

Prosumers – an integral part of the power system and the market

A EURELECTRIC paper

June 2015

EURELECTRIC is the voice of the electricity industry in Europe.

We speak for more than 3,500 companies in power generation, distribution, and supply.

We Stand For:

Carbon-neutral electricity by 2050

We have committed to making Europe's electricity cleaner. To deliver, we need to make use of **all low-carbon technologies**: more renewables, but also clean coal and gas, and nuclear. Efficient electric technologies in **transport and buildings**, combined with the development of smart grids and a major push in **energy efficiency** play a key role in reducing fossil fuel consumption and making our electricity more sustainable.

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We support well-functioning, distortion-free **energy and carbon markets as** the best way to produce electricity and reduce emissions cost-efficiently. Integrated EU-wide electricity and gas markets are also crucial to offer our customers the **full benefits of liberalisation**: they ensure the best use of generation resources, improve **security of supply**, allow full EU-wide competition, and increase **customer choice**.

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Europe's energy and climate challenges can only be solved by **European – or even global – policies**, not incoherent national measures. Such policies should complement, not contradict each other: coherent and integrated approaches reduce costs. This will encourage **effective investment to** ensure a sustainable and reliable electricity supply for Europe's businesses and consumers.

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KEY MESSAGES

EURELECTRIC supports customer empowerment, and the active role of customers in the electricity markets. Through the liberalisation of the market, customers were given the possibility to select their own electricity supplier. Recently, customers' choice has increased further with the wider introduction of distributed generation: customers are now able to choose whether to buy all their electricity from a retailer or to produce part of it themselves. Prosumers benefit from a guaranteed and continuous supply of electricity through the connection to the grid and access to the market: the network allows the injection and withdrawal of electricity, while access to the market makes it possible to buy and sell electricity at market prices.

A stable and market-based regulatory framework properly values electricity and stimulates innovation, thus enabling companies to develop products and services for prosumers. In a market-based regulatory framework excess electricity can be priced based on wholesale prices, allowing customers to react to the market signals and optimise their consumption. Distributed generation will develop cost-effectively when the regulatory framework provides a level playing field between all generation technologies, storage and demand response. This will allow increased market integration of distributed generation whilst minimising market distortions. **Adequate metering data provided by smart meters is an enabler for the development of services for prosumers while purchasing obligations, non-market-based net-metering¹ and price regulation have the opposite effect. They should therefore be phased out.**

Europe has moved beyond the early deployment of distributed generation. The regulatory framework should therefore be adapted to ensure cost-effective development of distributed generation and grids, as well as a fair allocation of costs and benefits. If distribution generation regimes are not reformed, they will lead to costs being increasingly shifted to non-prosumers and significant distortions in investment decisions.

EURELECTRIC's recommendations for reforming the regulatory regimes:

- **Opting for distributed generation should be a customer choice that does not result from artificial incentives.**
- **Prosumers should be integrated into the market and the power system:** indirect subsidies, such as non-market-based net-metering schemes and socialising of prosumers balancing costs should be avoided, as well as other schemes preventing market integration. Support schemes should be designed so as to be cost-efficient and avoid market distortion.
- **Prosumers should contribute to the network cost recovery in the same way as other customers.** Network charging for small and medium size customers, including prosumers should evolve towards more capacity-based network tariffs to ensure that customers pay for the grid they use.
- **DSO regulation should facilitate investments in smart grids** to allow the integration of prosumers to the power system and market.
- **The use of the electricity bill to collect (non-energy related) taxes and levies should be avoided,** as this hampers the sound development of the electricity market for consumers and prosumers. The level of taxes and levies should also be reconsidered - these have increased recently, and often form a considerable part of the electricity bill.

WG RES (under the Energy Policy and Power Generation Committee),
Chair Beatrix Widmer
with the involvement of TF Demand Side Participation (Retail Customers
Committee), WG Wholesale Market Design (Markets Committee) and TF
Network Tariffs (DSO Committee)

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¹ See pages 10 and 11 for definition of non-market-based net-metering

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Introduction

The power sector is undergoing one of the most profound changes in its history: the share of renewable energy sources is increasing, and **we are moving rapidly towards a smarter power system where centralised and decentralised solutions including generation, storage and demand response all have a role to play**. New technology enables major changes in the way the power sector works. New types of customers are emerging and these are generally more aware and demanding, more active and engaged. EURELECTRIC supports increased customer empowerment, and the active role of customers in the electricity market.

The rise of small-scale, distributed generation implies that the electricity consumers of today have more choice than ever before. In countries where market liberalisation has been completed, customers have the possibility to select their own supplier. **With the introduction of distributed generation, customers can now also choose whether to buy electricity solely from a retailer or to produce part of it themselves**. While becoming active market participants, prosumers remain part of the power system that guarantees them market access and continuous supply of electricity by providing back-up when distributed generation is not available to meet their demand. For example, the network allows the injection and withdrawal of electricity, and consequently access to the market, making it possible to buy and sell electricity at market prices.

With this paper EURELECTRIC addresses the need to revise the regulatory framework when the share of distributed generation increases. The paper discusses practices and characteristics of regulation that enables the cost-effective development of distributed generation to the benefit of prosumers and other customers alike. Information was collected from 17 European countries² to understand the current state of play and to identify key areas for improvement.

The focus of this paper is on prosumers, by which we mean **customers who produce electricity primarily for their own needs, but can also sell the excess electricity**. Prosumers are connected to the distribution network with small to medium installed capacity. National legislation in the various European countries differentiates between different sizes of prosumers, and services provided to prosumers by utilities are also specified based on the scale of activity. While we consider the recommendations in this paper valid for all sizes of prosumers, their practical implementation may also differ based on the prosumers' size. Other arrangements, such as being part of a microgrid³, may also influence.

I New services by market actors enable distributed generation

Companies offer services to prosumers in a market-based environment

Innovative, customer-friendly solutions, technologies and services make it significantly easier for customers to become prosumers. **Services related to smart home applications and electrification, storage, buying excess electricity, installation and maintenance of generation equipment and outsourcing of generators' responsibilities (e.g. balancing) are gradually becoming more available**. This has been facilitated by the decrease in technology costs and the development of smart grids and smart meters. Offers on buying excess electricity are often

² Austria, Belgium, Finland, Denmark, Germany, Greece, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden and Switzerland.

³ A microgrid is a localised grouping of electricity generation, energy storage, and loads that normally operates connected to a traditional centralised grid (macrogrid).

combined with more comprehensive packages of services which help and encourage customers to become prosumers. However the possibilities for companies to grasp the opportunities and differentiate their services in this area depend on the regulatory framework.

Market-based business can grow when prices are not regulated and when there is no obligation for any party to buy electricity. Adequate metering data, with a reading interval of one hour or less, is an enabler for creating an attractive business environment in which companies offer a variety of services to prosumers. Smart metering and smart grids make it possible to measure the injection and consumption of electricity separately and frequently enough to base the pricing of excess electricity on the varying wholesale prices. Annex I presents a checklist as a tool to be used for evolving towards an advanced regulatory regime for distributed generation, while Annex II portrays two examples of services that a company offers to prosumers.

Customers' interest in distributed generation, as well as a stable and clear regulatory framework, is crucial for the development of any services for prosumers. The number of customers wishing to become prosumers can be expected to grow even further as technology costs decrease. Higher awareness of the opportunities brought about by the large scale deployment of these technologies is also foreseen

In Finland, where the regulatory framework is market-based, approximately 20 out of the 70 retailers buy excess electricity from prosumers. Subsidies⁴, price regulation or purchase obligations are not applied. In addition, smart meter roll out has been completed and all generators have balancing responsibility. Out of the surveyed countries only Finland, Sweden and Spain apply neither purchase obligations nor net-metering for prosumers.

The regulatory framework should be stable and market-based: electricity should be valued in the market and innovation should be stimulated in order to make it attractive for companies to develop services for prosumers. Purchasing obligations and price regulation should be phased out. Access to adequate metering data provided by smart meters is an enabler for development of services.

II Cost-efficient development of distributed generation

Europe has moved beyond the early deployment of distributed generation. The regulatory framework should thus be adapted to reflect the increasing maturity of distributed generation technologies and the growing number of prosumers: it should provide a **market-based environment, with a level playing field between distributed generation and other generation technologies, storage and demand response**. A level playing field, with real benefits and the costs of each technology adequately reflected, leads to improved cost-efficiency, and will also push technologies to continue innovating and lowering their costs.

Network tariffs, taxes and levies - allocation of costs and benefits

Costs and revenues, practical considerations as well as personal preferences all play a part in influencing a customer's decision whether or not to become a prosumer. **Customers assess the option of becoming a prosumer from an economic perspective by comparing prosumers' costs and revenues to the retail electricity prices, which include energy, network as well as taxes and**

⁴ Some exemptions regarding grid fees/ taxes are applied.

levies components. Under the existing distribution generation schemes, prosumers usually pay a minor share of the network costs, taxes and levies compared to other customers, while both prosumers and non-prosumers benefit from the access to the market and grid. **Due to the increased share of taxes and levies in the bill, it has therefore become more attractive to become a prosumer in many European countries.** In 2012, the share of the taxes and levies component occupied on average a 34% share of the European household customers' electricity bills, while the network component occupied 26 % and the energy and supply component 40%⁵. On average, taxes and levies rose by up to 31% between 2008 and 2012, while the energy and supply cost decreased by 4% over the same period⁶. **Both the network costs and policy support charges tend to be fixed costs which will be shifted to other customers when the share of prosumers grows, unless the regulatory frameworks evolve.**

Under the existing regulatory regime, the individual customer's economic assessment to inform his decision whether to invest in distributed generation is often not based on cost parity from a system perspective: the real investment and generation cost, grid cost and back-up cost are not the basis for the investment. This, in combination with the allocation of taxes and levies and network costs as explained above, does not lead to a cost-effective outcome from the system perspective. The resulting market distortions **hamper competition between the various technologies.**

Network tariffs

The network service is not energy as such, but rather the capacity to supply the contracted electricity when required and, in the case of prosumers, to feed-in the excess electricity. Telecommunication companies provide a similar service to their customers: the product that the company offers is not the actual amount of the information that is exchanged but the capacity to exchange such information in a reliable manner. A typical product sold to domestic telecom consumers is based on a flat rate tariff (€/month) which allows the customer to exchange information up to a maximum information flow rate.

The net amount of electricity distributed through the grids is reduced when a customer becomes a prosumer. At the same time, in most European countries, **grid tariffs for small and medium size customers are largely based on volumetric (kWh-based) charges.** Consequently, in these countries **prosumers contribute less to the costs of grid development and management.** However, **the fixed network costs are unlikely to fall with the increase in decentralised generation:** the grid must still be designed to cover peak demand when there is no local production, and to also export excess production when there is low local demand. As a recent study shows⁷, network costs can even rise if extended network connection and network reinforcement are needed. This is most likely to happen if the regulatory framework is designed in way which incentivises feed-in to the network rather than self-consumption.

The gap in the recovery of fixed network costs will have to be covered by collecting higher network tariffs from the other customers who simply want to continue to buy all their electricity from a retailer and/or do not have the possibility or the means to invest in distributed generation. In addition, many DSOs with longer pricing periods bear a volume risk that they cannot control and its financial, and in some cases even economic, consequences, which results in an increasing gap in revenues (see Annex III).

⁵ The corresponding share figures as concerns industrial customers' electricity bills are as follows: taxes / levies 24%, network 21% and energy and supply 55%.

⁶ EURELECTRIC (2014): Analysis of European Power Price Increase Drivers

⁷ MIT Energy Initiative (2015), The Future of Solar Energy

The regulatory framework should therefore ensure fair allocation of grid costs among different customer categories, encouraging customers to shift towards efficient use of the grid. It should also allow for the full and timely cost recovery for DSOs, irrespective of the current (short term) utilisation of the network, as long as DSOs manage and build their networks efficiently. Network tariffs that are more capacity-based⁸ would enable this, and they could also incentivise customers to optimise their capacity needs.

The regulatory framework should ensure fair allocation of costs and benefits. An evolution towards more capacity-based network tariffs would help ensure that customers pay for the grid they use.

Taxes, levies and other costs

The practice of including different types of taxes and levies, including policy support costs, in electricity bills was adopted at a time when customers did not have realistic alternatives to buying electricity from a retailer. The electricity bill therefore provided a reliable vehicle for collecting levies and tax revenues. High taxes and levies, that often do not only form a considerable part of the bill, but also cover elements that are not directly linked to electricity supply, accelerate grid parity of distributed generation. Prosumers contribute little to taxes, including VAT, levies and other fixed system costs, because they are in many cases collected based on the volume of electricity which is consumed and billed by the supplier. In this way, a large share of the policy support costs and other possible fixed system costs, are shifted to other consumers, whose electricity bills consequently increase.

Avoid using the electricity bill to collect (non-energy related) taxes and levies, as it hampers the sound development of the electricity market for consumers and prosumers.

Reconsider also the level of taxes and levies: these have increased recently, and often form a considerable part of the electricity bill.

Secure system and market integration

The cost-effective deployment of distributed generation requires its effective integration into the market and the power system. In addition to this paper, EURELECTRIC has recently called for the reduction of market distortion caused by support schemes and for action to make renewable electricity fit for market and vice versa. Measures to integrate of distributed generation to the power systems have also been addressed.⁹

⁸ Such as for example through prices referring to contracted capacity (i.e. capacity in the narrow sense) or to used capacity (i.e. power) or fixed charges.

⁹ EURELECTRIC (2014) Renewables and security of supply: finding market solutions, EURELECTRIC (2013) Active Distribution System Management.

Benefits of optimising the production and consumption

If the prosumer wishes to mainly consume the produced electricity himself, the size of generation equipment and the choice of technology should be optimised to cater for the prosumers' demand profile. It can also be economically attractive to select the technology based on the wholesale market price profiles. Once in operation, prosumers can achieve economic benefits by optimising the consumption based on the own production, possible storage capacity and wholesale price signals. Home intelligence systems, combined with the electrification of energy uses, help prosumers to optimise their electricity consumption and generation.

The optimisation of the equipment size and the prosumers' consumption (in terms of volume and timing) delivers significant benefits from the perspective of the power system: it helps ensure that new prosumers reduce network losses and constraints instead of actually creating them. Optimisation of consumption, generation and storage creates a partial shift in the injection of electricity to the power system to hours when there is more demand for it. Currently a number of European countries apply schemes, that can lead to the over-dimensioning of installations by incentivising systematic feed-in to the network regardless of the state of the power system. These schemes are also in conflict with the optimisation of consumption, generation and storage.

Prosumers should be able to choose the technology and size of equipment on the basis of their individual preferences, as well as the related market-driven costs and revenues. At the same time the regulatory framework should not provide incentives that lead to market distortions and negative impacts from the system perspective.

Enabling the market integration of prosumers

The possibility to sell electricity they produce is part of the prosumers' integration into the market. Under fair and equitable market conditions, the injection of electricity to the grid and the withdrawal of electricity from the grid are valued separately: prosumers sell excess electricity at the wholesale market price, and they buy electricity at the full retail price (that covers energy costs, network costs as well as taxes and levies). **Smart meters with measurement intervals that are aligned with the intervals of the wholesale market allow the market value of both injected and consumed energy to be determined.** This also helps manage imbalances and attribute imbalance cost more fairly.

Depending on the technology in question, distributed generation can also offer flexibility and ancillary services to the market. An aggregator would provide an interface between the prosumer and other market actors and system operators to facilitate this in practice. EURELECTRIC's recent reports¹⁰ provide recommendations on how to unlock the potential of distributed generation in providing flexibility and ancillary services.

Various means to provide indirect support to distributed generation are applied in Europe today. Technologies have developed, and distributed generation has increased significantly since the adoption of these schemes, creating a need to adapt the regulation to the new circumstances. **Indirect support for distributed generation (such as non-market-based net-metering schemes) hinders the market integration of prosumers.** By net-metering schemes that are not market-based we mean schemes with the following characteristics: The prosumers' official consumption meter runs backwards when the excess electricity which has been produced is fed into the grid.

¹⁰ EURELECTRIC (2013) Active Distribution System Management. EURELECTRIC (2014) Flexibility and Aggregation: Requirements for their interaction in the market

As a consequence, the prosumer does not have to pay his supplier for the corresponding volume of electricity actually consumed, and the grid operator does not receive grid fees for these volumes. At the same time, delivering these volumes of electricity has a cost for both supplier and grid operator related to sourcing, grid use, etc. This will either lead to higher retail prices for the supplier's remaining customers, or to a negative impact on the supplier's profit margins. The grid operator might not be able to recover the unpaid grid fees, and will therefore actually fund the subsidy as well. In addition, the problem of avoided grid fees, taxes and charges, which have to be paid then by the other consumers, is even more pronounced in such net-metering schemes. **Such non-market-based net-metering schemes lead to indirect subsidies and prosumers are thus not integrated in the market. Consequently, this type of scheme also does not provide a sound framework for developing services for prosumers.**

However, a range of very different schemes currently applied by European countries are actually being referred to as net-metering, and the market impacts of these different schemes vary. For example, the time between meter readings is an important factor: the longer the period for netting, the larger the subsidy. The netting period can also be aligned with the trading interval of the wholesale market, which provides a basis for valuing the electricity in a market-based manner. In some countries, the impacts of net-metering are partially compensated by the inclusion of fixed fees to cover the network costs, minimising the share of costs that are socialised between other customers. A high share of taxes and levies in the electricity bill increases the distortions caused by net-metering.

The absence of balancing responsibility and the socialising of the imbalance costs lead to another indirect subsidy, in cases where the imbalance costs are significant. **When the information on prosumers imbalances is available, the costs of imbalance can be borne in the place where they occur. In this way they do not have to be socialised and shifted onto other customers.** Consequently, the motivation to produce more accurate generation forecasts arises, hence reducing the overall imbalance costs. In practice, small scale prosumers outsource the balancing responsibility to their supplier or to an aggregator.

Forecasting prosumers' generation is becoming more and more important as their numbers and size increase. Good quality forecasts are enabled by real time metering data: according to the information collected from EURELECTRIC's members, forecasting was seen as a challenge in countries where the metering interval is longer than one hour. **Smart meters enable both the identification of prosumers imbalance as well as good quality forecasting.**

In addition to indirect support, many European countries continue to apply direct support for small scale power generation. **The market distortions caused by direct and indirect support for distributed generation should not be underestimated. Even though individual installations may be small in size, when taking their market share in total, this may comprise a significant portion of the power generation capacity.** Operating aid (€/MWh) distorts the signal provided by the wholesale market price and leads to the inefficient operation of power generation. It also reduces the incentives to forecast generation accurately and to invest in flexibility. In view of this, investment aid is considered as a preferable form of support. Dedicated support is needed for immature technologies primarily through research, development and demonstration support.

Subsidies lead to market distortions and should be avoided. This also applies to indirect subsidies such as non-market-based net metering schemes. The regulatory framework should evolve to enable costs of imbalance to be borne where they are created. Balancing responsibility motivates good quality generation forecasts and the reduction of imbalances.

Where they exist, support schemes should be designed so as to be cost efficient, transparent and not cause market distortion.

Enabling investments in smart grids

DSOs need an adequate regulatory framework in order for them to make efficient, long-term investments and to develop smart grid technologies (also through R&D pilot projects). DSOs currently have to cope with demanding investment requirements. Existing assets should be replaced in order to ensure continued quality of supply. Smart grids should be developed because they contribute to the integration of distributed generation, the creation of new markets and services and the effective participation of consumers to the energy system. European electricity distribution networks will require a total of €400 billion in investment by 2020¹¹. At the same time, an adequate set of tools to help DSOs cope with the challenges of a more decentralised system is missing¹².

Clear and transparent conditions to connect decentralised generation equipment should be established. In addition, regulation should ensure that generation equipment is safe and fit to be integrated to the distribution grid. In some cases standardisation can be a helpful tool in addressing the barriers to the deployment of distributed generation.

Economic regulation of DSOs should be revised in order to incentivise long-term investments and to enable R&D and pilot projects in smart grid technologies.

¹¹ European Commission 2011.

¹² EURELECTRIC (2013): Active Distribution System Management.

Annex I Towards advanced regulatory regime for prosumers

The checklist provides a tool for evolving towards advanced regulatory regime for distributed generation and self-consumption.

	CHECKLIST ON REGULATORY REGIMES FOR PROSUMERS
Buyer of produced electricity	<ul style="list-style-type: none"> ✓ Retailers and aggregators have the possibility to offer market-based services, including offers on produced electricity to prosumers. ✓ Purchasing obligations are not applied.
Price of produced and consumed electricity	<ul style="list-style-type: none"> ✓ Companies can specify the offers for prosumers in a market-based manner. ✓ There is no price regulation on electricity produced and consumed by prosumers.
Metering	<ul style="list-style-type: none"> ✓ Smart meters register both feed in to the network and electricity withdrawn from the network. ✓ The metering interval is aligned with the trading interval of the wholesale market, facilitating 1) use of wholesale prices in pricing the produced electricity 2) optimisation of generation, demand and storage 3) measuring imbalances 4) more accurate generation forecasts 5) provision of flexibility and ancillary services
Network costs	<ul style="list-style-type: none"> ✓ Prosumers network costs are not shifted to other customers. ✓ DSOs are able to recover their costs in a timely manner.
Taxes, levies and system costs	<ul style="list-style-type: none"> ✓ Electricity bills are not used to collect (non-energy related) taxes and levies. ✓ Prosumers contribute to the system costs.
Balancing	<ul style="list-style-type: none"> ✓ All market participants have balancing responsibility (the service can be outsourced to suppliers/aggregators). ✓ The information on prosumers imbalances is available, facilitating market based offers for the service.
Services provided by prosumers	<ul style="list-style-type: none"> ✓ Action is taken to evolve towards an electricity market where prosumers have the possibility to provide flexibility and ancillary services.
Support schemes	<ul style="list-style-type: none"> ✓ Support is focused on immature technologies. ✓ Support schemes are transparent. ✓ Market distortions are minimised (investment aid rather than operating aid). ✓ Support schemes do not create incentives to feed-in electricity to the network regardless of the state of the system.
Development of network	<ul style="list-style-type: none"> ✓ Regulation allows DSOs to recover the costs of developing smart grids, including through R&D projects.
Grid connection	<ul style="list-style-type: none"> ✓ Regulatory regime supports DSOs in ensuring that generation equipment is safe and fit to be integrated to the distribution grid.

Annex II Examples of services which utilities provide to prosumers

The table below describes the various services that two different utilities in a European country provide to prosumers.

SERVICE PACKAGES PROVIDED BY COMPANIES	
<p>Solar solution 1</p> <p>The solar package includes a home visit, all material needed, installation service and support with all the paper work.</p> <p>The packages range between 1,5 kW and 3 kW, producing about 1400 to 2800 kWh per year.</p> <p>The company buys the excess electricity on an hourly basis for the wholesale price – fee 0, 24 c/kWh. Prosumers are equipped with smart meters.</p> <p>The prosumer covers its remaining demand with electricity supplied by the company based on the retail price.</p>	<p>Solar solution 2</p> <p>The solar package includes recommendations and the installation of solar energy system and an energy management system that allows prosumers to manage and balance consumption with self-generation.</p> <p>The company buys the excess electricity on an hourly basis for the wholesale price – 10%. Prosumers are equipped with smart meters.</p> <p>The prosumer covers its remaining demand with electricity supplied by the company based on the retail price.</p>

Annex III Network cost recovery and fair cost allocation

Many European countries experienced a significant reduction in distributed energy in recent years (see Table 1 below) which was mainly due to the rise of decentralised generation, increased energy efficiency as well as the economic crisis. This has an impact on the possibility for DSOs to recover their allowed revenues.

A survey within EURELECTRIC's Task Force on Network Tariffs has shown that many DSOs bear the volume risk which they cannot control as well as the financial or even economic consequences. This effect, accounting for up to 10% of DSOs revenues, has been recorded in the last three years and is expected to continue, and in some countries even increase, in the years to come. A DSO is generally refunded for financial deficits (the effects of lower tariff financial flows due to lower energy consumption) ex-post with a delay. In cases where DSO revenue is based on consumption volumes, the DSO is also exposed economically (i.e. the amount of revenue which it collects can be affected). Table 2 includes countries where financial and economic consequences have been identified. This is particularly relevant in countries where regulators are involved in setting the tariff structures (not just the revenues). In some countries, such as Spain, the volume risk borne by DSOs is magnified due to the fact that other regulated charges not related to the network are also included in the network tariffs.

Besides shifting towards more capacity-based network tariffs, adequate mechanisms that would allow for adjustments of prices during the regulatory period should also be put in place. This will help ensure the timely recovery of allowed revenues, since temporary financial gaps can also jeopardise the possibility for the distribution companies to finance their investments. In any case, DSOs should never be exposed economically to consumption volumes, so they should, at least, be refunded ex-post for the financial deficits related to lower volumes.

Table 1: EU countries with declining amounts of electricity distributed through DSO grids

Country	Total distributed power (TWh) 2011	Total distributed power (TWh) 2013
ES	278	260
IT	287	269
NL	109	90
PT	47	44

Table 2: Volumetric risk borne by DSOs

Financial effect in the past three years	Economic effect in the past three years
AT, ES, FR, GR, LT, NL, PL, PT, DE, IT	DK, PL, PT



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