ENERGY EFFICIENCY SUPPORT SCHEMES

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1. General introduction

Energy efficiency policies enable countries to alleviate the financial burden of oil imports on their balance of trade and also improve energy supply security. As many non-energy producing energy intensive countries are faced with low economic growth and high unemployment, energy efficiency is seen as the best strategy to improve the competitiveness of industry, by reducing energy cost and stimulating economic growth and job creation through the investments generated. In many countries where heating is an important component of consumers' energy bills, energy efficiency can help to reduce costs for low-income consumers and can contribute to alleviating poverty.

In developing and emerging economies, energy efficiency enables a reduction in energy investment, and helps to make the best use of existing assets to improve energy access. Improving the efficiency of electricity usages has two benefits:

- Supplying more customers using the same electricity production capacity thanks to the grid losses reduction, allows to provide **electricity access** to more people, which is often the main challenge in many developing countries.

- Curbing the electricity **demand growth**, and so reducing the investment needed for expansion of the electricity sector. This is especially important in countries with high growth in electricity demand.

Energy efficiency also has many other benefits, such as reducing the impact of oil volatility on the balance of trade and on national budget, when prices are subsidised.

Energy-producing countries have also become concerned by energy-efficiency as they realise they are wasting valuable resources by not using them efficiently.

Most of the energy efficiency investments are cost effective since they are paid back in a few years through lower expenditures on energy supply and other benefits.

Success in implementing energy efficiency requires aligning incentives correctly along lengthy supply chains and across stakeholder groups with different and often divergent interests. Still, there are a number of barriers to carrying out energy efficiency measures that are cost effective and technically feasible but left undone. Even where energy prices are rational, and where environmental and other externalities are factored in, other barriers interfere with the operation of the simple economic logic of higher relative energy prices leading to higher efficiency.

The following barriers are often invoked to justify the implementation of policy measures:

- Even after decades of consistent action on energy efficiency in many countries, a **lack of information** persists, in large part because energy is an intermediate good and often plays a hidden role;
- The availability of **efficient appliances** and production devices in the domestic market is limited;
- Energy efficiency is a field requiring a great deal of specialization, and a paucity of trained personnel and of **technical and managerial expertise** is common;
- **Unfamiliarity with efficient technologies** may lead to a perception of higher risk than is warranted;

- **Energy prices** are not always cost reflective, whether by subsidies or other means (or which are otherwise distorted), and contribute fundamentally to blocking uptake of efficiency measures;
- **High transactions costs** for contracting and financing energy efficiency projects are common;
- **High discount rates** of projects cash flows for end users may lead them to undervalue the benefits of investments with longer payback times;
- Efficiency measures require initial, sometimes large, investments, and end users may lack **access to capital and credit**;
- Finally, there are often mismatches between the incidence of costs and benefits of efficiency investments (**principal–agent issue**), as with the owners and occupants of rental housing.

Overcoming these barriers is a matter of reorganizing and reforming institutions—that is, the formal and informal rules that establish how market players interact—to facilitate broader adoption of technically feasible and cost-effective energy efficiency measures. Establishing and overseeing such institutions is the responsibility of government. Specific **energy efficiency policy** support schemes are therefore necessary to address these multiple barriers. The main objective of applying policy measures for energy efficiency is to create the necessary conditions to speed up the development and the dispatching of efficient equipment and services, through:

- information and communication, well channelled to final consumers to increase their awareness and show them the range of possible options for technical decisions

- Support for the purchase of energy-efficient equipment and devices through financial incentives (e.g. subsidies, – subsidised loans) with subsidised interest rates or fiscal measures (tax credit, tax reduction, taxation of inefficient equipment)

- deployment of specific financing mechanisms to enable consumers to invest in cost effective solutions with high investment

- regulation on appliances, equipment and buildings to mandate the display of their energy-efficiency performance through efficiency labels and to impose minimum efficiency standards to remove the least efficient from the market

- regulation imposing obligations on consumers (e.g. audits, reporting, plans, energy savings)

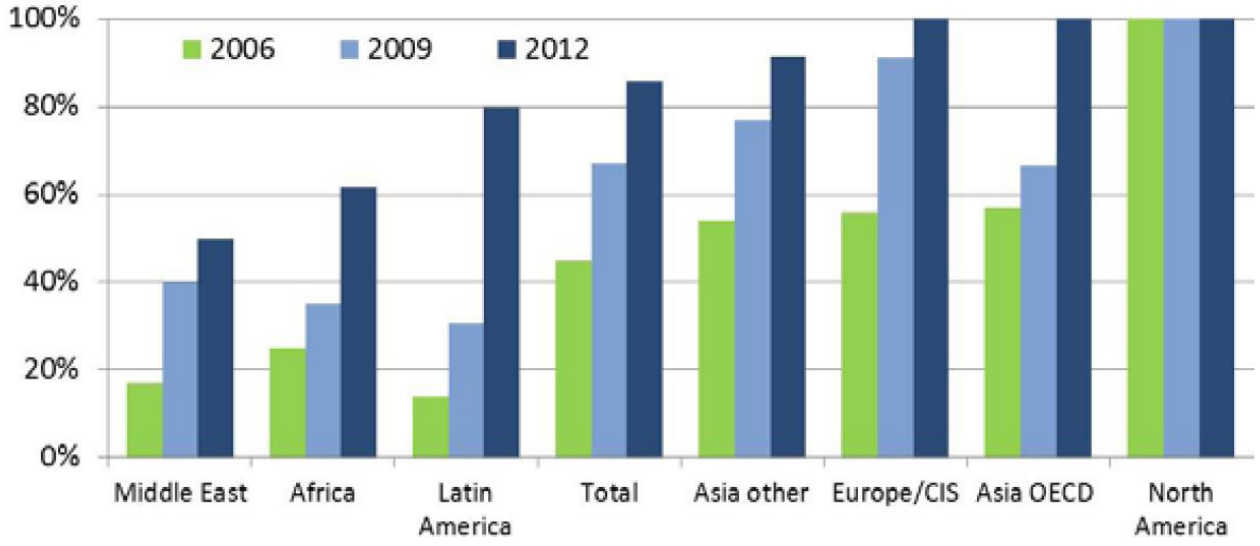
- research and development (R&D) and demonstration programmes for energy-efficient technologies to speed up their penetration in the market

In a context of budget constraints and to reach multiple consumers more directly, public policies rely more and more on the private sector: energy utilities, and the energy services companies (ESCOs). The involvement of utilities can be through negotiated or voluntary agreement or through regulations that mandate these utilities to make energy savings with their customers – energy savings obligations. The involvement of ESCOs helps to introduce the inclusion of technical and financial solutions that enable consumers improve the efficiency of their energy usage and therefore reduce their energy bills.

2. Policy, institutional and legal framework

2.1 Quantitative energy efficiency policy targets

An increasing number of countries are adopting national energy efficiency programmes with quantitative targets.



Percentage of countries per region with quantitative energy efficiency targets – source WEC ADEME 2012-2013

The targets are expressed in various ways but mostly in terms of a rate of energy savings or **energy efficiency improvement**. This is the case for all EU countries complying with the Energy Services Directive (ESD), New Zealand, Japan, and Vietnam. The second type of adopted target is the **phase-out of incandescent light bulbs**, first launched in 2005 by Brazil and Venezuela and now extended to ECOWAS member states. Targets on **energy intensity reduction**, which used to be the main mode of expression of policy target, are no longer popular. The objective of **reducing the energy consumption** compared to a baseline year is a new and much more constraining target presently considered in six European countries. Most countries have adopted at least three specific energy efficiency targets and at least five countries[1] have more than 10 targets.

Approaches to energy efficiency vary widely among sectors, and so enabling environment for private investment concerns sector-specific policies, regulations, and pricing that are crucial to the viability of investments in energy efficiency. Sector-specific enabling environment should focus on the following sub-sectors: buildings ; industry; the utility sector and transport..

2.2 National energy efficiency laws

The adoption of energy-efficiency laws or energy laws with a strong component related to energy efficiency is a new approach to reinforce the institutional setting for energy efficiency: most of the laws have been implemented over the last 10 years. A law gives a more durable status to energy-efficiency policy as it is less sensitive to political changes. These laws provide a legal framework for the adoption of other regulations, such as labelling, minimum efficiency energy performance standards (MEPS), obligations for large consumers (e.g. Turkey or India) or even energy-savings obligation for utilities (e.g. France). Energy-efficiency law may also provide a legal framework for setting up an energy-efficiency fund (e.g. Thailand, Uruguay).

2.3 National energy efficiency agencies or centres

The implementation of energy-efficiency programmes may require a dedicated technical body able to reach scattered and multiple energy consumers. Some measures, such as energy pricing or transposing international standards may however be implemented without a specific energy-efficiency institution. Energy-efficiency agencies are increasingly recognised as necessary instruments to foster energy-efficiency policies.

[1] France, Spain, Algeria, India, South Africa

An energy-efficiency agency is defined here as a body with strong technical skills, dedicated to implementing the national energy efficiency policy. Such agencies may be part of a ministry, as in Denmark, Canada, the United States (US) or the Philippines. Over 2010-2013, five energy efficiency agencies have been created in China, Chile, Indonesia, Senegal and Ukraine.

Energy-efficiency agencies have the mission and capabilities to design, implement and evaluate programmes and measures, to contract a range of stakeholders, such as companies, local authorities, or non-governmental organisations (NGOs) and, finally, to ensure coordination with higher or lower level authorities (international, national, regional and local).

These agencies are usually public institutions funded by the state budget. In developing countries, they are often supported by overseas technical assistance funds. In an increasing number of countries, they are partly financed by a levy on energy price (e.g. Denmark, Norway, Spain, Switzerland, Thailand, Tunisia). Some countries have set up agencies with private sector participation (e.g. Morocco, Portugal, Kenya[2], Ghana[3]), while others expect their agency to operate as a partially private body that has to earn income.

In countries with a federal or decentralised structure (e.g. Spain, Germany, Belgium, the US, Canada, Russia, China or India) energy-efficiency agencies have been set up by provincial governments. Many other countries have set up decentralized branch offices, especially in EU countries.

Decentralised agencies aim to provide more targeted information and measures, as they are closer to consumers and local governments. Government ministries do not, in general, have the required expertise to carry out all the activities of energy agencies.

Another important function of energy efficiency agencies is to act as a coordinator of all government initiatives in the field of energy efficiency to avoid scattered and uncoordinated actions by different ministries. In particular, the existence of such agencies has proved very useful in negotiating sectoral agreements with groups of consumers, equipment producers or energy utilities to reach specific targets for efficiency improvements.

In countries that receive funding from international development assistance programmes, such agencies can also act as the national counterpart with whom investors can negotiate the implementation of financial packages for energy efficiency.

Energy-efficiency agencies serve to promote or act as an advocacy organisation for energy efficiency on a long-term basis.

3. Mandatory regulation

Regulations are widely used, partly because they have proven effective in lowering energy consumption of specific appliances and equipment and in speeding up the diffusion of energy-efficient equipment, energy-saving investments and practices.

At world level, there is a predominance of regulations and it is increasing (e.g. Asia and the Middle East). This is not surprising as regulations are more powerful than traditional incentives to transform the market, because they do not leave any choice for consumers. Incentives may be considered as weak because they depend on the behaviour change of millions of consumers who essentially lack the information and resources to act. However, the impact of regulation depends on their effective enforcement.

[2] Kenya Association of Manufacturers

[3] Energy Foundation

If regulation is important in the residential and service sectors (appliances, labelling, building codes and certificates), financial incentives are more important in industry where competitiveness should not be affected by regulation.

In general, regulations aim either to impose minimum efficiency standards or energy-efficient practices (auditing, reporting, maintenance), as well as to provide systematic information to consumers (e.g. energy-efficiency labels).

Regulations can be set nationally, for a group of countries (e.g. Directives in the EU or in ECOWAS[4]), or at sub-national, regional level (e.g. California in the US).

3.1 Minimum energy performance standards (MEPS)

A majority of countries have implemented at least one MEPS such as efficiency standards on lamps, appliances (refrigerators, washing machines and air conditioners), equipment (electric motors are the single largest end-use category of electricity worldwide), and new constructions. MEPS on vehicles are less common.

3.2 Energy audits and other regulations

Designated consumers may be targeted by mandatory requirements, such as mandatory energy audits, energy consumption reporting, energy managers, energy-saving plans and, more recently, energy-savings performance monitoring. These designated consumers are usually high-volume consumers, identified from energy consumption thresholds, in selected sectors (e.g. steel, cement, public sector, large commercial buildings).

Energy audits, either in the form of walk-through audits or detailed energy audits are necessary to gain a better understanding of the current status of energy use and to identify potential actions for energy savings. Mandatory energy audits are more popular in OECD countries.

Other regulations include mandatory maintenance, installation of solar water heaters and an energy-saving obligation for utilities. Other regulations not directly linked to energy efficiency can have a significant impact on the energy use (such as speed limits).

3.3 Public procurement regulation

For government agencies, rules requiring public procurement to privilege efficient devices and budget rules that permit entering into multiyear contracts with energy service companies are fundamental to implementing efficiency measures.

3.4 Enforcement of regulation

Regulations represent a powerful instrument to promote energy efficiency but their impact depends on good implementation and effective compliance. Australia, Canada, the US and EU countries are very active in integrating compliance directly into their energy efficiency programmes. Canada integrated a compliance policy into its standards development right from the start. Australia has a similar, rigorous approach. In the EU, the compliance for electrical appliances is built into the **Ecodesign Directive** and procedures for compliance of the mandatory energy performance certificates and inspection reports for buildings is included in the **Energy Performance of Buildings Directive**. The Australian Equipment, Energy, Efficiency (E3) Committee provides a forum to exchange information on enforcement and compliance issues and community information and marketing initiatives.

For appliances and equipment, the absence of **certification facilities** in many emerging or developing countries makes it difficult or impossible to check the compliance of imported

[4] ECOWAS = Economic Community of West African States

products with national standards; it may also be impossible for them to adapt or strengthen the national standards so as to follow the technical change in state-of-the-art technology. A national or regional testing and certification centre that can verify the compliance of marketed products with the national law (technical standards) is a key element for the implementation of policies intended to promote efficient appliances or solar water heaters. An alternative is the application international standards and the use of international certification facilities.

A better understanding of how to develop and implement compliance systems is needed. It is also important to increase the awareness of the need for compliance. Much of this can happen through greater international cooperation. Examples of such cooperation, especially in terms of capacity building are provided by the Collaborative Labelling and Appliance Standards Program (CLASP), Asia-Pacific Economic Cooperation (APEC) and the European Committee of Domestic Appliance Manufacturers (CECED).

The control of **building codes** is often decentralised at the level of cities that lack the resources and expertise to maintain such controls. In addition, in several countries, buildings codes have been prepared but not officially implemented or, if they have been approved, are not applied, which of course limits their impact.

4. Demand side economic incentive regulation

Economic incentives aim at encouraging investment in energy efficient equipment and processes by reducing the investment cost, either directly (financial incentives) or indirectly (fiscal incentives). Financial incentives include subsidies for energy audits or investments and soft loans. Fiscal incentives include tax reduction, tax credit or accelerated depreciation, as well as tax on inefficient equipment (appliances and cars). Economic incentives can be defined as a fixed amount, as a percentage of the investment (with a ceiling), or as a sum proportional to the amount of energy saved.

Demand-side management (DSM) measures aim to increase the efficiency of energy service delivery by using opportunities, which are not being fully taken advantage of in the market. Using DSM measures electricity suppliers try to mobilize cost-effective savings in electricity and peak demand by aiming to influence the time and level of electricity used by customers. DSM essentially aims to decrease the amounts of electricity used during peak times by shifting enough demand from peak morning and evening periods into the mid-day and night-time hours, thus resulting in a constant, efficient use of electricity.

Regulators can encourage electricity suppliers to influence the time and quantity of electricity used by consumers by offering incentives. For example, the regulator can influence the tariffs that can be charged by the supplier at different times of the day, allowing the supplier to charge higher tariffs during peak hours and lower tariffs during off-peak.

Regulators can also work directly with larger consumers by offering financial assistance on investments to improve consumption patterns and reduce overall consumption through efficiency measures.

A successful DSM strategy will ultimately result in a more efficient electricity system, and therefore in significant cost savings for the provider and the consumer. The household sector is a prime target for DSM measures, as energy consumption in this sector is always rising.

4.1. Design of incentive prices for consumers

Many energy-importing, non-OECD countries are protecting their consumers from an increase in the oil price by maintaining subsidised price for fuels. These subsidies represent a significant disincentive for energy-efficiency investments and limit the scope and profitability of ESCOs. In addition, they have a negative impact on public budgets, especially in time of high oil price. Subsidies often lead to illegal trade, resulting in an artificially high energy consumption in the

countries with low prices and an underestimation of the consumption in countries with higher prices. As illegal trade is not recorded in statistics, this affects any attempt to monitor consumption or energy-efficiency trends in these countries.

The first step of any energy-efficiency policy for countries with subsidies should be to adjust energy prices to the energy supply cost to send the right message to consumers, to provide incentives for behaviour change or to encourage them to acquire energy-efficient equipment and technologies. Although most energy policymakers agree with such objectives, they often face reluctance and opposition from decision makers outside the energy sector who fear public resistance and the impact of energy price corrections on the consumer price index. Also, energy is a basic commodity for which a low price is a condition for access for low-income households. This makes actual price adjustments very slow or non-existent in many developing countries, especially in the household sector. There is, however, some good practice in countries that have successfully removed price subsidies and adjusted energy prices, such as new EU member countries with centrally planned economies, such as Ghana or the Philippines, and, more recently, China, India, Iran, Jordan and South Africa.

Energy-producing countries often maintain a very low domestic price, which leads to intensive energy uses, and a loss of revenue (opportunity cost). A reduction in the subsidies could save energy that could be sold at a much higher price on the international market and bring benefits to these economies.

In OECD countries, price signals are already significant with most prices being taxed, sometimes heavily, such as motor fuels in European countries for instance. In some of these countries, new taxes are implemented to increase price incentives, often labelled environmental, energy or carbon tax.

Independent of price levels, the way tariffs are set can also have an impact on energy efficiency, mainly for electricity and gas. Power tariffs are usually set in a way that encourages consumption: the higher the consumption of a given consumer category (e.g. household), the lower its average electricity price. However, some countries have implemented an inclining block tariff which makes any marginal consumption more expensive and provides a good disincentive to consumers. This study shows that around 40 countries have some sort of progressive tariffs. France is planning to implement an innovative approach, called bonus-malus, where electricity intensive consumers in a given category will pay a premium while those who consume less will get a discount. A benchmark volume of electricity and gas is assigned to each category (based on several parameters such as average size, heating fuel and geographical location to take account of heating needs) representing the first quartile of consumption in France. For each dwelling and each type of fuel, there are three levels of consumption: consumption below the benchmark will get a bonus (i.e. discount), while consumption above the benchmark will pay a premium.

4.2. Information campaign to reach out consumers

Public awareness and information campaigns are an important element of supporting energy efficiency and promoting energy efficiency policies and programmes. Improvement of energy efficiency and the related market transformation requires informed consumers and raised awareness among all segments of society, as well as tailored information, education and training for selected stakeholders.

Information on energy efficiency can include different tools and activities, such as awareness campaigns, education and training programmes, labelling schemes, smart metering, information on 'best' products, information centres and demonstrations as well as governing by example.

Typically most public awareness and public benefit campaigns are designed and implemented by government agencies or NGOs. Energy companies are also involved in energy-efficiency awareness campaigns, either by highlighting capacity constraints, showing how to reduce the

risk of power shortage (e.g. South Africa) or to attract new customers. Communication campaigns have a greater impact if they are combined with other policy instruments (such as regulatory or financial measures). These campaigns should be based on market segmentation which allows better focus, use of tailored instruments and more efficient use of resources. Campaign resources can be enhanced by cooperation with partners and other stakeholders.

Transparent Clear, open reporting of monitoring and evaluation results enhances the learning process by showing the strengths and weaknesses of the campaign. This helps in the development of effective campaigns in the future.

While consumer motivation and action can be monitored and measured, it is more challenging to estimate energy savings attributable to communication campaigns.

4.3 Labelling

Because labels help enable consumers to identify the energy efficiency performance (or CO2 emissions) of new equipment and appliances, they are often one of the first regulatory measures to be introduced. Labelling aims to encourage consumers to purchase more efficient appliances and persuade manufacturers to remove inefficient appliances from the market. Labels now cover new electrical appliances, cars and buildings.

These labels are mandatory in most countries; some countries, however, favour a voluntary approach which can be a transition phase before making them mandatory. An example of such a label is the **EU Energy Star** regulation[5], a voluntary energy labelling of office equipment. Other appliances to consider setting efficiency requirements for are lighting ballasts, domestic hot water boilers, domestic refrigeration appliances and air conditioning systems.

Green Star is a voluntary rating system which separately evaluates the environmental initiatives of designs, projects and/or buildings based on a number of established criteria. It provides the industry with an objective measurement for green buildings. Green Star South Africa was developed by the Green Building Council of South Africa (GBCSA) based on existing systems and tools in the overseas markets, most notably the Green Star system developed by the Green Building Council of Australia (GBCA), by adapting and establishing individual environmental measurement criteria relevant to the South African marketplace and environmental context.

Labelling is well developed for refrigerators in Latin America. In Africa and The Middle East, labelling is not yet widespread but is being planned. In Sub-Saharan Africa, Ghana has adopted Energy efficiency standards and labelling regulations.

4.4 Introduction of smart metering

Easy and regular access to reliable energy consumption data is an essential prerequisite for good energy management for every type of consumer. The analysis of existing metering data and consumption profiles can show where the highest and/or easiest to realize energy savings potential lies in order to direct the focus of energy efficiency measures towards certain appliances, certain periods and certain target groups.

Metering provides an effective means to raise awareness on energy efficiency, as metering data offer insight into the increase/decrease of actual energy consumption over the months/years. It is generally recognized that for instance in the household sector, there is the potential to deliver energy savings of 5-10 per cent for many customers through the use of improved feedback on energy consumption.

[5] https://www.eu-energystar.org/legislation.htm

A possible, although somewhat extreme measure is the use of budget meters, where customers get a card by which they charge their electricity meter (cf. a pay-and-go mobile phone card), according/restricted to their budget. This measure is usually imposed on customers having difficulties to manage their budget and pay their bills. Prepayment meters are offered by private electricity companies and run on the same principle. The disadvantage of these is that the price for the electricity is usually higher.

As the availability of energy consumption data is a major issue for most sub-Saharan African utilities, a first set of data could be collected by distributing a questionnaire to and interviewing a representative sample of a selected target group. As this data will often not be very accurate, rules of thumb could be applied initially in order to estimate energy consumption. The questionnaire and interviews should then be repeated yearly in order to improve the quality of the data (collection) and start building historical data, which in time will enable utilities to discover trends and patterns in energy consumption.

4.5 Financial incentives

Financial incentives fall into three broad categories: subsidies for audits; investment subsidies; and soft loans. About half of financial incentives are given in industry and services. If audits are not mandatory, subsidies aim to make them more attractive to consumers. The subsidy is either a fixed amount or a percentage of the audit cost (e.g. 30%). Audit subsidies are more frequently distributed in industry and public and commercial buildings than in residential buildings.

Investment subsidy schemes are especially popular in OECD countries. Investment subsidies exist to retrofit existing buildings, dwellings or industrial facilities. They are also used to lower the price of efficient equipment that is usually more expensive than less energy efficient equipment (e.g. Compact Fluorescent Lights (CFLs), efficient motors or boilers, solar water heaters). Investment subsidies are mainly directed at appliances. Subsidies may also be given to equipment producers to encourage the development and marketing of energy-efficient equipment, to improve the quality and the cost of production.

Globally around 30% of the subsidies on energy-efficient equipment are dedicated to solar water heaters and CFLs. In OECD countries and Asia, more than 40% of the subsidies are directed to new clean and efficient cars.

Financing the initial investment in energy-efficient equipment requires easy access to credit with appropriate finance conditions. Overcoming any initial cost barriers is achieved by making soft loans available to consumers who invest in energy-efficient technologies and equipment. Soft loans have the advantage of being easily implemented by banking institutions. Specific credit lines with the help of investors and state credit guarantee schemes will encourage banks to be more active by providing soft loans to finance energy efficiency investments.

4.6 Fiscal incentives

Fiscal incentives include measures to reduce the annual income tax paid by consumers who invest in energy efficiency: they comprise accelerated depreciation (industry, commercial sector), tax credits and tax deductions (households). Another form of fiscal incentive is to reduce the tax on energy-efficient equipment (VAT, import duties or purchase for cars) or when investing to improve energy efficiency in buildings (reduction in VAT rate on labour cost). Incentives also include tax reduction for the use of efficient cars (annual registration tax). Taxing inefficient equipment (appliances and cars) can discourage their use and move consumers towards use new, more efficient models. And, although their primary goal is to reduce congestion and pollution, toll roads are also considered to be a fiscal measure that affects energy use. Several cities have implemented such schemes.

Fiscal measures on income tax or company tax work well if the tax collection rate is sufficiently high. They usually have a poor performance in an economy in recession or in transition. They are more adapted to well-developed countries. However, unlike subsidies, tax credits do not lower the barrier of the initial upfront payment.

Reduction on VAT and on import tax on energy-efficient equipment (e.g. CFLs, efficient motors) is mostly used in emerging and developing countries in Asia, Africa and the Middle East. The compact fluorescent lamp is the most common equipment to which this measure applies outside the OECD, followed by solar water heaters (e.g. Tunisia, Jordan, and Columbia). In Africa, 50% of fiscal measures are taxes on inefficient appliances or cars.

Reductions on purchase tax and/or annual registration tax for cars have been introduced in several European countries to promote the diffusion of efficient cars: they are usually linked to CO2 emissions and therefore indirectly to energy efficiency. The objective is to give incentives to consumers to buy more efficient cars.

VAT reduction on labour costs to reduce the investment cost in building renovation exist in several European countries. Accelerated depreciation is used mainly in industry and is not commonly implemented.

Tax waivers for companies that make concrete commitments to energy-efficiency gains or CO2 reduction and meet their targets are also another innovative way to promote investment in energy efficiency (e.g. Denmark or UK).

4.7 Energy efficiency funds

Energy-efficiency funds aim to provide resources to support economic incentives. The geographical scope of implementation is mostly national; it may be supra-national or trans-national (revolving funds created in Eastern Europe from development aid), but it may also be regional or local. These funds are implemented by energy-efficiency agencies, financial institutions or dedicated institutions.

Different types of funds can be identified. Funds can be supplied partially or in total from dedicated levy to have a more stable funding and to be less dependent on annual budget allocations. Funding from energy tax exists in different countries. For instance, in Spain, a levy equivalent to 1.5% of fuel bills is raised on electricity and gas distribution companies to provide a resource to which funds are added from the central government and European regional development funds. In Uruguay, the government has adopted an energy-saving obligation scheme for utilities with annual energy savings targets and the creation of the Uruguayan Saving Trust for Energy Efficiency, or Fideicomiso Uruguayo De Ahorro y Eficiencia Energética (FUDAEE), to manage the energy-efficiency certificate mechanism. A key source of funding for FUDAEE comes from a 0.13% levy on total sales from energy suppliers. Another example is in Denmark which has the Danish saving trust.

Energy-efficiency funds can also be supplied partially or totally from international financing institutions (i.e. multilateral funds). Developing countries and economies in transition mainly benefit from external finance in the form of incentives, grants and soft loans. The World Bank, Global Environment Facility, the United Nations Development Programme (UNDP), regional development banks (such as the European Bank for Reconstruction and Development, Asian Development Bank, African Development Bank), national development banks (e.g. KfW, AFD) and national aid agencies (GIZ, USAID) are very active in financing energy-efficiency programmes. Although a large volume of external finance to date has been invested in increasing the efficiency of energy supply and distribution (e.g. upgrading district heating networks, reducing transmission and distribution losses), an increasing share is now going to consumers.

Energy-efficiency funds can be entirely supported by the state budget, as in India where the government has launched a new fund aiming to provide state governments with financial help to promote energy efficiency. The Energy Conservation Fund will be formed by contributions from the state governments which can later request grants to promote energy-efficiency programmes.

5. Supply side economic incentive regulation

5.1. Energy saving obligations

Energy-efficiency obligation is a recent and innovative measure in which energy companies (suppliers and retailers or distributors) have a legal obligation to undertake energy-efficiency activities with their customers. In some cases, this obligation can be met by trading energy-saving certificates, usually called 'white certificates'.

Energy companies in seven EU countries currently have energy-saving obligations: Belgium (Flanders region), France, Italy, UK, Denmark, Ireland and Poland. Energy-saving obligations also exist for electricity suppliers in Brazil, Uruguay and Australia. In Flanders and the UK, the obliged energy companies are required to ensure that there are savings with low-income households.

Usually the size of the target and the sectors to be covered are decided by government. The targets are allocated by companies in relation to the volume of energy supplied or distributed. The targets are either expressed in lifetime savings or annual savings and in different units: final (e.g. France) or primary energy (e.g. Italy), MtCO2 (e.g. UK), dollars (e.g. Brazil).

The savings are even discounted in some countries (e.g. France) to account for the decrease of the economic value of the certificate and the gradual decrease of savings over time. The discount rates are currently 3.5–4%.

The eligible measures are only actions or equipment better than the market average and/or the performance level required by legislation (e.g. installation of refrigerators or freezers with an A+ or A++ energy label).

Most countries charge penalties for those energy companies that do not fulfil their energy-efficiency obligations. In practice, no penalty has been issued as virtually all the obligated energy companies have met their targets.

The energy savings are evaluated ex-ante for standard operations and equipment ('deemed savings'). This approach greatly simplifies the monitoring and verification process which in effect becomes the equivalent of counting the number of energy-efficiency measures implemented and can be verified using random sampling controls. To make the deemed energy savings or engineering estimate approach work successfully, there needs to be transparent and public information of the energy saving values, published well in advance of the start of the obligation. With this approach, it is difficult to assess the reality of savings.

The targets have been increasing over time and are becoming more ambitious; the initial targets were low to leave time for markets to become familiar with the schemes.

These schemes are just one component of the policy: most of the equipment and operations benefit from various financial or fiscal incentives (e.g. in France). The scheme acts as an accelerator of decisions that households or other consumers are always hesitant to undertake. Utilities also contribute to informing consumers about actions they can take and about the existence of incentives.

The impact of the schemes, and other incentives, is significant in terms of economic impacts: induced investments, employment, reduced imports (balance of payment) and lower expenditure for consumers.

The savings have been gained mainly in the household sector (~ 90% in France, ~ 80% in Italy, ~ 40% in Denmark), from actions with low investment cost or taking advantage of existing financial incentives: simple insulation (about three-quarters of energy savings with cavity wall insulation in UK), CFLs (about three-quarters of energy savings in Italy), heating appliances (efficient boilers) (about two-thirds of energy savings in France and Denmark).

The cost is shared by consumers, companies and the public budget, as these obligations are combined with other measures (such as incentives). The cost for companies may be passed to end-use customers in liberalised markets; for regulated consumers, the cost may be passed to the regulated tariff (planned by most laws but not effective as long as costs are low for companies).

Clearly the UK, with its long experience and improvement of the scheme over time, is among the best practices; in particular, the obligation to get half of the saving obligation for low-income households is quite innovative, as these households do not take advantage of the usual financial incentive schemes and have a strong upfront cost constraints. Its combination with a financial scheme (the Green Deal), implemented as of 2013 with the new Energy Company Obligation (ECO) will enable the UK to tap more expensive investments.

The contribution of energy saving obligations to the EU 2020 target is significant in most EU countries: 30% in UK, 22% in France and 40–50% in Poland.

For energy supply utilities, expanding into energy efficiency requires both mandates to achieve savings, and a change in regulations that allows them to recover costs of and even to profit from customers' efficiency investments.

5.2. White certificates

Following the experience gathered with systems using green certificates, the introduction of "white certificates" (or energy saving certificates) is currently being investigated. Some European countries such as Italy and United Kingdom recently adopted a similar system, while France is preparing to do so. New South Wales (Australia) was one of the first regions to introduce a white certificate scheme as part of a Greenhouse Gas Abatement scheme.

A white certificate system is a market-based policy instrument. This essentially includes a target (in order to create demand), a clear definition of what the white certificate contains, and a set of certificate trading rules. Whereas demand creation and trading rules can be similar to a green certificate system, the definition of what the white certificate actually stands for needs additional clarification.

A green certificate is commonly defined as an amount (usually 1000 kWh) of electricity produced from renewable energy sources. Defining a white certificate as an amount of energy saved requires a reference point to compare with (e.g. energy consumption in a given year). The amount of energy saved can be either expressed as primary energy savings (Italy), or as saved kWh (United Kingdom).

The use of white certificates could prove a useful means to trigger more and cost effective energy savings measures in different sectors. Ultimately (cross border) trade of white certificates between grid operators could be possible. As the experience with green certificates has shown though, the establishment of cross border certificate trade faces substantial market and institutional barriers. It is therefore too early at this stage to make assumptions on how successful white certificate systems can be on national and regional level.

6. Enabling environment for private sector

Because of tensions on public budgets, there is an increasing involvement of the private sector in supporting investments in energy efficiency, through ESCOs and energy utilities.

ESCO activities exist in many countries to different degrees. For example, there are more than 250 ESCOs in Germany and less than 100 in France. ESCOs are companies that develop, install, and arrange financing for projects designed to improve the energy efficiency of facilities. Remuneration of the performance contractor is through participation in the energy cost savings resulting from the energy-efficiency measures. ESCOs usually operate through Energy Performance Contracts (EPCs). EPCs are a contractual arrangement between the beneficiary and the provider (e.g. an ESCO) of an energy-efficiency improvement measure, where investments are paid for in relation to a contractually agreed level of energy-efficiency improvement.

Experiences with ESCO financing have highlighted the importance of contractual details, which reinforces the need for technical expertise in contractual issues and a sufficient legal framework to support it. Performance contracting is becoming increasingly popular in both industrialised countries and economies in transition.

ESCOs are widely promoted by the European Commission, the European Investment Bank, the European Bank for Reconstruction and Development and the IEA, as it provides a framework to encourage private funding to support energy-efficiency investments with a minimum role for governments. Article 18 of the EU Energy Efficiency Directive[6] contains a list of measures that member states should adopt in order to promote energy services, including the ESCO market.

Innovative packages have been implemented, mixing the involvement of ESCOs to share the burden and the risk (e.g. Green Deal in the UK) or the combination of ESCOs with public subsidies (e.g. Salix Finance in the UK) or even an ESCO-type approach within public administrations (e.g. Public Internal Contracting – PICO – in Germany). The China Energy Conservation Project of the World Bank ran a loan guarantee programme to support the development of the Chinese ESCO sector.

Public-private partnerships include the private sector management of some government services, normally coupled with public oversight of the contracted entity. This way, private money is used for investments and operational budgets. The main area where public-private partnerships have been used is in utilities provision where energy-efficiency opportunities are often substantial.

7. Key questions

Legal basis

Does the country / region have an energy efficient law?

What areas are covered by the law?

What still needs to be covered?

How effectively is the law enforced?

Mandatory regulation

Does the country have Minimum energy performance standards, mandatory energy audits?

[6] https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive

How, if any, building codes is effectively applied?

Incentive regulation

Are the energy prices to final consumers at least covering the real cost of energy supply?

Is energy labelling applied in the country? How is it used by the final consumers? How efficient is it?

How relevant and efficient are" the financial and fiscal incentive (subsidies for audit, investment subsidies, soft loans, tax credit, tax exemption, income tax reduction,…)

Are any energy efficiency funds available and how efficient are they?

Energy Efficiency awareness

Do consumers have a clear understanding of the impact of energy consumption on the environment?

Do consumers understand how they can optimize their energy consumption?

Do consumers feel social pressure to save energy?

Which organizations do consumers trust to inform them about actions they can take to optimize their energy consumption?

Are consumers aware of electricity management programs?

What are the drivers and barriers to adoption of electricity management programs?

How efficient are the energy efficiency campaigns?

Institutional setting

What is the degree of commitment to energy efficiency?

Are there institutions supporting the implementation of energy efficiency programmes?

8. Useful references and links

UNIDO – Module 16 – Regulatory and policy options to encourage energy efficiency
http://www.unido.org/fileadmin/media/documents/pdf/EEU_Training_Package/Module16.pdf

World Energy Council – Energy Efficiency Policies, what works and what does not
https://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/world_energy_council_-_world_energy_perspective._energy_efficiency_policies._what_works_and_what_does_not_-_submitted_by_the_u.s.pdf

Accenture – Understanding consumer preferences in energy efficiency
https://resapps.accenture.com/newenergyconsumer/downloads/Understanding_Consumer_Preferences_Energy_Efficiency_10-0229_Mar_11.pdf

IEA – Energy Efficiency Market report 2014
http://www.iea.org/Textbase/npsum/EEMR2014SUM.pdf

IEA – Capturing the multiple benefits of energy efficiency
http://www.iea.org/Textbase/npsum/MultipleBenefits2014SUM.pdf

UNEP - Handbook for Drafting Laws on Energy Efficiency and Renewable Energy Resources
http://www.unep.org/pdf/dtie/UNEP_Energy_Handbook.pdf

ECOWAS Renewable Energy and Energy Efficiency Status Report 2014, REN21
http://www.ecowrex.org/news/ecowas-renewable-energy-and-energy-efficiency-status-report

Good practice ways out of energy debt, Energy Efficiency Watch http://www.energy-efficiency-watch.org/fileadmin/eew_documents/Documents/EEW2/Good_practice_ways_out_of_energy_debt_BROCHURE.pdf

Improving and implementing national energy efficiency strategies in the EU framework, findings from energy efficiency watch II analyses, June 2013, Energy Efficiency Watch
http://www.energy-efficiency-watch.org/fileadmin/eew_documents/images/Event_pictures/EEW2_Logos/EEW-Final_Report.pdf

SE4ALL – Global tracking framework - Chapter 3 – energy efficiency http://www.se4all.org/wp-content/uploads/2013/09/8-gtf_ch3.pdf

ECOWAS energy efficiency policy
http://www.ecreee.org/sites/default/files/documents/basic_page/081012-ecowas-ee-policy-final-en.pdf

Regulation (EC) No 106/2008 of the European parliament and of the council of 15 January 2008 on a Community energy-efficiency labelling programme for office equipment http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:039:0001:0007:EN:PDF

Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1399375464230&uri=CELEX:32012L0027