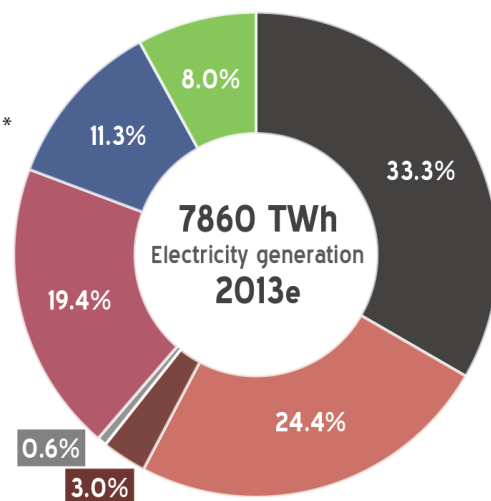
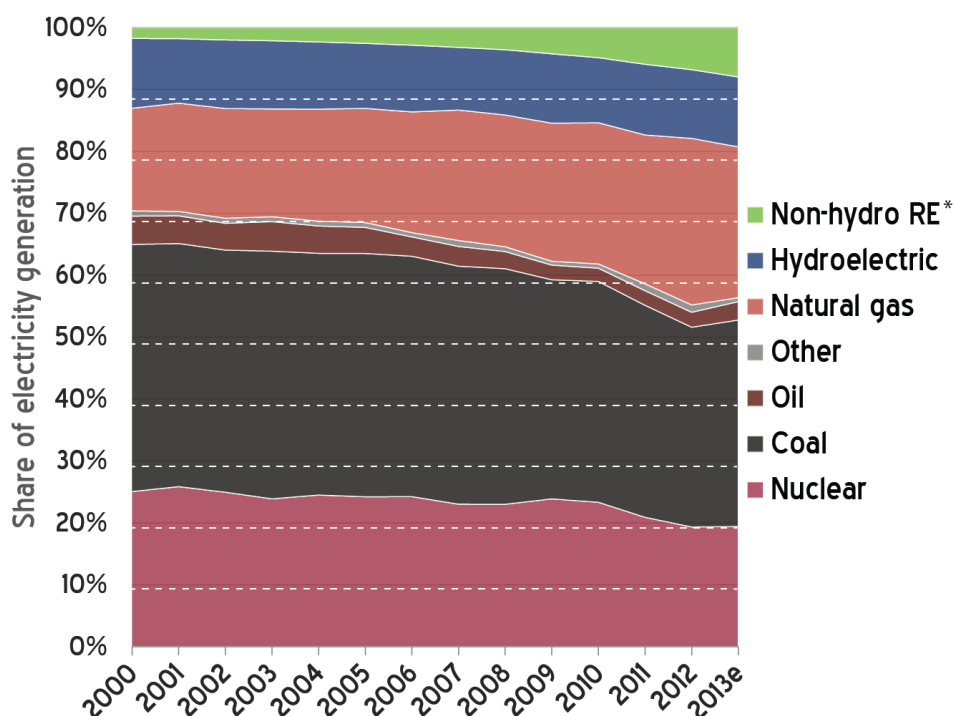


# G7's Energiewende: Right direction, wrong speed

A brief country-by-country overview of the G7's electricity mix, progress in GHG emission reduction and Greenpeace's demands

## G7 | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

In March 2015, the International Energy Agency announced that the annual rise in global carbon emissions had stalled in 2014 following a slow down in 2013. While it is too early to celebrate and take these figures to represent an irreversible turnaround, it's still good news. After all, the decline of emissions is not the result of a major slump in economic growth, such as the 2008 financial crisis. Rather, China is beginning to clamp down on its coal

sector, partly to decrease pollution. And worldwide, renewable energies – especially wind and solar power – are being added to the grid on a massive scale. The G7, as large GHG-emitters (both historical and current), have an obligation to add momentum to this development and help the world on its way towards a future of 100 percent renewables for all. These seven profiles provide a quick overview of the power sector in each G7 country.

While renewables are on the increase across the G7, this is happening at very different speeds. Germany, Italy and the UK are pushing forward, but the USA, Japan, Canada and France are lagging behind. Within the G7 group overall, non-hydro renewables achieved a share of 8 percent of the electricity generation in 2013. So far this is not enough to drive carbon emissions in the group down at the speed that is needed. In the 22 years between 1990

and 2012 the G7 only managed to decrease GHG emissions by a meager 1.3 percent. As a result, the seven states, while only accounting for 10 percent of the global population, were responsible for 26.3 percent of global carbon emissions (2013). It is clear that the inevitable transition from fossil fuels and nuclear power to renewable energies needs to pick up speed in order for the G7 to contribute their fair share in the fight against global warming.

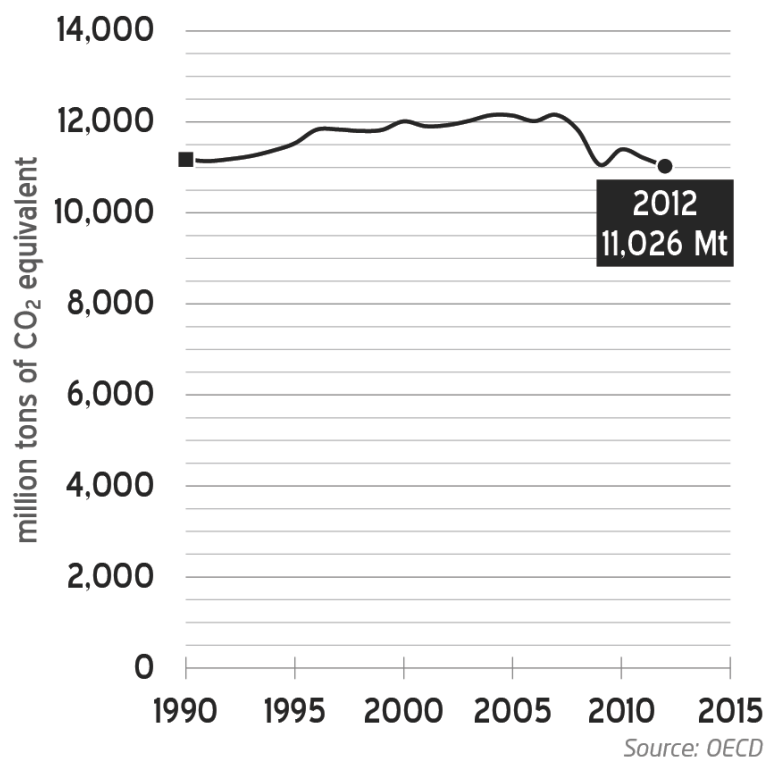
While the renewable energies boom is still largely policy driven, there are utilities that are already starting to build solar power plants and wind farms for purely economic reasons now that the cost of these two energy sources has become highly competitive compared to fossil-based energy and nuclear power. This trend is expected to continue in an increasing number of countries and with increasing speed, as unlike hydropower, there are significant untapped solar and wind resources in almost all parts of the world.

If this trend does continue, more countries will have significant shares of non-hydro renewable energy in their power supply by 2020.

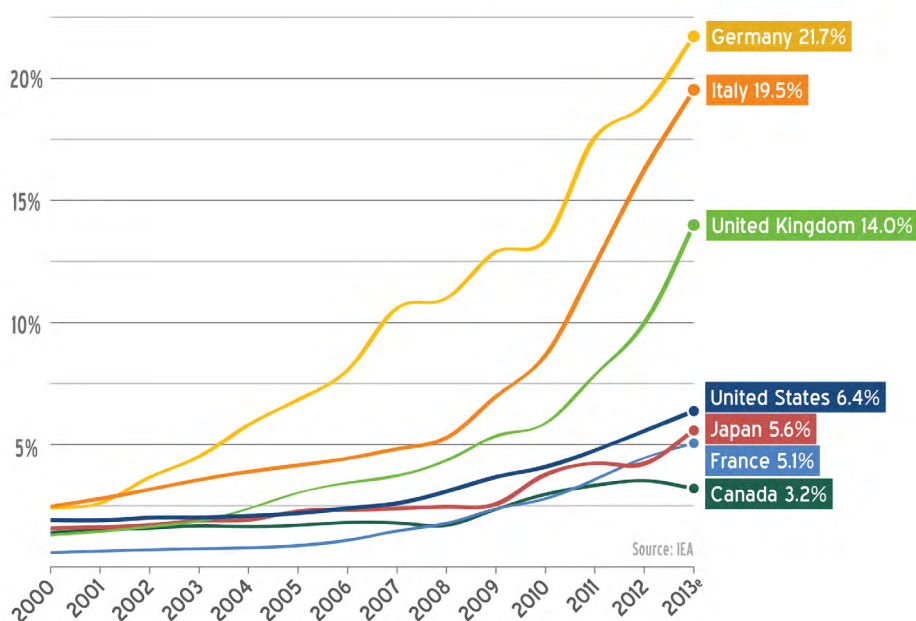
## Greenpeace demands

The G7 needs to establish a bold vision of a just transition towards 100 % renewable energy with access to energy for all people by phasing out fossil fuels and nuclear power by 2050.

## G7 | GHG emissions since 1990



## Share of non-hydro renewables in electricity generation

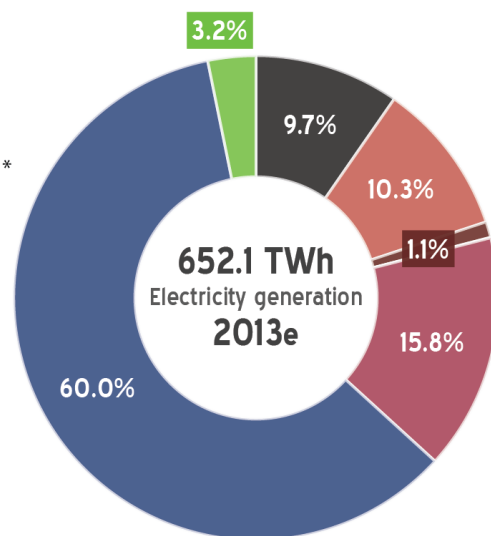
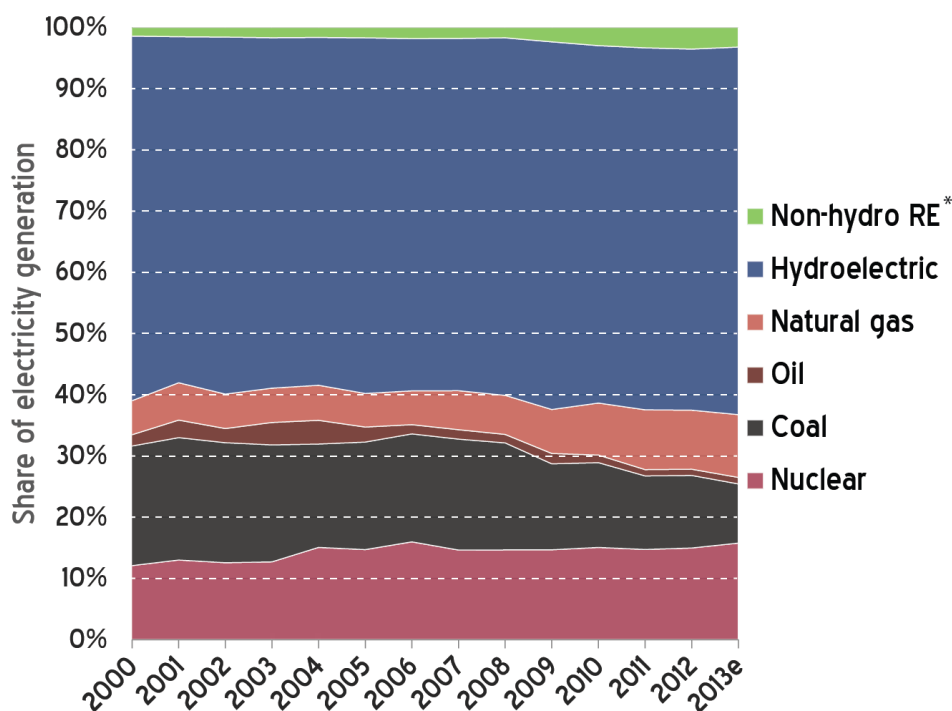


# Canada

## In and out of climate agreements

- Climate target: 30 % reduction by 2030 relative to 2005
- CO<sub>2</sub> emissions compared to 1990: + 23 % (2013)
- Annual CO<sub>2</sub> emissions per capita 15.7 tons (2013)
- Share of renewable power in 2013: 63.2 %

### Canada | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

Canada's power supply is relatively clean, but unfortunately not for reasons that are easy to copy elsewhere. Hydropower alone makes up roughly 95 percent of renewable electricity supply. Not every country has such tremendous hydropower resources relative to its population. The provinces of Newfoundland and Labrador, Québec, Manitoba, British Columbia, and Yukon all have 90 percent or more hydropower. Furthermore, the share of renewable electricity has grown only slightly from around 60 percent in 2000 to 63 percent in 2013.

Energy policy also differs from one province to another, with a relative lack of leadership from the national government. For instance, Ontario forged ahead with renewables in its Green Energy Act of 2008, whereas Alberta has gigantic oil and gas reserves, much of it from shale. Ontario also switched off its last coal plant in 2014, leaving the province without any domestic coal power production.

#### Carbon emissions stable after increase

As a nation, however, Canada's performance has been mixed, if not

disappointing. A signatory of the Kyoto Protocol, Canada originally aimed to reduce its greenhouse gas emissions by six percent relative to 1990 by 2012. When the country realized its emissions had risen, not dropped, by more than 20 percent, it stepped away from the Protocol in 2011 – the only signatory to the Protocol to do so.

Nonetheless, the Canadian government continues to set greenhouse gas targets for itself. In May, the country's Environment Minister announced a plan for a 30 percent reduction below the 2005 level by 2030. The

announcement was an advance over the pledge in Copenhagen for a 17 percent reduction (relative to 2005) by 2020. Unfortunately, Canada is not on target for its 2020 reduction, so this target-setting practice may turn out to be more political positioning than a sign of genuine political commitment. In particular, the government's commitment to expanding tar sands production and export is incompatible with achieving significant GHG reductions.

### Renewable energy in the pipeline

In 2014, the Canadian wind market grew by 1.9 GW, bringing the country up to roughly 9.7 GW in total installed capacity. With its tremendous wind resources combined with the flexibility of hydropower, Canada should have little problem phasing out fossil fuel and nuclear power in electricity supply should it choose to do so.

Solar power has been installed to a lower extent, with 1.2 GW connected to the grid at the end of 2013. Growth has been healthy at hundreds of megawatts per year over the past few years, but solar nonetheless remains a marginal source of electricity in Canada, making up 0.06 percent of electricity supply in 2013. Though Canada is a northern country, most of the population – and hence, most power consumption – is found close to the US border, where solar conditions are generally better than in Germany, the country with the most installed PV capacity worldwide. The share of wind power also remains quite small at 1.5 percent in 2013.

## Canada | GHG emissions since 1990



Source: Canadian NIR 2015

## Greenpeace demands

- As a major supplier of carbon to the world, Canada must divest from fossil resources. The country is not only struggling to reduce its own carbon emissions at home, but also providing fossil fuels for other countries to burn.
- Canada is in an enviable position to complement fluctuating wind and solar with dispatchable hydropower. The country can easily strive for a 100 percent renewable power supply by phasing out both coal and nuclear.
- The Canadian government must take climate agreements seriously. As a supplier of carbon to the world,

Canada sets an example for others to follow. By not meeting its own voluntary targets, the Canadian government discredits the entire climate negotiation process. Refusing to accept mandatory targets only makes matters worse.

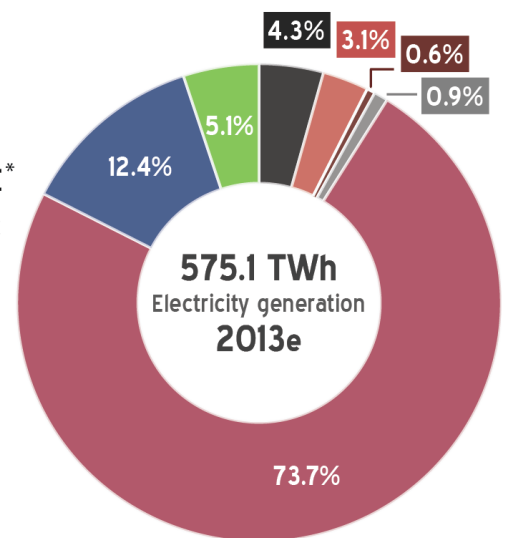
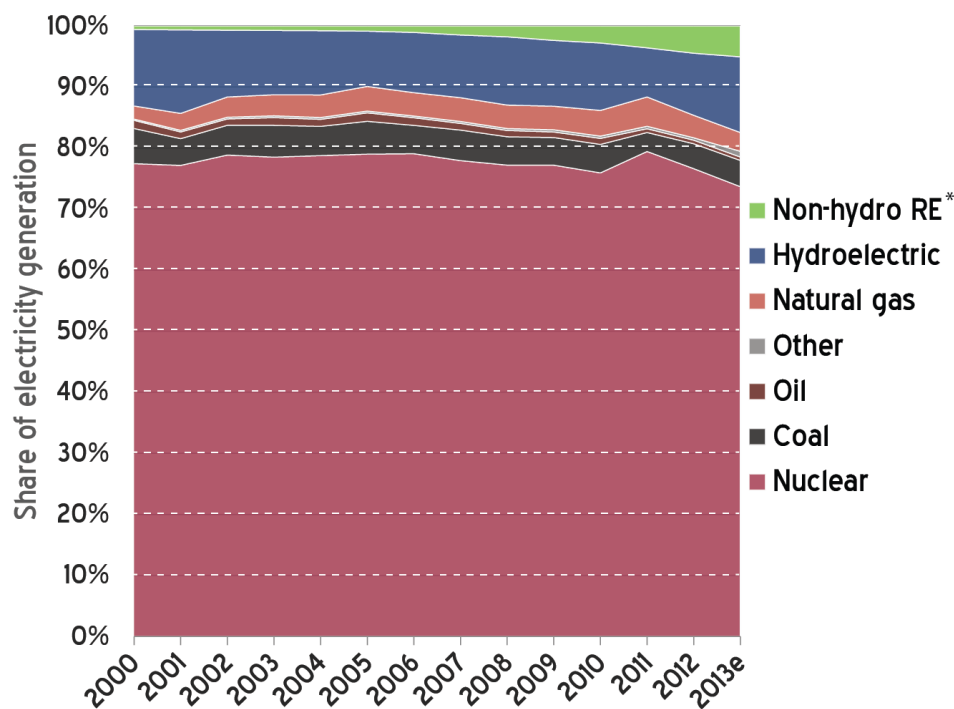
- Keep biomass at home. Canada – like the United States – is a major supplier of wood pellets to Europe, many of which are co-fired in coal plants, especially in the UK and Belgium. Canada has tremendous biomass resources, but they must be managed sustainably – and international trade of biomass worsens that equation.

# France

## Most eggs in the nuclear basket

- Climate target: 20 % reduction by 2020 relative to 1990
- CO<sub>2</sub> emissions compared to 1990: -6 % (2013)
- Annual CO<sub>2</sub> emissions per capita 5.7 tons (2013)
- Share of renewable power for 2014: 19.5 % (19.3 % in 2013)

### France | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

The French government plans to reduce the country's dependence on nuclear power, but the goal is hard to reach politically. The French Senate and Environmental Minister both oppose the plan, calling instead for new nuclear reactors. But in 2015, the French Parliament reasserted the original ambition: a 25 percentage point reduction in nuclear power from 75 to 50 percent of supply by 2025.

Because the nuclear sector is so entrenched in French society – from labor unions to political and scientific institutions – there is so much opposition to the policy that no

roadmap containing names of specific nuclear reactors has yet to be proposed. Furthermore, the goal is defined as “50 percent of power production,” leaving the door open for power exports.

France is already the largest net power exporter in Europe. If power exports can be increased, more nuclear plants could be maintained even if the share of nuclear is reduced; however, power lines to Germany, the UK, and Belgium are already frequently saturated, so new interconnections would be needed. The country is also pushing for electric mobility by providing special tax incentives for electric car purchases. An increase in domestic power demand

would provide more space for the current reactors, but the French grid operator believes consumption will remain flat even if there is slightly ambitious electric car growth.

### Carbon emissions

French carbon emissions have remained relatively stable over the past 20 years, albeit at a level roughly half as high per capita as in Germany and Japan – and only a third of the level in the US and Canada. Nuclear power, which makes up 75 percent of electricity supply and 40 percent of total energy consumption, is the main reason for this low level. In the past

few years, however, carbon emissions have begun to drop in France. The country has ramped up wind and solar in recent years, and electricity from oil and coal have been squeezed out in order to fulfill European regulations. Combined with unusually warm weather in 2014 – a phenomenon that affected electricity and energy consumption across Western Europe – coal power fell by 58 percent and natural gas by 28 percent. The result was a 40 percent reduction in CO<sub>2</sub> emissions from the power sector last year. Otherwise, carbon emissions have dropped as a result of lower industrial activity, lower emissions from road transportation.

### Renewable energy in the pipeline

Hydropower still makes up nearly three quarters of renewable electricity generation in France, but wind power and photovoltaics continue to grow significantly, though not nearly at the rate needed or recommendable. 2014 was the third biggest year ever for wind power in France with nearly a gigawatt newly installed, bringing the total up to 9.1 GW. Likewise, solar growth was the third greatest ever at 926 MW, producing a total PV capacity of 5.3 GW. These numbers are less impressive in terms of the country's potential, however. France has far better wind and solar conditions than Germany, for instance, yet the Germans have more than four times as much wind capacity and seven times more solar installed.

### France proves nuclear incompatible with wind + solar

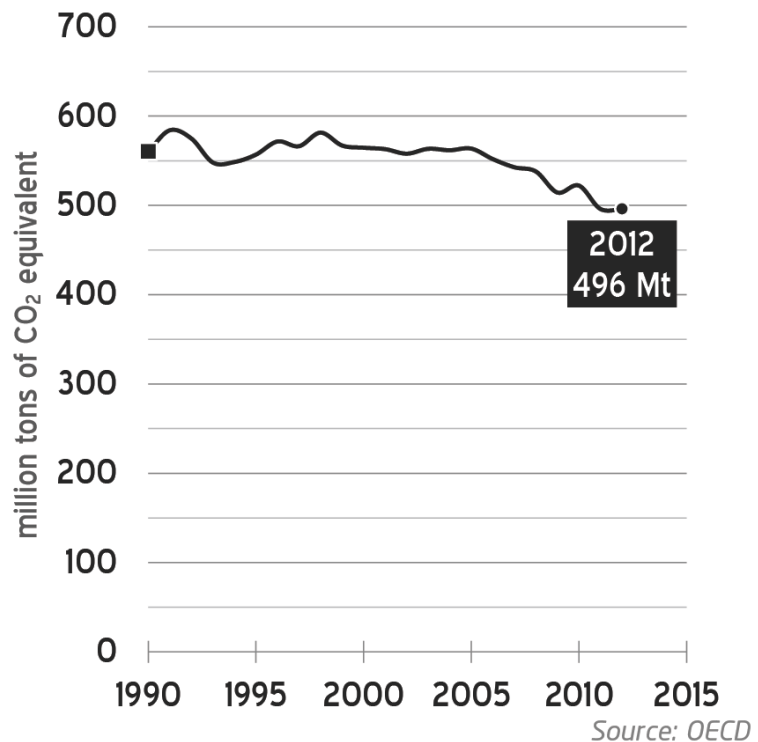
Towards a low-carbon power supply, there are calls for nuclear power in combination with wind and PV. With the highest share of nuclear power in the world, France demonstrates that this combination is not possible. France is keeping the growth of wind and solar in check to protect its nuclear fleet. Fluctuating wind and solar require very flexible backup generators, and nuclear

is the least flexible of all power plant types. Spikes in wind and solar power production will require fast changes in the output of other generators, and nuclear reactors cannot respond so flexibly. In return, France is already struggling to meet peak demand—a record 101 GW in 2012—because its nuclear fleet cannot ramp up beyond around 63 GW.

## Greenpeace demands

- France must make itself fully independent of nuclear power, starting by closing at least 5 reactors by the end of 2018 to be on track with its 50% of nuclear in electricity mix by 2025. Already, the financial disaster of the EPR reactor design in Flamanville and Finland have led to a downgrade of Areva on financial markets. The French government seems poised to fix the problem by taking over its former national champion. Clearly, nuclear power has become too big to fail in France

## France | GHG emissions since 1990



– but failing, it is.

- The PPE energy plans should be specific. This summer, the French energy law will be finalized for 2015 – 2018 and 2019 – 2023. There should be concrete plans and tools to meet the objectives set.
- French nuclear blocks the Energy Union. The French are surrounded by countries (Belgium, Germany, Italy, and the Iberian Peninsula) that have developed a lot of wind and solar. The inflexibility of the French nuclear fleet will increase the need for power storage when nuclear reactors cannot switch off fast enough, and the grid will be clogged, thereby hampering power trading.
- France can reach its goals with renewables. The French goals for efficiency and carbon reductions should be strengthened and be complemented by a faster development of renewable energy, as the country has far greater renewable energy potential than its targets suggest.

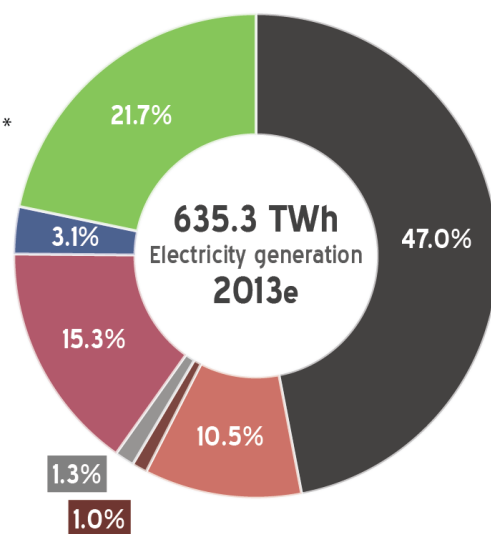
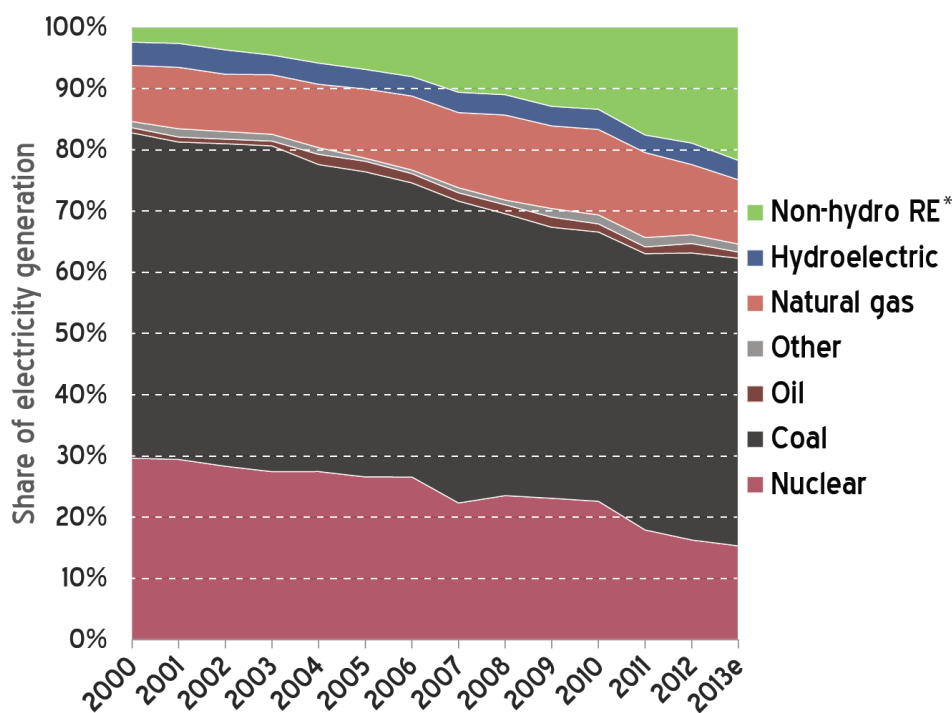


# Germany

## Near the midpoint of the Energiewende

- Climate target: 40 % reduction by 2020 relative to 1990
- CO<sub>2</sub> emissions compared to 1990: - 17 % (2013)
- Annual CO<sub>2</sub> emissions per capita 10.2 tons (2013)
- Share of renewable power in 2014: 25.8 % (24.8 % in 2013)

### Germany | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

Germany's energy transition (Energiewende) has multiple potential starting points, including anti-nuclear protests in the 1970s, the Feed-in Act of 1991, and the Renewable Energy Act of 2000. In any case, it has been underway for many years now. In contrast, it has a clear ending: by 2050, the country is to get 60 percent of its energy from renewables. Germany is therefore now approaching the midpoint of its energy transition, which will continue for another 35 years.

Most progress has been made to date within the power sector. The share of renewable energy in electricity

generation grew from six percent in 2000 to around 25 percent in 2013. This growth is nearly equally spread across wind power, solar power, and bioenergy (roughly half of which is from waste). Note that Germany is a major net exporter of electricity, reaching record levels in 2013 and 2014. Because renewable energy has a priority on the power grid, foreign demand increases the production of conventional power. Without net power exports, renewable electricity covered around 27 percent of domestic demand.

#### How was nuclear power replaced?

In 2011, the German government roughly re-implemented phaseout roadmap of 2002, which it had reversed only the year before. Since then, nuclear power production has fallen by 44 TWh, equivalent to around eight percent of demand. However, by 2013, the growth in renewable energy had already outstripped the shortfall in nuclear; by 2014, renewable power had grown by 56 TWh. That year, electricity from fossil fuels fell to a 35-year low as natural gas and hard coal were squeezed out further. Unfortunately, electricity from lignite remains in a relatively safe position, having

remained roughly stable since 2003 at around a quarter of German power supply. Because lignite is Germany's only significant domestic source of fossil fuel, German divestment from carbon resources will mean leaving most of this lignite in the ground – a step that has met with opposition from some labor unions.

### Renewable energy in the pipeline

At current growth rates, Germany is likely to reach its target of 35 percent by 2020 for renewable electricity. However, because so little progress is being made outside the power sector the share of renewable energy remains quite low at 11 percent, so Germany will probably not reach its target of 20 percent renewable energy by the end of this decade without further policy support. In addition, the country is not on target for its carbon reduction target of 40 percent by 2020, primarily because the share of lignite in power supply remains high and is unlikely to shrink during the nuclear phaseout without a much higher carbon price in emissions trading or additional national policy changes.

## Germany | GHG emissions since 1990



## Greenpeace demands

- ▶ Germany needs to clamp down on power from lignite. The country has tremendous brown coal resources, and this energy source is quite inexpensive because external costs are not internalized. The German government's recent proposal to reduce carbon emissions from old coal plants, which would have primarily affected lignite, would be a step in the right direction, but Chancellor Merkel needs to follow through on this idea. Greenpeace calls for a socially responsible phasing out of lignite by 2030, and from the coal in total by 2040.
- ▶ The Energiewende must take place outside the power sector as well. Germany is a major manufacturer of luxury cars and has blocked progress in fuel efficiency at the EU level. The German government should provide incentives for the country's car companies to produce a more future-proof fleet of efficient vehicles, including electric ones. Finally, although Germany is a leader in Passive House architecture, the renovation rate is still too low.
- ▶ All coal subsidies must be abolished. After two decades of negotiating with Brussels, Berlin will finally phase out domestic subsidies for hard coal mining in 2018. But other subsidies are still provided for lignite mining in the country. For instance, groundwater usage is artificially inexpensive, and large mining firms are exempt from the renewable energy surcharge as energy-intensive industry.
- ▶ 100 % renewable energy: For our benefit and for future generations, Germany must get rid of fossil fuels starting now and speed up the transition towards 100 % renewable energy by 2050.

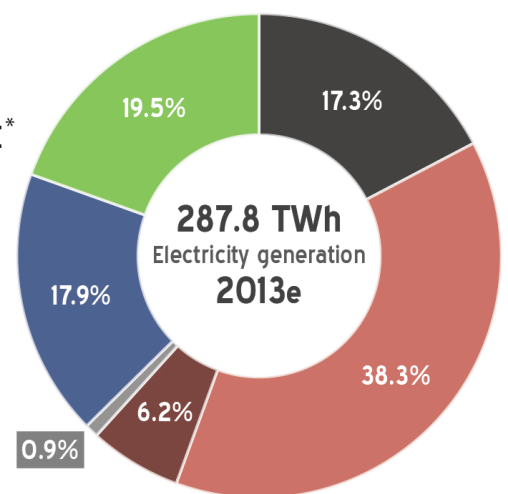
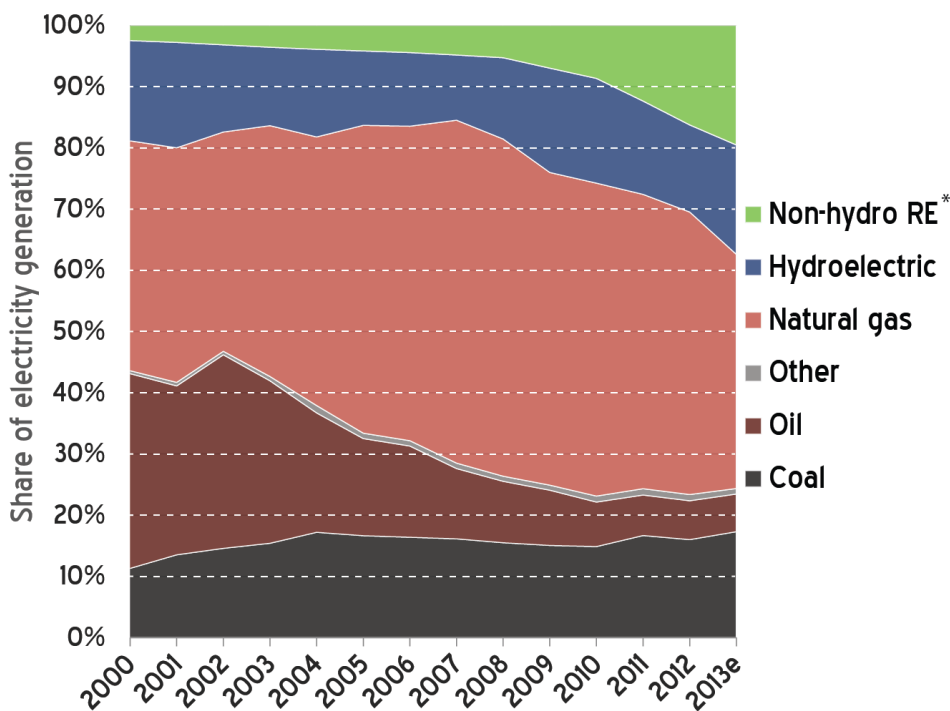


# Italy

## An unsung success story

- Climate target: 20 % reduction by 2020 relative to 1990
- CO<sub>2</sub> emissions compared to 1990: -8 % (2013)
- Annual CO<sub>2</sub> emissions per capita 6.4 tons (2013)
- Share of renewable power for 2014: 43.3 % (38.5 % in 2013)

### Italy | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

Since 2000, Italy has roughly doubled the share of renewable electricity in domestic generation from around 20 percent to nearly 40 percent today. Approximately half of that amount is hydropower, but solar and wind have grown rapidly, especially since 2008. As a share of total power consumption, PV made up 7.5 percent of supply in 2014, the largest percentage of any G7 country. In addition, Italy had around five percent wind power and five percent electricity from bioenergy. The country also has a marginal share of geothermal electricity.

The Italians generally import roughly 15 percent of their power supply (14 percent in 2014), however, so these shares are slightly higher when expressed in terms of domestic generation alone, as in the chart below. For instance, in 2014 renewable electricity made up 43.3 percent of national production but only 37.5 percent of national consumption. Most of all, the share of oil in power consumption has decreased over the past decade; Italy is the largest consumer of oil in the power sector within the G7 along with Japan.

### The Italian nuclear phaseout

Italy's dependence on imports is interesting in another respect: so much of the electricity comes from France. The electricity imports are therefore largely nuclear power. Yet, after Chernobyl (1986) Italy resolved to phase out nuclear entirely, a process completed only four years later. Nonetheless, nuclear power still makes up roughly 4 – 5 percent of total power supply in Italy through imports.

After Fukushima, a referendum was held in which Italians rejected then –

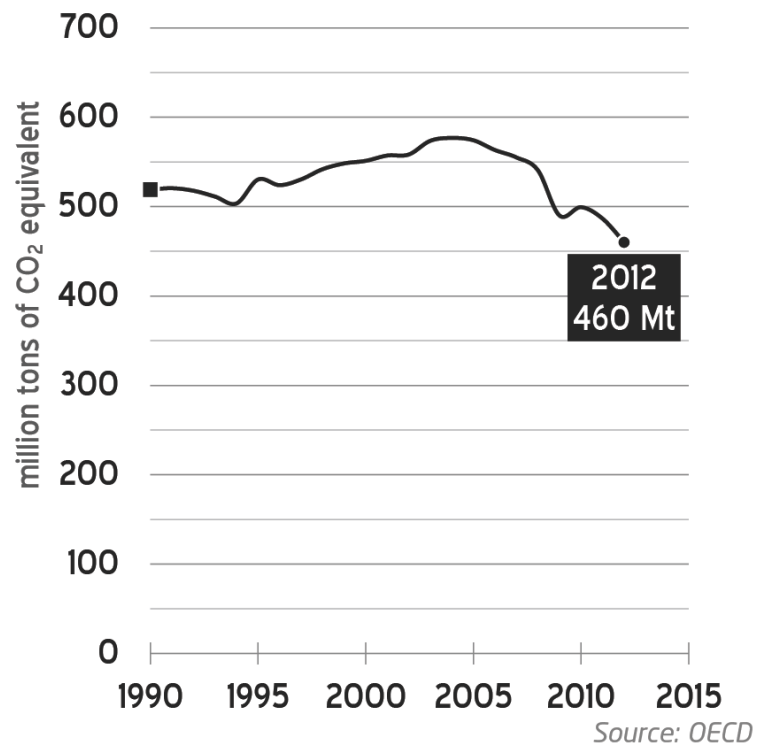
Prime Minister Berlusconi's plans to construct four new EPR reactors; to this day, not a single one has been completed worldwide, so Berlusconi's plans were risky since the technology had not (and still have not) yet been proven.

### Carbon emissions

Italy is one of the more successful countries in reaching its 2020 targets for efficiency, renewables, and carbon reductions. The country is clearly on track for the first two, whereas the CO<sub>2</sub> target is within reach but not completely certain based on data from 2013.

Renewable energy in the pipeline Unfortunately, it is unclear whether Italy will continue to grow renewable energy at the rate of the previous few years. The share of solar power, for instance, increased from a mere 0.21 percent of demand in 2009 to 7.5 percent of demand last year – a 36-fold increase. Yet, solar installations have slowed down considerably, with only 385 MW installed last year to produce a total installed capacity of 18.3 GW. Italy has also seen its wind power market slowdown, with only 108 MW installed in 2014, bringing the total up to 8.7 GW.

## Italy | GHG emissions since 1990



## Greenpeace demands

- **No retroactive policy changes:** The Italian government has clamped down on photovoltaics in particular by reducing compensation for systems that were already installed. Such retroactive changes undermine not only the PV sector, but also the credibility of Italy as an investment environment. Large institutional investors currently interested in alternatives to fossil fuels will shy away from renewable energy under such circumstances.
- **Use domestic renewables to increase independence.** With one of the highest levels of net power imports, Italy could continue to expand wind and solar power in order to offset demand for electricity from abroad. In doing so, the Italians would also reduce their reliance on nuclear

power in particular, an energy source they reject at home.

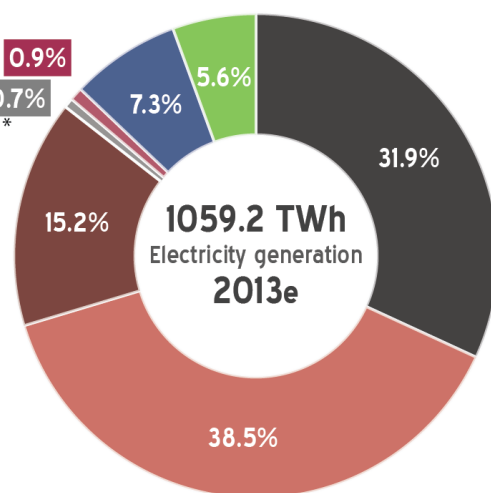
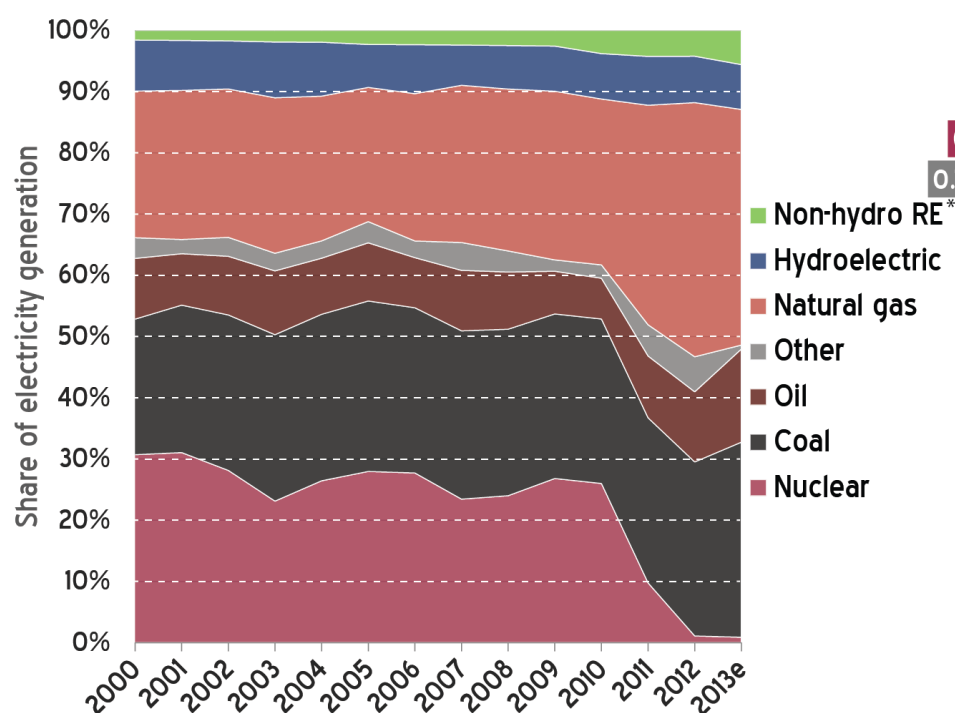
- **Italy is a forerunner in smart meters but is not using the technology to its full potential.** The country could become a pioneer in demand response to accommodate high chairs of fluctuating wind and solar power with flexible dispatchable backup, which would give it an industrial lead for a promising technological field.
- **Italy should adopt more ambitious targets.** When a country reaches its energy targets, the goals then become a stopping point if not properly designed. Over the next few years, the Italian renewable energy market might stall unnecessarily. The goal should be “at least” a certain percentage by a certain year to allow growth and progress to continue.

# Japan

## Nuclear comeback or phaseout?

- Climate target proposed: 26 % reduction by 2030 relative to 2013
- CO<sub>2</sub> emissions compared to 1990: 17 % (2013)
- Annual CO<sub>2</sub> emissions per capita 10.7 tons (2013)
- Share of renewables in 2014: 14.2 % (13 % in 2013)

### Japan | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

Current Japanese energy policy fails to secure the necessary and achievable reductions in carbon emissions, while also risking future severe nuclear accidents. One consequence of the Fukushima Daiichi nuclear accident was that it forced a reexamination of energy policy with growing public demand for a transition to an economy based on renewables. The chart below shows the drastic reduction in nuclear electricity output, shrinking from nearly 30 percent of power supply in 2010 to zero percent by September 2013, since when no electricity has been generated from nuclear reactors.

Polls continue to show that a majority of the Japanese public do not want a return to nuclear power. However, the response of the current government has been to promote restart of most nuclear reactors, restricting renewable energy growth and increase support for new coal power plants.

#### How was nuclear power replaced?

Given the abrupt shutdown of so much nuclear capacity, Japan has increased its fossil fuel use but also dramatically reduced electricity demand. In the period between 2010 and 2013 electricity use dropped by 78.9TWh, the

same amount generated by 13 nuclear reactors. Coal and oil consumption, while up between 2010-2012, was still below the levels before the 2008 economic crisis. Contrary to Japanese government claims, 65% of the cost increase in fossil fuel importation was due to a combination of the depreciation of the Japanese yen and oil prices changes in the global market. The post-Fukushima CO<sub>2</sub> emissions figures do not represent anything close to a sudden, drastic increase, but rather a continuation of emission trends that were already unsustainable. The share of renewable energy, which

began to increase in 2009, still remains a small share of overall electricity, but the potential for its rapid growth is enormous. The critical factor is Japanese government policy, which remains committed to a nuclear and fossil energy economy.

### Renewable energy in the pipeline

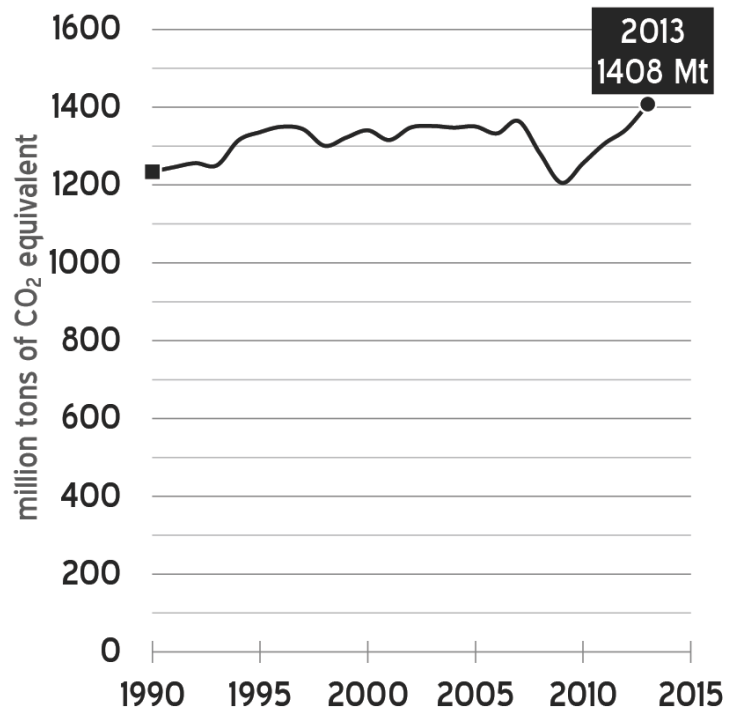
One consequence of the Fukushima nuclear plant disaster was the adoption in 2012, of new feed-in tariffs for renewables (solar, wind, geothermal, biomass and small-medium sized hydro). Since when, more than 70 GW of PV projects have been approved, 21 GW of which had been installed by the end of 2014. However, nuclear power companies, seeing the rapid growth and threat to their market, are seeking to limit grid access for renewables.

Unfortunately, wind power growth has been low. At the end of 2014, a mere 2.9 GW was connected to the grid, only 118 MW of which was newly installed that year. One major factor is that the same environmental impact assessments consider wind turbines as if they were multi-story office complexes, making the licensing process unnecessarily complicated and long. Overall, the future of renewable energy, which has increased since 2011, is at risk from current Japanese government policy. In fiscal 2013, non-hydro renewable electricity made up 2.3 percent of supply, increasing to three percent in fiscal 2014.

If all countries adopted Japan's proposed policy on emissions reduction, global warming would likely exceed 3 – 4°C in the 21st century. The current energy strategy of the Japanese government will not secure a transition to a renewable energy based economy. The government is proposing to generate 22 % of its electricity from

nuclear power by 2030, but this will not be possible. Due to major unresolved safety and ageing issues, as well as political and legal challenges, many reactors will never restart operation. A more likely scenario is between 6 – 8 % of electricity, and potentially as low as 1.8 %, will be generated from nuclear power by 2030. This reality, combined with efforts to limit renewable potential, will mean the future of Japan's energy supply will be to increase fossil fuel use the result of which will be a failure to even reach the current Governments weak climate target. However, Japan could achieve a rapid transition to renewable energy, with zero nuclear power, together with ambitious demand reduction, which will yield the necessary major reductions in carbon emissions – but it will not do so based on current policy.

## Japan | GHG emissions since 1990



Source: OECD, NIES

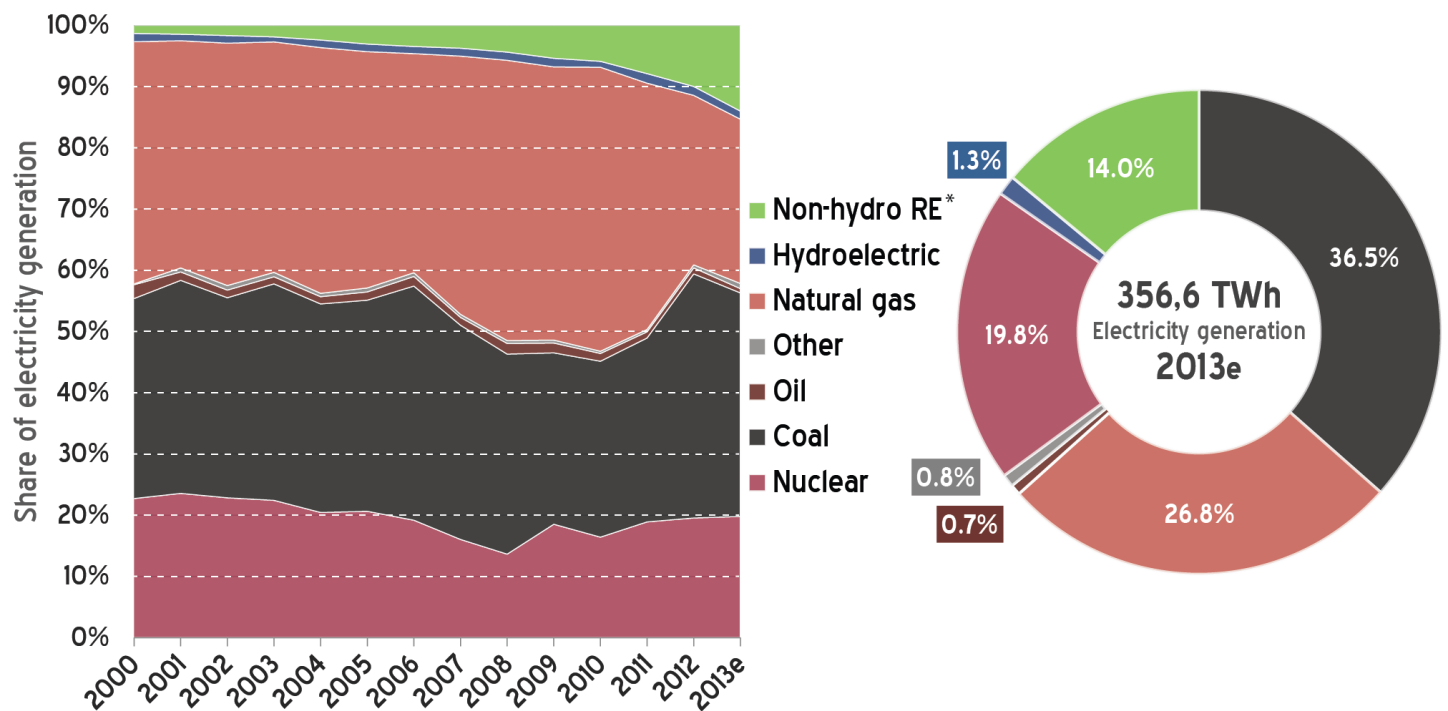
## Greenpeace demands

- ▶ Japan needs an ambitious and binding climate target – not the one being proposed by the Abe government. Current energy policy will not secure major emission reductions, therefore a revision of policy is essential.
- ▶ No nuclear reactor restarts – Japan has the potential to generate 56 % of its electricity from renewables by 2030 which would secure large reductions in carbon emissions. Japanese energy policy will fail to secure significant restart of nuclear reactors in the coming years. Ignoring this reality will lead to a failed energy and a disastrous climate policy.
- ▶ Japan needs a balanced renewable energy mix – not just photovoltaics. Unjustified planning obstacles to wind power need to be removed, together with increased support for offshore wind power develop.

## The Saudi Arabia of wind power?

- Climate target: 34 % reduction by 2020 relative to 1990
- CO<sub>2</sub> emissions compared to 1990: - 19 % (2013)
- Annual CO<sub>2</sub> emissions per capita 7.5 tons (2013)
- Share of renewable power in 2014: 19.2 % (14.9 % in 2013)

### United Kingdom | Electricity generation mix 2000-2013



The UK has achieved the most impressive reduction in carbon emissions within the G7. It has in recent times forged ahead with wind power both onshore and offshore, and has legislated an 80 percent carbon reduction target for 2050. Furthermore, as of 2015 the country seems to be on track for its 2020 renewable energy and greenhouse gas goals. But a closer look reveals a few shortcomings and challenges.

To begin with, the CO<sub>2</sub> reduction since 1990 was at least partly a side effect of economic policy, not primarily of climate policy. The UK switched from

coal to natural gas in the power sector when the country became a major natural gas producer and changes in electricity market structure made gas-power investment much more attractive. Most of this transition occurred prior to 2000; as the chart below shows, the share of coal power has remained relatively constant since then. As in Germany, the growth of renewable energy has mainly offset natural gas in the power sector based on price. Without further policy support, neither of these countries will transition from coal to gas. Finally, a 42 percent increase in net power imports, which covered 6.1 percent

of electricity demand in 2014, further squeezed out domestic electricity generation from fossil fuel. Against the long-term trend, power from coal decreased last year, partly when the second Drax unit switched from coal to biomass.

England and Scotland continue to pursue clearly diverging energy policies. The governing Conservative party policy is that local people should “have the final say on windfarm applications” onshore, while the Scottish government emphasis is to enable communities to benefit from them.

### Low-carbon electricity

The UK wishes to “decarbonize” its energy supply and to prioritize low carbon electricity, and then to electrify transport and heating. The role of the power system is therefore critical. The proposed future British power mix is to include nuclear as a significant source of low-carbon electricity. But by 2023, the UK will have only one nuclear power plant still running under current decommissioning plans. The government in London therefore wants to build a new EPR reactor at Hinkley Point. The financial arrangement has raised eyebrows, however. A 35-year inflation-adjusted fixed tariff of 9.25 pence per kWh (2012 prices) initially is to be provided along with loan guarantees and other forms of risk transfer to the public. The project is up in the air, however, for two reasons: first, the EPR design is now in question after flaws were discovered at the reactor under construction in Flamanville; second, Luxembourg and Austria are challenging the financial support scheme and third, commentators are saying this would be a bad deal because of the decreasing price of renewable energy, whose costs are already below the Hinkley price. The debate underscores a fundamental discrepancy in terms “decarbonization” and “sustainability,” with only the former including nuclear.

### The growth of renewable energy

After Germany and Italy, the UK has posted the greatest growth in variable renewable energy (solar and wind) within the G7 in recent years. The share of renewable electricity rose considerably in 2014 to 19.2 percent from 14.9 percent in the previous year. The increase was the combined effect of greater renewable energy generation and a 6.7 percent drop in power demand. Wind and solar power generation increased by 16.7 percent year-on-year.

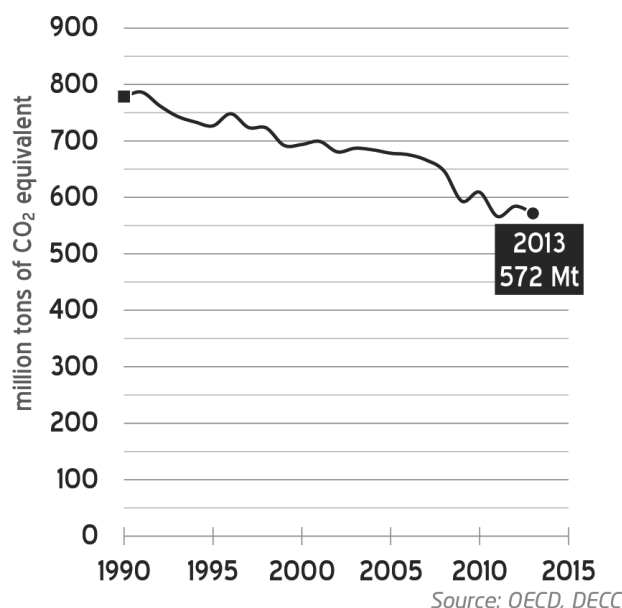
Last year, the UK posted the second strongest growth in wind power in the EU, with 1.7 GW added, bringing the

total up to 12.4 GW. Roughly a third of that capacity was offshore, making the UK the global leader in offshore wind farms. But the country has only begun tapping its potential; the UK has been called the “Saudi Arabia of wind power.” In 2014, the British had roughly the same amount of wind power capacity in the pipeline as was installed, but it remains to be seen whether the new government will go ahead with plans to support a doubling of installed capacity over the next few years. 2014 was also the best year ever for photovoltaics in the UK; roughly 2.2 GW was installed, bringing the total up to 5 GW. 2015 may also turn out to be a bumper year for PV, but only because planners are rushing to complete projects as policy support is curbed.

## Greenpeace demands

- ▶ UK should commit to phase out coal from existing power stations by early 2020s, creating ‘space’ on the power system for greater renewable generation
- ▶ The UK should review costs for different electricity systems and drive down build costs for new renewable power. The strike price for new nuclear power could bring up the price to more than 20 pence

## United Kingdom | GHG emissions since 1990



per kilowatt-hour by the 2030s – a completely uncompetitive level compared to the cost of renewables over the long-term, even allowing for their variable output levels. Yet, despite its tremendous wind resources, the UK also pays around nine pence for onshore wind power today. Other countries with similar excellent wind resources pay only half as much.

- ▶ Stop co-firing imported wood pellets. Burning biomass imported from across the Atlantic is an accounting trick; the switch from coal to biomass reduces domestic emissions, but the process drastically worsens the sustainability of the biomass, and this worsening does not show up in the count of carbon emissions. The UK is the main culprit within the EU for the co-firing of imported wood pellets.
- ▶ Communities can make their own energy. The English should follow the Scottish example and promote community energy. Local resistance in England against onshore wind farms is partially a result of utilities forcing large wind farms onto communities against their will. Let these communities build their own smaller wind farms, and public support will grow.

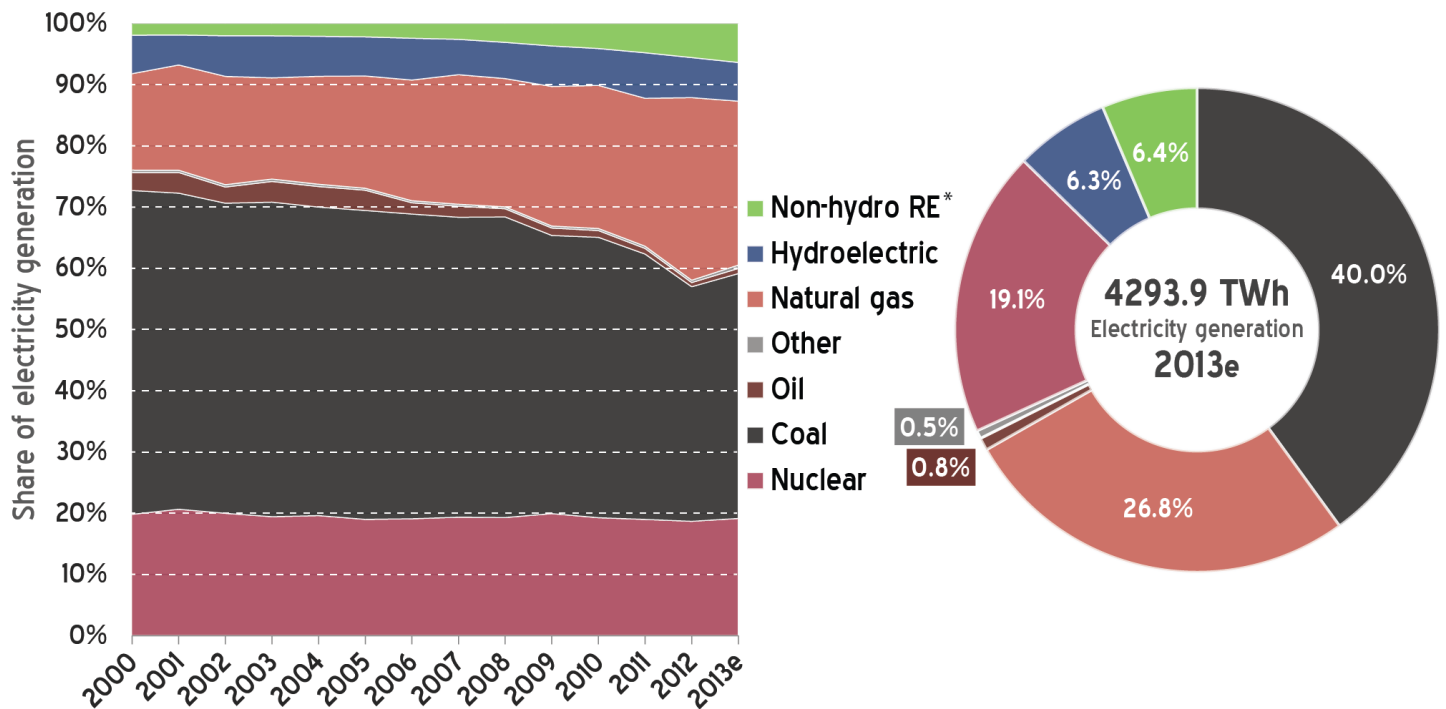


# United States

## A policy called “all of the above”

- Climate target: 26 – 28 % CO<sub>2</sub> reduction below 2005 levels by 2025
- CO<sub>2</sub> emissions compared to 1990: + 6 % (2013)
- Annual CO<sub>2</sub> emissions per capita 16.6 tons (2013)
- Share of renewable power in 2014: 13.4 % (12.7 % in 2013)

### United States | Electricity generation mix 2000-2013



\* including waste incineration | Source: IEA

In the United States, a lot of progress has come at the state and local levels rather than from the federal government in Washington, DC. The country currently lacks a comprehensive national energy and climate policy, with President Barack Obama referring to the unofficial one as “all of the above.” Under the “all of the above” strategy, the federal government has developed policies to curb carbon emissions, increase fuel efficiency standards, and encourage renewable energy development, while also opening up public lands and water to coal, oil, and gas extraction,

supporting the shale gas boom, and overseeing an increase in US fossil fuel exports. However, in March 2015 the Obama administration submitted carbon emission targets for 2025 to the UNFCCC after reaching an agreement with China last November. The Obama Administration’s soon to be finalized Clean Power Plan aims to cut carbon emissions from the power sector 30 percent from 2005 levels by 2030, assigning states targets for reducing their carbon intensity.

The “all of the above” approach welcomed the boom in natural gas

production – especially shale gas from fracking – within the power sector starting in 2006. The shift from coal to gas becomes clearly visible starting in 2009. By 2011, the US had become the largest natural gas producer in the world. But coal power rebounded in 2013 and 2014, rising from 37 percent of power supply in 2012 to 39 percent last year.

#### The role of nuclear power

Towards meeting its carbon reduction target for 2025, the “all of the above” approach could also include nuclear power. However, nuclear power is

not performing well under market conditions in the US. In 2013, four reactors were closed for economic and safety reasons, with a fifth being shut down in 2014. And other planned reactor power upgrades have recently been abandoned, also for financial reasons.

#### Finally, the nuclear renaissance

never materialized in the U.S. and the nuclear industry has now cancelled more capacity than is currently under construction. There are two new nuclear plants currently under construction (four reactors). The plant in Georgia, Vogtle, delayed by three years is now \$2.1 billion over budget. The Summer plant in South Carolina is currently two years behind schedule and 1.1 billion over budget. The only other reactor under construction in the US and the next to come on line is the once abandoned Watts Bar 2. But it has been under construction since 1973 and is also at least \$2 billion over budget.

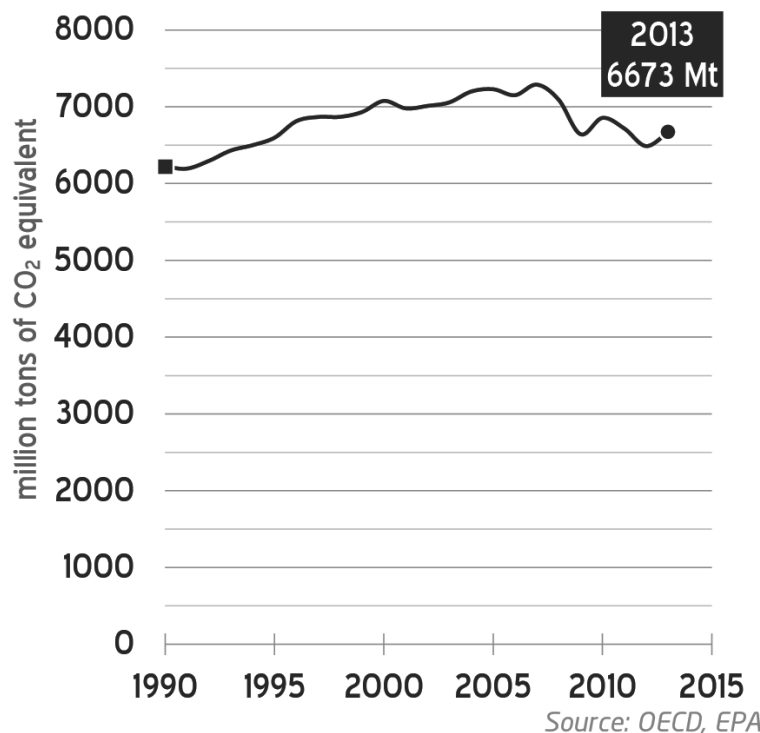
#### New capacity mostly renewable

Otherwise, the market in the US is mainly building additional natural gas, wind, and solar capacity under the current business framework, which includes tax credits for renewables. In the first four months of 2015, 84 percent of new power generation capacity was wind, solar, and geothermal. The remainder was natural gas and a small increase in hydropower. No coal, oil, or nuclear capacity was added in the first third of this year.

#### Carbon emissions

President Obama's signature climate policy, the Clean Power Plan, is anticipated to reduce carbon emissions by approximately 5.3 billion tons between 2020 and 2030. And additional regulations, alongside a large and growing anti-coal movement in the US will lock in additional GW of coal fired power plant retirements above and beyond what the Clean Power Plan

## United States | GHG emissions since 1990



requires. However, major challenges remain. The Obama administration continues to lease publicly-owned coal, oil, and gas reserves, often at below-market rates, unlocking tens of billions of tons of carbon emissions. US coal exports reached record highs in recent years, and the federal government has supported the construction of new LNG export terminals. The challenge is clearly to find a way to leave this carbon in the ground.

## Greenpeace demands

- ▶ The US needs to leave its fossil resources in the ground. While the US has reduced its domestic emissions, the federal government continues to lease publicly-owned fossil fuels and support increased fossil fuel exports to the world. A proper divestment strategy, which climate change requires, requires leaving most current fossil fuel resources buried.
- ▶ People have the right to make their own energy. Utilities are clearly turning towards renewable energy, especially as costs decline and major electricity customers like the IT sector demand 100 % renewable energy options. However, these utilities are actively working to stall the rise of distributed, 3rd party owned renewable energy, rooftop solar in particular. Utility companies should not become a barrier to the energy revolution. It's time to open up the market to new players, empowering citizens and communities as energy producers on previously monopolized power markets.
- ▶ The US government should take more of a leadership role in climate negotiations. Rather than insisting that developing countries take steps in unison with the United States, the US should work with the EU to demonstrate that a clean future is the best path towards energy independence and a clean environment. Rich countries in the West should set an example for others to follow.