GOOD PRACTICE OF THE YEAR 2023

10th Anniversary Edition

Foreword

Kadri Simson
EU Commissioner for Energy

Nearly two years after the full-scale Russian invasion of Ukraine, our Union has responded more powerfully than ever: together, in solidarity, we have saved energy, partnered with like-minded countries and diversified our supplies of natural gas, and deployed more renewable energy capacity than ever before. The REPowerEU Plan is in full swing, paving the way to strategic autonomy and energy security, sustainability and economic growth.

When the energy crisis hit, our political ambitions did not change. The pace just got faster. The newly agreed binding renewable energy target for the Union under the revised Renewable Energy Directive set an ambitious goal of reaching 42.5% by 2030, with an aspiration towards 45%. Large-scale deployment of renewables in the EU will have to flow into a modernised and complete network of transmission and distribution lines and bring this electricity to consumers across Europe.

Our decade-long infrastructure policy at EU level, the trans-European energy networks, has made sure we have one of the most robust and interconnected power grids globally. As the work on our cross-border gas network is done, our focus now is on electricity grids, offshore projects and hydrogen network. The recently updated trans-European energy networks regulation (TEN-E Regulation) has put in place new targeted provisions to accelerate these Projects of Common Interest (PCIs) further. The Net-Zero Industrial Act also identifies grid technologies as one of the eight strategic net-zero technologies, giving the right signals to the market on where EU's priorities stand.

On the 10th anniversary of the TEN-E Regulation, grids are now in the public eye more than ever before. The role of energy infrastructure for ensuring energy security, fighting climate change and keeping prices in check has become evident. More than half of the 166 projects on the 1st Union list of Projects of Common Interest and Projects of Mutual Interest adopted by the Commission on 28 November respond to the need to transport and store large-scale offshore and onshore renewable capacities. However, lengthy grid project development and mounting grid connection requests and delays risk turning grids into a bottleneck hindering the EU's clean transition, rather than the enabler we need. To address this, the Commission also adopted on 28 November a Communication "Grids, the missing link: An EU Action Plan for Grids", which proposes key actions for stronger, more interconnected, more digitalised, and cyber resilient European power grid.

The cornerstone of the TEN-E Regulation is cooperation amongst all actors involved in the implementation of PCIs. Cooperation has yielded tangible results: thanks to this instrument, 86 electricity and gas transmission and storage and smart electricity grids PCIs have been completed to date linking Member States' networks, increasing their security of supply and integrating a large share of renewables.

We are no longer in a business-as-usual scenario for grid development. Although the TEN-E Regulation establishes clear cooperation, consultation and engagement rules, notably towards wider communities impacted by the construction of a grid project, it can only set the framework. Stakeholder engagement, as laid down in the Regulation, albeit transparent and early on, needs to be complemented by regular efforts from promoters and all relevant authorities to raise awareness on the crucial need for grids. Rather than being a one-off exercise related to a specific project, it should be part of a continuous dialogue making communities part of the process.

In the past ten years, I have witnessed many such excellent efforts where project promoters have approached grid development in an innovative, environmentally sound and engaged manner. The Renewables Grid Initiative's "Good Practice of the Year" Award ceremony celebrates these practices every year, serving as a platform for exchanging and continuous learning.

With the EU Action Plan for Grids, the Commission is stepping up efforts to help reinforce public engagement and turn it into a regular and meaningful collective effort that harnesses trust and participation in grid development, softens the impact on communities and nature, redistributes benefits and enhances nature protection. The Pact for Engagement to ensure early, regular and meaningful stakeholder engagement in grid development will kick off this process. Collectively, we will strengthen our communication on the role of grids for the energy transition. We will do so by engaging and cooperating more closely on grid acceleration and faster implementation of permitting rules, and ensuring a more sustained dialogue with regulators and stakeholders.

I wish to congratulate the winners of this year's edition of the "Good Practice of the Year" award and thank all project promoters participating in the competition. This award constitutes an excellent initiative promoting sustainable solutions for electricity grids and a low-carbon economy by 2050.

Kadri Simson
EU Commissioner for Energy

Introduction

The first ‘Good Practice of the Year’ awards were granted ten years ago in 2013. Since then, the Renewables Grid Initiative (RGI) has awarded twenty organisations for their outstanding work in integrating renewables onto the grid and deploying electricity infrastructure. Across three impact areas – communication and engagement; environmental protection; and technological innovation and system integration – these awards shine a spotlight on those striving to improve the relationships between the grid, biodiversity, and communities.

To celebrate this milestone, we have added some fresh paint to our competition title, which will from now on be known as the ‘RGI Grid Awards: Good Practice of the Year’. In addition, we held a public vote among participating past winners for the ‘10th Anniversary All-Star’ award. Together with the ‘Good Practice of the Year’ award, the winners were announced during the ‘RGI Grid Awards’ ceremony in November 2023.

10th Anniversary All-Star

Recovery of Posidonia Oceania seagrass meadows, by Red Eléctrica

Posidonia Oceanica is a seagrass species that provides essential functions to the Mediterranean ecosystem, most notably it acts as a natural carbon sink. Since 2016, Red Eléctrica, the Transmission System Operator in Spain, has undertaken a seagrass restoration and research project in the Balearic Islands and the wider Mediterranean. Since winning the 2017 ‘Good Practice of the Year’ award in environmental protection, this restoration practice has provided insight into the carbon sequestration capacities of Posidonia. Find out more on page 4.

Communication & Engagement

Building resilient communities and healthcare through renewables, by EcoSwell

EcoSwell is a Peruvian NGO which implements renewable energy projects with vulnerable communities in a participatory way. They take a bottom-up approach to design bespoke systems and train end users for sustainable long-term use. Recently, EcoSwell installed a solar-PV based uninterrupted power supply system in a central Medical Centre in Talara, Peru, allowing staff to safeguard vaccines. Other projects include a hybrid micro-grid system, residential energy consultations and PV systems and a solar distiller. Find out more on page 10.

Technological Innovation & System Integration

Increasing the Rate of Change Frequency limit to +/– 1 Hz/s, by EirGrid

The rate at which system frequency changes is referred to as the Rate of Change of Frequency (RoCoF). Events that result in high RoCoF levels can potentially lead to instability in the power system. Detailed studies identified a need to increase RoCoF from 0.5 to 1 Hz/s to reach the target of 40% electricity generation from renewable sources. EirGrid therefore established a multi-year and stakeholder programme of work to change RoCoF, and from May 2023, 1 Hz/s RoCoF was successfully implemented and is enduring operational policy. Find out more on page 18.

Environmental Protection

Ecological corridor management in overhead line corridors, by E.ON

E.ON has been implementing ecological vegetation management in their grid corridors for decades, having realised that clear cutting is not an effective way to prevent vegetation interference with power lines. Instead, by selectively removing only fast-growing trees, they preserve valuable biotopes, promote biodiversity, reduce maintenance costs, and boost public acceptance. By 2029, E.ON will roll-out this approach on approximately 13,000 km of overhead lines in grid zones of the DSOs in 6 EU countries. Find out more on page 30.

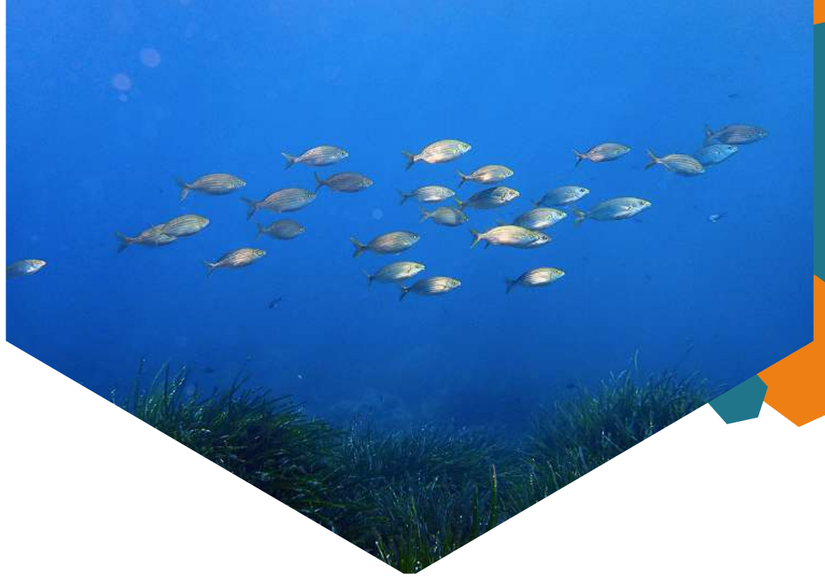
We would like to cordially congratulate all the winners and express sincere gratitude to all those who participated in this year’s competition. We would further like to acknowledge the great work of our jury, who have contributed their time and expertise to this competition, as well as the valuable contribution of the international auditing and advisory company, Mazars, who accompanied the evaluation process for the tenth year in a row. Lastly, we would like to thank the European Commission for hosting the ‘RGI Grid Awards’ ceremony the Fourth PCI Energy Days in Brussels.

10TH ANNIVERSARY ALL-STAR 2013 - 2023

Recovery of Posidonia Oceania seagrass meadows

Red Eléctrica

Posidonia Oceanica is a seagrass species that provides essential functions to the Mediterranean ecosystem, most notably it acts as a natural carbon sink. Since 2016, Red Eléctrica, the Transmission System Operator in Spain, has undertaken a seagrass restoration and research project in the Balearic Islands and the wider Mediterranean. Since winning the 2017 'Good Practice of the Year' award in environmental protection, this restoration practice has provided insight into the carbon sequestration capacities of Posidonia.



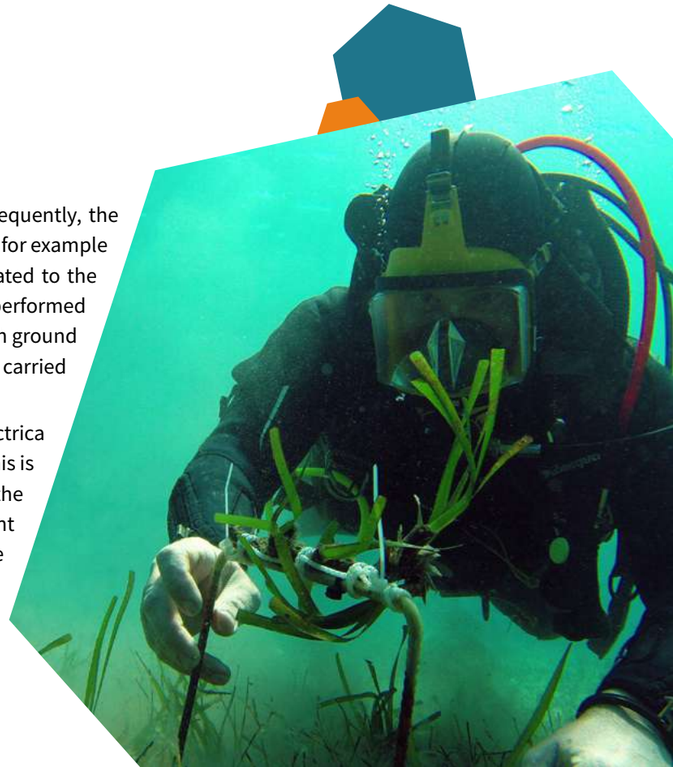
Highlights

- Reached a seagrass survival rate of 95% from 2017 to 2022, surpassing the 35% observed in other restoration techniques.
- Revealed considerable positive effects of Posidonia for combating ocean plastic, via via a separate research project from 2020-21, which showed how Posidonia filters these pollutants and integrates them with natural fiber bundles called 'Neptune Balls'.
- Launch of a virtual exhibition in 2021, which is accessible on Red Eléctrica's website. It enables interested readers to delve deeper into the project and understand the value of Posidonia Oceanica.

About the Practice

Wind farms and undersea cables can contribute to the degradation of seagrass meadows, which suffer from a 1% to 5% annual estimated rate of loss globally. Posidonia Oceanica forms large underwater meadows that are an important part of the ecosystem due to their ability to sequester about half a million tonnes of carbon CO2 in the Mediterranean Sea annually. To tackle the challenges stemming from the deterioration of seagrass meadows, Red Eléctrica conducted an extensive research project on the utilisation of the seagrass, Posidonia Oceanica, and devised an open method for recovering seagrass meadows. To do this, Red Eléctrica conducted research on the use of Posidonia Oceanica seedlings and developed an open seagrass meadow recovery method. The seagrass recovery method involves the collection and cultivation of Posidonia Oceanica fragments and seeds grown under laboratory-controlled conditions or obtained directly from natural seagrass meadows. Subsequently, the seedlings can be transplanted into degraded meadow areas, for example into trenches opened on the seafloor due to works associated to the laying of submarine electricity cables. The replanting is performed using different types of substrate in order to determine which ground is best for the growth of the plant, and regular monitoring is carried out to determine the survival and growth rate of each plant.

Based on the success of the initial practice, Red Eléctrica established the 'Bosque Marino,' or marine forest, in 2018. This is a significant restoration initiative focusing on Posidonia in the Mediterranean. The Bosque Marino now operates as a vibrant research facility and serves as a benchmark for novel offshore projects worldwide. This initiaitve has the potential to guide future, large-scale restoration projects in degraded areas, and leverage research-driven results to ensure the non-invasive recovery of Posidonia Oceanica.



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.

Rachel Asante-Owusur

Programme Manager, International Union for Conservation of Nature (IUCN)

The focus of her work involves promoting measures to safeguard biodiversity, ecosystem services, natural-resource dependent livelihoods and rights from renewable energy and extractive sector operations. Formerly, Rachel was a research scientist in the field of biotechnology.

Joachim Balke

Head of Unit for Infrastructure and Regional Cooperation in DG Energy

Joachim has been the Head of Unit for Infrastructure and regional cooperation in DG Energy since November 2019. Previously, he held posts in the Commission in the Cabinets of Energy Commissioners Guenther Oettinger and Miguel Arias Cañete, as well as in the units dealing with Renewable Energy and Energy Taxation (DG TAXUD)

Susana Batel

Integrated Researcher, University Institute of Lisbon (ISCTE)

Susana Batel is an Integrated Researcher at the Centre for Social Research and Intervention (Cis) of the University Institute of Lisbon (ISCTE), Portugal, working on the social studies of energy and the environment. Her research examines people's responses to and engagement with renewable energy generation and infrastructures.

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.

Marie Donnelly

Chairperson of the Climate Change Advisory Council Ireland

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.

Jean-Michel Glachant

Professor, European University Institute'

Jean-Michel is also the Holder of the Loyola de Palacio Chair in European Energy Policy & Regulation, and vice-president of the International Association for Energy Economics as well as associate researcher at the universities of Cambridge and at the MIT. He worked in the industry and private sector before becoming professor at La Sorbonne.

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.

Carl Zichella

Retired Director for Western Transmission at NRDC

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

Communication & Engagement

GOOD PRACTICE OF THE YEAR 2023

Building resilient communities and healthcare through renewables

EcoSwell

EcoSwell is a Peruvian NGO which implements renewable energy projects with vulnerable communities in a participatory way. They take a bottom-up approach to design bespoke systems and train end users for sustainable long-term use. Recently, EcoSwell installed a solar-PV based uninterrupted power supply (UPS) system in a central Medical Centre in Talara, Peru, allowing staff to safeguard vaccines. Other projects include a hybrid micro-grid system, residential energy consultations and PV systems and a solar distiller.

Highlights

- Creates more resilient communities (and especially health centres) in Peru through renewables and micro-grids and access to energy.
- Ensures sustainable use of systems through trainings for local people and staff, operation, and maintenance (O&M) manuals, and ongoing monitoring.
- Places communities' needs at the forefront of decision making for bespoke, people-powered projects.
- Collaborates with Ministry and authorities to drive policy change and encourage the consideration of the intersection between energy and health.

About the Practice

In Piura, northern Peru, frequent blackouts, extreme weather and an unreliable grid endanger access to electricity for many local communities, especially when employment is low and power prices are high. Indeed, around 1.5m Peruvians have no access to power. For the health sector, this situation jeopardises the cold chain supply for crucial vaccines and thus has serious knock-on implications for public health.

Sustainable development NGO, EcoSwell, develops participatory renewable energy projects to bring affordable, renewables energy to local communities. Noting the critical situation at a central Medical Centre in the city of Talara, EcoSwell ran interviews with staff and authorities to understand their electricity needs and the impact of blackouts. They worked with electricians and engineers to develop a bespoke UPS and solar panel system with maximum system efficiency and yield, including an oversized solar array to account for future electrical demands. This ensures the centre's freezers are never without power supply. EcoSwell also trains local staff, creates guidance manuals, measures performance, and works closely with the Medical Centre team to ensure sustainable use of the system. They also communicate results for the public through their website.

This approach can be seamlessly transferred to other regions and multiplied by training local communities in management. EcoSwell has implemented another 'Resilient Medical Centre' in the small coastal town of Lobitos and will work with two more in 2023-25, aiming to reach ten in the coming years. Other projects include building a 13.04 kW solar and wind-based hybrid micro-grid for a community of 40 families in Nazca, southern Peru; residential energy consultations & PV system installations; and a solar distiller to overcome critical water scarcity.

Urban Farming in Power Transmission Networks

Cities Without Hunger

Cities Without Hunger is a Brazilian NGO which works with grid operators and local communities to transform the unused areas around power lines into productive agricultural spaces. The lines are located on the poor suburbs of Brazilian cities and employ local people, thus providing jobs, tonnes of organic food at affordable prices, and improving the people's relationship to the infrastructure.

Highlights

- A scalable solution which improves food security; combats urban poverty; reduces usage of pesticides, water usage and carbon emissions.
- Employs around 600 local people across 33 urban grid-farms. ±6,000 tonnes of organic food were produced in 2022.
- Works closely with the grid operators and regulator to comply with safety specifications for safe permanent use.

About the Practice

Despite Brazil being one of the world's largest agriculture exporters, around 62 million citizens experience food insecurity, with poorer populations in urban areas being particularly vulnerable. Since 2004, Cities Without Hunger (Cidades sem Fome) has been building urban farms beneath transmission cities in major cities. They identify and lease appropriate sites (±2 ha) from the grid operator, then work with local communities to prepare the space and train local people in organic agriculture and site management according to safety rules. The vegetables produced are sold in the neighbourhoods themselves, generating a supply of cheap organic food and monthly income for the workers. The project constantly undertakes research with workers, consumers, academia, and other initiatives on how to improve urban farms.

Energy Compass Project

Polskie Sieci Elektroenergetyczne (PSE)

Polskie Sieci Elektroenergetyczne's (PSE), the Polish Transmission System Operator (TSO), developed the Energy Compass project to support users, especially households, to responsibly plan their electricity consumption. It is comprised of a few elements: the app, an educational campaign, the website, and widgets on PSE's corporate website. Its main goal is to educate users on how to support the operation of the National Power System, by actively adjusting their energy consumption to the current situation in the system.

About the Practice

Domestic appliances account for 10% of the country's electricity demand and up to 20% in the evening peak, therefore users' awareness and participation have a great potential and their impact is going to increase along with the electrification of heating or growth of electromobility. Though the Energy Compass, PSE hopes consumers will experience a reduction in their electricity bills, as well as support reductions in CO^2 and other GHG emissions within the electricity sector. In particular, the Energy Compass App is the first of its kind in Eastern-Central Europe and supports the responsible use of electricity, addressed primarily to households. The App guides users on how and when adjusting their electricity consumption to the current situation in the system will lower GHG emissions in the electricity sector, contributing to the protection of the environment. It also gives hints on efficient electricity use and reducing bills.

Highlights

- Enhanced citizen participation in the energy transition, leading users to support climate targets and the balance of the power system.
- Promotion of a comprehensive all-year-long educational campaign to raise awareness on how the power system works and how can consumers contribute to its safety.
- Amounting to 12,000 app downloads within three quarters of 2023 with strong user engagement.
- Improving app functionalities according to user feedback, e.g. "cleanest" hours function added in August 2023.

XR@Transnet

TransnetBW

Using extended reality (XR), German TSO TransnetBW turns infrastructure projects into immersive experiences before they exist. The tool “XR@TransnetBW” can show what TransnetBW is planning, what it will look like and how it will feel once it’s finished. With these assets, the technology makes often abstract plans for infrastructure and its necessity tangible and clear, and therefore more accessible to a broader group of people.

Highlights

- Helps people get a clear idea of projects that are still abstract by making them transparent and visible, while also addressing people’s fears.
- Creates realistic expectation management about look, noise and dimensions of a facility.
- Has wide applicability while each individual use case is project-specific and enhanced by local knowledge.
- Presents a sustainable alternative to quickly outdated brochures and can be easily updated.

About the Practice

Globally, TSOs are developing essential energy transition infrastructure. Yet this can only succeed if local residents and decision-makers receive transparent information and are taken along on the “journey” right from the start. XR@Transnet creates this transparency by demonstrating and explaining a project in detail that does not yet exist. The software achieves this via different types of user experiences, such as virtual tours of planned projects with audio guides and info boxes as well as lighting and sound simulations that can all be projected onto virtual reality goggles. To enhance user-friendliness and to allow the use of the goggles in more remote areas, TransnetBW has ensured they also work without internet access.

Offshore Box on the North Sea Island Norderney

Amprion

German TSO Amprion transformed a mobile shipping container into an innovative information centre which aimed to provide comprehensive awareness regarding offshore drilling beneath the North Sea Island Norderney island and the need for offshore grid connections. This ‘Offshore Box’ aims to foster a nuanced understanding of the energy transition's intricacies while also addressing the significance of network expansion projects.

About the Practice

To realise Amprion’s offshore grid connections DolWin4 and BorWin4 they need to cross the North Sea Island Norderney, a well-known tourist destination featuring pristine beaches and dunes. Due to environmental requirements, Amprion was only allowed to work on the construction site on the beach in the high tourist season and despite it being surrounded by a noise barrier, there was naturally a huge amount of interest from locals and tourists. Amprion therefore decided to build an Offshore Box as an independent information point and place it directly along the dunes near the construction site of the drilling across the island. The Offshore Box actively engaged visitors to discuss the project, its role in the context of the energy transitions and address concerns transparently.

Highlights

- Transformed a shipping container into an ‘Offshore Box’ with text explanations, visual depictions of offshore construction phases, and immersive presentations
- Engaged visitors and delivered comprehensive insights into offshore drillings necessary for grid connections and the energy transition.
- Utilisation a new communication approaches to network expansion projects and a solution which is flexible concerning the location and content installation.
- Located directly along the dunes where project construction took place and put in place during the tourist high season to address community concerns and questions.

Technological Innovation & System Integration

GOOD PRACTICE OF THE YEAR 2023

Increasing the Rate of Change of Frequency limit to +/– 1 Hz/s

EirGrid PLC and SONI Ltd

One of EirGrid's and SONI's key tasks as Transmission System Operators is to maintain balance between electricity supply and demand. EirGrid and SONI as TSOs faced a challenge in enabling the growth of renewable energy on the system so they worked to create a technologically innovative solution. The goal was to increase the instantaneous non-synchronous renewable generation penetration limit. This is a key enabler for delivering a cleaner energy future.

Highlights

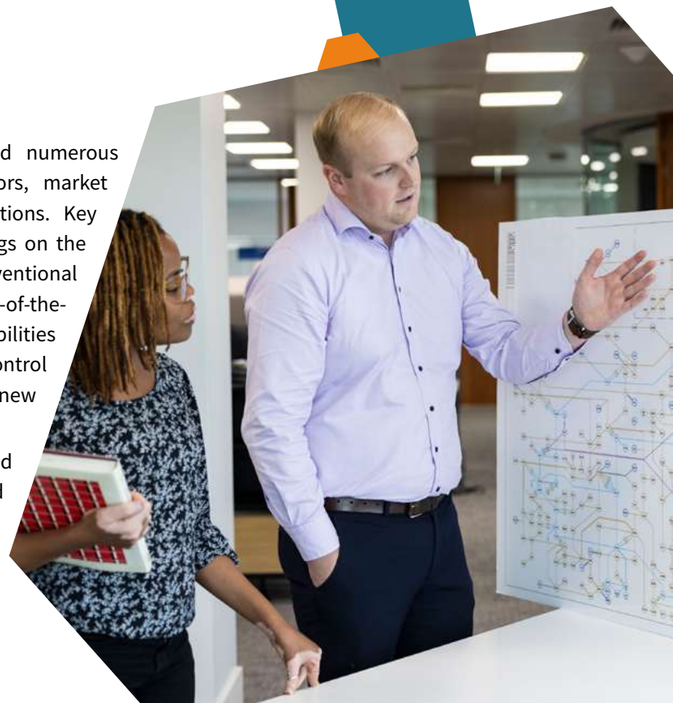
- Pioneers increased renewable energy penetration in the Ireland and Northern Ireland power systems via complex cross-industry involvement.
- Enabling this change made it possible to increase the instantaneous non-synchronous renewable generation penetration limit to 75%.
- Allowed EirGrid to trial the reduction in the minimum number of synchronous units required to be connected to the grid at any one time.
- Lowers the carbon intensity of the electricity supply in Ireland and Northern Ireland power systems by reducing the curtailment of renewables.

About the Practice

Imbalances between supply and demand occur from time to time on the power system. For example, when a large electrical generator suddenly disconnects and its electrical power is lost, the supply from the system is temporarily below the demand and the system frequency begins to fall. An important metric when this happens is the Rate of Change of Frequency (RoCoF). This is a technical term describing the rate at which the frequency changes during a system imbalance event.

Events that result in high RoCoF levels can potentially lead to instability in the power system, so to help reach the target of 40% electricity generation from renewables, detailed studies identified a need to increase the maximum allowable RoCoF from 0.5 to 1 Hz/s on the Ireland and Northern Ireland power systems. EirGrid and SONI established a multi-year and multi-stakeholder programme of work to change the RoCoF standard with multiple strands and numerous stakeholders including the Distribution System Operators, market participants and regulatory authorities in both jurisdictions. Key focus areas included: changing interface protection settings on the distribution system; conducting compliance testing of conventional generators; implementation by EirGrid and SONI of a state-of-the-art dynamic stability assessment tool with look-ahead capabilities to be able to monitor and assess RoCoF in real-time in the control rooms; and modification of the Grid Codes to reflect the new RoCoF standard.

In May 2023, following a successful operational trial and detailed studies, the RoCoF programme concluded and EirGrid and SONI are now operating the Ireland and Northern Ireland power systems with a RoCoF limit of 1 Hz/s. This operational capability will enable higher levels of renewable energy in Ireland and Northern Ireland.



Coordinated reactive power exchange

Amprion

German TSO Amprion embarked on a coordinated reactive power exchange with Germany's biggest DSO E.ON. The aim of the practice is to make a joint contribution to the fundamental transformation of the energy system by quickly and cost-effectively improving voltage stability in the transmission grid.

Highlights

- Creates independence from conventional energy sources while maintaining security of supply.
- Expands capacity of power system to incorporate renewables.
- Accelerates the energy transition by reducing the need for new generation plants as the TSO can use previously unused potential from the distribution grid instead of constructing new assets.
- Represents a solution that can be extended to almost all electrical grids worldwide.

About the Practice

As part of the energy transition, conventional power plants (coal, nuclear and gas) are being decommissioned, making the influence of variable renewable energy on the electricity grid increasingly important. In this context, new reactive power compensation systems must be built to ensure that voltage limits continue to be maintained. Compensation systems that utilse the reactive power potential of wind turbines are already in place for voltage control in the distribution grid, but do not extend to the transmission grid. To change this, Amprion and E.ON developed a concept for a coordinated reactive power exchange between the transmission and the distribution grid in real-time operation that exploits synergies in voltage control. The concept has since been successfully tested in the field and is now used in daily operations.

Smart Metering

JSC Sadales tīkls

JSC 'Sadales tīkls' carried out one of the biggest digitalisation projects in Latvia. Within their smart metering programme, new generation smart electricity meters were installed for all Sadales tīkls' customers, adding up to more than one million metering points. The data generated via this programme and the smarter energy management it allows, have led to much more climate-friendly energy consumption across Latvia.

About the Practice

Sadales tīkls is committed to the smart meter rollout to develop a distribution system that meets the new needs of the electricity market as well as Latvia's climate neutrality goals. The smart devices make energy data available for each of the more than one million market participants. Sadales tīkls offers data services on consumed, generated active and reactive energy with the reading frequency for the previous day, twice a day or even for the previous hour. This transparency has helped to improve efficiency, not only for Sadales tīkls' grid operation and maintenance, but also for customers and other electricity market participants. Results so far show that due to the rollout, Latvia has reached one of the lowest costs per meter in the EU and market participants offer customers various solutions how to optimize energy consumption.

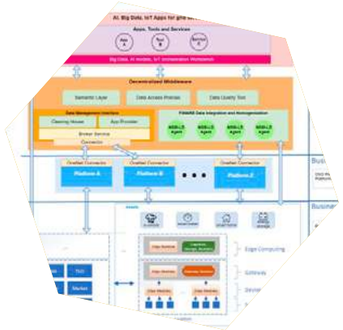
Highlights

- Allows for the development of automatic solutions for the operational and precise control of electricity consumption/ production and for electricity grid monitoring in the entire territory of Latvia.
- Allows customers to make date-driven decisions and access solutions on how to optimise energy consumption and costs.
- Processes around 60,000 trader market data requests per month, this added up to more than 8 mio trade market messages in 2022.
- At the end of the programme, data availability and the benefits of DSOs e-services are highly rated and 99% of customers perform their activities in the e-environment.

OneNet Data Connector

Fraunhofer Institute for Applied Information Technology

Considering the increasing need for grid balancing and flexibility, as well as the crucial role digitalisation will play as the energy transition advances, Fraunhofer developed the OneNet Data Connector in partnership with several stakeholders in the energy market. OneNet is an open architecture to integrate innovative markets and grid operation, ensuring economic viability both at TSO and DSO level and enabling a holistic view of the system as integrated infrastructure.



Highlights

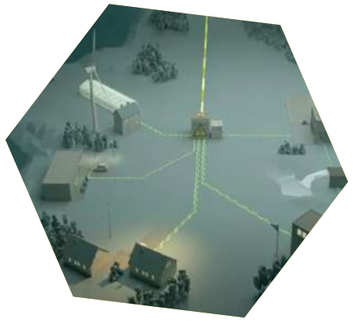
- Standardised approach for Europe's electricity grid sector, considering national legislations, regulations and business models.
- Coverage of different European regions, with demos including 15 country markets.
- Continous dialogue with major stakeholders in the electricity grid sector through the GRIFOn (Grid Forum).

About the Practice

In the context of an energy system dominated by distributed renewables, customers move from being peripheral users to key players of the energy system, contributing renewable generation and grid flexibility. This transformation requires an integrated approach between generation and grid operation to allow for close-to-real-time situation management. Digitalisation is an enabler of this process, opening the way to smart, secure, and efficient management of data sources. OneNet's architecture transforms the fragmented European electricity system into a smarter, efficient, and pan-European one. The goal is to establish solutions with broad market uptake, driven by consensus-building at the European level, and leading to efficient standardisation processes. It offers mechanisms for pan-European interoperability for power network stakeholders, ensuring data and service integration, privacy compliance, and cross-stakeholder governance.

NorFlex

Å Energi, Glitre Nett, NODES



On the pathway to meet decarbonisation targets, Norway is already at 50% electrification and facing a strained grid. To reduce this strain on the grid and avoid deploying more costly infrastructure, the NorFlex marketplace was created to trade flexibility assets. This marketplace pays households and businesses to reduce consumption during peak demand times and sell surplus electricity back onto the grid.

About the Practice

To respond to grid congestion and allow independent aggregators into the electricity market, the EU has taken steps to allow electricity system operators to produce and deploy flexibility. Moreover, Norwegian DSO Glitre Nett expects a necessary increase of 5x peak capacity due to massive electrification and new connection requests. To avoid resource-intensive grid infrastructure projects, the NorFlex practice was selected to solve these challenges. The goal of NorFlex is to demonstrate how flexibility can be used by the DSO to increase efficiency of gird operations and grid connection capacity, while postponing costly grid investments. The NorFlex marketplace enables short- and long-term trading within "grid nodes" or zones where the DSO can purchase flexibility, and afterwards the flexibility can be offered to the manual Frequency Restoration Reserve (mFRR) service for the TSO under special rules. Meeting decarbonisation targets requires further electrification, thus the need for solutions like NorFlex to reduce strain on the grid will

Highlights

- Creation of a trading platform for assets as small as 1 kWh and as high as 5.4 MWh.
- Participation of households, electric vehicles, commercial buildings, batteries, and industry in NorFlex.
- Procurement of a total of 1.394 GWh of flexibility by the DSO Glitre Nett using the NODES flexibility marketplace.
- Registration of more than 30,000 trades for providing flexibility by 8 different Flexibility Service Providers (FSPs)
- Payment of almost 1.1 million Euros for flexibility procured by grid operators in three years.

EcoWatt

RTE

The French Transmission System Operator, RTE, developed the EcoWatt system in collaboration with the French Agency for Ecological Transition, ADEME, to reduce instability in the grid. The system signals the level of tension for supply-demand balance within the power system. RTE's objective is to encourage rapid mobilisation on the most stressful days and hours, by guiding each type of consumer towards the most effective eco-actions, ensuring a secure flow of electricity.

Highlights

- Collaboration with over 430 partners, including companies, local authorities and associations that have signed the EcoWatt charter and are committed at their level to reducing their consumption.
- Downloads of the EcoWatt App amounting to over 3M on Android and iOS systems
- Information provided on the App is colour-coded, inciting different actions from users according to the system status.

About the Practice

Considering the impact of the reduced gas supply from Russia, as well as droughts in the summer of 2022, the French power system was facing possible instabilities for the winter of 2022. Since levers for action on the production side were quite weak, without acting on the consumption side, power cuts would have been possible.

RTE launched its Emergency Plan for Security of Supply in order to reinforce the actions on consumption, relying on reducing demand and implementing measures for the most critical periods for the balance of the power system. Tackling the second point, EcoWatt provides a colour signal with hourly intervals for the next three days, as well as advice on useful eco-actions for consuming less and at the right time.

EconiQ retrofill for gas-insulated lines ELK-3, 420kV

Hitachi Energy Switzerland Ltd

Hitachi's EconiQ retrofill solution replaces sulfur hexafluoride (SF6) in installed high-voltage gas-insulated lines and gas-insulted switchgear with an eco-efficient gas mixture to significantly lower the carbon footprint over the total installation life cycle. EconiQ retrofill eliminates the emissions of SF6 and the associated carbon footprint and avoids the costly decommissioning and replacement of equipment.

About the Practice

As the design life of switchgear is usually around 50 years, much of the equipment installed today which contains SF6 needs an alternative solution to avoid either the high write-off cost of early replacement, or the cost of continuing SF6 management. Replacing the gas, not the equipment, can offer a viable solution. With the EconiQ retrofill, Hitachi has developed a solution that is scalable and has an immense impact on the CO2 reduction of existing gas insulated lines. They aim to start a trend in the industry to move away from SF6 for both new equipment and existing assets. This will reduce the financial risks of the owners of gas-insulated lines and address environmental issues simultaneously.

Highlights

- SF6 is a potent greenhouse gas with a high global warming potential but is used for its strong insulating capabilities in high voltage equipment.
- Usage of eco-efficient fluoronitrile-based gas mixture to replace sulfur hexafluoride (SF6) in installed gas-insulated lines.
- Facilitates the conversion of equipment that is designed for SF6 into non-SF6 equipment.
- Allows SF6 from the installed gas-insulated lines to be reclaimed and filled into gas bottles for recycling.

Ubiquitous Energy

Ubiquitous Energy

Ubiquitous Energy (UE) produces transparent solar windows that integrate renewable energy sources into the facade of homes and buildings in a seamless and aesthetically pleasing way. Their trademark UE Power harvests energy from infrared and ultraviolet light, while visible light passes through, thus making it possible to generate electricity invisibly.

Highlights

- Achieved the first large area deployment of transparent solar windows in the world.
- Demonstrates that transparent windows can be multi-functional: produce renewable energy and show a good thermal performance at the same time.
- Represents an innovative approach to generating renewable energy that can power LED lighting.

About the Practice

In times, when it becomes harder and harder to find available space for the renewable energy infrastructure the global energy transition needs, UE's transparent solar windows represent an innovative solution: integrating the production of renewables into the windows of homes and other buildings. The transparent solar coating on the windows is made from light-absorbing dyes, sourced from non-toxic, earth-abundant materials, similar to the pigments found in fabrics and paints. This allows for the integration of power generation into windows and the surfaces of other everyday objects without compromising their aesthetic or functionality. An exterior façade of approximately 100 square feet of transparent solar windows is capable of producing more than 300Watts of power under typical sunlight exposure.

Novel busbar protection scheme for impedance-earthed distribution networks

Delft University of Technology

This practice is an example of how existing infrastructure can be used to resolve problems resulting from single-phase-fault currents. Researchers used Impedance-Earthed Distribution (IED) infrastructure, backboned by an IEC 61850 communication, to create a distributed busbar protection scheme against single-phase-to-ground faults in medium-voltage impedance earthed distribution networks. Implemented by the DSO Stedin in the Netherlands, it also includes distributed protection algorithms for fault detection and fault elimination.

About the Practice

Due to the vast number of substations at the distribution level of the electricity system and increased costs of differential busbar protection, Distribution Systems Operators (DSOs) need cost-effective protection schemes for busbar protection. By using the established IEC 61850 communication between the Impedance-Earthed Distribution and research from the University of Delft, this innovative practice can detect a single-phase-to-ground fault on the busbar system. This practice addresses this challenge and enhances communication with intelligent, high-quality protection schemes, enabling primary and backup busbar protection based on existing infrastructure and without new investments. Currently in use by the DSO Stedin in the Netherlands, this practice has now became a standard part of their protection policy and is currently being implemented in all their MV substations.

Highlights

- Use of existing equipment infrastructure to provide busbar protection against single-phase fault currents in high-impedance grounded networks.
- Distinguishes between healthy and faulty busbar sections using zero-sequence voltage detection in the IEDs in the incoming feeders.
- Development of distributed protection algorithms for fault detection and fault elimination.
- Provides a solution for a unique problem and showcases how academic research can facilitate actual protection applications for electricity systems.

Environmental Protection

GOOD PRACTICE OF THE YEAR 2023

Ecological corridor management in overhead line corridors

E.ON

E.ON already started the implementation of ecological vegetation management in their high-voltage grid corridors a few decades ago, having realised that intensive clear cutting is not the only and not always the most effective way to prevent vegetation interference with power lines. Instead, by selectively removing only fast-growing species of trees and bushes and foster slower-growing ones, they preserve valuable biotopes, promote biodiversity, reduce maintenance costs in the long run, and boost public acceptance for corridor maintenance.

Highlights

- Developed in collaboration with local authorities, NGOs, forest administrations, landowners, and universities.
- Creates more resilient, interconnected ecosystems, better able to withstand extreme weather events, thus furthering improving supply reliability.
- Established ecological corridors have seen the return of several red-listed species.
- Improved conditions regarding vegetation, ensuring the safety of power lines and gradually reducing the cost of maintaining vegetation.

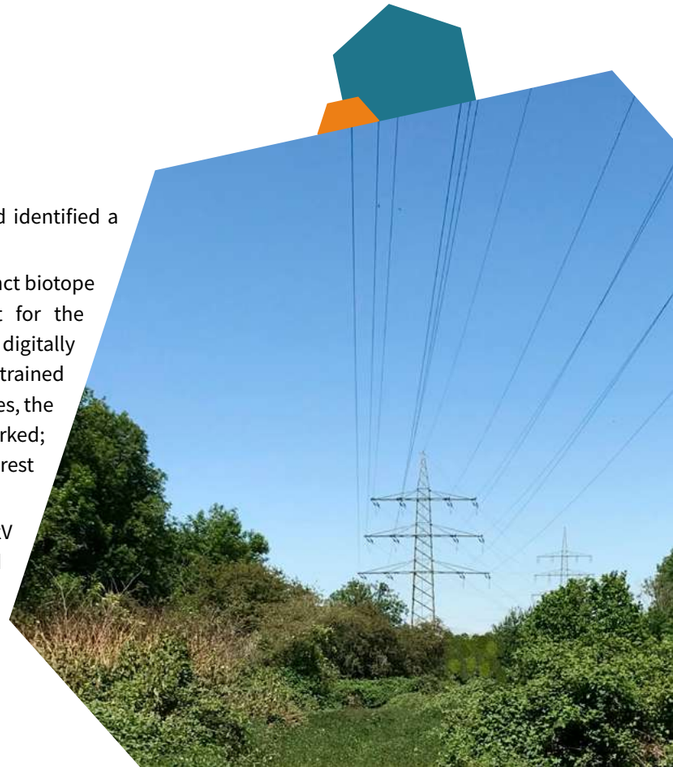
About the Practice

In the early 1990s, E.ON began collaboratively developing an alternative model to conventional vegetation management in grid corridors – 'Ecological Corridor Management' (ECM). Thirty years of ECM implementation by some subsidiaries, such as German DSO, Westnetz, have proven diverse benefits of ECM in terms of biodiversity, lower costs, and better stakeholder relationships.

The goal of ECM is to facilitate a more sensitive vegetation management – as opposed to clear-cutting - by obtaining a heterogeneous stock of slow-growing plants, which in the end (after approx. 5-7 years, depending on the location and the prevailing vegetation) can be extensively and cost-effectively maintained. Slowly but surely, a corresponding "Pro-ECM" mindset grew among those responsible at the DSO and among the service providers (e.g. forestry companies). The newly developed maintenance concept was very helpful in this regard, as it described the required measures in greater detail and identified a desired development goal.

The ECM approach at E.ON requires a mapping of each distinct biotope and a locally adapted vegetation maintenance concept for the identified biotope. These maintenance plans are created digitally based on maps, technical line data, and geographic data by trained biologists. The different types of flora and, in exceptional cases, the fauna in the corridors are recorded; protected areas are marked; and overall results shared with the nature conservation/forest authorities, some large property owners, and NGOs.

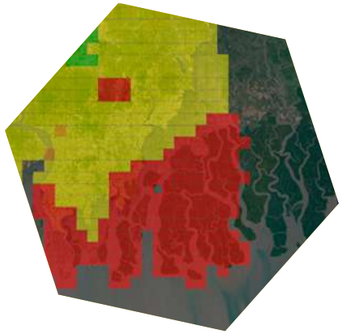
E.ON is now rolling-out ECM for their entire European 110 kV high-voltage grid, across 13,000 km of varied geographies and vegetation types. E.ON also promotes ECM internationally, including through brochure and external events.



AVISTEP – the Avian Sensitivity Tool for Energy Planning

BirdLife International

AVISTEP: the Avian Sensitivity Tool for Energy Planning offers a robust and accessible platform to assess avian sensitivity in siting decisions of overhead powerlines, on- and offshore wind and solar-PV. Launched in 2022 for India, Nepal, Thailand, and Vietnam, it is expected to expand and can become the preeminent global planning tool providing information on bird and biodiversity sensitivity to inform the responsible expansion of renewable energy.



Highlights

- Intuitive use requires no technical knowledge of spatial analysis, with a simple and instinctive interface and access to BirdLife's online Data Zone.
- Expansion ongoing with an emphasis on Asia, Australasia, Africa, and Latin America.
- Collaborative development with input of numerous global experts and data providers.
- Constantly updated methodology to ensure relevance to the specific environmental conditions of each new project country and to reflect improving datasets.

About the Practice

BirdLife International recognises that the most effective way to ensure that energy infrastructure does not adversely impact biodiversity is to site it away from sensitive species and habitats. Thus, AVISTEP was created to facilitate and mainstream the usage of complex species-sensitivity analysis within siting decisions within one open-source interface. The tool integrates a huge underlying dataset regarding species present, sensitivity values, conservation sites & habitat matrix analysis into 5km x 5km heat map cells. These pioneering techniques are highly replicable in other regions and for other uses, e.g., cumulative impact calculation and micro-siting. BirdLife's intention is to rapidly expand AVISTEP globally, with an emphasis on countries with fast emerging renewable energy sectors, high risk biodiversity and low existing regulation.

ALEGrO Soil Monitoring Approach

Amprion

Extra-high voltage (EHV) underground cables are an inherent part of the German energy transition. Still, they are controversial among the public, affected farmers, and organizations due to thermal losses and potential effects on surrounding soils and crop yield. This practice uses the 320 kV-DC-Transmission line "ALEGrO" to measure and evaluate the consequence of the EHV underground cable operation to surrounding soils for the first time under real conditions.

About the Practice

ALEGrO is an approximately 90 km long 320 kV direct current underground transmission line (UTL) from Oberzier, Germany to Lixhe, Belgium. During operation, UTL's emit thermal energy into soil in relation to electric voltage of the cables and other factors. Soil thermal energy modifies several soil processes directly and indirectly, thus artificial soil warming is a highly significant environmental impact factor. At four different study sites near Aachen, Germany, soil perpendicular to the cable line was monitored. In addition to the continuous monitoring of soil temperature and soil moisture dynamics, at each season of the year soil samples are taken from each soil depth, both within the UTL cable lines and the control sites, to analyse soil microbial properties and metabolic processes, thus soil functioning.

Highlights

- Combines a sensor network with an extensive site characterisation and attendant biological field and laboratory surveys concerning earthworm abundance and enzyme activity.
- Combination of weather data with the sensor network enable an innovative description of the site-specific mass and energy balance considering operating EHV underground cables.
- Initial findings that there are no significant impacts on the thermal and energy budget of soils and the microbial activity as well as the carbon cycle in the main root zone.

Decision Support System to increase resiliency to wildfires

REN

This practice is composed of a network of multi-sensorial monitoring systems for the automatic detection of wildfires and a Decision Support System (DSS), which simulates fire spread and alerts where and when it will impact the electric or gas infrastructures. The developed monitoring systems report meteorological data and the detection of wildfires through multi-spectral cameras installed on the top of the electric pylons.

Highlights

- Anticipates where and when a wildfire will impact the electric or gas infrastructures, using the developed DSS, which increases the efficiency in dispatch and operational rooms.
- Covers an average area of 110 km2 for each individual monitoring system, limited by topographic conditions.
- Allows real time tracking of the fire through a PTZ camera.
- Applicable worldwide if meteorological data, fuel and topography maps, and an input of ignitions are available.
- Currently there are eight monitoring systems installed, with a predicted scale-up of over 80 by the end of 2025.

About the Practice

The Portuguese TSO, REN, manages over 10,000 km of linear infrastructure – electricity transmission lines and gas pipelines - 66% of which is in forest areas and exposed to the risk of wildfires, with over 5000 fires being detected near REN's infrastructure every year. To address this concern, within the scope of the rePLANT Agenda, REN developed a pilot project with ADAI from University of Coimbra and Whereness. For the early detection of wildfires an integrated monitoring system was developed with Bee2Fire.

The developed DSS is based on a fire spread algorithm of the IMFire system, developed by ADAI. When a fire is detected, a fire spread simulation is done and the predicted fire perimeter is intersected with the infrastructures. This allows personnel in operation control rooms to know where and when it will impact the infrastructure.

Nature-Positive cable protection to restore marine biodiversity

Redeia

Red Eléctrica, the Spanish Transmission System Operator, used innovative technology to design a submarine cable protection system that allowed the restoration of a natural reef habitat between the islands of Fuerteventura and Lanzarote. The concrete blocks used to protect the subsea cable along a rock trench section were designed by incorporating ECOncrete's bio-enhancing concrete technology.

About the Practice

With this practice, Red Eléctrica introduces a new and innovative nature-positive cable protection system which facilitates renewable integration by enabling needed offshore infrastructure to become nature-positive. Traditional cable protection measures have a significant impact and do not encourage marine life to recolonise the structures. Ten months after installing ECOncrete's bio-enhancing concrete blocks, many species cover them, allowing the structures to blend back into the natural reef habitat and draw fish and crustaceans to the area. Environmental monitoring every six months will allow the Red Eléctrica to analyse how the concrete blocks mimic the local marine environment and plans to further study and improve the practice and apply it to other contexts are already planned.

Highlights

- Design of a nature-positive cable protection solution with ECOncrete's innovative technology, which provides a nature-friendly alternative over traditional solutions.
- Blueprint for the construction of nature-positive cable protection, bridging sustainability and grid development by providing biodiversity recovery opportunities while meeting engineering requirements.
- Reduction of potential impacts from electricity infrastructure on local marine ecosystems while showcasing possibilities to recover nature reef habitats.

Submit your practice

The 'RGI Grid Awards' are an annual accolade granted by RGI, based on the expertise of our jury. We strongly encourage grid operators, project developers, NGOs, and public authorities involved in grid projects, both European and non-European, to submit their entries and highlight their most original and successful practices.

Group photo of the 2022 winners of the RGI Grid Awards, taken at the award ceremony during the PCI Energy Days in Brussels, Belgium.

The purpose of this award is to recognise, promote, and commemorate practices that display extraordinary dedication and ingenuity. The jury thoroughly evaluates several factors, such as innovation, impact and outcomes, scope and transferability, and collaborative approaches, to determine the three winning practices.

The RGI Grid Awards honour remarkable practices in grid development across three categories: Technological Innovation & System Integration, Communication & Engagement, and Environmental Protection.

Learn more about the Awards and submission process at https://bit.ly/RGIGridAwards.

Renewables Grid Initiative

The Renewables Grid Initiative (RGI) is a unique collaboration of civil society organisations and Transmission System Operators from across Europe engaging in an 'energy transition ecosystem-of-actors'. We promote fair, transparent, sustainable grid development to enable the growth of renewables to achieve full decarbonisation in line with the Paris Agreement within three dimensions: Energy & Nature, Grids & Energy Systems, and Energy & Society.

Learn more about RGI and how you can get involved at https://linktr.ee/renewablesgrid.

Imprint

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