public sector (for example improvements to illumination and heating systems). However the plan stops short of defining saving targets for the public sector.

Law 10, 1991, which provided the framework legislation which actuated the 1988 energy plan, carries forward the lead role assigned to the PA in the plan by placing the obligation on public authorities to implement energy saving solutions where these prove technically and economically feasible (Article 26, comma 7). In the case of central heating plant, subsequent building codes (DPR 412, 1993) define the terms of economic feasibility. Specifically the building codes oblige public authorities to implement "efficient solutions" when the extra costs with respect to the "standard" alternatives are repaid, from energy savings, within eight years or ten years in the case of towns with more than 50,000 inhabitants (Articles 5, commas 15 and 16).

Otherwise the PA is called upon as an economic planning agent (development of territorial energy plans, voluntary agreements) rather than as an end user.

### Trends, expected evolution

There are no existing studies on global energy use of the PA.

Table 2 provides a summary of recent trends in electricity consumption in the public sector put together from a number of sources within the present PROST study. (Refer to section "" for detailed reference list).

Table 2 shows the growth of electricity consumption by PA to be roughly 1% above overall national growth rates; 3,5 %/annum over the four year period 1995 go 1999. Within the PA, the health sector shows the greatest positive variation; 6,25%/annum over the same period.

**Table 2. Trends of growth of electricity consumption**

| Trends of growth of electricity consumption    | 1995/96    | 1996/97   | 1997/98   | 1998/99   |
|--|------------|-----------|-----------|-----------|
| Agricoltura                                    | 2%         | 6%        | 3%        | 4%        |
| Industria                                      | 0%         | 4%        | 3%        | 1%        |
| Usi domestici                                  | 1%         | 1%        | 1%        | 2%        |
| Terziario                                      | 4%         | 4%        | 4%        | 5%        |
| Servizi vendibili                              | 4%         | 4%        | 5%        | 5%        |
| <b>Pubblica Amministrazione</b>                | <b>2%</b>  | <b>4%</b> | <b>3%</b> | <b>5%</b> |
| <i>Uffici amministrativi centrali e locali</i> | <b>-4%</b> | <b>0%</b> | <b>2%</b> | <b>4%</b> |
| <i>Sanità, Istruzione e altri servizi</i>      | <b>5%</b>  | <b>9%</b> | <b>5%</b> | <b>6%</b> |
| <i>Illuminazione stradale</i>                  | <b>4%</b>  | <b>3%</b> | <b>3%</b> | <b>4%</b> |
| Total  | 1%         | 3%        | 3%        | 2%        |

At the moment it has not been possible to develop a picture regarding changes in the use of gaseous and liquid fuels.

### ***Policy Programmes on Energy Efficiency in the Public Administration***

Since 1991, all non industrial subjects in the economy consuming more than 1,000 TPE/year equivalent are required by law to have a **Director for the conservation and rational use of energy**, (*Responsabile per la conservazione e l'uso razionale dell'energia*), commonly (and maybe diminutively) referred to as Energy Managers (Article 19 , Legge 10, 1991)

The Law requires energy managers to:

- identify actions, interventions and procedures necessary to ensure the promotion of the rational use of energy.

F.I.R.E. the Federation of Energy Managers undertakes a number of activities to support the Energy Managers operating in the different segments of the economy; training courses, consultancy, and programmes. At the moment an initiative directed specifically at the Energy Managers of the PA is underway.

The initiative is working on four themes, three of which consider the PA as end user (the fourth action regards the institutional role of the local councils in the control of domestic heating systems):

#### Schools

A voluntary agreement between local councils and schools, which attempts to overcome split incentives. The agreements have been tested thus far in the City of Modena and the Provincial administration of Bolzano.

### Illumination

Two actions:

National Organiser of the European Green Light programme which is global to the Industrial and Tertiary sectors.

Data collection on Public Lighting, which is developing energy efficiency indicators

### Energy Indicators

Data collection in order to develop a database on efficiency indicators for the PA. The database presently contains heating and electricity indicators for buildings of the Piedmont Regional Government.

Participation in these initiatives is on a voluntary basis and would appear to be thus far limited.

Beyond the specific programmes summarised above the activities of Energy Managers in Italy suffers from a number of problems which are considered in more detail in the section "Energy Management in Public Institutions".

ANPA, *Agenzia Nazionale per la Protezione dell'Ambiente*, completed a draft manual for **Green Public Procurement** in December 2000 (ANPA, 2000). The draft manual which in total looks at 14 products provides purchase guidelines regarding three "energy consuming" products: printers, photocopiers and computers. The emphasis of the manual is environmental impact in general (production processes, product use and disposal) in which product energy efficiency represents one of only roughly seven product characteristics considered.

A pilot phase application of the guidelines was planned, involving public authorities (town and provincial councils as well as ANPA itself), before developing the final procurement manual. Information obtained from one of the agents involved in the pilot action is that the project which should have finished in June 2001, is for the moment stalled (as of November 2001).

### ***Co-operative Purchasing by Public Institutions***

Important, though not unique, to the purchasing practices of all the PA is **CONSIP**, a central purchasing agency. Central government and central dependent authorities (*Le amministrazioni centrali e periferiche dello Stato*) are obliged to purchase through CONSIP. All other public authorities, for example regional, provincial and town governments, health and education authorities, with-in the limits of transparency and free competition, have practically complete freedom in purchasing decisions. However despite of this freedom there is a trend for these authorities to also purchase through CONSIP. A large number of public authorities have established purchase agreements with CONSIP, for example 80% of provincial governments, 30% of town councils, though it is difficult to arrive at a global estimation.

CONSIP Spa is a private limited company, totally owned by the Treasury. The agency was born out the 2000 Budget (Law 448, 1999, Article 26, *La razionalizzazione degli acquisti di beni e servizi delle Pubbliche Amministrazioni*) with the objective of the reduction of public expenditure through the use of e-procurement. The project is considered a strategic component in the development of e-procurement in the wider economy in Italy.

CONSIP is an on-line procurement agency. CONSIP provides a number of procurement channels to the PA:

➤ electronic catalogue based on conventions with suppliers. Suitable for products characterised by an high degree of standardisation, low price and technological volatility and high market concentration, such as office equipment: computers; printers, faxes, photocopiers.

Interested public authorities stipulate an agreement with CONSIP and in doing so provide information on their annual purchasing requirements. CONSIP aggregates the requirements expressed by the individual authorities and develops a global requirement. Using a public tender process CONSIP stipulates agreements with services and product providers able to meet and satisfy the tendered requirement. Agreements usually allow for a maximum number of units (for example computers), for a given time period at a specific price.

Agreements are published on the CONSIP web site. Once published on the WEB, public authorities proceed to purchase the required products on the basis of the individual conventions established between CONSIP and supplier, direct from the supplier.

➤ on line auctions for products characterised by high price and technological volatility, rarely purchased and a fragmented market.

The system offers a virtual space in which users specify a requirement. A number of suppliers, possibly previously selected through a public tender process, bid online to supply the requirement within an allotted time. The contract is awarded on the basis of low bid price.

➤ market place for products of low standardisation and low unit price.

The system offers a virtual market space in which a number of suppliers detail services and goods. Product lists are modified as required by suppliers.

At the present time development as concentrated on the actuation of the electronic catalogue, with only a pilot on-line auction in preparation.

In awarding supply contracts for office equipment CONSIP is presently applying both the criteria of *lowest purchase price* and the *economically most advantageous offer*. In the latter case this is for the moment defined principally in terms of after sales service provision. At the moment contracts do not take into consideration product energy efficiency or lifetime energy costs (though the procurement legislation permits this). However CONSIP is showing interest in developing the issue.

CONSIP's activities are not limited to standard product supply. A public tender is presently in the phase of evaluation for space heating service provision. The total value of the tender is in the region of 160 Million Euro/year, representing roughly 10% of service requirements of the PA.

The contract defines service provision in terms of space comfort levels (not fuel provision) and within the context of *economically most advantageous offer*. There is a declared hope that this will

provide incentives to service providers to introduce efficiency measures to reduce fuel requirements and hence increase their own profit margins. However the tender identified no explicit requirement to introduce efficiency measurements, either generally or within the terms of the law (w.r.t. DPR 412/92, Article 5, comma's 15 and 16).

The contract was repartitioned and tendered for at regional level. The size of individual lots is such that potential service providers had only very limited information regarding the state of the building stock to be serviced, which lead to significant variations the value of bids presented (in the region of 7 to 1). CONSIP believes that with such large unknowns, the difficulties in estimating the cost of efficiency measures would (have) complicate even further cost determination by the potential service providers.

On the other hand it is possible that if correctly defined within the tendering process the requirement for energy efficiency rather than proving a burden for potential service providers could instead be a source of economic savings.

Generally managing service contracts at regional and higher level does raise issues on how to best manage energy efficiency requirements within the tender process. Positively, again as in the case of product provision, CONSIP seems interested in developing the argument further.

CONSIP is rapidly acquiring an important position in the supply chain. In less than 2 years from conception agreements have been stipulated with:

- all 20 regional governments with the exclusion of di Friuli, Venezia Giulia e Trentino Alto Adige;
- 82 of the 103 provincial governments
- 2,295 of the 8,100 city, town and village councils
- a number of public insurance and research agencies, other associations, national parks.
- 38 of the 100 local business councils
- 104 comunità montane
- 580 schools
- 205 local health authorities and hospitals
- 45 universities or university departments

Part of the reason is that CONSIP alleviates its contracted public agencies the difficult and burdensome task of establishing supply contracts with the private sector according to the transparency and within the best economic terms required by law. Also those public authorities which continue to manage there own tendering must ensure that the terms and conditions of the winning suppliers are at least as favourable as those offered by CONSIP. Thus it seems likely that as CONSIP enlarges its sphere of action to cover more products and services, autonomous tendering activity by single authorities will become less evident.

However it must also be noted that there are concerns that the stipulation of contracts at national level is placing local supplies at a significant disadvantage, a complaint which may ensure that a certain amount of autonomous tendering by single authorities continues.

## **Energy Management in the Public Administration**

The director for the conservation and rational use of energy, (*Responsabile per la conservazione e l'uso razionale dell'energia*), or Energy Managers is the principle energy programming agent with-in the PA (considering the PA as end user).

The Law requires Energy Managers to:

- identify actions, interventions and procedures necessary to ensure the promotion of the rational use of energy.

All public authorities consuming more that 1,000 TPE/year equivalent are required by law to have an Energy Manager. It is difficult to match the consumption requirement to types of administrative unit. Certainly most small medium and small town councils (< 50.000 population) are exempt from the obligation.

However even considering the 1.000 TEP/year threshold the application of the law is far from complete. Presently there are 674 Energy Managers operating within the PA. Since no records are kept in Italy, regarding the consumption of individual public authorities it is not known, to what degree the 674 covers the effective legal requirement. The Federation of Energy Managers (F.I.R.E.) estimates that in the case of town councils, the application of the law is limited; 146 registered Energy Managers whereas the total number should be in the region of 500 - 900 (an estimation based on town populations and local climatic conditions). However in the case of health authorities and hospitals the presence of energy managers is considered as satisfactory.

**Table 3. Energy Managers in the Public administration in Italy**

|  | 1995       | 1996       | 1997       | 1998       | Expected |
|--|------------|------------|------------|------------|----------|
| Councils                                     | 175        | 157        | 160        | 146        | 600-900  |
| Main Provincial Cities                       | 57         | 55         | 60         | 59         |          |
| Other Towns                                  | 118        | 102        | 100        | 87         |          |
| Provincial administration                    | 45         | 37         | 34         | 35         |          |
| Regions                                      | 5          | 7          | 8          | 7          |          |
| Ministries                                   | 2          | 4          | 3          | 2          |          |
| Welfare Agencies                             | 5          | 8          | 8          | 8          |          |
| Health (Local authorities and hospitals)     | 200        | 196        | 181        | 189        |          |
| Refuse                                       | 43         | 49         | 97         | 86         |          |
| Education                                    | 24         | 27         | 33         | 36         |          |
| (Research Institutes)                        | 11         | 12         | 12         | 12         |          |
| Total of PA                                  | 510        | 497        | 536        | 521        |          |
| <b>Total PA, Public and Private Services</b> | <b>687</b> | <b>663</b> | <b>693</b> | <b>696</b> |          |
| Total Number in Economy                      | 2013       | 1984       | 2033       | 2065       |          |

The lack of coverage might in part be explained by the difficulty in finding suitably qualified personal to cover the role. The list of of nominees (maintained by The Ministry of Industry) for 1998, identified only 64% of Energy Managers as having a technical or economics degree (the minimum which the state recommends as suitable for covering the position).

Even when nominally active Energy Managers often find their time dedicated to activities which at best are only marginally in line with their legislative defined role, such as Thermal Plant Manager, or more tenuously developing public tenders, or managing building stock. The nomination of the Energy Manager can thus (often) result a purely formal exercise to comply with Legislation, with no effective means for the nominee to cover the role.

Otherwise the position is most often covered by a technician, badly positioned in the managerial hierarchy to exert any influence on purchase decisions. He has problems in reaching out and informing the larger organisation in which he works.

Generally the problems inflicting Energy Managers and more specifically those working in the PA are well documented (for example SAVE (1994), Picchiolotto (1998)). Summarising it might be said that thus far the activities of Energy Managers, with minor notable exception (see section for the case of Modena) have failed to live up to the expectations of the Legislator when setting out the requirement.

In a poll organised by The Federation of Italian Energy Managers (FIRE, 1998) its members identified the main problems which hinder their meeting their institutional objectives:

- 1.lack of training/information
- 2.lack of funds
- 3.lack of decisional autonomy

### Energy Plans and Programmes

Article 5 of Law 10 introduced the requirement for regional and larger cities administrations (>50.000 inhabitants) to develop territorial energy plans. In some way comparable to Integrated Resource Plans, a principle objective was to identify the scope and the means for meeting service requirements in the wider economy through the rational use of energy and the application of renewable energy sources . The plans establish a framework in which to co-ordinate activities, in part by directing the investment of general and dedicated (to energy efficiency) public funds.

In June 2001, regional administrations undersigned an agreement to develop a co-ordinated Energy and Environmental plan, based on the individual regional energy plans, as part of their effort to develop a common strategy to reduce greenhouse gas emissions. As with the regional plans, the co-ordinated plan will prioritise the recourse to renewable energy sources and the rational use of energy.

Recent legislation passed to provincial administrations the facultative task of developing action programmes by which to realise the savings potentials outlined in the regional energy plans (Dgls 112, 1999).

Thus far all 20 regional plans (considering Trento e Bolzano as a region), 10 of the required 134 city plans and an unknown number of provincial programmes (estimated to be thus far relatively low) have been developed.

As noted the scope of the energy plans and more recent programmes is a coordination tool for wider territory (region, province or city) in which they are developed and in which the PA, in its many guises, is one in a plurality of actors present in the economy.

Though there exists no legal requirement to do so, the plans represent an ideal platform from which to develop the scope for and the actions necessary to achieve energy savings in the PA and thus identify a privileged end user able to lead change in the wider economy. In part this seems to be recognised and programmes can be seen to single out the PA for specific attention; though given the number of plans and programmes developed no global analysis has been completed to verify this.

The principle failure would appear to be however that the specific recommendations and guidelines in respect of the Public administration, where these exist, are not communicated to the wider public audience which is theoretically addressed by the proposals. Thus the programmes fail to influence the operating practices of the many public authorities distributed on the territory outside of the developing authority (the regional and provincial governments); for example health and welfare institutes, education bodies, judicial and security services, central and outlying ministerial offices, trade councils etc.

### ***Key Statistical Data***

The section offers a collection of data characterising the PA in Italy, including an estimation of energy consumption.

Before proceeding it proves necessary to define better the term Public Administration.

The national statistics office, ISTAT, uses the ATECO 91 classification scheme (realised by ISTAT in accordance with NACE/rev.1, General Industrial Classification of Economic Activities within the European Communities). ATECO 91 identifies the following three categories:

- public administration
- health
- education

The sub category "public administration" itself includes:

- legislative and executive authorities of central and local government, financial administration and regional, provincial and city administrations
- control authorities of the health, education and other social services (welfare excluded)
- economic control authorities
- central support services of the Public administration
- collective services (foreign affairs, defence, police forces, fire brigade)
- compulsory social security

In reporting electricity consumption, the National Grid Manager (*Il Gestore della Rete di Trasmissione Nazionale, GRTN*) uses the classification scheme introduced by the electrical utilities in 1995, which in part is coherent with ATECO'91. According to the GRTN system, all public services are classified under the category "Non commercial services". The category "Non commercial services" is divided into:

- public administration (which equates with the same category under ATECO)
- public lighting
- other non commercial services (health, education and other non commercial services)

However the ATECO 91 systems, contrary to the GRTN system, makes no difference between commercial and non commercial services. Data for health and education as reported by ISTAT therefore cover both commercial as well as non commercial activities.

Within the present text we take Public administration as referring to all non commercial services. Generally we follow the three category GRTN's system, but where possible we separate the health and education categories from non commercial services. The complete scheme is thus:

- offices (local and central administration, defence and security)
- public lighting
- health
- education
- other non commercial services

### Energy data

#### **General Data**

The manager of national electricity grid, the GRTN (*Gestore della Rete di Trasmissione Nazionale*) provides a breakdown of national electricity consumption in its annual report.

Data relative to gaseous and liquid fuel consumption is instead provided by The Ministry of Industry (*Ministero dell'Industria, Commercio e Artigianato*). At the moment has not been possible to develop a picture of fuel consumption of the public sector.

reports electrical energy consumption in Italy, highlighting , where possible, energy use by the Public administration.

**Table 4 Electrical Energy Consumption in Italy from 1995 to 1999 (source GRTN)**

| Electrical energy consumption (GWh/year)               | 1995          | 1996          | 1997          | 1998          | 1999          |
|--|---------------|---------------|---------------|---------------|---------------|
| <b>Public administration of which :</b>                | <b>12.697</b> | <b>12.971</b> | <b>13.547</b> | <b>13.984</b> | <b>14.656</b> |
| -Offices, defence, security                            | 3.314         | 3.173         | 3.174         | 3.234         | 3.364         |
| -Health, education e and other non commercial services | 4.658         | 4.904         | 5.324         | 5.566         | 5.918         |
| -Public Lighting                                       | 4.725         | 4.894         | 5.049         | 5.184         | 5.374         |
| <b>Private Sector</b>                                  | 39.991        | 41.751        | 43.372        | 45.363        | 47.532        |
| Total Tertiary (PA +private services)                  | 52.688        | 54.722        | 56.920        | 59.347        | 62.188        |
| Domestic   | 57.244        | 57.997        | 58.485        | 59.275        | 60.717        |
| Industry   | 129.461       | 129.128       | 133.916       | 137.700       | 139.698       |
| Agriculture  | 4.015         | 4.107         | 4.354         | 4.487         | 4.682         |
| Total  | 243.408       | 245.954       | 253.674       | 260.809       | 267.285       |
| <b>Public administration/Total</b>                     | <b>5,2%</b>   | <b>5,3%</b>   | <b>5,3%</b>   | <b>5,4%</b>   | <b>5,5%</b>   |

, Figure 1 , Figure 2 highlight the trends in electricity consumption between the years 1995 and 1999.

Electricity consumption by the Public administration accounts for 5,5% of total national aggregate demand, with an annual growth rate in the region of 3 -4 %. This lies roughly 1% above the average growth for the economy as a whole of 2 - 3%.

Within the tertiary sector, the private services sector shows a greater growth rate than the public service sector.

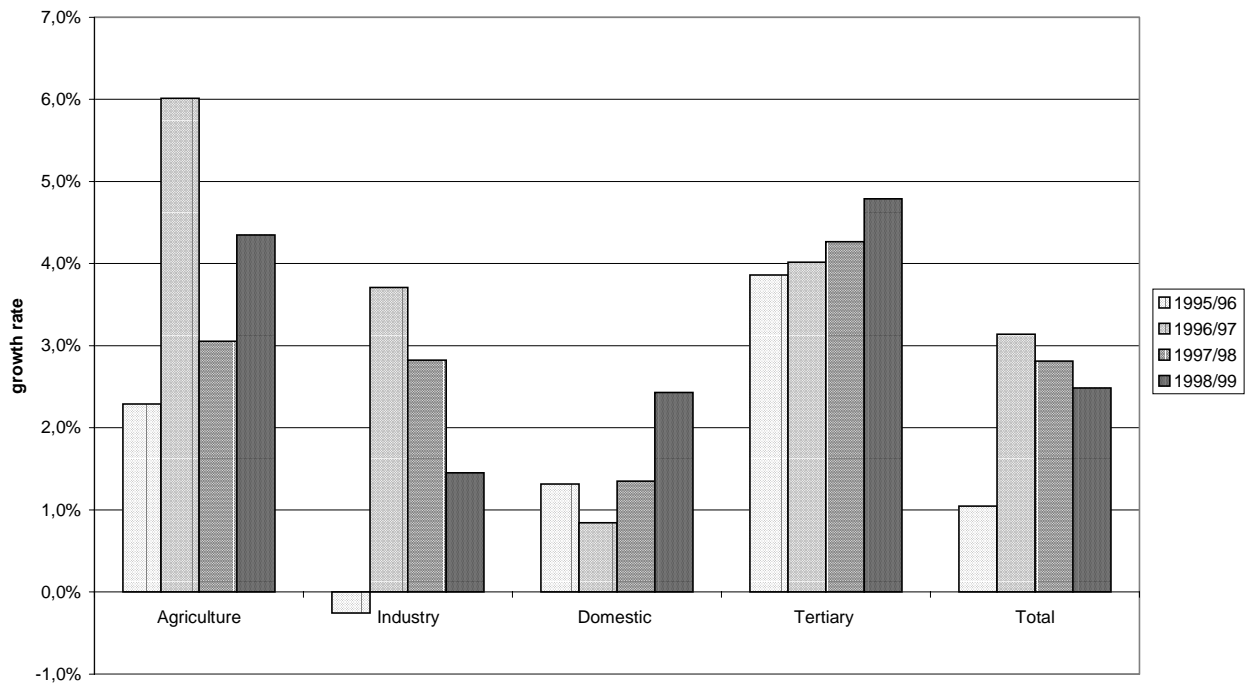
More specifically, in respect of the Public administration we observe the following annual growth rates :

- public illumination : 2,7 to 3,7%
- offices (central and local administration, defence and security): -4,3 to 4,3%
- health, education and other services : 5,3 to 8,6 %

Anecdotal evidence would suggest that a possible cause for the increase in consumption in the health sector is the increased diffusion of summer air conditioning systems in recent years.

**Table 5 Trends in electricity consumption**

|  | 1995/96      | 1996/97     | 1997/98     | 1998/99     |
|--|--------------|-------------|-------------|-------------|
| <b>Public administration</b>                               | <b>2,2%</b>  | <b>4,4%</b> | <b>3,2%</b> | <b>4,8%</b> |
| <i>Central and local administration, defence, security</i> | <b>-4,3%</b> | <b>0,0%</b> | <b>1,9%</b> | <b>4,0%</b> |
| <b>Health, Education and other services</b>                | <b>5,3%</b>  | <b>8,6%</b> | <b>4,5%</b> | <b>6,3%</b> |
| <b>Public Lighting</b>                                     | <b>3,6%</b>  | <b>3,2%</b> | <b>2,7%</b> | <b>3,7%</b> |
| Agriculture  | 2,3%         | 6,0%        | 3,1%        | 4,3%        |
| Industry   | -0,3%        | 3,7%        | 2,8%        | 1,5%        |
| Domestic Use   | 1,3%         | 0,8%        | 1,4%        | 2,4%        |
| Tertiary   | 3,9%         | 4,0%        | 4,3%        | 4,8%        |
| Commercial Services  | 4,4%         | 3,9%        | 4,6%        | 4,8%        |
| Total  | 1,0%         | 3,1%        | 2,8%        | 2,5%        |



**Figure 1 Variation in electricity demand by sector from 1995 to 1999**

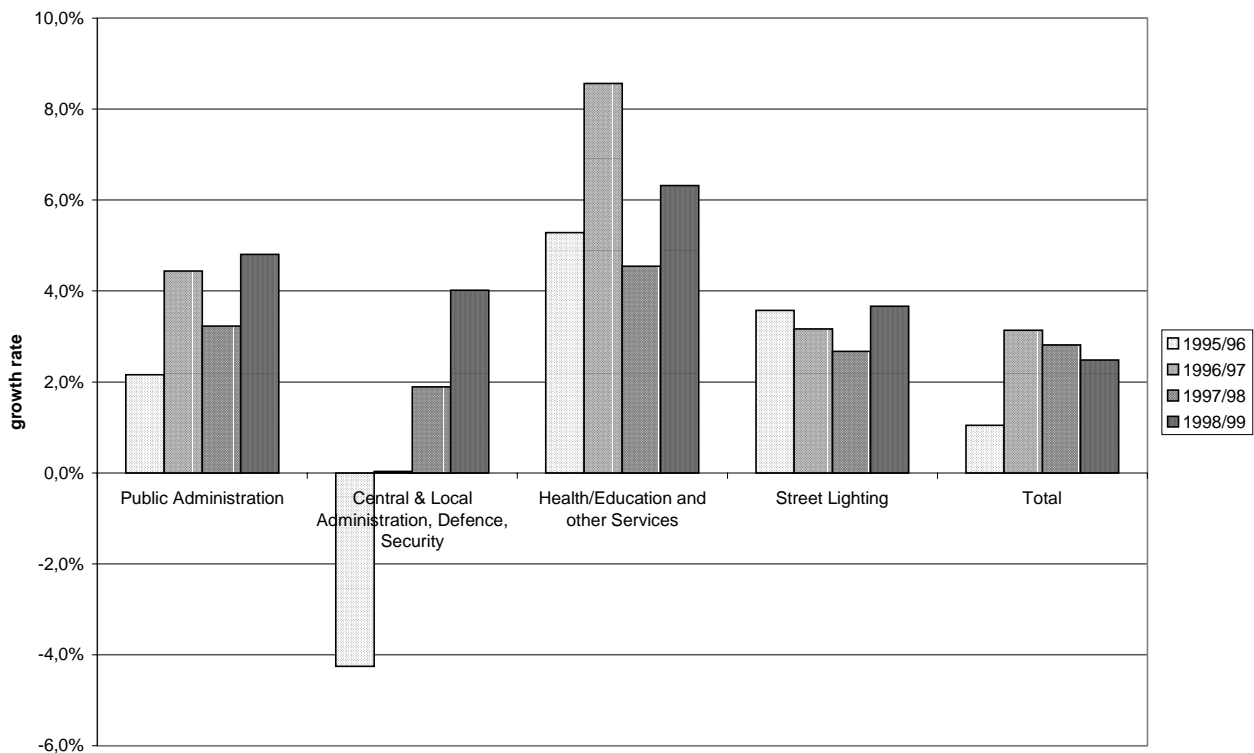


Figure 2 Variation in electricity demand in sectors of the Public administration from 1995 to 1999

### Consumption by End Use

No established data was identified in this sense. In order to arrive at a first estimation of the nature of energy consumption by end use two analysis were completed:

- Top Down: known aggregate consumption levels (GRTN) were attributed to different end uses by applying representative weighting factors
- Bottom Up: known product number in use by the PA were multiplied by typical average product consumption levels

The analysis was hindered in both cases by lack of reliable and complete data. The two analysis provided values of end use energy consumption of the same magnitude, but figures differed by several factors .

Reported here are the estimates developed using a Top Down approach, for the simple reason that by its nature, the sum of the constituent parts add to the total aggregate energy consumption reported for the PA by the GRTN. The calculation method is detailed in the section “Notes on Analysis” below.

Table 6, Table 7 and Table 8 list the energy consumption by end use for the different sectors of the PA for the years 1998 to 2000. Analysis for 2000 is based on provisional data from the GRTN.

**Table 6 Electrical energy consumption - year 2000**

| GWh/year        | Public administration | Central and local administration, defence, security | Health sector | Education sector |
|-----------------|-----------------------|---|---------------|------------------|
| <i>Lighting</i> | 3.569                 | 1.495   | 872           | 1.202            |
| <i>Cooling</i>  | 1.035                 | 498   | 296           | 240              |
| <i>Other</i>    | 4.649                 | 1.329   | 2.198         | 1.122            |
| <b>Total</b>    | <b>9.253</b>          | <b>3.322</b>  | <b>3.366</b>  | <b>2.565</b>     |

**Table 7 Electrical energy consumption - year 1999**

| GWh/year        | Public administration | Central and local administration, defence, security | Health sector | Education sector |
|-----------------|-----------------------|---|---------------|------------------|
| <i>Lighting</i> | 3.438                 | 1.514   | 809           | 1.115            |
| <i>Cooling</i>  | 1.002                 | 505   | 275           | 223              |
| <i>Other</i>    | 4.425                 | 1.346   | 2.039         | 1.041            |
| <b>Total</b>    | <b>8.865</b>          | <b>3.364</b>  | <b>3.122</b>  | <b>2.379</b>     |

**Table 8 Electrical energy consumption - year 1998**

| GWh/year        | Public administration | Central and local administration, defence, security | Health sector | Education sector |
|-----------------|-----------------------|---|---------------|------------------|
| <i>Lighting</i> | 3.265                 | 1.455   | 761           | 1.049            |
| <i>Cooling</i>  | 953                   | 485   | 258           | 210              |
| <i>Other</i>    | 4.190                 | 1.294   | 1.917         | 979              |
| <b>Total</b>    | <b>8.408</b>          | <b>3.234</b>  | <b>2.936</b>  | <b>2.237</b>     |

The major factor affecting consumption is:

1. artificial lighting within the Administrative and Education sectors
2. "other" in the Health sector (which includes specialised diagnostic equipment)

**Offices (central and local administration, defence and security)**

For offices (central and local administration offices, defence and security ) a more detailed breakdown of end use consumption is offered (Table 9 ).

**Table 9 Offices (central and local administration, defence and security) electrical energy consumption**

| GWh/year                                    | 1995         | 1996         | 1997         | 1998         | 1999         | 2000         |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| Lighting                                    | 1.491        | 1.428        | 1.428        | 1.455        | 1.514        | 1.495        |
| Cooling                                     | 497          | 476          | 476          | 485          | 505          | 498          |
| Office Equipment                            | 497          | 476          | 476          | 485          | 505          | 498          |
| Fridge/freezers                             | 99           | 95           | 95           | 97           | 101          | 100          |
| Hot Water                                   | 166          | 159          | 159          | 162          | 168          | 166          |
| Ventilation and Pumps for cooling in summer | 249          | 238          | 238          | 243          | 252          | 249          |
| Ventilation and Pumps for heating in winter | 249          | 238          | 238          | 243          | 252          | 249          |
| Other                                       | 66           | 63           | 63           | 65           | 67           | 66           |
| <b>Total</b>                                | <b>3.314</b> | <b>3.173</b> | <b>3.174</b> | <b>3.234</b> | <b>3.364</b> | <b>3.322</b> |

## **Health Care**

For health sector a more detailed breakdown of end use consumption is offered (Table 10 )

**Table 10 Health sector electrical energy consumption**

| GWh/year             | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  |
|----------------------|-------|-------|-------|-------|-------|-------|
| Lighting             | 636   | 670   | 728   | 761   | 809   | 872   |
| Cooling              | 216   | 228   | 247   | 258   | 275   | 296   |
| Electrical equipment | 263   | 277   | 301   | 314   | 334   | 360   |
| Washing machines     | 177   | 186   | 202   | 211   | 225   | 242   |
| Medical machines     | 130   | 137   | 149   | 156   | 165   | 178   |
| Hot water boilers    | 120   | 127   | 138   | 144   | 153   | 165   |
| Electrical heating   | 37    | 39    | 42    | 44    | 47    | 50    |
| Computers            | 12    | 13    | 14    | 15    | 16    | 17    |
| Food preparation     | 10    | 10    | 11    | 12    | 12    | 13    |
| Other                | 855   | 900   | 978   | 1.022 | 1.086 | 1.171 |
| Total                | 2.457 | 2.587 | 2.809 | 2.936 | 3.122 | 3.366 |

## **Public Lighting**

Table 11 details energy consumption for Public Lighting from 1995 to 1999.

**Table 11 Public Lighting Energy Consumption (Source:GRTN)**

|          | 1995  | 1996  | 1997  | 1998  | 1999  |
|----------|-------|-------|-------|-------|-------|
| GWh/year | 4.725 | 4.894 | 5.049 | 5.184 | 5.374 |

Public Lighting includes street lighting as well as lighting used in sports plants and various outdoor public structures.

It is estimated that Public Lighting is provided by roughly 7 million light sources which are managed by ENEL (21,4%), city utilities (8,6%) and by local councils (the rest). A recent analysis conducted by ENEL suggests that roughly 50% of installed plant is obsolete.

A rough estimation based on data concerning the the city of Rome, the city of Florence and *Provincia di Torino* gives the following distribution of lighting technologies in use on the territory:

- mercury vapour lamps: 36%
- high pressure sodium lamps: 44%
- other; low pressure sodium, fluorescente tubes, other: 20%

### **Notes on Analysis**

Energy consumption by sector of activity of the PA and by end use is estimated by applying a number of weighting factors to the total known aggregate consumption figures reported by GRTN (Top Down). A Bottom Up approach corroborated the magnitude of the consumption figures which resulted from the Top Down analysis, but there were factor variations in the figures. See the section "Product data" for the results of the Bottom up analysis.

The sectorial energy consumption reported here was determined by applying the weighting factors reported in the 1985 ISTAT analysis (ISTAT, 1985) to the GRTN published figures for "Health Education and other non commercial services" for the three years 1998 - 2000.

Energy use is considered homogenous in each of the five sector of activities: offices (central and local administration, defence and security), health, education, public lighting and in "other non commercial services". The latter sector accounts globally for only 7% of the electrical energy consumption by "all non commercial services" and so no attempt was made to arrive at a division by end-use

In respect of each of the four sectors of activity, the aggregate sectorial consumption is attributed to three major end uses; lighting cooling and other. This was achieved by applying weighting factors reported in the following reports:

For the Office sector:

➤Energy Plan of the *Provincia di Torino*

For the Health sector:

➤Energy Plan of the *Provincia di Torino*

For the Education sector:

➤Energy Plan for Rome (ACEA and Istituto di Ricerche Ambiente Italia, 1995)

In want of any definitive analysis or research at national level on the relative weight of single end uses on the total aggregate consumption levels in economic sectors, the weighting factors there reported were felt to be as valid as any. Figures reported in the Energy Plan of the *Provincia di Torino* and Energy Plan of Rome were themselves based on work completed by ISMERI in 1991 (*ISMERI, 1991*).

The more detailed breakdowns of end use consumption offered for Offices (central and local administration, defence and security) and Health Care applied weighting factors reported in the Energy Plan for the *Provincia di Torino* and in the Energy Plan for the *Comune di Roma*, respectively.

## Energy Indicators

End use consumption, as detailed above, is considered in respect of a number of parameters characterising sectorial activity in order to determine:

- Office unit space energy consumption, kWh/m<sup>2</sup> year, (Table 12).
- Hospital unit space energy consumption, kWh/m<sup>2</sup> year, (Table 13 )
- Hospital unit bed energy consumption, kWh/bed year, (Table 14 )

**Table 12 Office unit space electrical energy consumption by end use**

| Electricity consumption/square meter (KWh/m <sup>2</sup> year) | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|--|------|------|------|------|------|------|
| Lighting   | 32   | 31   | 31   | 32   | 33   | 33   |
| Cooling  | 11   | 10   | 10   | 11   | 11   | 11   |
| Office Equipment   | 11   | 10   | 10   | 11   | 11   | 11   |
| Fridge/freezers  | 2    | 2    | 2    | 2    | 2    | 2    |
| Hot Water  | 4    | 3    | 3    | 4    | 4    | 4    |
| Ventilation and Pumps for cooling in summer                    | 5    | 5    | 5    | 5    | 5    | 5    |
| Ventilation and Pumps for heating in winter                    | 5    | 5    | 5    | 5    | 5    | 5    |
| Other  | 1    | 1    | 1    | 1    | 1    | 1    |
| Total  | 72   | 69   | 69   | 70   | 73   | 72   |

The aggregate hospital floor space in Italy is not known. Total national hospital space was determined by applying unit bed space, registered for the Regione Lombardia (110 m<sup>2</sup>/ bed), to the total number of known national bed spaces.

**Table 13 Hospital unit space electrical energy consumption by end use**

| KWh/m <sup>2</sup> year | 1995 | 1996 | 1997 | 1998  | 1999  | 2000  |
|-------------------------|------|------|------|-------|-------|-------|
| Lighting                | 21,4 | 22,2 | 25,2 | 27,2  | 31,6  | 34,4  |
| Cooling                 | 7,3  | 7,5  | 8,5  | 9,2   | 10,7  | 11,7  |
| Washing machines        | 5,9  | 6,2  | 7,0  | 7,6   | 8,8   | 9,6   |
| Medical machines        | 4,4  | 4,5  | 5,1  | 5,6   | 6,5   | 7,0   |
| Hot water boilers       | 4,0  | 4,2  | 4,8  | 5,1   | 6,0   | 6,5   |
| Electrical heating      | 1,2  | 1,3  | 1,5  | 1,6   | 1,8   | 2,0   |
| Computers               | 0,4  | 0,4  | 0,5  | 0,5   | 0,6   | 0,7   |
| Foods preparation       | 0,3  | 0,3  | 0,4  | 0,4   | 0,5   | 0,5   |
| Other                   | 37,6 | 39,0 | 44,2 | 47,7  | 55,5  | 60,5  |
| Total                   | 82,6 | 85,7 | 97,1 | 104,9 | 121,9 | 132,9 |

**Table 14 Hospital unit bed electrical energy consumption by end use**

| MWh/bed year       | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|--------------------|------|------|------|------|------|------|
| Lighting           | 2,4  | 2,4  | 2,8  | 3,0  | 3,5  | 3,8  |
| Cooling            | 0,8  | 0,8  | 0,9  | 1,0  | 1,2  | 1,3  |
| Washing machines   | 0,7  | 0,7  | 0,8  | 0,8  | 1,0  | 1,1  |
| Medical machines   | 0,5  | 0,5  | 0,6  | 0,6  | 0,7  | 0,8  |
| Hot water boilers  | 0,4  | 0,5  | 0,5  | 0,6  | 0,7  | 0,7  |
| Electrical heating | 0,1  | 0,1  | 0,2  | 0,2  | 0,2  | 0,2  |
| Computers          | 0,0  | 0,0  | 0,1  | 0,1  | 0,1  | 0,1  |
| Food preparation   | 0,0  | 0,0  | 0,0  | 0,0  | 0,1  | 0,1  |
| Other              | 4,1  | 4,3  | 4,9  | 5,3  | 6,1  | 6,6  |
| Total              | 9,1  | 9,4  | 10,7 | 11,5 | 13,4 | 14,6 |

### **Sectorial Studies**

The values determined within the present analysis are here compared to a number of existing sectorial studies.

Table 15 and Table 16 report unit space lighting consumption for Public Offices and Health Care Institutes in Italy, as reported in the 2000 Save study " Market Research on the Use of Energy Efficient Lighting in the Commercial Sector " (Energy Piano, 2000) figures are based a survey of some 10 buildings in each of the two sectors. (In Table 15 we report figures from audits undertaken in private sector offices, since those reported for the public sector appeared erroneously low).

Both figures reported in Table 15 and Table 16 compare favourably with unit space figures determined for lighting, and reported in Table 12 and Table 13 above.

**Table 15 Unit space artificial lighting consumption for Offices (Source:Energy Piano, 2000)**

| Type of room | Surveyed Consumption (KWh/m <sup>2</sup> year) |
|--------------|--|
| Corridor     | 32,9   |
| Office       | 16,2   |
| Open-plan    | 5,7  |
| Reception    | 2,7  |
| Store Room   | 77,8   |
| Toilet       | 50,9   |
| Other        | 14,6   |

**Table 16 Unit space artificial lighting consumption for Health Institutes (Source: Energy Piano, 2000)**

| Type of room      | Surveyed Consumption (KWh/m <sup>2</sup> year) |
|-------------------|--|
| Cafeteria         | 45,7   |
| Corridor          | 20,7   |
| Office            | 10,1   |
| Operating Theatre | 42,2   |
| Reception         | 39,4   |
| Store Room        | 9,7  |
| Toilet            | 7,4  |
| Treatment Room    | 12,7   |
| Wards             | 9,2  |
| Other             | 17,6   |

In respect of unit bed electrical consumption the Caddett study "Saving Energy with Energy Efficiency in Hospitals" (CADDET, 1997) reports

➤ for Italy 5,1 MWh/bed year

➤ for other EU countries, 16,1 MWh/bed year (average value) and 145 kWh/ m<sup>2</sup> year

The Cadett provided figure for Italy is thus notably lower, both to the figure reported for EU countries, and with respect to the unit bed consumption estimated here, namely 9 to 14 MWh/ bed year (Table 14 ). This latter figure instead agrees with the Cadett across Europe average figure. All of which would seem to indicate that the Cadett reported figure for Italy is erroneously low.

Considering in more detail unit bed thermal energy consumption Cadett reports:

➤ for Italy: 23,3 MWh/bed year

➤ for other EU countries, 33,9 MWh/bed year

Though the Cadett figure reported for Italy is lower than that reported for other EU countries, it is in almost perfect agreement with the figure of 23,2 MWh/year reported in a report by the Regione Lazio (ISNOVA, 1999).

### Product data

Annual expenditure for products and services by the PA in Italy is estimated to be in the region of 54,6 billion Euro (Benvenuti, 2001).

Table 17 , provides an estimation of the stock and annual sales of the principle office equipment within the Office Sector of PA. Considering average unit electrical consumption for different equipment types, a first estimation of global equipment energy use is developed. The total consumption of installed stock estimated in this way is of the same order of magnitude for estimated for Office consumption, from the top down analysis (Table 9 ) though there is a factor variation in the two figures.

**Table 17 Bottom up estimation\_office equipment energy consumption**

|              | No. Sold to PA<br>per year | estimated stock | estimated energy consumption<br>for one year sales (MWh/year) | estimated energy consumption<br>for the whole stock<br>(MWh/year) |
|--------------|----------------------------|-----------------|---|---|
| PC           | 120400                     | 602200          | 10,9  | 54,6  |
| Screens      | 120440                     | 602200          | 13,1  | 65,4  |
| Printers     | 80000                      | 480000          |   |   |
| <i>laser</i> | 68000                      | 408000          | 20,9  | 125,7   |
| <i>ink</i>   | 12000                      | 72000           | 0,3   | 1,6   |
| Copiers      | 21800                      | 130800          | 0   | 0   |
| <40 ppm      | 12000                      | 72000           | 4,8   | 28,5  |
| > 40ppm      | 9800                       | 58800           | 9,4   | 56,4  |
| Faxes        | 20000                      | 120000          | 4,2   | 25,3  |
| Total        |                            |                 | 63,6  | 357,5   |

### **Notes on Analysis**

Generally, purchase volumes are based on the PA central purchasing (CONSIP Spa) agency figures (www.acquisti.tesoro.it). CONSIP figures represent the accumulated total of the expressed requirements of its contracted (voluntary and compulsory) clients. We estimate that CONSIP as currently established supply agreements with roughly 50% of the PA.

PC purchase numbers are instead estimated by considering a five year average lifetime in respect of the total PC stock of the PA as determined by the *Autorità per l'Informatica* (AIPA, 1999).

Total stock numbers (with the exception of PC's ) are determined by considering average lifetimes (5 years in the case of PC's and Screens, otherwise 6 years) in respect of annual purchase volumes.

Total stock energy consumption is established by considering total stock in respect of typical average unit energy consumption of office equipment as reported in the "*Piano Energetico della Provincia di Torino*".

### **General Data**

This section reports a collection of general information characterising the PA in Italy.

Table 19 details employment numbers in the economy at large and specifically within the Public administration, as a percentage of the total resident population ( Table 18). The Public administration employs some 19% of the total national workforce.

( Employment figures by ISTAT report private and public health and education employees together as a single item. However ISTAT also reports the ratio of private and public employees for each sector allowing the number of public employees to be determined).

**Table 18 Total Resident Population (Source ISTAT)**

| Year       | 1995       | 1996       | 1997       | 1998       | 1999       | 2000       |
|------------|------------|------------|------------|------------|------------|------------|
| Population | 57.332.996 | 57.460.977 | 57.563.354 | 57.612.615 | 57.679.895 | 57.844.017 |

**Table 19 Employment numbers (Source:ISTAT)**

|   | 1995         | 1996         | 1997         | 1998         | 1999         | 2000         |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| - Central and local administration, defence, security       | 1.517        | 1.496        | 1.525        | 1.544        | 1.788        | 1.816        |
| - Health, education and other public services               | 2.097        | 2.093        | 2.098        | 2.110        | 2.187        | 2.204        |
| <b>Total public sector</b>                                  | <b>3.614</b> | <b>3.589</b> | <b>3.623</b> | <b>3.654</b> | <b>3.975</b> | <b>4.020</b> |
| Total   | 20.010       | 20.088       | 20.086       | 20.197       | 20.692       | 21.080       |
| <b>quota of workforce employed by Public administration</b> | <b>18%</b>   | <b>18%</b>   | <b>18%</b>   | <b>18%</b>   | <b>19%</b>   | <b>19%</b>   |

## Offices.

Table 20 reports the total estimated surface area occupied by the Public administration, excluding education and health.

The estimation is based on figures reported by ISTAT derived from the 1991 census (ISTAT, 1991). For each surface class reported by ISTAT, the total surface area is estimated by taking the mid point value. In the case of the "> 500 m<sup>2</sup>" we consider a value of 700 m<sup>2</sup>.

It is possible to obtain more detailed data of building characteristics up (e.g. construction types and ages) by contacting directly each public agency.

**Table 20 Number of buildings arranged by class of surface area (does not include health and education, though it includes their relative ministries) (Source:ISTAT)**

|  | 1-50    | 51-100  | 101-200   | 201-500   | more then 500 | not known | total      |
|--|---------|---------|-----------|-----------|---------------|-----------|------------|
| No. of buildings                         | 9.247   | 10.599  | 15.566    | 24.248    | 38.537        | 18.115    | -          |
| Estimated surface area (m <sup>2</sup> ) | 231.175 | 794.925 | 2.334.900 | 8.486.800 | 26.975.900    | 7.162.045 | 45.985.745 |

## Education

**Table 21 Nursery school (Source:ISTAT)**

| <b>Nursery Schools</b> | 1994-95   | 1995-96   | 1996-97   |
|------------------------|-----------|-----------|-----------|
| No. of schools         | 26.573    | 26.296    | 25.944    |
| No. of classrooms      | 67.558    | 67.106    | 67.340    |
| Children               | 1.582.338 | 1.582.556 | 1.577.537 |
| Teachers               | 121.520   | 121.308   | 123.423   |

**Table 22 Primary school (Source:ISTAT)**

| Primary Schools | 1994-95   |         |           | 1995-96   |         |           | 1996-97   |         |           |
|-----------------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|
|                 | State     | Private | Total     | State     | Private | Total     | State     | Private | Total     |
| No. of schools  | 18.846    | 2.076   | 20.922    | 18.383    | 1.978   | 20.361    | 18.042    | 1.864   | 19.906    |
| No. of classes  | 153.304   | 10.974  | 164.278   | 151.368   | 10.534  | 161.902   | 150.391   | 10.016  | 160.407   |
| Children        | 2.596.781 | 218.850 | 2.815.631 | 2.604.079 | 212.049 | 2.816.128 | 2.607.365 | 202.675 | 2.810.040 |
| Teachers        | 276.174   | 12.881  | 289.055   | 273.611   | 12.860  | 286.471   | 276.818   | 12.686  | 289.504   |

**Table 23 Junior Secondary School (Source:ISTAT)**

| Junior Schools | 1994-95   |         |           | 1995-96   |         |           | 1996-97   |         |           |
|----------------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|
|                | State     | Private | Total     | State     | Private | Total     | State     | Private | Total     |
| No. of schools | 852       | 8876    | 9728      | 8.420     | 830     | 9.250     | 8.312     | 807     | 9.119     |
| No. of classes | 97.527    | 3.974   | 101.501   | 91.091    | 3.491   | 94.582    | 89.117    | 3.334   | 92.451    |
| Children       | 1.909.872 | 86810   | 1.996.682 | 1.828.356 | 72.852  | 1.901.208 | 1.783.696 | 68.551  | 1.852.247 |
| Teachers       | 238.402   | 11202   | 249.604   | 231.712   | 10.791  | 242.503   | 225.864   | 10.664  | 236.528   |

**Table 24 Secondary school (Source:ISTAT)**

| Secondary Schools     | 1994-95   |         |           | 1995-96   |         |           | 1996-97   |         |           |
|-----------------------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|
|                       | Public    | Private | Total     | Public    | Private | Total     | Public    | Private | Total     |
| No. of schools        | 5.977     | 1.864   | 7.841     | 5.988     | 1.854   | 7.842     | 6.048     | 1.806   | 7.854     |
| No. of classes        | 115.974   | 10.759  | 126.733   | 114.827   | 10.320  | 125.147   | 114.438   | 9.793   | 124.231   |
| No. of classrooms*    | 118.140   | 13.338  | 131.478   | 119.286   | 13.316  | 132.602   | 117.818   | 13.245  | 131.063   |
| No of busy classrooms | 109.468   | 10.434  | 119.902   | 108.575   | 10.021  | 118.596   | 108.928   | 9.524   | 118.452   |
| Students              | 2.535.985 | 187.730 | 2.723.715 | 2.518.746 | 174.582 | 2.693.328 | 2.489.258 | 159.277 | 2.648.535 |
| Teachers              | 276.306   | 36.254  | 312.560   | 162.846   | 21.481  | 184.327   | 286.232   | 32.753  | 318.985   |

\*laboratories are not included

**Table 25 Universities (Source:ISTAT)**

| Universities | 1994-95   | 1995-96   | 1996-97   | 1997-98   | 1998-99   |
|--------------|-----------|-----------|-----------|-----------|-----------|
| Students     | 1.661.839 | 1.685.921 | 1.772.054 | 1.676.996 | 1.676.702 |
| Professors   | 48.624    | 49.400    | 48.891    | 47.887    | 48.933    |

## Health institutes

**Table 26 Number of bed places in recovery institutes (Source:ISTAT) . Data for 1998, 1999, and 2000 are estimated values from the *Ministero della Sanità*.**

|      | 1995    | 1996    | 1997    | 1998    | 1999    | 2000    |
|------|---------|---------|---------|---------|---------|---------|
| Beds | 270.598 | 274.282 | 262.920 | 254.377 | 232.762 | 230.315 |

## Prisons

Table 27 Number of prisoners and bed in prisons (Source: ISTAT)

|           | 1995  | 1996  | 1997  | 1998  |
|-----------|-------|-------|-------|-------|
| Prisoners | 47344 | 48049 | 50011 | 48760 |
| Beds      | 40161 | 41506 | 43712 | 43121 |

## PIL and public expenditure

In Italy the ratio between public expenditure/GDP increased by 20 percentage points between 1970 and 1980, passing from an average of 31,4% in the sixties, to 50,9% in the eighties, arriving at a maximum of 57,7% in 1993. By 1999 the ratio had falling back to 50%.

Recent development of the public expenditure/GDP ratio is given in Table 28 .

Public expenditure includes: personnel salaries and payment, procurement of goods and services (intermediate consumption), subsidies to the manufacturing sector, transfers to families (health, welfare, assistance, subsidies), investments.

Table 28 Incidenza della spesa pubblica sul PIL (Source: ISTAT)

| incidenza della spesa pubblica sul PIL | 1995  | 1996  | 1997  | 1998  | 1999  |
|--|-------|-------|-------|-------|-------|
|  | 53,2% | 52,9% | 50,9% | 49,4% | 48,8% |

## Laws and Regulations Governing Product Purchasing and Investment by Public Institutions

### General Laws and Regulations

Italy has implemented in national law European directives 93/36/CEE, 92/50/CEE, 97/52/CEE, 93/38/CEE and 98/4/CE on the theme of public procurement which determine the adjudication criteria of public contracts. (In particular directives 93/36/CEE, 92/50/CEE, 93/38/CEE fix the criteria *economically most advantageous offer* (see below), respectively in water, energy, and transport and telecommunication service public tenders).

In public procurement, the lowest purchase price achieved still is a crucial parameter for decision-making. However, in line with the European Directives Italian legislation on public procurement also provides that a tender may be judged in terms of *economically most advantageous offer* which can include running costs (including energy), efficiency, quality, aesthetics and functionality, post sales service . Legislation demands that selection criteria of public procurements must be non-discriminatory, objectively measurable, and clearly related to the procurement target. Tendering parties are to be informed beforehand on all specified criteria and energy efficiency requirements related to the product or service procured. In the evaluation process of the tenders received, specifications and requirements set for the procured products and services must be taken into consideration when making the procurement decision.

For public procurements above the threshold value, Italian procurement agencies follow the procurement rules of the European Community and the World Trade Organisation's GPA agreement. For public procurements below the threshold value, national legislation applies.

The threshold values are set as follows

General state administration

Goods: 130 000 EUR  
Services: 130 000 EUR  
Works: 5 000 000 EUR

Other state authorities, local authorities and joint municipal authorities, legal persons regarded as part of the public administration

Goods: 200 000 EUR  
Services: 200 000 EUR  
Works: 5 000 000 EUR

Operating units of the water , energy, transport or telecommunications sector

Operating units of the water, energy and transport sector

Goods: 400 000 EUR  
Services: 400 000 EUR  
Works: 5 000 000 EUR

Operating units of the telecommunications sector

Goods: 600 000 EUR  
Services: 600 000 EUR  
Works: 5 000 000 EUR

In contrast to purchases of the private sector, the procurements of the public sector are controlled by law. Legislation on public procurement secures competition as well as equal and non-discriminatory treatment of all parties participating in the competitive bidding process.

Special Energy Efficiency Regulations for Public Buildings

Law 10, 1991, obliges the Public administration to implement energy saving solutions where these prove technically feasible and economic (Article 26, comma 7). The law makes general provision for energy recovered in process, plant and products, though singles out for particular attention energy recovered in climatisation, lighting plant and interventions on the building envelope.

This general requirement is formulated more specifically in subsequent legislation in the case of investment decisions regarding central heating plant. Article 5, commas 15 and 16 of the building codes DPR 412/93 oblige public authorities when installing new or refurbishing old heating plant to implement the "efficient solution" when the extra cost with respect to the "standard solution" is repaid, from energy savings, within eight years (ten years in the case of towns of more than 50,000 inhabitants). Further public authorities are obliged to set out in detail, as part of the plant design specifications, the technical impediments to the realisation of the efficient solution when this is the case.

It can be generally said public authorities have never realised their obligation in line with Article 5, commas 15 and 16 of DPR 412/93. There can be said to be a general lack of awareness of the obligation even amongst Facilities Departments responsible for the realisation of heating plant, though generally knowledge of the other obligations under DPR 412/93 are now integrated into common heating system design practices.

The inability to apply the regulation is to some degree paradoxical for, although it is an obligation (which might from some quarters interfere with efficient management), the terms of application are clearly in the economic interest of the public authority realising the investment. Said simply public authorities are obliged to invest in efficient solutions only if these provide monetary savings.

The factors which are felt to have contributed for the failure to implement Article 5, commas 15 and 16 of DPR 412/93, are listed in section "Incentives and Barriers for Energy Efficiency in Public Authorities".

In some public authorities the decision to adopt "efficient solutions" is indeed evaluated on the basis of the payback period offered by relative monetary savings. However the application of such criteria by the Facilities Departments derives from a general cultural awareness and a desire to realise improved solutions, rather than as a response to the legislative obligation. As such the application of the criteria is informal (the eight and ten year limits are seldom respected), applied inconsistently to investment decisions, and however suffers from the lack of common structured procedures which allow cost/benefit analysis of alternate investments. Certainly no attempt is made to detail the technical or economic limitations of possible efficient solutions which fail the mark as legislation would require.

In other occasions the public authority adopts the efficient solution, on the general assumption that there is some form of monetary payback in time, though no analytical analysis of alternative investments is undertaken. For example in refurbishing, double glazing might be installed knowing that some form of energy savings will be achieved, but no attempt is made to quantify these.

### Special Energy Efficiency Regulations for Public Purchasing

As noted in the previous section, Law 10, 1991, obliges the Public administration to implement energy saving solutions where these prove technically feasible and economic (Comma 7, Article 26). The law make general provision for energy recovered in process, plant and products.

In the case of products this general provision was not followed with more detailed codes specifying the terms of economic feasibility as in the case of heating systems.

## Organisation of and Decisions on Product Purchasing and Building Investments in Public Institutions

Figure 3, Figure 4 and Figure 5 report the division of responsibilities in the purchase of products and building components for some of the public authorities examined.

The figures are simplified representations of quite complex decisional processes which were specific to each of the authorities. Considering the large number of public administrations and institutions and the financial autonomy which each operates it would be bold to arrive at general conclusions applicable to the entire PA.

The general scheme which is derived (Figure 3) must therefore be treated with caution. Its purpose is to allow a minimum of orientation which may assist interpretation and comparison of the more specific schemes.

The general scheme considers a generic public authority or institution (Town Council, a Hospital, ) to be organised administratively and operationally according to a number of sectorial or service groupings, for example:

- A Town Council has Highway, Education and Recreation Departments etc.
- A Hospital has Emergency, Radiology, Recovery Wards

The responsibility of the procurement of:

- building components (maintenance and refurbishment)
- products
- energy

is divided amongst at least three service groupings.

The Facilities Department which lies with-in the *Ufficio Tecnico* manages maintenance and refurbishment of:

- building structure: envelope, internal fixtures, internal and external floorings etc.
- plant: electrical, and plumbing
- systems: lighting, heating and cooling

of all most (all) stock owned by the public body.

Depending on the size of the public authority the Facilities Department might:

- undertake design and installation directly
- out source either design and or installation

End users or direct in-line supervisors in each of the many service groups identify the need for products (computers, faxes, photocopiers and more specialised equipment). Individual requirements developed in this way may either be:

- aggregated by a dedicated departmental purchase officer or simply by the Accounts Department, which organises a public tender supply competition when numbers permit. In doing the purchase officer might rely upon specialised knowledge of a specific department; for example computer services.
- realised by the individual (or direct in line supervisor) by making a one off purchase by direct purchasing from a preferred supplier using a small expenditures budget.

It is however likely that in the future, the direct purchasing from private sector suppliers by individual public authorities will be reduced, as greater use is made on CONSIP developed supply conventions; both for the supply of single and aggregated units.

Energy costs for all building stock are met by the the Accounts Department (for example: *Contabilità e Ragioneria*).

The essential point is that the concentration of the responsibility for procurement varies according to the type of good.

The Facilities Department:

- represents the principle reference point for all building stock investment decisions
- acts across and manages relevant funds for many (all) service groupings

In the case of Products:

- a plurality of actors from any number of service groupings can (though not necessarily) undertake purchases
- funds are managed autonomously by each service grouping

The Accounts Department

- covers the energy costs of many (all) service groupings

Funds for the Facilities and Accounts Department are derived often as quotas of the total budget at the disposition of the public authority. Products may also be funded directly from the same budget, or alternatively service groups may appeal to alternative funding authorities.

For example, the local town council uses its annual budget to ensure schools are maintained (by the town Facilities Department) and heating bills paid (by the town Accounts Department). However funds for school didactic material (including computers and other office equipment) is provided by funds derived from the Ministry of Education.

It is emphasised that the general scheme intends to identify a number of salient aspects commonly found investment procedures, it is not intended to represent the scheme globally implemented. There are exceptions, as the other schemes show.

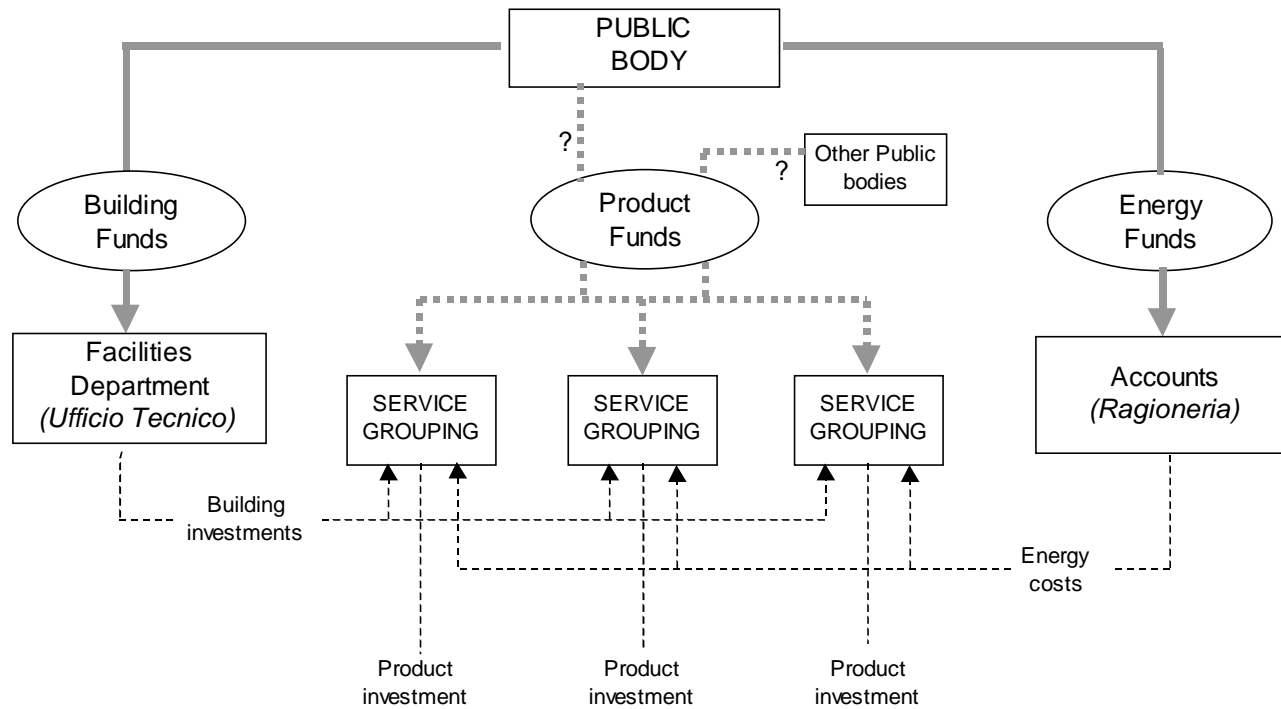


Figure 3 General procurement scheme for the Public administration

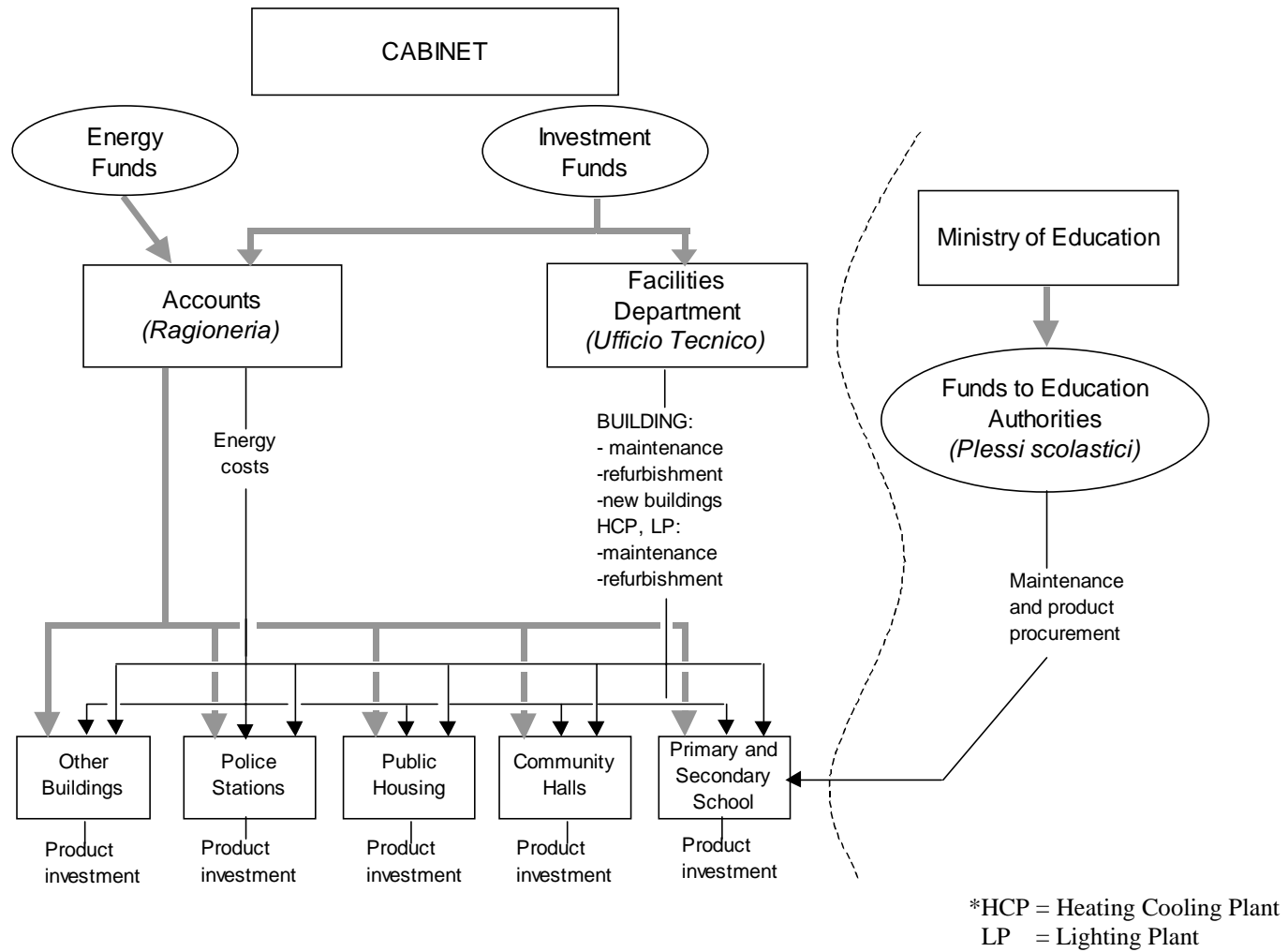


Figure 4 Procurement scheme for town and city councils

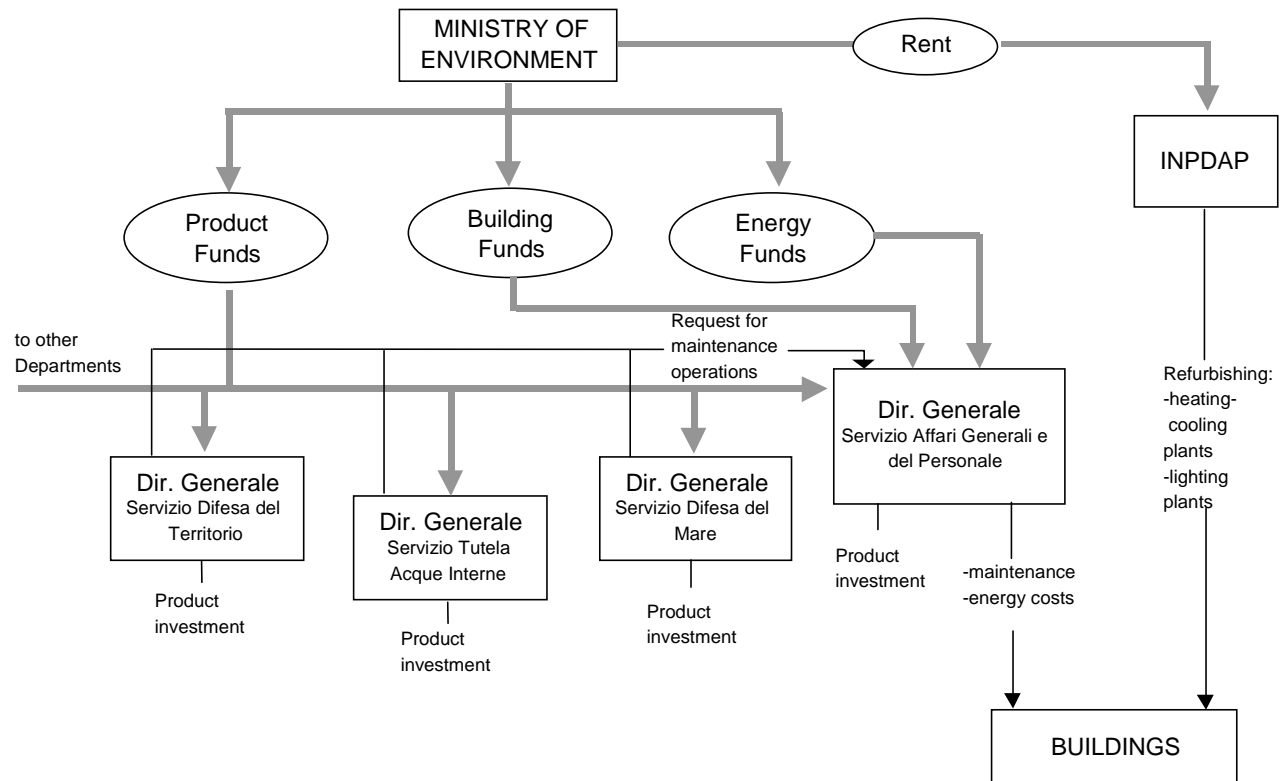


Figure 5 . Procurement scheme for the Ministry of the Environment

## ***Success Stories and Good Examples of Energy Efficiency in Public Institutions***

The Energy Manager of the City of Modena was elected directly by the ruling cabinet which agreed concurrently the first lines of action. In so doing the Energy Manager achieved recognition and support from the highest management tier in the authority. The Energy Manager reports directly to the council Director General, chief staff advisor to the City Mayor.

The result of which, and also no doubt to the the particular energies of the individual, the Energy Manager has been able to establish a strong influential role in the activities of the council service groupings for example:

- assigning energy costs to individual service groupings
- definition of refurbishment plan for energy services
- proposals for building improvements for reductions in energy use

In doing so the Energy Manager has developed with success the consultancy role that the position traditionally holds (with a total of more than 20 important actions completed). However importantly the Energy Manager of Modena has stepped beyond consultancy to establish direct budget control of a number of investment decisions. The Energy Manager now controls budgets for all service groupings for :

- the maintenance and refurbishment of all heating and cooling plant
- space heating energy costs (though costs are still nominally assigned to individual service groupings)

The procurement model is schematised in Figure 6 .

The investment model implemented by Modena, obviously goes some way to overcoming barriers to the optimising investment and energy cost budgets over product and service lifetimes. The Energy Manager, together with the council Director General, is in the process of identifying how to develop the role further. The proposals is to achieve responsibility for:

- heating and cooling plant in new structures
- lighting plant in new and existing structure
- electricity costs

The proposal does not for the moment consider how to interact with the Facilities Department on developing building envelopes, nor does it include investment decisions regarding product purchases. However in respect of the latter the city council is currently in the phase of acquiring the EMAS environmental certificate, which the Energy Manager believes should be a strong tool toward directing product procurement.

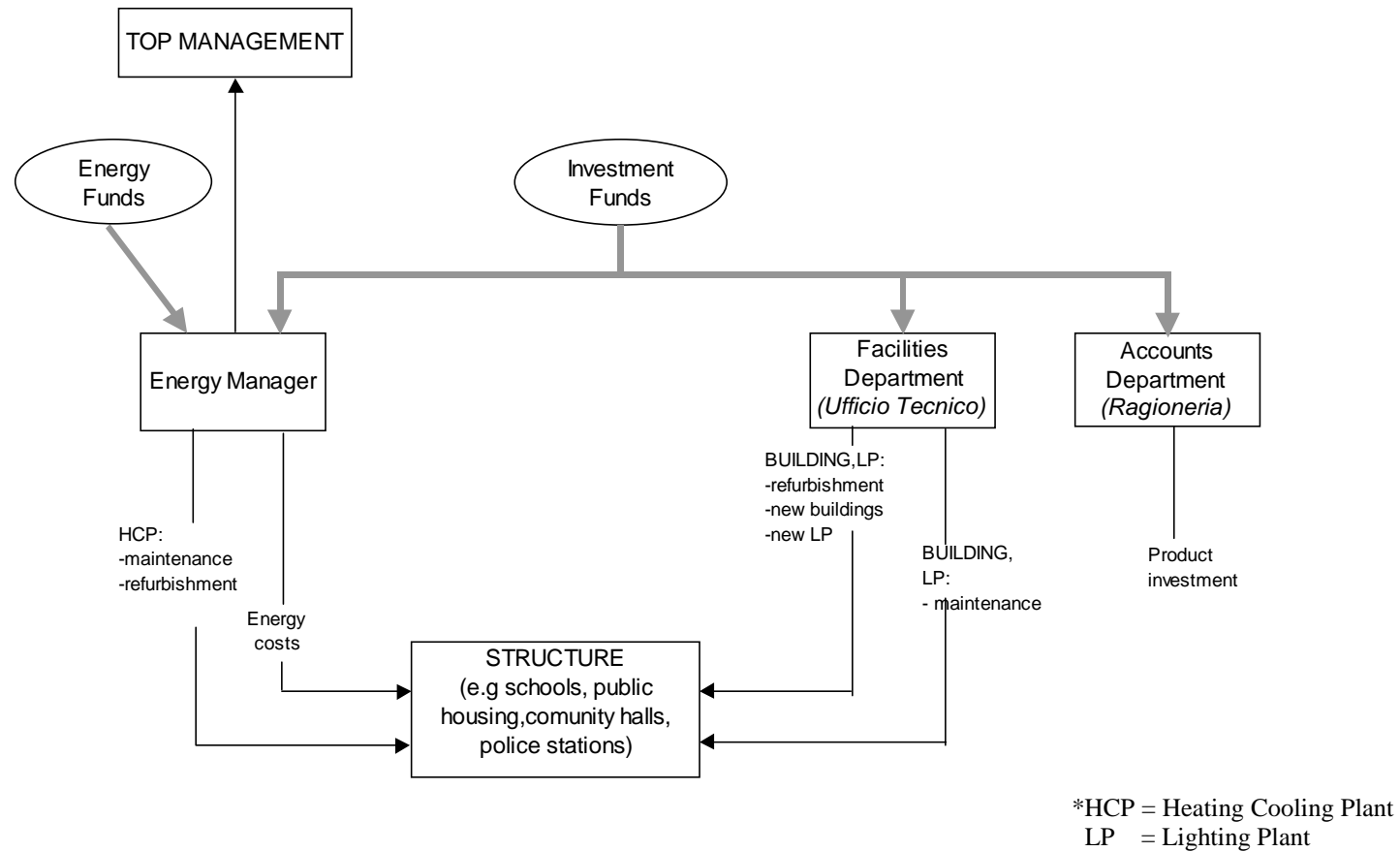


Figure 6 Procurement scheme for the City of Modena

## Incentives and Barriers for Energy Efficiency in Public Authorities

Law 10 (1991) "Codes for implementing the national energy plan through the rational use of energy and the application of renewable energy sources" introduced several progressive concepts of energy management for the PA in Italy. In doing so Law 10 provides important incentives for energy efficiency in the PA. On the other hand failure to implement a number of elements identifies the barriers to the application of energy efficiency in Italy. Importantly the failures of implementation of Law 10 show that:

➤ Legislation alone is insufficient to ensure application

Summarising, Law 10 introduced the requirement for:

- Directors for the conservation and rational use of energy (Energy Managers) : Law 10, 1991; Article 19
- Purchase of Efficient Products and Components: Law 10, 1991, Article 26, comma 7
- Energy Plans: Law 10, 1991, Article 5

Said simply the second obligation basically (though the detailed terms were never defined, except in the case of heating systems) affirms that the use of funds (investment and running costs) must be optimised over (part of ) the lifetime of products and services and places the onus on public authorities to work in this sense. Though in reality the PA has failed to implement the requirement, it could well turn a useful, once the reasons for failed implementation have been resolved (for example it would be supportive of the use of *economically most advantageous offer* criteria in public contracts)

However as noted, generally it can be said that public authorities have failed to translate the potential offered by the requirements into effective measurable energy savings. Three reasons might be advanced to explain the failure to realise of the first two requirements, in line with the original expectations held by the legislator; summarily:

- **Lack of Priority:** Energy efficiency is considered by top management (at times political level) principally as an environmental not an economic issue. This in part maybe understandable; energy costs account for only several percentage points (say 2 to 5 %) of the total annual operating budget for the public sector as a whole, and of individual administrations and authorities<sup>3</sup>. Personal costs on the other hand account for 30% (typical of city administrations) to more than 80% (the public sector as a whole) of annual operating costs<sup>4</sup>. Thus reductions in energy use, even significant, result in only marginal annual economic savings compared to total annual budgets of individual administrations. However though relatively small, in absolute terms the figures are significant. For example close to 16 million Euro/year for a city of 400.000 inhabitants (Bologna) and estimable as not less than 1.4 billion Euro<sup>5</sup> for the public sector as a whole in Italy.
- **Lack of Technical Information and Formation:** In order to implement the legal requirement to invest in energy efficient solutions (Article 26, Law 10/1991) where these prove technically and economically feasible, requires that staff charged with procurement are able to identify efficient solutions and can determine the nature of the energy savings which would result (in respect of none efficient alternatives); information and procedures until now missing.
- **Lack of Investment Culture:** PA invests in society in the wider sense. Its mission statement is directed by service provision. Investments aimed at yielding direct future economic returns are not innate to this culture. This is reflected at decisional level, where priority is directed to improved service levels, and administration, which lack the skills to undertake simple cost benefit analysis.

These must be considered the important barriers to implementing energy efficient solutions within the PA in Italy at the present time. Though other elements do exist, most notable "split incentives" (discussed below), it is felt any action must first address these three issues if lasting results are to be achieved.

### Split Incentives

The degree to which budget division and purchase responsibility between product and component investment and running costs creates barriers to energy efficiency in the form of "split incentives" depends on the size of the organisation.

Often investment and running costs are considered globally as a single entity by top management. Particularly in smaller authorities this could well be a single individual: the mayor of a small town, the director of an hospital. These managers are generally aware, if not keenly, on the need to reduce costs, and can direct changes to investment strategy with relative ease provided a suitable rationale.

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<sup>3</sup> Total annual fuel costs (methane (cooking), heating and electricity) for the city administrations of of Genoa and Bologna for the came to less than 4% and 3% respectively in 2001. Fuel costs for public hospitals typically account for roughly 5% of total operating budgets. Considering the public sector as a whole the total cost of procured services in 2002 (of which electricity and heating fuel represent only one item) will be in the region of 8%.

<sup>4</sup> In 2002 staff salaries will account for 86% of the total budget of the Public administration in Italy.

<sup>5</sup> Considering energy costs as accounting for not less than 2% of the total annual operating budget of the public sector in 2002 (71.768 million Euro).

Even in larger public authorities it is not necessarily the case that by administrating expenditure on a number of costs centres the organisation automatically forgives its responsibility to minimise overall, investment and running, costs. There is a self awareness of the professional staff of the need to run their respective service groupings to the benefit of the entire organisation. For example the Facilities Department of the Provincial Government of Milan operates a five year pay-back rule on the relative additional costs and subsequent energy savings resulting from adopting improved over standard efficiency solutions in building investments; even though the department does not achieve any direct economic return (from reduced energy bills).

Thus attention must be made in not overstating "split incentives" as the global cause hindering the application of energy efficient solutions in the PA in Italy. Important and equally pressing are the barriers identified above.

This said it must be recognised that five year pay-back by the Facilities Department of the Provincial Government of Milan probably represents an aberration within the general scheme of things. The disincentive to optimising expenditure over product and service lifetimes, caused by the division of investment and management budgets is to some degree, if not globally, recognised. Certainly the Energy Manager of Modena, is working to unify investment and management budgets as a means to promoting the implementation of energy efficient solutions (see Section "").

In a number of cases, investment and management budgets are also separated across different public authorities, for example:

- Generally primary school heads purchase didactic and administrative material using funds derived from the Ministry of Education. School energy bills are however met by the local City council.
- The Ministry of the Environment rents office space from the INDAP state pensions institute, which is responsible for undertaken building refurbishment, (the Ministry completes normal maintenance).

Obviously optimising investment and management budgets in these situations requires that a strong dialogue is established between the authorities involved, which entail consequential costs. However solutions are possible. The Federation of Italian Energy Managers for example as developed a model voluntary agreement to be used between schools and councils, which allows for a repartition of economic savings derived from energy savings (in schools) between the school administration and the local council.

### Other Disincentives

Public authorities maybe funded in part on the basis of historic costs. Cost reductions through the implementation of energy efficient solutions will over time affect historic costs and thus funding levels; thus savings are not automatically maintained by the authority.

## Public Internal Performance Contracting (PICO)

### ***Overall Conclusions on the Usefulness and Feasibility of PICO***

The PICO structure aims to overcome at least two important barriers hindering realisation of the energy savings potential within the PA:

- the presence of split incentives between investment and management budgets
- the lack of relevant technical knowledge and administrative skills

The presence of both barriers are recognised by the PA, though the the problem of split incentives is felt to be at times overestimated. However the

lack of priority recognition for energy efficiency from management

is felt to be a substantial a priori barrier which, if not addressed, would hinder the successful implementation of PICO as it presently hinders the full realisation of current (progressive ?) legislation in the field of energy efficiency. It is felt that PICO itself offers no innate advantage over existing administrative structures in overcoming this barrier.

Achieving priority recognition necessary for the successful implementation of a PICO structure, would equally facilitate the application of existing legislation: at local level by increasing the role of Energy Managers or by imposing the application of eight year pay back rule on efficient investments, and at all levels by freeing funds with which to develop the necessary product knowledge base.

Thus if there is a general interest in the PICO proposal this is balanced by an equally pressing interest to ensure the correct application of existing legislation.

This said, other than the lack priority recognition for energy efficiency by top management, interviewed persons reported no legal or administrative barriers which should prevent the creation of a PICO structure. However given that legislation affecting the public sector is exceedingly complex, and that no more than a superficial analysis could be made, this might prove to be over simplified. Nevertheless at least one authority was keen to develop the idea further.

Generally there exists a significant degree of financial autonomy within the PA, with most authorities organising global annual budgets freely with in the terms of transparency. The limit of autonomy varies according to the agency and institute and considering the very large number of bodies it is difficult to develop a global definition; certainly the roughly 8000 city and 100 provincial administrations, all hospitals and individual Ministries have full budget autonomy. National welfare institutes (for example are INPS, INAIL, INDAP) are organised on a regional basis, though autonomy might extend down to local office level, depending on the particular organisational model adopted.

The principal restriction is that budgets are balanced over the year, i.e. income must equal outcomes. Loans are possible, though limited to a fixed portion of incomes.

The text proceeds by considering the comments made in respect of the different PICO structures. The two models, profit centre and fake privatisation, were seen to offer varying advantages and disadvantages, which are here detailed.

In addition an innovative Energy Management model is also offered, which attempts to provide a more global management of energy issues than PICO. The two methods are not directly comparable in application, though they should address comparable issues in the process implementation in existing organisations (first and foremost the need for priority recognition from top management). Any action to test the implementation the PICO method could do well to consider the here proposed Energy Control Unit structure.

The text proceeds by considering the comments made in respect of the different PICO structures.

### PICO: General Advantages

The most common advantage seen in PICO (fake privatisation, profit centre), is as an alternative to private sector service providers, (ECSO's or facility managers). The two main problems with which are:

1. The tender/bid process is seen as complex, in which the public authorities must strive to ensure transparency and fairness in implementation and ensure that adjudication is completed to their best advantage. Recourse by private bidders against adjudication is always a possibility. The keen interest shown in the new central buying agency (CONSIP) in part testifies to the interest of public authorities to avoid involvement in the tender process.
2. Though space heating service performance contracts are now quite widespread, public authorities report that equitable solutions were developed only after a number of years; a learning period which included acrimonious disputes with the service providers. There are problems in resolving contentious situations in favour of public authorities when service providers are ready to seek judicial recourse and when problematic operators can remerge as future service providers through the "blind" tender/bid programme.

Very much connected with this point are fears of "cream skimming" by service providers.

Though in the second case well developed standard service contracts could help in this sense, generally the PICO agent would indeed avoid the need to enter into tender/bid process with the private sector.

### PICO : The Profit Centre Model

Two possible problems in realisation are:

- The concept of a formal agreement which foresees payment between two service groupings of the same authority appears strange, though not necessarily impossible to realise
- Loans from private institutions are regularly undertaken. However in the case of city councils the annual allowed repayment premiums are limited by law to a given quota of council annual incomes. The request for investment funds by the PICO agent would most likely need to be made therefore within a global context. Autonomous action by a single service grouping to achieve private capital loans seems difficult to realise.

Otherwise seen advantages:

- Suitable for larger public authorities, which have sufficient energy savings potentials to allow the structure to be self financing
- Less likely of cream skinning (w.r.t. Fake Privatisation); the interests of the client (its own organisation) will be more prevalent

Disadvantages

- Possibilities of conflicts with activities of existing structures, for example the Facilities Departments
- Transaction costs in order to establish the necessary service agreements between the PICO and the serviced structure.

Neutral (w.r.t existing situation)

- the PICO structure must be provided with sufficient resources and priority recognition from top management to undertake its activities

### PICO: The Fake Privatisation Model

The most likely solution would be the creation of a Consorzio of either entirely public, or mixed private and public funding, or a Special Company (*Azienda Speciale*).

Seen advantages:

- Public authorities can access Consorzio services directly, without passing through a tender bid process
- Is in line with an ongoing (political ? ) trend, of out sourcing services
- Would allow smaller organisations (small town councils, hospitals), which singularly are unable to maintain a PICO structure, to pool resources
- The administrative structure is well defined
- The need for financial autonomy would be greater, there is a distinct separation of finances from participating agents (private and public), which could serve as a greater incentive for achieving self sufficiency and therefor a more aggressive search for achieving energy savings
- Legislation provides financial incentives to the public sector to pool services

Seen disadvantages:

- Transaction costs in order to establish the necessary service agreements between the Consorzio and the serviced public authorities
- Problems of coordination in investment decisions by Consorzio and existing Facilities Departments

Neutral :

- Though an out sourced agent the Consorzio must be provided with sufficient resources to begin activity by the participating bodies

### ECU : An alternative proposal

The Energy Control Unit (ECU) overcomes problems common to the PICO Profit Centre and the Fake Privatisation models, namely:

- There are transaction costs in order to establish the necessary service agreements between PICO and the "service" department. These will always be present and for smaller investments may prove excessive.
- PICO would need to coordinate its activities with those ongoing investment activities of the existing Facilities Department and in the case of products the Accounts Department.
- PICO would not automatically influence the investment strategies of the existing Facilities or Accounts (for products) departments.

On the negative side:

- It does not propose to be a self financing structure, and therefore might be less aggressive in realising energy efficient interventions.

The alternative approach is schematised in Figure 6 . The proposal represents a rationalised version of the investment decision model, in place in the City administration of Modena. It would need to be investigated to see how well the scheme could be adopted to other structures.

In essence the ECU works to concentrate all energy management costs of an authority (investment and running) in a single cost centre which reports directly to top management. This represents a step forward from existing Energy Management in public authorities, where the unit attempts to simply coordinate and provide consultancy to other service groupings.

The essential points of the proposal are:

- the ECU (under the direction of the existing Energy Manager if in place) takes control of the maintenance and refurbishment of the main energy consuming systems (light, heating and cooling plant) in all facilities, and consequentially the relevant annual investment funds.
- the ECU pays energy bills incurred by the facilities, and consequentially is provided with the relevant annually appointed funds.
- the Facilities Department maintains control of all other building maintenance and refurbishment; thus improvements to the building envelope, the structure, plumbing plant, ecc. The Facilities Department is charged with realising new facilities. However an obligation to inform the ECU is introduced in the case of refurbishment or when realising new facilities. The ECU responds by providing relevant consultancy on the proposed interventions. In the extreme, one could imagine empowering the ECU with the power of veto over the Facilities Department, should the consultancy role fail. In the case of maintenance the Facilities Department works to ECU established or promoted guidelines.
- the ECU is empowered to propose to the Facilities Department structural and envelope interventions which could lead to energy savings. Investment funds for these additional interventions would need to be allocated within the context of the authority yearly budget provision
- the ECU is headed by an Executive Director reporting directly to top management (for example the city cabinet).
- annually the ECU reports to top management, detailing activities undertaken and achieved energy and economic savings.

The scheme represents a significant modification to the investment responsibilities commonly found in councils and other public authorities. However much of the process is already in place in the City Council of Modena (see above), proving that given sufficient interest by top management the ECU does represent a feasible solution.

In application the ECU does not equate directly with PICO. However in terms effort of implementation:

- The ECU equates most readily with the Profit Centre Model: both require the introduction of a new department within an existing organisation. Though the ECU maybe headed by an existing Energy Manager (upgraded if needed to Executive Director), the unit takes on significant number of responsibilities not currently covered by the Energy Manager.
- There maybe insufficient saving potentials to establish a self financing PICO Profit Centre Model within smaller organisations (for example small town councils). However the ECU could be established within most any organisation, since to some degree it represents simply a change in responsibilities of existing cash flows. However even if this were achieved it is likely that in smaller authorities the ECU would lack the technical skills to achieve significant savings. Thus in the case the Fake Privatisation Model (Consorzio, Special Company) probably represents the better option.

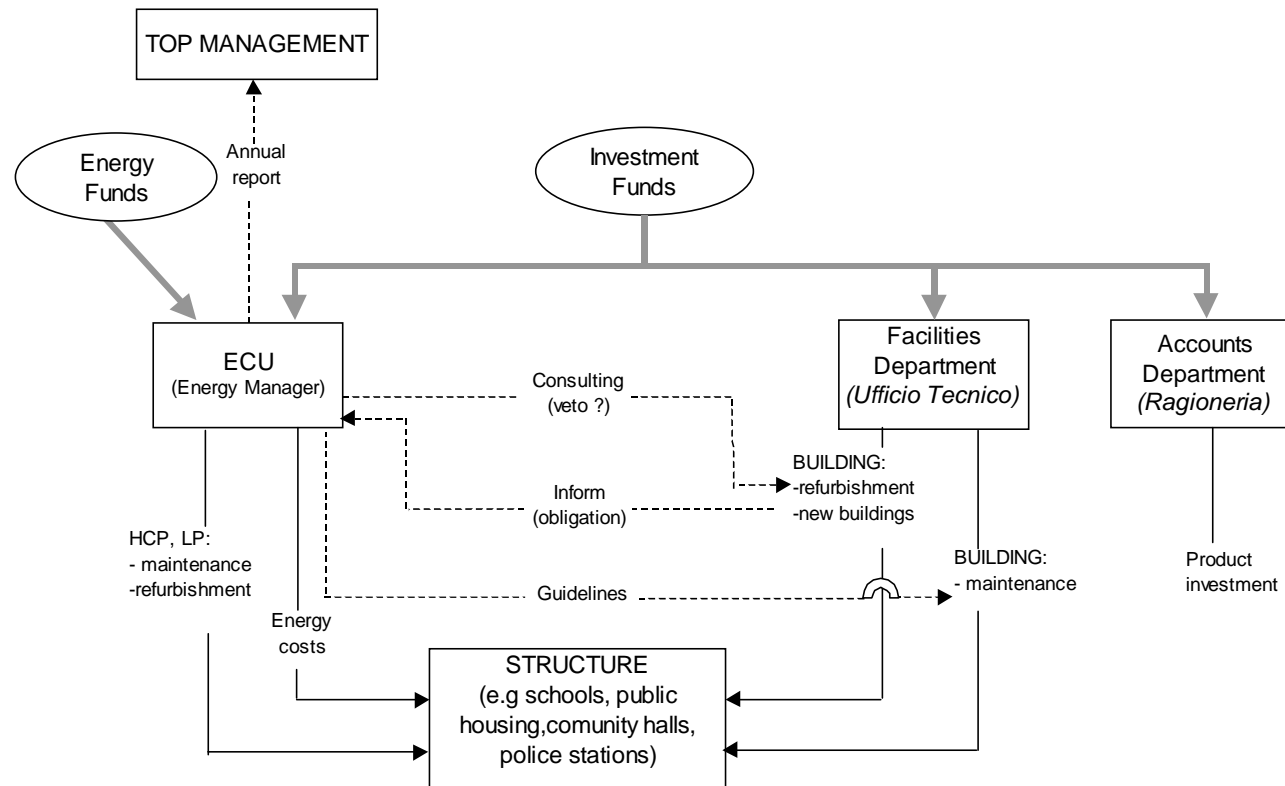


Figure 7 Procurement scheme according to the ECU proposal

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