AWARD

GOOD PRACTICE OF THE YEAR

Best cases from the 2016 competition

Renewables Grid Initiative

Imprint

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The Renewables Grid Initiative is a unique collaboration of NGOs and TSOs from across Europe. We promote transparent, environmentally sensitive grid development to enable the further steady growth of renewable energy and the energy transition.

For more information, visit our website: **www.renewables-grid.eu**

Foreword by Dominique Ristori, Director General for Energy, European Commission

Managing the transition to a low carbon economy while continuing to ensure energy security and affordability is one of the greatest challenges of our time. Moving to a secure, sustainable and competitive energy system will require the deployment of new technologies, many of which are still at the development stage. Grid infrastructure is one of the building blocks of the energy transition. In this context, the increasing share of variable renewable sources brings new challenges for the operation of our electricity system. Achieving an Energy Union will require committed action at all levels of society, and a robust framework ensuring that collectively we deliver on our goals.

One of the key instruments and the core of our work for achieving a fully integrated internal energy market is the TEN-E Regulation and the selection and implementation of Projects of Common Interest (PCIs). The TEN-E Regulation, together with financial support from programmes such as the European Fund for Strategic Investments (EFSI) or the Connecting Europe Facility (CEF) is the guarantee that the necessary investments will be made and the infrastructure that Europe needs will get built.

However, the process of constructing, extending, and upgrading the necessary electricity grids in Europe may sometimes face reservations from stakeholders and citizens due to a lack of information and early consultation. Failing to reach an agreement with local stakeholders on the deployment and siting of projects can cause lengthy and costly delays to the planning process and can even jeopardise the project altogether. This is why increasing societal acceptance of energy infrastructure is key. Transparency and communication are essential, but citizens and other stakeholders must also see the added-value and benefits brought to them by the project, locally or through a positive impact on energy bills. In this context, we are supporting public consultations with a view to enhance the capacity of citizens, associations and other stakeholders to participate more directly in the EU's decision-making process.

RGI's "Good Practice of the Year" award is an excellent contribution in response to these issues. It explores new territory with regard to public engagement, environmental protection and technical innovation, and gives cross-border visibility to outstanding initiatives that help accelerate the energy transition.

The award is unique in recognising and promoting the hard work and dedication involved in responding to this challenge. I would like to extend my warmest congratulations to all participants and I am delighted that DG Energy has the honour of hosting the "Good Practice of the Year" award ceremony at this year's Energy Infrastructure Forum in Copenhagen.

Introduction

AWARD GOOD PRACTICE OF THE YEAR

Renewables Grid Initiative

MAZARS

In 2016, RGI's "Good Practice of the Year" award once again attracted an array of amazing applications, the most exciting and ground-breaking of which we have collected in this brochure. All of them have been jury favourites in the submission process and have been judged as most commendable and worth being shared with a large audience. By presenting those practices in this brochure, we wish to reward actors who test innovative approaches and inspire others to replicate them or find their own way of overcoming technical, participatory and environmental challenges in grid development. The award explicitly honours exceptional practices, not entire grid projects, in the three categories "Technology & Design", "Environmental Protection" and "Communication & Participation".

Each of the projects that are being honoured as the most outstanding in their respective categories, feature approaches or components that set them apart form the other entries. Next Kraftwerke submitted their "Virtual Power Plant Next Pool", an undertaking that uses cloud-computing technology and decentralised power producers to combine the flexibility of both power producers and consumers into a single virtual power plant. The jury chose this project as the "Technology & Design" winner because it is an immense asset in the transformation of the power grid. Both supply and demand flexibility will be increasingly necessary to accommodate fast ramping periods and to address corre-

sponding supply forecast errors. In the “Environmental Protection” category the jury singled out a practice by Italian grid operator Terna that explores the relatively young field of preserving marine ecosystems when building offshore grid cables. By using innovative drilling techniques and biodegradable material to install the cable that links the energy networks of Malta and Sicily and therefore contributing to the integration of power generated from renewables into the Maltese electricity system. The jury applauded this holistic and sustainable approach. As the award winner for “Communication & Participation” the jury chose a project that perfectly shows how important it is to utilise local knowledge when building new grids and engage with stakeholders before and during the project planning. Danish grid operator Energinet.dk involved landowners in the corridor planning in a simple but innovative way: in group discussions relevant landowners were asked to explore grid location concerns using a map and a string. It is an easily replicable showcase for meaningful involvement in potentially challenging and controversial projects and has been very positively evaluated by the citizens involved.

Congratulations to the winners and thank you to our incredible jury of experts who donated their time and knowledge to this competition. We are also thankful to the international audit and advisory company MAZARS for once again accompanying the evaluation process in a most helpful and accomplished way.

An independent jury of experts

Based on the evaluation criteria and their personal expertise, our independent jury elected a winner in each of our three categories: Communication & Participation, Technology & Design and Environmental Protection. The jury members are experts in their respective fields that include grid development, energy policy and biodiversity:

Gregg D. Ander, Executive Consultant at the Energy Foundation

Gregg D. Ander is an executive consultant for the Energy Foundation, which he formerly worked for as Vice President of Power Strategies. In this role, he oversaw a portfolio of initiatives including energy efficiency, demand response, renewables, gas, coal, smart grid, and financing.

Dr. Maguelonne Dejeant-Pons, Executive Secretary of the European Landscape Convention

Dr. Maguelonne Dejeant-Pons is Executive Secretary of the European Landscape Convention. She has published several books dealing with territorial development, the protection of coastal and marine zones, biological and landscape diversity and the human right to the environment.

Patrick Devine-Wright, Professor of Human Geography at the University of Exeter

Patrick Devine-Wright is an expert on public engagement with low-carbon energy technologies and associated infrastructure such as high voltage power lines. He has participated in, and led, several multidisciplinary research consortia and advises an EU pilot project on public acceptance of electricity grids.

Marie Donnelly, Director for New and Renewable Sources of Energy, Energy Efficiency and Innovation at DG Energy, European Commission

Within the Directorate General for Energy, Marie Donnelly is responsible for the development of policies and actions on energy efficiency and renewable energy, the coordination of research activities in the field of energy as well as actions supporting the achievement of the 20-20-20 targets.

Baard Eilertsen, Founder of energy utility advisory company Truebase

Baard Eilertsen is the former CEO & President of Wire-

less Maingate AB. He created the world's largest and most successful Smart Home solution 100Koll for E.ON. In 2015, Baard started Truebase AB, a company advising large utility companies in Europe on strategy.

Mike Hogan, Senior Advisor at the Regulatory Assistance Project

Mike Hogan works on electricity decarbonisation policy, particularly matters related to market design. He previously led the power programme at the European Climate Foundation and has 35 years' experience in the electricity industry.

Jo Leinen, MEP and member of the Party of European Socialists

Jo Leinen has been a Member of the European Parliament since 1999. Before becoming an MEP, Jo Leinen was Minister for the Environment in the State Government of Saarland (Germany) from 1985-1994.

Dr. Gerd Leipold, former CEO of Greenpeace International

Dr. Gerd Leipold led Greenpeace as Executive Director between 2001 and 2009. Today he advises companies on sustainability, works with scientists to improve their stakeholder communication, investigates how to finance a modern electricity grid and supports NGOs in their strategy development.

Catharina Sikow-Magny, Head of Unit B 1 at DG Energy, European Commission

Catharina Sikow-Magny joined the European Commission in 1997. She is the head of unit in charge of "Internal market I: networks and regional initiatives" in the Directorate General of Energy. Before that, she was responsible for the international transport relations team.

“Virtual Power Plant Next Pool“ by Next Kraftwerke GmbH

Short description of the good practice

Next Kraftwerke developed a virtual power plant that combines the flexibility of both power producers and consumers by using cloud-computing technology and decentralised power producers. The aggregated power can be used to provide control reserve in order to balance out fluctuation in the grid.

Objectives:

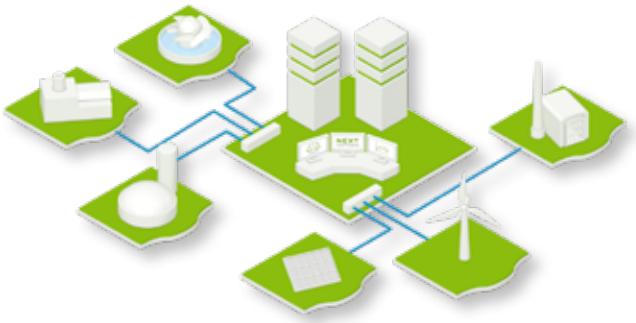
- Organise an intelligent shifting of the power production to times with high prices at the power exchange, while shifting the power consumption to lower price regions
- Make renewable energy a better projectable component in power, using near-time values and master file data, especially of small and medium size plants
- Improve the congestion management on the German grid and reduce the need for expensive balancing power
- Use the data for the promotion of renewable energy

Geographic scope: Germany, Austria, Belgium, France and Poland

Time Span: 2008-2016 (Evaluation from June to August 2016)

A large number of small, decentralised renewable power plants are feeding into the power system. A high percentage of their production is volatile. This fluctuating power production and the industrial power consumption need to be balanced in order to avoid unwanted congestion in the grid.

Next Kraftwerke has developed a cloud-computing technology, which combines the flexibility of power



producers and consumers into a single Virtual Power Plant. The aggregated power can be used to provide control reserve in order to balance out fluctuation in the grid. It allows for intelligent shifting of the power production to times with high prices at the power exchange, while shifting the power consumption to lower price regions.

The Next Pool connects more than 2,900 medium- and small-scale power- producing and power-consuming units (1.9GW) with a fully automated centralized control system. Each individual asset is integrated via a remote control unit called Next Box. The control unit reads the status of each asset and is able to control the asset automatically. This way the Virtual Power Plant can react to control reserve calls with an extremely high granularity. The largest group of participants consists of biogas plants as their production is steady and therefore a perfect energy source for stabilising the grid. This Virtual Power Plant provides secondary and tertiary control reserve for the whole system.

Additional information:

- Next Kraftwerke is the operator of a large-scale Virtual Power Plant (VPP) and a certified power trader on various European energy exchanges (such as EPEX and EEX). Their VPP technology and concept can be transferred to different markets, only the varying market designs of the different countries need to be taken into account
- Project website: https://www.next-kraftwerke.com/virtual-power-plant

“Promotion of biogas systems“ by Namalere Forest Conservation Group (NFCYG)

Short description of the good practice

The Namalere Forest Conservation Group promotes off-grid solutions in combination with biogas as an alternative source of energy in Kenya in order to improve social welfare, encompassing improvements regarding the living conditions and the health of inhabitants, environmental protection and sustainability in an efficient and cost-saving approach.

Objectives:

- Improving the living conditions and health of people
- Introduction and access to clean, renewable and sustainable energy
- Development of a modular system for biogas use
- Reduction of the use of fossil fuel, especially kerosene
- Enablement of local employment, provision of technical training and knowledge especially to women and youth

Geographic scope: Bungoma (Western Region Kenya)

Time span: 12 months

The NFCYG has successfully completed the installation of two large scale and 150 small scale generation projects at schools, markets and homesteads along with a 1.8km long distance heating off-grid, giving at least 500 homesteads access to clean, sustainable, and affordable energy. The installed local biogas plants run with existing raw material such as manure, human and agriculture waste. Turning waste products into biogas creates many advantages for the local com-

munities: It is accompanied by a reduction of waste and greenhouse gas emissions, lower energy costs, the reduction of respiratory and eye diseases caused by cooking fires and traditional lighting indoors, and a lighter workload for women and children related to fuel wood collection and cooking activities.

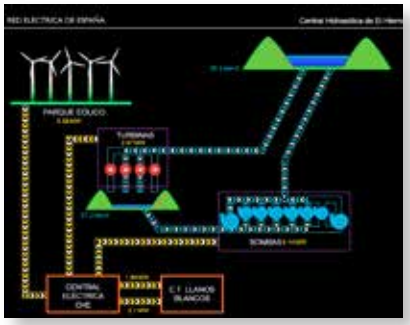
The practice also provides women with skills and resources to increase their productivity and income through employment. Women are trained as technicians, to take care of day-to-day maintenance of the installed biogas plants. The goal is to help them fulfil their economic potential, improve their well-being and that of their families and communities.

In the long run, the goal of the practice is to develop a modular system in order to provide many local communities with the advantages of biogas. The NFCYG expects to install 2,000 digesters in this area before expanding to other areas. This would directly benefit around 1.9 million people – with 300 people directly or indirectly employed as a result of the programme.

Additional information:

- The NFCYG is an NGO that promotes energy conservation and reduced deforestation in western Kenya by supporting community driven efforts and addressing environmental threats on a local level. It develops biogas as an alternative source of energy for institutions and homesteads. It further pursues social and environmental objectives, creating employment and a sustainable use of forest resources.

"MARES Real Time Automatic Control for PSH in Small Isolated Systems" by Red Eléctrica de España



Short description of the good practice

Red Eléctrica de España (REE)'s tool MARES is a real time monitoring tool based on automation algorithms developed in order to maximise the penetration of renewables while assuring the security of supply in an isolated system on the island El Hierro.

Objectives:

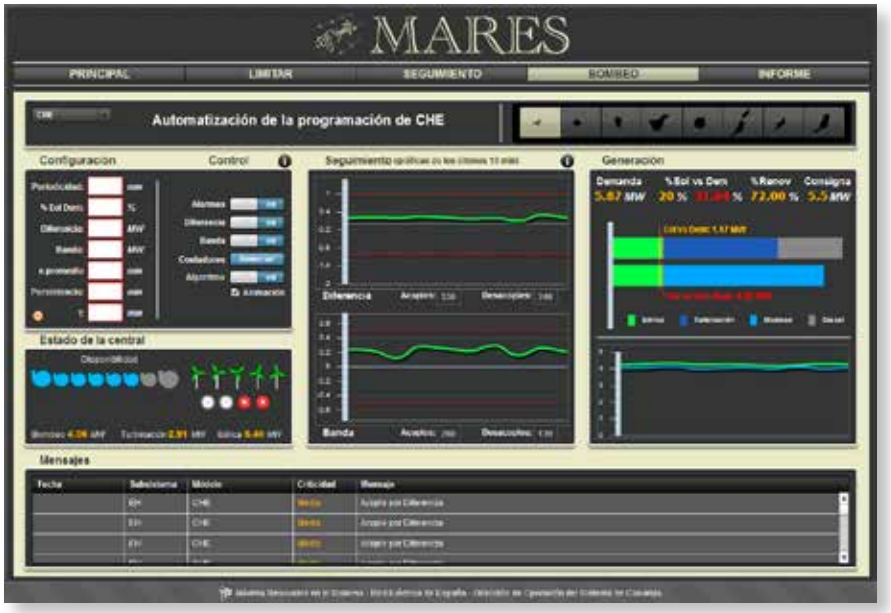
- Maximise the amount of renewable energy that the is able to be fed into the El Hierro power system in a system-safe way
- Minimise the risks associated with unpredictability of windpower that could trigger important incidents in the power grid and island-wide blackouts
- Develop a self-made automatised solution that suits the challenges faced by the island

Geographic scope: The Canary Archipelago (El Hierro Island)

Time Span: 2015-2016 (entered into service in November 2015)

The island of El Hierro supplies part of its demand out of a unique power plant - a wind park linked to a pumped hydro storage system. The wind power is fed in when available. In times of oversupply water is moved to a storage reservoir in order to be used to generate electricity on demand.

The software tool MARES is employed to monitor this interaction, optimise the management process performed by the operator and minimise the response time. The 'Real-Time Automatic Management' tool is based on the idea that automation, real-time monitoring and fast-response are key to achieving the integration of high shares of



renewables in a frail, isolated power system. As a result, the integration of renewable energy has moved from two per cent in 2014 to currently over 20 per cent on average, and even reached a peak of 50 per cent in February 2016 when a continuous 40 hour period with 100 per cent renewable demand coverage was reached. The generated renewable energy replaces electricity traditionally produced by diesel generators.

During the development phase of the project, the "test-bed" was the power system itself. Since the implementation no major grid discrepancy occurred. Dispatchers at the control centre are evaluating the tool performance continuously, providing feedback and enhancement proposals.

Further benefits have been identified beyond the increase of renewable penetration: the optimisation of dispatchers' daily tasks, a cleaner environment, a reduction of system costs and an increase in tourism.

Additional information:

- Red Eléctrica de España (REE) is the Spanish transmission operator. REE connects 45 million people with electricity, aided by a workforce of 1,700 people. Its mission is to guarantee the correct functioning of the electricity system at all time.
- Project website: http://entrelineas.ree.es/en/learn-more/real-time-automatic-management-el-hierro-hydro-wind-power-station

“Net demand ramping variability“ by the California ISO

Short description of the good practice

The California Independent System Operator (CAISO) developed a more precise data calculation and control performance approach regarding the net demand variability and its influence on the reliability of the grid. This allows them to quickly analyse and respond to challenges associated with the increased volume of renewables while simultaneously adhering to existing reliability requirements.

Objectives:

- Provide CAISO with accurate projections for system ramping capability needs, as increasing amounts of renewables are added to the resource mix
- Make better-informed planning decisions and recommendations to the state regulator CPUC (California Public Utilities Commission)
- Ensure sufficient net demand ramping capability, which assists the ISO in maintaining power balance, frequency, and reliability

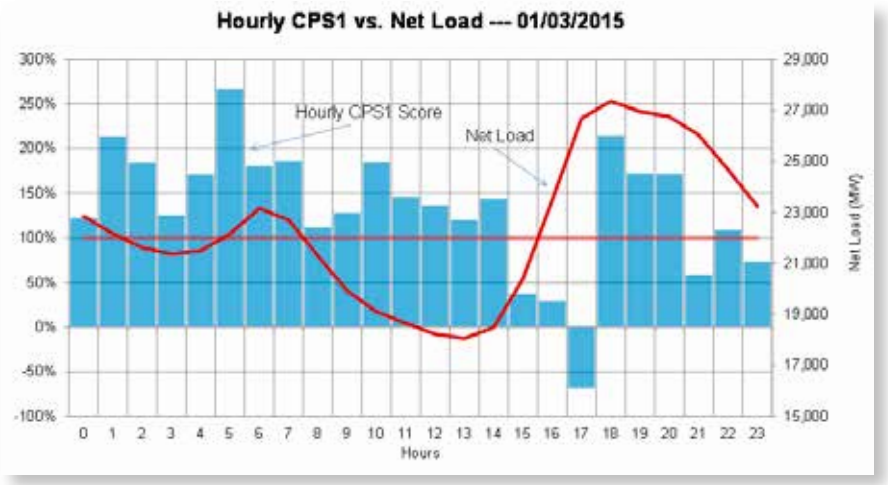
Geographic scope:

Continental United States, Canada, Northern Mexico

Time span: 2010-2015

The California power grid has to cope with the integration of substantial amounts of renewable energy. Due to the fluctuation of renewables, there are times of the day when generation drops and conventional power plants have to ramp up quickly to meet the demand.

To approach this challenge, CAISO developed a measurement for net



demand ramping variability that allows them to quickly analyse the issue and respond to it. The measurement also enables balancing authorities to ensure on-going electricity system reliability and compliance with mandatory operating standards.

The ISO now calculates its "net-load" on a minute-by-minute basis by subtracting forecast renewable production for the same time. The ISO then determines the net demand ramping variability over a three-hour period, which is needed to maintain reliability. Prior to the development of the new measure, performance data was measured on a monthly basis and averaged over a 12-month rolling average basis. By evaluating its performance each minute, and averaged across an hour, CAISO gained a much clearer view of actual operating conditions. In addition, this more granular evaluation revealed deficiencies in the existing information flow and allowed CAISO to put in place initiatives that will support higher levels of renewable integration. All in all, the practice contributed to better grid reliability and better compliance with mandatory operating standards.

Additional information:

- The California ISO manages the flow of electricity across the high-voltage, long- distance power lines that make up 80 per cent of California's and a small part of Nevada's power grid. As the only independent grid operator in the Western US, CAISO grants equal access to 26,000 circuit miles of power lines and reduces barriers to diverse resources competing to bring power to customers.

“PV energy data service“ by SMA Solar Technology and TenneT

Short description of the good practice

Available data of small and medium size photovoltaic (PV) plants is used for precise and geographically highly resolved PV extrapolations and forecasts. The aim is that PV energy becomes a more predictable component in the power system.

Objectives:

- Improve PV predictability for energy marketing and system operations by using near-time values
- Use the data for the marketing of renewable energy
- Define a data product that can be used for the marketing of electricity for a variety of purposes (i.e. the reduction of control reserve need, for congestion management, feed-in management validation), leading to significant yearly savings and increasing the social welfare
- Improve the existing extrapolation and forecasting tools, in compliance with legal framework

Geographic scope:

TenneT TSO control area in Germany

Time span:

December 2015- August 2016

The energy system is influenced by fluctuating generation from renewable energy such as photovoltaic. For system dependability, generation and consumption need to be balanced at any time, and deviations between generation and consumption need to be settled through expensive control power. Since renewable energy production is not schedulable but volatile, precise generation forecasts are essential and their impact will further increase.

In the control area of TenneT a large number of small and medium PV systems are installed (660,000 systems with 15 GW in total; 20,000 PV systems with 300 MW used for this practice). In order to improve forecasts, SMA uses the available data of small and medium size PV plants in online portals to issue precise and geographically highly resolved PV extrapolation and forecasts.

By accessing a highly representative, robust and cost effective measuring network as well as reducing the extrapolation delay from previously 40 to now 10 minutes through the usage of near-time data, the quality of extrapolations and forecasts of the total PV generation in the TenneT grid area in Germany will be significantly improved. These extrapolations and forecasts will be used to reduce the need for expensive balancing power and congestion management.

It will improve the system stability by supporting the PV grid integration and will have a positive impact on grid fees and thus finally the price for electricity.

Additional information:

- SMA Solar Technology AG is a leading global specialist for photovoltaic system technology. SMA employs more than 3,000 people in 20 countries with significant PV penetration.
- TenneT is a leading European electricity transmission system operator (TSO) with activities in the Netherlands and in Germany and serves 41 million end-users with their high voltage grid connection of 21,000 km.

"Minimise cable impact on marine ecosystem" by Terna

Short description of the good practice

Terna developed an innovative methodology for installing marine cables which minimises the environmental impact of submarine grid interconnections and especially protects meadows of the rare sea grass *Posidonia oceanica*.

Objectives:

- Assure a better protection of the marine ecosystem, especially of *Posidonia oceanica* meadows, during the construction of a submarine interconnector
- Implement a sustainable strategy from planning through to construction
- Develop a methodology and a portfolio of solutions to achieve this goal
- Promote a collaborative effort, involving engineers, national governments, local administrations and an environmental protection agency

Geographic scope: Sicily & Malta

Time span: 2010-2015

Terna developed the impact minimisation project for an interconnector linking the energy networks of Malta and Sicily. It is needed in order to improve the Maltese energy supply via a reduction of Sicily's energy surplus through transmitting power to Malta and therefore contributing to the integration of renewable energy in the electricity system of Malta. The corridor foreseen for this cable crossed an area that is home to "*Posidonia oceanica*", a seagrass that is declining (according to the RedList) and provides habitat for many species.

In order to protect the "*Posidonia oceanica*" as well as other seabed species from harm, Terna refrained from the common drilling technique used for marine cable installation. This technique would have involved bentonite to lubricate and consolidate the sand around the drilling head, which could have potentially suffocated the "*Posidonia oceanica*" due to the bentonite debris. The innovative solution applied used Xantan gum, a polysaccharide sometimes employed as a food additive that can easily be biodegraded. The portfolio applied further influenced the drilling technique and the drilling path. In addition, residual environmental impacts on meadows directly crossed by the cable have been mitigated with a transplant on a site in Sicily.

After the first year of monitoring, Terna could assess the good condition of the *Posidonia oceanica* meadows originally affected by the cable (cast iron shell and drilling) as well as the good condition of the growing transplanted rhizomes.

Additional information:

- Terna is an independent grid operator and one of the key players in Europe in terms of kilometres of electricity lines managed. The Terna Group manages the Italian national transmission grid with over 72,000 km of HV lines through its subsidiary. Terna Rete Italia has over 3,700 employees and a widespread presence across the entire national territory.
- The practice has been developed in cooperation with the Ministry of Environment of Italia, the EPA (Environmental Protection Agency), and Nexans.
- The Malta Sicily interconnector, owned by ENEMALTA, the Maltese distribution system operator, is part of the Trans-European Energy Network and was financed through the "European Energy Program for Recovery".

"One Flew over the Osprey's Nest" by RTE

Short description of the good practice

RTE is installing and producing live videos of ospreys living in nests located on top of RTE pylons in order to conduct ornithological studies.

Objectives:

- Provide visual information about feeding, mortality, predation and nest life habits of ospreys
- Raise awareness of the need of osprey protection
- Demonstrate RTE's active involvement in the protection of an endangered species in France
- Minimise the impacts on natural capital and generate a benefit for society as a whole

Geographic scope: Sologne (center of France)

Time span: since 2015

Collisions of birds with power cables are a relevant cause of bio-diversity loss as well as a cause of grid disruptions. In the past, RTE perceived bird nests on pylons as threats because of the weight which had to be supported and the short circuits they could cause. Today, ospreys are welcome on RTE pylons and the company has committed to a dedicated protection plan.

The protection of ospreys is a major issue since ospreys are "umbrella" species whose presence demonstrates the quality of the whole ecosystem in a defined region. While ospreys have almost disappeared from France a few decades ago, today 31 couples live in continental France, 20 per cent of them as tenants of RTE pylons. The first

initiative regarding osprey protection was to move the nests onto platforms located on top of the pylons. This allowed RTE to protect the quality of its electricity supply. RTE has led a task force with some partners (the Museum of Orleans for Biodiversity and Environment, a regional environmental NGO and ONF, the French National Forest Office) in order to choose the sites and the camera system, which had to be both non-intrusive for the ospreys and compatible with the pylon environment. RTE bought and installed the camera systems (powered by solar panels) on the pylons in winter during osprey migration. The ospreys came back from their migration in March 2016 and have started to mate. RTE's partners have since then started to conduct ornithological studies on ospreys thanks to the camera system images, which allow them to observe the birds from their office at any time. The live images of the ospreys contribute also to the educational programmes put in place locally for the protection of ospreys and can be viewed by anyone online. The observations made thanks to the camera already raised RTE's awareness on the need for adapting its pylon maintenance plan (painting, periodical patrol) to the osprey habits.

Additional information:

- RTE is the French electricity transmission system operator. Its mission includes the operation, maintenance and development of the high and extra high voltage network. RTE also guarantees the smooth operation and security of the grid.
- See the live videos of the ospreys: http://www.sfe-france.com/balbuzards.html

“PAS System for Safe Grid“ by EVN Bulgaria

Short description of the good practice

EVN implemented bird-friendly power lines involving the insulation of components of the grid infrastructure and the installation of additional elements to overhead power lines in order to protect both the lines and specific bird species. The practice is part of the Life for Safe Grid project (life 12 NAT/BG/000572) funded by the Life Programme of the EU.

Objectives:

- Prevent the collision and electrocution risks for the imperial eagle “Aquila heliaca” (primary target) and other bird species
- Enhance the security of the grid and the supply of electricity by preventing disruptions caused by bird incidents

Geographic scope: South-east Bulgaria

Time Span: 2013-2018

The insulation of power lines is a common practice for bird protection. However, PAS system is innovative as it combines various protective measures in one holistic system in an efficient and bird-friendly way. It is composed of the following elements: wire, insulation coating on the line (weatherproof synthetic VPE material), insulated parts (fittings, connectors to the pole, consoles) and protective elements, such as perches, that provide a higher and safer place for birds to rest, and wing space diverters, that ensure a gap between the pole and the place available for birds to perch.

The practice was first implemented along a 15 km stretch of the overhead power line “Balgarin”. The line passes across the Sakar Special Protected Area (SPA), which is part

of the Natura 2000 network and the most important SPA for the Imperial Eagle in Bulgaria, holding 10 breeding pairs and supporting the young birds during their dispersion period. The Imperial Eagle is classed as one of numerous vulnerable species according to the Red list of Threatened Species. Unnatural mortality caused by aboveground electric infrastructure has been proven to be the major threat for juvenile and immature Imperial Eagles in Bulgaria. In the period 2009–2012, over 78% of all juvenile eagles have died as a result of electrocution. PAS evaluation of the effect on bird mortality will be undertaken in 2018, but the first results indicate reduced disturbances on the grid since the implementation of the line, which is a great indicator of success regarding the protection of both the birds and the line.

Additional information:

- EVN Bulgaria Elektrorazpredelenie is an electricity distribution company that operates in South-East Bulgaria and provides electricity for more than 1,5 million customers. The company operates in an area of nearly 42,000 square kilometres.
- The practice is part of the activities of Life for Safe Grid project funded by the Life programme of the European Commission. The activity was planned in cooperation with the partner in the project, the Bulgarian Society for the Protection of Birds (BSPB), and takes place in eight protected areas within the Natura 2000 network in Bulgaria.
- Project website: http://www.lifeforsafegrid.bg/

“Rationalisation of urban areas“ by Terna

Short description of the good practice

Terna identified improvement potentials in Italian urban areas, replacing dated infrastructure and aiming at building a more efficient and reliable system with a reduced environmental impact.

Objectives:

- Improve the efficiency of the national transmission grid by renewing very dated infrastructure
- Reduce the environmental impact of power lines and emphasise the welfare of citizens with a view to landscapes and green areas
- Enhance the profitability of the grid structure, generating savings due to a more reliable and sufficient electricity supply
- Generate savings for the end consumer (citizens and industry)

Geographic scope:

Multiple areas in Italy, specific example of Turin

Time span: 2007-2013

In this practice, Terna designed an innovative approach to the replacement of dated power lines. It encompasses the activation of underlying improvement potential in modernisation projects regarding environmental, archaeological, social and economic aspects. It is regarded as a best practice internally and is therefore pursued in all similar projects when local conditions permit it.

As a concrete example of the application of the practice, 58 km of old power lines in the city of Turin have been efficiently replaced with only 7 km of new lines. The old ones have been demolished and removed. The most effective part of this rationali-

sation affected the Pellerina Park, the biggest green area of the city of Turin: 5.5 km of old power lines built in the 50s have been demolished and fully replaced with underground cables. This operation liberated about 10 hectares of park that can now be used much better by people and animals alike. All of the components of the 21 demolished pylons from the park have been reused and recycled by specialised companies.

The negative impact of the working sites are close to zero. New technologies such as the Horizontal Directional Drilling have been used. In addition, archaeological findings have been evaluated during the whole project: during the excavations, an anti-raid shelter from WW2 has been discovered, restored and given back to the community. This site has now become part of the cultural heritage of the city.

Finally, the practice resulted in savings amounting to approx. € 50 million per year for citizens and companies (reduced costs in the electricity bills).

Additional information:

- Terna is an independent grid operator and one of the key players in Europe in terms of kilometres of electricity lines managed. The Terna Group manages the Italian national transmission grid with over 72,000 km of HV lines through its subsidiary. Terna Rete Italia has over 3,700 employees and a widespread presence across the entire national territory.
- Terna implemented the practice in cooperation with the local authorities.

"Early involvement of landowners" by Energinet.dk

Short description of the good practice

Energinet.dk applied this communication methodology in order to involve the landowners who will be affected by a 150 kV cable project in the early planning – before and during the authority permitting procedures.

Objectives:

- Implement local knowledge in Implement local knowledge in the planning of the project
- Make the project more transparent und understandable locally
- Give the possibility to the landowners to use their participation power to influence the project
- Increase the acceptance of the project

Geographic scope:

Denmark – North-Western part of Jutland

Time span: 2013-2016

Energinet.dk developed a communication approach to better involve both local neighbourhoods and potentially directly affected landowners in the early stages of a new grid project. During the stage of planning the official corridor, meetings were held in local neighbourhoods with relevant landowners invited. Instead of planning individual meetings with every single landowner when the corridor is fixed, Energinet.dk discussed the cable route with a whole group of neighbours, as changes to the route often affect a whole district of properties.

The cable project Han Herred-Thy-Mors-Salling, is aiming at maintaining and expanding the transmission grid in the North-Western part

of Jutland in Denmark in order to integrate more wind power into the Danish power system.

Several local neighbourhood meetings were held and delivered valuable information, that influenced the final corridor for the cable route. Important inputs included advice on special farming operations (e.g. Christmas tree cultivation), distinct soil conditions, particular drainage challenges etc.

Furthermore, Energinet.dk has organised four targeted neighbourhood dialogue meetings with landowners. During group meetings, the neighbours got a map and a string, and had to reach an agreement on the exact cable route.

Feedback from landowners on the process has been very positive and the degree of involvement and the value of shared information was rated high. First evaluations have shown that the approach reduces errors and setbacks due to public and landowner protests.

Additional information:

- Energinet.dk is the Danish TSO, a non-profit enterprise owned by the Danish Ministry of Energy, Utilities and Climate. It owns the Danish primary electricity and gas transmission system and is responsible for the overall short-term and long-term security of electricity and gas supply and the development of grid infrastructure.
- Energinet.dk cooperated with a group of researchers from the University of Aalborg who work on the involvement of stakeholders and citizens.
- Project website: energinet.dk/thy-mors-salling

“Animated video - Clean Energy Mini-Grid“ by EDP

Short description of the good practice

EDP developed an animated video called “Clean Energy Mini-Grid”, which visualises the implementation of electricity production from biomass in a remote village in Mozambique.

Objectives:

- Communicate clearly and effectively to both the local population, including illiterate citizens, and to other stakeholders about the Clean Energy Mini-Grid project
- Attract funding for the Mini-Grid project
- Explain the advantages of rural electrification in general, using clean energy mini-grids as a solution, creating awareness and participation

Geographic scope: Mozambique

Time span: 3 months

The animated video promotes a Clean Energy Mini-Grid based on the use of biomass in remote areas. It explains the concept of biomass energy in a very straightforward way, using a scribe technique where a hand draws the story while a local African voice (both in Portuguese and in English) narrates it. This allows for the correct understanding of the project for both the local population and other stakeholders including funding entities, central and local government as well as equipment and service suppliers.

This visual demonstration explains how the project will work, how the population will gain access to electricity and how they will participate in the electricity production process.

It also describes advantages the electricity service will bring to the village. Big outdoor screening events have been organised by EDP to ensure that all members of the affected population have a chance to see the video. The film has already succeeded in attracting funding for the project from international development entities and companies, and despite the fact that this video was designed to specifically target one project, it has been reused as a general video about rural electrification by several key organisations, including the United Nations Environment Programme, the UN Foundation and Power Africa.

The types of renewable energy that are used in mini-grid systems are typically photovoltaic and hydro power. Biomass energy is more complex. People are a fundamental part of it, particularly in decentralised models, where biomass feedstock is purchased from many micro farmers. This practice explores the renewable source, biomass, as a strong alternative to isolated rural mini-grids.

Additional information:

- EDP – Energias de Portugal S.A. is a multinational power and gas utility company, present in 14 countries, with more than 11 million customers and close to 12,000 employees around the world. EDP has a relevant presence in the world energy outlook. It is the largest generator, distributor and supplier of electricity in Portugal and has significant operations in electricity and gas in Spain.
- Watch the video: https://www.youtube.com/watch?v=1s63UleLtZ4
- Project website: http://www.edp.pt/en/sustentabilidade/acessoEnergia/projetos/Pages/MozambiqueTitimane.aspx

"Citizens Transmission" by Citizens Energy Corporation

Short description of the good practice

The unique Citizens Transmission project model, designed by Citizens Energy Chairman Joseph P. Kennedy II, dedicates 50 per cent of the profits generated from high-voltage power lines into charitable energy assistance programmes helping low-income residents in the project areas.

Objectives:

- Partner with utilities to develop, construct, and own high-voltage transmission lines
- Use profits from transmission projects to create energy assistance programmes for low-income households
- Enhance public support for much-needed grid development projects
- Deliver renewable energy resources to market

Geographic scope: United States – operational project in Southern California; active development in California and New York/Vermont

Time span: 2005-2013

In 2005, Citizens, together with San Diego Gas & Electric (SDG&E) began developing the "Sunrise Powerlink," a USD 1.8 billion, 120 mile, 500 kV power line connecting San Diego County to large sources of locked-in renewable energy from Imperial County. The goal was to develop and finance lines that carry green power from wind, solar, and geothermal sources and use the profits to enable low-income families to reap the benefits of clean energy at no cost in an area where temperatures can soar to 48 degrees Celsius and pose significant health impacts on families who cannot afford air-conditioning.

Citizens ultimately invested USD 100 million in the line for the rights to 50 per cent of the transmission capacity in Imperial County. Citizens turned that capacity over to the regional grid operator and earns a federally regulated rate-of-return on its investment. Since the line became operational in 2012, Citizens has provided over 500 free residential solar-rooftop installations through the Citizens Solar Homes Programme. The programme cuts each low-income household's electricity costs by up to 50 per cent per year, freeing up income for other basic necessities like food and medicine in California's poorest county. The rooftop solar systems are funded through a 20-year pre-paid lease, ensuring that the homeowners will have no financial obligations, like maintenance and equipment replacement, during the entire lease.

Additional information:

- Since its founding by former U.S. Congressman Joseph P. Kennedy II in 1979, Citizens has used revenues from commercial enterprises to channel millions of dollars into charitable programmes in the U.S. and abroad. Whether heating the homes of low-income citizens, lowering the cost of prescription drugs, or starting solar heating projects in the Caribbean basin, Citizens has created social ventures financed by its innovative business ideas.
- Citizens is currently partnering with utilities on two additional high-voltage transmission projects in California and one in New York and Vermont and will design charitable programmes using profits from its ownership interest in the lines.
- Project website: http://www.citizensenergy.com//business-initiatives/citizens-transmission

“Empowerment of citizens via crowd funding“ by RTE

Short description of the good practice

RTE uses the practice of crowd funding to enhance the acceptability of its new power lines. The money raised via this approach is complemented by RTE with some funding available via the PAP (Plan d’Accompagnement de Projet), a financing tool agreed with the French government through a public service contract, to finance the sustainable economic development of the areas affected by the construction of new power lines.

Objectives:

- Create a closer relationship with the citizens living within the area affected by the future line and a direct compensation in order to enhance the acceptability of the line
- Give more visibility to the actions which are financed with the PAP funds by using the crowd funding website as a “display case” for these projects
- Promote RTE as a local actor of the development of the territory, in line with the spirit of the PAP

Geographic scope: Several projects in France («Haute Durance» in the South-East, «Avelin-Gavrelle» in the North-East, “Saône” in the East, “Deux-Loire” and “Paudy” in the center of France)

Time Span: 2015-2017

In January 2016, RTE launched the webpage ‘My territorial projects’ on the crowd funding platform ULULE. On the page, users can pitch entrepreneurial, cultural, agricultural or a number of other projects which RTE co-finances once they have reached their crowd-funding goal.

According to the public service contract signed between RTE and the government, RTE has to finance actions of sustainable economic development in the area where it undertakes the construction of overhead high voltage lines. The crowd funding practice is a way of honouring that contract and at the same time closely involving citizens into the selection of the projects benefiting from the PAP by having them develop projects themselves or support projects they deem useful for the community.

In order to ensure their feasibility, the projects proposed on the website for crowd funding were pre-selected by RTE and its project partner ULULE, who supported RTE in developing this participatory financing solution. A call for projects was launched to identify suitable projects ideas. Two and a half months later, 15 projects were selected and two of them have already been financed successfully through crowd funding and implemented. The others are still in the funding period.

Additional information:

- RTE is the French electricity transmission system operator. Its mission includes the operation, maintenance and development of the high and extra high voltage network.
- ULULE is the major partner of RTE on this practice. It is specialised in crowd funding projects. Since it was created in October 2010, 13,106 projects have been effectively and successfully financed in 179 countries around the world via the platform ULULE, with an effective success rate of projects of 66 per cent. The platform counts about 1,120,556 members.
- Project website: https://fr.ulule.com/rte/#projects/all/ (in French)

"Your Grid, Your Views, Your Tomorrow" by EirGrid

Short description of the good practice

EirGrid carried out a national public consultation on its strategy to develop Ireland's grid in the future. Entitled "Your Grid, Your Views, Your Tomorrow", this engagement initiative was the first of its kind, with an emphasis on the citizen's role in how Ireland's grid is developed. The initiative was welcomed by the Irish government.

Objectives:

- Enhancing public awareness and understanding regarding planning and development of the transmission system
- Promoting open dialogue and encouraging feedback from the general public and stakeholders throughout the decision making process
- Creating and establishing trust through open engagement with communities as well as committing to making the most of new available technologies and to making the existing grid work harder

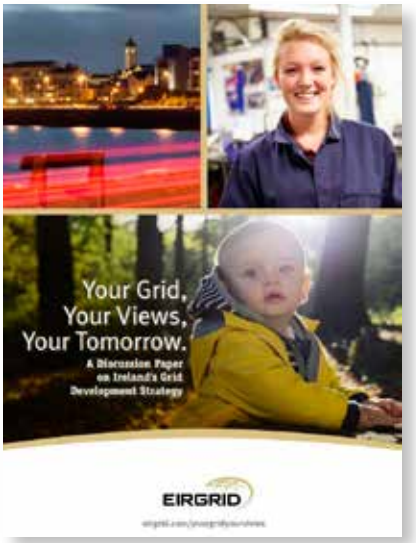
Geographic scope: Ireland

Time span: 2014 - 2016

EirGrid developed a comprehensive public engagement approach. As part of this approach, EirGrid actively engaged with the public, communities and national elected representatives, among many other stakeholders. Information gathered through briefings, one to one meetings, and feedback collected and collated via a bespoke online platform allowed EirGrid to produce a report, which summarised findings and detailed next steps in the drafting of a grid development strategy.

Over 60,000 people were reached through this initiative. Communications tools used included: a dedicated website, social media, a bespoke online portal, an above the line advertising campaign and marketing communications, regional forums which were also live streamed online, stakeholder/one to one briefings, and a mail drop providing information on the initiative and how to get involved. In the end, 3,386 responses were received to the consultation.

A report summarising the outcomes of the public consultation was published in September 2015 - "Your Grid, Your Views, Your Tomorrow". The title reflects not only the input given by the public but also an updated view of the economic context for developing the grid. A plain English summary of the report was also developed providing clear, concise and easily understandable information for a non-technical audience. Work on a final grid development strategy is on-going.



Additional information:

- Since 2006, EirGrid, a state-owned company, has operated and developed the national high voltage electricity grid in Ireland. It operates the flow of power on the grid and plans for its future. EirGrid supplies the electricity distribution network, and aims to deliver a secure and reliable supply of electricity.
- The practice was developed in collaboration with a wide range of stakeholders, including the Department of Communications, Energy & Natural Resources; Department of Jobs, Enterprise & Innovation, elected representatives, IDA Ireland, national regional interest groups, local communities and the general public throughout the country.
- Project website: www.eirgridgroup.com

“Communication and Participation Concept“ by Amprion

Short description of the good practice

Amprion developed a comprehensive communication approach for the routing of the interconnector project “ALEGrO” linking Belgium and Germany.

Objectives:

- Support the official planning procedure by informing and involving the public at an early stage of the interconnector project
- Gather feedback and valuable input during the planning procedure
- Develop and adapt the routing of the interconnector according to the provided information
- Increase the acceptance regarding the route of the interconnector

Geographic scope: Germany

Time span: 2012-2016

The Aachen Liège Electricity Grid Overlay (ALEGrO) is an HVDC underground cable link with a bidirectional rated power of 1.000 MW and the first interconnection between Belgium and Germany. Its objective is to enhance market integration by enabling direct power exchanges between Belgium and Germany.
Given the project’s importance, Amprion implemented a proactive and interactive information strategy as well as a participation concept before and during the formal proceedings of the planning approval procedure. The public, communities and associations were informed early and comprehensively about the project. All of them received regular background information via various channels and were informed

about the proposed routes in a timely manner, thus giving them the opportunity to give feedback. Amprion provided the opportunity for the public to contribute to finding the best route for the cable via an online participation platform. On the platform, comments concerning the overall project and/or specific information, requests or proposals with regard to the routing could be given. The information received was used to adapt the routing of the cable accordingly. Overall, the communication campaign encompassed six information and dialogue events for public bodies as well as six additional information and dialogue events for the public, four digital newsletters and two bulk mailings.

The approach might possibly have led to a longer planning phase, but contributed to early, transparent and continuous information. It should contribute significantly to a better support during the approval procedures and therefore will save time in the long run. As of today, there are no protests against the project.

Additional information:

- Amprion GmbH operates a transmission system with the voltage levels of 380 and 220 kilovolts. With approximately 1100 employees, Amprion is managing a length of around 11,000 kilometers and some 160 substations between Lower Saxony and the border to Switzerland and Austria.
- Project website:
  http://netzausbau.amprion.net/projekte/alegro-deutschland-belgien
  http://www.eliagroup.eu/Projects/Infrastructure/Alegro-Elia

“History of Electricity“ by Litgrid

Short description of the good practice

The Lithuanian transmission operator Litgrid created an educational website dedicated to explaining the grid and the history of electricity in Lithuania to the general public.

Objectives:

- Present the history of the electric system in Lithuania in a comprehensible manner and on a centralised website
- Provide the public with readily available educational material
- Create enthusiasm and motivation regarding the profession of electrical engineering

Geographic scope: Lithuania

Time span: 8 month (launch in April 2016)

The electricity sector is complex and difficult to understand for those not directly involved. For this reason, Litgrid created an educational website dedicated to the history of electricity in honour of the 70th anniversary of the Lithuanian power system. The website displays the development of electricity in Lithuania, how it is produced and delivered to consumers, how power flows are managed and what the role of the transmission system operator is. The story is based on clear examples, expressive visuals and simple games. The user is encouraged to take part in the story as the website is interactive.

The practice provides a full picture of the country's electric system, including power generation from traditional resources as well as from renewable energy plants, transmission and distribution networks and the consumers. Especially because community engagement is a crucial part of every grid development project, the website aims to increase public awareness of the power system in general and grid in particular, and to engage society by providing information on why the power system is so relevant and how it works in detail.

Additional information:

- Litgrid AB is the Lithuanian electricity transmission system operator. It maintains a stable operation of the national power system, controls electricity flows and enables competition in an open domestic electricity market. Litgrid is responsible for integrating the national power system into the European power infrastructure and electricity market. The company has implemented two strategic electricity cross-border links, namely, NordBalt (Lithuania-Sweden) and LitPol Link (Lithuania-Poland).
- Project website: www.elektrosistorija.lt

Grafik: Trabucchi Media Services - trabucchi.de