

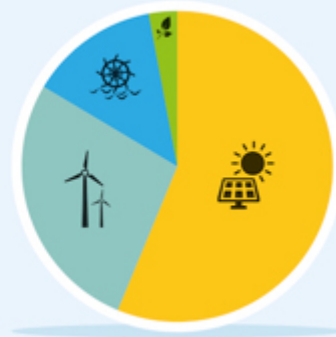


Federal Ministry  
for Economic Affairs  
and Energy



Energiewende  
**direkt**

18 May 2018



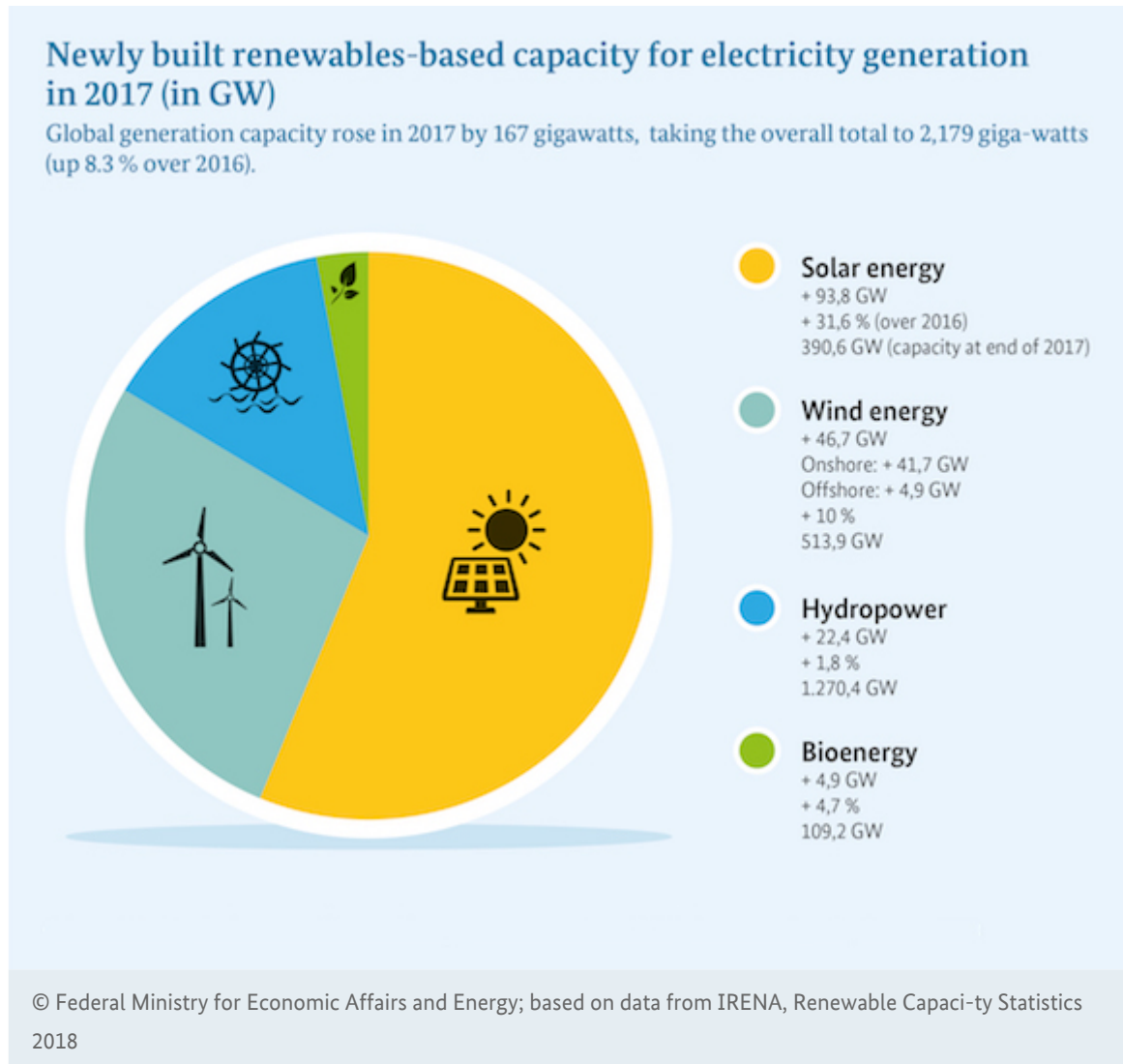
## Energy transition becoming a global business model

Renewable energy has become the centrepiece of global energy. [Find out more](#)



# Energy transition becoming a global business model

Renewable energy has become the centrepiece of global energy. When it comes to electricity generation, more renewables-based capacity was built in 2017 than conventional power plants.



The energy transition has long developed into a global phenomenon. According to the latest figures from the International Renewable Energy Agency IRENA, some 8.3% more renewables-based electricity generation capacity (net) was built in 2017 than in the previous year, a total of 167 gigawatts (GW). This was more than in conventional energy sector. Solar energy showed the strongest rate of growth, with an increase of 32% compared to 2016. Wind energy, the second largest renewable energy source after hydropower, expanded by 10%. According to the Working Group on Renewable Energy Statistics AGEE-Stat, in 2017, Germany added a further 8.3 GW of electricity generation capacity to its existing renewables-based stock (net). Wind energy posted the strongest growth, increasing by 6.3 GW to 55.9 GW (12.7% more than in the previous year). New photovoltaic capacity in Germany was equivalent to an extra 1.7 GW, bringing PV capacity up to 42.4 GW (+4.1%) at the end of 2017. This meant that at the end of last year, total renewables-based electricity generation

capacity in Germany amounted to 111.9 GW.

Around the world, renewable energy accounted for around 25% of electricity generation last year but, according to IRENA, this is not enough. The agency said that the UN climate goal of keeping global warming well below two degrees Celsius cannot be achieved on the basis of current energy policy.

## **Berlin Energy Transition Dialogue: Speeding up the energy transition**

When the Federal Government hosted its 4th Berlin Energy Transition Dialogue from 17-18 April 2018, a major task was to develop long-term prospects for the next steps in the energy transition based on statistics provided by IRENA. Secretary-General of the agency, Adnan Z. Amin, and Executive Director of the International Energy Agency IEA, Dr Fatih Birol, each presented studies that analyse how the two-degree objective set out in the Paris Climate Agreement can be implemented.

The IRENA study, entitled *Global Energy Transformation: A Roadmap to 2050*, estimates that we will need at least six times more renewables-based capacity than we have in the world today if we want to achieve the targets set. It also says that renewable energy sources will have to account for two thirds of energy consumption and 85% of electricity generation by 2050. So, according to the study, speeding up the energy transition would make good economic sense. By 2050, it says, 7.4 million jobs will disappear from fossil energy, while at the same time, 19 million new jobs will be created in renewables, energy efficiency, grid expansion and energy flexibility – a net total of 11.6 million more jobs in the energy sector worldwide. According to the analysis, the savings that are made possible as a result of the energy transition far outweigh the additional costs. IRENA's scenario indicates that completing a comprehensive, long-term energy transition by 2050 would cost \$1.7 trillion more each year than is being spent under current energy policy. However, costs of \$6 trillion a year could be saved through lower rates of air pollution, reduced environmental damage, and the improvements to human health that this would bring. In addition, the energy transition would stimulate economic growth. The study calculates that when compared to a business-as-usual scenario, economic output up to 2050 would increase by \$52 trillion.

## **The role of energy efficiency**

According to an IEA analysis presented at the Berlin Energy Transition Dialogue, expanding renewable energy is, on its own, not enough to reduce greenhouse gas emissions to the extent necessary. The underlying study, entitled 'Perspectives for the Energy Transition: The Role of Energy Efficiency', suggests that more efforts would be also needed across the world to improve energy efficiency which, it says, could generate 35% of the reduction in carbon emissions aimed for in the Paris Climate Agreement.

The IEA analysis shows how the three biggest energy-consuming sectors – industry, transport and buildings – can contribute to achieving these goals through raising their energy efficiency. Although investments in energy efficiency pay off over a plant's lifetime, as the study emphasises, this period is, it concludes, usually longer than consumers or companies take into account when making decisions.

The study goes on to show that a lack of knowledge and information about potential savings are also reasons why too little a focus is placed on energy efficiency. According to the IEA, global energy intensity – measured as the amount of primary energy demand needed to produce one unit of gross domestic product (GDP) – only improved by 1.7% in 2017, which was less than in the three years

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previous. This is why the IEA is seeking to provide energy-efficient advice to governments worldwide by means of analyses, best practice models and training.

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#### FURTHER INFORMATION

➔ IRENA study ‘Global Energy Transformation: A Roadmap to 2050’

➔ IEA study ‘Perspectives for the Energy Transition: The Role of Energy Efficiency’

➔ Video: Secretary-General of IRENA, Adnan Z. Amin, at the Berlin Energy Transition Dialogue

➔ Video: Executive Director of the IEA, Dr Fatih Birol, at the Berlin Energy Transition Dialogue

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## Aerial drones making it quicker to connect to the grid

**Hobby pilots use them to take spectacular pictures. But now they’re set to help with the energy transition: these unmanned aircraft – known as quadcopters – can drastically shorten the time it takes to put solar tower power plants into service.**



© DLR

The huge mirrors used by solar tower power plants usually take around a year to be correctly adjusted, sometimes even longer. Using aerial drones, however, could cut the time needed to just one or two weeks. “With the right combination of high image resolution, good data processing and precise flight manoeuvres, the quadcopters should be able to perfectly align solar fields of up to 60,000 mirrors within a few days,” says Christop Prah, Head of the joint HeliPoint project at the German Aerospace Center. He goes on to say that this would greatly speed up the commissioning of solar tower power plants, and that green electricity would be connected to the grid about six months faster.

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Solar tower power plants use thermal processes to generate electricity from solar heat. This differs from photovoltaic systems, which convert sunlight directly into electricity. The central tower plants use numerous concentrator mirrors called heliostats to direct sunlight onto the top of a tower. This is where the central receiver is located, which absorbs the concentrated solar radiation and converts it into high-temperature heat.

The mirrors used for solar tower power plants, which are slightly curved, have to reflect the sunlight onto the receiver precisely so that the energy can be used as optimally as possible. This is also vital – as concentrated sunlight that hits the wrong spot is a risk to the overall operation of the plant.

### **Flying computers control mirrors**

The project partners within the HelioPoint project want to equip the quadcopters with additional technology for their new field of application. The plan is for the drones to function as flying computers on which large data streams can be processed and then stored online. At the end of this, a two-stage process is to be used. Stage 1: The camera records the 3D coordinates of each one of the mirrors. Stage 2: An array of powerful, coloured LEDs is attached to the drone's target point. By reflecting these LEDs onto the mirror, the programme can calculate the precise alignment of the mirrors to a high degree of accuracy.

The procedure used to date is rather different to this. Each mirror is individually aligned to the tower with the help of natural solar radiation. As part of this procedure, the sun's pathway over the course of the day and year are taken into account. "By using the drone and the integrated LEDs, the process of adjusting the mirrors will not be dependent of the light of the sun and the construction of the tower, which is usually carried out by other companies," says Mr Prahl. He goes on to say that German companies will then be able to hand over the mirrors to the operator as a turnkey solution with a performance guarantee. Last but not least, he says, nothing had to be additionally installed on the plant itself, i.e. on the tower and mirrors, which means that the process can be used no matter what stage of construction the other parts of the power plant are at.

### **Funding from the Federal Ministry for Economic Affairs and Energy**

The Federal Ministry for Economic Affairs and Energy is providing around €700,000 million in funding for the HelioPoint project. Other project partners working alongside the German Aerospace Center are CSP Services GmbH, sbp Sonne GmbH and TeAx Technology UG. Solar thermal power plants are built in regions that enjoy a lot of direct sunlight, such as Spain or the MENA region (Middle East and North Africa).

HelioPoint is one of 3,655 research projects funded by the Federal Ministry for Economic Affairs and Energy last year in the field of renewable energy and energy efficiency. Information on further innovative research projects can be found in the ministry's annual report 'Innovation through Research 2017', which has just been published. The report contains more than 140 pages of information on research projects and findings that contribute to the implementation of the Federal Government's climate and energy policy goals.

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# Working together to achieve more: energy efficiency networks for companies

Companies that exchange information as part of networks increase their energy efficiency twice as fast as non-networked companies. However, still too few companies are making use of the idea despite the advantages it can bring.



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Germany's Energy Efficiency Networks initiative has spawned more than 160 energy efficiency networks involving over 1,600 companies. It is proof that energy efficiency and economic strength don't have to be a contradiction in terms. The idea behind the networks is both simple and convincing. With the support of technical experts, companies exchange information about practical measures that can be taken to increase energy efficiency, reduce costs and thus increase competitiveness. In this way, they also make an important contribution to protecting the climate and making the energy transition a success.

## Multiple companies with one shared goal: to save energy

Energy efficiency networks are usually made up of 8 to 15 companies from a particular region or industry. However, businesses can also create an internal company network consisting of several sites, for example. What they all have in common is that the participating businesses start by setting a joint savings target that they want to achieve by the end of the network's subscriber lifespan – usually 2 to 3 years. Each network is supported by a professional moderator, who organises, moderates, prepares and follows up on the network meetings. There is also an energy consultant who supports the companies in identifying and implementing appropriate savings measures. The spectrum ranges from energy-efficient lighting concepts, to rainwater storage tanks for the cooling energy that is required.

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## **Reduce energy costs, increase company value**

Taking a glance at the progress report from 'Energy Cost Management DIALOG' network, for example, shows us how this works in practice. This network consists of seven manufacturing companies in the Lower Rhine area that are seeking to increase their energy efficiency with the support of a university. All of the companies participating in the network have already begun to use an energy management system which they want to develop further as part of the network. During the network's start-up phase, an analysis of the energy consumption in each company was undertaken and the results of this discussed within the network. In a next step, specific reduction measures were developed and the profitability of each of these was looked at in detail. The proposed measures were then implemented, which included replacing outdated compressed air systems that showed poor efficiency, improving the thermal insulation of high-temperature furnaces or optimising the energy supply to buildings. The companies within this network are seeking to save a total of almost 80 gigawatt hours of energy by the end of 2019 – equivalent to the amount used by 20,000 three-person households in a year. This will reduce the energy costs of the companies by €1.1 million per year and also raise the value of the companies by around €17.5 million.

## **Competitors all on one team**

The Energy Efficiency Network in Northern Bavaria is made up of 10 mechanical engineering companies and is one step further on. When it expired in March 2018, the network had exceeded the target it set itself by a considerable margin: instead of saving its goal of 6.7 million kilowatt hours, the final figure was some 9.6 million – a huge 40 percent over target! Although the companies are direct competitors, they joined together to work on energy efficiency, cooperating closely and sharing experience – both positive and negative. For example, one company converted to using LED lighting but, to save money, didn't replace the lamp holders. As a result, the lighting was sub-optimal. The company then shared its bad experience with the others – saving them time by giving an example of what not to do. However, the network achieved its desired results through the successful modernisation of lighting elsewhere, by replacing windows, using more efficient air compressors, ensuring better heating distribution and control, as well as through a further 32 measures implemented besides. The results were so convincing that the companies decided to enter into a second round of cooperation within the network.

## **Saving money through woman power**

The 'EnergyEfficiencyNetwork of guild businesses and women entrepreneurs in Essen' ('EnergieEffizienzNetzwerk Essener Innungsbetriebe und Unternehmerfrauen') is another success story to add to the list. Not only is it the first energy efficiency network within Germany's skilled crafts sector, but it's also the first network purely made up of women. The companies participating in the network are a goldsmith, three electricians businesses, two painting and two roofing companies as well as a management consultancy. Although the savings potential here is smaller than in the two previous examples, the target of reducing electricity consumption by 13,500 kilowatt hours actually went on to be exceeded by 85%! In fact, the companies have now implemented almost all the measures that were planned within the network – from LED lighting, to better building insulation, well-sealed windows and doors, to more efficient cooling in server rooms. One of the most important realisations was that even the smallest company can save energy across an array of different areas – and that it succeeds in doing so as part of an energy efficiency network. Here once again, this has led participating companies to extend the lifetime of their network, which had already expired.

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## Excellent performance, excellent feedback

Among the particularly successful networks now entering their second round of activities are four that received awards from the Federal Ministries for Economic Affairs and Energy and for the Environment at the second annual event of the Energy Efficiency Network initiative, held in Berlin on 9 April. These were EVU-Energieeffizienznetzwerk II, the network 'Ökoprofit Klub 2017/18', GlasNET 2.0 and Energieeffizienznetzwerk Dresden 2. Together, these four networks have reduced their combined energy consumption by more than 50 gigawatt hours over two years.

A survey of the companies taking part in 2016 also shows that the energy savings made really do pay off in almost all networks, with 83% rating the cost-benefit ratio as good or very good. Some 94% of respondents said they would recommend participating in such a network to other companies. Evaluations conducted of energy efficiency networks also showed that networked companies increase their energy efficiency, on average, around twice as fast as comparable companies that have not joined forces within networks. In short, the networks offer a real competitive advantage in several different respects.

## Much more to be done – why not join a network!

The company networks operate as part of the Energy Efficiency Networks initiative, which was jointly launched by the Federal Ministry for Economic Affairs and Energy, the Federal Ministry for the Environment, together with 22 business associations and organisations. The goal is to set up around 500 networks by the end of 2020 that, together, will reduce carbon emissions by five million tonnes and thus make an appreciable contribution to climate protection. The initiative has already become the most successful and largest energy efficiency drive in business. The more companies come together to form networks, the greater and more sustainable the success of these networks will be.

And it's not only in Germany that companies are networking to save energy; the idea is also gaining increasing popularity worldwide, with the pilot projects on energy efficiency networks already under way in Mexico, China, Japan and Vietnam.

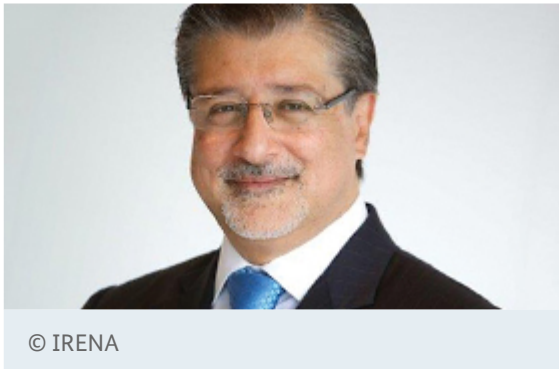
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### FURTHER INFORMATION

- [\[→ Energy Efficiency Networks initiative \(German only\)\]](#)
  - [\[→ Information about the 'Energy Efficiency Networks initiative'\]](#)
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## Quote of the week



“Renewable energy and energy efficiency – together – form the corner-stone of the decarbonisation of the energy sector, as they can provide over 90% of the energy-related carbon emission reductions required to keep global temperature rise to two degrees Celsius.”

Director-General of IRENA , Mr Adnan Z. Amin, at the presentation of the study ‘Global Energy Transformation: A Roadmap to 2050’

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## Turning energy around using multimedia

The ‘energie.wenden’ (‘turning energy around’) is the most visited special exhibition at the Deutsches Museum in Munich since the start of the new millennium. It is built around a multimedia role-playing game in which visitors can design different aspects of the energy transition themselves. In addition to the games, there are also nine exhibition areas which look at the history of energy, energy sources and topics such as mobility, networks, housing, production and consumption. The exhibition will run up to 19 August 2018.

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## First joint auctions for wind and solar installations

The Bundesnetzagentur (Federal Network Agency) has announced the results of the first joint auctions for wind and solar installations, held on 1 April 2018. These are governed by the Ordinance on joint auctions for onshore wind and solar installations (GemAV), which provides for two annual auctions of 200 megawatts respectively between 2018 and 2020. Running auctions mean that the technologies directly compete with one another. In the first set of joint auctions, all 32 contracts were awarded to solar energy. The average level of funding awarded (volume-weighted) was 4.67 cents per kilowatt hour.

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