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Integrating Renewables in a Competitive European Energy Market

Original scientific paper

The study "Roadmap Towards a Competitive European Energy Market" has been developed by an international Task Force set up by the World Energy Council, London. The main objectives, among others were (a) to suggest a roadmap towards a competitive electricity market, including renewable energy sources; (b) to formulate the pre-requisites for a successful liberalization of European electricity markets; and (c) to define milestones in order to benchmark the progress towards a single liberalized market including a methodology to boost the non-mature technologies. With the recent financial crisis evolving today into a severe, global economic recession, there are growing doubts over whether energy markets can continue to operate efficiently under present conditions or whether the shift to non-market mechanisms would be a better solution. The primary danger prevailing from this recession is that the European countries might revert to national priority and protectionism which could lead further to the disintegration of Europe. Renewable energy sources are playing an increasing role in power generation and they provide a valuable contribution to Europe's energy security and Europe's sustainable energy development. The recent EU-Energy Climate Package has fixed ambitious targets to integrate renewable energy into Europe's energy mix, and those targets are being constantly encouraged by a number of policy incentives. However, a number of economic and operational problems still exist. Renewables are not yet competitive, and the existing large grids still need to adapt to and ease the access of smaller, decentralized renewable energy sources electricity producers without causing operational failures to the system.

Key words: *energy markets, liberalization, policy incentives, competition, sustainability, models*

Introduction

The objective of this paper is to give an overview of the situation of renewable energies (RES-E) in Europe as presented in the World Energy Council (WEC) Study "'Roadmap Towards a Competitive European Energy Market" [1]. It addresses the following questions:

– Why encourage the increase of RES-E in the generation mix?
– What are the available mechanisms to promote RES-E?
– Which of these mechanisms are the most effective and efficient?

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– What are the technical issues surrounding integration of the RES-E grid into Europe's generation mix?
– How can RES-E be integrated into the European market?
– What are the current status and the future goals for RES-E in Europe?

The above questions from the WEC study will be addressed in full details with an aim to contribute to better understanding of the key messages on suggested roadmap towards a competitive electricity market with renewable energy sources included in the generation mix.

Why encourage the increase of RES-E in the generation mix?

RES-E can play a fundamental role in managing the challenges of climate change, environmental degradation, and energy security. As these issues become more and more pressing, governments and markets are seeking innovative solutions. In the EU, all 27 Member States have put in place a range of support measures for promoting renewable electricity, to support introducing RES-E into the market, and to fulfill the RES-E quotas of the EU. These measures include feed-in tariff schemes, tenders or Tradable Green Certificates (TGC), and tax rebates. The intermediate goal for the EU-27 is 12% renewable energy by 2010 and a renewable electricity share of 21%. By 2020, the renewable energy should have a share of 20%. Many of the EU-27 countries have already made important progress in promoting renewables in their energy mix. However, obstacles remain, and bigger efforts are needed in order to achieve the EU-27 renewable target for 2020. So far the renewable electricity share is not yet defined by 2020, however, the EU Commissions' "Renewable Energy Road Map" (2007) assumes RES-E shares in different scenarios between 34.2% and 42.8 % in 2020 [1].

Currently, 27 Member States operate 27 different national support schemes. RES-E is a key element in developing a sustainable energy mix, and it can contribute to energy policy objectives in a number of ways, fig. 1.

Figure 1. The current subsidy schemes for renewables in Europe [1]

Reducing import dependency and diversifying the fuel mix to enhance energy supply security

For Europe in particular, RES-E is considered an important part of the energy supply. Since RES-E can be produced within Europe, it helps to reduce import dependency. That said, renewables are only one of several ways to offset the pressures caused by decreasing fossil fuel resources. Historical development of electricity generation from "new" renewable electricity in the European Union (EU-27) between 1990 and 2006 is presented in fig. 2 [1]. Figure 3 illustrates the capacity breakdown of non-hydro renewables in the European Union.

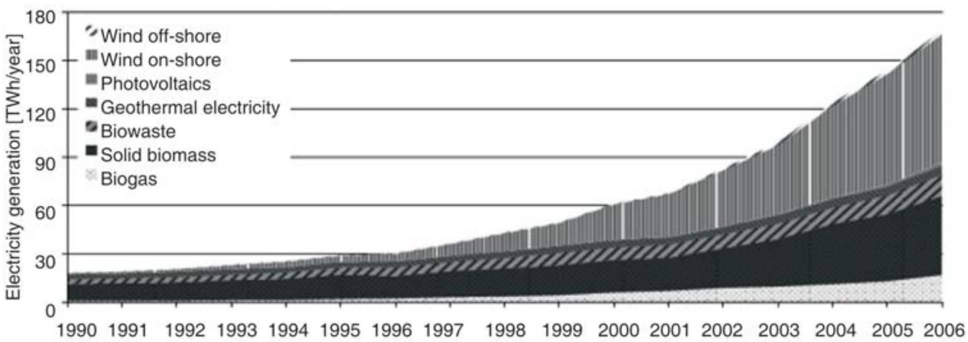
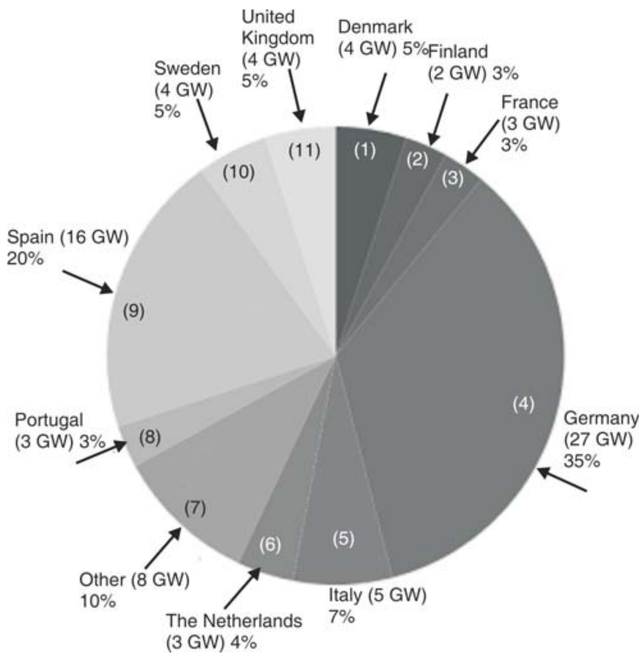


Figure 2. Electricity generation from "new" renewables in the European Union (EU-27)

Figure 3. Breakdown of non-hydro renewables in the European Union [1]
(1) – Denmark (4 GW),
(2) – Finland (2 GW),
(3) – France, (3 GW),
(4) – Germany (27 GW),
(5) – Italy (5 GW),
(6) – The Netherlands (3 GW),
(7) – other (8 GW),
(8) – Portugal (3 GW),
(9) – Spain (16 GW),
(10) – Sweden (4 GW)
(11) – United Kingdom (4 GW)



Lower CO_2 and other emissions

Climate change and environmental damage as a result of CO_2 and other greenhouse gas emissions must be urgently addressed. In order to do this, RES-E must play a larger role in the global energy supply. If emissions levels and climate change are going to be stabilized at a level of 2 °C above preindustrial levels (a level many environmentalists have identified as the necessary cap to avoid the most serious damages of climate change), major long-term emission reductions adapted from a variety of options – including larger RES-E production – should be undertaken.

Development of new technologies

In January 2008, the European Commission presented the Energy Climate Package, a set of legislative proposals with specific emissions targets for the EU to meet by 2020. The EU's Council of Ministers adopted the final legal texts of the energy and climate change package of legislation in April 2009. The main provisions are:

- a reduction of at least 20% in greenhouse gases (GHG), rising to 30% if there is an international agreement committing other developed countries to comparable emission reductions and economically more advanced developing countries to contributing adequately according to their responsibilities and respective capabilities,
- a 20% share of renewable energies in EU energy consumption, and
- a 20% increase in energy efficiency (this is so far only an indicative value).

Looking at the EU Emission Trading Scheme (ETS) as a truly European approach, it is clear that creating an internal energy market in Europe would also require enough harmonisation among policies to reach other environmental goals. The interesting argument pro ETS to reduce the macroeconomic costs is in principle also true for renewable energy.

What are the available mechanisms to promote RES-E?

In the long term, there is a general consensus among economists that RES-E will become competitive. Ultimately, RES-E should be completely integrated into liberalised market framework, and it should not require any kind of subsidy. However, hardly any renewable energy resources are currently competitive, and therefore, some financial promotion is still necessary. There is a great range of instruments that governments can use to subsidise RES-E. These can be divided into two categories: investment support (capital grants, tax exemptions, or reductions on the purchase of goods) and operating supports (price subsidies, green certificates, tender schemes and tax exemptions, or reductions on the production of electricity).

The operational support incentives are generally more utilised by governments than the ones focused on investment support. Operational support incentives include: Price-based market instruments, quantity-based market instruments, tenders, and fiscal incentives. These are summarised as follows.

Price-based market instruments. Feed-in tariffs and premiums are granted to operators of eligible, domestic renewable electricity plants for the electricity they feed into the grid. The preferential, technology-specific feed-in tariffs and premiums paid to producers are regulated by the government. Feed-in tariffs take the form of a total price per unit of electricity paid to the producers whereas the premiums (bonuses) are paid to the producer on top of the electricity market price. The tariff and the premium are normally guaranteed for a period of 10-20 years. The guaranteed duration of these tariffs and premiums provides a high degree of long-term certainty for investors, thus lowering the risk of investing in renewables. Both feed-in tariffs and premiums can be structured to encourage specific technology promotion and cost reductions (the latter through stepped reductions in tariff/premiums).The experiences of some Member States, such as Spain and Denmark, of using premiums over the spot market price prove that an ambitious support to RES-E does not also mean that renewable generation cannot be subject to the same rules concerning participation in the market. Under existing Spanish RES-E regulation (RD 661/2007), all renewables must sell their production in the market, either by bidding in the power exchange or through bilateral contracts, as any other generator. Feed-in tariffs or market premiums are then settled against the spot price. Other countries like Germany just pay a fixed feed-in tariff. In this case, the operator of a RES-E plant does not experience any market price movements.

Quantity-based market instruments. Under a quota obligation, governments impose an obligation on consumers, suppliers, or producers to source a certain percentage of their electricity from RES-E. This obligation is usually facilitated by tradable green certificates (TGC). Accordingly, renewable electricity producers sell the electricity at the market price, but can also sell green certificates, which prove the renewable source of the electricity. Suppliers prove that they reach their obligation by buying these green certificates, or they pay a penalty to the government.

Tenders. Under tendering, a tool which is used more widely in the United States, a tender is announced or the provision of a certain amount of electricity from a certain technology source. In this case, bidding should ensure the cheapest offer is accepted.

Fiscal incentives. In some countries, fiscal incentives such as tax exemptions or tax reductions are the main RES-E support scheme. In countries like the United States, they are used as supplementary instruments. Renewable energy producers are exempted from certain taxes (*e. g*. carbon taxes) as a means of stimulating more investments into RES-E. The effectiveness of such fiscal incentives depends on the applicable tax rate. In countries like Finland with relatively high energy taxes, these tax exemptions can be sufficient to stimulate the use of renewable electricity; in countries with lower energy tax rates, fiscal incentives need to be accompanied by other measures.

With the help of premiums, quota/TGC schemes, tendering schemes, tax exemptions and investment support, renewable electricity is normally traded in the electricity market and subject to market prices and conditions. The support is therefore remuneration on top of the electricity price. Since the electricity is sold in the market, the producers participate on the regular electricity market in competition with other producers, and this supply will then have an influence on the final electricity price.

With feed-in tariffs, renewable electricity is not sold directly in the market. Rather, the electricity is paid for through a purchase obligation, something that is normally imposed on the system operator. This electricity is shared among the customers and is paid for through a fee included in the network tariff. Although renewable electricity that receives a feed-in tariff is not sold directly in the market, the additional supply will nonetheless have an indirect impact on the market price.

Which of these mechanisms are the most effective and efficient?

The answer to this question depends on the specific goals and criteria that have been adopted. The most commonly assumed goal is least cost of generation of RES-E.

Another common assumption is that models based on quantitative market-based mechanisms like those used in the United States and the UK will induce renewable production at lower cost, thus producing a result that is economically efficient. This occurs because of promotion of competition between renewable producers, leading to a defined target of RES-E generation at minimum aggregate social cost. Additional goals include maximum deployment, reduced risk for investors, building a diversified portfolio of RE generating sources, increased employment, and minimising complexity and administrative costs. In the United States and the United Kingdom, there is a distinct preference for tradable green certificates as opposed to the feed-in tariffs that are preferred in Germany and Spain among others. This preference is grounded in a theoretical assumption that tenders and RPS laws can provide renewable generation at the lowest cost. Associated with it is the firmly held conviction that the introduction of a feed-in tariff mechanism would inevitably lead to less cost-efficient outcomes. Markets very rarely meet the ideal of perfect competition. Nonetheless, the assumption that even a partially competitive market will produce a more efficient use of resources compared to a fixed price system remains.

If suppliers of RES-E do not offer a competitive price, no one will buy their electricity. Therefore, they are forced by competitive pressures to avoid rent-seeking pricing strategies. Under certificate/quota laws there is no incentive to invest in technologies other than the cheapest, typically either biomass or wind power. On this basis, quota laws tend to limit technological diversity, and least cost technologies such as large scale wind farms are favoured over the more expensive solar PV. Considering the Spanish experience with PV installation, this is an important positive characteristic in comparison with the feed-in tariff system. In Spain, the subsidy for PV installation was 455 €/MWh for 20 years [1]. This led to a massive PV installation of more than 3000 MW (dramatically more than the 400 MW targeted) with an impressive over cost for the power system and a relatively small contribution in terms of RES-E output. However, as the UK example shows, of the promotion of more expensive technologies are also possible in a quota framework by allocating a higher number of certificates to the produced electricity, as is the case with UK offshore wind. The least competitive RES-E technologies, such as solar PV, should receive support to reduce the generation costs before they are rolled out on a large scale. Here, targets in term of installed capacity should be carefully considered. The use of quotas and green certificates systems alone will not lead to technological diversity. The coexistence of state-of-the-art models (quantity market based instruments and price market based instruments) is a good mix of support schemes, to develop in a first possible technological answers and in a second step let the market decide, which of these technologies are economic efficient. The criteria for when the switch between the promotion schemes should occur must be clear and explicit.

The European Commission has developed the following indicators to measure the performance of the different support schemes. Among these, the key role is expected to play several indicators such as effectiveness, cost efficiency, dynamical efficiency, and practicability. The effectiveness indicator shows the increase of electricity generation compared to the additional realisable mid-term potential to a particular year (*i. e.* 2020) for a specific technology. The cost efficiency indicator compares the total amount received for RES-E (level of support) to the generation cost. The closer the level of support is to the generation cost, the more efficient a support mechanism is in terms of covering the actual costs. Relationship between costs and results includes low transaction costs and efficiency in finding the right technologies. The dynamical efficiency indicator, being in line with the general framework of the energy market, includes innovation efficiency and incentives for cost reduction. The practicability indicator calls for low administrative burdens, regulatory and monitoring issues and flexibility and adaptability of the used technologies.

What are the technical issues surrounding integration of the RES-E grid into Europe's generation mix?

Infrastructure for generation mix including renewables

The existing grids that developed in the context of large, monopolistic, and conventional fuel-based energy producers still need to adapt to the incorporation of smaller, decentralised RES-E producers into the market. In the long-term, the overall trend for renewables is for more central production, *e. g.* with off-shore wind plants. Since renewable energy production is strongly dependent on geography, it makes sense to concentrate the production. In the future, the grid will also have to meet the requirements of centralised production. Conditions on priority grid renewable generation access and generation dispatch must be compatible with security of supply, which remains the first priority for network operators. Grid conditions must also match a functioning electricity market, particularly as RES-E will occupy a large share of the market in the future.

Because of the European Union's new ambitious targets for RES-E market share (20% by 2020), the degree of competition in the internal electricity market has major implications for renewable electricity. The electricity market needs to become more transparent and competitive, with independent transmission system operators, improved infrastructure access, and balancing rules for renewable electricity. With the development of regional and European energy markets, it is important that the rules regarding renewables are objective, transparent, harmonised, and non-discriminatory.

The EU's legal framework requires guaranteed access and provides rules for sharing the cost of various grid investments (such as connections, reinforcements, and extensions) that are necessary to integrate renewable electricity into the grid. The directive 2009/28/EC prioritises generation from renewable sources, thereby influencing operation of conventional generation and increasing its cost and deviates from market rules.

It provides in particular that generation from RES should either be granted priority or guaranteed access to the grid, that Transmission System Operators (TSO) should give it priority in dispatching whenever secure operation of the system is possible, and that they should be able to minimise and justify curtailing measures. An increased share of total power production covered by intermittent and not perfectly predictable RES-E power generation leads to a change of the system costs. The connection of RES-E to the grid imposes costs depending on site and voltage level.

RES-E challenges

In contrast to conventional sources of electricity, RES-E presents three major challenges such as Limited availability, Limited predictability and Geographical allocation. These are as follows.

Limited availability. Limited availability means that it cannot be guaranteed that a given renewable source will produce the needed amount of electricity. For example, photovoltaic does not work at night or on a cloudy day, and wind turbines do not produce electricity in calm wind situations or in storms. Consequently, the production by renewable sources can result in tremendous variance. To enable a secure production of electricity, back-up conventional power plants are needed. These conventional plants will run in all cases when RES-E is unable to produce. This back up capacity is not without cost, and these costs should be socialised between all customers depending on their final consumption or renewable consumption *i. e.*).

Limited predictability. The weather forecast plays a crucial role in wind power production. In cases where the wind power forecast deviates from the actual production levels, balancing energy is needed. This is usually supplied by conventional power plants. In the future, technical solutions for energy storage may alleviate this problem, but storage technologies are currently very expensive. Figure 4 demonstrates very strong daily fluctuations of wind power generation.

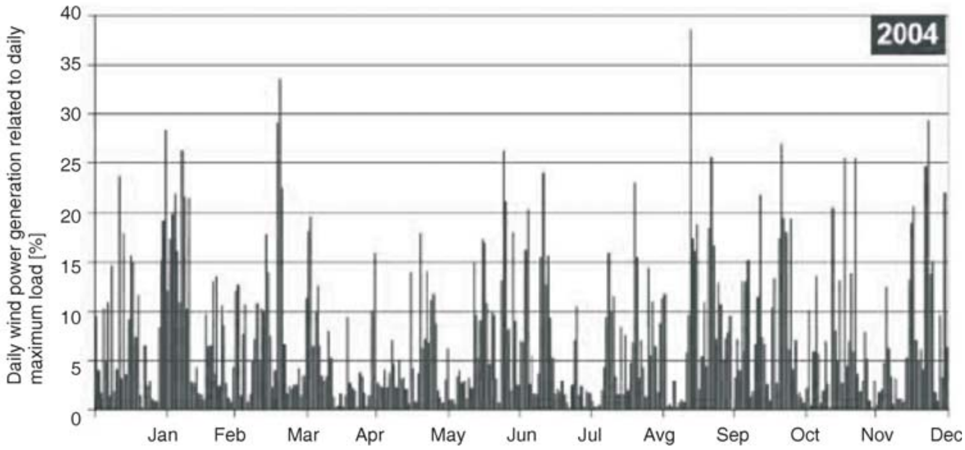


Figure 4. The daily wind power generation shows strong fluctuations (*E.ON Netz*) [1]

Geographical allocation. As with other forms of electricity production, RES-E is generally connected to network infrastructure. Big wind farms in particular are very dependent on adequate transmission capacity, especially since they are often situated further away from consumption centers. Thus, adequate development of network infrastructure is a precondition for the development of renewable electricity. RES-E sources are very location dependent, and the preferred sites for wind mills or solar power plants are usually not close to the consumption centers, hence large-scale transport of electricity is needed. For this reason, an extension of the existing grid usually has to take place. Because of regulatory obstacles, the grid extension may happen at a slower pace than the development of renewable power plants. This results in frictions in the electricity transport system. The non-harmonised promotion of RES-E within Europe will consequently lead to a certain way of grid extension, and this extension might be the wrong grid once the markets become harmonised.

RES-E integration costs

The main costs of integrating RES-E into the existing grid include:
- grid connection costs,
- grid reinforcement costs,
- investment costs into regulating power plants caused by RES-E power production, and
- change of operational costs of conventional power plants due to the integration RES-E power plants.

Grid connection costs

Connecting an RES-E power plant to the existing transmission or distribution grid requires the installation of an additional from the RES-E power plant to the existing transmission or distribution grid and the modification of the existing bus-bar and transformer. These costs are dependent on:
- the distance between the RES-E power plant and the point of coupling with the grid,
- the voltage of the connection line and the connected grid, and
- the possibility to apply standardised equipment (cables, bus-bars, *etc*.).

Grid connection costs are an important economic constraint for the development of RES-E, so it is extremely important that regulators recognise the need to reinforce networks, to authorise investments on a timely basis, and to allocate the appropriate remuneration (or authorise the necessary grid tariffs) to TSO and Distribution System Operators (DSO).

Grid reinforcement costs

The integration of large scale RES-E can require additional network capacities in the distribution and transmission grid, depending on the location of the RES-E relative to the load centers and the existing grid structure. The intermittent feed-in from RES-E must be balanced with regulating conventional power plants that can be located elsewhere in the grid. Also, larger control areas that can make use of regulating capacity from outside a country require sufficient transmission capacities. Basically, RES-E will change the power flows in the transmission system, potentially causing new bottlenecks in existing transmissions or distribution grids.

Another challenge is that the grid reinforcement is technically a national task, but it still has significant cross-border implications. Strong fluctuations in some major wind-electricity producing countries also affect the neighbouring countries. This indicates that renewable energy production is no longer a national task, but an issue for international electricity markets and requires international grid investments. The European view of the TSO will become even more important in of the context of implementing a high-voltage Direct Current (DC) grid in Europe.

RES-E-related investment costs for regulating power plants

Due to forecast errors and the fluctuations of RES-E power production, the demand for reserve power both for up- and down-regulation will increase, especially compared to a situation where the same energy is delivered by a continuously operating plant.

In this case, power plants running at part-load (spinning reserve) and eventually additional investments in flexible power generation technologies like gas turbines are necessary.

Change of operation costs of conventional power plants and benefits caused by RES-E

The intermittent RES-E energy feed into the electricity system affects conventional power plant operators' unit commitment and increases dependence on balancing energy to meet the total generation demand. This is especially true with regards to the notoriously inconsistent wind power. The need for up- and down-regulation can be met by using additional quick start capacity and conventional power plants running at part load (so called spinning reserve). More frequent start-ups of conventional thermal power plants forced by drops of RES-E power production result in increased fuel and maintenance costs. Running conventional thermal power plants at partial capacity reduces the efficiency factor and therefore increases the fuelusage related to the electricity generated. Thus, the allocation of providing reserve power between standing and spinning plants is a trade-off between the additional costs of the operation of quick start capacity with typical high marginal costs and the costs of running a spinning power plant with efficiency losses. In power systems that are dominated by hydro power plants (for example, the Nordel power system), the needed balancing energy can be provided quickly and with low variable costs. However, the replacement of fossil fuel-based electricity production with RES-E power production saves fuel and reduces CO_2 emissions.

Principles for the treatment of grid connection and reinforcement costs

The further expansion of renewable energy production should be co-ordinated with future development plans for the European grid. In this context, it is important to carefully consider where to build renewable electricity production plants. They should be located places that will minimise the costs for the grid development or vice versa. The existing grid reinforcement plans can indicate the good sites for renewable production.

The following are possible payment methods for the costs of grid connection and the reinforcement borne by the RES-E power producer and the TSO or DSO. Shallow connection method – The RES-E power producer only has to pay for the grid connection, but not for a possible grid extension. If grid extensions beyond the connection point and at higher voltage levels are necessary, they have to be paid by the corresponding TSO or DSO.

- *Shallow connection method*: The RES-E power producer only has to pay for the grid connection, but not for a possible grid extension. If grid extensions beyond the connection point and at higher voltage levels are necessary, they have to be paid by the corresponding TSO or DSO.
- *Deep connection method*: The RES-E power producer pays for the necessary grid reinforcements that result from the connection of a RES-E power plant. In other words, the RES-E power producer has to pay for grid adjustments beyond the point of connection and at higher voltage levels.

– *Shallowish connection method*: With this method the grid reinforcement costs are split between the RES-E power producer and the TSO or DSO. This can be difficult because there is no common regulation for the subdivision of these costs.

In some countries, the connection charges are set independently of the actual costs by a public regulator.

Principles for the distribution of regulating power costs

The RES-E power producer is generally the cause of electricity imbalances, but the TSO or DSO normally shoulders the burden of balancing electricity production within its balance area. Therefore, the costs of regulating power are usually borne by one of these two actors. If the TSO or DSO has to bear the occurring costs of regulating power, those costs will be socialised by transmission or distribution system charges. When the RES-E power producer bears the costs of regulating power, the EU methods essentially penalise the RES-E power producer with prices derived from the bids and offers from a regulated power market.

What are the current status and the future goals for RES-E in Europe?

The European Union's goals for RES-E are defined in the so-called 20-20-20 package announced on January 10, 2007. In this package, the EU lays out its objective of achieving 20% RES on the supply side. The potential increases for each country are detailed in fig. 5 [1].

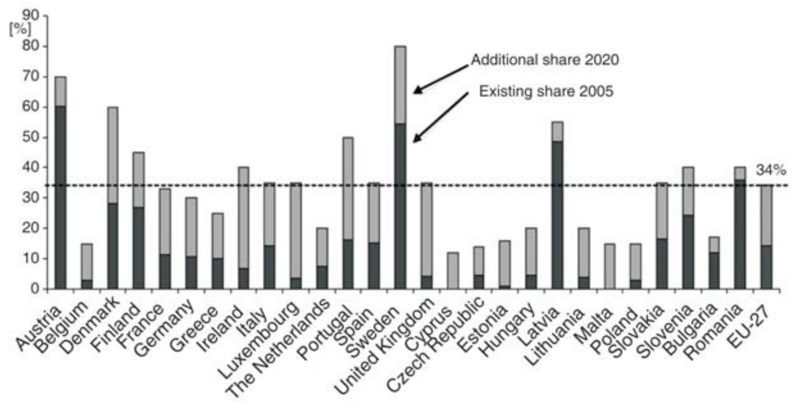


Figure 5. An estimate of how the EU RES-goals could be translated into EU RES-E goals, (*Source: EURELECTRIC*)

The overall EU goal for RES translates into specific RES-E share for member countries as presented in tab. 1. The EU member country GHG emission limits by the year 2020 compared to 2005 GHG emission for non-ETS are also presented.

Table 1. Goals for the renewable share in the total energy supply for EU member states (*Source: Renewable Energy Focus.com*) *[2]*

EU member country	RES share (final consumption) in the year 2005 [%]	Target for RES share in the year 2020 [%]	Member Country GHG limits by the year 2020, compared to 2005 GHG emission for non-ETS [%]
Belgium	2.2	13	–15
Bulgaria	9.4	16	20
Czech Republic	6.1	13	9
Denmark	17.0	30	–20
Germany	5.8	18	–14
Estonia	18.0	25	11
Ireland	3.1	16	–20
Greece	6.9	18	–4
Spain	8.7	20	–10
France	10.3	23	–14
Italy	5.2	17	–13
Cyprus	2.9	13	–5
Latvia	34.9	42	–17
Lithuania	15.0	23	15
Luxembourg	0.9	11	–20
Hungary	4.3	13	10
Malta	0.0	10	5
The Netherlands	2.4	14	–16
Austria	23.3	34	–16
Poland	7.2	15	14
Portugal	20.5	31	1
Romania	17.8	24	19
Slovenia	16.0	25	4
Slovak Republic	6.7	14	13
Finland	28.5	38	–16
Sweden	39.8	49	–17
United Kingdom	1.3	15	–16

Conclusions

It is impossible to envision the future of the European electricity without integrating renewable energy into the liberalised market structure. Renewables will certainly be an important part of the future generation mix in Europe, and the EU goals for renewable energy production will lead to renewables having a substantial market share by 2020 (estimates are 34%). These increases will have a notable impact on the wholesale electricity market. One of the prerequisites for market integration is technical integration. The difference between supply and demand of electricity can only be resolved via transport. Therefore, meeting energy demand is primarily a cross-border grid issue.

Maintaining a strictly national view with regards to renewable energy is simply not realistic in this day and age. Renewables, especially wind energy, need a European-wide grid for multiple reasons, including reducing the impact of inconsistent renewable production and easier access to balancing energy in the larger international market, as well as enhancing Europe's security of supply.

Renewable energy's volatile production should lead to smaller price effects when balanced against a larger market area. Unfortunately, European grids still reflect the national electricity systems, and major investments are needed to develop into a truly pan-European grid. As a European grid develops, international coordination of regulatory bodies must also be improved and harmonised. This will not only benefit renewable promotion schemes but also grid access, balancing energy, liquid intra-day markets, and so on.

Research, development, and deployment of renewable energy will continue to be necessary, but policymakers must also keep in mind that different technologies require different treatment. Some technologies like on-shore wind can produce electricity roughly in line with market prices. These technologies will become competitive without major government intervention. For these technologies, a certificate market is a reasonable tool to help finance projects and to give incentives for investments. Other technologies, like photovoltaic, are still in the early stages of development. In these instances, it might be preferable for states and the private sector to first fund additional research and to hold back on deployment for the time being. In this way, the EU will avoid a large-scale roll-out of a non-mature technology.

It is imperative that the European Union develop a roadmap outlining how the various national renewable promotion schemes in Europe will be harmonised and how they will be integrated into the existing regional electricity markets. As certain RES technologies become competitive, a market-based programme like the certificate scheme would likely incur the lowest macroeconomic costs. The roadmap for the integration would consist of identifying the renewable technologies that are most advanced and closest to competitiveness, integrating these technologies into an European-wide incentive system and harmonising regulation, grid access, balancing energy. This approach would also improve the competitiveness of the electricity market as a whole.

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Апстракт

Слав СЛАВОВ

Светски савет за енергију, Лондон

Интеграција обновљивих извора у конкурентско тржиште енергије у Европи

Студију „Пут ка конкурентском тржишту енергије у Европи" (*"Roadmap Towards a Competitive European Energy Market"*) израдила је међународна радна група формирана од стране Светског Савета за Енергију (*World Energy Council – WEC*), из Лондона. Основни циљеви, између осталих били су (а) да се сугерише пут ка конкурентском тржишту електричне енергије укључујући обновљиве изворе енергије, (б) да се формулишу предуслови за успешну либерализацију тржишта електричне енергије у Европи, и коначно (в) да се дефинишу контолне тачке да би се пратио прогрес ка јединственом либерализованом тржишту, укључујући и методологију подстицања технологија које још нису достигле зрелост. Са недавном финансијском кризом која данас прелази у озбиљну глобалну привредну рецесију, расту сумње у могућност тржишта енергије да могу наставити да ефикасно функционишу у садашњим условима или би окретање ка не-тржишним механизмима било боље решење. Првенствена опасност која преовлађује из ове рецесије је да би се Европске земље могле окренути ка националним приоритетима и протекционизму, што би могло даље довести до дезинтеграције Европе.

Обновљиви извори енергије играју растућу улогу у производњи енергије и дају вредан допринос сигурности снабдевања енергијом у Европи и развоју одрживог снабдевања Европе енергијом. Недавни енергетско–климатски пакет регулативе ЕУ је фиксирао амбициозне циљеве да интегрише обновљиве изворе у енергетски микс Европе, и ти циљеви бивају константно охрабривани једним бројем политичких подстицаја. Међутим, и даље остаје један број економских и погонских проблема. Обновљиви извори још нису конкурентни, а постојеће велике мреже тек треба да се прилагоде и олакшају прикључење мањих, децентрализованих извора електричне енергије на обновљиве изворе без изазивања погонских испада система.

Кључне речи: *тржишта енергије, либерализација, политика подстицаја, конкурентност, одрживост, модели*

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