CENTRE FOR EUROPEAN REFORM
policy brief

How to meet the EU's 2020 renewables target

By Stephen Tindale

★ The EU is capable of meeting its target to derive 20 per cent of its energy needs from renewable sources by 2020.

★ A major share of the increase in renewable energy capacity should take the form of renewable gas generated from sewage and other waste. This would significantly reduce the cost of meeting the renewables target, since major investment is already needed to upgrade sewage treatment infrastructure in order to meet water quality directives.

★ In order to harness the enormous renewables resources provided by wind and solar energy, major new electricity grids linking EU member-states with North Africa must be built. The EU should help finance this investment.

★ Subsidies to emissions-intensive forms of agriculture, such as livestock farming, should be cut and the use of artificial fertilisers discouraged.

The rapid expansion of renewable energy forms a key element of the EU's drive to cut overall emissions of greenhouse gases by 20 per cent by 2020. Renewables will in the future provide cheaper (and more secure) energy than fossil fuels, and it is now accepted, following the publication of the British government's Stern Review, that the cost of not controlling climate change is far higher than the cost of controlling it.[1]

[1] *Nicholas Stern, 'The Economics of Climate Change', HM Treasury, 2008.*

The EU currently generates around 8.5 per cent of its total energy needs from renewable sources. The member-states have agreed collectively to raise this proportion to 20 per cent by 2020. This is possible and would benefit Europe in a number of ways. It would help control climate change, greatly increase EU energy security and create many new jobs and industries. But this target will only be met if EU governments focus on increasing the use of renewable gas as well as electricity, and move quickly to improve electricity grid infrastructure.

Renewable energy is not just about renewable electricity. Only a fifth of EU energy consumption comprises electricity, so it will not be possible to meet the overall renewables target through increased use of renewable electricity alone. Governments need to focus on the full range of renewable energy sources, in particular biomass and biogas. Biomass is easily the most important source of renewable energy across the EU. It utilises energy crops, waste wood, wood chips and forests as a source of heat and power. Not all biomass is good in climate terms, but it has a vital role to play. Biogas involves making gas from sewage, manure and agricultural waste, which is then fed into existing gas distribution grids. There is also scope for an increased role for biofuels, although the same caveats apply to biofuels as to biomass.

Increasing investment in renewable energy is only part of the challenge. Just as important is expanding the infrastructure required to link renewable sources of energy to energy-users. If the EU is serious about meeting the renewables targets – and the other 2020 targets agreed in the climate package in December 2008 – it needs to facilitate a rapid expansion of electricity grids (both onshore and offshore).

In order to link intermittent energy sources such as wind, Europe needs far more connections between national electricity grids (since it is likely that there

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will usually be enough wind blowing somewhere in Europe). For example, the EU should help to finance the construction of an offshore grid spanning the North Sea, linking Denmark, Germany, the Netherlands, Sweden and the UK. Similarly, it should support the building of a grid linking Southern Europe with North Africa, which would make it possible to import energy from African solar farms. EU support for the expansion of electricity grids could be undertaken under the trans-European-network for energy (TEN-E) programme.[2]

[2] The European Union finances electricity and gas transmission infrastructure projects of European interest.

The EU should also stop spending money on things which damage the climate. Under the common agricultural policy (CAP), biofuel production receives subsidies, irrespective of whether the biofuel in question actually reduces emissions of greenhouse gases. Many biofuels are no more environmentally sustainable than gasoline, and sometimes less so. Subsidies to the agricultural sector should be linked to emissions of greenhouse gases. For example, subsidies to emissions-intensive forms of agriculture such as livestock farming should be cut and the use of artificial fertilisers discouraged.

The development of the EU's renewables policy

The European Commission's 1997 white paper 'Energy for the future: Renewable sources of energy' is the basis for much of the EU's subsequent policy regarding renewable energy. A renewables directive was adopted in 2001.[3] This set targets of 12 per cent of total energy use and 22 per cent of total electricity consumption to be generated renewably by 2010. However, these targets were only indicative, despite the Commission's efforts to make them binding. The directive proposed national support schemes to meet these targets, but argued that a harmonised support scheme across the EU might become necessary if national schemes did not deliver. In 2003, the biofuels directive set a target of 5.75 per cent of all transport fuel to comprise biofuels by 2010.

[3] European Commission, 'Directive on electricity production from renewable energy sources', 2001.

However, it was not until 2008 that the EU really got serious about renewables. The 2008 directive set binding targets for the proportion of energy consumption that must be produced renewably.[4] Targets vary by member-state, depending on each country's starting point and income level. Every member-state has to increase the proportion of its energy generated renewably by 5.5 percentage points between 2005 and 2020, with the remaining gap shared among the member-states according to wealth. Richer member-states are generally required to do more, poorer ones correspondingly less. For example, Sweden is supposed to raise the proportion of its energy generated renewably to 49 per cent by 2020, whereas Hungary's target is just 13 per cent (see chart on page 3).

[4] European Commission, 'Directive on the promotion of the use of energy from renewable sources', 2008.

The directive obliges each EU member-state to outline the steps it will take to meet its target in a national renewable energy action plan (NAP), to be submitted by June 2010 to the Commission. NAPs will include sectoral targets for the shares of transport fuel which must be renewable (there is an EU-wide target of 10 per cent by 2020) and targets for the proportions of electricity and heating/cooling that must be renewable. NAPs must also include proposals for removing the administrative barriers to greater investment in renewables and the obstacles to connecting renewable energy sources up to electricity grids.

National governments will have to provide progress reports every two years. Member-states can agree to a 'virtual' transfer of renewable energy from other member-states that have exceeded their targets. Under certain conditions, they can count actual physical imports of renewable energy from non-EU countries (for example, from solar farms in North Africa) towards their national target. The directive also requires EU countries to take "the appropriate steps to develop transmission and distribution grid infrastructure, intelligent networks, storage facilities and the electricity system," and to speed up authorisation processes for approving the expansion of grid infrastructure.

Delivery

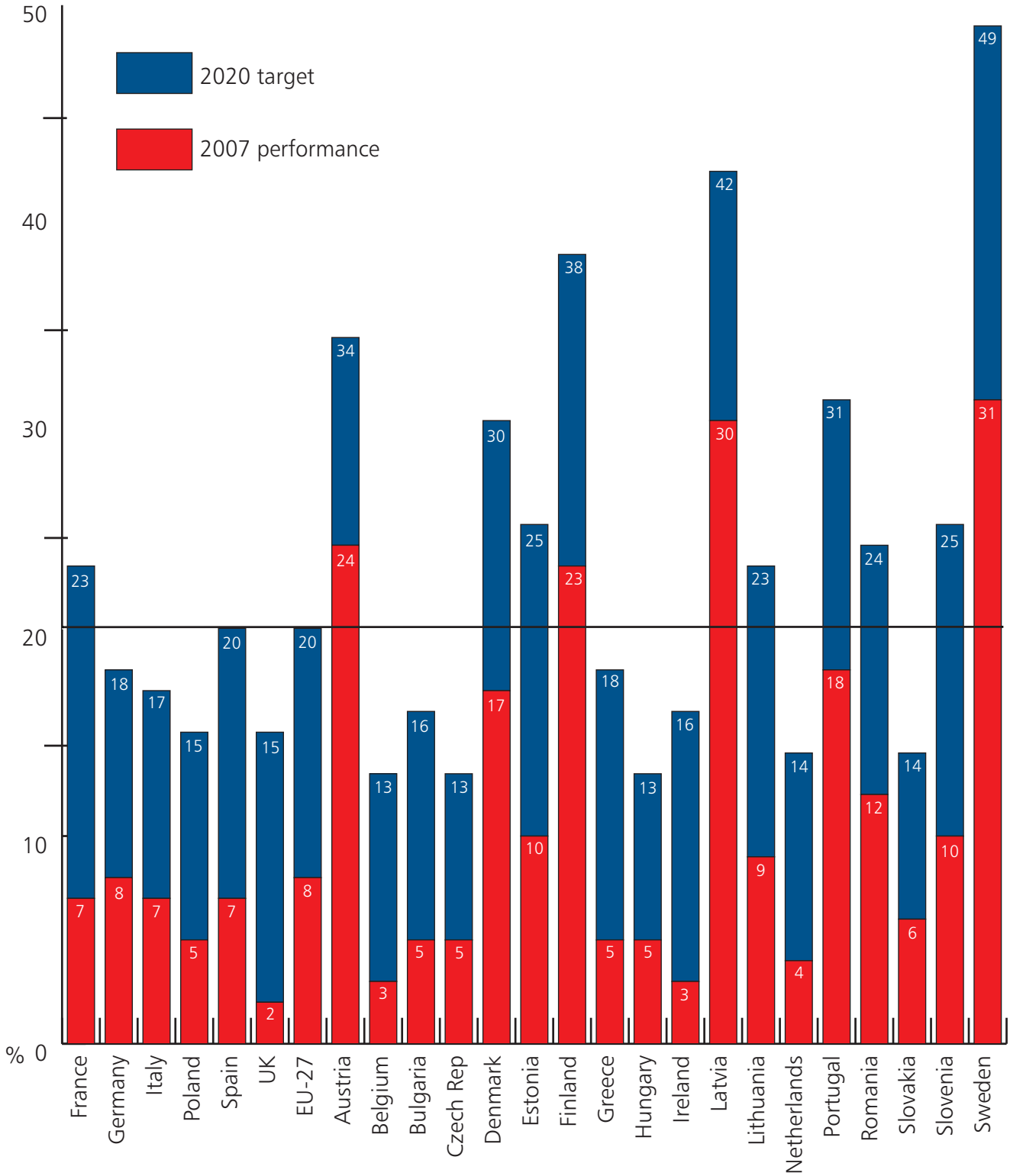
The proportion of energy coming from renewables has increased by over a third since the publication of the Commission's white paper in 1997. The biggest absolute increase has been in biomass, which accounted for 3.5 per cent of EU-27 energy consumption in 1997 and 5.4 per cent in 2007. However, in relative terms, renewable energy from wind-power has expanded most rapidly. Wind generated 0.5 per cent of the EU's energy needs in 2007, a ten-fold increase compared with 1997, and wind accounted for over a third of all new generation facilities built in 2008. Renewables of all types accounted for almost 60 per cent of the new generating capacity in that year.

Much of the expansion in the EU's renewable energy capacity over the last decade has been in Germany. In 1996, half of total EU renewable energy was accounted for by France, Sweden, Finland and Austria. By 2007, France, Sweden, Germany and Spain accounted for half. However, measured by the proportion of total energy used that is renewable, the top four member-states in 2007 were Sweden (31 per cent), Latvia (30 per cent), Austria (24 per cent) and Finland (23 per cent). Germany managed over 8 per cent and France, Italy and Spain 7 per cent. The UK, which has the EU's

best wind, wave and tidal resources for generating renewable energy, derived just 2.1 per cent of its energy from renewable means. This put the country second from bottom, above only Malta.

Sixteen per cent of EU electricity was generated renewably in 2007. The three best-performing member-states were Austria (78 per cent), Sweden (60 per cent) and Latvia (49 per cent), reflecting these countries' heavy investment in hydroelectric power. But the EU's success in meeting the 2010 and 2020 renewables targets will largely depend on the performance of the big six countries: France, Germany, Italy, Poland, Spain and the UK. Of these countries, Spain performs best, with 20 per cent of its electricity generated renewably, followed by Germany (15 per cent), Italy (14 per cent) and France (13 per cent). The UK (5 per cent) and Poland (4 per cent) stand out as the weak performers.

Renewables targets
(renewable energy as a percentage of total energy demand)



Sources: Eurostat, European Commission.

The European countries which have achieved rapid growth of wind and solar energy – Germany, Spain and Denmark – have so-called feed-in tariffs. These guarantee relatively high prices for renewable energy, and hence help to overcome the cost disadvantage that renewables suffer compared with conventional energy sources. The guaranteed income stream means that investors have more certainty and so a lower cost of capital. In the case of Germany and Spain, the feed-in tariffs generally last for 20 years from the point the investment is made. The German feed-in tariff was introduced as far back as 1990, primarily to encourage the installation of small-scale decentralised sources of renewable energy, especially solar panels. Utilities were originally excluded from the feed-in system, though they are now included.

The alternative to feed-in tariffs is a so-called 'renewables portfolio standard', in which energy companies are required to meet a specified proportion of their electricity from renewables. An example of this approach is the UK's 'renewables obligation'. This has delivered unimpressive results, although this is partly because the UK's land-use planning system makes it difficult, slow and expensive to get permission to build a wind farm. Nevertheless, if a system is being designed from scratch a feed-in tariff is a better way of ensuring investment in renewable energy than requiring companies to generate a given proportion of their energy renewably. However, it is possible to combine the best of both worlds and pursue the two approaches simultaneously. This is the strategy adopted by California, and subsequently by the UK government following its announcement in 2008 that it would introduce a feed-in tariff.

Biogas

Renewable gas, usually referred to as biogas, can be fed into the gas grid, mixed with natural gas, and used in exactly the same way. Biogas is already being injected into the gas grid in France, Germany and Austria (as well as in New York).

The most established way to produce biogas is a so-called anaerobic digester. This involves putting organic waste (such as sewage, manure or food waste) into a container, where it is kept without oxygen at a high temperature (around 40 degrees centigrade) until it becomes gas and solid compost. Anaerobic digesters are currently used in many sewage works and some waste treatment plants, though the biogas, absurdly, is often flared (burnt-off). The compost, if it is made from waste or animal manure, can be used on fields or gardens, and is an excellent fertiliser. If based on human sewage, there is no practical reason why it cannot be used as fertiliser, but public opposition would be strong (even though human sewage has always been used as manure and still is in much of the developing world). The solid compost from sewage could be incinerated (to generate electricity) or buried. Burying it would have the added advantage that the remaining greenhouse gases are then kept out of the atmosphere, making the biogas in an anaerobic digester not just 'climate neutral' but 'climate positive'. It would form part of a geo-engineering approach to reduce greenhouse gasses in the atmosphere.

A less developed technology for producing biogas is gasification, which is better suited to drier agricultural waste and energy crops. Gasification technology was used to turn coal into gas up until the 1970s, but has not been used significantly since then. There are demonstration plants to gasify organic waste and energy crops being built in Germany, Austria and the UK.

Because it uses the existing gas grid, biogas significantly reduces the infrastructure cost of renewables development. A major expansion of biogas would help to meet other EU objectives (such as reducing the amount of waste going into landfill and improving water quality) by reducing the cost of investment in new waste infrastructure. For example, the UK's National Grid company has estimated that biogas could meet 10 per cent of British energy demand by 2020 (two-thirds of the country's renewables target).[5] According to the research done by the company, this would cost £30 billion. But £20 billion of this is on new waste infrastructure which needs to be built anyway, reducing the net cost to £10 billion.

[5] *National Grid, 'The potential for renewable gas in the UK', 2009.*

Biomass

Plants – notably trees – can be used to provide heat and power, as they have been throughout human history, and still are in most of the world. In the renewable energy context, this is referred to as biomass. Biomass has significant advantages. Unlike other renewables, it is not intermittent: it can be burnt when needed. And it can produce heat as well as power. Finland and Sweden get nearly a fifth of their energy from biomass, and Austria, Denmark and Portugal around an eighth. The UK again performs poorly.

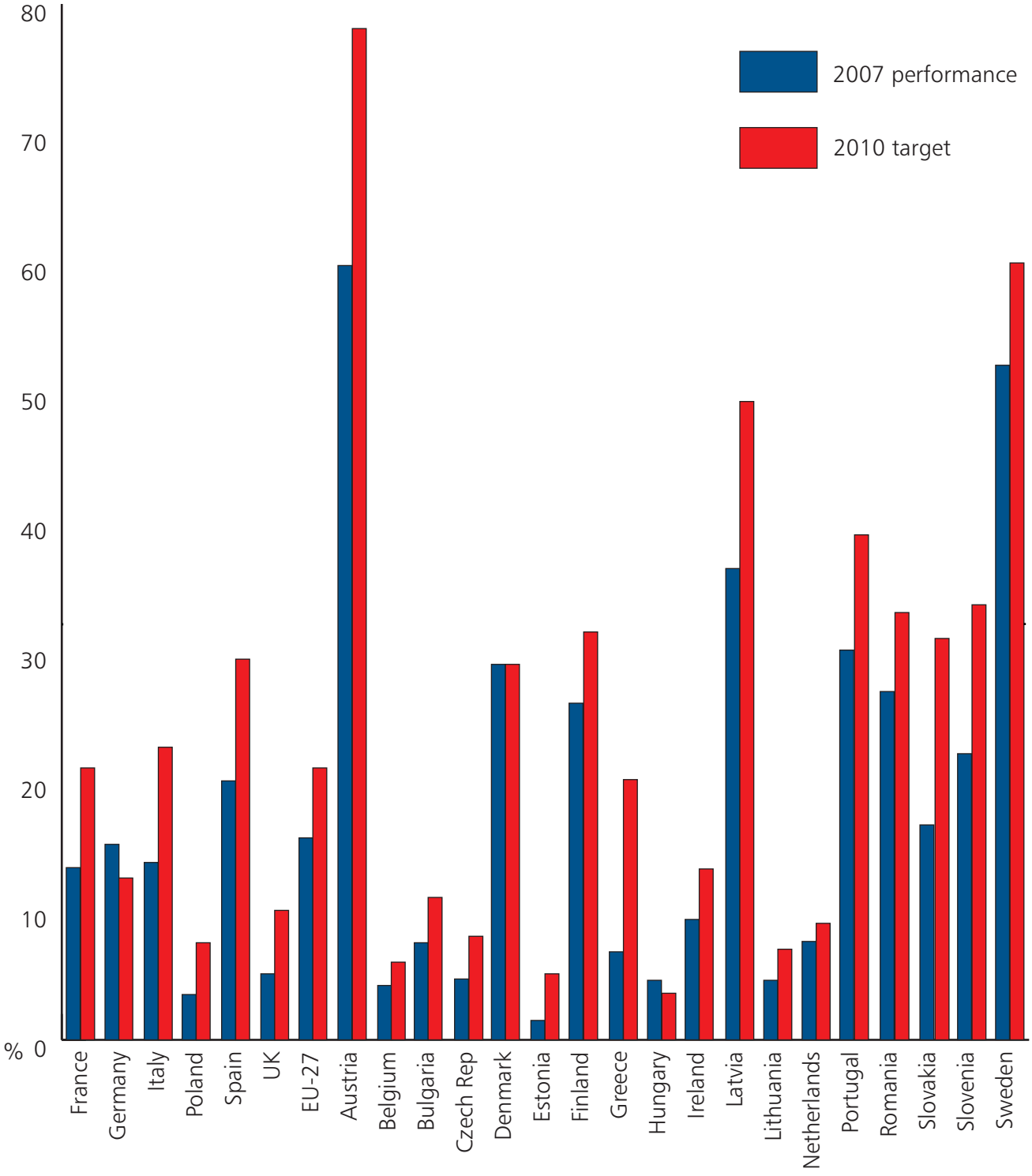
In theory, biomass is climate-neutral, as the carbon is absorbed by the plants while growing and then released when the fuel is used. But in practice it depends on what plants and land are used, and also how the plants are grown. Converting land from pasture to arable land for the cultivation of energy crops releases substantial amounts of carbon from the soil. Growing biomass with large quantities of chemical pesticides and fertilisers also reduces, or even reverses, its climate benefits. For example, burning wood chips from sustainably managed forests to generate electricity can produce just 15 per cent as many emissions per unit of energy as a modern gas-fired power plant, whereas using straw can produce 35 per cent more.

Subsidies to intensive agriculture accounts for roughly 85 per cent of all spending under the CAP.

The Agenda 2000 paper, 'A CAP for the future', was announced by the EU as a means of making the CAP sustainable, but it does not mention climate change.[6] Yet agriculture is responsible for around 10 per cent of EU emissions of greenhouse gases and much more than this in member-states with big agricultural sectors. Despite this, the CAP subsidises some of the most emissions-intensive types of agriculture, such as cattle farming. Also, under the present system of subsidies, farmers have an incentive to use high levels of fertiliser (which emit the potent greenhouse gas, nitrogen oxide) and to drain wetlands (which hold large volumes of carbon dioxide.) Subsidies should be shifted away from encouraging environmentally damaging types of agriculture to more sustainable cultivation and the production of biogas. For example, farmers should be given financial incentives to turn agricultural waste and manure into biogas.

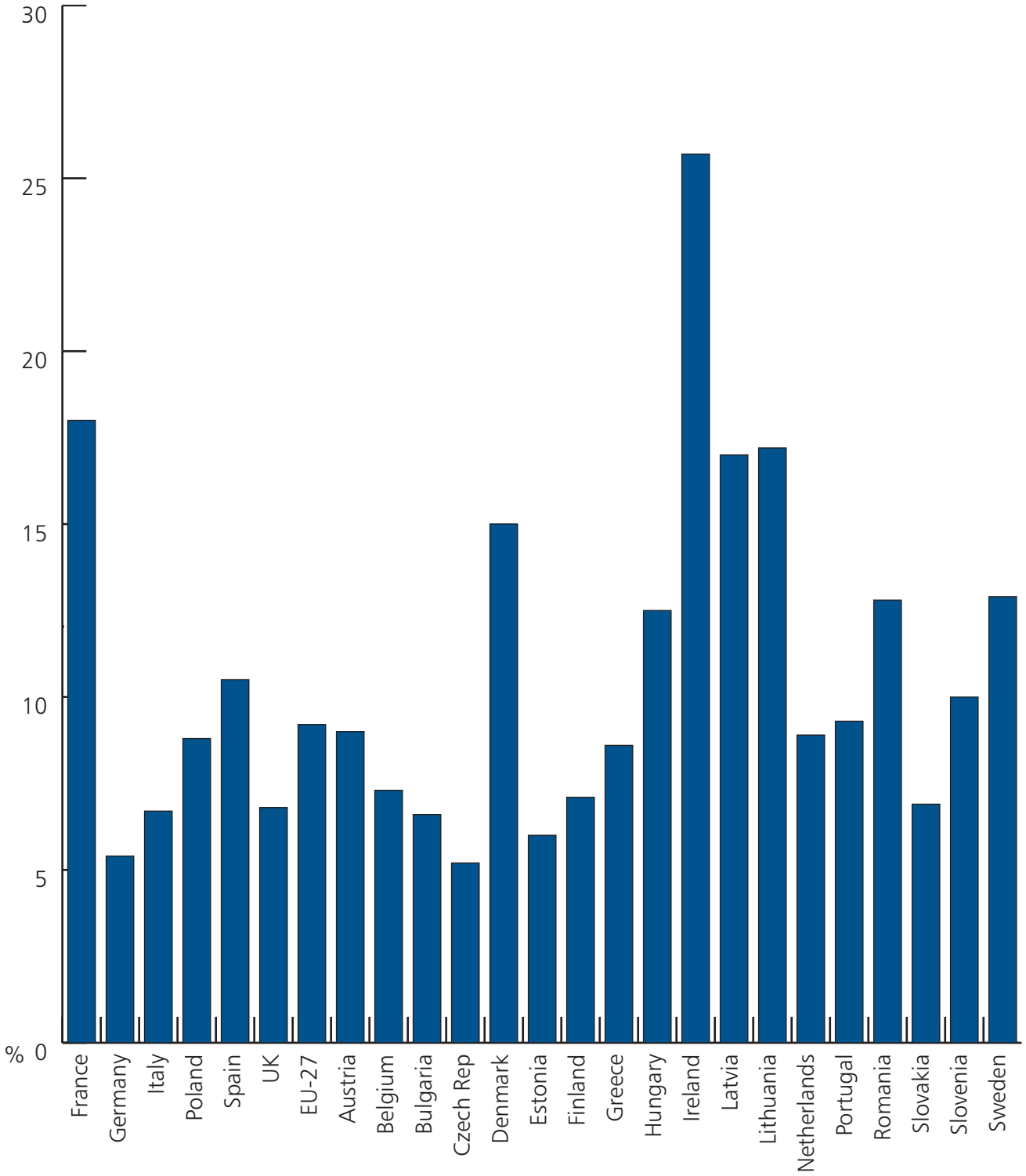
[6] *European Commission, 'Agenda 2000 – A CAP for the future', 2000.*

Share of electricity generated renewably (as a percentage of total electricity)



Sources: Eurostat, European Commission.

Agricultural emissions of greenhouse gases (as a percentage of total emissions)



Sources: Eurostat, European Commission.

Biofuels

Plants can also be turned into fuel for road transport. But the same issues apply to biofuels as to biomass. Many of the biofuels currently grown, at considerable public expense, are actually worse for the climate than using oil. This is the case when intensively-grown wheat, corn or rape is used to produce biofuel.

Moreover, the production of some biofuels contributes to deforestation, which is one of the biggest drivers of global warming. For example, palm oil is imported from Indonesia, leading directly to the destruction of rain forests in that country. And using large areas of agricultural land for biofuels means that food has to be grown elsewhere, often adding to deforestation (as well as pushing up food prices). Given the global food shortage, using crops to produce transport fuel has potentially serious socio-economic implications.

Advanced, 'second generation' (and 'third and fourth generation') biofuels are being developed, but are not

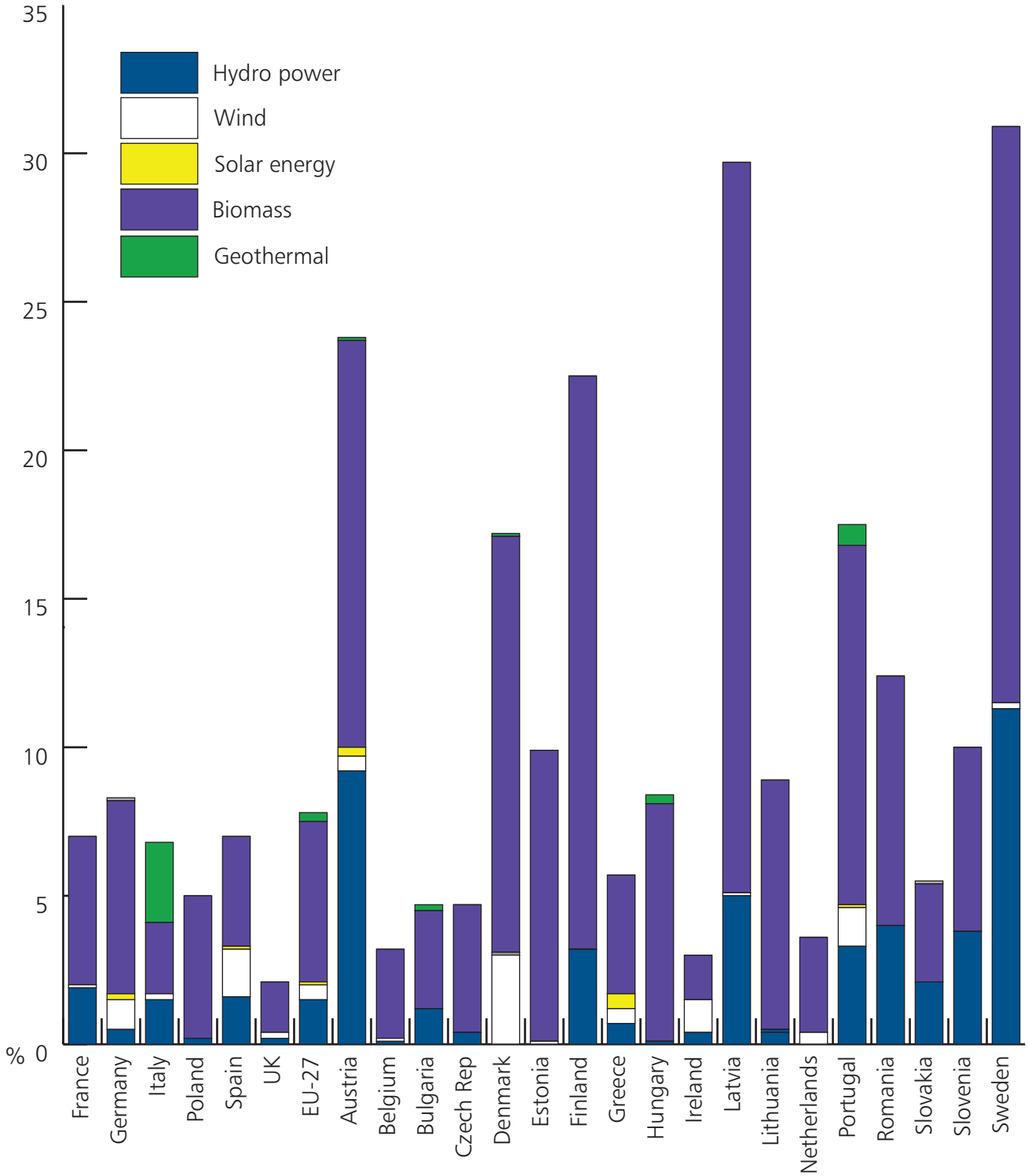
yet on the market. These will be fuels made from municipal and farm waste (such as corn stalks) or non-food crops (such as switchgrass), and as such should be genuinely renewable.

The 2008 renewables directive represents some progress on biofuels practice. It states that biofuels used for compliance with the renewables targets should meet sustainability criteria, and promises that the EU will take 'appropriate steps' to ensure they do. From 2017, only biofuels that deliver 50 per cent greenhouse gas savings will count towards the target, and from 2018 this will rise to 60 per cent.

Wind

In addition to biogas and sensibly produced biomass, the renewable that must be rapidly expanded if the EU is to meet the renewable electricity target is wind. The main obstacle to onshore wind development is land-use planning, in which the EU has no role. However, with regard to offshore wind farms, the main barrier is cost, including the cost of connecting to the electricity grid. A grid covering the North Sea would be expensive, but would have enormous climate, energy security and economic advantages.

Share of renewables in total domestic energy consumption, 2007



Sources: Eurostat, European Commission.

Finally, wave power and tidal stream power (turbines under the water which turn as the tide flows in and out) have enormous potential, but are unlikely to make a significant contribution to meeting the EU's 2020 target. New tidal range capacity (such as a barrage proposed for the Severn estuary in Western England) is unlikely to be built by 2020.

Solar

Solar power has immense potential. 'Solar photovoltaic' cells use sunlight to generate electricity, while 'solar thermal' collectors harness the sun's energy to produce heat. Germany has significantly expanded solar energy through its feed-in tariff. However, the southern European member-states of the EU obviously have better solar potential than northern ones. Of these countries, Spain has made the most progress. However, the biggest opportunity is to harness the potential of North Africa, in particular the Sahara. So-called 'concentrated solar power' uses mirrors to reflect sunlight to boil water and to generate electricity. Covering a very small percentage of the Sahara with such mirrors could generate enough electricity to meet Europe's entire energy needs. A number of European member-states, led by Germany and Italy, are actively exploring means to harness this potential by constructing an electricity grid across the Mediterranean linking southern Europe and North Africa.

Conclusion

The EU's 2020 renewables target can be met, but only if action is taken now to boost investment in renewable energy generation and in the distribution of that energy to customers. Renewable energy is not just about renewable electricity. If the EU is to meet the target it will also have to increase the proportion of the energy it derives from biomass and biogas. Increasing investment in renewable energy capacity is only part of the challenge. As important is expanding the infrastructure needed to link renewable sources of energy to energy consumers. The Swedish presidency needs to prioritise the issue of renewable energy, but also the issue of grid infrastructure. The EU should provide financial support under the trans-European network for energy (TEN-E) for an electricity grid covering the North Sea and one linking southern Europe and North Africa.

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