R&D NESTER

24 NL dez 2022

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EDITORIAL

Dear Reader,

Two topics are continuing to have increased attention in the context of the Energy Transition: Hydrogen and Energy Communities.

Both bring indeed a reinforcement on the degrees of flexibility that an energy system can enjoy. The first one via the so called multi-sector energy system approach, through which excess or lack of energy in energy carrier context (e.g., electricity, gas, heating & cooling, hydrogen) can be shifted to and from another. The second one via the flexibility that aggregation of consumption and generation at a more capillary level of the network (residential consumer, industries, commercial buildings) and demand side management can provide to the energy system and to its operation.

These are the subjects of several of the communications that we bring to you with this edition below.

Additionally, this edition also features information on the following:

- how to manage grid assets in a more efficient manner using Dynamic Line Rating; indeed, this is becoming an increasingly topic of attention, as the construction of transmission lines continues to be difficult in a context where more grid is needed to support the ambition of electrification of the energy system and integration of renewable energy sources; this is being addressed in project OptiGrid ("Methodology for Analysis of Dynamic Line Capacity and Optimized Management of Electric Grids"), a national project in Portugal;
- how to ensure that the grid operation is stable against the increased variability of generation as more renewable energy sources are integrated in the energy system leading to a possible increase in frequency oscillations; this is being addressed in project FLEXITRANSTORE, an H2020 project;
- how to ensure that resources (being it consumption or generation) on the distribution side and on the transmission side of the electrical system, which in Europe are mostly managed by different entities, are efficiently coordinated for and adequate and secure operation of the system; this is being addressed in projects OneNET and OSMOSE, two H2020 projects;
- how to handle the massive integration of off-shore wind energy and what is the the impact that these possible new sources of power could have in existing power system at country level; this is being addressed in project ARCWIND, an European INTERREG project.

Add to these an essay of Electric Vehicles in our Technical Information section, and, as you can see, plenty of developments and novelties going on as go through this Energy Transition.

Don't forget to test your knowledge with our popular Quiz section, this time on the Portuguese energy system, where penetration of renewable energy is one of the highest in Europe.

Enjoy your reading!

Sincerely,

Nuno de Souza e Silva

Managing Director

HIGHLIGHTS

R&D NESTER IN ENERGYEAR PORTUGAL 2022: PANEL “ENERGY RESILIENCE GREEN HYDROGEN AND ENERGY STORAGE”

R&D NESTER participated in Energyear Portugal 2022 congress.

It was the second edition of this networking congress that took place this year in hybrid format, with a face-to-face event taking place in Lisbon.

The announcement for the 2030 to 2026 target of 80% of renewable energy generation has accelerated the need for business synergies and the entry of new players in the country.

The Energyear congress brings together decision-makers across the whole value chain to share best practices, exchange views on market updates and trends, and above all, to facilitate face-to-face meetings to explore business opportunities in an exclusive environment that matches the level of the speakers, partners and attendees.

The program had 8 Panels and several Presentations, where multiple actors in the various sectors of activity had the possibility to present ideas and opinions presenting possible solutions and alternatives.

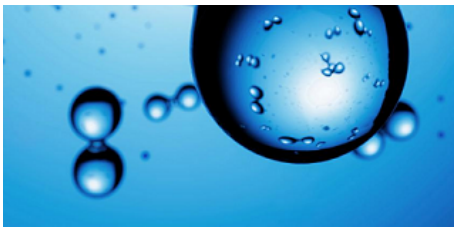
R&D Nester was represented in one of the 8 Panels with the theme **"Energy Resilience: Green Hydrogen and Energy Storage"**. Nuno Souza e Silva, Managing Director of R&D Nester, discussed this theme together with the entities Smartenergy, EnergyIn, AFRY, Endesa and AP2H2.





For more information: Energyear website

R&D NESTER REPRESENTED IN PANEL ON ECONOMIC AND REGULATORY CHALLENGES ON HYDROGEN



R&D Nester was represented in the workshop **"Challenges and Perspectives for Hydrogen in the Context of Decarbonization"** promoted by Portuguese and Brazilian institutions, namely **GESEL - Electric Sector Studies Group**, and **SENAI-CIMATEC**.

This Workshop was promoted with the objective of forming innovation networks for the creation of H2 Valleys and for the development of technologies and Green Hydrogen solutions.

This event agenda was composed with a first moment of Thematic Debates, where 3 topics were addressed:

- Panel A: Technological Challenges
- Panel B: Economic and Regulatory Challenges
- Panel C: Hydrogen Valleys - potentials and challenges

R&D Nester was invited to be part of one of the Debaters Teams in one of these Panels on the agenda: **"Economic and Regulatory Challenges"**.

Nuno Souza e Silva, **Managing Director of R&D Nester**, composed the Debaters Team on this topic, together with other representatives of EDP and GESEL-UFRJ.

In a second moment, this event was composed with a Workshop, which promoted the discussion and mapping of joint opportunities resulting from the synthesis and classification of the main challenges identified during the first moment in the event agenda.

Preliminary ideas of strategies were analyzed in face of identified challenges and appointed possible partners, in a first approach, as well as possible future actions to meet opportunities for promotion and financing between Brazil and Portugal.

R&D NESTER HOSTS FINAL MEETING OF EUROPEAN PROJECT FLEXUNITY ON FLEXIBILITY AND ENERGY COMMUNITIES

R&D Nester hosted the final meeting of the European project **FleXunity - Scaling-up Power Flexible Communities business models empowered by Blockchain and AI** at its facilities in Sacavém, Portugal.

After remote meetings during 2020 and 2021, the consortium organized the final Project meeting in a face-to-face format.







The **R&D Nester** team involved in this project was present, namely, Nuno Pinho da Silva, project leader from the R&D Nester side, Nuno Fulgêncio, Ricardo Pastor, Cao Yang and Isabel Alvite.

The meeting was also attended by the several partners involved in this project, such as Clean Watts (Portugal), Lappeenranta University of Technology (LUT, Filand) and Electric Corby (England), Simples Energía (Spain).

On the agenda of this meeting was the review of the ongoing work, accordingly to the work plan, and it was also planned and discussed the final webinar of the project that will be carried out later by the organization of the project teams. This webinar will be focused on the dissemination of **FleXunity** results and main achievements.

The **FleXunity** project started in December 2019 and its main objective is to deploy novel services for managing energy communities and their integration in the electric power system, including their participation in the energy and ancillary services markets, enhanced by **Virtual Power Plant (VPP) technology** empowered with **AI algorithms** focused on optimizing the use of distributed renewables from the utility or community portfolio.

The innovative services developed in this project will enable new business models from managing multiple energy flexibility assets, enhancing the use of renewables and support energy security and climate change challenges.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870146.

More information:

FleXunity project website

FleXunity Project @ R&D Nester website

FleXunity Project LinkedIn Page

R&D NESTER PRESENTS PAPERS ON FLEXIBILITY AND TSO-DSO COORDINATION AT CIRED PORTO 2022

CIRED workshops on specific topics are organized in Europe every two years between CIRED main conferences.

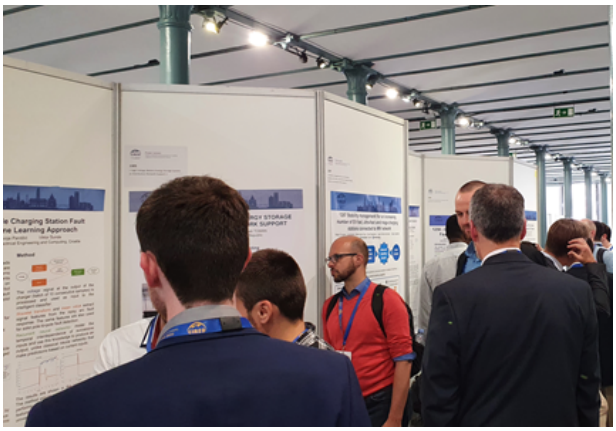
This year, the CIRED PORTO 2022 Workshop addressed **"E-mobility and power distribution systems"** and it was held in Oporto, Portugal.

CIRED
PORTO, PORTUGAL
2– 3 JUNE 2022

On its 8th edition, this 2 days' workshop counted with 400 experts in the fields of **"E-mobility and power distribution systems",** with a programme with 250 presentations, 2 round tables and 4 keynote speakers.







R&D Nester was represented in this event with 2 publications:

1) Co-author of a paper published in this event, entitled **"Cross-border flexibility prequalification of DER and EVs based on decentralized communication mechanisms for the distribution system operation"**.

This publication was co-produced with the Portuguese DSO in the scope of OneNet **(One Network for Europe) project - "TSO-DSO Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation"**. This project it's an Innovation Action addressing the following objectives 1) creating the conditions for a new generation of grid services able to fully exploit demand response, storage and distributed generation while creating fair, transparent and open conditions for the consumer; 2) build a customer centric approach to grid operation by proposing new markets, products and services and by creating a unique IT architecture.

The concept proposed by OneNet is tested and implemented in 4 geographical cluster demos. This 3-year project lasts from October 2020 to September 2023. It counts with the participation of 72 partners, where, amid many others, R&D NESTER, REN, INESC-TEC and E-REDES are from Portugal.

2) Co-author of another published paper, entitled **"Distribution network reactive power optimisation considering TSO/DSO coordination".**

This publication was produced in the scope of OSMOSE **project - "Optimal System-Mix of Flexibility Solutions for European Electricity**". OSMOSE is a TSO-led project aiming at a holistic approach towards the identification and development of the optimal mix of flexibilities to enable the European energy transition. The major objectives of this project include the demonstration of different flexibility technological solutions, increasing their techno-economic feasibility and scalability, the forecast of the economically optimal mix of flexibilities for the future European electricity system and the proposal of new market designs and regulation facilitating the optimal mix of flexibility and maximizing social welfare. The project had a duration of four years, starting in 2018, finished last April.

Both these projects, **OneNet** and **OSMOSE** received funding from the European Union's Horizon 2020 research and innovation programme.

More information:

OneNet Project @ R&D Nester website

OSMOSE Project @ R&D Nester website

P2020 OPTIGRID PROJECT PRESENTED A POSTER ON DYNAMIC LINE RATING AT IEEE PES T&D



The **IEEE PES T&D Conference & Exposition** presents an unmatched opportunity for energy professionals to reconnect and explore a range of ideas driving change in the industry. This event has a comprehensive technical program backed by IEEE's esteemed standards, combined with the widest display of innovative T&D solutions. This immersive experience enables the power community to move forward with the shared purpose of delivering a reliable and resilient energy grid to individuals, businesses, and communities around the globe.

R&D Nester was represented this year in this biannual event sponsored by the **IEEE Power & Energy Society**.

Entergy New Orleans was the Host Utility for this year conference that took place in hybrid format (live in New Orleans and online).

R&D Nester was co-author in a poster presented in this event, entitled **"Crease cross-border capacity to reduce market splitting of day-ahead electricity markets - A dynamic line rating approach"**.

This Poster was produced in partnership with LNEG who presented it at the event. This publication was produced in the scope of **OptiGRID** project developed in partnership between R&D Nester and LNEG, with a duration of 48 months, starting in 2018 and ending this year by September.

This project **OptiGRID "Methodology for Analysis of Dynamic Line Capacity and Optimized Management of Electric Grids"** main objectives are the development of an operational tool and a methodology using Dynamic Line Rating increasing the transmission capacity to facilitate an increase of RES integration in the power system and to reduce the number of separation hours of markets, affecting its prices.

The OptiGrid project is financed by the P2020 program.

Disclaimer and financing programme/entity: Project PTDC/EEI-EEE/31711/2017 submitted under the call for tenders (AAC) No. 02 / SAICT / 2017, funded by national funds through the budget of the Foundation for Science and Technology (FCT).

R&D NESTER PUBLISHES SCIENTIFIC PAPER IN JOURNAL OF MARINE SCIENCE AND ENGINEERING



R&D NESTER team involved in the project **ARCWIND** published a scientific paper named "Fostering Offshore Wind Integration in Europe through Grid Connection Impact Assessment" in the Journal of Marine Science and Engineering.

This paper aims to contribute to an eventual future integration of floating wind energy in continental power systems in Europe, by calculating the capacity that these networks have to absorb new energy sources. Additionally, the impact in the network is also measured trough the calculation of the contribution that these connections could have in short circuit current levels near the chosen point of connection.

This analysis was performed for six regions from five European countries (Portugal, Spain, France, United Kingdom and Ireland), all considered in the scope of ARCWIND. The results presented in this paper are related to the research activities performed by R&D NESTER in this project, whose main objective was to study the impact that these possible new sources of power could have in existing power system at country level.

The ARCWIND project, financed by INTERREG Atlantic Area, aims to contribute to the development of floating wind solutions. Different areas of knowledge are addressed, including the analysis of potential of wind resource, design and testing of prototypes of floating wind platforms, network impact and economic viability studies.

The published paper has free access and is available at https://www.mdpi.com/2077-1312/10/4/463.

All details related to ARCWIND are available at http://www.arcwind.eu/.



More information:

R&D NESTER CREATING A SMART ENERGY FUTURE ARCWIND

ARCWIND Project @ R&D Nester website

R&D NESTER PRESENTED POSTER ON LOW-FREQUENCY OSCILLATIONS AT CIGRE SEERC 2022



CIGRE SEERC Colloquium was held in Vienna, Austria last June were energy professionals discussed current projects and new ideas during 3 days. This year theme was **"Green Deal for the SEERC Region - The Future Power System in the SEERC Region"**.



This event counted with 150 participants and guests who took part in the colloquium week and enjoyed 15 lectures, 9 presentations in the tutorials and around 30 scientific posters.

The main focus on the first day was an insight into current projects for the energy transition, held by the SEERC countries Turkey, Slovenia, Greece, Romania, Serbia, Bosnia, and Herzegovina and Austria. There was a wide range of topics during the tutorials on the first day, from cyber security management on the one side to innovative solutions for active distribution grids on the other side.

The second colloquium day was dedicated to the panels: History of the SEERC Region, New Generation Network, Women in Energy.





After the closing session, the participants went in a final excursion to AIT Austrian Institute of Technology and its brand new DC Lab-a development and validation platform for DC components for manufacturers and operators of DC systems.

R&D Nester was co-author in a poster presented in this event, entitled **"Grey-box model for identification of low-frequency oscillation modes - the Bulgarian case study"**.

This publication was produced in the scope of FLEXITRANSTORE **project (An Integrated Platform for Increased FLEXIbility in smart TRANSmission grids with STORage Entities and large penetration of Renewable Energy Sources).**

This project funded by H2020 aims to contribute to the evolution towards a pan-European transmission network with high flexibility and high interconnection levels. FLEXITRANSTORE will promote increased cross-border electricity flows using the valorization of flexibility services. The project takes both a national and a regional approach, acknowledging the need to seamlessly integrate national markets, particularly in the South Eastern European network, which still lacks the high interconnectivity that the rest of the European network has.

More information:

FLEXITRANSTORE Project @ R&D Nester website

R&D NESTER SIGNS PROTOCOL WITH SENAI CIMATEC FROM BRAZIL

R&D Nester received on its premises a Brazilian delegation from **SENAI CIMATEC** (Serviço Nacional de Aprendizagem Industrial - Centro Integrado de Manufatura e Tecnologia), an accredited educational and research institution by the Brazilian *Conselho Estadual de Educação*, Ministry of Education and Ministry of Science, Technology and Innovation, with whom signed a Protocol. SENAI is one of the five largest professional education complexes in the world and the largest in Latin America.



With this protocol, R&D Nester intends promote research, development and innovation (RD&I) activities in partnership with SENAI CIMATEC, having this agreement the purpose of promoting scientific and technological development and aiming to foster the development of industry and the search for technological solutions.

This technical partnership will promote the exchange of information, development of joint projects, use of laboratories, workshops and other facilities and facilities. The main focus will be the transmission of scientific knowledge and/or technologies, and other services of interest in the field of their specialties.

The signing of this agreement took place on June 9th. A photographic record was made of the moment of the signing of this Protocol, signed by Professor Leone Peter Correia da Silva Andrade, Innovation & Technology Director/Rector in SENAI CIMATEC and Eng. Nuno Souza e Silva, Managing Director of R&D Nester.







Professors Luís Alberto Breda Mascarenha, Greta Moreira and José Luís Gonçalves were also present. R&D Nester was also represented by Senior Researchers, Rui Pestana and Nuno Pinho da Silva.

More information:

SENAI CIMATEC website

SENAI website

CIMATEC website

R&D Nester - R&D Network (rdnester.com)

TECHNICAL INFORMATION

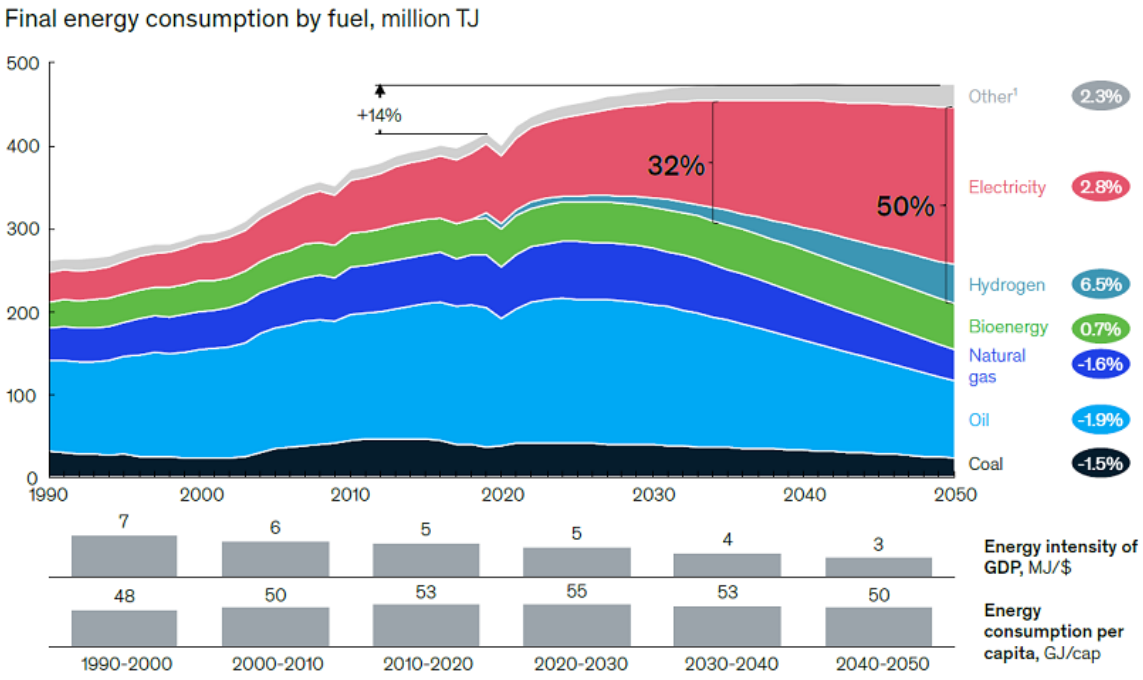
ENERGY SECTOR DECARBONISATION AND THE ROLE OF HYDROGEN

Most recent estimations foresees that in the next decades, global energy consumption will not follow the world's economy and population growth, remaining close to 14% (McKinsey&Company, 2022).

This expectation is based on the continued efforts on reducing the energy intensity of the economies and by the improved efficiency of buildings, industry and transport. Electrification plays a crucial role on this effort as it promotes, among other benefits, cross-sector efficiencies.

However, this poses an additional burden for the decarbonisation of the electrical sector as it must almost completely rely on decarbonized resources to continue its path to a fully carbon neutral economy.

Within this decarbonisation transition path, hydrogen is seen as a key decarbonisation enabler, being expected a contribution in the final energy consumption around 10% and the combined share of electricity and hydrogen could represent 50% of the total final energy consumption by 2050.



(Source: Global Energy Perspective 2022, McKinsey&Company, 2022)

The electrification of power consumption will play a major role in the decarbonisation strategy, especially with the widespread adoption of EVs and the production of green hydrogen, which is expected to account for 28% of the total demand by 2050.

Hydrogen, EVs and batteries will also contribute for the flexibility of the energy system, side by side with traditional generation capacity, contributing to 25% of the energy system flexibility needs.

Likewise, by adapting the gas turbines to hydrogen, it is expected that hydrogen will work as well as long-term storage, contributing for additional flexibility and resilience of the power system that will be needed as the power system generation mix evolves towards the 80-90% projections of RES in power generation globally by 2050.

ELECTRICAL VEHICLES CHARGING TECHNOLOGIES TYPES

Electrical vehicles charging can be accomplished using a variety of electrical vehicles charging station (EVCS) technologies. Wired solutions using conductive methods are by far the most spread out because they can easily ensure the demanded power level, safety, and interoperability with most vehicles. The non-wired solutions are starting to attract interests and are being studied for highway applications, for example. Battery swaps is an alternative way that instead of charging the vehicle battery it recurs to the swapping of the used battery by a charged one.

Alternating Current (AC) infrastructures are dependent on the on-board chargers of the vehicles and have power

limitations because of the vehicles characteristics. On the other hand, Direct Current (DC) infrastructures rely on off-board power electronics that are set up at the charging station. This enables larger and bulkier charging stations resulting in charging powers of up to 350 kW in today's top-performing EVCS.

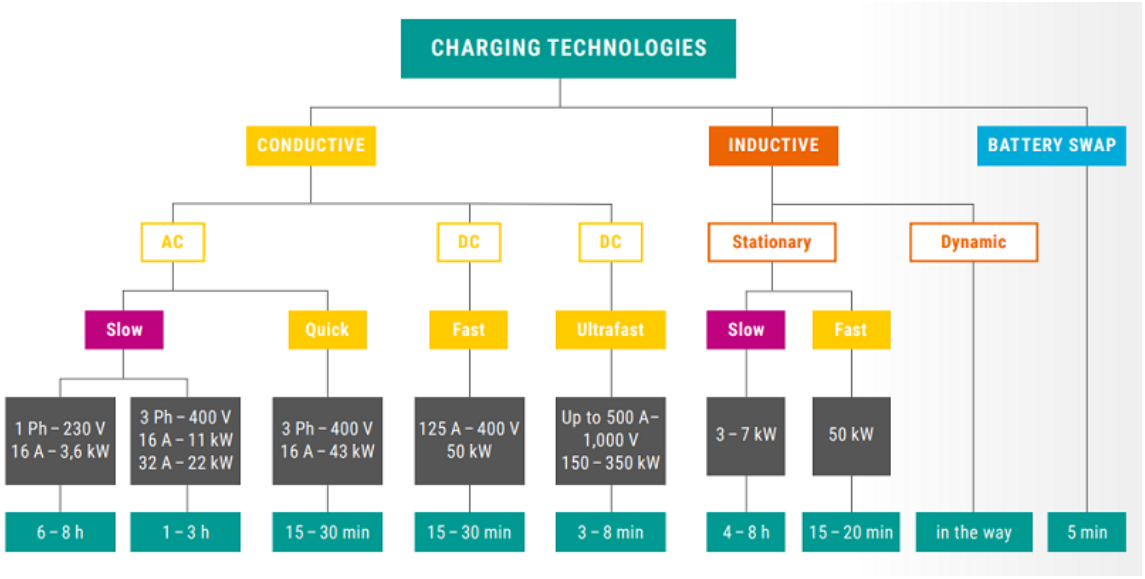


Figure 1 - EV charging technologies

Followingly is described in more detail each of the methodologies for charging EV batteries.

The conductive charging refers to how a direct physical connection charges the EV from the power grid. In conductive charging, two types of chargers can be used to charge EVs: on-board and off-board chargers. An on-board charger is mounted on the EV itself and does not require additional equipment to connect to the grid, so the EV can be charged anywhere by plugging in an electrical outlet. However, this type of charger has a low power transfer capability. On other hand, the off-board chargers normally they have higher power rates and they can be found in commercial parking lots, highways, or fast-charging stations.

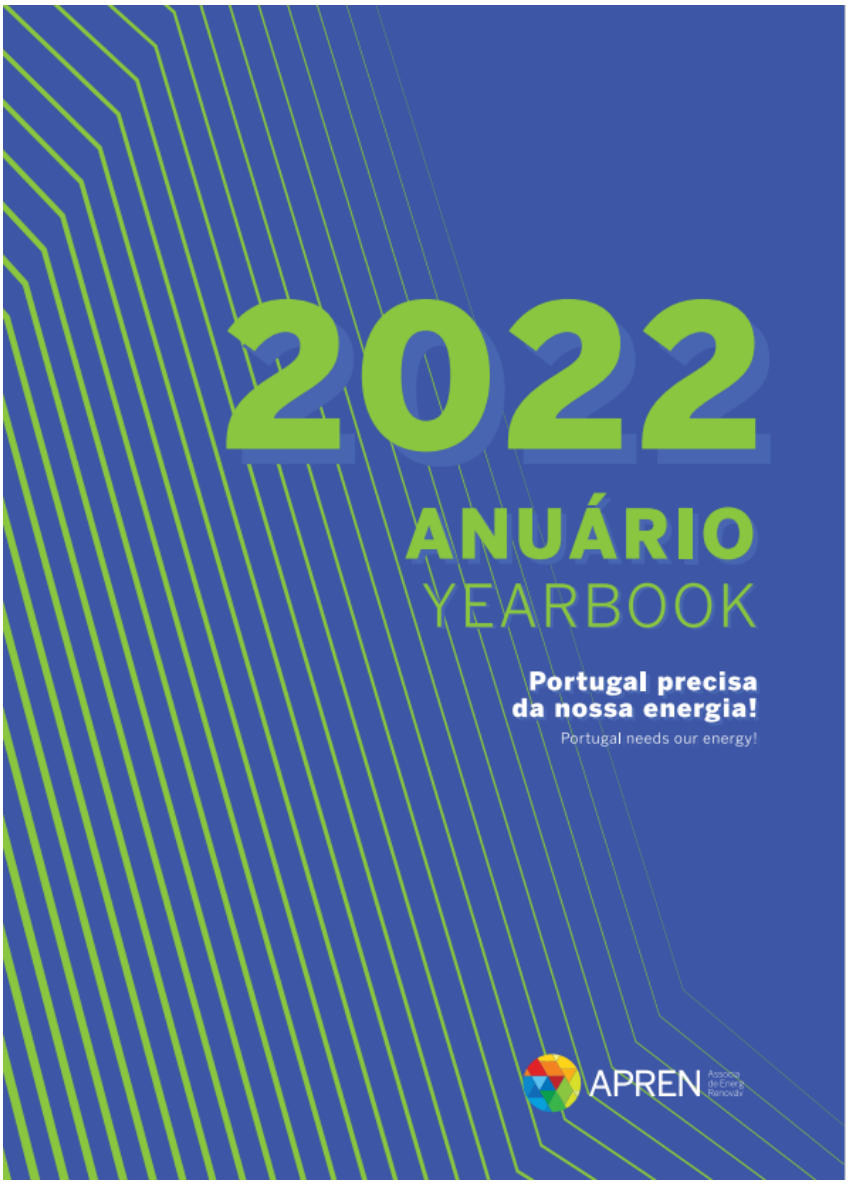
In the inductive method, which is also called wireless charging, there is no need for a physical connection between the EV and the power grid, and the power transmission occurs through the electromagnetic field. One of the advantages of inductive charging is reducing the risk of exposing to electric shocks but on the other hand, due to the relatively large air gap the charging efficiency decreases in this case.

In general, inductive charging can be implemented in both stationary/static and dynamic ways. When the EV remains stationary during the charging process, we are in the presence of the called inductive stationary charger. However, the EV can also be charged while moving in dynamic charging mode. With this charging method, the EV driving range could be increased, and the size of the EV's battery may be reduced due to the ability to charge it while moving. As a result, dynamic inductive charging will handle many of the barriers seen by users, however, the high investment costs of this EVCS technologies are one of the main challenges in developing the dynamic inductive charging method.

The last EVCS technologies that we will explore is the battery swapping. In this method, an empty battery of an electric car is replaced rather than charged. This method significantly reduces the charging time for the EV's owner and benefits the battery swapping station by managing charging, discharging, and battery swapping allowing to prolong battery lifetime by enabling controlled charging with low currents and reducing the instances when fast charging becomes unavoidable. . The ownership of the battery usually lies with the car manufacture, a utility, or the battery-swap company, not with the owner of the vehicle.

Reference: ENTSO-E Position Paper Electric Vehicle Integration into Power Grids, 31 March 2021

APRENs yearbook is a milestone on the national energetic panorama and a glimpse of what the association does regarding the electricity production from renewable sources. In the first chapter we present the main statistics and macroeconomical indicators from the electricity sector, with a bigger highlight on the renewable component, and including the country's exterior energetic dependence.



Link for Publication

WORLD ENERGY PULSE APRIL 2022 CLIMATE, COVID AND CONFLICT: IMPLICATIONS AND OUTLOOKS

The world is reeling from global energy shocks triggered by the convergence of crises: climate change, covid, and conflict.

The interaction of these crises has cascading and uneven impacts in energy which are felt at all levels of society. As leaders seek to step up to meet these crises, responses reflect different experiences and expectations.

World Energy Pulse April 2022 presents a quick "pulse" of current attitudes and trends felt across the industry and provides global and regional perspectives of crises implications and transformational actions.

Findings are based on responses to the World Energy Pulse received during the first half of April 2022.

To inform the World Energy Community and enable real-time decision-making amid a fast-changing situation, World Energy Pulses will be taken at regular intervals over the coming months.



Link for Publication

EVENTS

5 -7 Dec 2022

MUSCAT, OMAN

GREEN HYDROGEN SUMMIT OMAN 2022

25 -26 Jan 2023

GLASGOW, UK

SCOTTISH RENEWABLES OFFSHORE WIND CONFERENCE 2023

20 -24 Mar 2023

AMSTERDAM, THE NETHERLANDS

SMART GRID FORUMS - SGTECH WEEK 2023

24 -27 Apr 2023

COPENHAGEN, DENMARK

WINDEUROPE ANNUAL EVENT 2023

4 -7 Dec 2023

ROTTERDAM, THE NETHERLANDS

26TH WORLD ENERGY CONGRESS - REDESIGNING ENERGY FOR PEOPLE AND PLANET

12 -15 Jun 2023

ROME, ITALY

CIRED 2023 - INTERNATIONAL CONFERENCE & EXHIBITION ON ELECTRICITY DISTRIBUTION

QUIZ - This edition's questions refer to the Portuguese Electricity System data for the year of 2021. For more information, see the document 'Technical data 2021', available at: https://www.ren.pt/en-GB/media/publicacoes

1) WHICH WAS THE PERCENTAGE OF THE CONSUMPTION SUPPLIED BY RENEWABLE GENERATION?

- ○ a) 29 %
- ○ b) 39 %

4) COMPARED TO THE PREVIOUS YEAR, THE RENEWABLE GENERATION:

- ○ a) Increased 1%
- ○ b) Increased 10%

c) 49 %
d) 59 %

2) WHICH WAS THE PERCENTAGE OF THE GENERATION PROVIDED BY COAL PLANTS?

a) 1 %
b) 11 %
c) 21 %
d) 31 %

3) WHICH OF THESE SOURCES MOST CONTRIBUTED TO THE GENERATION?

a) Wind
b) Hydro
c) Natural Gas
d) Solar

c) Decreased 1%
d) Decreased 10%

5) COMPARED TO THE PREVIOUS YEAR, THE INSTALLED CAPACITY IN PHOTOVOLTAIC PLANTS INCREASED AROUND:

a) 250 MW
b) 500 MW
c) 1000 MW
d) 2000 MW

Correct answers will be provided to you soon.
If you have problems answering this quiz, click here to answer this via browser.

1. Answer: d) 59 %
2. Answer: a) 1 %
3. Answer: c) Natural Gas
4. Answer: a) Increased 1%
5. Answer: b) 500 MW



LINKS

ON RESEARCH, DEVELOPMENT AND INNOVATION

Portugal

- Portugal 2020
- Portal da Inovação
- Agência Nacional de Inovação (ANI)
- COTEC Portugal
- Portugal in Europe Research and Innovation Network (PERIN)
- Agência para o Desenvolvimento e Coesão (AdC)
- Direção-Geral de Estatísticas da Educação e Ciência (DGEEC)

Europe

- BRIDGE (H2020)
- European Energy Research Alliance (EERA)
- ETIP SNET - European Technology and Innovation Platform Smart Networks for Energy Transition
- Horizon 2020
- Horizon Europe
- BlueInvest

OTHER ENTITIES

Portugal

- Laboratório Nacional de Energia e Geologia (LNEG)
- Associação de Energias Renováveis (APREN)
- Associação Portuguesa da Economia da Energia (APE)
- Portugal Energia
- Portal de Ciência e Tecnologia | Fundação para a Ciência e a Tecnologia (FCT)
- ERSE - Entidade Reguladora dos Serviços Energéticos
- DGGE - Direção-Geral de Energia e Geologia

Europe

- European Network of Transmission System Operators for Electricity (ENTSO-E)
- The European Wind Energy Association (EWEA)
- The Alliance for the Internet of Things Innovation (AIOTI)
- JRC Publications - Joint Research Centre - Smart Electricity and Interoperability
- The European Commission's Priorities

- EIT InnoEnergy
- Eurostat - Science, Technology and Innovation
- Funding, Tenders | European Commission
- Research and Innovation | European Commission
- Energy, Climate Change, Environment | European Commission

Rest of World

- China Electric Power Research Institute (CEPRI)
- Mission Innovation
- Innovation – Department of Energy (USA)
- NREL – National Renewable Energy Laboratory
- EPRI- Electric Power Research Institute
- EU-GCC Clean Energy Technology Network

- A Europe fit for the digital age | European Commission
- European Climate, Infrastructure and Environment Executive Agency (CINEA | ex-INEA)
- EUASP - The European Union Agency for the Space Programme
- ESA - The European Space Agency

Rest of World

- CIGRE - International Council on Large Electric Systems
- CTCN - Climate Technology Centre and Network
- GEIDCO - Global Energy Interconnection Development and Cooperation Organization
- Energy Web
- World Intellectual Property Organization (WIPO)
- International Energy Agency (IEA)
- International Electrotechnical Commission (IEC)

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