



Rheinland-Pfalz

MINISTERIUM FÜR  
WIRTSCHAFT, KLIMASCHUTZ,  
ENERGIE UND  
LANDESPLANUNG

# ENERGY TRANSITION IN THE STATE OF RHINELAND- PALATINATE, GERMANY



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# PREFACE



## **The energy transition is climate protection**

Germany is a successful export nation. Alongside numerous other products, in recent years the "energy transition" has also become an export hit. Yet the reference here is not merely to the sale of industrial goods, but also the forwarding of know-how.

Rhineland-Palatinate offers exceptional prerequisites for the use of wind and solar energy, moreover biomass and hydropower are also available. Our state has assumed a pioneering role within Germany as regards the energy transition. The aim of this brochure is to illustrate how the energy transition is being implemented in Rhineland-Palatinate and how the regions and people here are benefiting from this. The brochure firstly outlines the framework conditions for realising the shift from an essentially centralised energy supply based on fossil and atomic energy to a decentralised system powered by renewable energy sources.

The main goals of the energy transition in our state and the measures for their realisation are explained in detail. The brochure is completed with details of the main players and the "winners" from this energy system changeover.

This shift represents a challenge which cannot be mastered within the space of a few years; it is a task for the coming decades. Yet here in Rhineland-Palatinate we have decided to embrace this challenge, not only to protect the environment but because it makes economic sense.



Eveline Lemke

# 1. THE FRAMEWORK CONDITIONS OF THE ENERGY TRANSITION

The energy transition in Germany was preceded by a long process of growing environmental awareness and the mobilisation of environmental policies which, in fact, began in the 17th century with the development of a sustainable forestry concept. Whilst the environmental movement of the 20th century made reference to preserving the integrity of creation and protecting nature, in essence it was a completely new social movement which also pursued sociopolitical objectives. This movement has its roots, for example, in the protests organised by the "Citizens' action group for environmental protection in the central upper Rhine region" which was established back in the early 70s. This group was against the plans to expand the oil refineries in Karlsruhe-



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Knielingen. Further examples are the Baden-Alsatian citizens' initiatives against the construction of the Wyhl nuclear power station and the movements against forest decline which were organised simultaneously in both West and East Germany. Consequently, numerous environmental initiatives and associations were established including the "Federal Association of Environmental Citizens Groups (BBU)" which proceeded to gain political weight.

In the political arena, this ever-growing environmental movement led to the foundation of "The Green" party at federal level in 1980. Following reunification, the new party joined with "Bündnis 90", which was an amalgamation of various environmental groups from the GDR. This movement gained momentum after the Chernobyl reactor catastrophe in 1986. In reaction to this, for the first time a separate federal ministry for the environment was created just five weeks later. Other political parties have also become increasingly environmentally aware in their thinking.

From an international perspective, with the signing of the United Nations Framework Convention on Climate Change in 1992 climate protection became an important priority when formulating energy-policy objectives. With the Kyoto Protocol, which was agreed in 1997, a process was set in motion which, to date, has been continued with a total of 19 conferences between the contractual states.

At federal level, the energy transition has essentially comprised the following stages:

- 29 March 2000: Introduction of the Renewable Energies Act (EEG) as a support mechanism based on feed-in tariffs.
- 14 June 2000: Agreement between the federal government and the energy supply companies on gradual nuclear phase-out ("nuclear consensus"). The agreement was legally safeguarded in 2002 with the revision of the Atomic Energy Act.
- 23 August 2007: Resolution on the key points of the integrated energy and climate programme (IEKP) of the German government. Packet of measures



for the development of renewable energies and energy efficiency. Goals for reducing greenhouse gas emissions by 2020 were laid down for the very first time.

- Autumn 2010: Long-term extension from 8 to 14 years for the phasing out of German nuclear reactors by the CDU/CSU-FDP coalition government.
- 6 June 2011: Resolution on the immediate shut-down of eight nuclear power plants and the gradual phasing out of nuclear energy by 2022 as a result of the nuclear catastrophe in Fukushima in March 2011. On 30 June 2011, the German federal parliament passes the "13th Act to Amend the Atomic Energy Act".

The reforms to the Renewable Energies Act came into effect at national level on 1 August 2014.

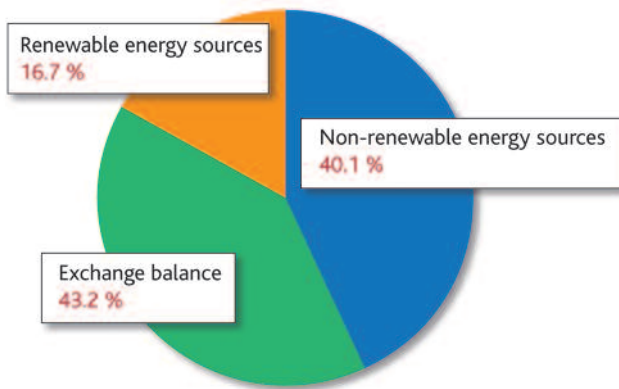
The energy transition is a process which is to be agreed between the federal government and the federal states as well as within Europe. The political and technical coordination of the activities undertaken by the government and states is managed at a number of levels, e.g. through government/state coordination as part of the consultations during the conferences between the minister for economic affairs and the environmental minister and the five energy transition platforms hosted by the Federal Ministry for Economic Affairs.

# 2. OBJECTIVES

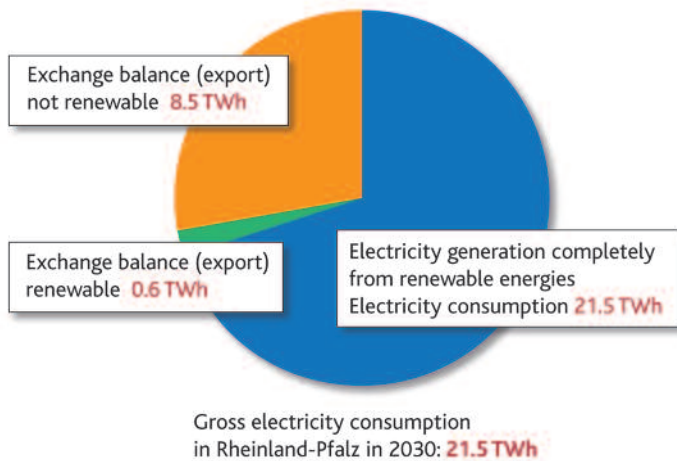
## 2.1. Development of renewable energies for electricity generation

Rhineland-Palatinate aims to completely cover its electricity consumption with renewable energies by 2030.

**Gross electricity consumption in Rhineland-Palatinate in 2011: 28.88 TWh**

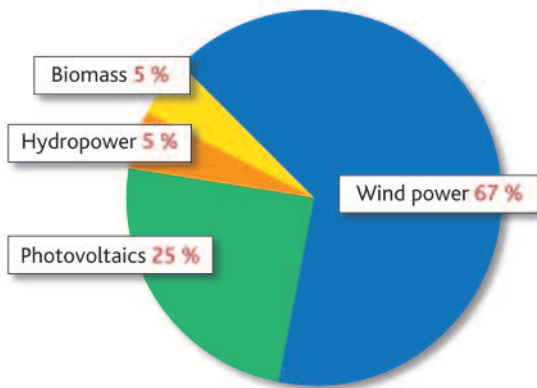


## Predicted gross electricity generation in Rhineland-Palatinate in 2030



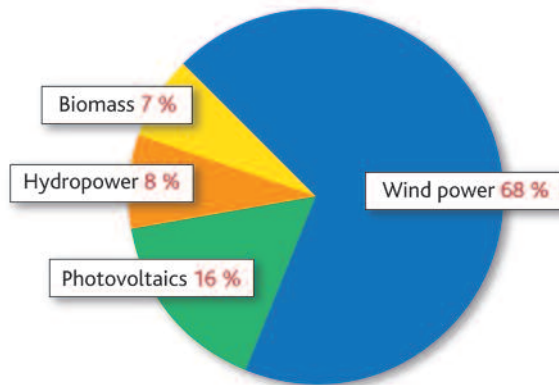
It is planned that the major contributors to renewable electricity generation in 2030 will be wind power (around two-thirds) and photovoltaic energy (about a quarter). Electricity generation from hydropower will cover approx. 5% of the state's power demand. Biomass may also play a key role in providing balancing and control energy. It is not expected that deep geothermal energy will be an important source of regenerative energy before 2030.

## Composition of electricity generation from renewable energies in Rhineland-Palatinate in 2030



By 2020, the generation of electricity from wind power in relation to the base year of 2010 should have increased fivefold, and photovoltaic energy should generate as much as 2 billion kWh.

## Composition of electricity generation from renewable energies in Rhineland-Palatinate in 2020



Realisation of the target of, on the balance sheet, power generation completely from renewable energies requires that a sufficient number of locations be made available, which is particularly true for the important wind generation sector, and that these locations be compatible with the environment and acceptable to citizens. To this end, two per cent of the state surface area is to be earmarked for wind power generation and, of this, two per cent should be located in Rhineland-Palatinate's forest area.

## Implementation

At national level, Rhineland-Palatinate is committed to ensuring that the conditions for the ongoing development of renewable energy sources remain favourable. As part of the amendment of the Renewable Energies Act (EEG 2014) retention of priority feed-in for electricity from renewable sources, remuneration which can be reliably planned for plant operators and investors and technology-specific promotion of all renewable energies are fundamental principles.



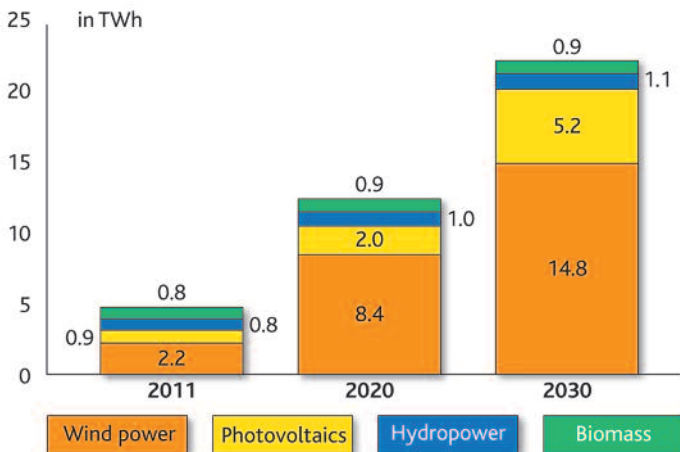
According to the official data from the state statistical office, at approx. 5.7 billion kWh regenerative electricity generation in Rhineland-Palatinate represented a share of approx. 20% in terms of gross electricity consumption and approx. 33% with reference to the state's gross electricity generation in 2012.

In 2012 regenerative power generation in Rhineland-Palatinate was made up as follows:

● Wind power:	2.665 billion kWh
● Photovoltaics:	1.145 billion kWh
● Hydropower:	1.048 billion kWh
● Biomass:	0.790 billion kWh
● Other:	0.042 billion kWh

As such, in 2012, approx. 15% of the electrical energy produced in Rhineland-Palatinate came from wind power.

### The development of renewable energies in Rhineland-Palatinate



As per the current extension data from the Federal Networks Agency and the renewable energy trade associations, at the beginning of 2014 a total of almost 1,360 wind farms with an output in excess of 2,300 MW as well as around 83,000 photovoltaic systems with an overall performance of more than 1,700 MWp were installed in Rhineland-Palatinate.

In 2013 with approx. 406 MW of generation capacity / 146 newly established facilities, Rhineland-Palatinate ranked second in a nationwide comparison as regards the development of wind farms.

Based on the latest figures, it can be estimated that, at the start of 2014, renewable energies supplied approx. 24% of the state's gross electricity requirements.

The Rhineland-Palatinate state government has further boosted the development of regenerative energies by setting out regulatory frameworks for regional planning.

With the update of the regional development programme IV, the fundamental revision of the wind energy circular and the newly issued Rhineland-Palatinate wind atlas in 2013, the state government has set the course for the continued rapid and structured development of wind power in this region.

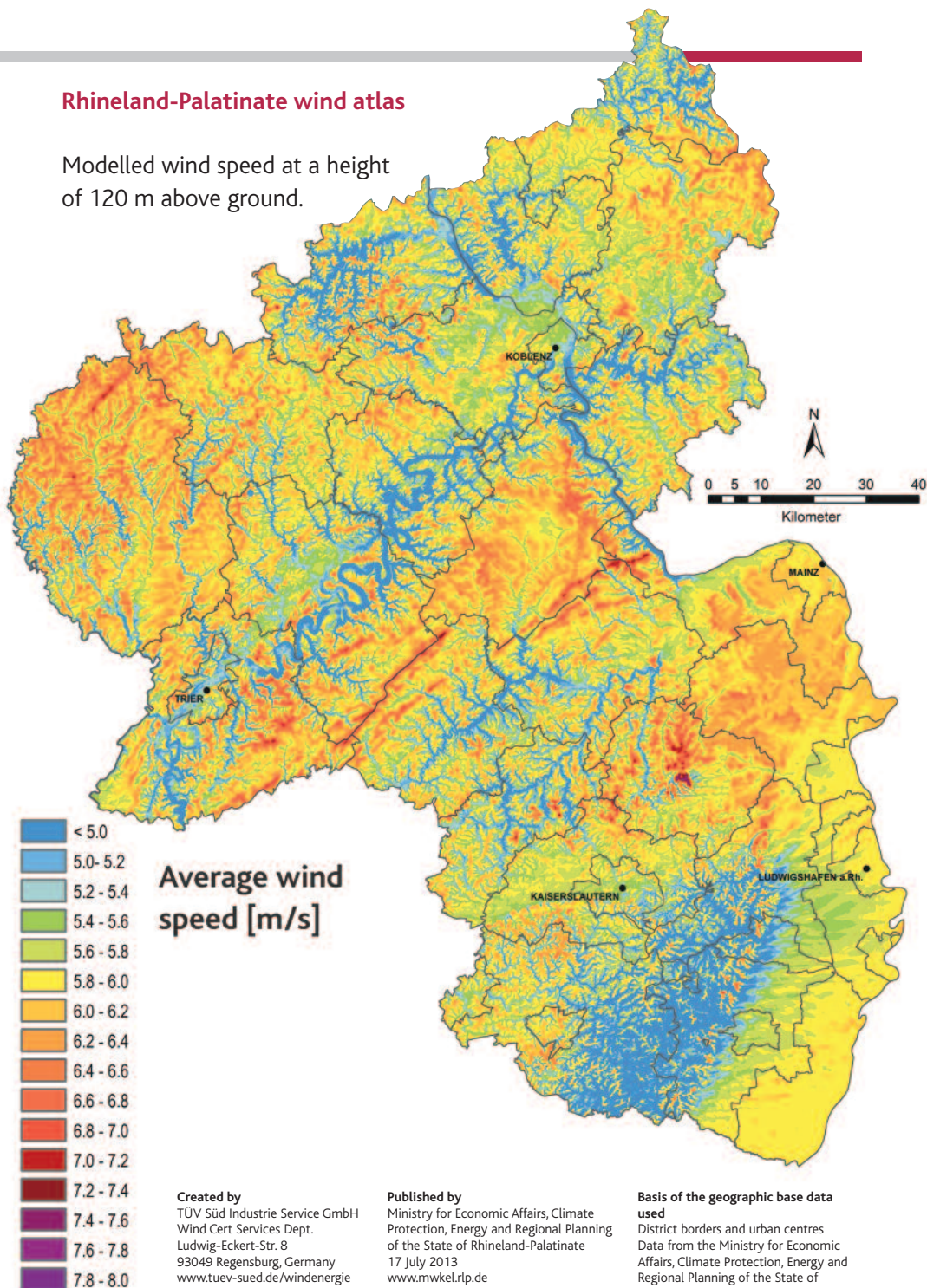
The update of the regional development programme IV lays down the framework conditions for the utilisation of wind power in Rhineland-Palatinate and is thus binding for both regional and urban land-use planning. It offers local authorities greater planning freedom and also gives them greater planning responsibility.

The structured development of wind energy is to be guaranteed in combination with regional and urban land-use planning. By designating preferred locations and concentration areas, the aim is to bundle the network infrastructure. Individual facilities are only to be approved if there are guaranteed plans for at least two further facilities in the vicinity.



## Rhineland-Palatinate wind atlas

Modelled wind speed at a height  
of 120 m above ground.





With its wind energy circular, the state government specified the goals and principles contained in the update of the regional development programme IV with respect to the regional policies for planning and using wind energy sites in Rhineland-Palatinate. The information for assessing the feasibility of wind energy facilities in the region acts as an interpretation guide for the authorities involved in the approval process. Amongst other things, the circular makes reference to the obligation to designate priority areas for wind energy utilisation, to increase the planning freedom granted to communities and to establish state-wide standardised binding criteria for determining the exclusion zones. Moreover, the circular aims to inform third parties about the valid regulations, procedural steps and measures.

The high-resolution (50 x 50 m) Rhineland-Palatinate wind atlas which was commissioned by the Ministry for Economic Affairs offers those responsible for regional and urban land-use planning a sound basis for deciding upon priority and special building areas. It also provides citizens with detailed information on wind conditions. The wind atlas plays a key role in determining the windiest potential sites in accordance with planning law regulations. By selecting the windiest sites, the maximum energy yield is achieved which takes up the minimum amount of space.

The changes to the region's landscape which inevitably come with this investment in wind energy must be handled in a manner which is not only sensitive to the people here and the way they view their home but which also respects the state's cultural and natural landmarks and tourist attractions. A report has been commissioned by the Ministry for Economic Affairs which serves to specify the state-wide important historical cultural landscape in order to determine, justify and present the exclusion zones as well as restrictions vis-à-vis the development of wind energy. The report provides regional planners with key information for designating exclusion areas as per goal 163 d of the update of the regional development programme IV.

Moreover, it will not be permitted to set up wind energy facilities in the core area of the UNESCO World Heritage area in the Upper Middle Rhine Valley. The establishment of wind energy locations in this designated area is opposed if

these are not compatible with the UNESCO World Heritage status. The visual impact study which was conducted to assess the facts and circumstances visualised and assessed planned, requested and fictitious wind energy sites both inside and outside the designated framework area. It concluded that the potential for conflict inside this area was extremely great and, for this reason, this entire UNESCO World Heritage area should not be used for wind energy generation. This is to be ensured by setting targets in the two relevant regional plans.

In order to take sufficient account of protection of the UNESCO World Heritage status, including outside of the designated framework area, both with regard to urban land-use plans and the development of renewable energies and climate protection, a corresponding policy is to be established for urban planning in the regional plans.

## **2.2. Development of state-wide energy consultation services**

The energy transition has to be initiated at both national and state policy level and implemented at local level. To this end, the initial information and initial consultation of companies, local authorities and citizens on the development of renewable energies, energy saving and increasing energy efficiency must be revised and made more widely available. By integrating companies and local authorities in technical networks, the aim is to make an important contribution to the identification and exploitation of existing potential energy savings and energy efficiency measures.

### **Implementation**

The Rhineland-Palatinate state energy agency is responsible for providing information on energy issues to companies, local authorities and individuals. The agency boasts nine regional offices and offers an advice service to private households via the Rhineland-Palatinate consumer advice centre.

**State energy agency:**

The Energieagentur Rheinland-Palatinat GmbH started work on 01.07.2012 and offers local authorities and companies in particular information on saving energy, the efficient use of energy and regenerative energies for generating electricity and heat. This agency also holds information events at schools on a wide range of energy-related issues.

Another of the agency's central components to realise the stated goals of the energy transition and guarantee the optimal transfer of knowledge within Rheinland-Palatinat is the development, coordination and maintenance of specialist networks on renewable energies, the energy sector and energy efficiency. The energy agency supports existing networks, e.g. the electromobility network at Kaiserslautern University of Technology which is dedicated to the introduction and promotion of electromobility and focuses in particular on the use of renewable energies. Further such networks include smart grids and



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virtual power stations established within the framework of the Rhineland-Palatinate future initiative. The agency furthermore brings together local climate protection managers in its own network. More networks, state-wide working groups and regional exchange platforms are being planned and implemented.

The state energy agency assists all regional players on questions relating to the energy sector, energy efficiency and the development of renewable energies. The agency's activities even extend to energy-efficient building and refurbishment.

The regional offices provide a comprehensive range of information and support services throughout the entire region. With its regional energy agencies, the state government aims to raise awareness amongst the public for energy generation and consumption as well as ways to save energy and to give interested parties expert and direct advice on energy-related questions. Furthermore, the regional offices serve to support the efforts of citizens, local authorities and companies to save energy and use energy efficiently. Together with the state energy agency, the goal is to bring together and further develop the know-how and potential offered by the state's various players. To this end, the regional offices work closely with the local authorities and the energy consultation service offered by the consumer advice centre.

### ***Energy consultation service offered by the Rhineland-Palatinate consumer advice centre***

The energy consultation service offered by the consumer advice centre has been expanded in order to offer private households an improved service, particularly with regard to energy law and energy consumption labelling.

The Rhineland-Palatinate Ministry for Economic Affairs has increased its financial support to the advice centre for 2013 to 2015 to approx. € 500,000 per year. Today 62 advice points throughout the region offer free initial information and initial advice on all energy-relevant issues.

Moreover, the advice centre in the Mainz metropolitan area has started a pilot project on energy poverty. With its wide-ranging and multi-level advice concept, the aim is to help those on a low income who find it difficult to pay their energy bills on time and, as a result, face supply cuts and energy debts. This advice centre works closely with charities, debt advisors, the Mainz job centre and local default providers. This project is to be expanded to cover further areas in the region at the start of 2015.

A state-wide consumer advice energy hotline can be offered to consumers free of charge.

The energy-saving services supported by the state, e.g. seminars on energy-efficient building and modernisation, special advice on heat pumps and solar panels, consultations on energy law and the Internet services are being further developed and expanded.

### **2.3. Intelligent electricity grids and storage systems**

The energy policy goals in the electricity sector result in key consequences for the new electricity supply system which, for the most part, still remains to be developed:

The integration of electricity generation from the fluctuating regenerative wind and solar energy sources is one of the main technical challenges of coming years. The term “smart grid” refers to the intelligent management of generators, storage systems, consumers and grid operation resources in transfer and distribution networks with the aid of information and communication technologies (ICT). The objective of an essentially automated overall energy system which enables the increasing dynamism, flexibility and complexity of energy supply to be controlled demands, on the one hand, methods, procedures and ICT components in order to integrate and coordinate the information and energy-related components of an overall system and, on the other hand, the development of market-relevant applications which use the know-how gained from practical energy management.

## Implementation

The state supports the development of intelligent networks, the introduction of intelligent network management systems and the development of an energy storage infrastructure to link fluctuating electricity generation, load-flexible consumers and energy stores.

Rhineland-Palatinate is focused on the modernisation and development of information technology in distribution networks. This is achieved by supporting research, development and innovation in suitable projects.

In a distribution network study for Rhineland-Palatinate the necessary capacities as well as the technological options which restrict network development were identified. The results show how the use of modern information and communication technologies (smart grids) can efficiently link up new structures as well as the framework conditions which can aid technologically progressive development. This study contributes to enabling the grid to develop the electrical network to meet demands and satisfy its obligations as per energy legislation. This also guarantees that the costs of grid expansion remain justifiable. The results clearly show that development of the grid will not have a big impact on local people. The expansion of the distribution networks will in fact be barely perceivable and, in most cases, it is sufficient to exchange the lines on existing masts. The innovations are in place and the key to success lies in optimisation. As such, the Rhineland-Palatinate grid is all set for the energy transition.

With the "Smart Grids Future Initiative" the state is supporting the comprehensive introduction of intelligent grids and intelligent grid management systems and, as part of this, is integrating both the industry and local authorities. The "Future Initiative" provides initial information on how to use intelligent grid technology, consumption management, the economic use of flexibility as regards energy consumption and the integration of domestic electricity generation systems and innovative energy storage solutions in virtual power stations.

The cluster initiative “StoRegio” which, amongst other things, focuses on the provision of market-ready energy storage systems as components of a smart grid, receives financial support from Rhineland-Palatinate.

The model project “mypowergrid” managed by the Fraunhofer ITWM in Kaiserslautern which aims to realise a regenerative combined power station including a decentralised energy storage also receives state support.

In addition, state funding is made available to the joint project “Vevide”. This project is committed to developing a large virtual energy storage system from the numerous various energy stores which already exist, e.g. compressed air reservoirs, heat and cold storage systems in combination with CHP plants or heat pumps as well as electrical additional heating systems in heat grids and water pumps with large stores. With this, it should be possible to reduce the energy consumption of industrial companies in periods of high consumption/low generation and offer control energy to the market. In addition to the Bingen transfer point, EWR Netz GmbH, Technische Werke Ludwigshafen AG, DEEnO Energie AG and SP EnergyControl GmbH are all involved in this project.

At national level, the state is pushing to ensure that the national government provides sufficient resources for R&D in the field of energy storage, creates effective incentives for investments in the future “energy storage” market and ensures a favourable energy legislation framework for the building and operation of energy stores and intelligent network structures.

## **2.4. Citizen participation and acceptance**

Rhineland-Palatinate is committed to a regionally anchored and citizen-supported energy transition. The objective is to involve the largest possible number of individuals in the realisation of this transition as a means of driving it forward and increasing the acceptance of this process.

Local citizens want to be involved in and actively shape future energy supplies. This is why today they are investing in energy efficiency measures and the construction of renewable energy facilities.

Yet they don't want to be seen as mere investors when it comes to wind farms and photovoltaic installations but, instead, as co-owners with the right to co-determine. After all, if citizens actively shape and determine what happens in their region, this will increase their acceptance of renewable energies and the necessary energy infrastructure projects (grid expansion/enhancement).

What's more, the financial participation of citizens is a key factor in regional value creation. In this way it is not only the major investors who rake in the profits from renewable energy installations but locals too. The regional economy also benefits directly, e.g. through the contracts awarded to local companies.

## **Implementation**

Over the past years many citizens have joined forces in order to implement renewable energy projects in their regions. There are a large number of ways to get involved in the realisation of the energy transition.

One way which is becoming increasingly popular is the energy cooperative as there are numerous and diverse options for structuring such projects. Regardless of his/her capital contribution, each member is granted one vote. With most energy cooperatives citizens only have to pay a relatively small contribution (for many just € 500 and some even less than € 100<sup>1</sup>).

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<sup>1</sup> Results of a survey conducted by Deutscher Genossenschafts- und Raiffeisenverband e.V. (DGRV) together with Bundesverband Solarwirtschaft e.V. (BSW-Solar) and Agentur für Erneuerbare Energien (AEE) e.V., July 2012, <http://www.unendlich-viel-energie.de/de/detailansicht/article/4/energie-genossenschaften-investieren-800-millionen-euro-in-energiewende.html>



With a cooperative the main aim is not to ensure a return but to create something together.

Citizen-organised energy cooperatives are an important driving force for the decentralisation of energy generation and the development of renewable energies. After all, they enable renewable energy installations to be realised with numerous equal partners both democratically and locally. Citizens are not only given the chance to participate financially in energy installations but also to actively design the energy supply system of tomorrow.

In Germany there are currently around 650 renewable energy cooperatives, whereby there has been a significant increase since 2009. More than 90% of the members of such cooperatives are private individuals.<sup>2</sup>

According to the results of a survey conducted by DGRV – Deutscher Genossenschafts- und Raiffeisenverband e.V., energy cooperatives have already invested on average 1.8 million euros in renewable energies, if projected this gives a total of 1.2 billion euros.<sup>3</sup>

The majority of energy cooperatives are involved in electricity generation from regenerative energy sources, especially photovoltaics. In addition, in rural areas in particular, energy cooperatives have been founded which supply the connected households with heat from biomass via a shared heat grid.<sup>4</sup>

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<sup>2</sup> DGRV-Deutscher Genossenschafts- und Raiffeisenverband e.V., Energiegenossenschaften results of a survey by the DGRV and its member associations, 2013, [http://www.dgrv.de/webde.nsf/7d5e59ec98e72442c1256e5200432395/dd9db514b5bce595c1257bb200263bbb/\\$FILE/Umfrageergebnisse%20Energiegenossenschaften.pdf](http://www.dgrv.de/webde.nsf/7d5e59ec98e72442c1256e5200432395/dd9db514b5bce595c1257bb200263bbb/$FILE/Umfrageergebnisse%20Energiegenossenschaften.pdf)

<sup>3</sup> DGRV-Deutscher Genossenschafts- und Raiffeisenverband e.V., Energiegenossenschaften results of a survey by the DGRV and its member associations, 2013, [http://www.dgrv.de/webde.nsf/7d5e59ec98e72442c1256e5200432395/dd9db514b5bce595c1257bb200263bbb/\\$FILE/Umfrageergebnisse%20Energiegenossenschaften.pdf](http://www.dgrv.de/webde.nsf/7d5e59ec98e72442c1256e5200432395/dd9db514b5bce595c1257bb200263bbb/$FILE/Umfrageergebnisse%20Energiegenossenschaften.pdf)

<sup>4</sup> DGRV-Deutscher Genossenschafts- und Raiffeisenverband e.V., Energiegenossenschaften results of a survey by the DGRV and its member associations, 2013, [http://www.dgrv.de/webde.nsf/7d5e59ec98e72442c1256e5200432395/dd9db514b5bce595c1257bb200263bbb/\\$FILE/Umfrageergebnisse%20Energiegenossenschaften.pdf](http://www.dgrv.de/webde.nsf/7d5e59ec98e72442c1256e5200432395/dd9db514b5bce595c1257bb200263bbb/$FILE/Umfrageergebnisse%20Energiegenossenschaften.pdf)

The growing trend for energy cooperatives throughout Germany is also evident in Rhineland-Palatinate. Here a total of 22 cooperatives were founded between 2009 and 2012.

The “Landesnetzwerk Bürgerenergiegenossenschaften Rheinland-Pfalz e.V. – LaNEG” (state network for citizen energy cooperatives) was established on 18 March 2012 with the support of the Ministry for Economic Affairs, Climate Protection, Energy and Regional Planning. This network works to bring together the issues of importance to the citizen energy cooperatives in Rhineland-Palatinate and acts as a mouthpiece for these initiatives.



The state network represents the interests of the regional energy cooperatives, links the other players in the energy transition and supports new cooperatives. As such, it is a central contact point for all aspects relating to this key issue.

The LaNEG was founded by 12 members. Today it comprises 20 citizen energy cooperatives. In addition, the network "Energy transition now" and the Neulsenburg cooperative association are also members.

In addition to the conventional fields of photovoltaics and wind energy, the state network endeavours to identify and develop further opportunities for citizen cooperatives in order to secure feed-in payments as per the Renewable Energy Act. At present, the direct marketing and direct consumption of electricity and regional electricity grids are further interesting diversification areas for energy cooperatives.

Further information on the state network and its members can be found at [www.laneg.de](http://www.laneg.de).

The brochure "Bürger machen Energie" (citizens make their own energy) also offers helpful advice on how to establish an energy cooperative. This brochure can either be downloaded or ordered from the Ministry for Economic Affairs ([www.mwkel.rlp.de](http://www.mwkel.rlp.de)), the Rhineland-Palatinate energy agency ([www.energieagentur.rlp.de](http://www.energieagentur.rlp.de)), the state network for citizen energy cooperatives ([www.laneg.de](http://www.laneg.de)) and the "Energy transition now" initiative ([www.energiegenossenschaften-gruenden.de](http://www.energiegenossenschaften-gruenden.de)).

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## 3. ENERGY TRANSITION PLAYERS

The energy transition can only prove successful if the various players from all fields get involved – local authorities, industry, academia and citizens. There are so many ways to play a role: The focus here is on creating and communicating connections, developing innovative technologies, processes and business models in order to strengthen the regional industry and realise specific measures to save energy, increase energy efficiency and generate and use renewable energies as well as enable participation.

### 3.1. Local authorities

High CO<sub>2</sub> emissions from the trades, industry, domestic housing, traffic and leisure time are set against great potential to save energy and introduce efficiency measures in local authorities. The state's districts, towns and municipalities are key players in Rhineland-Palatinate's energy transition; they are increasingly discovering and using the means available to help protect the climate – through energy saving and efficiency measures and the use of renewable energies. As a result, there is less strain on budgets and regional value creation is enhanced. In particular it is the state's rural areas which can benefit from the energy transition and decentralised energy generation by spending less on energy imports, keeping capital local, securing and creating jobs and thus keeping the area for residents and the local/regional economy. These aspects will be outlined in greater detail in the following chapters.

The decentralised and reliable supply of energy is often the responsibility of the municipal utilities. Many local authorities have already established their own energy and climate protection concepts and employ a climate protection manager whose role it is to support implementation of the relevant measures.

Local authorities also act as role models. By rendering their properties and buildings more energy efficient they set an example to citizens and companies to implement their own energy-saving and climate protection measures.

### **3.1.1. Practical example: Zero emissions in the Cochem-Zell administrative district**

With the target "Zero emissions in the district", Cochem-Zell hopes to reduce its CO<sub>2</sub> emissions by 50 per cent by 2020 and supply its residents with affordable energy. These goals are to be achieved via:

- The accelerated development of renewable energies, in particular bioenergy
- Energy savings and energy efficiency
- Energy sufficiency



Today the Cochem-Zell district can already cover the energy needs of its 65,000 residents from renewable energies. An important component here is bioenergy. The biogas plant in Alflen alone produces up to 6,000 MWh of electricity per year (enough to supply around 1,700 average households) and 3,000 MWh of heat energy for the air base in Büchel. As such, around 2,000 tonnes of CO<sub>2</sub> are saved each year. Lutzerath primary school is also heated up in a climate-friendly manner via a biogas plant. The district is one of 21 bioenergy regions in Germany which is being supported from 2012 to 2015.

In 2013 in Alflen four local heat networks based on wood chips were established. The initiator was the working group "Alflen village development" which is made up of members of the local council and active citizens.

The four networks measure approx. 1,200 m in total. An annual demand of approx. 1,200,000 kWh was calculated for operation. The necessary 1,600 loose cubic metres come from the region and, compared to the fuel oil used in the past, considerably cheaper heating costs are expected. The local heat network received financial support from the Rhineland-Palatinate Ministry for Economic Affairs, Climate Protection, Energy and Regional Planning.

The association "Unser Klima Cochem-Zell e.V." links up the diverse climate protection activities in the district and offers advice on saving energy and renewable energies. The cooperative "Mehr Energie eG" enables citizens to participate financially in the energy transition.

### **3.1.2. Measures to support local authorities**

The Energieagentur Rheinland-Pfalz GmbH, which is wholly financed by the Ministry for Economic Affairs, Climate Protection, Energy and Regional Planning, helps local authorities to achieve more reliable and decentralised energy supplies as well as increased energy efficiency:

- Information on local strategies to increase energy efficiency and develop renewable energy as well as the corresponding subsidies.



- Special events on the latest issues and questions on the energy transition in a local context.
- Exchange of experience with other local authorities and other players via working group and subject-specific networks.

In order to drive the energy transition forward, the brochure “Windenergie und Kommunen” (wind energy and local authorities) provides local associations in particular with advice on developing wind energy. In addition to ways to optimise value creation via local participation, the publication also describes approaches to inter-authority cooperation.

With the brochure “Kommunen und Klimaschutz” (local authorities and climate protection) local decision-makers can discover more about the consultation services available both regionally and nationally.

The Internet portal [www.energie-komm.de](http://www.energie-komm.de) is a shop window and communication platform for all the state local authorities that are interested in climate protection and the use of renewable energies and who wish to share their experiences. The energy portal also serves to provide citizens with information on local and regional projects and energy concepts.

### **3.2. Efficient economy**

More than 90 per cent of companies in Rhineland-Palatinate are either small- or medium-sized. Industry, the craft trade and services are important pillars of the region’s economy. For many, increasing energy efficiency and the use of renewable energies represent a major challenge, yet at the same time they are also an opportunity for more efficient business management which is less dependent on expensive raw material imports.

Companies benefit when energy efficiency aspects are integrated in operational processes and taken into account in investment decisions. Nevertheless, the potential savings are often underestimated and specific measures are not implemented in an energy optimised manner. In small- and medium-sized

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companies in particular energy efficiency measures often compete with other investments which, at first glance, appear more important. Yet, energy efficiency offers such companies a means of reducing cost pressures and thus enhancing competitiveness.

There are potential savings to be made in all companies; in terms of lighting, insulation, compressed air production and use, heat generation and distribution and the optimisation of production processes.

The craft trade is an important partner in realising the energy transition. For example electricians who install modern domestic control electronics which contribute to increased energy efficiency and reduced energy consumption, heating installers who install and maintain modern energy-saving systems based on regenerative energies, roofers who set up solar energy-operated systems for generating electricity and heating up of process water on roofs as well as builders and painters. All these partners take specific measures towards realising the energy transition and, in doing so, not only help to protect the climate but also strengthen the local economy.

To inform and advise local companies, the state supports the Effizienznetz Rhineland-Palatinate (EffNet), a central, multidisciplinary and non-commercial information, consultation and networking platform. Within the framework of the EffNet, projects aimed at production-integrated environmental protection (PIEP) and resource consumption (raw materials, resources, auxiliaries, energy etc.) are realised in small- and medium-sized companies. Each year the EffCheck PIEP analysis offers up to 30 companies in the region the opportunity to have their production assessed by a consultancy company of their choice in order to identify potential savings. The information and agency services offered by EffNet are tailored for smaller craft trade and industrial companies as well as service providers. The information and consultation network brings together various network partners who are linked directly and via the efficiency network. In addition, additional relationships can be fostered between network partners and external consultants/institutions. Further partners can join the network at any time.



### 3.2.1. Practical example: Werner & Mertz, Mainz

In Werner & Mertz' new main building in Mainz more energy is generated by the wind and photovoltaic installations and near-surface geothermal energy than is actually used. Some of the excess energy is fed back into the local grid.

The building has been awarded the LEED Platinum certificate. LEED stands for Leadership in Energy & Environmental Design and is used to distinguish high-quality ecological buildings. Around 200 employees work in the main building, spread over 5 floors and a total of 9,000 m<sup>2</sup>. The glass façade boasts exemplary heat insulation. The large amount of natural daylight and intelligent ceiling uplights which adapt to the daylight and react to movement reduce the amount of energy consumed. "Green walls" in the reception area/foyer and staff restaurant feature 2,350 plants which not only improve the room climate but also save energy as the higher air humidity reduces the need to heat.



Thanks to an intelligent system based on regenerative energies, in summer the building is cooled down and heated up in winter: 16 small wind energy systems on the roof produce approx. 132 MWh of electricity per year. They satisfy the electricity requirements of the pumps for the geothermal system via which the temperature in the main administration building is regulated. For this, cold ground water (12°C) is conveyed from 5 m below the ground to the building and heated up to 35°C via the heat pump in winter. In summer the cool ground water is used to create a pleasant room temperature via the cooling system in the floor.

The photovoltaic installations on the 350m<sup>2</sup> roof generate electricity from the sun. They produce approx. 45 MWh of electricity per year. This corresponds to approx. the annual electricity requirements of 11 average 3-person households. Two electric company cars are fuelled by this electricity.



### **3.2.2. Practical example: Wipotec GmbH, Kaiserslautern**

Wipotec GmbH in Kaiserslautern is a manufacturer of high-performance checkweighers, in-motion scales and X-ray scanners. In addition, the company markets intelligent weighing technologies for industrial integration.

Wipotec has been using near-surface geothermal energy for heating and cooling purposes in its factory building since 2007. 40 probes, each in 130 m holes, are used. According to the company this is the largest geothermal probe field in Südwestpfalz.

Alongside innovative architecture and building technologies, regenerative energy technologies also play a central role in the company's new buildings and extensions. With its new energy concept, the heat supply is to be optimised and the company's energy requirements reduced by 70 per cent compared to a conventional heat supply. The cladding of the new building meets passive house standards. There is a large geothermal store below the new building (150,000 m<sup>3</sup> sandstone). It has approx. 200 probes in 30 m-deep holes. Solar energy and waste heat from cooling are transferred to the store via these probes and stored there and then used in winter for heating via a heat pump. The building's near-surface geothermal heat supply is also supported by two geothermal probes in 1,500 m-deep holes.

In addition, a highly efficient and need-based controlled ventilation system is used. It features an extremely efficient so-called air/rainwater heat exchanger. There is a 2000 m-long stainless steel pipe in a rainwater retention basin. The fresh air is heated/cooled down via the stainless steel pipe system depending on the temperature gradient and supplied to the ventilation equipment. At the same time, the air/rainwater heat exchanger regulates the building's humidity balance.

### 3.3. Citizens

The energy transition is not only a major technical challenge, it is also an infrastructure, economic and social project. It offers citizens the chance to take on responsibility, get involved and also enjoy the benefits. Surveys have shown that the majority of citizens are in favour of the energy transition<sup>5</sup>. In Rhineland-Palatinate, which is committed to a decentralised energy supply, they are presented with diverse ways to help shape this transition actively and passively (citizens as investors). For example, they can get involved in:

#### ***Citizen-operated energy installations:***

- Installations which use renewable energies which are operated and/or financed jointly by citizens.
- The regional roots of those involved, operator companies and installations are characteristic.
- Renewable energy installations are often operated as a cooperation between private individuals, companies and local authorities as a joint corporate form.

#### ***Cooperatives:***

- Jointly operated companies whose members also own the installation. Thanks to the structure – one head, one voice – citizens can directly influence the activities of their energy cooperative.

In Rhineland-Palatinate multiple energy cooperatives have joined forces in the "Landesnetzwerk Bürgerenergiegenossenschaften Rheinland-Pfalz e.V. (LaNEG)". This network is financed by the Ministry for Economic Affairs, Climate Protection, Energy and Regional Planning. The LaNEG represents the interests of the cooperatives, markets the ideas behind the cooperative and helps those interested to found new initiatives.

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<sup>5</sup> Amongst others Verbraucherzentrale Bundesverband (Federation of German Consumer Organisations), survey dated August 2013

The energy cooperatives organised within the framework of the LaNEG had around 2,500 members at the end of 2012, of which 2,300 were natural persons and around 130 corporate entities, in particular local authorities and companies. In total, they have invested some 27.4 million euros in sustainable energy supplies.

### **3.3.1. Practical example: Cooperative local heating grid in Mannebach**

The cooperative local heating grid in Mannebach (Rhein-Hunsrück district) supplies 20 houses with heat. Wood chips from residual forest wood (currently procured from a regional sawmill) are used as the fuel for the power plant. In addition to private households, the community hall, a restaurant and a forge are all served by this plant. The remaining houses in this community already have, in part, pellet boilers or wood heating systems or, alternatively, are new constructions with energy-efficient heat pump heating systems. The cooperative set up a photovoltaic installation on the heating house with a 28.8 kilowatt peak output. The installation was connected to the public electricity grid at the start of December 2012. By the end of July 2013, it had already produced 20 megawatt hours of electricity. Of this total, 3,900 kilowatt hours had not been fed into the grid but directly used as electrical auxiliary power to operate the boiler, heating circuit pumps, conveyor technology etc.







What is particularly worthy of note is that this grid was established at the initiative of local residents. In February 2012 18 residents of Mannebach founded their own initiative "Energy for Mannebach". Every member paid a share in the business of 5,000 euros. To construct the local heating network, low-interest loans with partial debt relief were taken out from Germany's Reconstruction Credit Institute (KfW). Further support came from the interest subsidy programme of the Rhineland-Palatinate Ministry for Economic Affairs, Climate Protection, Energy and Regional Planning. A total of 550,000 euros were invested.

### 3.4. Academia

Institutions of higher education and research institutes are important players in the energy transition. They provide stimuli for the further development of energy technologies and innovative system solutions. In terms of research and teaching in the higher education sector, a number of institutions in Rhineland-Palatinate have emerged as places which enjoy an excellent reputation both throughout Germany and internationally.

### ***Academic excellence in Bingen:***

- Bingen University of Applied Sciences: Teaching of environmental protection, energy, building and environmental management, regenerative energy management, energy operational management etc.
- The Bingen transfer point (TSB): Supports local authorities, industries and commercial operations with energy efficiency measures, the use of renewable energies and mobility concepts. The main research fields relate to energy management, virtual power stations and smart grids.
- Institute for geothermal resource management (igem): Engineering and geological know-how in the fields of deep geothermal energy (prospection and exploration) and near-surface geothermal energy. Research, consultation and teaching of the geological and procedural aspects of geothermal energy.

### ***Academic excellence in Trier:***

- Trier University of Applied Sciences: Teaching on technical building management and energy management.
- Environmental Campus Birkenfeld (UCB): The Environmental Campus Birkenfeld (UCB) offers a multiple-award-winning interdisciplinary degree programme at Europe's only "Zero Emission University".
- Institute for Applied Material Flow Management (IfaS): This institute has been working on the development of national and international zero emission concepts through the sustainable optimisation of material and energy flows in practice-oriented projects for more than ten years. The aim is to increase regional value creation whilst reducing the impact on the environment.
- Fuel Cell Centre: Project development, issue-related advice, further training on battery technology, energy-efficient systems and electronics developments.
- Institute for renewable energy, energy efficiency and climate protection law (IREK): This institute specialises in energy environmental and energy economy law. It aims to promote scientific research with an application-related focus in the fields of renewable energy, energy-efficiency and climate protection law at national, European and international level. The results from this research are used to provide stimuli for the ongoing development of the legal framework for a sustainable and efficient energy supply from renew-

able sources. The institute also advises companies from the energy sector, associations, ministries and authorities.

### ***Academic excellence in Kaiserslautern:***

- Kaiserslautern University of Technology: Building-related and automated energy systems, innovative drive systems, energetic optimisation of disposal systems.
- Institute for mobility and traffic (imove): Research on sustainable mobility and traffic development.
- Professorship for control systems: Research on the control of mechatronic systems for electromobility.
- Kaiserslautern University of Applied Sciences: Teaching with a practical orientation, e.g. on energy efficiency systems.
- Fraunhofer Institute for Industrial Mathematics (ITWM): Focal research areas: Management of decentralised systems, prognosis and control, simulation and optimisation of technical systems, financial mathematics.
- Fraunhofer Institute for Experimental Software Engineering (IESE): One of the world's leading research institutions in the field of software and system development methods, contributes to the development of innovative energy supply and management systems, e.g. in the context of smart grids.
- German Research Centre for Artificial Intelligence (DFKI): Development of software technologies based on artificial intelligence methods, with innovative solutions for the energy transition.

### ***Academic excellence in Mainz:***

- Johannes Gutenberg University: Key areas include geosciences.
- Max Planck Institute for Polymer Research: Research, amongst other things, on organic solar cells.
- Max Planck Institute for Chemistry: Atmospheric chemistry, interdisciplinary system research on biogeochemistry. The institute has provided interesting contributions from its studies into the emissions which result from the combustion of biomass which generated stimuli to develop biogas installations which produce fewer emissions.
- Mainz Institute of Microtechnology (IMM): Work on the conversion of regenerative and fossil fuels in portable mobile and stationary systems into hydrogen and subsequent conversion into electricity in fuel cells.



### ***Academic excellence in Koblenz-Landau:***

- University of Koblenz-Landau: Applied environmental sciences and energy management complemented by the teaching of electrical engineering at Koblenz University of Applied Sciences; with the energy management distance learning course.

Further institutes across the state round off this research landscape, e.g. Prüf- und Forschungsinstitut Pirmasens e.V. (PFI), Agrosience GmbH based in Neustadt an der Weinstraße, the Research Institute for Forest Ecology and Forestry (FAWF) in Trippstadt, the Rhineland-Palatinate Centre of Excellence for Climate Change Impacts. More information on their activities and the focus of the work of the various institutes can be found on their Internet sites.

### **3.5. Clusters, networks and initiatives**

State-wide clusters, networks and initiatives play an important role when it comes to energy. They bring together expertise and create synergies. The exchange of experience and use of stimuli from the world of R&D are all-important here. The state government provides financial support to various clusters, networks and initiatives, offers technical assistance and helps to link up the various activities.

At present the work of the networks and clusters is focused on the efficient storage of energy and the intelligent control of grids, renewable energy technologies, system approaches and sustainable mobility.

#### ***Industrial networks and cluster structures***

- Energy & Environment cluster: At the initiative of the metropolitan region Rhein-Neckar GmbH, a total of approx. 250 companies, institutions, higher education institutions and research facilities have joined forces in the Germany-wide cluster "Energy & Environment". The Rhein-Neckar centre of environmental expertise (UKOM), the "EnergieEffizienzagentur Rhein-Neckar gGmbH" (E2A) and the "Alliance for living, environment and employment" (Urban Plus) are essentially focused on four main fields: Energy efficiency in buildings, energy efficiency in small- and medium-sized companies, energy

and environmental concepts for built-up areas and renewable energies, particularly, deep geothermal energy. Their work is centred around the successful marketing of innovative services and products from the energy and environmental technology sectors both at home and abroad, the promotion of small- and medium-sized businesses through cooperation with each other and also larger companies, the improvement of innovation skills by intensifying the transfer of technology and know-how and the encouraging of companies to relocate and set up as a means of enhancing the existing expertise.

- Storegio – Development and application of intelligent, stationary energy storage systems: Focus on intelligent, stationary energy storage systems and information and communication technologies (ICT). The three state cluster (Rhineland-Palatinate, Hesse and Baden-Württemberg) comprises a total of approx. 40 cluster partners essentially from the RheinNeckar metropolitan region. The cluster aims to offer complete system solutions for using stationary energy stores. This includes network integration and demonstration of the technical and economic performance of energy stores under real-life conditions, the investigation of forward-looking storage technologies as well as the development of scaling processes for the industrial production of storage systems.
- Software innovation cluster for the digital company / Transfer point for the software cluster digital company Rhineland-Palatinate and Software Technologie Initiative Kaiserslautern e.V. (Sti): One of four regional networks of the state-wide software cluster ([www.softwarecluster.com](http://www.softwarecluster.com)) which encompasses Darmstadt, Kaiserslautern, Karlsruhe, Saarbrücken and Walldorf. At the heart of the software cluster is the development of concepts, technologies and business processes in the field of emergent software. The transfer point for the software cluster digital company RLP originated in Kaiserslautern and is based at STI e.V. and has the goal of integrating small- and medium-sized businesses in Rhineland-Palatinate and the Kaiserslautern region in the cluster, getting them actively involved in transfer processes as well as helping new start-ups and creating regional IT jobs. The cluster aims to offer complete system solutions for using stationary energy stores.

- **Forum Organic Electronics:** This initiative aims to drive forward the development of organic electronics in the Rhein-Neckar metropolitan region. The focus of its work is, first and foremost, environmentally friendly energy production using organic photovoltaics, efficient energy use with organic LEDs and cost-effective mass production of organic switches, stores, sensor applications.

***Excellence networks and initiatives to promote the exchange of know-how and experience***

- **Rhineland-Palatinate Smart Grids and Virtual Power Plants excellence network:** The main areas are the identification and development of pioneering technologies and system solutions for the optimised coordination of energy supply and demand and, thus, a local network balance. Intelligent networks and measuring systems, load management and storage systems as well as virtual power plants are all focal points. Network partners are operators, energy supply companies, manufacturers, associations as well as higher education and research institutions, representatives from local authorities and companies.

The excellence network is a core component of the future initiative Smart Grids Rhineland-Palatinate which was founded in November 2013. This initiative is dedicated to providing initial information to local authorities, communities and public utilities as well as companies with respect to the application of and participation in smart grids. It is planned to actively support pilot projects.

- **Rhineland-Palatinate Electromobility Network** aims to introduce and promote electromobility in this region. The network partners are the (supplier) industry, fleet and parking space operators, the energy sector, local authorities and the scientific world.

## Topics:

Integration of electromobility in regional and national energy networks, life cycle assessments, usage and mobility concepts of the future, local electromobility, business models for and (regional) value creation via electromobility.

- The "local material flow management" network: Combines the state-wide activities of local authorities aimed at increasing resource and energy efficiency in order to promote and support local flow management, exchange information and experiences, boost the concept of recycling management and also protect natural resources. In its role as a network node, the Regional Authority for the Environment, Waterways and Trade Control in Rhineland-Palatinate (LUWG) is responsible for managing all these activities. The network partners are, first and foremost, interested administrative bodies, the Ministry for Economic Affairs, Climate Protection, Energy and Regional Planning (MWKEL), local central associations and Northern Structure and Approval Management.
- The Rhineland-Palatinate efficiency network (EffNet) is a central, multidisciplinary and non-commercial information and consultation platform, it brings together individual initiatives in the state to create a comprehensive range of information and advice services on resource efficiency, energy and the environment. Small- and medium-sized companies are supported, e.g. through the implementation of projects for production-integrated environmental protection as well as resource consumption (raw materials, resources, auxiliaries, energy etc.) The information and agency service offered by the Rhineland-Palatinate efficiency network is essentially aimed at regional craft and industrial enterprises as well as service providers, especially small- and medium-sized companies. The information and consultation network joins various network partners from the energy and environmental sectors in this region, including representatives from consultation firms, institutes and transfer points, self-governing bodies from the state's economy, specialist associations and societies, Rhineland-Palatinate funding institutions and state authorities.

- EffizienzOffensive Energie Rheinland-Pfalz (EOR) e.V. is the expert network for the energy industry in Rhineland-Palatinate, its members include energy company employees, architects, engineers, consultants as well as experts from professional associations and local authorities. A central area of its works is energy efficient construction and refurbishments. To this end, the state-wide work groups EnEV and energy consultants and the passive house work group were established.

In addition to these structures, the Energieagentur Rheinland-Pfalz GmbH promotes state-wide networking and the exchange of experiences. At present, the following networks and work groups are being assisted: The near-surface

geothermal network, the photovoltaics work group, the climate protection manager work group as well as the network for energy efficient construction and living and the energy efficiency network for hospitals. Moreover, a series of active regional networks have been set up, e.g. Energie Effizienz Agentur RheinNeckar gGmbH (E2A), the network Metropol-Solar Rhein-Neckar, PaminaSolar Südpfalz and Bau und Energienetzwerk Mittelrhein. More information on the activities and main fields of these networks, clusters and initiatives can be found on the relevant websites.



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# 4. BENEFIT FROM THE ENERGY TRANSITION

## 4.1. Commercial enterprises

A changeover to renewable energies, production processes which use fewer resources and the efficient combination of heat and electricity via cogeneration help companies in the region to reduce their energy costs, become less dependent on fluctuating energy prices and improve their competitiveness. On the other hand, the security of supply and competitive energy prices for companies, particularly manufacturing industries, are key demands made of the energy transition.

In a Germany-wide comparison, with cogeneration totalling a share of approx. 55% of total power production and, in terms of the state's gross electricity consumption, a share of approx. 32%, Rhineland-Palatinate is one of the leaders among the federal states. In 2006 Rhineland-Palatinate already met the government's expansion target of a cogeneration share of 25%, even with respect to its gross electricity consumption. On average in Germany the share of cogeneration vis-à-vis total power output was approx. 15% in 2011. Power production from cogeneration in Rhineland-Palatinate is based up to approx. 91% on natural gas and approx. 4% on renewable energies (remainder: waste utilisation and 0.7% coal).

Despite the currently advanced development of cogeneration in Rhineland-Palatinate compared to the rest of Germany, the state government's energy and climate policy targets mean that additional investments in highly efficient, flexible, electricity-driven cogeneration systems are necessary. In future, the focus of these developments will be on decentralised systems for small- and medium-sized industries, trades, services and the housing industry where there is a year-round need for heat in order to improve the cost effectiveness of investments through the expedient use of heat.

In a bid to reduce the rise in energy costs for companies, the energy consultation services available to companies, local authorities and citizens which provide advice on further developing renewable energies, saving energy and increasing energy efficiency have been redefined and expanded. Companies and local authorities are advised by the state energy agency with its nine regional offices and the Rhineland-Palatinate consumer advice centre is responsible for improving the services available to private households. A further task is the development and maintenance of specialist networks within the state.

To ensure a consistent and reliable electricity supply, the state is working to both develop the distribution grids and also expand storage capacities. Based on a study to investigate the extent to which regional grids need to be expanded given the changes to the framework conditions caused by energy transition, the distribution grids in Rhineland-Palatinate are to be developed so that they can handle the significantly increased volume of decentrally generated renewable electricity and distribute this to the load centres. In addition, the state government is also supporting projects for the intelligent upgrading of the grids (smart grids) which will help to increase their stability. Finally, two pumped storage power plants are being planned for Rhineland-Palatinate in order to save more fluctuating green electricity.

## **4.2. Labour market**

In Rhineland-Palatinate in 2012 a total of 12,600 people were employed in the renewable energy sector. Per 1,000 employees approx. 8 are employed directly in the renewable energy sector. Based on an optimistic scenario for 2030, a 73% increase in employment could be achieved in the wind energy field alone.<sup>6</sup>

Employment opportunities are not only offered in the core sector of renewable energy development but also in the set-up, operation and maintenance of facilities.

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<sup>6</sup> BMU, ZSW und gws: „Erneuerbar beschäftigt in den Bundesländern“, 2011.

The trade sector in particular and, as such, essentially small- and medium-sized companies are already benefiting from the energy transition. After all, the energy transition would not be possible without this sector and its specialists. For example, it is involved in the installation and maintenance of photovoltaic systems, energy saving and energy efficiency, the establishment of intelligent networks and the development of e-mobility. In order to promote and safeguard employment here, the training of specialists is all-important.

Examples of this are additional qualifications, e.g. a car mechanic specialising in electromobility or a service technician specialising in enertronics. The latter is aimed at electricians and other installers as well as heating engineers who wish to gain further qualifications in the field of energy efficiency and building installations. A pilot project with this in mind from the chambers of commerce and trade from 2011 to 2013 was awarded a grant of € 107,000 from the Rhineland-Palatinate Ministry for Economic Affairs.

### 4.3. Rural regions/regional value creation<sup>7</sup>

With their measures to save energy, increase energy efficiency and develop renewable energies, local authorities are making a valuable contribution to climate protection. They can also benefit financially as such measures can result in local value creation.

The conventional production of electricity takes place centrally in comparatively few locations in Germany. Moreover, a large share of fossil fuels, such

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<sup>7</sup> Also see:

Astrid Aretz et al.: Wertschöpfungs- und Beschäftigungseffekte durch den Ausbau Erneuerbarer Energien (Value creation and employment effects of the development of renewable energies). Institut für ökologische Wirtschaftsforschung (IÖW), Study commissioned by Greenpeace Deutschland. Hamburg 2013

Strategie: Erneuerbar! Handlungsempfehlungen für Kommunen zur Optimierung der Wertschöpfung aus Erneuerbaren Energien (Strategy: Renewable! Recommendations for local authorities to optimise value creation from renewable energies). Published by: Deutscher Städte- und Gemeindebund, Deutsche Umwelthilfe, Institut für angewandtes Stoffstrommanagement. Berlin/Radolfzell/Neubrück 2013

Kommunale Wertschöpfung durch Erneuerbare Energien (Local value creation from renewable energies); results of a study by the Institut für ökologische Wirtschaftsforschung (IÖW). Published by the Agentur für Erneuerbare Energien e.V.. Berlin 2010



as coal, natural gas and oil, have to be imported. Consequently, there is an outflow of funds in order to import fossil energy sources and end energy.

In contrast, the development of renewable energies in Germany is decentralised and found in local authorities and regions. The growth in the number of renewable energy systems being installed also serves to strengthen the economic clout of locations away from classic industrial centres and built-up areas.

As such, it is rural areas which benefit most from the decentralised development of renewable energies. After all, it is here that there is sufficient space to build wind farms and grow energy crops. And it also here that new jobs, long-term economic perspectives and sources of income for local authorities are often most desperately needed.

The towns, districts and associations of municipalities have a number of different ways to drive forward the development of renewable energy systems. To this end, local room for manoeuvre must always be considered against the backdrop of the valid legislation.

On the one hand, local authorities can either invest directly or via shares in generation systems based on regenerative energies. Local authorities with their



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own energy supply companies (municipal utilities) have the advantage of being able to use existing infrastructures (e.g. distribution grids). In addition, local companies boast the technical, organisational and business know-how to plan, build and supervise RE facilities as well as organise the marketing of the electricity produced. For the municipal utilities of medium- and small-sized authorities, a common route is to cooperate with other local or regional energy generation companies.

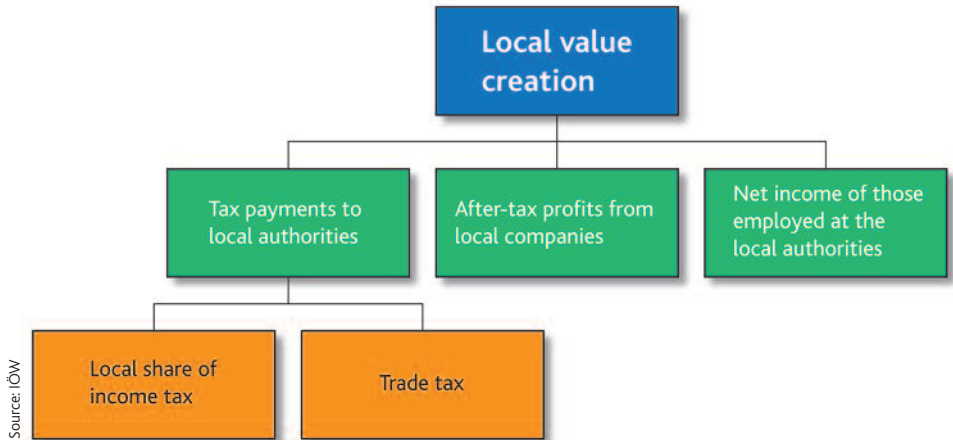
Should authorities not wish to invest directly, they can make the areas of land in their possession available to external investors, e.g. to set up wind farms and photovoltaic facilities. In this way, income from leasing is generated. Roof areas on local authority buildings can also be leased out (for photovoltaic systems).

Towns, districts and associations of municipalities can benefit greatly from renewable energies thanks to local value creation. However, a large number of RE facilities does not automatically result in great value creation for such regions. After all, in order to generate added value, it is vital that the value-creating players, companies and investors along the RE value creation chains, are actually located within the local authorities

If RE facilities are planned, set up and maintained by local companies and / or the facility operators are based in the region, then value is created locally. This is comprised in part of local fiscal revenue which flows directly into local budgets. The income of those employed by the RE companies and local trade companies also contributes to an increase in the purchasing power of local citizens, as do the companies' profits which are distributed to shareholders or used for new investments. These funds offer local authorities financial leeway in order, e.g. to refurbish schools, improve roads and support associations.

Renewable energies thus provide local authorities in many underdeveloped regions the chance to increase the appeal of their location and establish a new economic pillar. The systems set up on site are a source of income for the cash-strapped authorities which do not require large investments on their part. Communities and towns not only benefit from direct fiscal revenue – value is also created as a result of an increase in the overall prosperity of the region.

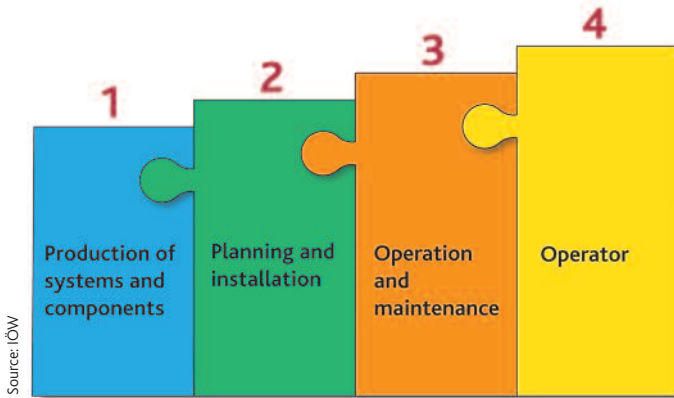
## The value-creation effects of renewable energies in local authorities



Farmers become energy managers and the leasing prices for the designated areas rise. One must also not forget the profits made by local companies and the newly created jobs which bind purchasing power to the region. The monies saved by the region since it is no longer necessary to import fossil fuels (crude oil, natural gas, coal) must also be taken into account. Thus we are talking here about an entire added value chain.

Moreover, value creation can be further enhanced depending on the value-added steps which are generated within the local authority. Studies have calculated that the direct value creation from renewable energies was worth around € 16.9 billion in Germany in 2012. Of this, local value creation amounts to € 11.1 billion and, as such, 66% of the value added across Germany benefits local authorities. The individual states receive fiscal revenue amounting to a total of € 1.3 billion, which corresponds to a share of around 8%.

## Value chain of renewable energies



The indirect value-creation effects calculated for 2012 from the use of renewable energies amounted to just under € 8.5 billion in 2012, of which € 6 billion can be attributed to local level. Fiscal revenue to the sum of € 0.4 billion went to the federal states.

The expansion of renewable energies is linked with the increasing substitution of energy generation based on fossil fuels. Since a large percentage of these fuels are imported, a reduction in fossil energy sources means a reduction in energy imports to Germany. According to the calculations, as a result of the development of renewable energies in 2012, energy imports to the tune of approx. € 6.1 billion (net) were saved throughout Germany. 52% of this sum can be attributed to electricity, 30% to heating and 18% to the transport sector.

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