Energy utility obligations and auctions

Why use energy utility obligations and auctions for energy efficiency?

Energy utility obligations and auctions for energy efficiency are becoming an essential part of the policy maker's toolkit. In 2017, 48 obligations and six auctions were in operation around the world.

- Both policies are market-based instruments that set a policy framework specifying the outcome to be delivered, without prescribing the mechanisms and measures to be used. This enables the discovery of the most cost-effective ways to achieve policy makers' goals.
- Typically, they complement other energy efficiency policies, for example by incentivising the take-up of measures that go beyond the performance levels demanded by minimum energy performance standards and building codes.
- On average the total cost per lifetime kilowatt hour saved is less than USD 0.03, significantly lower than the typical cost of supplying energy.

Key point Obligations and auctions are saving significant amounts of energy at less than the cost of supply

Which instrument to choose: obligation or auction?

Obligations require energy companies to achieve energy savings while auctions invite bids to deliver energy savings in return for funding.

- Both policy types incentivise the take-up of the most cost-effective measures and have been shown to be able to drive savings across different sectors and technologies, although more evidence is available on obligations.
- Utility obligations are funded by energy companies who pass on the costs to energy consumers through energy prices.
- Auctions have been funded through levies on energy bills, general taxation revenues and ring-fenced carbon market revenues.

Key point Both auctions and obligations can be successful if the rules are well crafted

Good policy design is essential

Both obligations and auctions give freedom to the private sector to innovate and discover the technologies and delivery routes that work best in the market, putting a premium on the design of sound market regulation to ensure that policy objectives are met.

- With energy efficiency auctions, policy makers retain control over the procurement of energy savings.
- Obligations place targets for energy savings on energy utilities, removing decisions over pricing from policy makers, but requiring regulators to set rules around the ways in which utilities comply with their responsibilities.

Key point Policy makers can learn from the experiences in programmes around the world

What are energy utility obligations and auctions?

Energy utility obligations and auctions for energy efficiency are market-based instruments that specify **outcomes** (e.g. energy savings, cost-effectiveness) to be delivered by market actors, without prescribing the delivery mechanisms and the measures to be used. Typically, they allow energy efficiency gains to be made across different sectors and end-uses, and by giving market actors the freedom to choose the measures and delivery routes that work best for them, the market as a whole is able to discover the most cost-effective way to achieve the outcomes set out by policy makers.

Energy utility obligations require suppliers or distributors of energy to achieve energy efficiency goals, either through their own actions or by contracting with third parties. The costs are then passed through to energy consumers through surcharges on energy prices. In some programmes, compliance with obligations can be traded in the form of white certificates. In energy efficiency auctions bidders compete on the basis of price to win funding to deliver energy savings. Auctions can be funded through a number of different routes (see next section).

In 2017, **48 energy utility obligations were in place** in 24 US States, 14 European countries, four Australian States and Territories, Brazil, Canada, China, Korea, South Africa and Uruguay. **Energy efficiency auctions were in operation in four European countries**, while two independent electricity systems operators in the United States allow energy efficiency to compete against other resources in electricity capacity auctions.

Which instrument to choose?

Both obligations and auctions, if well designed, can work effectively. Both types of policy require decisions to be made on sectors and fuels to be covered, the eligible measures, the calculation of savings and the way in which monitoring, verification and evaluation is carried out. Energy utility obligations also require governments to define the obligated parties, set targets, penalty regimes and banking and borrowing criteria, as well as rules around the ability of eligible parties to trade compliance (as in White Certificate programmes). Once the rules of an obligation programme have been set, the energy utilities decide how to meet their targets. Auctions for energy efficiency retain government control over the procurement of energy savings but require other decisions to be made, for example over pricing and payment, and project size.

Key aspects of instrument design	Obligations	Auctions
• Which fuels to target for savings • Which sectors to target • What types of measures to reward • How to calculate savings • Monitoring, verification, and evaluation	• Whom to obligate • What targets to set • Allowing trading of compliance • Banking, borrowing, and penalties	• How to structure • How to reward

An important issue relates to the way in which obligations and auctions are funded. **Obligations are funded through energy tariffs and paid for by consumers** as part of their energy bills. **Auctions can be funded** through a variety of mechanisms, with examples including **general taxation** (United Kingdom), **levies on energy bills** (Portugal and Switzerland), and **carbon market revenues** (Germany). The capacity auctions in the United States pay for efficiency through charges paid by all energy retailers, meaning that the costs are included in the rates paid by consumers along with transmission and distribution charges and other costs. Funding arrangements can have important social equity implications. Raising funds through energy tariffs is usually more regressive than doing so through general taxation. In some jurisdictions, these impacts are balanced by a focus on the delivery of measures to target groups, such as those in fuel poverty. And in the long-run, the continued delivery of cost-effective energy efficiency measures can reduce the costs of energy supply, reducing energy prices paid by all.

Key aspects of instrument design

Across the more than 50 examples of energy utility obligations and auctions in place around the world, there is considerable variety in the approach to policy design. A number of key aspects are dealt with in this note, beginning with the general design features that affect both auctions and obligations.

Which fuels to target for savings

Policy makers must decide which fuels energy savings can be derived from. All jurisdictions around the world with obligations or auctions allow electricity savings to be targeted. Many obligations also cover natural gas and a small number, in Europe, cover other heating and transport fuels. **Most auctions, however, are focussed solely on electricity**, although Portugal is considering expanding its programme's coverage to natural gas.

There are some differences between the approaches taken by policy makers in Europe and the United States to fuel coverage. In the United States, jurisdictions with obligations on both electricity and natural gas maintain a strict separation between fuels, essentially having two parallel obligations. This better aligns the group that pays (e.g. electricity rate payers) with those that benefit (in this case, electricity consumers). In European programmes, obligated parties and auction winners are free to source their energy savings from all fuels covered under the schemes.

Which sectors to target

Most obligations and auctions allow savings to be generated in multiple sectors, such as the residential, commercial and industrial sectors. The transport sector is included in some programmes but is excluded in many, reflecting the limited transport fuel coverage amongst the schemes in operation. Even when all sectors are covered by obligations or auctions, the overwhelming majority of savings are achieved outside of the transport sector. A key factor in explaining this phenomenon is the coverage of other policies in the transport area, such as corporate average fuel economy standards for new passenger vehicle that limit the potential for other policies to generate additional savings.

Some programmes focus delivery on sub-sectors, with the United Kingdom and Malta obligation programmes restricting savings to residential buildings, and three of the programmes in Australian states and territories focus on the residential sector and small- and medium-sized businesses. Some jurisdictions set shares of savings that must be delivered in specific sub-sectors. For example, in Ireland 25% of savings must be delivered in the residential sector, with 5% of savings in energy poor households.

The Energy Company Obligation programme, United Kingdom

Date started:	1994	Sector coverage:	residential
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity, natural gas	USD 1 035 million	922 GWh	0.1%

What types of measures to reward

All obligations and auctions impose rules on the types of measures that can be used to generate savings. In the United States, the regulators of the obligations often review and approve programme proposals out of a portfolio of measures proposed by the obligated utilities. Many obligations and auctions develop catalogues of eligible measures together with deemed savings that are awarded for each measure. Good examples of such catalogues can be found in Denmark, France, Ireland, Portugal, South Africa, the United Kingdom, and state-level programmes in California, Massachusetts, Vermont and New South Wales.

Standardised measures that appear in catalogues are the most commonly delivered measures. Typically, such measures include **building fabric improvements**, **heating, ventilation and air conditioning systems, appliances and motors**, all of which are open to reasonably straightforward of the expected savings, based on the history of previous investments. Alongside standardised measures, many programmes also allow custom measures to claim savings. Such measures are almost exclusively delivered in the industry and commercial sectors, in cases where interventions are highly specific and require bespoke calculations or the metering of savings. The obligation programmes in Denmark and Italy feature relatively large proportions of delivery in these sectors, at between 40% and 60%, depending on the year in question.

Behavioural measures are less common, although there are examples of both auctions and obligations that allow them to qualify for savings. In Portugal, the auction mechanism supports "intangible measures" such as information provision, training, campaigns and energy audit. And in the United States, home energy reports, provided by companies such as C3 and OPower are used to generate savings that help obligated parties meet their targets.

Efficiency Promotion Plan for Electricity Consumption auction programme, Portugal

Date started:	2007	Measures:	building & industrial technologies; information; training; audits
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity	USD 13 million	117 GWh	0.06%

How to calculate savings

There are three main approaches to calculating the energy savings from obligations and auctions. The most common method is known as **deemed savings**, where the savings generated by previous energy improvements are used to produce estimates of the expected savings from standardised measures. These estimates are then applied to the measures being implemented under the obligation or auction programmes, and are typically published alongside the catalogue of eligible measures, for example in Denmark, France, New South Wales, Portugal, South Africa, the United

Kingdom and in many programmes in the United States. In some cases, **engineering calculations**, for example based on buildings physics, are used where evidence of previous similar measures are unavailable and the obtaining metered data would be prohibitively expensive. This method is used in a number of programmes, including Austria, China, Denmark, France, Italy, New South Wales, Portugal, South Africa, Switzerland and most of the obligations in the United States.

Metering, however, is becoming more common as a method of calculation, as the digitalisation of the energy system allows for cheaper and more accurate measurement of the energy consumption of individual products and appliances, and the methods used to take account of factors such as production levels, building occupancy and the weather become more standardised, for example through the International Performance Measurement and Verification Protocols (IPMVP). A number of jurisdictions use this approach for some measures, including Austria, Denmark, New South Wales, South Africa and Switzerland. Many US States are also moving more in this direction, including California, which moved all of its savings measurement to the metered approach in 2015.

The Utilities' Energy Efficiency Obligation Programme, California, United States

Date started:	2004	Sector coverage:	all except transport
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity, natural gas	USD 1 580 million	6 092 GWh	0.3%

A particular issue relates to the treatment of savings generated over the lifetimes of energy efficiency measures. A number of auctions and obligations allow auction winners or obligated parties to claim savings based on estimations of the lifetimes of the measures implemented. This is the case in France, Germany, New South Wales, Portugal and Switzerland and the United Kingdom obligation, for example. There is some variation in approach, however. In France, for example, lifetime savings are discounted at a rate of 4% per year, while in the United Kingdom obligation, no discount rate is applied. In the German pilot auction, lifetimes are used as a way of determining measure eligibility, with only measures with a minimum life time of 10 years being eligible to bidders. In Italy, on the other hand, measures with long lifetimes are only able to claim savings up to a maximum number of years. And in some programmes, measures are only able to claim savings for the first year, for example in Brazil, China, South Africa, and many obligations in the United States. While there is less certainty over future savings, not accounting for the lifetimes of measures in the rewards provided for energy efficiency interventions risks skewing incentives towards measures with short lifetimes, such as lighting, and away from measures that deliver savings over the longer-term, such as insulation.

The Utilities' Energy Efficiency Obligation Programme, Brazil

Date started:	1998	Measures:	appliances; heating systems; lighting
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity	USD 191 million	620 GWh	0.02%

Independent monitoring, verification and evaluation are essential

All auctions and obligations involve some form of regular monitoring and verification of the measures put in place. The value of evaluation to the integrity and continuing improvement of programmes is becoming more understood. **Two key elements of an effective system** are a **high degree of**

independence of the agent responsible for monitoring, verification and evaluation; and **a mix of on-site inspections and desk-based checks** during the ongoing monitoring and verification process. It is unlikely to be cost-effective to check the performance of every installation. Therefore, a mix of on-site testing and desk studies is generally employed to monitor and verify savings. Statistical techniques to identify potential irregularities can identify where the depth of controls could be increased.

The importance of independent agents in the monitoring, verification and evaluation processes is increasingly being recognised. The Chinese obligation moved from a process of self-reporting to the use of a manual for independent reporting on achieved savings in 2013. Open proceedings on the savings attributed to measures are standard practice among utility regulatory commissions in the United States, who are most often responsible for reviewing implementation and cost allocation of obligations. California, Massachusetts, Vermont, New York and several other leading States have examined programme effectiveness in this way, often issuing corrective orders to help improve programmes.

Obligation programmes can be designed in many different ways

Obligation programmes are now in operation on six continents and have been adapted to suit local circumstances and priorities. The following section analyses some of the key decisions that policy makers need to address when designing an obligation programme.

Whom to obligate

Three approaches have been taken by governments setting up an obligation programme. Many of the obligation programmes in the United States, as well as those in Brazil, China, Italy and South Africa, are placed on **distribution companies**. As regulated monopolies, these utilities already have a history of engagement with regulators, meaning that institutional mechanisms, including cost recovery methods, can be adapted for the purpose of driving energy efficiency gains. In order to properly align incentives within distribution companies, regulators in the United States typically decouple distributor revenues from the volume of electricity and gas transported. Distribution companies have relatively little contact with end-users of energy, and less brand recognition compared with energy retailers. This means that they are more likely to rely on third parties to deliver energy efficiency measures; in Italy this has been one of the reasons for the large number of energy service companies in operation.

The White Certificates Obligation Programme, Italy

Date started:	2005	Sector coverage:	all
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity, natural gas	USD 784 million	5 815 GWh	0.4%

Another common approach by governments is to obligate **energy retailers**, examples of which can be found in the four Australian programmes and nine European countries including Austria, France, Poland and the United Kingdom. Energy retailers have a much closer relationship with end-users, a recognised brand and, in competitive markets, marketing departments to raise interest and awareness in energy efficiency. In France, placing obligations on energy retailers was part of a strategy to encourage a shift from pure energy retailing to an energy service approach within the

sector. On the other hand, in competitive retail energy markets the costs to utilities of meeting their obligations, and which are ultimately passed on to consumers, are not subject to regulatory control and as a result are not always transparent. In programmes which allow compliant energy savings to be traded as White Certificates (see below), and in which significant volumes are traded, the costs to obligated parties is clearer.

In markets with large numbers of energy retailers within scope, the number of obligated parties can be significant. In Austria and France, for example, whose programmes have wide fuel coverage, there are over 1 000 obligated parties. In France and many other programmes obligations are only applied to companies supplying more energy than a minimum threshold. This avoids placing regulatory burdens on small and medium-sized enterprises but also creates market distortions around the minimum thresholds.

In Vermont in the United States, a different approach has been taken, with the obligation being placed on a specially created **energy efficiency utility** which pools funds levied from electricity and natural gas distribution companies. Efficiency Vermont delivers savings under a performance contract supervised by the state's public utility regulator.

Efficiency Vermont, public benefits fund, Vermont, United States

Date started:	2000	Sector coverage:	All except transport
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity; thermal energy and process fuels	USD 48 million	103 GWh	0.25%

What targets to set

There are a number of variables to consider when setting targets. Most energy efficiency obligation targets are set in terms of **final energy consumption savings**, although China, South Africa and California in the United States, set targets in terms of both **final energy and peak load savings**, reflecting the particular concerns of policy makers. In the United Kingdom and two Australian obligations (New South Wales and Victoria), targets have been set in terms **of greenhouse gas emissions reductions**, based on the carbon content of the energy consumed.

The Grid Company Energy Efficiency Obligation Programme, China

Date started:	2010	Sector coverage:	All
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity	USD 448 million	14 578 GWh	0.04%

Most targets are calculated as a percentage of the previous year's energy consumption or peak load, although some are set in absolute terms. In many cases, once programmes have become established ambition has increased, both through the addition of new sector coverage and through increases in the percentage reductions required. Over time, existing potential is depleted and new potential becomes available, both as new technologies emerge and as the energy efficiency services market matures.

Should savings be tradable and if so, who should be allowed to trade them?

A number of programmes allow the trading of energy savings that qualify as compliance with obligation targets. In some programmes trading is allowed between obligated parties and third parties, such as energy efficiency service providers and businesses with certified energy managers. Such programmes are relatively uncommon, and are in place in France, Italy, Poland and the Australian states of New South Wales and Victoria. Often known as White Certificates, the trading of energy savings in the wider economy provides more transparency on the costs to obligated parties of complying with their obligations and, in Italy, has been associated with the development of a diverse energy efficiency services sector. Cost transparency is particularly important where obligations are placed on utilities competing in deregulated energy markets where regulators do not tend to have direct access to cost information. Recent trends in both the French and Italian White Certificate markets have provided valuable information to regulators on the impacts of recent changes in policy.

The Energy Efficiency Certificates Obligation Programme, France

Date started:	2006	Sector coverage:	All
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
All	USD 437 million	12 210 GWh	0.4%

In other programmes trading is permitted only among obligated parties. This is the case in Austria, China, Denmark, Ireland and South Africa, for example. In these markets, trading has been fairly limited to date, with obligated parties using it as a flexibility mechanism in cases of under- and over-compliance. Decisions over whether to engage in trades are also related to other flexibility provisions, such as rules over banking and borrowing, and penalty regimes. Trading is less common in the United States, where regulators seek to ensure that savings are delivered to the same groups of customers who are paying for the obligation programmes through their bills.

Completing the rule book: compliance periods, penalties, banking and borrowing

A number of other decisions need to be taken on the rules faced by participants in obligation programmes. Compliance periods – the amount of time that obligated parties have to meet their targets – vary amongst programmes. Multi-year compliance periods have been used to good effect in France, the United Kingdom and many of the programmes in the United States and Australia. In these programmes periods of around three years have allowed obligated parties to respond to market conditions and adjust strategies accordingly while balancing this against the policy need for savings to be delivered on a continual basis, year-on-year.

Programmes with a long-term regulatory basis, and horizons beyond the end of current compliance periods, can set rules for banking and borrowing between periods. These rules can provide obligated parties with more flexibility and can help to smooth "cliff edges" between compliance periods, helping to avoid sudden reductions in activity or increases in costs. At the same time, these rules need to be applied judiciously, so as not to allow for excessive borrowing, which may compromise target compliance in the long-run. A non-compliance penalty regime is essential as a last resort mechanism to ensure compliance with programme targets. Well-designed penalties are transparent at the outset of the programme and enforced without undue delay. This is the case in Denmark, France and New South Wales, for example, where penalties are set out in advance in proportion to the amount of missed savings.

The Energy Savings Scheme Obligation Programme, New South Wales, Australia

Date started:	2009	Sector coverage:	residential, commercial, and industrial
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity, natural gas	USD 52 million	237 GWh	0.1%

Auction programmes can also be designed in different ways

Auction programmes require a number of different policy design questions to be addressed. Decisions that, under obligations would be made by utilities need to be made by policy makers. These issues revolve around the procurement of energy savings.

How to structure auctions

In theory, auctions could simply be set up to deliver energy savings in a project, technology and sector neutral way, with bidders competing purely on the basis of price. However, in practice, **policy makers often have a more complex set of objectives other than minimising the costs to governments** of delivering energy savings. Just as in obligation programmes, where sub-targets for particular sectors are set, or limits on the delivery of particularly types of measures are put in place, auctions are commonly designed to ensure that a diversity of measures are funded. In Switzerland, where auctions for energy efficiency have been run since 2010, two separate auctions are held: one for projects and one for programmes. Project bids are submitted by owners of installations subject to electricity efficiency measures, while programme bids are submitted by third parties who realise a number of smaller measures in a separate cohort of small companies and households. The aggregation of smaller measures into programmes enables the entry costs of participation in auctions to be spread thinly across benefitting end-consumers.

The German pilot auction has two different types of auction slots: an "open" slot, which is technology and sector neutral; and "closed" slots, which are sector, beneficiary or technology specific. The Portuguese auction also separates bidders into different groups and, for some, ranks bids within the consumption segments that they address. In addition, the German pilot only supports measures that have long lifetimes, with measures needing to produce savings for at least ten years. In Switzerland, measures need to have a payback time of at least four years to avoid the funding of measures that should be economically viable without support. In addition, in the Swiss and German auctions, restrictions on maximum bid sizes are specified in order to limit the possibilities for single bids to dominate the auctions.

The ProKilowatt Auction Programme, Switzerland

Date started:	2010	Measures:	appliances; heating systems; motors; lighting; cooling
Fuel coverage	Programme expenditure	Energy Savings per year	Annual Savings as a percentage of total final consumption
Electricity	USD 23 million	50 GWh	0.02%

The United Kingdom pilot capacity auction for demand reduction, on the other hand, does not feature separate auction slots for different bid types. This emulates the capacity auctions in New England and the PJM area in the United States, although in these auctions, energy efficiency also competes with other energy resources, such as supply infrastructure. Nevertheless, across all auctions in place, bidders are able to aggregate smaller projects into larger bids, reducing the transaction costs associated with bidding.

How to determine winning bids and reward them

The energy efficiency auctions and capacity auctions use different methods to determine winners and how much they receive as rewards. In the capacity auctions in the United States and the United Kingdom, the clearing price is paid to all compliant bids received below the price at which the volume of capacity demanded by the regulator is realised. This means that the most cost-effective measures receive the highest rewards per unit of capacity. Often a price cap is set above which bids will not be rewarded, usually set at around the cost of new entry for the marginal unit of newly constructed supply-side capacity (e.g. a gas-fired power station). Simple auction mechanisms such as these mean that strategic bidding is less likely; at the same time the most cost-effective measures can make significant economic rents (excess profits) for bidders, reducing the public funds available for supporting energy efficiency or other measures.

Contrastingly, the auctions for energy efficiency savings (as opposed to capacity) reward bidders by paying them their asking price, and not the clearing price. Discriminatory auctions such as these mean that economic rents paid to winning bidders should be reduced, although with a loss in the economic efficiency associated with the instrument: strategic bidding is a likely outcome of such mechanisms as bidders look to increase their bids to a level closer to the price at which they believe the auction may clear, meaning that some cost-effective measures may end up over-bidding. Energy efficiency auctions also have many more criteria around the funds that winning bids receive. In Switzerland, project bidders can only receive up to 40% of the additional investment cost associated with an efficient (as opposed to standard) technology, and in the German pilot auction, bidders can only receive up to 30% of the additional cost. In addition, prices are capped per kilowatt hour of savings to be delivered, and in Switzerland, it is not possible for all bids to clear the auction, to ensure competition for funding even in cases where relatively few bids are placed.

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