New Business Opportunities

DSM and Energy Efficiency Initiatives

EDP Group 2022

CONTENTS

1. FRAMEWORK

Energy Policies worldwide have reinforced the need to promote the improvement of energy efficiency as one of the main drivers to decarbonising all sectors of activity. In Europe, the New Green Deal is the current framework establishing a set of policy initiatives aiming at making the EU climate neutral by 2050. The ambitious goals set introduce new challenges/opportunities for the business sector.

In July and in December 2021, the European Commission released the "Fit for 55" package, which comprises a set of legislative proposals (including revision of current legislation and proposal of new laws), setting the base to reach the decarbonization target for 2030 - reduction of greenhouse gas (GHG) emissions by at least 55% ´by 2030 vs. 1990 levels, which places the UE on the pathway of carbon neutrality by 2050. The current framework includes EU legislation (Directives) on Energy Efficiency, Renewable Energies and Energy Performance of Buildings and envisages to achieve the 2030 36%-39% target on energy efficiency, biding for Member States.

Under this framework, Portugal set the ambitious target of 35% minimum reduction of primary energy consumption in 2030 and Spain 39,5%, supported on the National Energy and Climate Plans (NECPs) - https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en, currently under revision

These ambitious goals, combined with the market opportunities they induce, have led to the development of demand-side management initiatives by the EDP Group, for instance in the areas of energy efficiency, fuel switching, load optimization, distributed generation and sustainable mobility.

Indeed, active promotion of demand side management is part of our climate strategy and is one of the top commitments of the EDP Group, along with the anticipation of customer needs. In this context, EDP adapted its organizational structures, business models and operational plans in order to strengthen its leading position and benchmark in the global energy market, by developing and offering their customers innovative and sustainable products and services related to energy efficiency, supported on communication campaigns and partnerships with other operators in the industry.

Moreover, EDP considers innovation as a key element to the energy transition and, in particular, to energy efficiency improvement. Under this framework, seven domains were identified in accordance with EDP's business strategy, which positions itself at all stages of the energy industry value chain, particularly in the main pillars of growth (renewable energies, networks), new domains of growth (distributed energy systems, green hydrogen, energy storage and flexibility, and sustainable mobility) and main trends in the sector (decarbonization).

In order to promote the deployment of energy efficiency, EDP also created synergies for increasing energy efficiency through the management of the distributed generation/ storage/consumers.

In this respect, EDP assumed the following commitments:

Generate Economic Value		
Provide customers with continuous access to low carbon, energy efficiency products and services allowing significant savings and avoiding about 15 $MtCO_2$ accumulated in the period 2015-2030.	Provide electricity customers with sustainable services by 2025, such as: mobility services (180 k clients); green electricity and/or gas offset (100% of the new clients); descentralised solar (3.7 GW); electric vehicles charging points (>40k) .	Expand the installation of smart meters to 100% of EDP's low voltage power network delivery points worldwide by 2030, through new smart grid technology.

Antecipating the new energy paradigm, where production, distribution and consumption will be increasingly decentralized, EDP provides a range of energy solutions oriented to the specific needs of the differents customers' segments, through a diversified offer of competetitve products and services that contribute to the electrification of energy consumption and energy efficiency improvement.

Among these services, sustainable mobility is a key issue for society and one of EDP's priorities. This is one of the areas that will most affect the energy sector and will be essential for the decarbonization of transport, which currently accounts for about 25% of global CO2 emissions. For EDP, the decarbonization of the economy involves a significant increase in the penetration of production from renewable sources, followed by strong energy consumption electrification, in particular in the transport sector and industry.

In the following chapters, we present the main business units involved in energy efficiency services (chapter 2) as well as the initiatives related to energy service provision (chapter 3), namely those that allow customers to change the amount and/or timing of use of electricity in response to supply conditions: distributed generation, smart grid paradigm, electric storage and other services.

2. BUSINESS UNITS

This chapter presents the Business Units that are involved in energy efficiency services.

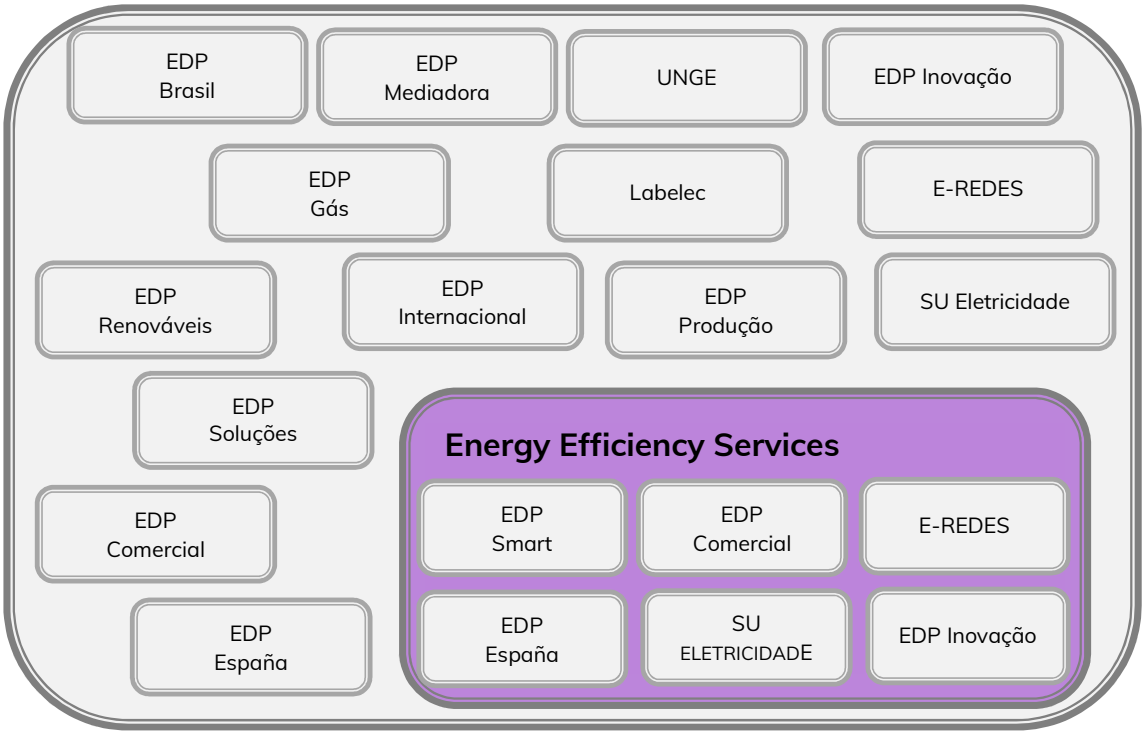

Figure 1- EDP Companies involved in energy services initiatives

EDP Brasil

EDP Brasil plays a key-role in consolidating new energy services businesses, strengthening the development of both energy efficiency and distributed photovoltaic generation projects, as well as investments towards transmission, which ensures EDP Brasil's operations in all segments of the eletric sector.

EDP Brasil believes that the opening of the free market will be a reality in the medium term. Accordingly, in line with its strategy and future vision, in 2019 the company created the B2B services and solutions segment, previously called EDP Smart, comprising a full portfolio of products and services for business and residential free market customers. The focus is on offering integrated solutions in the areas of free market commercialization, retail commercialization, energy efficiency, solar energy, electric mobility and end consumer services.

For the business market, EDP B2B offers solutions such as biomass-based steam co-generation, energy consumption management, smart monitoring, distributed generation and auto-generated solar production, lighting, refrigeration and air conditioning retrofits, among others.

Throughout the year, EDP B2B main highlight was the high execution of Capex in solar energy, which is directly related to sustainability in a scenario where customers have increasingly sought clean energy. Currently, EDP offers solar products to all business customer segments, including SMEs and large customers, demonstrating our ambition to cover the entire solar energy chain.

In addition to solar generation projects for large companies such as Arcos Dourados, Drogaria Araujo, TIM, Farmácia São João, Intermédica, Claro and Banco do Brasil, our first Shared Generation projects are already being marketed and will soon be offsetting clean and cheaper energy for several SMEs (small and medium-

sized enterprises) in the states of Rio de Janeiro and Minas Gerais. In 2022 alone, we added over 50 MWp in this modality through new contracts, amendments to existing contracts and plants aimed at Shared Generation, which shows our commitment to the energy transition in Brazil and worldwide. By 2025, another 467 MWac will be added to the installed capacity of the farms, thanks to the operation of two projects carried out in partnership with EDP Renováveis in the Solar Utility Scale segment: the Monte Verde Solar and Novo Oriente solar farms.

With an expected start of operation in 2024, the Monte Verde Solar Farm will have an installed capacity of 212 MWac and will be located in the state of Rio Grande do Norte, in the municipalities of Pedro Avelino, Lajes and Jandaíra. The Novo Oriente farm, in turn, will be built in Ilha Solteira (SP) and will have 254 MW of installed capacity. Just like in the case of Monte Verde Solar, the Novo Oriente power plant has already been granted and should start operating in 2024, with a 120 MWac PPA.

Since May 2016, distributors have to allocate 0.4% of their net operational revenue to energy efficiency programs, on a yearly basis. Prior to that, the mandatory allocation percentage was 0.5%, according to the national regulatory entity requirements (ANEEL - National Agency for Electrical Energy). In 2022, the Company invested R$32.23 million in energy efficiency initiatives with Distribution customers, which led to energy savings of 10 GWh/year in São Paulo and 16.15 GWh/year in Espírito Santo, resulting in approximately 1,1145.97 tCO2 of avoided emissions.

Our energy transition plan is supported by our transmission asset rotation strategy. In 2022, EDP delivered and started operation of three important transmission lines in the Transmission segment of EDP Brasil. The final section of EDP Aliança SC, a partnership between EDP and Celesc Geração S.A., in the proportion of 90% and 10%, respectively. The delivery occurred six months before the schedule agreed with Aneel. The final section of EDP Transmissão SP-MG S.A., with delivery made three months ahead of the schedule agreed with ANEEL. This section consists of two transmission lines whose 1,533 towers pass through 30 municipalities, interconnecting the Estreito (MG) and Cachoeira Paulista (SP) substations. And started the operations of Mata Grande Transmissão de Energia LTDA (MGTE). Located in the state of Maranhão, MGTE consists of a 230-kV transmission line with a length of 113 km. In addition, EDP won the auction for Lot 2 in December 2022, located in the state of Rondônia. This lot has 188 km of transmission lines and great synergy with EDP Transmissão Norte, which is located in the same region and is already over 20% complete in construction works.

EDP Comercial

Since 2009, the organizational structure of the Commercial area went through reorganization steps to become a more competitive company, innovative and agile enough to take less time to lead the energy and service markets in the new energy transitions to the new energy paradigm, in the retail market of new downstream, while also becoming the preferred company of customers.

During this period, from 2012 to 2022, EDPC has promoted several protocols with sectorial and business associations to promote energy efficiency opportunities covering some of the more intensive processing industries as plastic, ceramic, chemistry, melting, textile and metallurgical, as well as the fast-growing tourism sector.

In the Business Plan for 2021-2025, EDPC has defined a set of strategic objectives for the B2C and B2B segments, regarding not only electricity but also new products and services aligned with smart grid solutions and reinforced the commitment to develop the energy solutions offer as an important differentiator and additional source of revenues and profitability.

The 2022 targets have also been declined in annual targets and specific action plans and commitments. Some of the EDPC strategic priorities for 2022 are:

- Extract value from the traditional core through a proactive market management and the penetration of new products/services.
- Innovate with new products/services, capturing blue ocean dynamics;
- Focus on efficiency optimizing the Client experience and the Talent attraction;
- Restructuration of the business in Spain with Solar/Mobility B2C and Energy/Services B2B;
- Diversification to new geographies coping business models applied on the Iberian Peninsula.

In 2022, EDP Comercial continued to invest in the international expansion of its activity through the companies created in Poland, Italy and France. Additionally, EDP maintained its position as a company more connected to people with the reinforcement of its brand and values: diversity, inclusion, sustainability and innovation are some of the values reflected in EDP Comercial, reflecting a company even closer to its customers, innovative and enthusiastic - and who is committed to being “the energy of people”. Finally, it is important to highlight the company's efforts to expand to new business models that are essential for energy transition, namely with the development of new products and offers in Solar Energy and Intelligent Mobility.

In 2022, numerous macro initiatives were maintained to boost the business, residential and innovative energy services offer.

In B2B segment, 2022 was the year that recorded an additional growth and consolidation of the solar distributed generation. We were able to successfully complete our product portfolio that is now available for all business segments from the smallest company to the largest. The SOHO is the fastest growing segment with more than 19MWp contracted in 2022.

Solar distributed, Mobility, Technical and energy efficiency solutions are the four main product families, surpassing 200 M€ of contracted value during 2022.

In the B2C segment, considering the leadership role it aims to assume in the energy market, EDP Comercial invested once again in the continuous development of innovative and differentiated products, as well as in a greater proximity and service quality to its clients.

In B2C, main achievements in solar energy worth emphasize with the installation of around 90.000 solar energy systems, we managed to lead this emerging market with an estimated 74% market share in solar.

Taking into account the leadership of EDP in the electricity supply market in Portugal, as well as the growing market's appetite for Energy Efficiency solutions, EDP remains in an excellent position to lead this market for energy services (as the main Demand Side Manager enabler) and maintain at the forefront of business models innovation, continually developed in pilot tests, with the support of EDP Inovação and external suppliers for further dissemination in the market.

In addition, EDP has focused on the area of electric mobility, being a priority in the group's strategic agenda. Not only motivated by the responsibility of responding to customers' needs, but also by believing that, in the long term, mobility will be an important business growth vector. EDP also argues that a collective effort is needed to ensure that transport makes the necessary contribution to the decarbonization, through a growing electrification of the fleets. EDP is at the forefront of EV charging infrastructure deployment in Portugal and 2022 was the year with the highest use of the public charging network operated by EDP.

In 2022, EDP led the CEME market with over 50k clients benefiting from one of the most attractive tariffs in the market for public charging:

- simplest solution for the customer: he pays the same for the energy regardless of the time and day to which it charges with 100% green energy;
- for customers with an EDP energy contract at home, the CEME tariff has a discount of 20%;

- charging an EV also became available through the new app EDP Charge with the integration of the CEME card on the app.

In addition, and for customers with an EDP Charger (home charging solution), we offered a flat rate plan for the house with a 20% discount in the off peak period.

Planeta Zero programme

Planeta Zero, aims to strength the relationship with the EDP Comercial, reinforce the positioning of the EDP brand in sustainability to the extent that it is a catalyst for sustainable activities that allow EDP, customers and partners to positively impact society. It also aims to promote the energy transition of consumers as it promotes the purchase of products and services that make it possible to achieve greater efficiency in energy consumption, and finally promotes digitalization and self-care through an integrated digital experience. The following achievements were realized:

- Planeta Zero reached 500 thousand customers after the first year of deployment. On this platform, the customer begins by knowing his potential for saving CO2 in electricity and is then invited to enter Planeta Zero where he will participate in initiatives that promote a more sustainable life. In each participation, the client receives Zs that allow him to have access to experiences, benefits and prizes that promote environmental and social sustainability.
- Planeta Zero promotes challenges that include changing individual behaviors, participating in voluntary actions, efficiency in energy consumption and adherence to more sustainable EDP solutions, such as Solar, Electric Mobility, Green Energy and efficient equipment.
- By participating, customers receive and accumulate Zs, which allows them to advance to higher levels and have access to prizes, experiences, benefits with partners and to vote on social and environmental projects. All prizes and benefits awarded under the program contribute to a change in behavior and range from the electric car draw to online workshops on waste and savings.
- Since the beginning the Planet developed voluntary and support actions for institutions such as:
- volunteering actions that included i) a partnership with the ERP, European Recycling Platform, in which for one month all EDP stores received small appliances from customers, ii) cleaning the beach with the Brigada do Mar association, iii) social support with the offer of Christmas baskets with the Defense of Life Movement and iv) association with Pinheiro Bombeiro; More than 100 costumers engaged in volunteer actions.
- Promoting support for institutions and associations related to environmental and social sustainability, through customers vote, allocating a total of 70 thousand euros.
- Planeta Zero went offline for the first time inviting everyone for the first sustainable Christmas market, with 20 brands, 20 live workshops with experts, efficient home appliances showcase and contest, recycle and reuse toys exchange and a upcycled Santa Claus. More than 20.000 people in the heart of Lisbon where able to experience these new Christmas market.
- By the end of June 2022, the program had reached 640 thousand registered customers and more than 200 thousand transactions. EDP ZERO was also considered by consumers as the best application in Energy, with the 5 Stars award and was elected Product of the Year.

In 2022, EDPC has generated EUR 464 million (vs. EUR 256 million in 2022) in energy efficiency services, including, for instance, energy audits and certifications, Save to Compete program and other initiatives. Please see EDPC's website with all offered products and services (https://www.edp.pt/).

E-REDES

In what concerns energy efficiency and energy transition, E-REDES, as the main Portuguese Distribution System Operator, has a public obligation and a mission to foster energy efficiency and act as a market facilitator to accelerate the energy transition, contributing to worldwide decarbonisation efforts, a more rational use of electricity, endogenous resources and reinforcing its position in terms of innovation and sustainability.

Focused on these goals, E-REDES has established an active coworking involving Universities, Manufactures,Research Centres, etc.,to develop the smart grid concept, an essential axis of the European energy policy with demanding goals on emission reductions, energy efficiency, integration of renewable energies and a more proactive role of the final customers. Furthermore, E-REDES also participates in R&D programmes, under the European Commission's Horizon 2020, promoting research and innovation fostering Energy Transition.

In April 2020, E-REDES concluded the Sustainable Berlenga Project. This project aimed to replace 3 diesel generators with renewable energy production. The solution is composed of 70 kWp of phovoltaic panels, 150 kWh of batteries, 1 emergency generator and inverters, remote control and monitoring system. In 2022, the system secured 95% of fully renewable energy supply to the island, avoiding 67 tons of CO2.

The FlexIP Pilot Project is another example of energy service, as part of the integration of intelligent solutions in street light network. This pilot allows the remote control of the public lighting system, with light flux adjustment reducing energy consumption by up to 70% without jeopardizing safety, comfort and functionality.

In accordance with the recent Decree-Law 15/2022, in 2022 E-REDES delivered to the Portuguese Government and to the Portuguese Regulator an update to the Development and Investment Plan on the National Distribution Network (High Voltage and Medium Voltage network) for 2021-2025, covering the 2023-2025 period. The updated plan, still to be approved by the Portuguese Government, presents a similar investment amount for the total 2021-2025 period fotering the access to new services as the previously approved plan for the 2021 – 2025 presented in 2020, amounting to 7,9 million EUR per year (considering only materials and labour).

In 2022 E-REDES installed more than 703 thousand smart meters in end-user's facilities, reaching more than 4.5 million smart meters (around 72% of LV instalations).

As for European research and innovation initiaves, E-REDES activily participate in several European projects and energy policies to promote Citizen/Consumer and Costumer engagement, Energy efficiency and Flexibility, including through DSM, in order to obtain a more inclusive and sustainable energy system. Several Projects, described in chapter 3.6, have been contributing to these aims, namely: InterrFace and XL Connect, EUniversal, Onenet and InterConnect.

EDP España

The European Commission's "Fit for 55" legislative package sets out a commitment to reduce net greenhouse gas emissions by at least 55% by 2030, as a target to make Europe the first carbon-neutral continent by 2050.

As a whole, and expanding on other objectives defined in the European Climate Law, the package defines legislative proposals and interconnected actions that align climate, energy and transport policies. Among them, increased use of renewable energies and greater energy efficiency is highlighted as one of the key drivers.

In the Customer Platform in Spain, EDP offers companies different projects to help improve their competitiveness and their involvement in sustainability, where the customer is put at the center, allowing them to actively participate in the transition to clean energy and its decarbonization, making their own decisions about their energy use. For this purpose, the products and services offered are detailed by segments and technologies, according to:

- Building projects, where fuel switching projects and preventive and corrective maintenance of boiler rooms are developed.

- Standard projects, where customers are offered a portfolio of "packaged" projects for solar self-consumption, efficient lighting, energy audits, transformation centers, integral maintenance services or value-added services that include corrective work, optimization or capacitor banks.
- Customized projects, such as ad hoc projects defined according to the specific needs of each customer.

In figures, in 2021, 17 fuel switching projects were carried out in the Building segment, with an estimated savings for customers of 5,446 MWh and 525 tons of CO2 avoided; in Customized, 317 projects, which include green energy sales, resulting in customer savings of 26,891 MWh and 7,103 tons of CO2 avoided; and in Customized, 99 projects, 13,126 MWh saved and 4,893 tons of CO2 avoided.

EDP Inovação

EDP Innovation is the key enabler for innovation within the EDP Group. It's an autonomous entity dedicated to innovation activities as well as fostering stronger links with the entrepreneurial ecosystem.

EDP Innovation aims to integrate in its business activities new technologies, processes, products, and innovative business models, in order to enhance competitiveness and create value for stakeholders. EDP Inovação follows an Open Innovation philosophy that engages and promotes adoption both from within and without.

The EDP Group's strategy update, recently public communicated, reinforced an ambitious growth plan, which foresees an unprecedented acceleration in the adoption of renewable energies, one goal being becoming a 100% green company by 2030.

This is a challenge of great magnitude that depends on a strong investment in innovation, directed towards a substantial increase in the capacity of development and rapid adoption of innovative solutions. This urgency was the basis to set an investment target of 1 billion euros in innovation by 2026, reinforcing resources allocated to this area and prioritizing the focus on innovation opportunities.

A revised innovation model was materialized in 2021 and addressed opportunities for improvement in terms of sharing knowledge about innovation in the Group, leveraged the potential for capturing synergies between projects and boosted the alignment of processes and best practices between countries.

EDP's innovation operating model is based on a fast adopter logic with a well-defined purpose of accelerating new businesses with impact and promoting the rapid adoption of innovative solutions to lead the energy transition. The model favors three innovation paths (one internal and two external) that act parallel and complementary, fed by a transversal sourcing process. The pathways are:

- Internal projects: implementation of an innovation portfolio developed internally, through a process in a metered financing logic, with gradual risk reduction between the stages of the process and with the aim of achieving scale-ups
- External investments: implementation and management of venture capital investments in external opportunities / start-ups, in order to accelerate the adoption of innovative solutions and businesses
- External partnerships: implementation of external partnerships (start-ups, corporates, universities, among others) in the same way to accelerate the adoption of innovative solutions and businesses.

Since its implementation, this revised innovation model, and its teams, already produced some notable accomplishments:

1. In terms of priorities and innovation strategy definition:
    - Execution of the Megatrends projects in which we structured and defined the hunting zones of the domains, which helped us to organize and define our focus in the coming years
    - Production of the EDP Business Plan Innovation Development in 2022

- During 2023, we will review our priorities as our hunting zones

2. Major achievements, in the three pathways described above, involving a set of different global teams to make it happen
    - Successful EBOs/ Projects along the innovation funnel (described in chapters 3.5 and 3.6): **Auto PV Installation, Going net Zero,** Ubiquitous Charging, Flexible Connections

- High Quality open ecosystem programs and pilots launched:
    - Elexsys - The pilot will demonstrate that the eleXsys dSTATCOM technology can assist EDP in growing their capacity to host more distributed generation capacity on local networks, whilst maintaining voltage and power quality and support the grid in phase balancing to reduce technical losses. The demonstration project will also be very important to start to engage this type of technologies in current processes in E-Redes (from grid planning to grid exploration).
    - Liveable Cities - The pilot proposal aims to install a multi application sensor in selected sites that will include Lighting Controllers, Air Quality sensors, speed sensors, that will be installed in public street lightining. These sensors will then be monitored through cloud services.
    - Simerse - Through simulated images from Simerse's Synthetic Grid™ system, a dataset will be used to train a convolutional neural network (CNN) to identify i) defective wires in images of transmission lines and ii) detect low voltage distribution cabinets with missing, open, or partially damaged doors. The model can be integrated into existing systems to provide a seamless and efficient solution for detecting defective wires or damaged doors. The models will generate 100.000 images that will feed existing models.
- Venture Portfolio strengthening, with investments on the companies Spotlite; aplanet; Mixenergy; Green Lion; Hysilabs; 77 sol; Terabase) and successful exits on Zypho, Enging, PPI and Arquiled
- Strengthening of EDP's technical knowledge and foresight capacity (production of technology primers, trends insights, engagement with partners and suppliers to support future venturing opportunities)
- "The Spiral" program, an intrapreneurship innovation culture-driven instrument, with 60+ applications and 10 strong finalists and a high level of engagement from the organization
- Remarkable Web Summit (in Lisbon and Rio de Janeiro) and two Immersion Program editions, fostering the innovation culture cross the organization
- "Somos Play" intrapreneurship program launch, with 7 final projects implemented across the organization
- Significant ongoing improvement of the innovation governance model fast forwarding decision making supported by the Global Innovation Steering and Global Venture Platform bodies, also based on constant feedback and best practice benchmarking
- Deployment of tools that improve innovation process and knowledge and ways of working (e.g., InnovHub innovation platform, Knowledge Center, JIRA activity planning)
- Growth and reinforcement of the Global Innovation Platform fostering the global innovation platform along the several geographies where the innovation team is represented.

SU ELETRICIDADE

SU ELETRICIDADE is the Portuguese Last Resort Supplier. Its main activities include the buying of all the Special Regime generation (Renewables + Cogeneration + Dispersed Production + Market Facilitator/Last Resort Aggregator) and, in spot and future markets, the sale of energy acquired and the buying of its customer's portfolio real consumption energy, as well as the supply of electricity to final customers, under regulated tariff.

Regarding the activity of buying the special regime energy production, being the grid connection power less than 1 MW, as the producers reach the end of subsidized tariffs, or specially in other cases, namely energy exported to the grid by self-consumption units, SU ELECTRICIDADE, since 2020, has a new function: Market facilitator /Last Resort Aggregator (Decree-Law 76/2019, from June 3rd, that was replaced by Decree-Law 15/2022, from January 14th). It should also be noticed that SU ELETRICIDADE will purchase energy from photovoltaic power plants in which the connection point to the grid have been assigned under the 1st solar capacity auction. Since 2021 SU ELETRICIDADE has participated in auctions for the sale of guarantees of origin, 15 auctions being already held. Due to the rise in prices in the wholesale electricity market, SU ELECTRICIDADE carried out the supplementary traders supply through auctions, establishing physical bilateral contracts with those traders. In this way, the company helped in the stabilization of retail energy prices.

It should be noted that the first micro-cogeneration contract was drawn up, in accordance with the Ordinance 173/2016, from June 21st.

According to its business principles, the company assumes as a fundamental pillar of its relationship with the customer the delivery of an exemplary commercial service (in accordance with the standards set by the quality of service regulation) and the ability to advise the client about the efficient use of electric power, as well as facilitating the transition to a cleaner and decentralized energy production and consumption communities. This will empower much more Demand Side Initiatives to be developed in the market or imposed by regulation, which are expected to increase significantly in the coming years.

SU ELETRICIDADE also has to provide information about market liberalization in Portugal, which is expected to be concluded by the end of 2025. The previous deadline of December 2020 was postponed to 2025 to ensure enough time for a smooth transition to liberalize players, as the regulated tariff still has around 1 million customers (5% of the market in energy volume) and will be maintained as a business commitment in alignment with the objective of a liberalized European Energy Market.

Also, during 2022, an easier-to-use tool was launched allowing consumers to choose and adapt behaviors to a more clean and efficient energy pricing tariff. Through the presence and remote of digital contacts, which were reinforced since 2020 and throughout 2021, SU ELETRICIDADE, as a last resort commercial player, migrated since 2021 the clients of commercial players that did not cope with the energy rising prices in the markets and went bankrupt.

Participation on the PPEC – National Program to promote Efficiency on Consumption (PPEC): during 2022, SU ELETRICIDADE, with its long experience of participation in this program since 2008 with tangible and intangible measures, participated in the public consultation of the new edition managed by the Portuguese Energy Services Regulatory Authority (ERSE) and submitted a new Educational Program to the 2023 tender the TWIST project. The main goals of this project are:

1. Spread and demystify the broad topic of energy efficiency and promote rational saving behaviors in the short and medium term using different approaches, thus contributing to the reduction of energy illiteracy and energy poverty;
2. Give notoriety and simplify access to more complex issues such as energy sufficiency, energy transition, carbon neutrality, circular economy and other sustainable development goals, placing them in the day-

to-day agenda of young people by highlighting the importance of these subjects for the future of the quality of life of our society;

3. Play an active role in empowering and involving young people as drivers of change in the population's behavior, in order to achieve the country's energy and environmental goals and commitments.

The project has two different phases:

1) the development of a digital platform for engagement and communication, named Energia Letiva, a central tool for this phase of the project which started in the last quarter of 2022 and will be active until July 2024. Aimed at teachers and all secondary school students (1º ao 12º anos), it will disseminate knowledge and activities, practices to be developed in a learning context, encouraging the student's motivation and emotional connection to these subjects;

2) The TWIST – a competition with a set of actions taking place in the academic year 2023/2024, for teams with teachers and students at high school (10º, 11º e 12º anos). The project aims to enhance a greater civic participation by young people, his focus relies on creating individual and group skills so that students organize themselves consistently, create solid social relationships and generate actions with a real impact on their school and/or local communities.

In accordance with the EU Directive 2018/2001, from 11 December, which was transposed into the Portuguese legal system through Decree-Law 15/2022, from January 14th, the concepts of renewable energy individual self-consumption and collective communities was regulated, allowing them to produce, consume, store, share and sell energy without increasing disproportional costs.

Solar Capacity Auctions: SU ELETRICIDADE assumed a new role in the 1st Solar Capacity Auction. This 1st auction for the allocation of solar capacity was held in July 2019, in which there was a very high number of competitors. The total capacity of 1004 MW was allocated within the scope of the guaranteed remuneration. Extensive work was been carried out to establish the model for the energy purchase contract. Procedures for the sale of energy on the market and the sharing of charges, including deviations from programming, were also approved. The first photovoltaic plants awarded in the July auction are expected to establish the power purchase contract with SU ELETRICIDADE by 2024. The 2nd solar auction took place in 2020, with 12 lots being auctioned, with a total power of 700 MW. There were very significant discounts based on the tender's bidding basis. The photovoltaic plants are expected to be completed by 2024. Energy storage capacity has also been tendered, which competitors may or may not submit.

Market aggregator: according to Decree-Law 76/2019, from June 3rd, that was replaced by Decree-Law 15/2022, from January 14th, the last resort supplier was assigned the role of market aggregator for power plants whose power is less than 1 MW. This set includes conventional plants, as well as production units for self-consumption. The purchase price of energy is the hourly closing prices of the daily market, allocated to the Portuguese area of the Iberian Electricity Market. A charge will be billed to the producers, which include deviations from the schedule programming and a fixed tariff of 0.026 €/kW of installed power. During 2022, SU ELETRICIDADE was the aggregator of around 2 060 producers, with total installed capacity of 68,5 MVA and acquired about 16,3 GWh, representing roughly 2 M€.

Green Certificates: also noteworthy are the Guarantees of Origin (GO), which are electronic documents that prove to the final consumer that a certain amount of energy was produced from renewable sources, were implemented in 2021. SU ELETRICIDADE was designated as the entity responsible for placing these guarantees on the market through auctions,. From 2021 to the end of 2022, 13 auctions took place – whose total net income (EUR 61,7 million) were assigned to the National Electric System, allowing the reduction of access costs and thus slightly mitigating the energy costs.

Coming Prospects: the progressive use of solar energy, either through conventional power plants subject to auction, or through small production units or production units for self-consumption will occur. It will be a

challenge for distribution networks to operate in an active way and increase grid smartness to provide added value to consumers. The excess production of renewable energy and the development of new and dedicated renewable power plants may support the production of green hydrogen, taking advantage of the high renewable resources of the country, promoting economic growth and reducing the country´s energy dependence.

With regard to wind farms, namely floating, the expansion will involve the sea and the implementation of off-shore power plants, of which there is already a prototype of 25 MVA. With regard to new technologies, SU ELETRICIDADE will also play a role in the growing market of the implementation of hybrid power plants associated with photovoltaic solar plants resulting from the first auction. SU ELECTRICITY will be responsible for monitoring the equivalent hours of use of those solar plants and the application of penalties in case of non-compliance.

3. CLIENT-FOCUSED PRODUCTS AND SERVICES

Throughout its value chain, EDP offers a wide variety of Energy Services related to its electricity and gas activities, ranging from the ashes and gypsum resulted from the electricity generation, to the decentrilized solar solutions offered by the supply companies.

Energy services are classified into ten categories, which were established within the EDP Group by taking into account the comprehensive concept proposed and developed by Bertoldi & Rezessy of the European Commission (Energy Services Guide for the EDP Group):

1. Energy analysis and audits.
2. Project design and implementation.
3. Energy management.
4. Monitoring and evaluation of savings.
5. Maintenance and operation.
6. Property/facility management.
7. Energy and/or equipment supply).
8. Provision of service (space heating/cooling, lighting, etc.).
9. Integrated energy systems[1].
10. Other energy services.

The set of measures envisaged in the European Commission's policy framework "Energy Clean For All EUropean", in the downstream segment, retail and services, where Europe wants to strengthen customer protection, renewable energy penetration and energy efficiency targets and consequent reduction in emissions, are in total alignment with EDP's vision in the commercial business and business targets. Since 2009, EDP has been developing a strategy and enabling the company to leverage the energy transition, the technological change and acess in the energy retail market to develop and supply innovative offers of decentralized generation, distributed storage and electric mobility with increasingly scale in the retail market.

In terms of business alignment via KPI's, EDP Group has implemented sustainability indicators for all companies, areas and employees since 2017, which in case of the supply companies, enables the development and achievement of the DSM and EE strategy and targets.

3. PRODUCTS AND SERVICES

In 2022, the EDP Group generated around EUR 491 million revenues from energy efficiency products and services (up 88% vs. 2021) and invested EUR 197.7 million, which represents 3% of EDP's gross CAPEX. It is expected this % to increase to 8.9% by 2026 based on projections from the 2023-2026 Business Plan.

Some of these products and services are described in the following subchapters by energy services category, and main improvements during 2022 are highlighted.

For each category, a brief description of the type of products and services covered is provided, based not only on the comprehensive concept proposed and developed by Bertoldi & Rezessy of the European Commission, but also on EDP's reality in terms of services provided throughtout its value chain (Energy Services Guide for the EDP Group).

[1] New category, introduced by the EDP Working Group, when services cover more than one category.

3.1.1. Energy Analysis and Audits

The company acts as a consultant in energy rehabilitation, provides energy analyses for identification of actions with improved profitability to obtain the desired reduction in energy consumption.

3.1.1.1 Energy audits (Portugal | B2C and B2B segments; Spain and Brazil | B2B segment)

Energy audits are made available by EDPC both for B2C and B2B segments. In Spain and Brazil this services is carried out only for B2B customers. A remote auditing was launched to fasten penetration of this basic initial service. In Spain, following the publication of the Royal Decree 56/2016, a periodic conduct of energy audits in large companies was made mandatory. This has triggered the contracting of this type of services by EDP, resulting in 34 contracts to audit 546 installations that consume 408 GWhe and 79 GWht.

In 2018, Equipment Check-up was launched as an integral part of the Funciona service, with 87.545 check-ups being carried out since then. The Lighting auditing service was called Lighting Check-up, and 52.164 check-ups were performed.

In 2022, 1 company were audited in Spain (GEMRA).

3.1.1.2 Energy certification (Portugal and Spain | B2C and B2B segments)

Energy certification are available for both B2C and B2B segments in Portugal and Spain, with EDP quality assurance, which is mandatory when buying/selling real estate.

In Portugal, EDP is the market reference since 2012, with over 110.000 Energy Certificates issued to date.

A gas certification service, aiming at facilitating gas contracting and subsequent promotion of the dual offer (electricity + gas) is also provided by EDP. In 2022, EDP sold around 27.000 Gas certificates in Portugal to the B2C segment.

3.1.1.3 Improvement in power quality (Spain | B2B segment)

EDP identifies energy supply anomalies and alternatives to a better service supply, adjusting it to the requirements of the productive processes.

Also, EDP acts as a legal advisor to occurrences that affect the quality of supply.

3.1.2. Project Design and Implementation

This category includes the design of a project including demand management measures as a priority. Energy needs are covered by more efficient energy supply / equipment whenever economically feasible.

3.1.2.1 Efficienct Lighting (Portugal and Spain | B2B Segment)

EDP Comercial has developed an efficient lighting offer for B2B customers that guarantees companies the reduction of their costs, ensuring the maintenance of the luminous comfort levels of the installations.

Through the Save to Compete new platform, now it's possible for the client to simulate the annual redution potencial of each business electricity installation and choose between two different options: retrofit or replacement. Both solutions use more efficient and longer lifespan technologies, such as LEDs.

In 2022, 1 efficient lighting project was developed in Spain (SAINT GOBAIN PLAKO).

3.1.2.2 Advisory Energy Service (Portugal and Spain | B2B segment)

EDP acts as an energy advisor, allowing industrial and commercials customers to have a more rational use of energy, minimizing energy costs.

An on-site study is performed to understand the processes' requirements and to maximize fuel use efficiency.

Improving areas such as lighting, motors and variable speed drivers, climatization, heating and cooling processes are identified.

A detailed report is developed regarding the actual situation and the proposed measures. Assistance on measure implementation is provided.

In Portugal, during 2022, the Customized Projects area contracted more than 500 Projects for a total amount of more than 100 M€. In Spain, the main projects have been solar self-consumption projects. Further details are presented in section 3.2.

3.1.2.3 B.O.T (Portugal and Brazil | B2B segment)

This service (Build, Operate and Transfer) includes the design, operation and maintainance of measures to achieve the final energy use defined in the energy contract.

3.1.3. Energy Management

The company acts as a consultant, providing energy demand management measures.

3.1.3.1 Energy management systems (Portugal, Spain and Brazil| B2B Segment)

In Portugal, there is a regulatory framework, the SGCIE (Sistemas de Gestão dos Consumos Intensivos de Energia - Intensive Energy Consumption Management System) that aims to certify and promote energy efficiency in the industry segment. This framework sets a compulsory certification for installations with consumption equal or higher than 500 tep/year. The "Gestão de Consumo" (an energy management system) is an energy service developed in-house that aims to simplify energy management for Industry and Commerce/Services sectors. Two innovative packs are available covering a set of services that simplifies regulatory, administrative and operational requirements on energy management for customers. Companies may obtain online and in real time their electricity, gas and water consumption, perform historic analysis, consumption trends and benchmark analysis (https://gestaoconsumos.edp.pt/#login). This programme proposes 3 levels of services:

- **Light:** innovative, low cost service including electricity consumption (main electric meter);
- **Standard:** innovative service performing real time analysis of consumptions (electricity, gas, water and others), aiming at controlling, analysing, predicting and comparing partial inter-site consumptions within the company and carrying out national/international benchmarks;
- **Premium:** Similar to the standard service, but customized to the client's business, with detailed models of analysis and advanced forecast of consumption, tariff simulation and personalised alerts in real time.

An equivalent system is available in Brazil - SGE (Sistema de Gestão Energética – Energy Management (GE) System: control of the entire energy consumption (electricity, gas, water and others) aimed at reducing energy losses).

3.1.3.2 TRE (Portugal | B2B Segment)

EDP Comercial makes available an Operational Technician reponsible for the facilities (TRE - Técnico Responsável de Exploração), as well as for facilities well-functioning and energy decision making. During 2022, 35 customers used this service for a total amount of 36 k€.

3.1.4. Monitoring and evaluation of savings

The company acts as a consultant as part of an energy services contract.

3.1.5. Maintenance and Operation

The company acts as a consultant as part of an energy performance maintenance

3.1.5.1 Funciona (Portugal | B2C and B2B segments)

For the residential and business segments, EDP's B2C portfolio includes Funciona, a value added service that provides technical assistance to the main kitchen appliances and urgent repairment services, contributing to the increase of the customers' safety, savings and comfort.

In 2019, in order to increase the penetration of value-added services in the energy portfolio, EDPC started to commercialize Funciona in a bundle of services named Packs Living EDP. These solution beyond the offer of technical assistance, brings also some other value-added services, such as 100% green energy, an health plan, energy management equipment and advantages in exclusive partners, providing EDPC customers with a higher quality of life and more sustainable consumption habits.

The energy management functionality is a novelty launched in October 2021 that provides simple and detailed information about each customers electricity consumption, giving forecasts of the invoice values in the middle of the month and guaranteeing the automatic sent readings, avoiding estimates in the invoices. In the year 2022, we launched two new features in this functionality that allowed the clients to view a breakdown of energy consumption between different appliances, and the ability to send out alerts about excessive consumptions.

Despite the challenges imposed by the COVID-19 context on the commercial performance of the sales channels, more than 350.000 sales of Packs Living were achieved in 2021, thus been possible to reach the annual portfolio objective. The new energy management that we included in the offer in 2021 and the news in the health plan offer, also contributed to the good results.

In the year 2022, the context of high volatility in the energy sector had a significant impact on the sales of its value-added services. Despite these challenges, the company was able to achieve 203,000 sales of its EDP Packs. This, in conjunction with a lower churn rate, allowed the company to reach its goal of approximately 571,000 subscribed customers, including both Funciona Standalone and EDP Packs.

Additionally, around 17.206 B2B Funciona customers were part of the service by the end of 2022.

3.1.5.2 Integra (Spain |B2B segment)

Energy service developed to provide facilities maintenance and technical assistance to customers, available in two levels of services:

- **base**, that includes planned maintenance and access to online systems for real time control of electricity consumption;
- **premium**, that includes planned maintenance, technical assistance, access to electric generator if necessary and the online system for real time electric consumption control.

3.1.5.3 Energy Performance of Buildings (Portugal | B2B Segment)

EDP offers an integrated solution for building certification under the Regulation on Energy Performance of Buildings (RECS - Regulamento de Desempenho Energético dos Edifícios).

In a first phase, an energy audit is conducted to identify improvement opportunities. The management of the HVAC systems is done in order to guarantee an efficient operation of the systems and to issue the energy certificate.

3.1.6. Property/Facility Management

The company acts as a consultant, increasing the knowledge of end customers as owners/managers of facilities.

3.1.6.1 Facilities refurbishment (Portugal and Brazil | B2B Segment)

EDP conducts construction and refurbishment projects of electric or natural gas installations to adjust to customers' business needs.

3.1.7. Energy and/or Equipment Supply

The company provides power (green) under specific schemes and/or installs equipment and/or replaces obsolete equipment with more efficient devices.

3.1.7.1 PPEC (Portugal | B2C and B2B Segments)

EDP participates in the Plan for Promoting Efficiency in Electricity Consumption (PPEC) since 2007, promoted by the Portuguese Energy Services Regulatory Authority (ERSE - www.erse.pt). Launched every two years, PPEC is a voluntary programme based on a national tender in which all electricity related entities may participate, encouraging the implementation of measures for the adoption of more efficient habits and equipment by the different segments - residential, commercial and services, industry and agriculture. The programme considers either tangible measures (e.g. variable speed drivers, high efficiency motors, CFL and LED bulbs, etc.) or intangible ones (e.g., awareness of good practice in energy use, education projects in schools, etc.). EDP is participating actively in PPEC through EDP Comercial and SU Eletricidade.

In the last call launched in 2021, the following measures submitted by EDP were approved:

- "Energy Footprint" - carbon footprint calculation game

- TWIST – Educate and raise awareness on energy efficiency

- Energy Storage Solution - Industry and Agriculture

- Energy Storage Solution - Commerce and Services.

3.1.7.2 Heat pumps and water heating systems (Portugal and Spain | B2C and B2B segment)

In B2C segment, EDPC sells heat pumps, Intelligent Water Heaters, and Gas Instant Boilers which are the most efficient in the market. Part of this services were leveraged in PPEC initiatives. In 2022, EDPC sold and installed over approximately 2.500 efficient water heating solutions. In EDPC website, detail information and a simulator are provided, where customers can assess the best solution for their specific needs and the potential generated savings.

The EDP Comercial, water heating integrated systems for companies focus on boilers, heat pumps and thermal solar systems.

All B2B solutions include the following steps: design the system; replacement of the equipment; optimization of the system use; and periodic maintenance.

3.1.7.3 Compressed air system (Portugal and Brazil | B2B Segment)

The optimization of compressed air systems includes integrated solutions in the several process phases: production, storage, treatment, distribution and use.

3.1.7.4 HVAC System (Portugal and Spain | B2C and B2B segments; Brazil | B2B segment)

Integrated solution for HVAC systems optimization, from the design to the system installation and maintenance.

In 2018, EDPC launched HVAC Systems for the B2C segment. In 2022, EDPC sold and installed over 1.100 HVAC systems.

HVAC systems may have a high impact on energy costs of companies, typically between 30 and 40% of the electrical consumption of commerce and services buildings. All B2B HVAC integrated solutions are composed by the following steps: design the system; replacement of the equipment's; optimization of the system use; and, periodic maintenance. These optimization systems allow savings until 30% of the energy consumption and ensure comfort and safety for building users.

3.1.7.5 High Efficient Motors ans Variable speed Drivers (Portugal, Spain and Brazil | B2B Segment)

About 77% of the industry's electricity consumption is used in electric motors. The motors are used in a wide range of applications, such as pumps, compressors and fans. The high percentage of electric power they consume makes them one of the main potentials for saving electricity. High-performance engines are thus an important technology in reducing power consumption. EDP Comercial installs more efficient motors, replacing obsolete ones.

3.1.7.6 Green Electricity (Portugal and Spain| B2C and B2B Segment)

EDP Group invests in the decarbonisation of electricity generation, through organic growth focused on renewable energies and electrification of consumption, promoting energy efficiency, smart grids, distributed production from renewable sources and electric mobility .

Electricity production has an impact on the environment according to the primary energy source used. The use of renewable energies has less environmental impacts when compared to the use of non-renewable energies.

By December 2022, EDP had 739,312 B2C electricity customers with an electricity offer 100% from renewable sources, and 1,258 B2B customers, representing a total annual consumption of 1719 GWh and 366 GWh respectively.

Regarding the B2C market, since 2021 EDP's green electricity customers increased 1,4 times, representing in 2022 around 21,1% of EDP's total electricity residential clients.

In Spain, 4.274 GWh were certified as "green" electricity, as they were marketed under the Guarantees of Origine scheme.

3.1.7.7 Home Appliances (Portugal, Spain and Brazil | B2C Segment)

As part of a broad energy efficiency strategy, EDPC addresses the equipments that are the most responsible for the home electric consumption. In 2018 EDPC started selling home appliances such as fridges, washing machines, dryers and dishwashers.

The main driver was the efficiency, all the equipments were carefully curated as highly efficient. EDPC allowed its costumers to pay for these equipments in 24 months with no interest, this empowered the

clients to switch from old unifficient equipments to new and efficient ones. In 2022, EDP Comercial sold approximately 10,000 home appliances leading to a total portfolio of more than 35,000 installed equipments since 2018.

3.1.7.8 Casa Elétrica EDP (Electric Home) (Portugal | B2C Segment)

The scale of butane and propane consumption is still a problem in Portugal. The pollutant potencial and the high cost to costumers are the main reasons to invest in other solutions least expensives and more sustainables. Given this scenario, EDPC created a bundled product of electric cooking appliances and water heating equipments that can replace the butane or propane old appliances. All the electric installation adaption is bundled in the service.

This switch enables savings in energy consumption and a much smaller carbon footprint. Just like in the home appliances, EDPC allow its costumers to pay these service on a monthly basis, up to 48 months with no interest.

This service already accounts for more than 100 installations.
(https://www.edp.pt/particulares/servicos/casa-eletrica/).

3.1.7.9 EDP Solar Energy (Portugal, Spain and Brazil | B2C and B2B segments)

All activities under this service are detailed in chapter 3.2

3.1.7.10 Voltage Level Increase (Portugal, Spain and Brazil | B2B Segment)

The voltage level increase involves the installation of a voltage transformation station and its connection to the existing electric facility. EDP offers this service, so customers have access to appropriate electricity supply, in accordance to their energy needs. During 2021, this service was contratted by 5 new customers in Portugal with a total investment of 5M€.

3.1.7.11 Efficient Lighting (Portugal, Spain and Brazil | B2C and B2B Segment)

Efficient lighting solutions for small and medium-sized enterprises, allowing them to reduce costs and, at the same time, ensuring the maintenance of lighting comfort levels. Costumers may opt for the following two solutions: replacing light bulbs with more efficient ones and replacing the entire lighting system.

In December 2018, the PPEC initiative “Replace your light bulbs with LEDs” for the B2C segment was launched with an ATL campaign. In only one month over 100.000 lamps were sold.

During 2021, this service was provided to 6 B2B customers with a total investment of 188 k€.

3.1.8. Provision of Service

The company guarantees the supply of an energy service that will generate lower cost to the customer.

3.1.8.1 Re:dy (Portugal and Spain | B2C segment)

This domestic electricity consumption monitoring and active management service was first launched in Portugal in 2013.

When initially launched, the service allowed customers to monitor, control and manage household consumption in real-time, namely remotely turn on and off appliances, schedule tasks, automate the working and control the consumptions of electric appliances from anywhere, via an internet portal and smartphone (iOS and Android) – https://www.edp.pt/particulares/servicos/redy-en/.

To make it possible, the service relied on a set of hardware – re:dy Box, re:dy Plug, re:dy Meter, re:dy Switch and re:dy plug A/C – a platform developed and deployed on EDP's cloud where the service is configured, and a set of native mobile applications plus web portal for remote access.

Some of the energy efficiency features available are:

- Scenario programing according with the users needs habits and away periods.
- Individual equipment control and energy consumption analysis.
- Alert that helps the client to eliminate waste of energy.
- Advice on the best tariff and optimized contracted power.
- Reception of monthly personalized consumption analysis reports.
- Air conditioning remote IR control

As the service and solar offer evolved, EDP Comercial decided to refocus the service making it the default Iberian B2C solar monitoring solution to be jointly offered with every solar panel sold by EDP Comercial in Portugal and EDP Solar in Spain. That approach implied a reshape of the hardware and software features: the re:dy box and re:dy plugs were discontinued and a new re:dy meter, wi-fi based, was developed allowing the customers to monitor their solar production, self-consumption (and thus, savings) and grid consumption / injection. With this, the customer is able to understand exactly how to optimize his consumptions to extract the most of his solar installation and reduce the consumption from the grid.

By the end of 2022, more than 56k customers were benefiting from the EDP Re:dy service.

3.1.8.2 Set of energy services for B2B segment

Power factor correction*	Thermal-Heat recovery	Variable speed drivers	Solar Hot water production	Public Lighting (LED)
Portugal, Spain and Brazil	Portugal	Portugal, Spain and Brazil	B2B segment in Brazil	B2B Portugal and Brazil

* inclusion of a new approach which consisted in the rental of the Battery to EDP Comercial that managed the consumption of the installation and guarantees the exemption of the reactive payment during the contract period.

3.1.9. Integrated Energy Services

The company acts as a consultant in areas related to energy supply and the installation of more efficient equipment and/or the rehabilitation/refurbishment of buildings, including the integration of all the above energy services categories.

3.1.9.1 Save to Compete (Portugal and Spain| B2B segment)

In 2017, following the needs of business decision makers and the new Marketing trends, EDP focused on the re-launch of *save to compete* program, now with an innovative self-service platform, in which each consumer can easily access to the company energy efficiency opportunities. They can simulate and create their own proposal and even upload it already signed.

This is a new paradigm shift for the energy efficiency services sales in SMEs market. This program already saved 27 million euros to the companies and avoid 100 thousand tons of CO2 emissions.

In 2018, Save to Compete program launched two new products, Operational Technician responsible for the facilities (TRE - Técnico Responsável de Exploração) and Maintenance of Transformer Stations (MPT – Manutenção de Postos de Transformação).

The platform won the “Prémio 5 Estrelas” (Five Stars Award), regarding the category Energy Efficiency B2B in 2018 (https://premio.cinco-estrelas.pt/vencedor/edp-2019/edp-save2compete/).

3.1.9.2 Cuota Ahorro (Spain | B2B segment) and E:ficient (Brazil | B2B segment)

In line with the Save to Compete concept, through Cuota Ahorro in Spain and E:ficient in Brazil EDP makes a complete facilities’ assesment, implements the energy efficiency projects and invests on customers’ facilities. A part of the generated savigs is used to pay EDP’s invesments.

3.1.9.3 Energy Efficiency Programme – PEE (Brazil | B2C and B2B segment)

Since May 2016, distributors have to allocate 0.4% of their net operational revenue to energy efficiency programs, on a yearly basis. Prior to that, the mandatory allocation percentage was 0.5%, according to the national regulatory entity requirements (ANEEL - National Agency for Electrical Energy). In 2022, the Company invested R$32.23 million in energy efficiency initiatives with Distribution customers, which led to energy savings of 10 GWh/year in São Paulo and 16.15 GWh/year in Espírito Santo, resulting in approximately 1,145.97 tCO2 of avoided emissions.

3.1.10. Other Energy Services

The company acts as a consultant in areas related to energy supply and the installation of more efficient equipment and/or rehabilitation/refurbishment of buildings not covered by the above categories.

3.2 Distributed Generation

3.2.1 Portugal

In 2021, EDP Comercial launched a new solar energy ATL campaign with the aim to increase the access to electricity production by self-consumption. Customers who subscribe to EDP's solar energy are also entitled to an exclusive energy tariff, that provides 10% discount on the electricity consumed from the grid, and to EDP's Solar service, which allows customers to monitor the production of their solar system, know how much they are saving and manage their home energy consumption.

2021 was also marked by the overcoming of the commercial objective, with more than 21,000 installations of which approximately 17% were “premium” range with monocrystalline solar panels. In order to improve the solar customer experience, during 2021 the new solar simulator was developed and several communications were launched such as the welcome call and the Solar user guide.

During 2021, solar energy storage solutions were launched with a pilot and soft launch model during the 2H21. The product roll-out started in 2022.

EDP Solar Energy Solutions enable companies to produce and consume their own electricity and reduce bills. Solar Energy is captured by a set of photovoltaic panels that transform it into energy power. When there is extreme production, it is sold to the grid.

EDP Comercial makes available to its B2B customers in Portugal different payment methods. In 2022, EDP C contracted more than 2.000 solar plants for a total amount of 140M€.

3.2.2 Spain

EDP has a commercial portfolio that exceeds 17 TWh of marketed energy, between electricity and gas, with customers such as Adif , with whom it has the largest electricity contract in Spain.

Self-consumption of energy alone is one of the company's priorities. It is an energy solution that boosts savings, sustainability and the competitiveness of companies. EDP already has a portfolio of almost 110MWp, and maintains alliances with partners of national and international relevance, such as CaixaBank, which bring the most innovative integrated solar energy solutions to customers.

In the B2B segment, during 2022, self-consumption projects executed amounted to 221, with a total equivalent of 47,368kWp.

It is worth highlighting the growth of installations in Asturias, one of the areas with the lowest solar radiation in Spain, but where this type of installation also brings benefits. According to the IDAE , the energy generated in Asturias is only 1.085 kWh/kWp, compared to a national average of 1.42 kWh/kWp.

Likewise, the impulse to this type of installations has been given by the development of the contractual modality As a Service, where the owner of the company and implementation cover does not need to make an initial investment, but allows to provide energy directly to the productive processes of the companies, improving their energy autonomy, generating savings and reducing their carbon footprint.

Large companies have also relied on EDP for the implementation of photovoltaic installations in a multi-site, national and international format. The simultaneous project model in several locations allows synergies in management and advantages in the overall operation of the projects compared to an individual model.

Based on clients who were interested in multi-site projects that included installations in France, it was decided to go for a model of organic expansion to that region with Solar DG France, relying on local developers and agents. To date, the customer portfolio exceeds 130MWp.

One of the most outstanding projects in 2022 has been the one executed at Cárnicas Frivall, at its plant in Villar de Olalla (Cuenca, Spain). The installation has a power of more than 4,500 kWp and will enable the meat company to reduce its electricity consumption by 30% per year. This is EDP's largest self-consumption installation for industrial customers in Spain to date, with almost 8,500 photovoltaic modules occupying a surface area of 45,000 m2. Annual production will be around 7,500 MWh, equivalent to the average annual electricity consumption of more than 1,850 homes, avoiding the annual emission of more than 2,000 tons of CO2 into the atmosphere, which would be equivalent to planting 12,500 new trees.

And among the multi-site projects, Faurecia, a multinational automotive components group, has signed a global alliance to install up to 100 MWp of solar energy at Faurecia units in Europe, Asia and the United States.

By the end of 2023, it aims to install more than 60 self-consumption solar farms at the multinational's factories in Portugal, Spain, Italy, the United States, China, South Korea, Japan and Thailand. This is the largest distributed solar energy project ever undertaken by the EDP Group and the first to be installed with the same partner on several continents simultaneously.

EDP Solar - Spain

The B2C segment is experiencing a real explosion in Spain. EDP Solar has added a total of 12,946 new contracts, representing a total of 58,368kWp.

This deployment responds to a customer who is increasingly convinced of the need to opt for clean, sustainable energy that generates substantial savings from the outset.

One of the key levers of the business has been the signing of collaboration agreements with business partners, including CaixaBank, with whom EDP Solar has created a commercial package focused on photovoltaic installations, with financing under advantageous conditions, such as a 3-month grace period. The commercialization is done online through Wivai, where the customer can directly select the product and choose whether to finance it in installments of up to 120 months between 0% and 3% APR. CaixaBank customers have immediate access to the financing through their manager.

The good reception in the market of the joint CaixaBank and EDP proposal, in a context in which energy efficiency has become a key issue, has helped to strengthen this alliance. Thus, CaixaBank has strengthened the range of solutions for the home 'MyHome', and on the other hand, EDP has expanded the range of products linked to sustainability for private homes with new complementary proposals to solar panels, such as the installation of energy storage batteries.

Thanks to this agreement, CaixaBank and EDP aim to reach 100,000 self-consumption photovoltaic installations by 2025. This figure is equivalent to the planting of 9 million trees and would avoid the emission of 150,000 tons of CO2.

It would also facilitate an estimated saving of 80 million euros in the electricity bills of the people who install this equipment. The implementation of a photovoltaic installation for self-consumption in a home generates annual savings in electricity consumption that can reach up to 50%. In addition, customers can benefit from further advantages, such as the compensation of surpluses, whereby they receive a discount on the bill for the energy that is generated and not consumed. Likewise, depending on the municipality where the panels are installed, they are eligible for subsidies and tax rebates covering up to 35% of the cost of the installation.

Also noteworthy is the alliance between EDP and the real estate portal Fotocasa, which has launched a website that allows users to calculate the savings in electricity consumption when installing solar panels.

Through this website, any user can find out, by geolocating the home, whether it is suitable for solar panels and calculate the savings that would result from their installation.

3.2.3 Brasil

Focused on meeting the growing demand for energy consumption in Brazil, EDP have been engaged in the search for new end customers in the regulated and non-regulated market, through large investments in distributed and centralized solar generation. EDP's strategy is to provide cheaper and cleaner energy. The solar energy front has many business models:

- Regulated market:
  - Local self-consumption: The plant is in the same location as the consumer unit, which aims to produce solar energy on roofs and in garages. In this case, the energy is generated and consumed at the same time;
  - Remote self-consumption: The plant is leased exclusively to a single company, preferred by customers who do not have the physical space for power plant. In this case, we generate energy in the same concession area where the customer is located, which is injected into the grid and compensates for their location consumption;
  - Shared Remote Generation: Model consolidated in 2022, mainly due to the regulation of Law 14,300, which allowed greater legal certainty for the solar business (Micro and Mini energy from photovoltaic generation).
    Shared Remote GD is one of the distributed generation models and saw its growth in 2022, due to its financial and environmental appeal and without the need for effort by the customer, becoming the focus of EDP's B2B solar growth strategy. The modality makes it possible to share mini or micro-generation energy between two or more consumers, as long as all the participants are in the same concession area and can be used by a group of individuals or legal entities, through a consortium or cooperative, in locations served by the same power distribution network. Through the initiative, it is possible, for example, to share photovoltaic energy between SMEs (Small and Medium Enterprises), helping them with their financial structure and providing renewable energy for all of them.
    The Shared Generation also offers a number of advantages, as this model does not require initial investment by the customer and does not require installation or construction at the consumption's area, nor does it provide for time-consuming contractual obligations, moreover this business model can offer a range of discounts 10-15% off retail tariff (currently regulated tariff) for lifetime.

- Non-regulated market:
    - Large customers: For customers searching for predictability and guarantee that the source of the energy purchased is renewable, EDP offer the solution of traditional PPA or a self-consumption modality in large remote solar plants. In this last segment, we have focused on long-term contracts, where we develop the plant and lease the plant for a pre-established period, or we enter a partnership with the client, both with energy cost predictability over time and many advantages. The solar plant does not need to be in the same region as the consumer, EDP is responsible for managing the plant, and, in most cases, no investment will be required by the client.

In addition to solar generation projects for large companies such as Arcos Dourados, Drogaria Araujo, TIM, Farmácia São João, Intermédica, Claro and Banco do Brasil, our first Shared Generation projects are already being marketed and will soon be offsetting clean and cheaper energy for several SMEs (small and medium-sized enterprises) in the states of Rio de Janeiro and Minas Gerais. In 2022 alone, we added over 50 MWp in this modality through new contracts, amendments to existing contracts and plants aimed at Shared Generation, which shows our commitment to the energy transition in Brazil and worldwide.

By 2025, another 467 MWac will be added to the installed capacity of the farms, thanks to the operation of two projects carried out in partnership with EDP Renováveis in the Solar Utility Scale segment: the Monte Verde Solar and Novo Oriente solar farms.

3.3 Electric Mobility

EDP committed, in a pioneering way, to promote electric mobility over the next few years. The objectives now outlined are in line with the conviction that combating climate change and decarbonizing the economy will involve greater penetration of renewables and the electrification of consumption, particularly in the transport, heating and cooling sectors.

Along with the strategic objectives of achieving 100% renewable installed capacity in 2030 and reducing its specific emissions of CO_2 by 90% in 2030 vs. 2015 levels, we are actively contributing to accelerating the transition to sustainable mobility. EDP is now committed to achieving a 100% electric fleet (light-duty vehicles) by 2030, which will require a strong investment in the renewal of its car fleet. This transition will now be accelerated and will allow a 70% reduction of the CO_2 emissions of the overall fleet, consisting of close to 4000 service vehicles. EDP is also targeting the installation of 40,000 public and private charging points by 2025 in the differente geographies where we have supply activity (Portugal Spain and Brasil).

3.3.1 EDP Comercial

EDP Group - particularly EDP Comercial - is committed to keep on developing new commercial offers and solutions that promote the electrification of transport and improve the customer experience of EV users, both on the road and at home / work.

EDP has a renewed website with relevant information to help customers overcome the initial barriers of this new paradigm of sustainable transportation and with a simulator to help costumers choose the best solution for their electric veichule accordingly with their mobility profile and their home electric installation (https://www.edp.pt/particulares/servicos/electric-mobility).

In 2022, EDP Comercial did a huge digital transformation in Emobility ecosystem, which results in the launch of a new mobile application and web portals.

EDP Charge app integrates several Emobility uses cases, allowing clients to charge at public network, home and workplace. Using this new application, clients are able to check the availability of chargers, make cost simulations of charging session, start and stop digitally, including other new features that brings a new and seamless experience to EDP customers.

The new EDP Charge Portals, for condominiums and B2B clients, allow diverse charger management functionalities, monitor charging sessions and take remote actions on chargers that give clients self-sufficiency and flexibility in chargers management.

Smart charging was also launched in 2022. It offers a more convenient way of charging electric vehicles when electricity available power is lower. With the exponential growth of mobility, this topic has been one of the clients' main concerns.

In terms of charging solutions for B2B segment, the offer available on the Save to Compete, a platform of EDP Comercial that allows access to customized energy efficiency recommendations and technical services adapted to the business, has been updated with charging solutions suited to the real needs of business customers, both for proven access spaces and public access spaces, with different levels of customization and, also, available as-a-service.

For B2C segment, the offer of charging solutions includes the installation of renewed solutions for electric vehicles (EV) charging stations, both homes and condominiuns:

- Premium Charger EDP - up to 22kW of charging power, with online charger management through EDP Charge app;
- Standard Charger EDP – up to 7,4kW of charging power, with dynamic smart charging which manages peak energy consumption between costumers home and the car;
- Light Charger EDP – up to 22kW of charging power, a simple plug & charge solution with possibility to configure the charging power which best suits the home electric installation;
- Plug-In EDP – up to 3,7kW of charging power, a safe outlet, suitable for Plug-In hybrid vehicles, electric motorcycles or 100% electric vehicles that travel few kilometers each day;

EDP leads the CEME market - the market of public charging - with over 50k clients benefiting from one of the most attractive tariffs in the market for public charging:

- simplest solution for the customer: he pays the same for the energy regardless of the time and day to which it charges with 100% green energy;
- for customers with an EDP energy contract at home, the CEME tariff has a discount of 20%;
- Charging an EV also became available through the new app EDP Charge with the integration of the CEME card on the app;

EDP has been positively contributing to the creation of a wide public charging network, by increasing the number of charging points in key locations in Portugal with strategic partners (Brisa, McDonalds, Burger King, etc). In 2022, EDP grew +70% in contracted charging points and closed various important partnerships that resulted in more than 2.000 contracted charging points (on cumulative basis). EDP's growing network of partners, who provide space in their facilities for the deployment of charging points, continues to be crucial to EV users, ensuring greater capillarity of the public charging infrastructure. In 2022, there was a strong bet on public charging's growth via SMEs. It is important to note that 2022 was the year with the highest use of the public charging network operated by EDP with over 400,000 charging sessions in Portugal.

Focusing on fleet electrification, EDP is creating strong partnerships with key stakeholders also playing in the mobility arena such as automotive brands (Jaguar Land Rover, Volvo, Stellantis), leasing companies (Kinto Mobility, Locarent, Arval, Leaseplan)) and UVE (Portuguese Association of EV Users).

To create the best possible offers, we invest in R&D projects and we are also partnering with national organizations and entities from other sectors, with innovative and potentially scalable pilots:

- We continue working in smart charging solutions that allows customers that live in condominiuns and shared garages to balance the available power between all the electric vehicles that want to charge at a given time;
- EDP is creating a partnership ecosystem: i) for public charging with strategic locations and ii) promoting fleet electrification through the offer of charging solutions integrated in the vehicle sale;
- We strongly believe in the potential of this market, both in the B2C segment and in the B2B segment, for example in support of fleet electrification with integrated fleet solutions, charging infrastructure and power supply, by partnering with OEM's, Auto Retailers, Leasing Companies that try to simplify the adoption of electric cars and fleets;
- Presence in Be.Neutral agenda – work package of electric mobility - that aims to accelerate the development and industrialization, by 2025, of various mobility products, connectivity devices, and a new generation of interoperable service platforms geared to promote carbon neutrality.

In order to streamline and give visibility to electric mobility, EDP continues to promote "Portugal Mobi Summit", the largest urban mobility event in Portugal for the fifth consecutive year, in partnership with the Global Media Group.

EDP is present in some of the most important European Associations:

- EDP is an active participant in Eurelectric – where it will be Chairing the E-Mobility Working Group from 2023, contributing to the ongoing discussions within such organizations for the development of business oriented regulations and frameworks to support the transition to clean mobility;
- EDP is a board member in ChargeUp Europe, an association from companies of the EV charging infrastructure industry, that works actively on the advocacy for policies to promote expeditious and effortless rollout of EV charging infrastructure in Europe. EDP was the first Portuguese company to join at this association;
- Within **WBCSD** on a multisector program addressing business solutions and guidelines to the Decarbonisation of Mobility;
- As a founding member of **TDA,** which brings **together the 3 Cs** (countries, cities/regions and companies) as the major drivers in sustainable, low carbon mobility - aims **to accelerate the global transformation of the transport sector towards a net-zero emissions mobility system before 2050** EDP is part of the EV100 ambitious initiative of The Climate Group

Since 2018, EDP Comercial has a business unit of e-mobility to focus on the evolution of the sector. The smart mobility team grew up circa 50% in 2022 and the organizational structure became even more complete. The team is now divided into four areas, supported by three transversal support areas: Regulation & European Affairs, Marketing & Communication and Planning & Reporting:

1. Product Development: development of an Iberian vision for the e-mobility, which becomes a roadmap for products and services that meet the needs of the residential customer and corporate fleets, promoting the ideation of new solutions and a competitive offer, heavily leveraged on digital experience, aligned with the strategic and business goals of EDP Comercial.
2. Project Development: coordinate and implement projects and tests/pilots related to the definition and implementation of new business models seeking to accompany and anticipate the constant evolution in this sector.
3. Business Development: maximize and manage the mobility business in the public charging and at rental companies, guaranteeing the management and execution of strategic partnerships and commercial activities, and look for growth in the portfolio of customers boosting the mobility business in various segments.
4. Performance & Technology: support the mobility business through definition of the operations management strategy and sustainability of the assets in exploration, including charging infrastructure, systems and information technologies, ensuring the monitoring information about its technical

performance and economic and effective management of contracts of both internal and external suppliers.

3.3.2 EDP Brasil

EDP Brasil aims to be a reference for electric vehicle charging in public spaces, especially along highways with fast charging, with higher power. We invest in and operate chargers installed at strategic points that have a large number of vehicles and allow connection with other chargers in a loop or corridor format. This expands the travel range of an electric vehicle user.

After the implementation in 2021 of two more charging stations at Guarulhos International Airport and nine ultra-fast charging points (one of them being 350 kW, the most powerful in Latin America), in 2022 EDP Brasil began installing an ultra-fast charging network covering the entire state of São Paulo and connecting the main electric corridors in the country. This project, which is expected to be completed in early 2023, is part of EDP B2B's electric mobility initiatives presented through Research & Development to ANEEL, entailing an investment of nearly R$ 50 million.

EDP Brasil intends to continue monitoring this market, as it believes demand will rise for EV charging infrastructure by companies that wish, for example, to replace their vehicle fleets with their own or rented electric versions (as is the case with EDP Brasil itself, which has pledged to electrify 100% of its fleet by 2030). That's why we are designing a business model to serve this segment, with packages that can be marketed through long-term leases and that will include both the infrastructure and energy.

3.3.3 E-REDES

In recent years, electric mobility has demonstrated a growing tendency both in Portugal and worldwide and will likely be maintained in the forthcoming years. To sustain this growth and promote electric mobility, legislative changes have been made in Portugal and in the EU.

Electric mobility represents, in a strategic point of view, a reinforcement on the role of the Distribution System Operator (DSO) and on the distribution grid itself. It is a new segment of demand in direct contrast with energy efficiency measures and autoconsumption.

In order to foster the integration of electric mobility charging infrastructure, E-REDES is committed to reach 25 thousand charging points by 2025, accumulated from 2018. In 2022, there were almost 3 thousand charging points already integrated, more 72% when compared to the previous year.

Electric mobility also comes with a set of challenges for the DSO, such as the increase on peak demand, specially at low voltage level. Along with these difficulties comes new solutions, being smart charging the greatest asset on a more intelligent management of the grid. Smart Charging solutions have the possibility to increase the flexibility potential of the EV, through optimized charging profiles.

E-REDES has been studying the use of the smart charging technology in their office buildings, using a the Smart Charging Platform provided by Dutch company GreenFlux. This platform controls every Electrical Vehicle Chargers installed using a dynamic load balancing, which is implemented locally between the building consumption and the electric vehicle charging, tanking also in account the production of the PV installed in the building.

This project started at E-REDES office build of São Sebastião in Setúbal, which has a total of 20 charging points and were it was possible to validate the operation of the platform and his algorithm. Since this building didn't faced significant constraints, E-REDES decided to move forward and expand this pilot project to other buildings. Currently, the Greenflux Smart Charging Platform is installed in a total of 5 (Setúbal, Amial, Vila Nova de Gaia, Roligo e Coimbra - Alto de S.João) with the goal to further test the algorithm and try to demonstrate the benefits of Smart Charging in terms of a smarter investment and future grid stability.

3.3.4 EDP Spain

Electric mobility continues unstoppable, especially with the boost to recharging infrastructures following the new regulations that make it mandatory to install public access electric vehicle recharging points by January 1, 2023 in all types of locations, such as companies with parking spaces.

In 2022, EDP's recharging points exceed 800 recharging points in public access spaces and 750 private recharging points. In total, almost 900,000 kWh of energy have been recharged. This represents a growth of more than 60% compared to 2021, with a total distance traveled of 5.5 million kilometers and more than 112,000 tons of CO2 avoided.

Encouraging the use of electric vehicles, guaranteeing people recharging on their journeys and contributing to the improvement of the environment are some of the priorities of EDP, whose strategy involves providing electric vehicle users with the necessary infrastructure so that they can recharge their cars on their journeys. At present, by recharging at EDP points, a driver with an electric vehicle leaving A Coruña can travel along the Cantabrian coast to France without having to enter a city. In addition, EDP was the first company to link Asturias and Madrid with the necessary recharging points to guarantee recharging during the journey.

To set up these points, the energy company has reached agreements with different entities, such as city councils or service stations, with the aim of promoting electric mobility. It has also established alliances with private companies such as the Ahorramas supermarket chain, where it plans to install 450 recharging points in 140 parking lots and company offices.

Together with Ahorramas, the alliance is being extended with a major solar self-consumption project at its central platform in Velilla de San Antonio, consisting of more than 3,300 solar panels, with an installed capacity of 1,800 kWp, which will represent an annual energy saving of 25% of the total consumption of its logistics warehouses and central offices. With this installation, which will produce around 3,000 MWh annually, more than 1,650 tons of CO2 will be avoided.

On a regional scale, in the Principality of Asturias, an agreement has also been signed with Masymas (Hijos de Luis Rodríguez) for the installation of 20 chargers, each with a power of 22 kW, in eleven stores in the region.

Both proposals guarantee a "convenience charging" option, i.e., those who have a plug-in vehicle will be able to charge their vehicle while shopping, one of the key aspects to advance in the paradigm shift towards sustainable mobility.

On the other hand, EDP has strengthened its public charging offer for all our customers, supporting the idea that it is EDP who invests for the customer to place charging points in hotel parking lots, restaurants and gas stations.

Sustainable mobility is key for EDP, as one of the essential areas for the decarbonization of transport. The company also offers 'MiVe', a comprehensive electric mobility service configurable by the customer, which covers the installation and maintenance of points, recharging at home and in public access facilities, as well as the transfer of the vehicle or assistance for recharging incidents.

Mastercard Project:

EDP and Efibat are leading a nationwide pilot project to promote electric mobility.

These entities have signed a collaboration agreement under which the first 5 public access recharging points for electric vehicles will be installed, which will be equipped with a technology that allows payment to be made using commonly used bank cards or mobile devices.

The incorporation of the contactless system represents a particularly relevant innovation in the field of electric mobility, because currently, given the variety and diversity of charging point operators, drivers are

forced to have different means of payment or user accounts in the mobile applications of each infrastructure provider.

The installation of these first public access charging points is part of a large project in which Mastercard is participating, for the implementation of a large electric corridor in Spain, Portugal and France with the installation of up to a thousand vehicle charging points.

Asturias, in this sense, will be the first Autonomous Community in which the new recharging equipment with contactless technology will be installed.

3.4 Smart Grid Paradigm

The traditional electrical system architecture is characterized by a unidirectional flow of energy from few centralized production sites to many users, which it is not suitable for a massive integration of distributed small/medium power renewable generation plants.

With the commitment to achieve 100% of renewable installed capacity by 2030 and the goal of reduce CO2 specific emissions by 90% in 2030 (vs. 2015), EDP is facing the challenge of balancing energy production and consumption in real time. Consequently, EDP is preparing to advance into a new power model, where electrical grids are expected to radically change their behavior, becoming “smarter”.

These new smart grids will have to cope with the integration of unpredictable and intermittent renewable sources, as well as the increasing penetration of electric vehicles and storage.

In the following sections we include some details of initiatives that EDP set-up.

3.4.1 Inovgrid/Smartgrids (Portugal)

InovGrid is an innovative project aiming at the implementation of a new set of technologies fostering the transition for a new operation paradigm of distribution networks. This approach will contribute for the improvement of service quality, losses reduction, efficient operations and the integration of new resources into distribution network. Besides, it is a key enabler for an increase in energy efficiency by customers, which is the most important value driver. It also contributes for the green footprint by reducing the carbon emissions avoiding travel.

The first pilot was carried out in Évora between 2009 and 2012, with the installation of about 30,000 smart meters, enabling a more active behaviour of customers towards a reduction of energy consumption. In this project it was achieved a reduction of consumption of 3.9% in customers with smart meters when compared with a control group.

After having installed about 868 thousand in 2021, E-REDES installed more than 703 thousand smart meters in 2022 in several Portuguese municipalities. By the end of 2022, a total of more than 4.5 million customers have smart meters installed.

For most of these customers, billing is based on actual consumption and they have access to detailed information that allows greater control over their consumption’s habits. In addition, it enhanced the capacity for implementation of energy efficiency services by market agents, with potential impact on their energy bills and in developing of new business models.

With the publication of the Smart Grids Services Regulation, network operators are now better able to develop the Smart Grids infrastructure in order to provide services to customers and market agents, with emphasis on the following: daily load curve; consumption alerts; daily readings; etc. At the end of 2021, more than 3.4 million customers had these services available.

E-REDES has an important contribution to make in the modernization and automation of the electric grid, essential factors for the energy transition. To stimulate this innovation effort and the implementation of new technologies, E-REDES launched the Inovgrid20-30 project. The Inovgrid20.30 is based on three cornerstones:

- Technology Roadmap for Energy Transition: Coordinate innovation and technological development efforts to support the energy transition;
- Smart Grids Accelerator: Accelerate the implementation of the roadmap through pilots with stakeholder involvement;
- Digital Energy Center: Integrate supervision and control of the distribution network into a single digital platform.

The implementation of other innovative systems in 2021, such as 7,037 DTC (distribution transformer controller), and the remote metering in 100% of both secondary substations and public lighting circuits contribute respectively for the improvement of network supervision, the reducing of technical and commercial losses and the improvement of service provided to municipalities, giving them more information and performance tools for improving energy efficiency.

3.4.2 *InovGrid (Spain)*

EDP Redes España is the electricity distribution company of the EDP Group in Spain, which integrates E-Redes and Grupo Viesgo (Viesgo and BEGASA).

For the second consecutive year, it stands out as a leading company in security and quality of supply, as a result of the investment made mainly in the digitalization of the network to achieve a truly intelligent network, and operational efficiency, articulated through the Vega project.

Security and quality of supply are key aspects for customers. The TIEPI (interruption time equivalent to installed power) of EDP Redes España in 2022 maintains its leading position in the historical series, with 17,5[2] minutes, reflecting the high level of supply quality.

EDP Redes España's total investment during 2022 amounts to 169.3 million euros as a result of an ambitious medium-term strategic plan of the company, endowed with 899.5 million euros for the period 2022-2026.

According to the strategic purpose of the investments, they are segregated into:

- 12% in "Electrification and decarbonization". These are the investments facilitating the energy transition made in new grid capacity, including new customers/connections, new power lines, reinforcements and additional transformer capacity.
- 7% in "Resilience and Environment". This includes investments related to improving the quality of service and the environment. For example: new connections between lines; transformers and mobile substations and reinforcement of conductors.
- 39% in "Modernization". Investments in renewal and modernization of assets; replacement of obsolete assets (e.g. assets that have reached the end of their useful life -technical and accounting-, obsolete technology or harmonization of network voltage).
- 40% in "Digital transformation". These are the investments made in:
  - Network automation, communications and digitization. Specific network automation and monitoring projects.
  - IT systems

[2] Provisional data (figures still under construction)

- Smart meters, including remote control meter deployment programs, equipment and metering systems.

- 1% in "Specific losses". Included in this classification are specific investments to reduce non-technical losses: metering, investments in telemetering, investment in anti-theft cables, replacement of old meters and other projects.
- 1% in "Support". These are investments related to facility management and others, e.g. equipment, fleet, etc.

Key projects

1. In line with the company's ambition to be Carbon Neutral by 2030, it is worth highlighting the Grid Loss Reduction Working Group, which currently accounts for 91% of EDP Redes España's Carbon Footprint (Scope 1&2). This working group has made it possible to identify levers for their reduction, such as ecodesign transformers (Ecodesign Regulation (EU), taking power transformers out of service when possible from the point of view of network operation, replacing conductors with others of higher voltage, changes in line voltage, etc.
2. Digital Transformation Projects:
   There is a portfolio of projects related to Digital Transformation, 17 in innovation and 12 in data and grid intelligence, have been completed throughout 2022: 10 projects in innovation and 6 in data and grid intelligence, it is worth highlighting:

   - Datalake Project (1st phase): its second phase will allow throughout 2023 and beyond to improve predictive maintenance and asset management, grid operation, etc). EDP is fully committed to minimizing the energy consumption of data, which currently accounts for 1% of the world's energy demand.
   - Project to use low voltage balances to identify errors in the source data and thus improve the quality of the information valid for all the applications involved (ADMS, AMI, asset management).
   - The strategy of remote control of the low-voltage network was launched, using CB2T (Remote Controlled Low Voltage Panels), as the main lever of response to the challenges of the energy transition in the low-voltage networks. The first prototypes have been analyzed in 2022.
   - Other innovation projects in key technological areas for the digital transformation of the business: drones, Artificial Intelligence for image processing, use of satellites for use cases of aerial networks. These projects also stand out for their reduction in the Carbon Footprint.

3.5 Energy Storage and Flexibility

This is one of the main strategic areas of innovation EDP is focused on. The following projects are being developed by EDP:

Klugit Energy / Shifted Energy

Usage of energy for heat is the biggest consumption in a household. One key factor for decarbonization is electrifying water heating. Usually these systems do not take into consideration consumption patterns increasing energy lost due to stand-by inefficiencies, while also being assets that can become heat storage devices if used smartly. During 2021 EDP Inovação tested several solutions to analyze the impact of smart management of electric water boilers for residential. We were able to conclude on efficiency gains but also constrains from the technology and will leverage on this knowledge to develop opportunities for usage decarbonization.

Energy Storage for residential sector (PT, ES)

Technical storage pilot solution testing with commercial batteries in residential settings to identify performance deviations against those reported by manufacturers and implement control strategies for batteries linked to photovoltaic panels.

Redox 2025 (ES)

Development of a 250 kW / 1,05 MWh Vanadium redox low battery with Spanish technology, for commercial and industrial use, and testing in real an environment at the location of the Soto de Ribera (Asturias) power plant. The project is funded by the Ministry for Ecological Transition and the Demographic Challenge of the Government of Spain under the call for grants for innovative energy storage R&D projects in the framework of the Recovery, Transformation and Resilience Plan.

Plug-n-play storage systems (PT)

Evaluation and testing of plug-and-play energy storage solutions, allowing to reduce the acquisition costs of these systems.

Flexible management of systems with thermal storage (PT)

Testing the use of decentralized thermal systems in order to optimize their use and increase their efficiency.

Storage in renewable plants (ES)

New methods for the design, planning and operation of storage systems based on Li-Ion batteries in renewable plants, considering degradation models.

Smart4RES (PT)

Development of methods and tools to optimize renewable production integrated into the market and when accompanied by energy storage systems

2nd life batteries (PT)

The project aims at evaluating the potential to re-use batteries from electric vehicles for stationary applications. Among the several project objectives, it is critical to analyse and validate its technical performance in different stationary use cases, its economical viability and understand the supply value chain. The project is using used car modules from Nissan Leaf and it is being tested at EDP's laboratories in Labelec.

Energy storage E-REDES (ES)

To improve the quality of supply, especially in rural areas, following the start-up in 2020 and 2021 of two energy storage projects in San Vicente del Monte (Valdáliga, Cantabria) and in the area of Ribeira de Piquín (Lugo), a new project in the area of Coto Bello, council of Aller (Asturias) is pending commissioning. This will guarantee supply in the event of a breakdown or outage, as well as reinforcing distribution in the event of an increase in demand. In the medium term, EDP Redes España has increased storage by X3 in the BP, with ten new energy storage projects planned in the vicinity of the substations: 2 in Cantabria, 4 in Asturias, 3 in Galicia and 1 in Valencia.

3.6 Other Innovation projects

InterrFace

The aim of the INTERRFACE Project was to establish an European architecture where services would be developed and made available in a coordinated manner between Electricity System Operators and other stakeholders.

Although the objectives of the INTERRFACE Project were established about 5 years ago, and since then the energy context has changed considerably, much motivated by the Russian invasion of Ukraine, the work resulting from INTERRFACE has allowed the development of a base architecture of services to be made available to various stakeholders, This will serve as a basis for improvement and development of existing or new services for the European Project ONENET which has, among others, the participation of several Distribution and Transmission System Operators, among which we highlight E-REDES as well as the associations E. DSO and ENTSOE.

XL CONNECT

XL-Connect brings together 24 partners from 10 different countries and has as its main research focus the optimization of electric charging - a real challenge for the European energy system, considering that, by 2030, the European Union (EU) aims to reach 30 million electric vehicles (EVs). This challenge is also an opportunity for the use of technologies such as V1G (intelligent vehicle charging), V2G (Vehicle to Grid), and V2X (Vehicle to Everything).

The overall goal of the XL-Connect project is the optimizing of the entire EV charging chain - from the energy supply to the end user - creating benefits for all stakeholders. To this end, a charging-on-demand solution will be developed, based on an optimized charging network considering human, technical, and economic factors.

The study of user behavior and the energy system and grid analysis will serve as a basis for forecasting the future behavior of EV owners and fleet operators, as well as possible vulnerabilities in the grid and system.

EUniversal

H2020 Project, coordinated by E-REDES, starded in February 2020, aims at enable the transformation of the energy system into a new multi-energy and multi-consumer concept guaranteeing a sustainable, secure and stable manner of electricity supply by bringing forward an universal, adaptable and modular and open and interoperable approach through a Universal Market Enabling Interface (UMEI) to interlink active system management with electricity markets and the provision of flexibility services, taking also into consideration the activation needs and the coordination requirements with both commercial parties and TSOs, promoting energy efficiency at local levels amoung all stakeholders of the energy systems (https://euniversal.eu/).

InterConnect

H2020 Project envisages to contribute for the democratization of efficient energy management, through a flexible and interoperable ecosystem where demand side flexibility can be soundly integrated with effective benefits to end-users. In order to pursue this objective, 7 large scale pilots in different countries (Greece, France, Portugal, Netherlands, Germany, Belgium and Italy) will be engaged. The solutions developed will allow the digitalisation of homes, buildings and electric grids based on an Internet of Things (IoT) architecture by including digital technologies (Artificial Intelligence, Blockchain, Cloud and Big Data) based on open standards, such as SAREF, it will guarantee the interoperability between equipment, systems and privacy/cybersecurity of user data promoting Citizen empowerment in a Flexible, Efficient energy ecosystem.

OneNet

The project “OneNet” (One Network for Europe) is funded through the EU’s eighth Framework Programme Horizon 2020 titled “TSO – DSO Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation” and responds to the call “Building a low-carbon, climate-resilient future (LC)”.

The scope of OneNet is to create a fully replicable and scalable architecture that enables the whole European electrical system to operate as a single system in which a variety of markets allows the universal participation of stakeholders regardless of their physical location – at every level from small consumer to large producers (https://onenet-project.eu/).

BEYHOND

While energy produced from offshore wind farms may provide significant contributions to the decarbonization of the European energy system, the inherent variability of these sources inevitably leads to a temporal mismatch between supply and demand. In this context, green hydrogen offers a solution to balance out and store variable renewable electricity and carry energy from renewables over long distances to onshore consumption centers. If hydrogen is to become a clean energy carrier in the future energy system, the scale of renewable hydrogen production must increase immensely while the production costs continuously decrease. The BEHYOND project aims to address these key challenges by developing a conceptual engineering solution with technological and economic feasibility, able to produce offshore green hydrogen from wind power at large-scale and suitable to several off-takers.

Electric Dots

This project aims to develop an artificial intelligence algorithm that identifies the best locations to install new electric vehicle charging points, considering the historical occupation rates of existing points and their geographic surroundings that can justify the demand at each point.

HARDY

This initiative reviews and evolves the technology that ensures data flows and data modeling in a database that, together with other practices, support decisions in the energy market. The data have the characteristic of coming from different sources, with different schemes and in time series format. The project ensures the architectural qualities of flexibility, scalability, atomicity and consistency using various custom components and PaaS.

Flexigrid

Flexigrid (Interoperable solutions for implementing holistic FLEXIbility services in the distribution GRID) is a project funded by the European Union's Horizon 2020 Research & Innovation programme. It brings together 18 from 6 european countries. FLEXIGRID project is developing solutions that will protect the security and reliability of the electricity grid as it incorporates growing amounts of renewable energy. It aims to make the distribution grid operation more flexible and cost efficient through the development of four hardware and four software solutions. A single, open-source platform will integrate the different solutions and make them interoperable with the IT systems used by energy stakeholders. The project has defined eight use cases that will be demonstrated in four countries. The demonstration sites will be operated by three distribution system operators and two large companies.

Accept

Accept (ACtive Communities & Energy Prosumers for the energy Transition) is a project funded by the European Union's Horizon 2020 Research & Innovation programme. It brings together 17 from 10 european countries. The project intends to develop and deliver such a digital toolbox that allows energy communities

to offer innovative digital services and access revenue streams that can financially support their functions and secure their sustainability and effectiveness. The ACCEPT framework will be demonstrated and validated in four pilot sites in Greece, the Netherlands, Spain and Switzerland involving more than 3 000 people and 750 residences.

R2D2

R2D2 (Reliability, Resilience and Defense technology for the grid) is a project funded by the European Union's Horizon Europe Research & Innovation programme. It brings together 17 participants and 1 partner from 10 european countries. R2D2 strategic goal is to improve the resilience and reliability of current EPES (Electrical Power and Energy Systems) against a growing number of threats and vulnerabilities that may affect such critical infrastructure, exposing weaknesses with harmful and damaging effects on different stakeholders and final customers.

This will be done through the deployment of four tools dedicated to the prevention, protection and restoration of EPES in two different independent but complementary scenarios in the energy value-chain – from regional coordination between TSOs, to privacy of LV customers. The project will build on top of strong energy coordination actions in South-East Europe (SEE), following EU legislation and in alignment with the recent activities promoted by ENTSO-Eabout cyber-security in transmission systems.

InCube

InCube W(An INClUsive toolBox for accElerating and smartening deep renovation) brings together 23 high-level partners and 2 affiliated entities from 7 european countries. The project is funded by the European Union's Horizon Europe Research & Innovation programme. InCUBE envisages unlocking the EU wave of renewal through standardised state-of-the-art processes, integrated industrialisation-based processes, innovative technologies for electricity production and storage, digitalisation and new market entrants. InCUBE solutions will be validated in 3 large-scale demonstration sites: Zaragoza (ES), Trento (IT) and Groningen (NL).

OmegaX

OmegaX (Orchestrating an interoperable sovereign federated Multi-vector Energy data space built on open standards and ready for GAia-X) is a project funded by the European Union's Horizon Europe Research & Innovation programme. It brings together 29 participants and 3 partner from 11 european countries. OMEGA-X project aims to implement an energy data space. This will include federated infrastructure, data marketplace and service marketplace, involving data sharing between different stakeholders and demonstrating its value for concrete energy use cases while guaranteeing scalability and interoperability with other data space initiatives.

Hy2Market

Hy2Market is projet funded by the Interregional Innovation Investment Funding Instrument I3 which aims to support the commercialization and scaling up of interregional European innovation projects and investments through the development of European hydrogen value chains. Hy2Market is a multi-regional project led by the New Energy Coalition to research and produce hydrogen on an accelerated timeframe.

Auto PV Installation

Focuses on technological solutions for automation in the construction of solar plants, contributing to increased efficiency, speed in time to market, increased quality and safety, while at the same time

contributing to cost reduction by reducing the manpower required. The technologies under analysis thus greatly contribute to EDP's commitment and global goals of accelerating the deployment of solar and investing in energy transition.

Going net Zero

Early feedback from EDP stakeholders including C&I clients, strongly indicates the need for an IT solution supporting the transition to net zero. In the Validate phase we worked to understand which of the key building blocks to reach net zero are of most interest for EDP to enter in this new business

Ubiquitous Charging

Solution has the potential to solve the charging infrastructure problem and democratize the use of electric vehicles

Flexible Connections

Aim to provide more power for EV charging in garages minimizing the grid reinforcement typically needed. Creating flexible connections of power will be possible by increasing the available for garages when it is not being used by the building. Flexible Connections will, thus, reduce E-Redes pipeline jobs for grid reinforcements and will accelerate energy transition by reducing the EV charger's installation time.