

ISO 56002 standard “Innovation management – Innovation management system – Guidance”

Innovation management is a strategic topic for organizations and companies, and the ability to manage innovation as a system and organize all the phases of the innovation process represents a critical success factor.

In August 2022, we were among the first companies in the world to voluntarily adopt the **ISO 56002 standard** for innovation management. This standard is part of a wider series of ISO 56000 standards and covers all aspects of innovation management: from the creation of an idea to its development on a global scale. By adopting this standard, organizations can consolidate their governance, increasing the effectiveness of innovation and therefore business opportunities, which in turn creates the conditions for a wide-spread innovation culture that stimulates the creativity of employees and stakeholders, and promotes the emergence of new

valuable proposals, in line with market developments.

The standard is based on eight pillars: coherence with the Innovability® vision (innovation for the Company and a more sustainable world); generation of value through innovative ideas; future-oriented leadership and challenges to the *status quo*; innovation culture as a strategic asset; innovation development based on customer requirements; management of uncertainty and risk mitigation; proactiveness and resilience; systemic approach for a solid performance appraisal.

Furthermore, in 2022 we signed an **agreement with UNI** (Italian Standardization Body) to draw up a public document known as “Reference practices”, which has the purpose of making Enel a reference on a national level in Italy in the area of innovation governance.

How ideas are transformed into business solutions, creating shared value

Here are some examples of Innovability® projects (see also chapters: "[Clean electrification](#)", "[Circular economy](#)", "[Conservation of natural capital](#)"):



Green hydrogen

NextHy: a global initiative designed to stimulate the growth of the entire green hydrogen ecosystem. Its center is the Hydrogen Industrial Lab in Sicily, an industrial technological validation platform that will be built between Carlentini and Sortino, where new technologies will be developed for accelerating the reduction of the cost of green hydrogen and the decarbonization of the so-called "difficult to abate" sectors.

NextHy is one of the Italian projects that benefited from the IPCEI Hy2Tech loan, the 4.5 billion euro fund made available by the European Union for the development of initiatives of strategic interest centered on hydrogen. The NextHy project also includes NextHy Booster, an acceleration program promoted by Enel Green Power that has the objective of supporting the most promising startups to scale their technology and their business to green hydrogen, creating a long-term partnership with Enel and connecting to the global network of green hydrogen.



Smart City

YoUrban (Italy), a single point of access for using all Enel X solutions activated in the urban perimeter, from the digital management of public lighting system faults to the innovative City Analytics solution for optimal urban planning. In 2022, new functions were developed that provide a complete overview of communities and areas of improvement in terms of services for citizens, CO₂ and the degree of circularity.



Customer centricity

Customer recognition through biometric factors (Spain), such as, for example, vocal recognition, to guarantee safe and inclusive access to our services as an element for the authentication of customers at call centers, which improves the personalization of the service, emotional involvement and accelerating the resolution of customer requirements.

Pilot project for the **application of advanced artificial intelligence models** to improve the operation of contact centers (Italy, Romania, USA, Spain). These models personify the needs and language of our customers, generating concepts/phrases in hundreds of transcripts thanks to the pre-trained model. This is useful for testing the qualitative level of our operators, preparing ourselves, in the future, for new evolutionary sales scenarios, automatic training and proactive support.

Use of **neurosciences** to obtain more in-depth information about the efforts customers make to understand the commercial communications and to simplify relationships, thanks to the interpretation of spontaneous physiological input (Italy).



Robots and safety

Innovative robots for inspections of submarine cables (Italy), operations at a height (Italy and Brazil) and for cutting vegetation (Brazil), to allow safe and remotely controlled/automatic interaction with network components for operating and maintenance activities, and to cut vegetation near the network.

New sustainable helmets (Italy and Romania), that can house intelligent glasses for hands-free operation and other accessories to improve safety. They are more ergonomic and made with recycled material.



Weather predictions, variability of natural resources and system operation

In Italy, development of four parallel projects, selected thanks to the tender launched together with ESA (European Space Agency), that are concentrated on the **development of algorithms for estimating the equivalent of snow water and the content of water in the alpine snowpack via satellite**, to be validated with *in situ* measures. To best manage the production of water in our power plants, it is in fact necessary to know not only the amount of rain, but also the volume of water contained in the snowpack (Snow Water Equivalent), which is an important temporary reserve of winter precipitation. Therefore, by improving the prediction of precipitation and the resulting prediction of hydroelectric generation through the combination of satellite data, weather prediction models and *in situ* data, it is possible to manage the risks related to the variability in natural resources and optimize market strategies.

The photovoltaic plant in El Paso, Colombia: the objective of the project is to automate the acquisition process of the cloud coverage above the plant and provide intraday and intrahour predictions of radiation, using satellite images and sky-cams in machine learning algorithms. The need results from the intrinsic characteristics of the area, as the El Paso photovoltaic plant is located in an equatorial area where it is very difficult to evaluate the actual amount of clouds in the sky with normal weather prediction services.



Use of water and biodiversity

Collaboration with **Reiwa Engine** (Italy) for the **automatic cleaning of photovoltaic panels without the use of water**.

In the wind park of Gibson Bay, in South Africa, an **innovative system for preventing the impact of bats and birds with wind generators** was successfully tested by means of installing an acoustic deterrent device developed by the US startup **NRG Systems**, which made it possible to reduce the risk of mortality for local bats by 80%.

New solutions based on remote image detection systems (such as satellites and LiDAR) and artificial intelligence, are able to identify the **presence of archaeological finds and vegetable species before opening the job sites**, in order to protect biodiversity.



NET-ZERO GRID

The innovation of the electricity grid to mitigate the environmental impact and improve its resilience

Lourdes García Duarte

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“Enel Grids is taking another significant step toward the decarbonization of electricity grids, thanks to the pilot installation of cutting-edge sustainable poles. An innovative combination of pine or fir materials and with an external layer made of 66% recycled polyethylene. The new poles make it possible to save up to 130 kg of CO_{2eq} as compared to similar standard poles made of concrete and without the toxic materials used in the old products. This is an important result for making our networks increasingly Net-Zero.”

Enel's Net-Zero strategy for the electricity grid sector is concentrated on reducing the CO₂ emissions from activities, reducing network losses and adopting circular, low-emission materials and components. An interesting direction of innovation of Enel Grids is in fact that of Sustainable Design and Resilience, targeted toward mitigating the environmental impact and improving the resilience of the network with new technologies and sustainable materials, in order to rethink the systems and components.

The pilot project of the sustainable pole was field tested in this sector. The solution was also tested by some Northern European DSOs. This is a new support for low and medium voltage. It is made of wood obtained from certified sustainable forests in order to reduce the carbon footprint of the electricity grid. The main structure is made with certified wood, whereas the external layer is comprised of 66% recycled polyethylene. The poles, thanks to the innovative combination of two materials, make it possible to save up to 130 kg of CO_{2eq} with the same dimensions of standard cement poles.

The utilized wood comes from certified sustainable forests where there is the obligation to guarantee and not alter the continuous growth of the forest, whereas the external layer of polyethylene seals the wood, protecting it from atmospheric agents, improving its fire resistance and preserving fauna from the electrical risk. The absence of impregnating material, which was used for the old wooden supports, represents an additional result in terms of sustainability, in line with the new directives issued by the European Commission.

The pilot project successfully tested mechanical resistance and resistance to aging, and was able to evaluate the operational installation and maintenance activities.

For in-depth information about the Group's activities concerning network infrastructures, see the chapters [“Clean electrification”](#) and [“Circular economy”](#).

Focusing on hydroelectric flexibility to accelerate transition and promote national energy autonomy

Vincenzo Ricchiuto

Short term management
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"The role of hydroelectrics, a clean source par excellence, in the electrical system is becoming more important as an enabling technology for transition thanks to modernization and flexibilization projects developed in full compliance with the environment and local communities. This result was made possible by an intense and lengthy synergy with Generation, Innovation and the Territory."

The challenge we are facing is to explore capacities that are not yet expressed in terms of flexibility of use of the existing renewable fleet with innovative modernization, efficiency improvement and management interventions. With experimental modeling and the implementation of new operating schemes, which keep up with the continuous regulatory changes, we are aiming to test and highlight the pivotal role that the hydroelectric fleet can take on during the energy mix evolution process thanks to its extreme versatility and wide-spread presence all over the territory.

In 2022, the first phase was completed with a 5-year time schedule of initiatives that basically involved the most of the Italian programmable hydroelectric fleet with a specific investment plan. For some it was an extension of potential in terms of regulation and flexibility of use, whereas for others it was a true start in a new activity; the purpose of it all is to guarantee also with hydroelectric a continuous service for the electricity grid oriented toward balancing the intermittence generated by NPRS (non-programmable renewable source) thereby favoring the safe penetration of new capacity.

In particular, in Italy, the increase in terms of MW enabled for the secondary regulation service was more than 550 MW approx., equal to 11% approx. of the total currently enabled for all technologies in Italy. Furthermore, approx. 50 plants, for a total of 650 MW approx. have been enabled for the market of services also through aggregations and innovative modeling.

As is known, 2022 was a year with strong geopolitical tensions, but also a record shortage in the hydroelectric resource, causing considerable increases in production costs and unexpected reductions in availability of some thermoelectric plants.

In this context, the plants involved in the efficiency improvement and flexibilization program have provided a considerable contribution with regard to the safe management of the electricity grid and the containment of system charges, especially during the most critical periods.