



## **Foreword**

The last five years have brought a multitude of challenges for the EU. The COVID pandemic took a heavy toll on our people and economy, Russia's war against Ukraine and its weaponisation of energy have threatened our energy security and driven up energy prices. But with strong solidarity between countries, with cooperation, determination and innovation, the EU never strayed from its path towards a sustainable, secure and affordable energy system.

In 2019, the European Green Deal set a clear plan on how the clean energy transition could serve as a growth strategy for the EU with the energy sector as a crucial contributor to sustainable, fair and inclusive recovery. Since then, we have progressed significantly in fostering the clean energy transition with the adoption of key legislation within the Fit for 55 package and reaching important milestones in achieving the REPowerEU objectives.

Future proofing the European energy network and allowing the benefits of the green transition to reach every single household is a cornerstone of our energy policies. With the updated Trans-European Networks for Energy (TEN-E) framework that goes hand in hand with the Connecting Europe Facility (CEF), the EU has been securing efficient grid infrastructure expansion based on regional cooperation already for more than 10 years. Since its launch in January 2014, CEF has significantly contributed to ending the energy isolation of EU countries and regions with overall investment of EUR 6.9 billion in more than 184 actions.

The EU Action Plan for Grids, adopted in 2023, is one of the key actions to further boost our infrastructure development. Grids are the backbone of the EU's internal market and a key element in bringing the dependency on Russian fossil fuels to an end. Together, we need to keep the momentum high - expanding, digitalising and ensuring better use of electricity transmission and distribution grids, including cross-border interconnections, and simplifying access to finance.

Initiatives like the Good Practice of the Year award by the Renewables Grid Initiative bring energy projects closer to consumers. By showcasing technological innovation, engaging with communities and putting environmental protection as a priority, we can enhance public acceptance and bring the benefits of renewable energy integration to the citizens.

It is my pleasure to congratulate the winners of this year's edition of the Good Practice of the Year award and thank all the project promoters for their inspiring work that sets an example on how to build a stronger, more secure and more interconnected Europe.

**Kadri Simson EU Commissioner for Energy** 

## Introduction

2024 marks the eleventh year of the RGI Grid Awards. This year, the Renewables Grid Initiative (RGI) is honoured to feature nearly twenty innovative practices that seek to improve the technical, environmental, and social aspects of electricity grid deployment and renewables integration.

With trends toward including environmental protection and nature restoration in infrastructure management and design; novel digital tools harnessing virtual reality and data collection technologies; and large-scale cross-sector collaborations, the RGI Grid Awards continue to serve as the gold standard in our common mission to deliver a renewables-based energy system that improves lives and enhances biodiversity.

The jury has selected four winners of this year's Good Practice of the Year award: three for each award category -communication and engagement, environmental protection, technological innovation and system integrationand one outstanding practice that cuts across two categories evenly. The winners were announced during the RGI Grid Awards ceremony in November 2024.



## **Moonshot** ECHT regie in transitie

The Dutch energy consultancy ECHT regie in transitie is awarded for their work in achieving a circular wind energy sector through collaboration across policy, academia, and industry stakeholders. Find out more on page 10.



### First Grid-Forming 300 MVAr STATCOM **Amprion**

German tranmission system operator Amprion is awarded for their work in ensuring grid stability with innovative grid-forming technology, enabling reliable voltage control under low short-circuit power conditions. Find out more on page 22.



## Nature Inclusive Design for an Energy Island Elia Transmission Belgium

Belgian transmission system operator Elia is awarded for their work in adopting a natureinclusive design approach for the Princess Elisabeth Island; the energy island's design will encourage marine life to flourish around it. Find out more on page 28.



## openmod Open Energy Modelling Initiative

This grassroots initiaitve of energy modellers is awarded for their work accelerating decarbonisation efforts through open-source energy system modelling and transparent public policy analysis. Find out more on page 18.

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, Forvis Mazars, who accompanied the evaluation process for the eleventh year in a row. Lastly, we would like to thank the European Commission for hosting the RGI Grid Awards ceremony at the 5th PCI Energy Days in Brussels.





## **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.

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.

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



Group photo of the 2023 winners of the RGI Grid Awards, taken at the award ceremony during the 4th PCI Energy Days in Brussels, Belgium.

## **Independent Jury of Experts**

Our distinguished jury of experts selects one submission per category as the Good Practice of the Year. While the idea and the evaluation criteria were developed by the RGI Secretariat, the evaluation itself solely lies in the hands of this independent jury of experts.



Gregg D. Ander

Managing Director - Gregg D. Ander, LLC | Senior Fellow - Navigant Consulting

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 in San Francisco and had a 30-year career at Southern California Edison.



Senior Programme Coordinator, Climate Change & Energy Transition - IUCN

Rachel promotes measures to safeguard biodiversity, ecosystem services, naturalresource 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 - DG Energy

Joachim has served in his current position since 2019. Previously, he held posts in the Cabinets of EU Energy Commissioners Guenther Oettinger and Miguel Arias Cañete, as well as in the units dealing with Renewable Energy and Energy Taxation (DG TAXUD).



Integrated Researcher - University Institute of Lisbon (ISCTE)

Susana examines responses to and engagement with renewable energy generation and associated infrastructures, and, she aims to better understand energy transitions as socio-technical processes.



### **Humberto Delgado Rosa**

Director for Natural Capital - DG Environment, European Commission

Humbertro is experienced in European and international environmental policy, particularly in biodiversity and climate change issues. Before his current position, he was the for Mainstreaming Adaptation and Low Carbon Technology in DG Climate Action





Marie Donnelly

Chairperson - Climate Change Advisory Council Ireland

Marie chairs the independent advisory body tasked with assessing and advising on how Ireland is making the transition to a low carbon, climate resilient and environmentally sustainable economy by 2050. Previously, she served in the European Commission for thirty years.



Professor - European University Institute (EUI)

Jean-Michel holds the Lovola de Palacio Chair in European Energy Policy & Regulation at EUI, and is the vice-president of the International Association for Energy Economics. Additionally, he is an associate researcher at the University of Cambridge and MIT





Michael Hogan

Senior Advisor - Regulatory Assistance Priect (RAP)

Micheal works on electricity decarbonisation policy, particularly in 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.



(Ret.) Director for Western Transmission - Natural Resources Defense Council (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 of the Center for Energy Efficiency and Renewable Technology (CEERT).



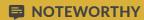




## Moonshot

### **ECHT** regie in transitie

Achieving a circular wind energy sector through collaboration across policy, academia, and industry stakeholders.



Integrated circularity into Dutch offshore wind farm tenders, impacting 4 GW worth of offshore wind capacity starting in 2023.

The Moonshot practice is an ambitious, collaborative initiative designed to drive the wind energy sector towards circularity. In response to the growing demand for sustainability, the practice was developed in the Dutch wind sector to bring together a wide range of stakeholders from policy, academia, and industry. Its primary goal is to tackle the complex challenge of improving the circularity of wind energy by fostering open dialogue, rapid knowledge sharing, and the co-creation of actionable solutions.

At the heart of the Moonshot practice are three key hubs: (1) the Knowledge Hub, which identifies knowledge gaps and supports research; (2) the Policy Hub, which recognises the need for regulatory change and crafts policy recommendations; and (3) the Industry Hub, which focuses on practical industry demonstrations and priorities. This structure ensures that each solution is both holistic and practical, considering the perspectives and needs of all key stakeholders.

One of the standout achievements of the practice was the inclusion of circularity criteria in the Dutch offshore wind farm tender processes, a first for the sector. The introduction of a Material Passport has become a critical requirement, adding transparency to the supply chain and ensuring that environmental impacts are clearly tracked. This move is expected to have long-term positive effects on the industry, promoting circular business models and sustainable project development.





Another major outcome of the Moonshot practice was the creation of the DecomCockpit consortium, a collaborative effort that focuses on the circular decommissioning of wind farms. This consortium is working on extending the lifespan of wind farm components and ensuring their sustainable recycling and reuse.

The inclusive nature of the practice is one of its key strengths. It engaged over 300 stakeholders, including policy makers, industry leaders, and academic experts, to collectively address the

challenges of sustainability. This inclusive, open approach fosters fast learning, accelerates decision-making, and ensures high levels of stakeholder buy-in.

The scalability of the Moonshot practice is another significant factor. While it has been highly effective in the Dutch wind sector, the model is designed to be adaptable to other industries and regions that face complex, multi-stakeholder, sustainability challenges. Its success lies in its ability to unite diverse stakeholders in pursuit of long-lasting, impactful change.





## **3D Line Planning Visualisation**

### **TenneT**

Enabling transparent stakeholder engagement through 3D visualisation, ensuring comprehensive understanding and better planning outcomes.

### **NOTEWORTHY**

The app can be used with a 3D headset at events for an immersive experience or accessed online from home for personal exploration. The Fulda-Main-Leitung project's <u>3D mapping application</u> was developed to facilitate transparent infrastructure planning by visualising power line routes and their impact on the environment and communities. The application offers an intuitive platform for all stakeholders, from property owners to environmental agencies, ensuring they have a clear understanding of the project's implications.

The project's primary goal is to minimise negative impacts on people, nature, and the environment by integrating local knowledge and environmental considerations from the outset. The tool combines

geographical, environmental, and infrastructure data, allowing planners to explore multiple scenarios and their effects on the landscape.

The application's user-friendly interface supports georeferenced notetaking, enabling stakeholders to provide direct input, which planners can review and incorporate. This interactive feedback mechanism has already improved public understanding and acceptance.

The 3D tool can be accessed with a VR headset at public events, providing an immersive experience, or viewed online for detailed exploration. Its scalability and adaptability make it a valuable resource for future infrastructure projects, enhancing transparency and supporting informed decision-making.







## **Grupo Motor**

### Red Eléctrica - Redeia

Collaborative networks empowering Spain's energy transition through local partnerships.

Grupo Motor for Territorial Development of the Energy Transition was created in 2022 to accelerate Spain's energy and ecological transition. Supported by Red Eléctrica, a subsidiary of Redeia, the group unites 47 organisations, including local action groups (LAGs), businesses, cooperatives, and educational institutions, aiming to promote renewable energy, energy efficiency, and local self-consumption. The initiative plays a crucial role in helping Spain meet its 2030 targets set out in the Integrated National Energy and Climate Plan (NECP), the Paris Agreement, and the European Green Deal.



Leverages a model based on social innovation, creating energy communities and combating energy poverty through local partnerships.

The group focuses on fostering social innovation, empowering communities by establishing energy communities, launching community transformation offices, and developing cooperative projects to promote decarbonisation. Their efforts have mobilised €11.25 million, with €4.5 million already allocated towards developing regional strategies for energy transition, including 12 community-led strategies.



This collaborative network has engaged over 500 municipalities, involving 2,500 participants and 300 entities, through participatory processes and strategic collaboration. The group has also developed Guidelines for Regional Energy Transition Strategies, which help identify, design, and finance new energy projects.

The initiative is designed to be scalable and replicable, providing a model that can be transferred across Spain and the European Union. By focusing on social innovation, it helps fight energy poverty while contributing to the global decarbonisation agenda and fostering sustainable energy practices for the long term.



## **Community Forum**

### **EirGrid**

Empowering communities through collaborative decision-making and shared benefits for sustainable energy infrastructure development.

### **NOTEWORTHY**

The Forums play a key role in developing Community Benefit Schemes, directly involving communities in deciding how funds are allocated.

The <u>EirGrid Community Forums</u> were established to enhance community engagement and social acceptance of grid infrastructure projects. Launched as part of EirGrid's Public Engagement Strategy, the Forums provide a platform for early and consistent dialogue between EirGrid and local communities, promoting transparency and building trust. Each Forum is democratically elected, independently facilitated, and geographically representative, ensuring balanced and diverse perspectives are included from the earliest stages of project development.

The Forums meet quarterly and are involved in multiple phases of project delivery. From the initial consultation, where project scope and routes are discussed, to post-consent stages, the Forums provide critical local insights and guide the development of the Community Benefit Schemes. This collaborative approach ensures the schemes are tailored to the unique needs and priorities of each region. Through these Forums, EirGrid has achieved increased social acceptance and reduced opposition to grid projects.

A notable feature of the Forums is the role of independent facilitators, who maintain neutrality, foster balanced discussions, and create a safe space for members to express their views openly. EirGrid's decision to hold meetings without their representatives further strengthens this environment of trust and transparency. By centring community voices in decision-making and promoting shared ownership of infrastructure development, the EirGrid Community Forums demonstrate a

scalable, transferable model of public engagement.





## **EmPOWER Your Environment**

### Polskie Sieci Elektroenergetyczne



Fostering sustainable growth and empowering communities around energy infrastructure projects through grants for local development.

Launched in 2019, this <u>initiative supports local communities</u> in areas impacted by transmission projects. It provides funding through a structured grant programme that promotes sustainable development, social engagement, and environmental stewardship. By enabling local authorities, NGOs, and community groups to implement projects addressing their unique needs, PSE's initiative has become a model for social dialogue and cooperation.



Improved application and reporting system, with support tools like webinars and instructional guides for applicants.

The programme's key objectives include enhancing community infrastructure, supporting environmental initiatives, and increasing

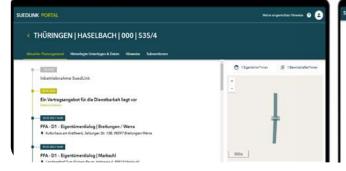
acceptance of transmission infrastructure through transparent communication. To date, over 1,050 projects have been implemented, including renewable energy installations, educational upgrades, and facilities for socially excluded groups.

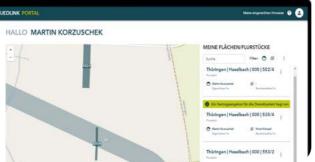
The impact of the initiative is multifaceted. Beneficiaries gain new infrastructure, upgraded educational tools, and strengthened community ties. In the environmental sphere, projects like anti-smog



murals and community fridges contribute to a healthier, more sustainable local environment. With a total budget of approximately €5 million, the initiative's reach continues to expand, ensuring lasting benefits for both PSE and the communities it serves.

Future efforts will focus on scalability and automation, with a view to maintaining strong partnerships and fostering continued positive relationships with local stakeholders. Through this initiative, PSE not only supports local development but also reinforces its role as a responsible and engaged corporate neighbour.





## **Bye-Bye Paper Floods**

### **TransnetBW**

A user-friendly, secure platform simplifying contract processing for property owners in grid expansion.

### **NOTEWORTHY**

Maximum IT security on German servers, using video identification and SMS authentication for sensitive transactions. The <u>SuedLink portal</u>, developed by TransnetBW, transforms communication between property owners and project developers involved in electricity grid expansion. Traditionally, this process was paper-heavy, slow, and resource-intensive. The portal addresses these issues by offering a fully digital, user-friendly platform for managing contracts, legal documents, and appointments.

The platform includes real-time updates, GIS integration, and tools for reporting damage, ensuring transparency and efficiency throughout the process. Property owners can schedule surveys,

coordinate consultation appointments, and manage contracts for easements or construction areas – all through a secure online system. Sensitive data is protected to the highest IT security standards, creating trust and confidence among users.

Launched in January 2023, SuedLink has already made significant strides in improving stakeholder engagement. Its scalability is one of its key strengths: while it currently serves regions like Baden-

Württemberg and Bavaria, the portal will be expanded in 2025 to handle other grid expansion projects, such as NordWestLink. With tens of thousands of potential users, the portal will streamline engagement on a much larger scale.

By digitalising traditionally slow, bureaucratic processes, the **SuedLink portal saves time**, **reduces resource consumption**, **and fosters greater acceptance of energy infrastructure projects**. This innovative tool is a milestone in the digitalisation of energy transitions, providing a blueprint for future projects across Europe.









## openmod

### **Open Energy Modelling Initiative**

Accelerating decarbonisation efforts through open-source energy system modelling and transparent public policy analysis.



The openmod community drives open-source energy modelling, empowering global south researchers to contribute meaningfully.

Public policy for energy and climate often relies on intransparent models, whereby the input data, underlying assumptions, and/or numerical processing are either opaque or legally encumbered, thus hindering and perhaps preventing transparency, reusability, and accountability in decision-making.

Growing awareness of these limitations led to the creation of the Open Energy Modelling Initiative (openmod) in Berlin in September 2014. At that time, 28 energy system modellers came together to create a manifesto advocating the open licencing of energy modelling frameworks, datasets, and research findings.

In the context of energy modelling, 'open' stands for publishing and sharing source code and data under established open-source and open data licences. These licences clearly define how the associated work can be used, modified, and redistributed by modellers to the benefit of their respective communities and beyond.

Accordingly, the openmod encourages the sharing of source code, datasets, early-stage ideas, and research outputs, aiming to improve model accuracy, reproducibility, transparency, and comprehensiveness. Additionally, it seeks to improve research efficiency through consensus standards for data semantics and metadata and creating consistent interfaces for submodels and support libraries.





The Open Energy Ontology project, for instance, provides formalised definitions for data, thereby improving information collection, sharing, collaboration, and review.

The openmod initiative has successfully fostered an international community of energy modellers, hosted 18 workshops, and created an online forum and mailing list, each with 1400 members. The openmod enables a social network that connects researchers in the global south and north, enabling a wider participation in

decarbonization efforts and catalysing useful exchanges more generally. Key achievements include influencing public agencies, like the EU Joint Research Centre, to adopt open-source frameworks.

The openmod community continues to grow, with widening geographical participation, as open energy modelling becomes increasingly mainstream for public policy support. Indeed, this entirely volunteer effort is leading the shift towards more collaborative, transparent, and repeatable energy system modelling, underpinned by important principles from open science.







## First Grid-Forming 300 MVAr STATCOM

### **Amprion**

Ensuring grid stability with innovative grid-forming technology, enabling reliable voltage control under low short-circuit power conditions.



Amprion plans to implement 5-9 additional STATCOMs with storage to meet future system demands.

The <u>STATCOM Opladen project</u> is a significant technological achievement aimed at improving grid stability in Germany's 400 kV transmission network. With the increasing reliance on renewable energy sources, the power grid faces the challenge of maintaining stability in a changing energy system with longer transmission distances and less conventional power plants. Amprion partnered with Hitachi Energy to develop a 300 MVAr STATCOM equipped with reactive power support and grid-forming (GFM) control. This technology is mainly used for voltage control and support during severe grid disturbances.

The primary goal of this project was to ensure the system's stability, even in scenarios where the grid experiences a drastic reduction in short-circuit power. Traditional grid-following systems struggle to maintain operation under such conditions, but grid-forming control ensures the STATCOM can function effectively even at low short-circuit levels.

During the development phase, various scenarios were tested, including angle and amplitude jumps in voltage and changes in grid short-circuit ratios. The grid-forming control demonstrated an inherent response to amplitude changes and provided immediate stabilisation during angular shifts. These results confirmed the system's capability to enable grid-forming control without oversizing its components.





This project, which began operation in August 2023, marks the first large-scale implementation of grid-forming converter controls in the European extra-high voltage grid. Amprion plans to enhance the technology by incorporating energy storage systems in future STATCOMs to provide inertia and further stabilise system frequency during severe disturbances.

This innovation not only addresses current grid stability challenges but also lays the groundwork for long-term, scalable solutions

essential for the evolving energy landscape. Amprion's commitment to continuous improvement will see the installation of additional units to meet the increasing demands for grid-forming capabilities.







# 'VeR' Mobile App for Grid Projects REN

Mobile application revolutionises project visualisation by integrating augmented reality (AR) to display infrastructure designs and environmental constraints.

### **■** NOTEWORTHY

Potential for broad applicability across different sectors and geographies, enhancing the scalability of the practice.

This project by REN (Rede Elétrica Nacional, S.A.) addresses the complex challenge of visualising environmental and infrastructure data during site visits for Environmental Impact Assessments (EIA). Traditionally, these evaluations rely on disparate sheets and maps, making it difficult to integrate and visualise data comprehensively. The project introduces a cutting-edge solution using augmented reality (AR) to streamline this process.

The primary goal of this project is to enhance the clarity and efficiency of site visits conducted as part of the EIA process. This is

achieved through the development of a <u>mobile application</u>, <u>called 'VeR'</u>, which utilises AR technology to present integrated visualisations of infrastructure projects and their environmental constraints. The app, compatible with both Android and iOS systems, <u>enables stakeholders to view 3D rendered objects of proposed infrastructure in real-time</u>, <u>overlaid on their actual geographic locations</u>. This innovation improves the stakeholders' understanding of the potential impacts, facilitating more informed decision-making.

The strategy involves a comprehensive back-office solution where project data and environmental information are uploaded and managed. This data is then utilised by the mobile application to provide an immersive AR experience during site visits. The project is set for completion by September 2024, with final acceptance tests and training slated for August 2024. The potential for scalability is substantial, as the technology can be adapted for various sectors and geographical regions, supporting a wide range of infrastructure assessments.









## Nature-Inclusive Design for an Energy Island

### **Elia Transmission Belgium**

Elia has adopted a nature-inclusive design approach for the Princess Elisabeth Island; the energy island's design will encourage marine life to flourish around it.

### **■ NOTEWORTHY**

World's first artificial energy island unites the construction of offshore infrastructure with measures designed to boost biodiversity.

Elia, Belgium's transmission system operator, has adopted an innovative nature-inclusive design (NID) approach for the construction of the world's first artificial energy island: the <u>Princess Elisabeth Island</u>. Located 45 km off the Belgian coast, the island will serve as a crucial link between offshore wind farms and the mainland, while also serving as a landing point for (hybrid) interconnectors with neighbouring countries. The project aims to address two of Europe's most pressing issues: the demand for renewable energy and the urgent need to protect and enhance biodiversity. Elia's approach to the construction of the Princess

Elisabeth Island has integrated biodiversity considerations into the energy hub project from the very beginning.

Elia has embedded six NID measures into the island's design: (1) ledges on storm walls, providing resting and breeding spaces for sea birds; (2) relief panels, allowing smaller marine organisms to shelter and forage for food; (3) chaotic scour protection and (4) gravel beds, creating diverse habitats for marine life; (5) large boulders around the island, attracting varied species; and (6) oyster tables, boosting oyster reef restoration.

Each of these measures was selected based on their ability to have a lasting and tangible impact on marine life in the North Sea and on their ability to interact with other measures as part of a unique ecosystem approach. Elia will continuously monitor these measures and their impact. They will fine-tune, adapt or add new





measures to the project to maximise their benefits and ensure they continue to benefit marine life.

The measures were tailored to the island's North Sea environment and were scaled up for the project (the island's foundations will stretch across 25 hectares on the seabed) as part of a co-creation approach, where Elia collaborated with over 16 partners, including universities, NGOs and marine conservation organisations. Elia's project is a leading example of how large-scale energy infrastructure

that will contribute to meeting Europe's climate goals can integrate nature at its core.

The projects demonstrates that offshore electricity infrastructure can and should be developed with environmental stewardship in mind. Centring collaboration and nature, it will serve as an example for future on- and offshore infrastructure projects. The island has been designed to last for many years and we look forward to seeing how the project will simultaneously support renewable energy goals and the enhancement of local ecosystems.







## **Resilient Ecosystems on Energy Island**

### **Ocean Ecostructures**

Plan to transform the foundations of Princess Elisabeth Island into a thriving artificial reef, enhance marine biodiversity, and offset environmental impacts.

### **NOTEWORTHY**

Based on results of previously installed units, the Life Boosting Units can boost biodiversity by up to 500%.

Marine biodiversity is declining at an alarming rate while new and existing users of the sea are aiming to become more sustainable and offset their impacts on ecosystems. Ocean Ecostructures is addressing these challenges with their unique Life Boosting Units (LBUs), which replicate natural reefs and enable ecosystem development around offshore infrastructure. The Princess Elisabeth Island project, the world's first artificial energy island, plans to install 450 LBUs by 2026 and support the formation of a thriving marine ecosystem around the island. The number of LBUs could grow to 2.000 in a second phase.

The goal is to contribute to offsetting the environmental impact caused by the island's construction while enhancing biodiversity. The practice replicates natural reefs by combining three key elements: a microfauna attraction system, a natural calcium carbonate substrate to encourage reef growth, and a multilayer design providing shelter for marine species. To measure impacts, a robust monitoring system utilising underwater drones and sensors is offered to track key environmental parameters such as biomass production, CO2 sequestration, and species diversity. All data is processed and reported via a cross-platform service, providing stakeholders with transparent insights.

Future scalability is a core feature, as LBUs can be adapted to a diverse range of marine infrastructure, including ports, offshore wind farms, and cabling. Ocean Ecostructures is aiming to redefine offshore infrastructure development by turning formerly grey, concrete spaces into thriving and resilient ecosystems.







## **Ermelo Orange Grid Orchards**

### **REN**

Protecting cultural heritage and promoting biodiversity through the preservation and expansion of the unique Ermelo orange trees.

Since 2010, REN has been implementing a Right-of-Way (ROW) reconversion programme to transform transmission corridors from fast growing and invasive species into sustainable and productive agricultural or forest spaces of slow growing species compatible with the grid. The initiative has the objectives of reducing management costs, promoting ecosystem services, improving infrastructure protection, and fostering positive community relationships.



Increased the overall population of Ermelo orange trees from 500 to over 1,800, contributing to the preservation of a unique local variety.

With the objective of further improving this strategy, REN collaborated with local communities to preserve the historically

significant Ermelo orange trees, a unique variety dating back to the 13th century, currently with a very limited producing population of around 500 trees. In recent years, there has been a sharp decline in Ermelo orange production due to population aging and depopulation, as well as the lack of a modernisation strategy that takes into account the traditional practices.



The project culminated in a launch event in May 2024, where the last trees were symbolically planted by local schoolchildren, demonstrating a shared commitment to preserving the region's natural and cultural heritage. This use of transmission corridors not only protects a local variety of oranges but also serves as a platform for economic development. The initiative aligns with REN's sustainability strategy, transforming the impact of powerlines into a community-centric opportunity that fosters long-term environmental stewardship.





### **TenneT**

In one of the first examples of emission-free drilling worldwide, hydrogen-powered drilling was used in a grid enforcement project in the Netherlands.

### **■** NOTEWORTHY

Benefits include the prevention of harmful emissions, including nitrogen and carbon dioxide, and minimisation of disturbances.

Innovations for emissionless heavy construction equipment are needed by the whole construction sector, including electricity grid operators. In addition, nitrogen emissions from regular drilling equipment can prevent high-voltage cable installation and enhancement in areas near Natura 2000 sites. TenneT has addressed these two issues by successfully testing a new method for hydrogenpowered drilling for a high-voltage cable next to a nitrogen sensitive nature area. This was the first time a drilling operation for a highvoltage cable was performed using hydrogen and is therefore an important step in the process towards zero emission construction works.

Over the 10 days of drilling activities, TenneT used hydrogen originating from an electrolyzer that is powered by wind and solar energy. The trucks involved in the project were also powered by 'HVO100.' an almost entirely CO2-free fuel. With this method, the only nitrogen emissions that remain are those from the trucks that transport the hydrogen to the construction site.

This method prevented harmful emissions, including nitrogen and carbon dioxide, and minimised disturbances (noise and smell) for people who work on or live near the construction site compared to the traditional method with a diesel generator. In total, 27750 kg of carbon dioxide emissions and 125kg of nitrogen emissions were saved. Though further innovation is needed and it is not applicable in all situations, the hydrogen drilling pilot can be easily scaled up and provided valuable learnings for the whole construction sector.







# **Prioritising Biodiversity in Vegetation Management**





RTE, French electricity transmission system operator, has undertaken a significant reform of its vegetation management contracts to align with its commitment to biodiversity preservation. This strategic shift aims to stop all mechanical clearing activities, such as flail mowing, during the crucial nesting season (16 March to 15 August) by 2029. The revised methodology divides annual work into three phases, including a constrained phase during the nesting period. The goal is to limit mechanical interventions in sensitive zones, thereby contributing to the conservation of local ecosystems.



95% of suppliers consulted supported RTE's approach, and 74% proposed additional measures to further reduce environmental impacts.

Key innovations include the introduction of a 'fair' remuneration mechanism to mitigate the financial impact on suppliers due to reduced activities in the spring season. This system adjusts compensation based on the extent of disruption, ensuring that very small enterprises (VSEs) and small-to-medium enterprises (SMEs) remain financially viable. To support these changes, RTE has engaged its supplier panel through a collaborative consultation process, resulting in 95% of suppliers endorsing the new approach. The majority have also committed to implementing additional environmentally friendly measures, such as adopting electric equipment and biodegradable lubricants.



With an annual budget of €40-50 million and over 100 qualified suppliers, RTE's comprehensive contract overhaul represents a landmark in balancing operational efficiency with ecological responsibility. This practice, though challenging, sets a precedent for sustainable land management in utility operations and is a replicable model for other regions and industries.

32 | RGI Grid Awards Good Practice of the Year 2024 | 33



## **LIFE Safe Grid for Burgas**

### Elektrorazpredelenie Yug

Ensuring bird safety and reducing power outages through innovative power line modifications around the Burgas lakes.

### **NOTEWORTHY**

The project contributes to reducing 15,000-150,000 bird deaths annually and prevents power outages, benefiting local communities and wildlife.

The 'LIFE Safe Grid for Burgas' project, funded by the European Union's LIFE programme, is committed to protecting threatened bird species in Bulgaria's Burgas Lakes region. This area, part of the Natura 2000 network and located along the Via Pontica flyway, is one of Europe's most significant migratory routes, providing critical breeding, wintering, and stopover sites for over 330 bird species, including globally endangered species such as the Dalmatian Pelican and the Red-breasted Goose. The project aims to prevent unnatural bird mortality caused by electrocution and collisions with overhead power lines.

The project employs a range of strategies to mitigate these risks. Specially designed 'firefly' bird diverters are installed along high-risk power lines, increasing visibility and reducing collisions. In addition, more than 2,000 hazardous pylons are being retrofitted with insulating caps to prevent birds from contacting live conductors, which is the primary cause of electrocutions. In areas with the highest risk, overhead power lines are being replaced with underground cables, effectively eliminating collision and electrocution risks.

By using innovative techniques, such as drones to install diverters in inaccessible areas, the project reduces its environmental impact and sets new standards for conservation practices. This initiative not only safeguards bird populations but also enhances the reliability of electricity supply for local communities, reducing outages caused by bird interactions with power lines and decreasing maintenance costs.





## **Using Drones for Bird Protection**

### **TenneT**

Achieving effective bird protection with innovative drone technology: an environmentally friendly and cost-effective solution.



The high-voltage grid poses significant risks to birds, with an estimated 800,000 to 1 million birds becoming casualties annually in the Netherlands. To address this, TenneT piloted a project using drones to install Firefly wire markers on a 150 kV high-voltage line between Dodewaard and Ede. Traditionally, wire markers are installed using helicopters or cranes and climbers, which is both costly and environmentally disruptive.



Drone installation of wire markers reduced emissions and noise, with less disturbance to the surrounding area compared to helicopters.

This pilot, conducted in partnership with Qirion and Slovak drone company FiiHaa, marked the first time drones have been used for this purpose in the Netherlands. The drones installed a new type of wire marker, known as the Firefly, over a two-kilometre stretch of the route near Wageningen.

This new method is not only environmentally friendly but also significantly reduces costs and disturbance to the area. Applying wire markers using helicopters is estimated to be 20 times more expensive, while also generating emissions and noise pollution. In comparison, drone application

requires no heavy machinery on land, making it particularly suited for challenging terrains, such as rivers and wetlands.



The pilot project has shown promising results, with only one bird casualty recorded since the installation of the markers. If the positive trend continues, TenneT plans to implement this method in other high-risk areas. This approach offers a scalable and transferable solution for bird protection across different regions, combining the use of existing technologies with an innovative application method.

**34** | RGI Grid Awards Good Practice of the Year 2024 | **35** 



## e-faunalert Mobile App

### **IUCN**

The e-faunalert mobile application helps identify and mitigate dangers posed by power lines, reducing electrocution and collision incidents globally.



Allows experts and nonexperts to easily collect, upload, and download data on power lines and wildlife mortality.

Power lines are vital to infrastructure and energy development but pose a significant threat to wildlife, especially birds, through electrocution and collision. The e-faunalert mobile application was developed to address this challenge. It provides a user-friendly platform for data collection on power line characteristics and wildlife mortality, enabling users worldwide to contribute to mapping highrisk areas.



collection from more than 10 countries, recording over 2000 data points. Users can register fatalities and technical characteristics of power lines, upload photos, and share findings through a centralised web platform. This capability helps experts, NGOs, and governments collaborate on wildlife protection measures and promotes a shared understanding of the risks posed by power lines.

The app supports offline data entry for remote areas and enables users to create working groups,

enhancing collaboration and data sharing. An interactive map-viewer on the e-faunalert website provides a clear overview of recorded data, allowing users to visualise and download data for analysis. This feature supports the identification of dangerous hotspots and informs decisions on mitigating impacts through design improvements and other interventions. With ongoing improvements and collaborations with stakeholders, e-faunalert can become an important tool for ensuring safer coexistence between power lines and wildlife globally.





## **Bird Protection System**

### **Bioseco**

Advanced Bird Protection System reducing avian collisions at wind farms using Al-driven detection and deterrent technology.

The Bioseco Bird Protection System (BPS) was developed to address the issue of bird collisions with wind turbine blades, which poses a serious risk to avian populations near wind farms. BPS combines stereovision, Al algorithms, and a cascade response system to identify birds and prevent collisions. The system can classify birds by size, filter out false positives, and even stop the turbine if necessary, ensuring a balance between energy production and environmental protection.



#### **■** NOTEWORTHY

Bird Protection System achieves over 90% detection accuracy for large birds within a 400-metre range.



Each wind turbine is equipped with 6-8 independent BPS modules,

covering 360° of the monitored area. These modules include high-resolution cameras and optional strobe or audio deterrents, which are activated based on the bird's proximity and flight trajectory. The BPS offers three versions—Standard, Premium, and Long Range—each varying in detection range and false positive rate, tailored to meet specific site requirements.



A notable feature of the BPS is its ability to reduce the need for extended turbine shutdowns, which in turns lowers operational costs, minimises wear and tear of materials and avoids preventable losses in overall energy generation. Independent evaluations have shown high detection efficiency with low localisation error rates. The system's scalability and long-term design allow it to operate for the entire lifespan of a wind farm, typically 20 years. This makes BPS a sustainable and costeffective solution, promoting harmonious coexistence between wind farms and avian life.

Good Practice of the Year 2024 | 37 **36** | RGI Grid Awards

# **Imprint**

2024 RGI Grid Awards: Good Practice of the Year © Renewables Grid Initiative, 2024

Renewables Grid Initiative. e.V. Manfred-von-Richthofen Strasse 4 12101 Berlin, Germany CEO: Antonella Battaglini Jurisdiction: AG Charlottenburg / VR 32907 B

Team Lead, Stephanie Bätjer, Director - Communication Project Lead, Mara Zainea, Manager - Communication Design, Eston McKeague, Manager - Communication

Contact: communication@renewables-grid.eu All practice photos owned by organisations named on practice pages.



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor CINEA can be held responsible for them.





Printed on recycled paper from the Berlin-Brandenburg region.

