

Wind power to dwarf other RE technologies in 2020

Wind looks set to consolidate its standing as the winning renewable energy technology across the EU over the next decade, according to data contained in the national renewable energy action plans (NREAPs) released so far by EU member states.

The plans, which were due to be submitted to the European Commission by 30 June 2010, outline how EU countries intend to achieve their goals under the 2009 Renewable Energy Directive.

ENDS Europe has now studied 13 of the plans either submitted to the commission or released at national level. This sample allows some initial conclusions to be drawn, as it includes plans from all the larger EU countries except France.

The Lithuanian and Slovenian plans were published by the EU executive on Friday as this analysis was being finalised. As a result, they are not included. Other countries including Portugal and the Czech Republic have also released draft plans for consultation, ENDS understands. They are not included in this analysis.

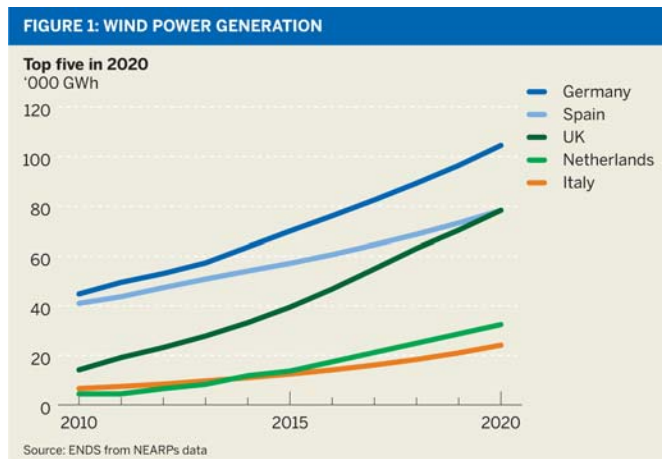
All the information in this article refers to the NREAPs either [submitted](#) to the commission or released in draft form by the following EU countries: Austria, Bulgaria, Denmark, Finland, Germany, Ireland, Italy, Malta, the Netherlands, Poland, Spain, Sweden and the UK.

ENDS Europe will publish in September a special report analysing all the plans and what they mean for the EU's renewable energy ambitions.

Wind wins the technology race

Wind power will dwarf all other renewable energy technologies in Europe, with more estimated installed capacity by 2020 than hydropower and solar put together. This is a remarkable development: hydroelectric power generation in the 13 countries analysed is currently nearly 70% higher than wind power.

By 2020, with an estimated generation of more than 100,000 gigawatt hours, [Germany](#) will confirm its lead ahead of Spain and the UK, both at about 78,000GWh. The UK plans to grow its generation more than fivefold from current levels.

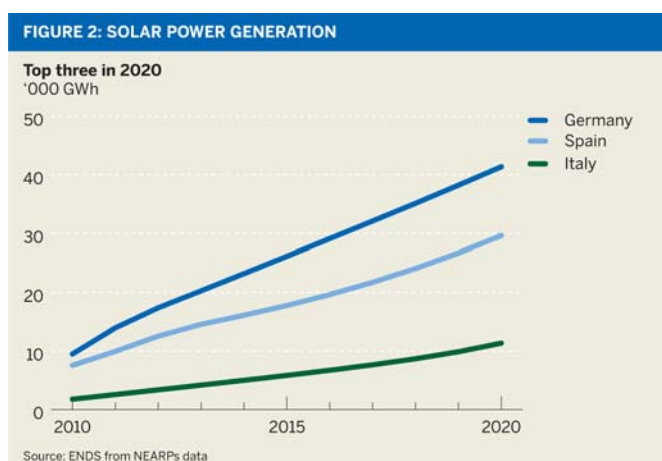


The Netherlands and [Poland](#) also have very ambitious growth plans in terms of electricity generation capacity, while Denmark's early lead in the sector is going to be superseded by more rapid growth in other countries over the next decade.

Wind power growth in the [UK](#), according to its national plan, is strongly reliant on off-shore generation, with installed capacity expected to reach nearly 13,000 megawatts by 2020, starting from 1,390MW today. This development, however, is highly dependent on significant funding becoming available.

The UK is also one of the few EU countries, alongside [Ireland](#) and to a smaller extent Spain, to plan for [wave and tidal](#) energy to play a role in the country's renewable energy mix. Marine energy in the UK is estimated to come on stream in 2016 and reach 1,300MW capacity by 2020.

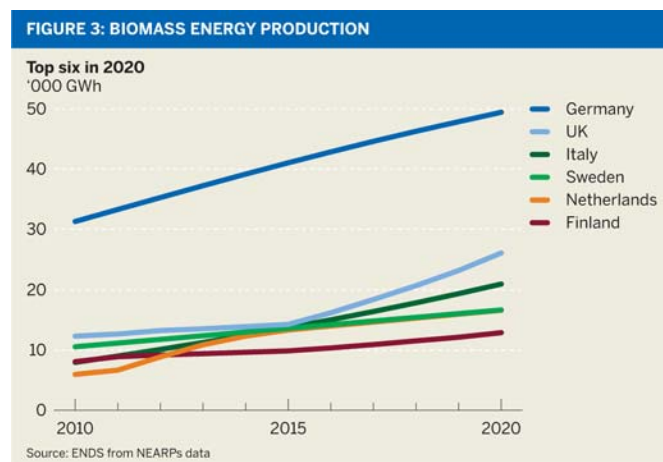
Germany remains the clear leader for solar, despite recent moves to cut generous [subsidies](#). Controversial new rules on feed-in tariffs in [Italy](#) and Spain also appear to fail to stop the rapid growth of solar generation in those two countries. In the 13 plans analysed solar power is estimated to grow more than fourfold over the next decade – faster than any other technology.



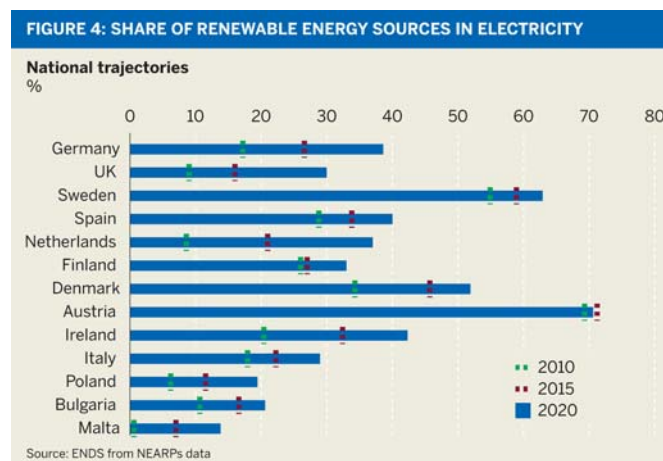
Hydropower, currently the largest source of renewable energy in the 13 countries analysed, remains a stronghold of renewable generation in Europe, with estimated generation in 2020 second only to wind. Spain, Sweden and Italy each hold nearly one

quarter of the total hydropower capacity in this group of countries. But very modest growth is expected overall.

Unsurprisingly, [biomass](#) is the most evenly distributed renewables source, with all 13 countries planning to grow their generation over the next decade. Germany is once again the current and future leader, aiming to generate nearly 43,000GWh in 2020. The Nordic countries confirm a strong performance, while Italy and the UK both plan significant growth, especially from 2015.



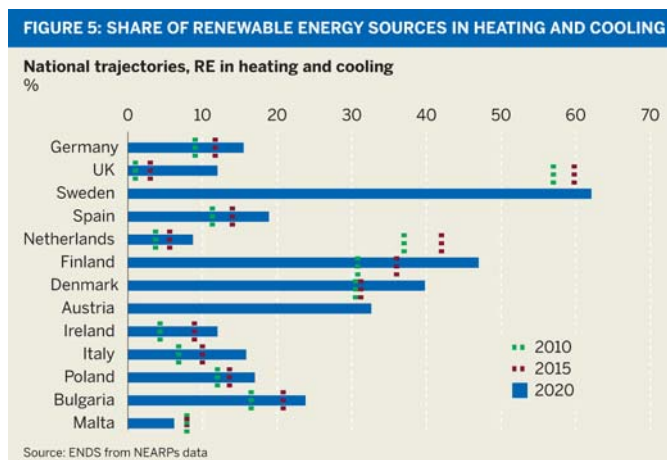
Out of the 13 countries analysed, Austria, Sweden and Denmark will have the biggest share of green electricity in final energy use in 2020 with 70.6, 62.9 and 51.9% respectively. While having more modest targets, Poland, the UK and the Netherlands will have to grow the most to meet them. Britain's share will have to increase from 9% to 30% over the next ten years.



Biomass dominates in H&C

Biomass will be by far the largest source of renewable energy in the heating and cooling (H&C) sector, with Germany, Sweden and Finland among the top users. Heat pumps follow suit, with Italy, the UK and Germany planning to rely on it the most. Solar energy will also play a role in H&C, particularly in Germany and Italy, while geothermal energy will only make a small contribution.

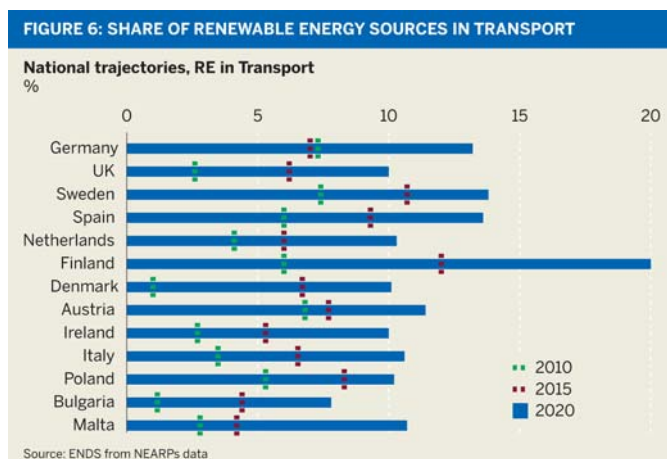
Nordic European countries confirm their supremacy for generating H&C from renewables, with shares rising to 62.1% in Sweden, 47% in Finland and 39.8% in Denmark.



In the transport sector, biodiesel will be the main source of renewable fuels, followed by bioethanol and its derivative ETBE. Spain, Germany and the UK will be among the largest users of biodiesel. According to the plans that ENDS has seen, the UK is to be by far the biggest user of bioethanol, followed by Germany.

The share of renewable fuels from green electricity will be relatively small. Unsurprisingly, none of the 13 countries plan to use hydrogen power, a technology expected to make a contribution after 2020.

The biggest share of renewables in transport fuels will be in Finland, with 20% in 2020. Most countries predict to have shares slightly above the mandatory 10% target.



Big struggles ahead

The action plans paint a rosy picture of future national efforts on renewable energy, with most countries expecting to meet their targets. But at the moment these are just

figures in spreadsheets. Implementing the plans over the coming years will be a [tough test](#) for member states.

Italy, Malta, Belgium, Denmark and Luxembourg predict to have deficits in 2020, which means they will need help from other countries to meet their targets. EU legislation provides for cooperation mechanisms such as the so-called joint projects and statistical transfers. Thirteen countries are willing to use joint projects, according to [national projections](#) published in January.

Developing renewable energy projects is a tricky business. The two largest [obstacles](#) are financing and planning permissions, which have been an endemic problem in France. The country wants to increase its wind power installed capacity to 25,000MW by 2020 but may find it difficult to do so due to public opposition.

Member states will need to persuade investors that they can deliver the figures in their plans. To achieve this, they will have to put in place the right policy frameworks to attract the level of funding needed to build additional renewable energy generation capacity.

For more information, please contact editor@endseurope.com

Electricity generation from RE, 2020
Installed capacity in megawatts - Power generation in gigawatt hours

| | Hydropwer | | Geothermal | | Solar | | Marine | | Wind | | Biomass | |
|-------------|------------------|------------|-------------------|------------|--------------|------------|---------------|------------|-------------|------------|----------------|------------|
| | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh | MW | GWh |
| Germany | 4309 | 20000 | 298 | 1654 | 51753 | 41389 | 0 | 0 | 45750 | 104435 | 8928 | 49457 |
| UK | 2130 | 6360 | 0 | 0 | 2680 | 2240 | 1300 | 3950 | 27880 | 78270 | 4240 | 26160 |
| Sweden | 16360 | 68000 | 0 | 0 | 8 | 4 | 0 | 0 | 4547 | 12500 | 2914 | 16689 |
| Spain | 22362 | 39593 | 50 | 300 | 13445 | 29669 | 100 | 220 | 38000 | 78254 | 1587 | 10017 |
| Netherlands | 203 | 714 | 0 | 0 | 722 | 570 | 0 | 0 | 11178 | 32408 | 2892 | 16639 |
| Finland | 3100 | 14410 | 0 | 0 | 10 | 0 | 10 | 0 | 2500 | 6090 | 2920 | 12910 |
| Denmark | 10 | 31 | 0 | 0 | 6 | 4 | 0 | 0 | 3960 | 11713 | 2779 | 8846 |
| Austria | 8997 | 42112 | 1 | 2 | 322 | 306 | 0 | 0 | 2578 | 4811 | 1281 | 5147 |
| Ireland | 234 | 760 | 5 | 35 | 5 | 13 | 500 | 1533 | 7045 | 19525 | 400 | 2453 |
| Italy | 15732 | 42000 | 1000 | 7500 | 8500 | 11350 | 3 | 5 | 16000 | 24095 | 4650 | 21000 |
| Poland | 1052 | 2599 | 0 | 0 | 3 | 3 | 0 | 0 | 6110 | 13541 | 1425 | 14383 |
| Bulgaria | 2549 | 3951 | 0 | 0 | 303 | 454 | 0 | 0 | 1256 | 2260 | 158 | 871 |
| Malta | 0 | 0 | 0 | 0 | 28 | 43 | 0 | 0 | 110 | 255 | 23 | 135 |

Heating and cooling from RE, 2020
Consumption in kilotonnes oil equivalent

| | Geothermal | Solar | Biomass | Heat pumps |
|-------------|-------------------|--------------|----------------|-------------------|
| Germany | 686 | 1245 | 11355 | 1144 |
| UK | n/a | 34 | 3914 | 2254 |
| Sweden | 0 | 6 | 9426 | 1046 |
| Spain | 9.5 | 644 | 4950 | 50.8 |
| Netherlands | 259 | 23 | 938 | 377 |
| Finland | 0 | 0 | 6610 | 660 |
| Denmark | 0 | 16 | 2643 | 370 |
| Austria | 40 | 269 | 3607 | 263 |
| Ireland | 0 | 20 | 486 | 84 |
| Italy | 100 | 1400 | 5520 | 2500* |
| Poland | 178 | 506 | 5318 | 63 |
| Bulgaria | 9 | 21 | 1073 | 0 |
| Malta | 0 | 3 | 2 | 0 |

* excludes cooling

Transport fuels from RE, 2020
Consumption in kilotonnes oil equivalent

| | Bioethanol | Biodiesel | Green elec. |
|-------------|-------------------|------------------|--------------------|
| Germany | 857 | 4443 | 666 |
| UK | 1743 | 2462 | 267 |
| Sweden | 465 | 251 | 198 |
| Spain | 400 | 3100 | 381 |
| Netherlands | 282 | 552 | 71 |
| Finland | 130 | 430 | 40 |
| Denmark | 94 | 167 | 29 |
| Austria | 80 | 410 | 272 |
| Ireland | 139 | 342 | 36 |
| Italy | 600 | 1880 | 386 |
| Poland* | | | |
| Bulgaria | 42 | 154 | 5 |
| Malta | 6 | 7 | 37 |

* data not included because different format used

Hydroelectric power generation in gigawatt hours

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Germany | 18000 | 18000 | 18000 | 19000 | 19000 | 19000 | 19000 | 19000 | 19000 | 20000 | 20000 |
| UK | 5100 | 5230 | 5360 | 5480 | 5610 | 5730 | 5860 | 5990 | 6110 | 6240 | 6360 |
| Sweden | 71249 | 70924 | 70600 | 70275 | 69950 | 69625 | 69300 | 68975 | 68650 | 68325 | 68000 |
| Spain | 34617 | 35353 | 34960 | 36023 | 36559 | 36732 | 37566 | 38537 | 38443 | 38505 | 39593 |
| Netherlands | 128 | 159 | 195 | 200 | 200 | 200 | 303 | 406 | 508 | 611 | 714 |
| Finland | 14210 | 14210 | 14210 | 14210 | 14210 | 14210 | 14250 | 14290 | 14330 | 14370 | 14410 |
| Denmark | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| Austria | 38542 | 38649 | 38783 | 38951 | 39161 | 39423 | 39750 | 40160 | 40672 | 41312 | 42112 |
| Ireland | 760 | 760 | 760 | 760 | 760 | 760 | 760 | 760 | 760 | 760 | 760 |
| Italy | 41571 | 41530 | 41507 | 41501 | 41514 | 41545 | 41596 | 41666 | 41757 | 41868 | 42000 |
| Poland | 2279 | 2311 | 2343 | 2375 | 2407 | 2439 | 2471 | 2503 | 2535 | 2567 | 2599 |
| Bulgaria | 3260 | 3340 | 3441 | 3472 | 3503 | 3534 | 3565 | 3798 | 3844 | 3898 | 3951 |
| Malta | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Wind power generation in gigawatt hours

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Germany | 44780 | 49453 | 53007 | 57273 | 63619 | 69953 | 76066 | 82465 | 89209 | 96358 | 104435 |
| UK | 14150 | 19130 | 23170 | 27790 | 33170 | 39430 | 46730 | 54800 | 63040 | 70320 | 78270 |
| Sweden | 4793 | 5564 | 6334 | 7105 | 7876 | 8646 | 9417 | 10188 | 10959 | 11729 | 12500 |
| Spain | 40978 | 43668 | 47312 | 50753 | 53981 | 57086 | 60573 | 64483 | 68652 | 73197 | 78254 |
| Netherlands | 4470 | 4472 | 6576 | 8322 | 11784 | 13655 | 17406 | 21157 | 24908 | 28657 | 32408 |
| Finland | 360 | 590 | 820 | 1060 | 1290 | 1520 | 2440 | 3350 | 4260 | 5180 | 6090 |
| Denmark | 8606 | 9335 | 9694 | 11321 | 11329 | 11242 | 11667 | 11837 | 11832 | 11787 | 11713 |
| Austria | 2034 | 2460 | 2844 | 3189 | 3500 | 3780 | 4032 | 4258 | 4462 | 4646 | 4811 |
| Ireland | 5504 | 6126 | 6244 | 7454 | 7751 | 11683 | 11425 | 12888 | 15440 | 16175 | 19525 |
| Italy | 6620 | 7451 | 8386 | 9689 | 10971 | 12440 | 14129 | 16079 | 18343 | 20987 | 24095 |
| Poland | 1911 | 2646 | 3381 | 4221 | 5271 | 6321 | 7371 | 8421 | 9471 | 11716 | 13541 |
| Bulgaria | 605 | 629 | 734 | 1009 | 1340 | 1672 | 1756 | 1952 | 2050 | 2152 | 2260 |
| Malta | 0 | 0 | 0 | 4 | 11 | 17 | 95 | 255 | 255 | 255 | 255 |

Biomass energy production in gigawatt hours

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Germany | 31296 | 33295 | 35280 | 37247 | 39176 | 41057 | 42868 | 44627 | 46298 | 47894 | 49457 |
| UK | 12330 | 12690 | 13260 | 13560 | 13910 | 14290 | 16220 | 18430 | 20730 | 23250 | 26160 |
| Sweden | 10567 | 11179 | 11791 | 12403 | 13016 | 13628 | 14240 | 14852 | 15464 | 16077 | 16689 |
| Spain | 4517 | 4655 | 4876 | 5151 | 5499 | 5962 | 6510 | 7171 | 7931 | 8876 | 10017 |
| Netherlands | 5975 | 6680 | 8882 | 10890 | 12332 | 13350 | 14008 | 14665 | 15324 | 15981 | 16639 |
| Finland | 8090 | 8910 | 9200 | 9420 | 9650 | 9880 | 10370 | 10930 | 11550 | 12150 | 12910 |
| Denmark | 3772 | 4132 | 4211 | 5773 | 5714 | 6035 | 6278 | 6763 | 7348 | 8412 | 8846 |
| Austria | 4720 | 4733 | 4749 | 4769 | 4794 | 4826 | 4865 | 4914 | 4975 | 5051 | 5147 |
| Ireland | 503 | 698 | 893 | 1088 | 1283 | 1478 | 1673 | 1868 | 2063 | 2258 | 2453 |
| Italy | 7967 | 9026 | 10129 | 11278 | 12478 | 13733 | 15047 | 16426 | 17873 | 19396 | 21000 |
| Poland | 3838 | 4568 | 5298 | 6029 | 6759 | 7489 | 8868 | 10247 | 11625 | 13004 | 14383 |
| Bulgaria | 2 | 56 | 122 | 199 | 559 | 656 | 1150 | 800 | 793 | 817 | 871 |
| Malta | 9 | 20 | 22 | 56 | 140 | 140 | 140 | 140 | 138 | 138 | 135 |

Solar power generation in gigawatt hours

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Germany | 9499 | 13967 | 17397 | 20293 | 23218 | 26161 | 29148 | 32132 | 35144 | 38243 | 41389 |
| UK | 40 | 120 | 240 | 410 | 610 | 890 | 1170 | 1440 | 1710 | 1970 | 2240 |
| Sweden | 1.4 | 1.7 | 1.9 | 2.2 | 2.4 | 2.7 | 3 | 3.2 | 3.5 | 3.7 | 4 |
| Spain | 7561 | 9945 | 12553 | 14570 | 16123 | 17785 | 19649 | 21741 | 24088 | 26719 | 29669 |
| Netherlands | 73 | 104 | 132 | 167 | 201 | 250 | 314 | 378 | 442 | 506 | 570 |
| Finland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Denmark | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 |
| Austria | 85 | 99 | 114 | 131 | 149 | 170 | 192 | 217 | 243 | 273 | 306 |
| Ireland | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 8 | 11 | 13 |
| Italy | 1769 | 2574 | 3374 | 4181 | 5000 | 5841 | 6717 | 7652 | 8685 | 9881 | 11350 |
| Poland | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| Bulgaria | 12 | 20 | 58 | 104 | 260 | 263 | 292 | 372 | 397 | 424 | 454 |
| Malta | 6 | 7 | 16 | 40 | 41 | 41 | 41 | 42 | 42 | 42 | 43 |

| National trajectories, % RE in transport | | | |
|---|-------------|-------------|-------------|
| | 2010 | 2015 | 2020 |
| Germany | 7.3 | 7 | 13.2 |
| UK | 2.6 | 6.2 | 10 |
| Sweden | 7.4 | 10.7 | 13.8 |
| Spain | 6 | 9.3 | 13.6 |
| Netherlands | 4.1 | 6 | 10.3 |
| Finland | 6 | 12 | 20 |
| Denmark | 1 | 6.7 | 10.1 |
| Austria | 6.8 | 7.7 | 11.4 |
| Ireland | 2.7 | 5.3 | 10 |
| Italy | 3.48 | 6.53 | 10.6 |
| Poland | 5.3 | 8.3 | 10.2 |
| Bulgaria | 1.17 | 4.4 | 7.8 |
| Malta | 2.8 | 4.2 | 10.7 |

| National trajectories, % RE in heating and cooling | | | |
|---|-------------|-------------|-------------|
| | 2010 | 2015 | 2020 |
| Germany | 9 | 11.7 | 15.5 |
| UK | 1 | 3 | 12 |
| Sweden | 57 | 59.8 | 62.1 |
| Spain | 11.3 | 14 | 18.9 |
| Netherlands | 3.7 | 5.6 | 8.7 |
| Finland | 37 | 42 | 47 |
| Denmark | 30.8 | 36 | 39.8 |
| Austria | 30.5 | 31.2 | 32.6 |
| Ireland | 4.3 | 8.9 | 12 |
| Italy | 6.79 | 9.98 | 15.83 |
| Poland | 12 | 13.6 | 17 |
| Bulgaria | 16.5 | 20.8 | 23.8 |
| Malta | 7.9 | 7.9 | 6.2 |

| National trajectories, % RE in electricity | | | |
|---|-------------|-------------|-------------|
| | 2010 | 2015 | 2020 |
| Germany | 17.2 | 26.6 | 38.6 |
| UK | 9 | 16 | 30 |
| Sweden | 54.9 | 58.9 | 62.9 |
| Spain | 28.8 | 33.8 | 40 |
| Netherlands | 8.6 | 21 | 37 |
| Finland | 26 | 27 | 33 |
| Denmark | 34.3 | 45.7 | 51.9 |
| Austria | 69.3 | 71.2 | 70.6 |
| Ireland | 20.4 | 32.4 | 42.3 |
| Italy | 17.93 | 22.23 | 28.97 |
| Poland | 6.2 | 11.52 | 19.43 |
| Bulgaria | 10.64 | 16.6 | 20.6 |
| Malta | 0.6 | 7 | 13.8 |

All tables created by ENDS based on national renewable energy action plans data