AWARD

GOOD PRACTICE OF THE YEAR 2019

The Renewables Grid Initiative (RGI) 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**

RGI gratefully acknowledges funding from the European Commission's LIFE operating grant, Stiftung Mercator and the European Climate Foundation. The sole responsibility for the content of this publication lies with RGI.

Foreword

Miguel Arias Cañete
EU Commissioner for Climate Action and Energy

With the political agreement on new rules for the design of the EU electricity market at the end of last year, we have closed the political negotiations on the Clean Energy Package for all Europeans. When fully in place, the new rules will establish a robust legislative framework for the European energy sector which will facilitate the necessary investment in the clean energy transition and enable us to deliver on our Paris Agreement commitments. It will help create a market which is better connected, more competitive and more sustainable.

With an ambitious new renewables target for 2030 agreed, it is time for our grid to underpin the deployment of renewable energies and deliver them where they are most needed.

Modernising Europe's ageing grid requires willingness, commitment and cooperation from all actors. A decade into its mission, the Renewables Grid Initiative (RGI) continues to share our aim of building better infrastructure projects bridging national and regional borders within the EU. In this context I would recall that our 10% interconnection target for 2020 rises to 15% for 2030.

By brokering dialogue between environmental organisations and transmission system operators, RGI is building a reliable narrative around sustainable infrastructure development, promoting transparency and creating opportunities for participation.

Thanks to the diverse set of skills and expertise drawn from its Members, RGI has dedicated itself to sharing best practices in grid development with a large share of renewables. Its annual 'Good Practice of the Year' Award hosted by the Energy Infrastructure Forum is an inspiration to project promoters all over Europe, as well as a reference point for sustainable infrastructure planning and implementation.

We are committed to reaching a low-carbon economy by 2050 and, as this process unfolds, we acknowledge the need for a collaborative effort in delivering on our energy and climate ambitions, as well as ensuring the security of our supply. Whilst the energy landscape is changing, RGI helps build the common ground for moving forward together.

Introduction

AWARD GOOD PRACTICE OF THE YEAR

Renewables Grid Initiative

MAZARS

We are not yet close to living in a world with an electricity system based on renewables. To actually achieve this goal, we cannot walk down the same well-trodden paths time and time again, we need to create new paths that lead to a fully decarbonised and largely renewable energy future. Easier said than done! Inspiration for new ideas doesn't just appear out of thin air when needed, it often arises from unlikely circumstances. We at RGI do not simply want to bet on new approaches breaking through at the right time, we want to play an active part in creating sources of inspiration. The 'Good Practice of the Year' award is one such source of inspiration meant to motivate and spur on players engaged in grid development to do more and to do better – when it comes to 'Communication & Engagement', 'Environmental Protection' and 'Technological Innovation & System Integration' – our three award categories.

We are happy to report that many outstanding practices are already being implemented. According to our jury of experts (see page 4) the most exceptional ones from among this year's submissions are:

Communication & Engagement

RTE France developed a Massive Open Online Course (MOOC) on electromagnetic fields (EMF) caused by power frequency. Our jury picked it as the winner of its category because "there is a great need for this type of community education and this project answers this need – the MOOC is an efficient, low-cost yet effective instrument targeting misperceptions about the impact of electromagnetic fields." Find out why our jury chose this practice on page 8.

Environmental Protection

nuventura developed an alternative insulation system for switchgears in which one of the most potent greenhouse gases (SF_6, a fluorinated gas 23,500 times worse than CO2 in terms of its effect on global warming) is replaced by dry air. "This project has the potential to be enormously impactful, greatly reducing the amounts of the most powerful greenhouse gas in the world in circulation and release. This is a major contribution to the fight against climate change", our jury explains nuventura's win. Read more about the practice on page 18.

Technological Innovation & System Integration

The 'Combined Grid Solution' (CGS) is the world's first hybrid interconnector, connecting Germany and Denmark utilising the infrastructure of existing wind farms. Our jury congratulates 50Hertz and Energinet on their joint project and is happy to announce CGS as the category winner. "It has the potential to be enormously consequential for the development of the North Sea and Baltic Sea resources, and its ambition of approaching 100% utilisation of the offshore grid assets is noteworthy." On page 28 you can find out more.

We would like to thank everyone who submitted the diverse and innovative practices that were part of the competition this year and extend a sincere congratulations to the winners. Our thanks also go to the international auditing and advisory company MAZARS for accompanying the evaluation process for the sixth year in a row and the European Commission's DG Energy for hosting the award ceremony at the "Energy Infrastructure Forum 2019" in Copenhagen.

An Independent Jury of Experts

Gregg D. Ander

Managing Director of Gregg D. Ander, LLC & Senior Fellow at Navigant Consulting

In his positions, Gregg provides consultative services on a variety of power and energy sector issues. Previously, he was Vice President of Power Strategies at the Energy Foundation and had a 30-year career at Southern California Edison.

Pierre Jean Coulon

President of "Transport, Energy, Infrastructure and Information Society" of the European Economic and Social Committee (EESC).

Before becoming a Member of the EESC, Pierre Jean was active as President of the international NGO Right to Energy SOS Future, as well as an expert adviser to the United Nations.

Humberto Delgado Rosa

Director for Natural Capital, DG Environment, European Commission

Previously, Humberto was Director for Mainstreaming Adaptation and Low Carbon Technology in DG Climate Action and served as Secretary of State for the Environment of the Portuguese Government from March 2005 to June 2011.

Patrick Devine-Wright

Professor of Human Geography at the University of Exeter

Patrick participated in, and led, several multi-disciplinary research consortia on public engagement with low-carbon energy technologies and associated infrastructure such as high voltage power lines.

Carl Zichella

Director for Western Transmission for the Natural Resources Defense Council (NRDC)

Carl is the NRDC's lead western U.S. renewable energy transmission siting expert and serves on a nationwide team working on climate and clean energy issues. Carl also serves as a director for the Center for Energy Efficiency and Renewable Technology (CEERT).

Marie Donnelly

Former Director for 'New and Renewable Sources for Energy', DG Energy, European Commission

As a Director in DG Energy, Marie was responsible for the development of policies and actions on energy efficiency and renewable energy as well as the coordination of research activities in the field of energy.

Baard Eilertsen

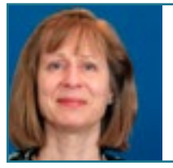
Founder of energy utility advisory company Truebase

Baard is the former CEO & President of Wireless Maingate AB. He created the world's largest and most successful Smart Home solution 100Koll for E.ON. In 2015, Baard started his own advisory company, Truebase AB.

Michael Hogan

Senior Advisor at The Regulatory Assistance Project

Michael 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.



Catharina Sikow-Magny

Head of Unit "Internal market I: networks and regional initiatives", DG Energy, European Commission

Catharina joined the European Commission in 1997 and has previously been in charge of the international transport relations team. She has also been responsible for the trans-European network policy, internalisation of external costs and strategic policy research.

Communication & Engagement

“Development of a MOOC on power frequency electromagnetic fields”

by RTE France

RTE France developed a Massive Open Online Course (MOOC) on electromagnetic fields (EMF) caused by power frequency, giving everybody free access to inform themselves about the much debated topic. The MOOC includes information material, videos and a discussion forum.

HIGHLIGHTS

- The platform aims at opening up educational content to as many people as possible without constraints and at offering each person the most suitable, personalised learning experience
- This new approach is also an exercise for RTE to build confidence in managing the EMF issue and reducing fears in a lasting way

About the Practice:

EMF and the related health debate are some of the main topics driving public opposition against grid development projects, which are key for the integration of renewable energy and the energy transition in Europe. The debate is often emotional and a lot of unreliable EMF information, that increases fears, is accessible online, whereas scientific information is often disregarded due to its complexity. RTE’s MOOC represents a solution to the lack of clear, transparent and user-friendly information on the topic and bundles technical information, scientific facts and statements by authorities on one platform.

The MOOC is free of charge and in full operation since May 2019. The MOOC offers learning courses on “Essential concepts related to electromagnetic fields”, “Introduction to relevant biomedical studies”, “Results of biomedical studies on low frequency EMF” and “Regulation”, lasting for one week each. Subscribing to the MOOC also allows to participate in the forum and discuss with moderators/EMF experts. In parallel to the participation in a MOOC session, all the teaching material (videos and associated documents) is also readily accessible.

The goal behind the MOOC is to reduce fears by providing the public (including health professionals) with unbiased information and allow for a better assessment of EMF issues by all stakeholder groups. Therefore, the target groups of the MOOC also include RTE employees, who use the tool for their own training and as a guideline when engaging in dialogues with concerned residents.

FIND OUT MORE

- The MOOC was developed by RTE in cooperation with the French national authoritative bodies in health and environment (ministries and agencies), expert researchers and selected health professionals. It also includes results of in-depth discussions on EMF with environ-mental NGOs.
- Depending on its success, an English version of the MOOC might be developed and offered to European and international organisations including other TSOs.
- Online sources: MOOC: https://mooc.cem-50hz.info and related material site: https://videos.cem-50hz.info/CEM/app/

“Planning Dialogue Borgholzhausen”

by Amprion GmbH

The planning dialogue Borgholzhausen is a special form of public participation in the planning of a high voltage underground line. The planning dialogue comprises two formats: public citizen information markets and a non-public stakeholder planning committee. The dialogue was restarted after a deadlock and successfully managed to transform into an inclusive practice.

HIGHLIGHTS

- Restart of planning dialogue for a high-voltage line broke up deadlock of differing viewpoints.
- Inclusive planning dialogue from a very early stage including info markets and a stakeholder committee.
- By allowing sincere public participation, Amprion benefitted from previously untapped expertise and was able to find a line route that most stakeholders agreed upon, greatly improving public acceptance.

About the Practice:

The transmission system operator Amprion is building a new 380kV power line in the west of Germany (Wehrendorf to Gütersloh) to accommodate new power generation structures in Germany where wind power from the north often has to be routed to the energy-intensive southern and western regions. Because it was originally intended as an overhead line, Amprion’s decision to build part of the line underground led to a new planning process.

Amprion decided to use this opportunity to also restart the planning dialogue with the citizens of Borgholzhausen, which had become deadlocked in the previous process. The new and more inclusive dialogue included two public info markets and six committee sessions with the involvement of all stakeholders and several citizens drawn by lots. The dialogue was set up from the earliest stage of planning to allow for input on the underground cabling route as well as the location for the cable connection stations. Through this, Amprion could not only generate public support but also benefit from the diverse know-how with regard to property and environmental issues, soil conditions and specific local challenges.

After the first phase of the dialogue, three quarters of the participants perceived the planning dialogue as a sincere participation opportunity. The proportion of sceptical participants dropped from 43 per cent at the beginning of the process to 25 per cent at the end of the first phase. The fresh start allowed the project management to break up old conflicts and establish a trustful communication. The committee successfully decided on a cabling route which is now being developed by Amprion as the preferred route alternative.

FIND OUT MORE

- Amprion is a transmission system operator in the southwest of Germany. They teamed up with the German Institute for Urban Studies (DIFU) who was responsible for monitoring and analysing the dialogue.
- Online source: all publishable dialogue results are documented on a micro website: https://borgholzhausen.amprion.net/Aktuelles/index-2.html

“Open Innovation Challenge”

by Elia Group

The Open Innovation Challenge (OIC) is an annual competition for start-ups organised by Elia Group. Successful applicants receive funding from Elia Group while the company can leverage ideas that help them improve the operation of their teams and change the internal culture of the company, making it more agile and innovative.

HIGHLIGHTS

- The OIC creates a new ecosystem of partners and a collaborative atmosphere towards internal and external cooperation within Elia Group’s teams.
- It’s a collaborative approach to identifying practices that are applied in other sectors and could be transferred to a TSO.
- The competition was first held in 2017 and previous winners are a 3D-visualisation system that can be used at both the planning and the permit application stages (2017) and a solution that can be used to better estimate power generation from solar panels (2018).

About the Practice:

Elia Group has created the Open Innovation Challenge to attract talent and innovative ideas that can be integrated into the company’s business activities relatively quickly. A designated jury chooses the 20 best start-ups from among the pool of applicants. These organisations are then assigned a mentor from Elia Group who guides them via the next steps of the programme and helps them refine their proposed solutions before pitching them to the jury in the final round. The most successful pitchers win € 20,000 as well as the chance to implement their technology within Elia Group’s challenging environment as a supervised pilot project to achieve a so-called Proof of Concept. If the solution is successfully tested, Elia Group starts implementing it in relevant areas.

After the 2017 competition, Elia Group involved researchers to further develop the winning tool, a 3D-visualisation system that can be used at both the planning and the permit application stages. This shows that the OIC does not only create a network of creative entrepreneurs but also prompts collaboration with researchers and universities.

In 2019, nearly 100 start-ups from all over the world applied for the competition, which this year has a special focus on improving the day-to-day activities of the work force dealing with asset management and maintenance. The final pitching session in front of senior executives will happen in Berlin in June 2019. This session took place in Brussels for the first two OIC editions in 2017 and 2018.

FIND OUT MORE

- Elia Group encompasses two major transmission system operators (TSOs) in two European regions: Elia Transmission in Belgium and 50Hertz Transmission, one of the four German TSOs, in north-eastern Germany.
- Even before creating the OIC, Elia started implementing projects that apply machine learning, blockchain technologies and artificial intelligence, such as using drones for inspections.
- Online source: https://innovation.eliagroup.eu/

“Underground Cable Information Center”

by TenneT

This practice revolves around a pilot underground cable information centre called "Voltage under the Earth“, designed and built next to a TenneT cable construction site, to inform about the technology and increase local and regional acceptance.

HIGHLIGHTS

- “Voltage under the Earth” is a permanent offer of a mix of information, touchable technology and a look "behind the scenes" of a sensitive topic.
- It is a platform of encounters during the construction period of an underground cable instead of impersonal communication measures such as information letters.
- To complement the information centre, TenneT has also set up observation towers along the construction site.

About the Practice:

One of TenneT’s new 380-kV AC power lines running from northern to western Germany is defined as a pilot project for partial underground cabling. The construction of the underground section raised great interest, because there was an overall need for information and a diffuse opinion among stakeholders, due to the fact that underground cabling is perceived as a new technology in the three-phase 380-AC-high-voltage sector as well as fears expressed by farmers who favour an overhead power line to protect their harvest.

In response to the concerns raised, TenneT built the underground cable information centre that features an exhibition with presentation walls, films and print material and touches upon grid planning, the differences between AC and DC, underground cable construction, impacts on the environment, soil protection and the technology utilised. Since its opening, TenneT has organised more than 60 events, including tours through the construction site, lectures, information events, in and around the centre with approximately 1,000 visitors participating.

So far, the initiative has led to a calmer environment for planning underground cabling sections in neighbouring regions and improved relationships with landowners, land users and residents in the vicinity of the cable. In case of conflicts related to the site, people always approached the centre directly, instead of going to the press, because the centre’s contact person was permanently on site.

FIND OUT MORE

- TenneT is a European electricity transmission system operator, with activities in the Netherlands and in Germany (over 22,500 kilometres of high-voltage connections supplying electricity to 41 million end-users).
- A graphic agency contributed to the preparation of the promotional materials.
- Online source: https://www.tennet.eu/de/unser-netz/rund-um-den-netzausbau/erdverkabelung/erdkabel-infozentrum/erdkabel-infozentrum-dankern/ (in German)

Environmental Protection

“nuventura”

by nuventura

nuventura has invented an innovative switchgear – an essential component of an electricity grid – free from greenhouse gases. Existing gas insulated switchgears (GIS) are based on SF_6 – the most potent greenhouse gas humanity knows. nuventura has developed a GIS that instead of SF_6 simply uses air, thereby enabling a reduction of emissions worth 100 million cars every year.

HIGHLIGHTS

- Redesign of switchgears allows for use of air as insulation material instead of traditionally used SF_6, the most potent greenhouse gas.
- Elimination of SF_6 brings technological advantages: a switchgear does not need to be sealed anymore which allows for sensor integration and predictive maintenance.
- If successful, the technology can significantly improve environmental impact of grids worldwide.

About the Practice:

Switchgears are used to connect and disconnect electrical equipment, for example two separate power lines. To erase the lightning impulse when connecting and disconnecting, the switchgear needs to have some insulation material.

The majority of electricity switchgears are insulated with Sulfur hexafluoride (SF_6), a powerful greenhouse gas that is 23,500 times stronger than CO2 in terms of its global warming effect. Its emissions into the atmosphere are nearly irreversible as there is no natural sink or an effective disposal method. SF_6 is also an extremely long-lived gas. The switchgears insulated with the gas therefore need to be hermetically sealed, leading to limitations in lifetime and reliability.

When compared to air, another commonly used insulation material, SF_6 can insulate the same voltage level with significantly less space, making it a common material choice. nuventura implemented structural changes inside the switchgear tank, arranging the parts of the switchgear in a way that allows air to be as effective at insulating as SF_6 while being similar-sized.

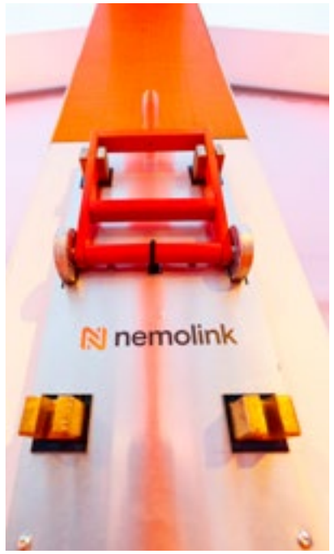
The practice allows for a significant reduction of SF_6 output, eliminating the environmental impact, the need to train personnel in gas handling as well as the need to seal the switchgear, thereby allowing for easy maintenance access. Because of the eliminated technological challenges associated with SF_6, nuventura was able to also significantly reduce operating costs. Regulators are already restricting the use of SF_6. The aim is to eliminate the gas completely from its main user - the grid - which consumes 85 per cent of all the SF_6 produced.

FIND OUT MORE

- nuventura is running a pilot with one of the biggest energy providers in Germany Westnetz/Innogy and is in the process of negotiating further pilots and the first commercial deal.
- More information: www.nuventura.com

“Nemo link cable road project“

by Elia Group



Nemo Link is an electrical subsea interconnector between the UK and Belgium. During its planning and construction phase many new environmentally friendly approaches were taken to keep the environmental impact of Nemo Link as small as possible.

HIGHLIGHTS

- Nemo Link was successfully routed around environmentally sensitive areas.
- Elia conducted comprehensive studies to be able to consider all impacts, environmental, commercial and cultural, at an early stage and avoid costly and environmentally invasive measures at a later stage.
- A yearly survey of the seabed will be done throughout the operation of Nemo Link. Changes in the seabed and recovery of impacted habitats will be monitored this way and lessons learned will inform the planning and implementation of future projects.

About the Practice:

Nemo Link is a connection between the electricity transmission systems of the UK and Belgium. It consists of subsea and underground cables connected to a converter station and an electricity substation in each country. While building this connection, special attention was paid to environmental considerations. A feasibility study was carried out to determine the best route – as short as possible to minimise disturbance to the marine biological environment and keep costs low. Part of this study was a seabed survey that gathered information on the seabed type, for both engineering and environmental purposes.

On top of that, mandatory Environmental Impact Assessments were carried out for Belgium and the UK, as well as a voluntary one for France to make sure all relevant environmental information was available for the planning process. The risks and impacts of all technical features of the cables were also carefully assessed to ensure that all risks of impact on the environment and the cable itself could be kept as low as possible. This way, possibly invasive maintenance work at a later stage can be kept to a minimum.

To avoid multiple trenches, and thus a bigger impact on the seabed, the HVDC cables were bundled and the trench that had to be dug for the cable was kept as narrow possible. The trench was only between 0.5 and 1 metres wide employing a technique that was only used in the oil and gas industry before being employed for Nemo Link.

FIND OUT MORE

- The Nemo Link interconnector is a joint venture between National Grid Interconnector Holdings Limited, a subsidiary company of the UK’s National Grid Plc, and the Belgian Elia Group.
- Organisations involved in building Nemo Link include the Flanders Marine Institute, local political authorities, archeologists and many others.
- Online source: http://www.nemo-link.com/

“Alerta Tendidos”

by Foundation Friends of the Iberian Imperial Eagle, Iberian Linx and Private Natural Areas

The project “Alerta Tendidos” which means “Powerlines Alert”, consists of the development, dissemination and improvement of a free user-friendly mobile application to engage citizens in the identification of potentially dangerous power lines for birds of prey, specifically for the endangered Iberian Imperial Eagle.

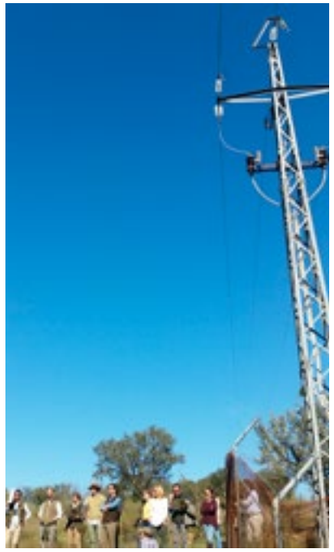
HIGHLIGHTS

- An easy-to-use mobile application allows for engagement of civil society, thereby significantly enlarging the potential data source pool.
- Data on bird mortality can be collected in remote and over extensive areas.
- Combined with information about structural characteristics of pylons and insulators, the practice aims to evaluate the current mitigation measures and give recommendations for future investments.

About the Practice:

Electrocution by power lines is one of the main causes of non-natural death for the Iberian Imperial Eagle, an endemic species of the Iberian Peninsula, as well as other birds of prey such as Bonellis or Golden Eagles. This non-natural cause of mortality is destabilising populations and could potentially cause local extinctions.

By using a user-friendly app, the project wants to enlist civil society to participate as voluntary observation groups while raising awareness of the importance to protect birds of prey. The mobile application “Alerta Tendidos” guides the user on a step-by-step observation and description of power lines, insulators, crossarms, etc. Users can upload pictures and coordinates, put in information and review it later. Experts then analyse the data provided by the users.



There is limited data on bird mortality related to extensive power lines and remote areas as most of the existing studies evaluate birds’ interaction with power lines in local areas only. The app aims to collect data to find the most important blackspots for death incidence and understand the spatial distribution of bird mortality across extensive areas. Combining this with information about the structural characteristics of the pylons and the type of insulators will help evaluate the efficacy of current mitigation measures. The findings can then be used to provide electricity companies and public administrations with relevant information about the most dangerous spots for birds of prey.

FIND OUT MORE

- The Foundation “Friends of the Iberian Imperial Eagle, Iberian Linx and Private Natural Areas” was initiated in 2005 by a group of owners and citizens engaged in the protection of habitats, the conservation of endangered species and the sustainability of natural areas. More information on the foundation can be found at www.amigosaguilaimperial.org
- The project partners included the Universidad Complutense de Madrid as well as environmental agents from the Spanish Nature Protection Service. From 2019 on, they will be joined by the International Union for Conservation of Nature in the internationalisation phase. The project is funded by the Banco de Santander Foundation.
- Online source: https://alertatendidos.org

“REN Biodiversity Chair”

by REN

Portuguese TSO REN is engaged in the ‘Invited Research Chairs’ programme run by the Portuguese Foundation for Science and Technology (FCT) and created a Research Chair at the Research Centre on Biodiversity and Genetic Resources (CIBIO), University of Porto. The research team focuses on assessing the impacts of power lines on biodiversity.

HIGHLIGHTS

- The Chair’s research plan is designed with clear benefits both for the company (improved management, use of scientific evidence in decision making and negotiations with nature conservation and impact assessment authorities) and the research centre (fostering applied research expertise, new contacts through REN led to new collaboration opportunities with other research centres, associations and companies from the energy sector).
- The aim of the REN Biodiversity Chair is to evaluate the effectiveness of impact mitigation measures and identify management practices to maximise positive impacts. The results have the potential to positively impact future best practice exchanges.

About the Practice:

Over the last 15 years, REN has collected a very relevant amount of data on bird-powerline-interactions, with high research potential. The data has been gathered via EIA processes (Environmental Impact Assessments) and via REN’s monitoring of the extensive use of their pylons as nesting places by white storks, aiming to manage the risk of power outages.

The REN Biodiversity Chair research agenda aims at providing scientific advice for decision making by REN, suggesting methodological improvements to maximise cost-benefit ratios in impact assessment and mitigation, creating an overview of and analysing biodiversity data gathered by REN in order to better understand bird mortality patterns, evaluating mitigation practices, and drafting a handbook of good practice for monitoring power line impacts on biodiversity.

In addition, the Chair carries out field studies to gather demographic parameters, simulate population dynamics and assessing population-level impacts of mortality caused by power lines on bird populations. There is also a specific task to gather information on the productivity of white storks nesting on pylons, which will be used for population simulations for this species, as well as a focus on research with regard to implementing the most effective compensatory measures.

Ongoing research of the Chair also includes the management of rights-of-way to potentiate biodiversity outcomes and technological development for impact monitoring.

FIND OUT MORE

- REN is the Portuguese transmission system operator, while FCT is a public agency that supports science, technology and innovation, in all scientific domains, under responsibility of the Ministry for Science, Technology and Higher Education. FCT runs the ‘Invited Research Chairs’ programme and funds 25 per cent of the REN Biodiversity Chair. CIBIO is the main Portuguese research center on biodiversity.
- The REN Biodiversity Chair team includes a coordinator (the Chair holder) and 6 researchers including PhD students and post-docs.
- Online sources: https://www.researchgate.net/project/REN-Biodiversity-Chair-Power-lines-and-biodiversity; https://www.ren.pt/en-GB/sustentabilidade/catedra_ren_em_biodiversidade/

Technological Innovation & System Integration

“Kriegers Flak – Combined Grid Solution: World’s first hybrid interconnector“

by 50Hertz and Energinet

The ‘Combined Grid Solution’ (CGS) is a hybrid system that interconnects the grid of north-eastern Germany with the Danish island of Zealand utilising the grid connection infrastructure of the German offshore wind farms Baltic 1 and 2 and the Danish offshore windfarm Kriegers Flak. It’s the first of its kind worldwide and will be operational before year-end.

HIGHLIGHTS

- CGS effectively manages fluctuations in intermittent supply and demand.
- It provides black-start capability by linking Scandinavian and continental grids.
- CGS aims to foster the European energy transition by strengthening grid integration of renewables and security of supply, especially for the Danish island of Zealand.
- Early dialogue and public participation accompanied the project systematically from start to finish, achieving high local acceptance.
- The project can be seen as a starting point for future meshed offshore grids.

About the Practice:

Due to the short distance between the German ‘Baltic’ wind parks and the Danish ‘Kriegers Flak’ wind parks the idea of creating a system that includes both, offshore wind park feed-in and cross-border interconnection capacity was born. This way, a better utilisation of offshore infrastructure than normal can be reached in the interest of society: when the wind is strong the grid infrastructure is used to transport wind power, when the wind is weak or not blowing at all, it is used to exchange electricity between Germany and Denmark.

What makes the project unique on a global scale is the combination of an interconnector with grid connections of offshore wind, as well as the way the complex hybrid system is going to be operated. A newly developed Master Controller for Interconnector Operation (MIO) with the latest information technology will be installed in the 50Hertz Control Centre in Berlin. The Master Controller acts as the ‘brain’ of the entire system. It calculates the available capacity of the interconnector (based on wind forecasts and the resulting wind infeed) in real-time, prevents overload by controlling the converter and/or the wind farms, maximises the feed-in from the wind farms through active system control, and controls the exchange of electricity between the grids of both countries by means of the converter installed in Mecklenburg-Western Pomerania (Germany). This way, the cable connection can be utilised to a much higher extend, thus maximising social welfare for society.

FIND OUT MORE

- The project is based on a partnership between the German transmission system operator (TSO) 50Hertz and the Danish TSO Energinet. This partnership includes the planning phase as well as the future operation of the interconnector, since both, 50Hertz and Energinet own all assets on equal shares. Further project partners, such as ABB and EnBW support the construction of the hybrid interconnector.
- Online source: https://www.50hertz.com/en/Grid/Griddevelopement/Offshoreprojects/CombinedGridSolution

“Networks Renewed”

by Institute for Sustainable Futures (ISF), University of Technology Sydney

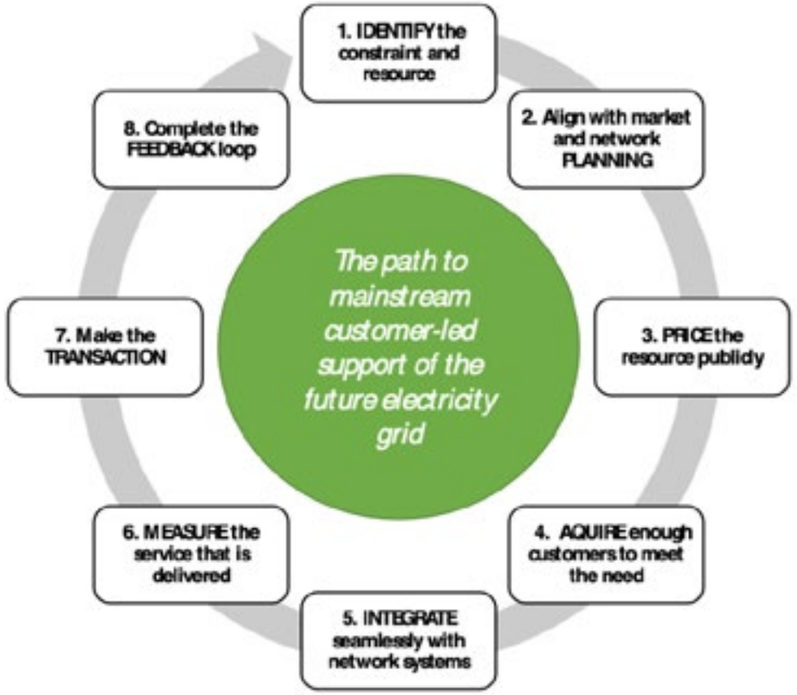
Networks Renewed was a $5 million (AUD) trial that aimed to prove that rooftop solar could be an asset, not a problem, for the electricity grid. The trial investigated non-network alternatives for providing voltage support using smart inverters connected to solar PV and battery storage. The project proved that smart inverters have the capability to control solar and batteries to improved voltage on the electricity grid. Its success opens the door to a suite of new business opportunities based on the premise that rooftop solar can be an asset to everyone.

HIGHLIGHTS

- The project demonstrated that advanced, distributed control of inverter-connected resources, such as rooftop solar, can have a positive impact on voltage in the low voltage (LV) network, make economic sense for distribution system operators (DSOs), and be attractive for consumers.
- The aim of the trial was to understand the extent to which residential solar panels, battery storage and inverters can manage voltage in distribution networks via real and reactive power, and to develop a framework for mainstreaming network support solutions sourced from distributed energy resources in general.

About the Practice:

Networks Renewed had two phases: a pilot-scale demonstration in 2017-18 to test potential voltage control algorithms at a relatively small scale; followed by a market-scale demonstration to ramp up the deployment to deliver significant network impact in 2018-19. The trial recruited 90 customers under innovative business models that were developed with the DSOs and other partners.



The project’s major achievement was that it proved that both solar and batteries can support network voltage. And the voltage correction can be enough to avoid other investments in the network. The other lessons that were learned along the way were:

1. It is possible to control individual household systems within the complex operation systems of DSOs. Widespread use requires more familiarity, standards, and integration.
2. Customers were paid fairly for their part in the trial. But it is not clear how much customers will be paid if the option was made commercial.
3. Customers liked the trial and are keen to more proactively manage their energy. Nonetheless customer engagement for new energy technologies could be improved.

The project team are now bringing together a broader partnership to pave a pathway to make the customer-centred energy transition a reality.

FIND OUT MORE

- ‘Networks Renewed was led by the Institute for Sustainable Futures (ISF) of the University of Technology Sydney and funded by the Australian Renewable Energy Agency. The project partners included three DSOs (Essential Energy, AusNet Services and United Energy), two service aggregators (Reposit Power and Mondo Power), the Australian PV Institute and the New South Wales and Victorian state governments.
- Online source: https://www.uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures/our-research/energy-and-climate-1

“CROSSBOW Horizon 2020 project“

by ETRA I +D

The CROSSBOW practice provides different tools and new transnational business models designed to help reduce network operational costs and improve economic benefits of clean energy and storage units, thereby facilitating RES penetration. It puts a special focus on cross-border management.

HIGHLIGHTS

- Communication/ICT technologies and control tools introduce more flexibility in the transmission grid, integrate storage facilities, allow for more flexible electricity generation and find solutions to enhance cross-border collaboration.
- Located across eight European countries (Romania, Greece, Bulgaria, Serbia, Bosnia and Herzegovina, Croatia, Montenegro and the Republic of Macedonia), the practice is transferable to other regions.
- The practice aims to create more than 600 new direct jobs and 70.000 indirect jobs after five years.

About the Practice:

The CROSSBOW practice is located in south-eastern Europe and aims to foster cooperation among the system operators of the region. The project consortium is comprised of 24 organisations from 13 different countries. Together they are developing nine different communication, ICT and control tools for the Regional Control Center.

By sharing resources, the tools enable a better control of exchange power at international connection points, facilitate the integration of new energy storage solutions as well as providing better communication and control of the network. Additionally, the project aims to define a transnational wholesale market with transparent, fair and sustainable remuneration for clean energies by proposing new business models that support the participation of new players and the reduction of costs.

By combining open, secure and flexible architecture with an interface that is manageable for end-users, the complementary tools allow for an integrated approach to cross-border and cross-sectoral RES management. This increases efficiency and reduces costs for a higher penetration of RES in the system.

CROSSBOW is a Horizon 2020 project and stands for “Cross-border management of variable renewable energies and storage unity enabling a transnational wholesale market”. The project was launched in 2017 and has a duration of four years. It will be deployed from June 2019 and evaluated by autumn 2021 by the eight regional TSOs.

FIND OUT MORE

- ETRA I+D, the project coordinator of CROSSBOW is a large business group dedicated to putting the most advanced technologies in the areas of mobility, traffic and transport network, lighting, energy, security and communications at the service of society. ETRA has become the leading provider of R+D+I, technology, engineering, installation and operation of Management and Control systems for mobility and intelligent infrastructure. More information about the coordinator: http://www.grupoetra.com/en
- Project website: https://www.crossbowproject.eu

“GRIDSOL: Smart Renewable Hubs for flexible generation “

by Cobra Instalaciones y Servicios S.A.

“Smart Renewable Hubs” combine primary Renewable Energy Sources (RES) and storage technologies under an advanced control system that dispatches the electricity on a single output according to the availability and cost-effectiveness of each technology.

HIGHLIGHTS

- Takes into account the local specificities in deciding which technologies work best to optimise power generation
- Evaluation of Smart Renewable Hubs to find optimal size
- Development of a Dynamic Output Manager of Energy (DOME) for flexible hybrid plants
- Helps long-term investment decision-making towards a sustainable energy transition

About the Practice:

The transition to energy generation from renewable sources requires finding an equilibrium between grid stability, security of supply and cost of generation. This often depends on local factors such as demand profiles, the availability of renewable resources and local infrastructure. The practice offers an optimisation tool that sizes each plant at each location and manages energy production according to grid and market requirements.

It does so by modelling non-dispatchable RES and the synchronous generation in smart renewable hubs and using a Dynamic Output Manager of Energy (DOME) for different configurations. What is new about the practice is that it doesn’t prescribe the technologies used. Rather, it aims to select the best choice in each case according to a multi-criteria decision-making approach.

Furthermore, the practice enables the development of sustainable roadmaps to assist decision-makers in investment planning as the requirement for flexibility increases. By helping to find the optimal size for Smart Renewable Hubs, the practice can support the substitution of conventional power plants. It looks at each individual location to select and combine the most suitable technologies and is therefore fully transferable to other geographical regions.

FIND OUT MORE

- The practice is coordinated by the COBRA Group, with nine project partners from industry, utilities, research centres and energy consultancies. It has been running since 2016 and will finish its implementation phase in 2019.
- More information about the coordinator: http://www.grupocobra.com/en/corporate-information
- Project website: http://www.gridsolproject.eu

Imprint

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