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How Green Is Europe?

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A superficial look might indicate great achievements. Yet a closer view reveals how far European renewables have to go, and what irrational choices are made to meet EU green energy quotas.



“Germany produces half of energy with solar.” That was the recent headline on a German website of news in English, and it would have duly impressed anybody whose understanding of energy matters extends to just such headlines. But the headline, totally wrong, was also a perfect example of why it is so important to deconstruct the reports about green Europe.

Analysis by the Fraunhofer ISE research institute showed that the recent peak of Germany’s solar energy usage lasted for only 1 hour, and that the record share (50.6 percent) was due not only to hot, sunny weather but that day being a public holiday with lower than normal demand — and, most fundamentally, to the fact that solar and wind have legal priority over fossil fuels and when available must be used to the maximum possible extent. But the key error of that headline’s claim is that it was not half of energy use (*Energieverbrauch*), it was half of electricity production (*Stromerzeugung*). And in Germany, as in any modern economy, electricity

accounts for only a fraction of overall energy use, known as total primary energy supply, which consists of all fuels (be they fossil or biofuels) and all electricity produced by nuclear reactors, water and wind turbines, solar photovoltaics (PV), and geothermal steam.

So how green is Germany’s and Europe’s energy supply in reality? Comprehensive comparative statistics always take a while to assemble, and the task is bound to be even more difficult when one has to deal first with 28 separate national entities. As a result, the European Union still has no official totals for 2013, but it has compiled all of its 2012 energy statistics.

A superficial look might indicate great achievements. The EU statistics show that in 2012 its 28 members derived 14.1 percent of their total primary energy supply from renewable sources. That share was well ahead of the interim target of 10.7 percent, and the union appears to be well on its course of reaching the EU-mandated 20 percent mark by 2020. Afterwards, the shift away from fossil fuels should continue, with the next (not yet officially mandated) goal of 30 percent by 2030 and, audaciously, 50 percent by 2050.

If you consult the annual BP World Energy Review statistics, however, you will see that it puts the share of EU’s renewables at 11.5 percent in 2013 and at 10.1 percent in 2012. This significant discrepancy (with the EU’s value being about 40 percent higher in 2012 than BP’s figure) is explained by different ways of accounting for biofuel consumption and by converting primary electricity to oil equivalent. But I will use the EU’s data, as the long-term goals for renewable energy shares are based on the EU accounting.

Deconstruction of the EU’s actual greenness must start by separating old renewables from new renewables — an essential task because in most countries the old renewables still provide the largest combined contribution in the green category. Readers of European news might be forgiven if they thought that wind turbines and PV panels, both heavily promoted and subsidized by many governments, lead the charge toward the continent’s renewable future. Actually, “solid biofuels” continue to be by far the largest category. In plain English, solid biofuels are wood, the oldest of fuels, be it trunks directly harvested for heat and electricity generation and burned as chips, or large amounts of wood-processing waste — a category particularly abundant in the EU’s two Nordic members with large forestry sectors. In 2012, 80 percent of Finland’s and 52 percent of Sweden’s renewable energy came from wood, and the average for EU-28 was 47 percent; even for Germany, the most aggressive developer of wind and solar, it was about 36 percent.

Burning logging and wood-processing wastes make sense; importing wood chips from overseas in order to meet green quotas does not. In 2013, the EU was burning more than 6 million tons of imported wood pellets. According to Forests and the European Union Resource Network, if all the EU states were to meet their 2020 green quotas, some of them would have to burn 50-100 percent more wood than they did in 2010. Imports now come mostly from North American and Russian forests, but Brazil is considered as the best source for future imports.

The irrationality of wood-based electricity generation is perhaps best illustrated by the conversion of Britain’s largest, originally coal-fired station to burning wood chips: initially they were to come from Brazil, but eventually more than 6 million tons a year will come from the swamp forests of North Carolina and tree plantations in Georgia. And wood-burning electricity generation would not be carbon-neutral even if all the trees cut down for chips were promptly replanted and if all of them regrew quickly and completely: more trees would have to be planted in order to offset carbon released by fossil fuels used in harvesting, processing, and intercontinental transportation of imported wood.

There is also nothing new about hydroelectricity (its generation began in 1882, in the same year Edison’s first coal-fired power-plant began operating). Europe was its early and vigorous developer, and now it has only a very limited unexploited potential, mainly in the Balkans. The EU’s deliberate push toward a higher share of renewables will thus benefit very little from new hydro capacities — but in 2012 they supplied 16 percent of the union’s renewables. Wood and water thus gave Europe nearly two-thirds (63 percent) of its renewable energy supply in 2012.

While water’s potential is limited, the continent can use more plant-based fuels by converting grain crops into ethanol, oil crops into biodiesel, or corn into biogas. By 2012, the European Union derived about 13 percent of its renewables from these modern biofuels — but for the past three decades I have argued for very careful and cautious development of these energy resources because their mass-scale production can have many negative consequences, ranging from higher food prices to excessive leaching of nutrients and enhanced soil erosion. Critical examinations of modern biofuels have uncovered many other inconvenient truths, not least the fact that crop-based fuels may actually increase (by 50 percent or even double) overall CO₂ emissions. In the best of all green worlds, only waste biomass (such as logging residues and crop residues that do not have to be recycled) should be used for energy, not crops grown on arable land that should produce food.

Outside of Italy, Iceland, and Hungary, geothermal energy is a minor player in Europe, and ocean energy (wind and waves) does not figure yet in any energy statistics, so the new renewables are (or ideally should be) down to wind and solar.

Undoubtedly, the EU's promotion of wind and solar resources resulted in consumption shares higher than anywhere else, but the contributions are uneven and remain small in absolute terms. Wind is big in Denmark (28 percent of all renewable energy) but marginal in France (6 percent of renewables), solar PV is relatively huge in cloudy Germany (but still only about 7 percent of all renewables) and negligible even in sunny Spain (4.9 percent of all renewables in 2012). And although they represent substantial shares of all electricity generated in several countries (38 percent in Denmark, 33 percent in Spain), their contribution to the EU's total primary energy supply remains very small: in 2012 about 1.1 percent for wind and not quite 0.5 percent for solar PV. Even in Germany their combined share of total primary energy supply was just 2 percent in 2012. Germany's nuclear reactors, slated for closure by the year 2022, generated 16 percent of the country's electricity in 2012, compared to 11.9 percent for wind and solar, and these shares shifted little by 2013 (15.4 percent nuclear, 12.4 percent wind and solar). Germany in 2013 was thus still more dependent on nuclear fission than on new renewables.

What has been in it for the consumers? Germany has the highest residential electricity prices of all the major economies in the European Union, and even the lower prices charged to the country's large industrial consumers are higher than in France or the United Kingdom (but lower than in Italy). What has this done to carbon emissions? Between 2008 and 2012, during the years of the fastest expansion of German wind and solar, the country's CO2 emissions fell by 7 percent, while U.S. emissions, without similarly massively subsidized wind and PV generation, fell by 9.5 percent.

Moreover, the expansion of Europe's new renewables does not appear to be accelerating, and in some cases the latest trends are even below the earlier growth rates. The latest Renewable Energy Progress Report mandated by the European Commission shows that of all the specific 2020 targets for the European Union, only one, PV electricity generation, is likely to be met — but that is the lowest contributor in terms of primary energy. Even if the European Union meets that target, it will add only about 7 million tons of oil equivalent (Mtoe) to the EU's energy supply. In contrast, trends for all others indicate moderate to major underperformance. Offshore wind turbines were expected to generate an equivalent of 12 Mtoe by 2020, but will likely supply less than 4 Mtoe; onshore wind turbines were to bring in 30 Mtoe and will deliver only about 18 Mtoe; solid biomass will contribute less than 90 Mtoe, rather than the expected 104 Mtoe; and modern biofuels will add about 20 Mtoe, rather than 30 Mtoe.

Densely populated and highly industrialized Europe in general, and Germany in particular, are too dependent on imported Russian natural gas and Middle Eastern crude oil: they need more electricity generated domestically by new renewables such as wind and solar. They also should develop these resources in a gradual, organic manner, not by rhyming fiats (20 by 20, 30 by 30). And all people reporting on those achievements should take a while to check their technical terms and the real numbers. That headline should have said: "Germany produces less than half a percent of its energy with solar PV."

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