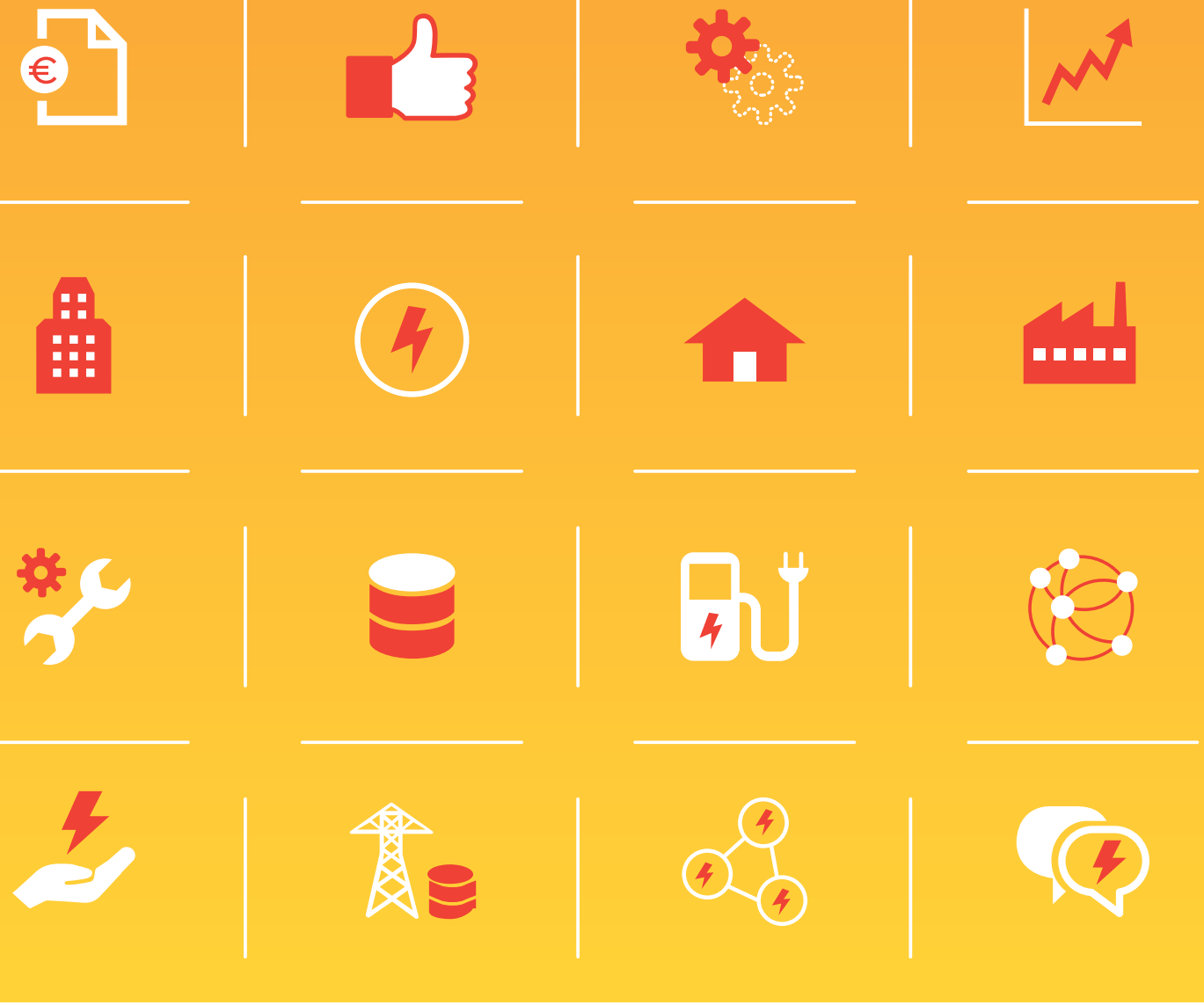
EUROPEAN ENERGY SECURITY

THE CONTRIBUTION OF LOCAL ENERGY COMPANIES: LOCAL, RELIABLE AND SUSTAINABLE



CEDEC REPORT

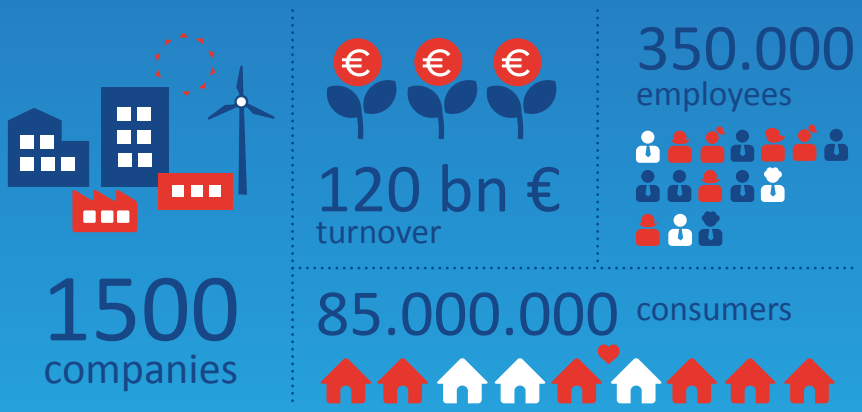
June 2015

CEDEC

CEDEC - Background information

CEDEC represents the interests of 1,500 local and regional energy companies with a total turnover of €120 billion, serving 85 million electricity and gas customers and connections, with more than 350,000 employees.

These predominantly medium-sized local and regional energy companies have developed activities as electricity and heat generators, electricity and gas distribution grid and metering operators and energy (services) suppliers.



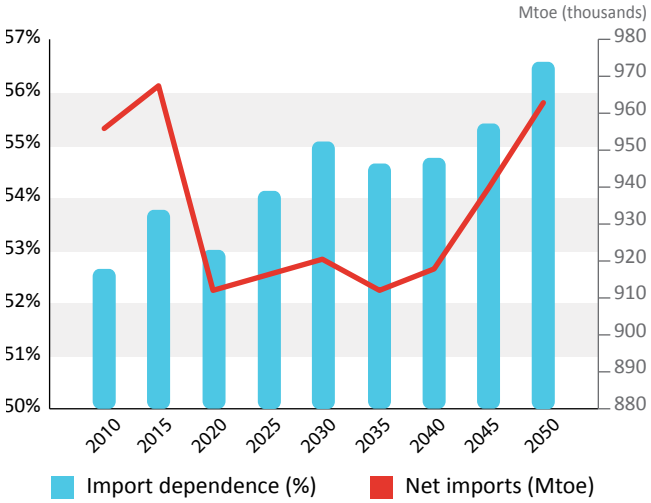
The wide range of services provided by local utility companies is reliable, sustainable and close to the customer. Through their investments and local jobs, they make a significant contribution to local and regional economic development.

THINK LOCAL WHEN IT COMES TO ENERGY SECURITY

Energy Security as the uninterrupted availability of energy sources at an affordable price. Energy security has many aspects: long-term energy security mainly deals with timely investments to supply energy in line with economic developments and environmental needs. On the other hand, short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance.[1]

In 2014, triggered by geopolitical events, the European Commission presented its Strategy for Europe's Energy Security which takes stock of the European energy system resilience. Currently, the European Union is largely dependent on imports for its energy supply: Member States on average import 53% of the energy they consume.

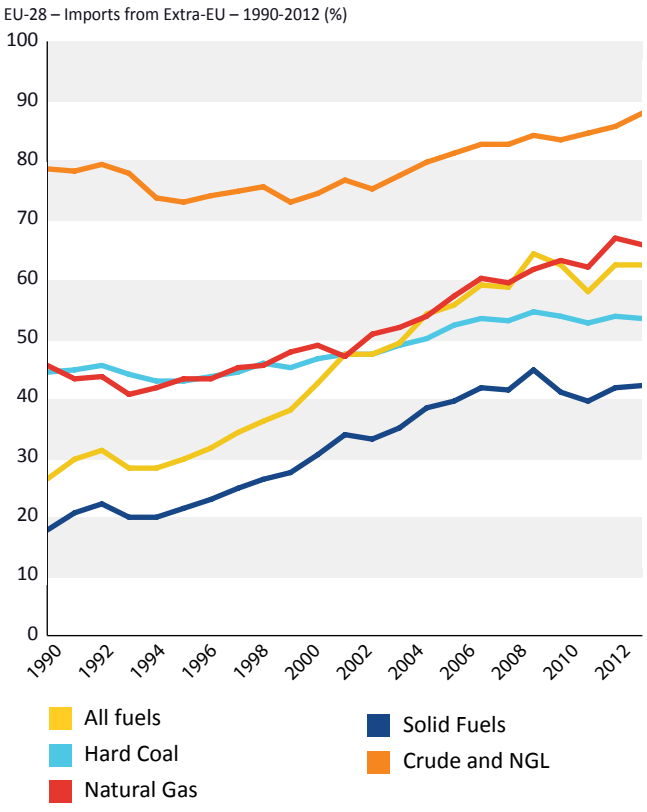
FIGURE 1 - PRIMARY ENERGY IMPORTS



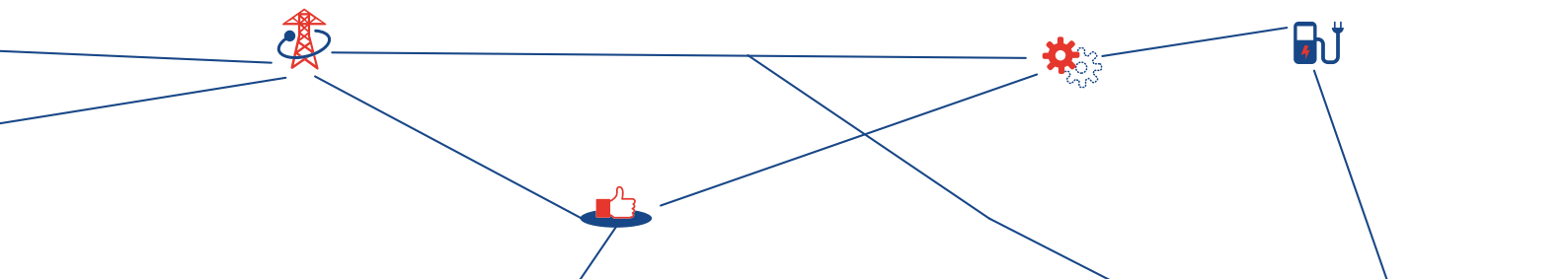
Source: European Commission, 2013

Projections by the European Commission show that without any further actions, the EU's import dependency is likely to increase to about 57% in 2050 due to the decrease in domestic fossil fuel production. Similarly, due to rising price tags for fossil fuels, even if mitigated by temporary decreases in the oil price, the EU's import bill is likely to increase to €600 billion per year in 2050 from ca. €400 billion today. [2]

FIGURE 2 - IMPORT DEPENDENCY BY FUEL



Source: EU energy in figures –Statistical Pocketbook 2014



Of all fuels, oil has the largest import rate. 90% of the oil consumed in Europe is imported. The second largest imported fuel is gas with 66% of it being imported, followed by solid fuels of which 42% are coming from outside the EU.

To counteract this import dependency, and to increase Europe's security of energy supply in the short as well as the long-term, several policy actions are identified: Among them, **the moderation of energy demand, increase of generation from indigenous sources and investments in smart, reliable and efficient energy infrastructure.**

Think local!

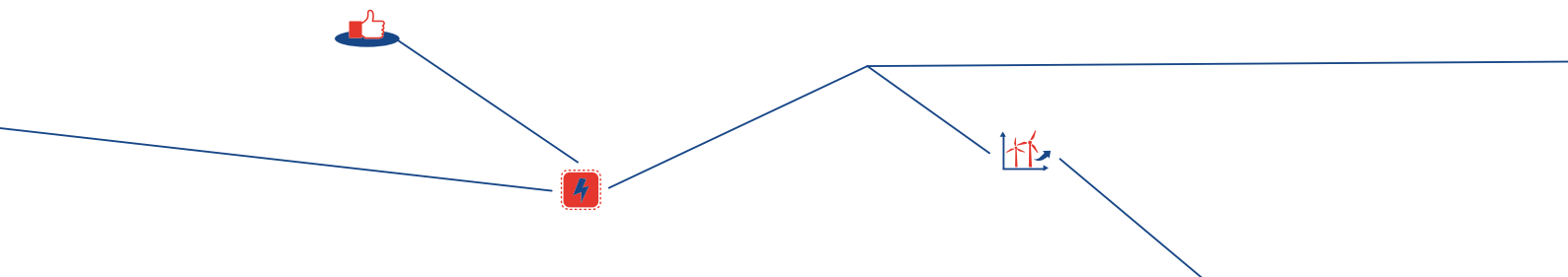
The recent discussions on Energy Security at a European level focused on large-scale projects, such as alternative gas supply routes, and voluntary common gas purchasing regimes. In CEDEC's view, these discussions miss the central points of energy security and do not take sufficiently into account how the ongoing transition of the energy sector is creating new opportunities. More and more energy in Europe is already coming from indigenous, renewable sources. Technological innovations allow for a more efficient distribution and use of energy. CEDEC believes that energy supply from sustainable sources and its efficient consumption, distributed through efficient networks that smartly balance demand and supply, will form the basis of a future energy system that is not only secure, reliable but also more sustainable than today.

Local energy companies, which are in most cases owned by local or regional authorities, exist in many Member States of the European Union. They are active in all parts of the energy value chain, generation of electricity and heat, and distribution of electricity, heat and gas. Many companies are multi-purpose utilities that provide also other services of general interest, such as water supply, local public transport, waste management and sewage systems.

Moreover, many citizen cooperatives have emerged in recent years and are active in generation and/or supply of (sustainable) energy.

Due to their diversified local services and specific shareholder structures, local companies and cooperatives operate close to the citizens and cooperate with local businesses, contributing to local infrastructure development, economic growth, and job creation. Local public utilities therefore enjoy a high-degree of visibility at the local level and surveys show consumers reward this with more trust in them than in private energy companies.[3]

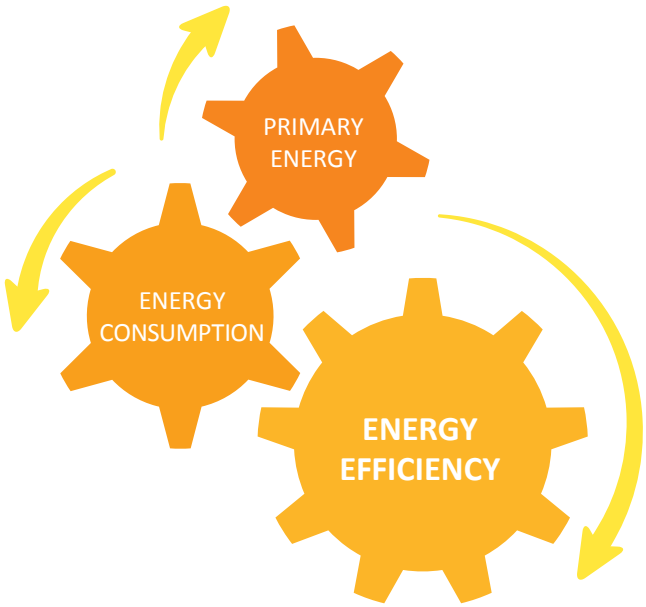
In the energy sector, local energy companies are important actors in the transition of the energy sector that is not only prompted by energy security concerns but also economic, social and environmental motives. A conscious and more efficient use of energy and generation from indigenous renewable sources that is reliably, efficiently and smartly distributed, are part of the key future competences of local energy companies, making them an indispensable pillar of Europe's energy security policies.



HOW DO LOCAL PUBLIC UTILITIES CONTRIBUTE TO EU ENERGY SECURITY?

1. Decreasing Demand with Higher Energy Efficiency

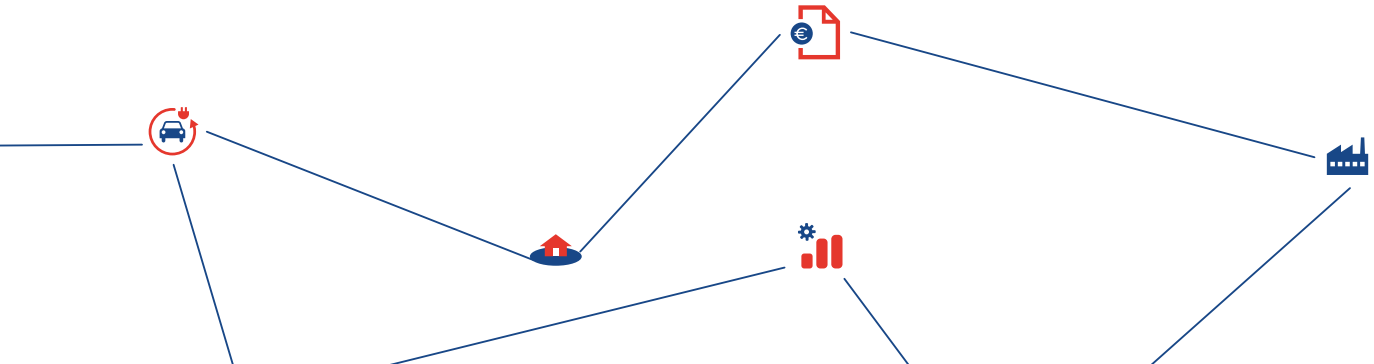
The role of energy efficiency for Europe's energy security is uncontested. The European Commission Vice-President for the Energy Union, Maroš Šefčovič has recently declared the goal of making energy efficiency an energy source of its own right in a European Energy Union. Reducing energy demand not only has beneficial effects on the reduction of greenhouse gas emissions but also on Europe's energy security, while increasing European industry's competitiveness, lowering energy bills and creating jobs, with especially high numbers in the construction sector at a local level.[4] The less energy is needed, the less it needs to be imported and produced, and thus to be paid for.



Efficient use of energy is important both with regard to primary energy, i.e. efficient production, and energy consumption by end consumers.

Combined Heat and Power

Highly efficient combined production of heat and power (CHP) is an effective method when it comes to saving primary energy. Many local energy companies are active in operating CHP plants. In Germany, for example, local energy companies produced one third of their electricity in co-generation processes in 2013. In Austria, where the level of cogeneration is generally very high, 30 TWh of heat and 20 TWh of electricity are produced annually from CHP. The highly-efficient plants reach an efficiency factor of 80-90% and helped to reduce Austria's CO_2 emission by 4 million tons in 2012 at relatively low cost.



Combined with district heating networks, CHP plants provide heat to industrial, commercial and household customers for their processes or for domestic heating. The already excellent climate and resource-use track record of district heating will be further enhanced by increasing the role played by renewable sources in the long term. District heating networks are situated mostly in urban, densely populated areas, as their costs decrease with a higher number of connected customers. CHP plants can be based on different conventional sources but also renewables, such as waste and biomass, resulting in a high level of diversification and greater independence from one single energy source in district heating networks. They are deployed locally, very close to the consumption sites and thus can have a positive impact on grid stability. Due to their programmable outputs, they can make a significant contribution to voltage control in electricity networks and to security of supply.

In combination with heat storage, CHP plants can also be operated more flexibly, based on electricity-demand, thus complementing the variable feed in from wind and solar electricity.

LINZ COMBINED HEAT AND POWER AND DISTRICT HEATING [5]

In Linz, the local public utility operates three CHP plants based on gas, biomass and waste, providing 1,180 GWh of heat and 530 GWh electricity annually. The three plants are located in one central area which is connected to the district heating network of 261 kilometers, providing 60,000 households with heat, a penetration of 60%.

Due to the central location of all three plants, the heat losses are very low and transport of the collected waste is rather short. A special filter cleans the flue gasses, meaning the plants have no impact on citizens living nearby.

The production sites are complemented with a heat storage of 1,400 MWh, which increases security of supply at all times and makes the operation of the CHP plants more flexible.

Energy efficiency in buildings

The building sector has a particularly high potential for energy efficiency: 40% of our energy demand originates from the 25 billion m² surface of European buildings. The huge savings potential is being addressed with many services. First of all, due to their specific local shareholdership, local energy companies offer energy audits and energy advice on the consumption of municipal buildings, such as administration buildings, libraries and communal centres. Starting with these typically larger buildings, considerable savings can be achieved through better insulation, efficient heating and renewed lighting systems.

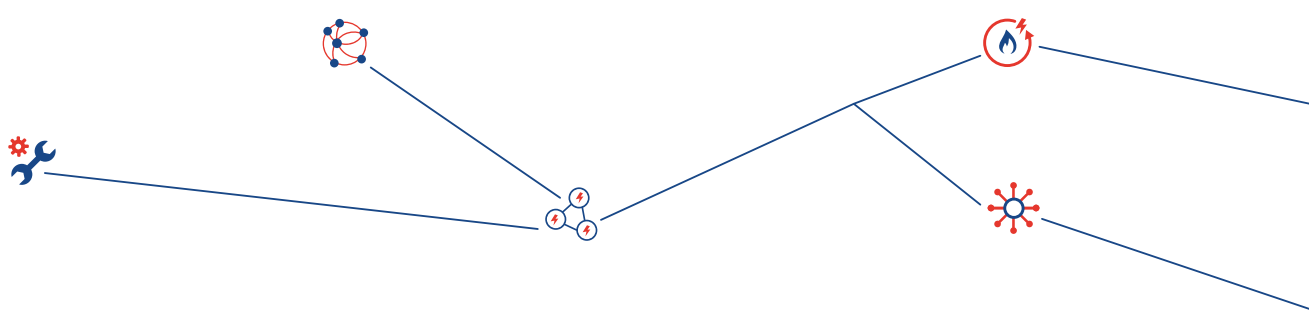
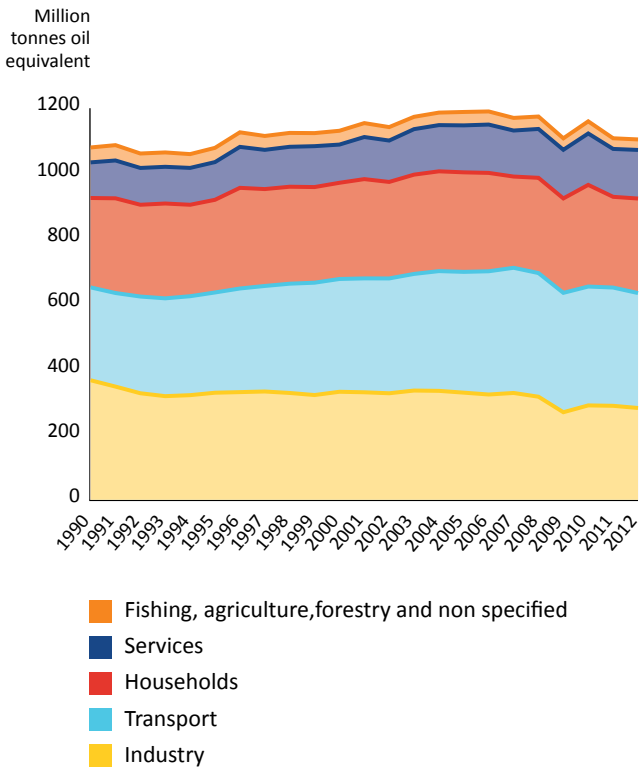


FIGURE 3 - **FINAL ENERGY CONSUMPTION BY SECTOR**



Source: European Environmental Agency, 2015

Besides larger public buildings, households, consuming 26% of the EU's energy, also have a substantial savings potential. Actions in individual family homes can therefore have considerable aggregated effects. However, often people do not know precisely how much energy they consume and where energy is lost through inefficient insulation, appliances or behavioral choices. Local energy companies offer a variety of services that identify the exact consumption and deliver targeted information and advice to consumers as to how to remedy this. Only with concrete knowledge and recommendations will consumers be able to change their behaviour or take the necessary steps to improve their energy consumption.

EWE AND ENERGY EFFICIENCY ADVICE IN BUILDINGS

EWE, a utility owned by several municipalities in Northern Germany, has offered specialized analysis of the energy consumption in buildings along with the resulting advice to its customers for more than 15 years.

In the water park of a local leisure park in Tossens, a small city near the North Sea, the annual energy costs for the swimming pool had amounted to ca. €1.5 million in 2011. In that year, EWE started a comprehensive energy consumption analysis of all automated processes in the swimming pool and wellness area: lighting, the technical appliances of the pool as well as ventilation and air conditioning systems. These tests, conducted through 22 metering points over a period of 14 days, aimed to show the thermal and electrical energy flows in order to get an overview of the consumption of single processes. The results led to concrete recommendations for action to improve the building's energy efficiency.

An optimization of the central building control system, in which the roof control system was linked to the ventilation system has led to the saving of 160,000 kWh annually. Moreover, the analysis led to further measures for energy efficiency improvements such as an adjustment of the operation of the micro-CHP plant, an exchange of pumps, the introduction of a reverse-osmosis system, an exchange of the chlorination as well as the heat exchange systems.

As a result of these efficiency measures the annual operational costs fell by ca. 10% while CO_2 emissions of the water park decreased by 20%.

Data - Knowledge is power

Energy Efficiency starts with insights into current energy consumption patterns and the potential for reductions. Only based on a thorough analysis can insights be translated into actions and for this data are key.

"ENERGIE IN BEELD"[6]

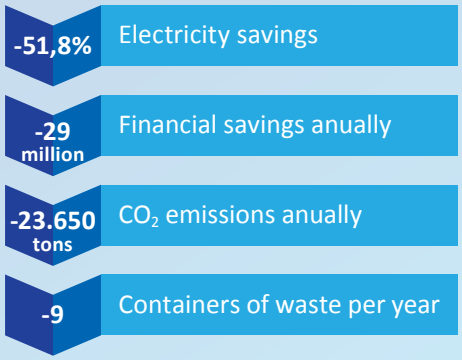
With their activities as network operators, local companies have specific and detailed knowledge of energy consumption in particular areas, like post code areas or even at street level. Alliander, Stedin and Enexis, three Dutch DSOs owned by Dutch municipalities and provinces, have developed the "Energie in Beeld" service which provides detailed energy consumption data to the municipalities, who can then develop targeted actions for their citizens. As shareholders of the DSOs they have an interest in the highest level of security of supply at the lowest cost for their regions. "Energie in Beeld" provides data on their citizen's consumption and production, the comparison between business and household consumers, provinces and cities, neighborhood and post code areas as well as historical data dating back to 2008. These insights can help municipalities and other stakeholders, such as housing cooperations, to develop targeted programmes and manage the energy supply.

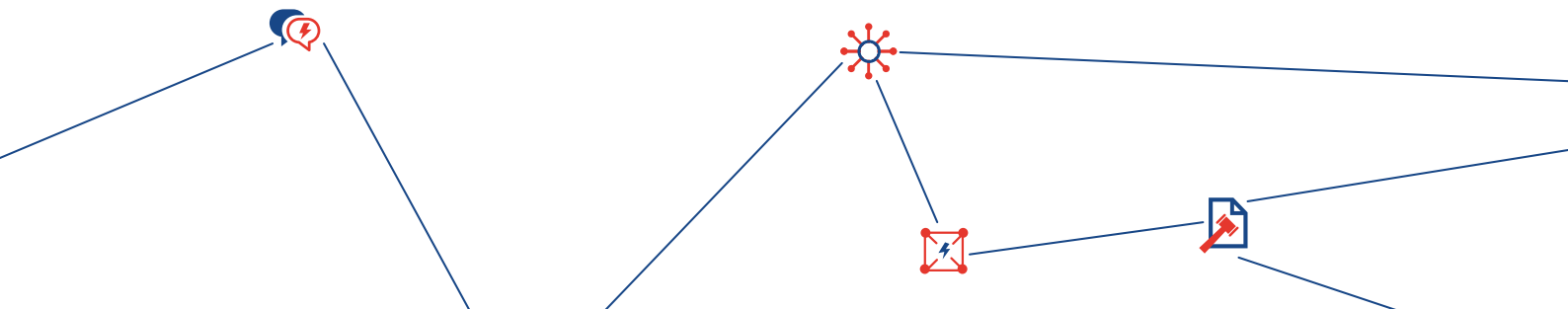
Intelligent Public lighting

Public lighting is a typical responsibility of local utilities, which represents a tremendous energy efficiency potential, due to economies of scale. This is perfectly illustrated by an example from Milan.

MILAN PUBLIC LIGHTING INITIATIVE

In the city of Milan there are 141,000 lights for the illumination of public spaces. In the first quarter of 2015 the local utility of Milan, A2A, has gradually replaced the 150W bulbs with new 75W LEDs whose life expectancy is 5 years greater. This replacement will reduce the electricity demand for public lighting from 114 million kWh to 55 million kWh annually, the reduction correlating to the electricity consumption of 22,000 apartments. The investment of €38 million will be compensated by annual savings for the municipality of €29 million as from 2016.



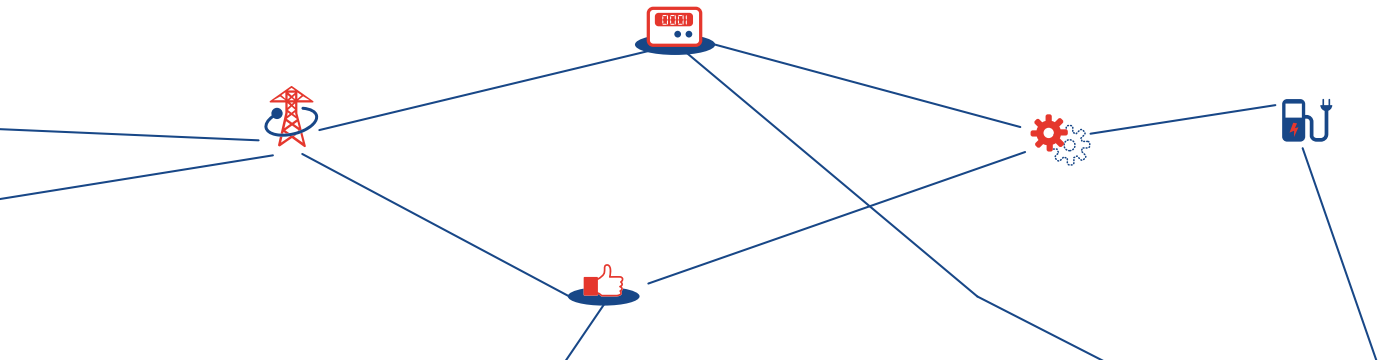


Targeted measures for low-income households

Local energy companies, which are usually the standard supplier, assist low-income households threatened by energy poverty. Based on their public ownership, the energy companies are often operating in cooperation with social departments of local authorities and consumer protection agencies to develop tailor – made programmes and staff training. On the condition of consumer consent, local utilities and the social departments in some cases even share consumer data and information, which can help to design preventive actions for energy poverty.

THE WUPPERTAL MODEL[7]

The public local utility of Wuppertal, WSW, offers several Energy Efficiency programmes, of which one is a mini-contracting offer for the replacement of old inefficient fridges in consumer households with new, very efficient ones. Households threatened by energy poverty often have very energy inefficient appliances which they cannot afford to replace. The replacement cost amounts to €250 of which €50 are taken over by the "WSW climate fund". Customers pay the remaining amount in rates of €10/per month. An accompanying study to the project showed that average household savings of 308 kWh per year have been achieved in this project.

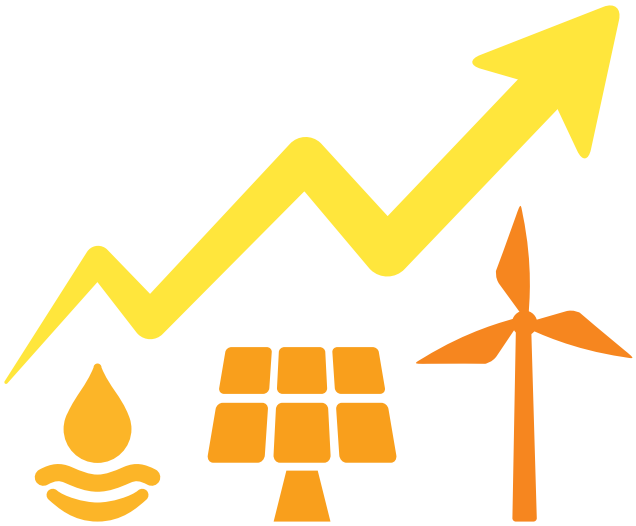


2. Increasing Generation from Renewable Energy Sources

Renewable Energy

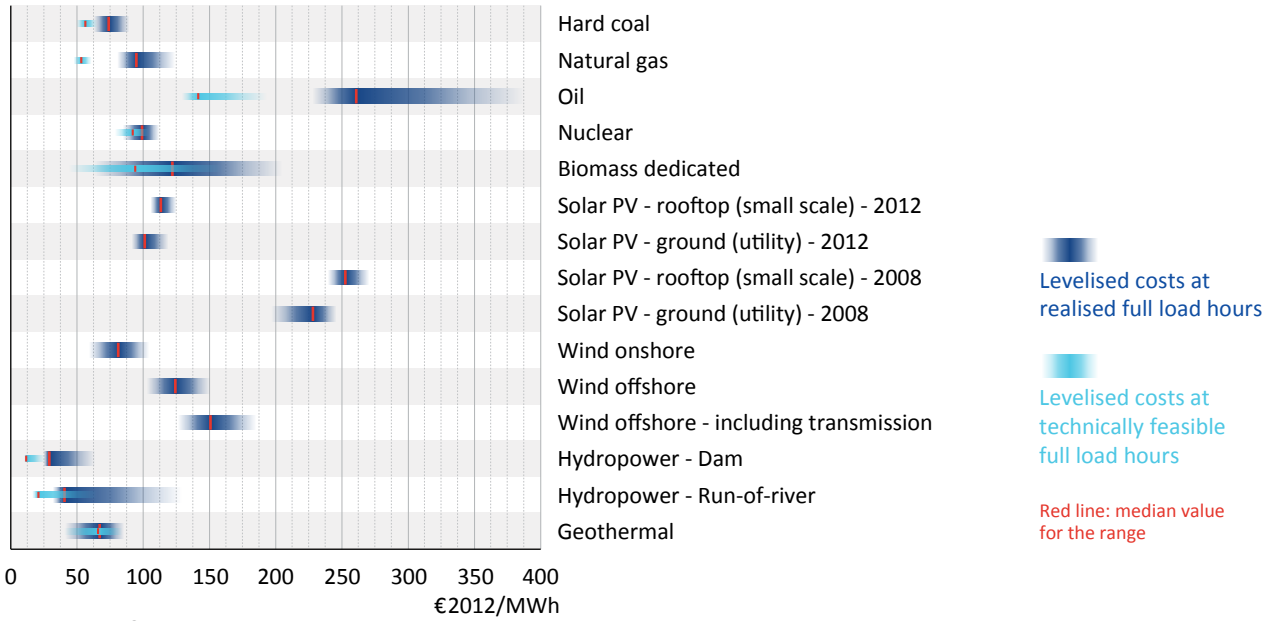
In 2014, the share of renewable energy sources (RES) in European final energy consumption amounted to a projected 15.3%[8] and is set to reach at least 27% by 2030. Against the background of Europe's energy and climate targets as well as with a view on its competitive advantage in renewable energy technologies, the President of the European Commission Jean-Claude Juncker introduced the ambitious goal of the EU becoming world leader in this sector.

Renewable energy has great potential in Europe, generating energy from resources which are endless, such as sun, wind and water. These sources therefore should play a central role in Europe's energy security strategy and their deployment has to remain a top priority in EU energy policies. From CEDEC's point of view, technology- and segment-specific support schemes for renewable energy should remain in place for the coming years, taking technology developments and cost evolutions into account, and without being disruptive and losing their predictability for investors. This will allow Member States to exploit all available resources on their territory, creating chances for innovative technologies to unfold their full potential in the energy mix. Retroactive changes to support schemes as previously witnessed in several Member States are absolutely to be avoided as they distort confidence of investors such as local energy companies.



The competitiveness of renewable sources has been increasing steadily due to decreasing technology costs. A recent report commissioned by the European Commission compared the levelised costs of electricity from all energy sources. Especially PV has had very steep cost reductions in recent years, which becomes clearly visible when comparing values from 2008-2012. Together with onshore wind, PV is the most competitive form of renewable energy, having reached grid parity in several countries in Europe. Apart from the economic performance the efficiency of technologies is also steadily improving, leading to increasing outputs per installed capacity.

FIGURE 4 - **LEVELISED COSTS OF ENERGY IN EU28 FOR ELECTRICITY (IN €2012/MWH)**



Source: Ecofys, 2014

Developing local initiatives

Local energy companies are significantly contributing to RES deployment by investing in renewable energy installations. In 2013, German local public utilities had 3000 MW installed RES capacity, which constituted an increase of 32% from the previous year.[9] Equally, the largest share of production capacity in permission procedures or under construction is renewables installations. In Italy, local companies own 2,400 MW in hydropower plants and 2,500 MW of biomass plants, constituting 13% and 50% of respective installed capacities on national level.[10]

HYDRO POWER IN BULGARIA

In 2003, two of the biggest utility companies in Northern Italy – Dolomiti ENERGIA and Azienda Energetica S.p.A. Etschwerke AG - together with two Bulgarian companies founded PVB Power Bulgaria JSC, a company that is investing in hydro power plants in Bulgaria.

PVB Power Bulgaria JSC has been developing two big hydropower projects in Bulgaria with total investments amounting to €225 million. The installed capacity of the two projects will amount to more than 50MW, producing on average ca. 263 GWh of clean electricity in Bulgaria.

The Sreden Iskar project, in which 5 small hydropower plants have started to become operational incrementally since July 2008, provides a very high level of security of supply. In 2014 the plants produced on average 96% of possible production hours during the year. Due to the high level of production and clean electricity produced, the Sreden Iskar project could reduce the CO_2 emissions of Bulgaria's power sector by more than 90,.000 tons between 2008 and 2012.

Increasing social acceptance by involving citizens

In the deployment of RES, local energy companies often overcome more easily the hesitation or resistance of citizens typically associated as a barrier with these types of installations. Besides generally operating close to the citizens, local companies in several interesting cases make available a share of their wind or solar farms, generating an income for citizens while bringing a sense of ownership and increasing public support for the projects. Moreover, as most jobs in renewable energy are in the installation and maintenance, local businesses also profit from this aspect of the energy transition.

Profit from synergies in multi-purpose utilities

Local public utilities often offer a bundle of services of general interest. Next to the supply of electricity, gas and heat, this is in many cases waste and waste water management, drinking water supply, public transport, the management of public facilities such as public swimming pools and the provision of telecommunication services.

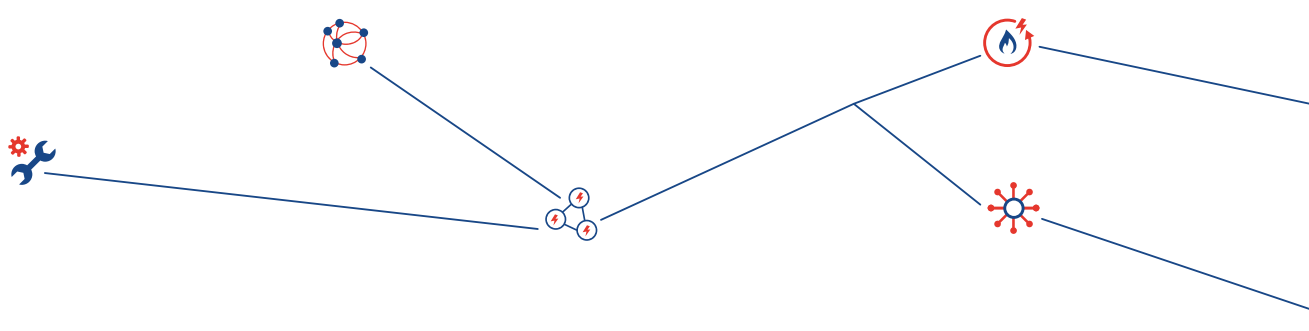
In the provision of the manifold and sometimes related activities, synergies can be exploited in order to save costs and to minimize interruptions in public life caused by public infrastructure works.

VIENNA SOLAR CITIZEN PLANT[11]

In Vienna, the local public utility Wien Energie has been particularly pro-active in the involvement of citizens in their renewable energy projects. In 2014, seventeen citizen solar plants were operated by Wien Energie. One of the largest consists of more than 1200 PV panels that were installed on the roof of the central station and a connected shopping center in the center of Vienna, producing 324 MWh of electricity per year, enough for 130 households and saving 130 tons of CO_2 annually. Citizens have the opportunity to buy a maximum of 10 panels of the installation and renting these to Wien Energie, which pays them a yearly return. While this makes citizens owners of the project, Wien Energie takes over the responsibility of the installation, maintenance and marketing of the electricity.

MULTI-UTILITY SYNERGIES IN VERONA

AGSM is the local energy company in the city of Verona, in the North of Italy. AGSM as the local utility is a shareholder of Aque Veronesi Scarl, the public company responsible for the waste water collection and treatment in the outskirts of Verona. Making use of synergies in these activities, the gases from the sewage are collected, processed and used to fuel turbines that produce the electricity and heat for the subsequent treatment of the waste water. In this way, the waste water treatment is for ca. 50 % fuelled with on-site-produced biogas, reducing the energy demand from the grid. Due to the cogeneration process, an efficiency of more than 50% has been reached in recent years.



Facilitating integration of renewables in markets and the energy system

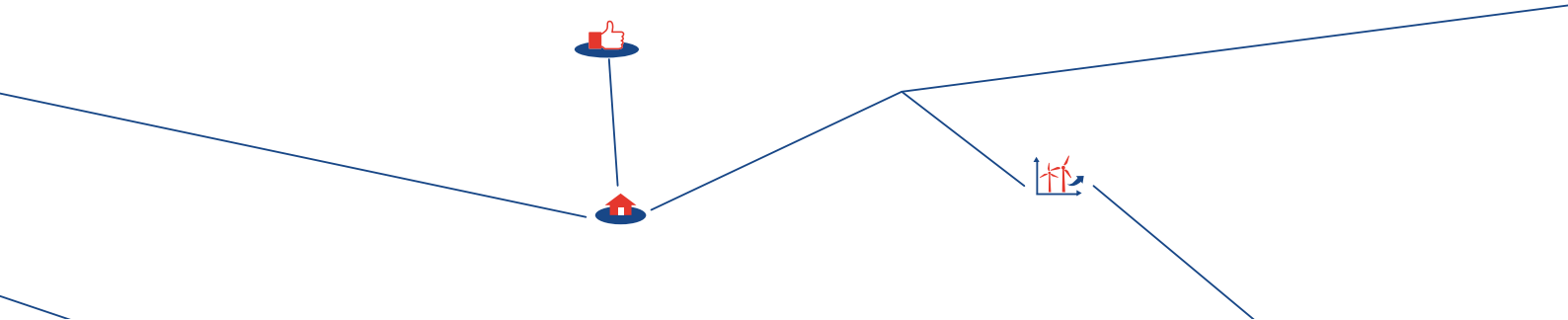
Due to their activities along the entire value chain in the energy sector, local energy companies have specific capabilities in the integration of renewable energy installations in the energy market by taking over all marketing obligations. As energy suppliers, local utilities can use the energy produced in their own RES installations in their own portfolio or sell it directly in energy markets. Moreover, local utilities are experienced with regard to the scheduling of generation outputs as well as balancing responsibilities and therefore facilitate the participation of RES in the market while taking over all responsibilities.

VIRTUAL POWER PLANT AND GEOTHERMAL DISTRICT HEATING IN MUNICH[12]

Stadtwerke Munich (SWM) stands out with their ambitious agenda for the deployment of RES: SWM already generates enough electricity from renewable energy sources in its own plants to supply all of Munich's private households, subways and trams combined. By 2025 SWM aims to generate enough electricity from renewable sources to supply the entire municipality.

To achieve this, SWM invests heavily in RES installations, including offshore wind and local, decentralized sources. Currently, SWM are piloting a virtual power plant (VPP), which links several small generation capacities as well as bigger energy consumers with flexible loads and emergency power systems in an information network. Bundled to one entity, the VPP has a capacity of 1,000 MW, comparable to a traditional power plant. Acting as facilitator, SWM offers –depending on the size of the capacity - services for direct marketing for renewable energy according to German law, selling capacity into balancing markets and scheduling. While the owners keep the full authority over their installations, SWM may – if permitted and against remuneration – take over control of the installation. Moreover, SWM is responsible for the data communication and analysis, trading, as well as forecasting of interventions.

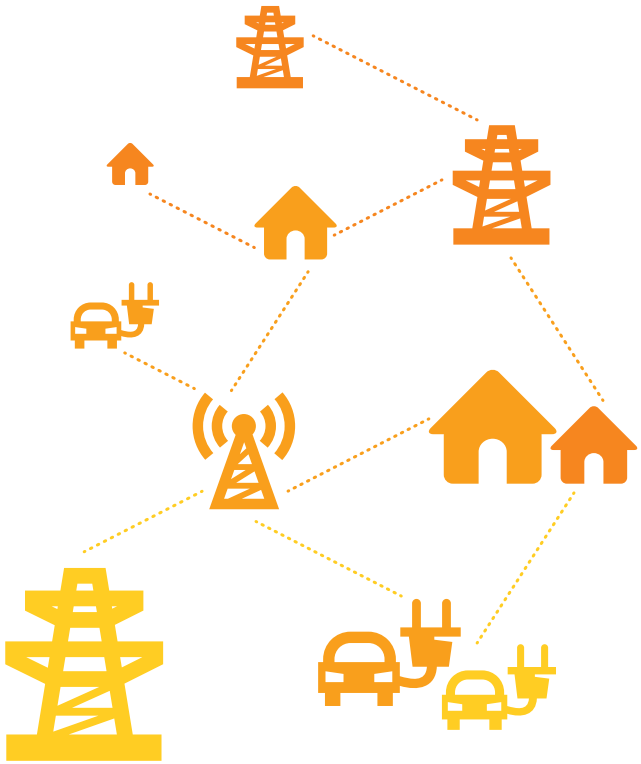
In the heating sector SMW aims to operate its district heating system with energy solely originating from renewable sources by 2040. To realize this vision, SWM will be concentrating on further tapping of geothermal energy. Findings to date show that the area covered by the SWM district heating network offers the potential for 16 geothermic wells. At present SWM already operates the most productive geothermal doublet in Germany with 9 MW_{th}. Other operation work is in preparation.



3. Investments in Energy Infrastructure

In Europe's transitioning energy system, distribution networks are becoming ever more important. Some 95% of all RES installations are distributed, meaning they are directly connected to the medium- and low-voltage lines. Where traditionally the energy was flowing one-directionally from the large generation capacities on transmission level to the consumers on distribution levels, in many regions there are now bi-directional flows, with generation on distribution level at times exceeding local demand.

To allow for an optimal and efficient usage of the energy closest to the production sites and for the stability of the grid at all times, DSOs are looking into and investing in smart technologies, such as automation at substations, smart meters, EV charging stations and storage solutions. Next to guaranteeing a secure, reliable grid operation, DSOs will also become the interface between networks and smart markets, that provide services for consumers to react flexibly to price signals by adjusting their consumption or production and thereby supporting the system. Demand-side flexibility, together with flexible generation management, and several forms of storage will in the future energy system make important contributions to ensure system stability and will therefore also actively be managed by DSOs.



Transmission lines need to take up loads from lower voltage network levels, requiring both technological adaptation and intensifying communication between TSOs and DSOs. Hence, a new paradigm is needed in network planning, enabling an integrated view for the development of networks across all voltage levels.

INFRAX META PV SMART GRID PILOT[13]

In the Belgian province of Limburg, Infrax (the local DSO) has teamed up with solar panel producers, research institutions and consultants to pilot one of the first smart grids in real life. The project consortium tested how innovative control algorithms of PV inverters can help to integrate larger amounts of variable sources into the system without the classical grid reinforcement and even actively support it, bringing technical as well as financial benefits.

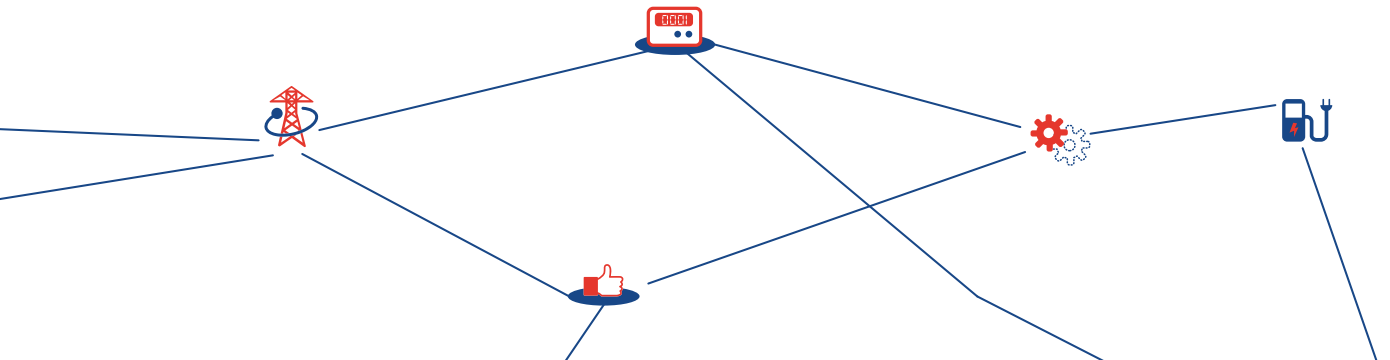
The active grid support from PV has been demonstrated at two types of sites: a residential/ urban area of 85 households with 4 kW each (428 kWp), and several industrial zones with 9 PV systems (2,4 MWp). The project participants tested voltage control strategies based on reactive power from PV and battery storage by providing information on their system to the DSO, which then developed new methods for analysis and control of the grids. The project proved that these new control strategies of the SMA-inverters are able to increase the hosting capacity between 30 and 50% depending on the type of grid, the location of the single PV-invertors and the control strategy. These smart inverters can postpone or even defer grid reinforcements at a very small additional charge.

To manage the new dynamics that will arise at distribution levels, DSOs will invest heavily in distribution networks in the future. It is estimated by the International Energy Agency that by 2035, €480 billion will have been spent by European DSOs to make their networks future-proof.[14] As regulated entities receive the largest part of their income through network tariffs, they are dependent on regulatory frameworks that equally incentivize innovative solutions such as ICT instead of traditional grid extension.

Secure network operations

Investments will also be made in reliable and secure ICT technologies for data management. Local public utilities in their role of DSOs are responsible for the management of the grid and therefore need data, amongst others on consumption. At the same time, in their neutral market facilitating role they also make the data available to all relevant parties that have been authorized by consumers, for example for the provision of demand side services. Those data must of course be handled securely to ensure consumer privacy. As regulated and non-commercial parties DSOs are best placed to respond to these requirements. They are developing the necessary technical solutions as well as creating economies of scale through exhaustive cooperation.

Security is also key since the actual operation of the grid is becoming more ICT-based. Energy networks, as strategic infrastructure assets, need to be protected from external threats in the best possible way. Local utilities with help of specialized external partners are developing solutions here that ensure the highest degree of protection.



SMART METER ROLL-OUT IN SWEDEN

In 2003, Sweden indirectly mandated automatic meter reading (AMR) by requiring that all customers with a connection over 63 A (current) must have hourly metering while customers with a connection less than 63 A (current) shall receive hourly metering upon their request.

Sundsvall Elnät AB, the local network company, is about to complete the smart meter rollout for its 27,500 customers, of which 90% are residential. Customers can today see hourly meter data if they log on to the web page and every month see the correct measurement value. In order to increase and facilitate knowledge about variations in consumption amongst their customers Sundsvall Elnät AB has developed a website to promote energy efficiency and active participation of end consumers. Consumers can also purchase displays that show meter readings on site, in their home.

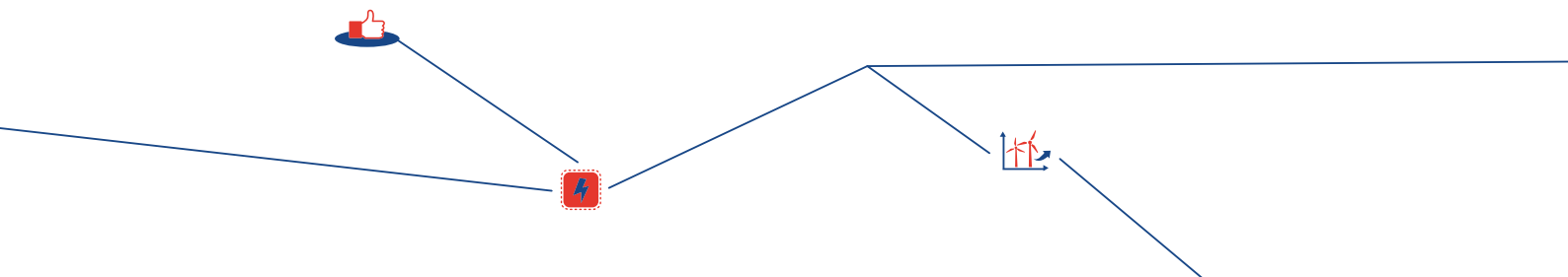
Sundsvall Elnät AB is also responsible for measuring the self-produced electricity and visualising this for prosumers. As a result of this increased transparency about consumption and production, more local real estate owners have been starting to install small generation plants (less than 46kW). This increases the possibility for a network company to react quickly and effectively and prevent black outs on a local level.

Sundsvall Elnät AB is using hourly data from the smart meters as well as their knowledge about power outages and power peaks for more efficient and effective grid maintenance.

Moreover, in the green highway pilot project, the charging stations infrastructure for electric vehicles are integrated in the system with smart meters for customers.

Electric mobility

In Europe, the transport sector is still largely dependent on crude oil, being accountable for 95% of the demand. Responsible also for 25% of EU's GHG emissions, several initiatives have been launched to boost alternative fuels in the framework of the EU's decarbonisation agenda. Against the background of an increasing share of electricity being produced from emission-free and domestic renewable sources, electric mobility is especially promising for increasing European energy security. Moreover, electric vehicles have an efficiency factor of up to three times higher than conventional cars. However, the market uptake has been lagging and fallen short of expectations in most Member States. Apart from the high cost of EVs and previously missing standardization, the main reason was range anxiety due to a lack of publicly accessible charging stations.



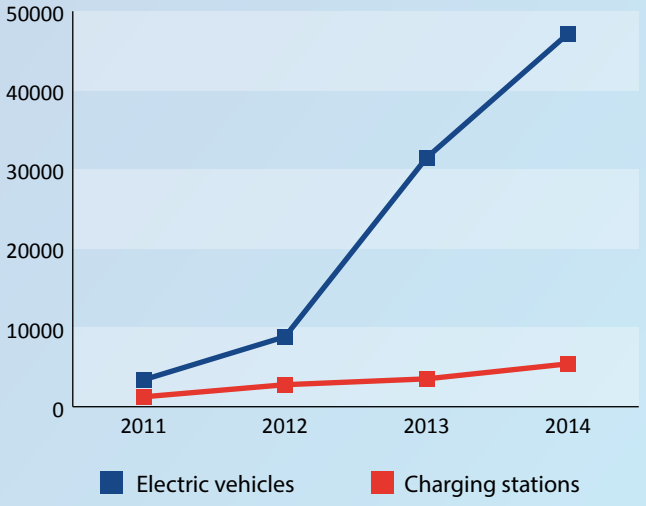
Local energy companies, especially the public-owned DSOs in the Netherlands, have been pro-actively mitigating this chicken and egg problem by deploying a public charging infrastructure for electric vehicles contributing to a larger market penetration. While there is no market for the charging infrastructure in most countries as yet, the deployment by DSOs allows for spreading costs of the basic infrastructure across all network users. Also, EV charging activities are expected to have a significant impact on the distribution networks, thus forming an essential part of a smart infrastructure.

E-LAAD FOUNDATION

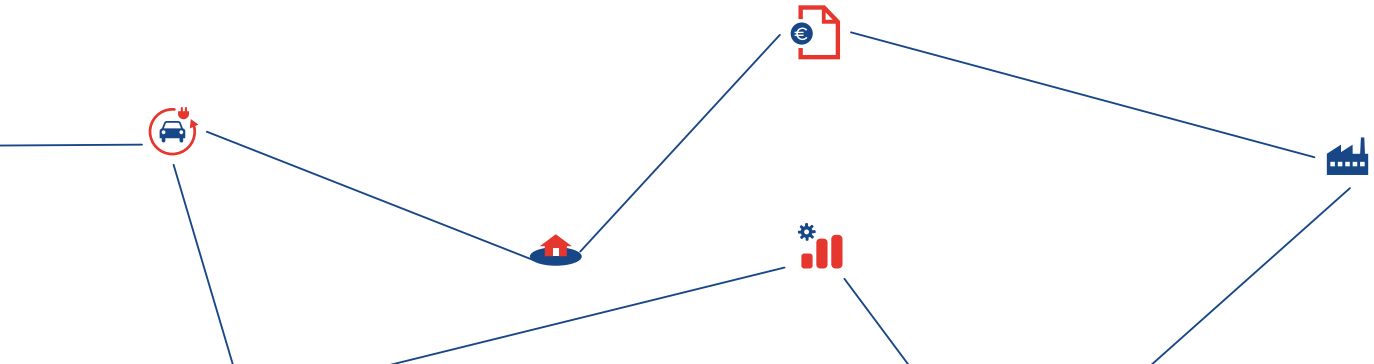
Between 2009 and 2014, E-laad - a (temporary) foundation by the DSOs - established a network of 3,000 public slow charging stations for electric cars across the Netherlands. E-laad was established to overcome the famous chicken-and-egg problem that hindered the market penetration of electric vehicles in the Dutch market.

As seen in the table, the systematic investments in charging stations caused the market for electric vehicles to pick up rapidly in the Netherlands. With commercial parties that have the intention to provide fast charging stations around the highways and additional activities being developed around the promotion of e-mobility, the market now seems to become competitive. For this reason, E-laad completed its work of placing public charging stations in 2014 and was split into two different companies: ElaadNL (coordinating the connections of public charging stations to the electricity grid on behalf of the network managers involved) and EVnetNL (managing and maintaining public charging stations).

FIGURE 5 - DEVELOPMENT OF EVS AND PUBLIC CHARGING STATIONS IN THE NETHERLANDS



Source: Elaad



Smart charging

The swift and widespread penetration of EV and the rapid growth in domestic photovoltaic generation has been the basis for the idea of using batteries of electric vehicles as flexible storage. Moreover, this would solve the potential problems of too many EVs charging at the same time during peak hours, which could cause problems in the electricity system. Smart charging concepts, which basically manage these processes, can offer a solution here.

In the Netherlands, an open standard for smart charging (the Open Charge Point Protocol, OCPP[15]) has been developed by DSOs, aiming to create an open communication standard that would allow charging stations and central systems from different vendors to easily communicate with each other.

The advantage of smart charging for DSOs would be to obtain a better use of the existing energy system, and to prevent rapid and expensive investment in strengthening the grid, even with a high penetration of EVs. The protocol has already been adopted by several similar initiatives in different countries.

The cooperative model

CEDEC's membership does not only comprise local public companies but also cooperatives of local communities such as the French SICAE, which constitute a great example of citizen involvement in the energy market.

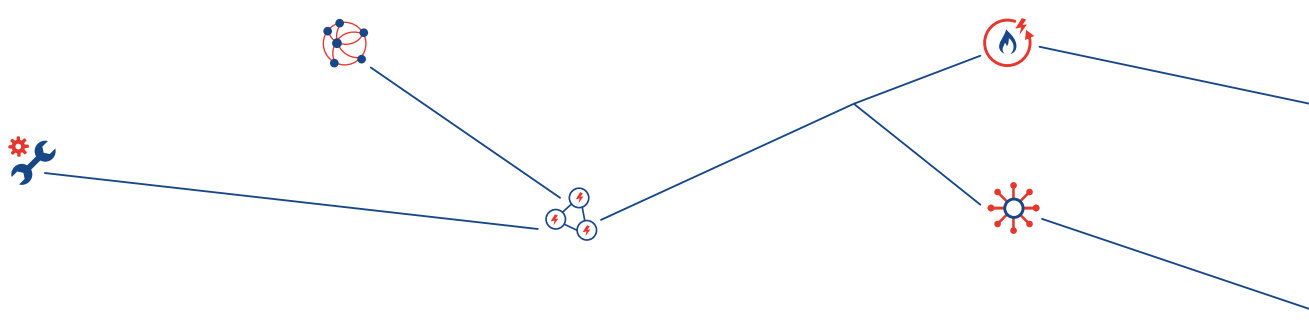
THE FRENCH SICAE

Since 1920, farmers in some rural areas of France have been banding together to form electricity cooperatives in order to accelerate the electrification of rural areas where big private investors did not have an economic interest to do so. Today, local cooperatives provide electricity distribution and supply for more than 1,000 municipalities in 18 counties and in 10 regions.

They provide a range of services, including management of low and medium-voltage public distribution systems, provision of energy supply and public lighting, and promotion of energy-saving practices and renewables. They are committed to supplying a quality service, for which they count on a diverse and well-prepared workforce of 520 employees engaging as customer service representatives, technicians, Human Resource managers, IT experts, accountants, etc.

Due to their activities, these cooperatives have become a key driver and essential to the development of local economies: the operating surplus has always been reinvested to develop and improve the networks and services available to the communities.

Having distributed 2,800 GWh of energy to more than 250,000 customers (companies and households) and 500,000 inhabitants through a network of 14,600 km of high-, medium- and low-voltage grids, including some 50,000 street lights, they look to their future with the goal of seizing new opportunities, especially in cost optimisation and the development of renewable energy, in order to continue providing a high-quality service in the electricity sector.



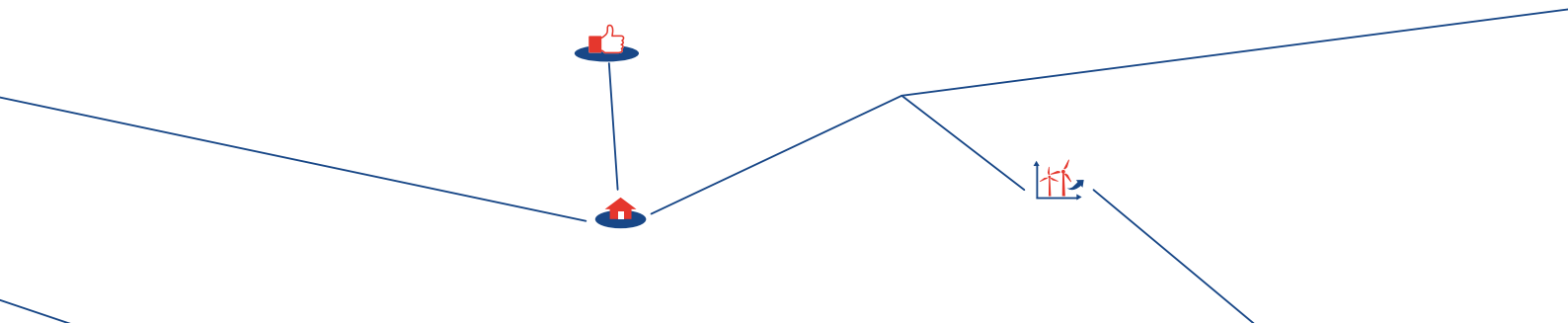
CONCLUSIONS

Europe's energy transition has been a bottom-up movement. Many local initiatives, like the ones illustrated in this report, have contributed to a fundamental change in Europe's energy system.

The illustrated examples show some cases that so far have been insufficiently exposed and promoted in the debate about Europe's energy security. Energy security encompasses much more than a reliable import of fuels from other parts of the world: instead the focus should be on the manifold initiatives on a local level – Europe's cities and regions – and how these developments can be supported and facilitated.

For the years to come, Europe will undoubtedly continue to rely on imports of conventional energy sources. But the potential it has in indigenous, renewable sources, its know-how and technical abilities to reduce the use of energy through smart systems and innovative and efficient technologies, is much greater than realized by many and should be actively promoted. Examples in this report show how local energy companies are already working on these solutions that will enable Europe to be more energy independent and sustainable – if the right economic incentives and accompanying regulatory frameworks are developed.

The energy future is local!



POLICY RECOMMENDATIONS

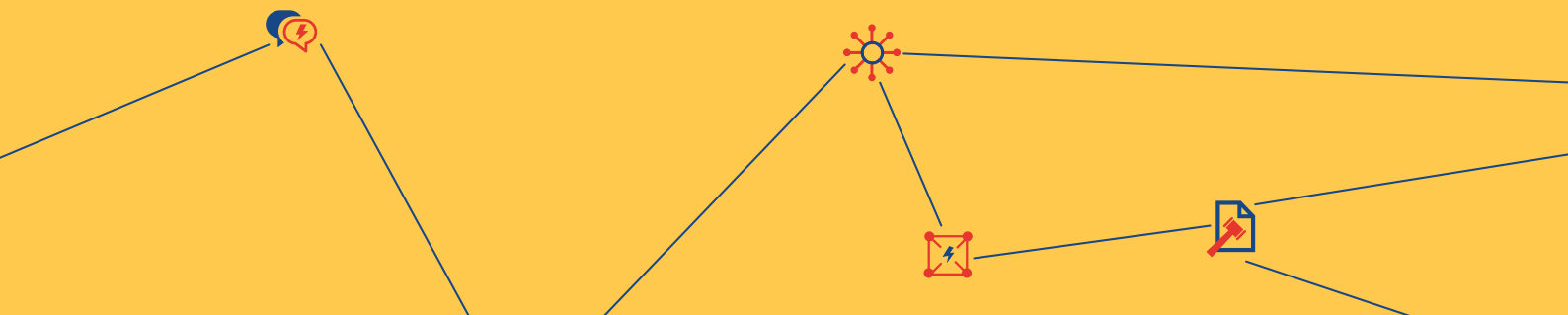
- Promote local solutions such as local energy companies, cooperatives and citizen projects to profit from local links between shareholders, management and citizens and resulting higher social acceptance;
- Promote platforms for exchange of best practices, such as the Covenant of Mayors, for local authorities to provide sustainable energy solutions;

Energy Efficiency and Renewable Energy

- Ensure the accomplishment of the 2020 targets by full and speedy implementation of all related policies, with special attention for local initiatives;
- Ensure a reliable, transparent governance process of the 2030 climate and energy package with clear trajectories for individual Member States that provide clarity and predictability to investing companies and accountability to Member States;
- Ensure swift and far-reaching reform of the European Emission Trading Scheme to incentivize investments in high-efficient cogeneration plants, Energy Efficiency and Renewable Energy;
- Adapt the Environmental and Energy State Aid Guidelines (EEAG) to take account of the special requirements of CHP in combination with district heating;
- Promote district heating for buildings in densely populated urban areas;
- Tap into the potential of energy efficiency in buildings, especially for low-income households through the provision of dedicated EU funding;
- Lift non-economic barriers for renewable energy projects, such red tape in administration and permission procedures;

Smart Distribution Grids

- Revise criteria for European projects of common interest for facilitated development of small-scale smart grid projects;
- Adapt regulatory frameworks for DSOs to incentivize investments in innovative ICT solutions in distribution networks, including high standards for network security;
- Allow for the deployment of public charging infrastructure for EVs through DSOs in the initial market uptake phase;
- Ensure high standard of data protection for consumer privacy in energy-related communication infrastructures.

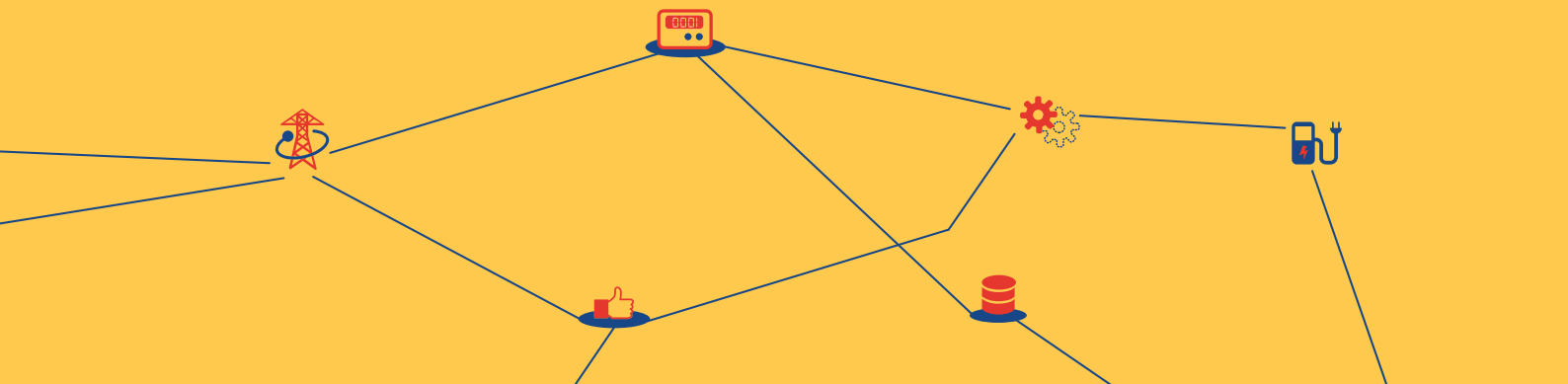


Markets

- Develop a market design that adapts to the needs of a system largely based on renewable energy, through closer to real-time gate closure and through facilitating the participation of RES in balancing markets;
- Progress with the completion of the internal energy market: allow for the integration of a liquid and cross-border intra-day market for better trading opportunities.

Financial Support

- Provide sufficient and easy access to funding for local actors, such as local energy companies and municipal administrations for Energy Efficiency and Renewable Energy projects;
- Streamline renewable energy and energy efficiency in all funding programmes and facilitate access for smaller actors, through light administrative procedures, off-the-shelf-templates and adapted criteria for small-scale projects;
- Support Research and Development in RES, EE and smart grids;
- Provide EU funds for the development of future-proof smart grids that facilitate for large-scale RES integration in distribution networks.



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FIGURES

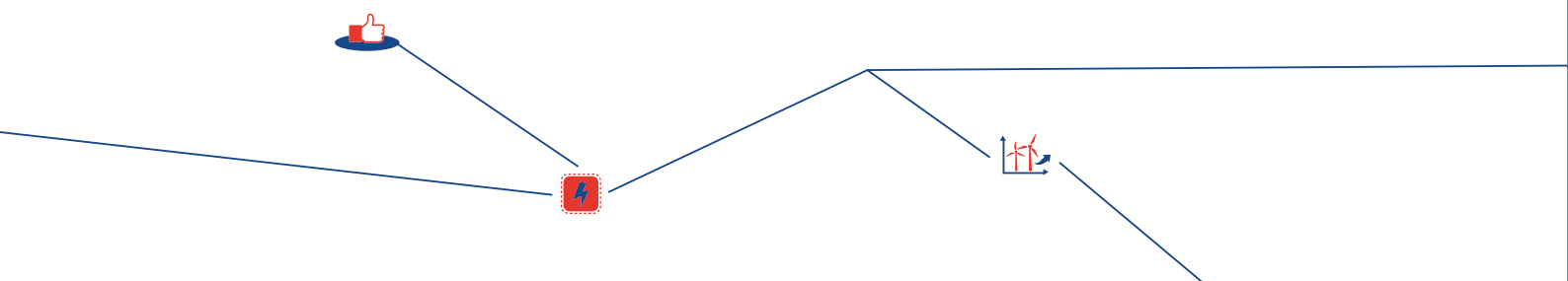
Figure 1: European Commission, 2013

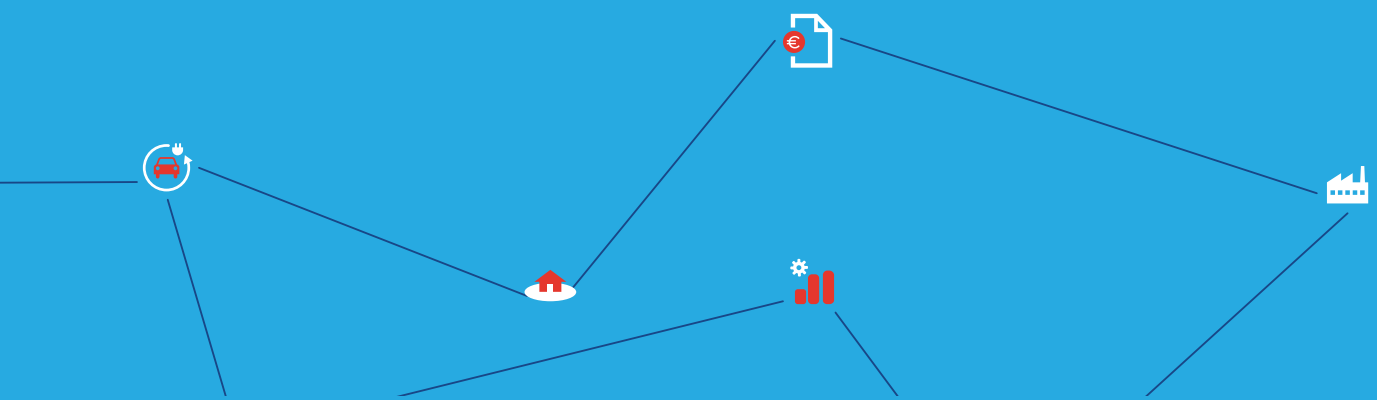
Figure 2: EU energy in figures –Statistical Pocketbook 2014

Figure 3: European Environmental Agency, 2015

Figure 4: Ecofys, 2014

Figure 5: Source, Elaad





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