edp

NEW BUSINESS OPPORTUNITIES DSM and Energy Efficiency Initiatives

EDP GROUP 2021



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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% in 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 Directives 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) - <u>https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en</u>.

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.



Generate Economic Value				
Provide customers with	Provide electricity customers	Expand the installation of		
continuous access to low	with sustainable services by	smart meters to 100% of		
carbon, energy efficiency	2025, such as: mobility services	EDP's low voltage power		
products and services	(180 k clients); green electricity	network delivery points		
allowing significant	and/or gas offset (100% of the	worldwide by 2030, through		
savings and avoiding	clients); descentralised solar	new smart grid technology.		
about 15 MtCO2 in the	(3.7 GW); electric vehicles			
period 2015-2030.	charging points (>40k) .			

In this respect, EDP assumed the following commitments:

Antecipating the new energy paradigm, we are convicted that EDP is preparing its presence in a future where production, distribution and consumption will be increasingly decentralized. Therefore 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.

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.

In the following chapters we detail this diversified offer (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: smart grid paradigm, electric storage and other services.

In summary, the present document focus on customer solutions, which covers energy efficiency products and services offered by the supply companies (EDP Brasil, EDP Comercial, EDP España and SU ELETRICIDADE), as well as projects and initiatives that are being developed by E-REDES (distribution company in Portugal) and EDP Inovação (innovation company), regarding smart grids, electric storage, distributed generation 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 EDP Smart, a brand 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 Smart offers solutions such as biomass-based steam cogeneration, energy consumption management, smart monitoring, distributed generation and auto-generated solar production, lighting, refrigeration and air conditioning retrofits, among others.



The company also introduced the offer of a series of services for the residential market in 2019, including insurance and general services, such as electricians, locksmiths, 24-hour residential assistance, distributed generation and electric mobility.

Throughout the year, EDP Smart's 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 Smart offers solar products to all business customer segments, including SMEs and large customers, demonstrating our ambition to cover the entire solar energy chain.

During 2021, EDP Smart also strengthened its position in the electric mobility market in Brazil, with private solutions for the business public. This way, the brand has expanded its portfolio of chargers, strategic partnerships, technical service partners and solutions available to the B2B public, managing to develop new offers and commercial solutions that promote the energy transition.

In 2021, through EDP Smart, we delivered two solar plants in the states of São Paulo and Minas Gerais, for the companies NGK do Brasil and Smart Fit. Together, both plants will avoid the emission of 231 metric tons of CO2 per year, of which 104 for NGK and 127 for Smart Fit. Besides the environmental benefits, the plants also offer economic advantages for the companies, with a significant reduction percentage in electricity consumption – 24.3% at Smart Fit and 7% at NGK. Regarding the latter, it is also worth mentioning how quickly the project was executed, in less than three months, from the mobilization to the plant's energization.

In October, EDP Brasil announced the development of the country's first large-scale photovoltaic plant, Parque Monte Verde, in partnership with EDP Renováveis. The project, located in the state of Rio Grande do Norte, will have an installed capacity of 209 MW, and is expected to start operations in 2024. With this investment in the plant, we will achieve meaningful advances in the goal announced in the 2021-2025 Strategic Plan to increase the size of our solar park in Brazil by over 25 times.

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 2021, the Company invested R\$31.34 million in energy efficiency initiatives with Distribution customers, which led to energy savings of 9.65 GWh/year in São Paulo and 7.38 GWh/year in Espírito Santo, resulting in approximately 2,155.8 tCO2 of avoided emissions.

Our energy transition plan is supported by our transmission asset rotation strategy. In 2021 we emphasized the acquisition of 100% of Celg Transmissão (located in Goiás), Mata Grande Transmissora de Energia (Lot 18, located in Maranhão) and Lot 1 (in Acre and Rondônia), and the sale of three transmission assets: Lot 24 (in Espírito Santo), Lot 7 and Lot 11 (located in Maranhão). Following these operations, we now have eight transmission projects in our portfolio which, when operational, will total 2,241 km of transmission lines. Our asset rotation strategy in the transmission segment also takes into account our great expertise in building



and anticipating greenfield assets, delivery, creating substantial additional value to the project. Therefore, the divestment of these lots will allow us to collect this value still in 2021. The transmission asset rotation strategy represents an opportunity to recycle capital for new investments and expansion in the country, especially the scaling up of solar energy investment, supporting the energy transition.

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 2021, 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 new 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 2021 targets have also been declined in annual targets and specific action plans and commitments. Some of the EDPC strategic priorities for 2021 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 2020, 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 2021, numerous macro initiatives were maintained to boost the business, residential and innovative energy services offer.

In B2B segment, 2021 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 mor than 3MWp contracted in 2021.

The growth in energy efficiency services accelerated in 2021 with a combined growth of 80% YoY surpassing 100M€ of contracted value during 2021. Solar distributed, Mobility, Technical and energy efficiency solutions are the four main product families.

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 50.000 solar energy systems, we managed to lead this emerging market with an estimated 80% 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.

In 2021, EDP EV.Charge platform (App and Portal), which was created as a digital interface with the electric mobility client, started to integrate all e-mobility use cases - charging at home (housing and condominium), at work and public charging.

In 2020, we consolidated the condominium charging solution, through EDP EV.Charge platform, by adapting our offer to condominium needs and introducing a new charger with OCPP protocol, which will allow us to continuous improve our solution over the years as technology evolves.

2021 was the year with the highest growth in the use of the public charging network operated by EDP. More than 178 thousand charging sessions were carried out in Portugal, 300% more than what had been registered in the previous year. In these charging sessions, vehicles were supplied with more than 2 GWh of electrical energy, four times more than in 2020 and enough to travel 15 million kilometers without using fossil fuels.

At the end of 2021, EDP Comercial was the player with most organic growth in public charging and has now more than 1,100 charging points contracted on the public charging network, in Portugal, in electric mobility partnerships and concession contracts:

- New electric mobility partnerships with key partners, namely one of the biggest partnerships in electric mobility with McDonald's for the installation of 150 charging points in 75 locations;
- Partnership with Brisa, BP and Repsol to install a fast and ultra-fast charging network on national highways 48 charging points, most of them installed and in operation in 2021;
- EDP also leads the CEME market and have one of the most competitive tariffs in the market for public charging with over 32.000 cards issued:
 - It is the 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%;
 - In addition, and for customers with an EDP Charger (home charging solution), we offer a flat rate plan for the house with a 20% discount in the off peak period.
 - For clients who contract EDP's CEME tariff and a Charger EDP for their home, we offer the first 50kWh of green energy in public charging network.
 - Charging an EV also became available through the app EDP EV.Charge with the integration of the CEME card on the app.
 - Planeta Zero, EDP Comercial relationship program for residential customers, 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.

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- promoting support for institutions and associations related to environmental and social sustainability, through customers vote, allocating a total of 70 thousand euros.
- In 2021 Planeta Zero, new features and iniciatives where developed:
- and launched a new open web space where all visitors can know more about sustainability and energy efficiency, increasing traffic and positioning EDP on changing tomorrow now, every day.
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- Planeta went offline for the first time inviting everyone for the first sustainable Christmas market, with 20 brands, 20 life 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.

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.

In 2021, EDPC has generated EUR 256 million (vs. EUR 137 million in 2020) 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 theses goals, E-REDES has established an active coworking envolving 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. One example is the InteGrid project, lead by E-REDES, bridging the gap between citizen and



technology/solutions offered by utilities, aggregators, manufacturers and other agents providing energy services, including the analysis of storage, EV charging, smart appliances and production within a flexibility framework that includes a market hub facilitating the interaction between these stakeholders.

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. Since its inception, the system has already secured over 64MWh of fully renewable energy supply to the island.

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 2020, E-REDES delivered to the Portuguese Government the Development and Investment Plan on the National Distribution Network (High Voltage and Medium Voltage network) for the 2021-2025 period. The Plan, approved in May 2021, included 16,2 million EUR investment in projects fostering the access to new services for the 2019-2021 period, with the investment for the period 2022-2023 to be reviewed by the 2021-2025 plan.

In 2021 E-REDES installed more than 685,000 thousand smart meters in end-user's facilities, reaching more than 3.9 million smart meters (around 65% of LV instalations).

E-REDES has also been promoting the improvement of its office buildings energy efficiency, taking into account national and EU policies, namely the 2012/27/EU Directive. Hence, as an energy efficiency measure, E-REDES installed 351 kWp of renewable energy production units (photovoltaics) for self-consumption. This measure reduces the building's energy dependency on the electrical grid and its greenhouse gas emissions. In 2021, these photovoltaic panels produced 346 MWh, saving 58.000€ and avoiding the emission of around 86.5 tCO2e.

E-REDES is also developing new projects regarding electric mobility "smart charging", which will not only help mitigating the challenges that arise from charging electric vehicles but also has the potential for reducing the cost and time frame of grid connection, allowing value stacking from system services and increasing the distribution grid utilization as well as renewable penetration.

In 2021, E-REDES had already a total of 188 electric vehicles (around 13% of the fleet, considering the 1,403 vehicles of E-REDES service fleet that year) and 252 charging stations in its buildings.

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 H2020 Projects, described in chapter 3.6, have been contributing to these aims, namely: EUniversal, DOMINOES, Onenet and InterConnect.



<u>EDP España</u>

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 Inovação is the key promoter for innovation within the EDP Group. It was established in 2007 with the objective of creating an autonomous entity responsible for internal innovation activities as well as fostering stronger links with the interpreneurial ecosystem.

EDP seeks to integrate in it's business new technologies, processes and products, as well as 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.

Among the innovation tools that EDP Inovação has establisghed to foster and interact with startups lie the startup engagement program (EDP Starter), the acceleration program (Starter Acceleration Program) and the venture capital fund (EDP Ventures). These act at different levels of startup's maturity in order to support them from inception to investment.

Impact - review of the innovation system and operating model



The EDP Group's strategy update, in the form of the Strategic Plan 2021-2025, defined an ambitious growth plan, which foresees an unprecedented acceleration in the adoption of renewable energies. Additionally, the strategic update established the goal of the Group 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. Recognizing this urgency, EDP's most recent Strategic Plan recommends the investment of 1 billion euros in innovation by 2025, doubling the resources allocated to this area and prioritizing the focus on innovation opportunities.

The strategic update has thus significantly reinforced the commitment to innovation in relation to the previous strategic plan. Naturally, this reinforcement led to the need to rethink the strategy and the operating model of innovation of the Group, in order to increase the delivery capacity, in terms of speed and impact.

The revision of the model, materialised by the Impact project, 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 fastadopter 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. Based on this strategic alignment, the model favours 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.

The revision of the innovation system and operating model redefined and formalised the internal innovation pathway, broadening the scope and value of the external investment pathway and the scope and ramifications of the external partnerships pathway.

The internal innovation pathway is supported on a pipeline model consisting of four phases, fed every two months. In each phase, characterised by well-defined objectives, the innovation opportunity (idea/project) is evaluated, based on its merit, in approval gates. The approval gates are moments of decision making regarding the advancement or not of the innovation opportunity to the next phase. The dynamics of the approval gates are supported by a



meeting called "Global Innovation Steering" where elements from all business units and geographies participate.

The four phases are: Opportunity, Validate, Build and Scale. Each of the phases of the pipeline model requires the evolutionary preparation of the idea/project, which starts in the opportunity phase, by the basic evaluation of the idea, until its potential scale-up. Scale-up provides the hand-over to, for example, a business unit of the Group, or even the creation of an autonomous business.



In each phase, what is sought is the identification of the minimum investment necessary to eliminate the greatest risk/certainty of the opportunity. As risk is removed along the pipeline, the investment will also become larger.

In fact, a commercial pre-launch or a scale-up pilot is only conducted after ensuring that a large part of the opportunity's uncertainties have already been validated and that the results create comfort for a higher level of investment, either financial, of time or of human resources.

In each of the four phases of this internal innovation process, the opportunity's potential for leverage is assessed in parallel, through the two remaining external innovation routes. Namely, through external investment, through value creation supported in Ventures or, through external partnerships, in order to create accelerators that promote, whenever possible, the quick adoption of solutions that meet the identified opportunities.

Thus, the distinction of the value generating mechanism in three innovation paths does not invalidate in any way the interconnection between them. Although the pipeline model described is restricted to the internal value generation pathway, every time there is a "green light" for an idea, ways of acceleration are assessed to leverage that same opportunity. There is an effective and active search to continuously create these synergies.

The Impact project has also reformulated the internal relationship between the business units and innovation. The business units have active participation in the selection of innovation opportunities of high uncertainty, through the approval gates and work closely with the innovation teams in projects and pilots. Although the opportunities are managed by EDP Inovação, the participation of the business units is constant and with incremental allocation as the opportunities are validated and the risk for the appropriation of the business unit decreases.

Innovation has long been a traditional investment area for EDP. Incremental innovation is developed and managed by the various business units with their own teams focused on continuously improving the competitive positioning of the businesses in the market. Incremental innovation represents 70% of total investment in innovation and a significant part of the resources globally allocated to innovation. More disruptive innovation is managed by dedicated innovation teams that are part of the global innovation platform. The relationship between the innovation teams of each business unit and the EDP Inovação teams is continuous and in several ways: in terms of scouting and analysis of opportunities (regular sessions by area called Heads-Up Innovation), in terms of evaluating opportunities (through the Global Innovation Steering where all business units are represented) and in the phase of preparing the delivery of projects to the business units.

The new innovation operating model began in 2021 and included the revision of the innovation system and operating model in order to redefine and broaden the context in which innovation operates.

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).

An "Open Box" domain was also contemplated, which aims to open space for the continuous effort of searching for new solutions, which may originate both within and outside the energy industry, given its fundamental role for other critical sectors and for society in general.





The domains are broad innovation themes that can be worked on by different EDP business units. The activities and projects of the areas of innovation and technologybased R&D are thus structured into seven domains (7+1) of the energy transition:

• Renewable energies, their integration and flexibility, to develop the solutions that will help EDP achieve its renewable energy installed capacity targets

• **Networks**, which enables energy transition through smart grids - the numerous sensors installed along its length allow instant control of the state of the entire network, load balancing and preventing breakdowns before they happen

• **Distributed energy systems** that support B2B and B2C customers in developing their distributed generation solutions

• **Green hydrogen** in order to support the energy transition in sectors whose activity is preponderantly dependent on carbon-emitting solutions

• Energy storage and flexibility, which tests new storage technologies, flexibility management

• **Sustainable mobility**, which supports EDP customers in their transition to electric mobility and provides associated services

• **Decarbonisation of energy uses**, which supports EDP customers' decarbonisation efforts by developing new solutions and speeding up their adoption.

The "Open box" domain also appears as an additional domain that creates space for ideas/projects to be developed that do not fit rigidly into any of the other domains.

SU ELETRICIDADE

SU ELETRICIDADE is the **portuguese last resort supplier.** Its main activities include the acquision of all the Special Regime generation (Renewables + Cogeneration) and, in spot and future markets, the real consumption of its customer's portfolio, as well as the supply of electricity to final customers, under regulated tariff.

Regarding the activity of buying the PRE production, as the producers reach the end of subsidized tariffs, SU ELECTRICIDADE, since 2020 has a new function: **Market facilitator** (DL76/2019) so while there are no alternative buyers for the producers, it is obliged to acquire the energy of the special regime producers (PRE) once in the market without subsidized tariffs under the conditions approved on the auctions already occurred and to be held in the future and then sell it in the market or in systems services.

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 descentralized 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 providing information about market liberalization in Portugal, which is expected to be concluded by the end 2025. The previous deadline of December 2020 was postponed to 2025, to ensure enough time for a smooth transition to liberalise 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 2021, an easier-to-use tool was launched allowing consumers to choose and adapt behaviour to a more clean and efficient energy pricing tarif.

Through the presence and remote and digital contacts, which were reinforced since 2020 and troughout 2021, SU ELETRICIDADE, as a last resort commercial player, migrated since mid 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) Efciency

During 2021, SU ELETRICIDADE, with its long experience of participation in this programme 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 - <u>www.erse.pt</u>) and submitted a new Educational Programme to the 2022 tender, wich results are expected to be known by mid 2022.

In accordance to the EU Directive 2018/2001, from 11 december 2018 the concepts of **renewable energy individual self-comsumpion and collective communities** was regulated, allowing them to produce, consume, store, share and sell energy without increasing disproportional costs. SU ELETRICIDADE participated in the following initiatives and assumed new roles:

Solar Capacity Auctions

A first 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 be connected to the grid by the end of 2021.

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 mid 2024. Energy storage capacity has also been tendered, which competitors may or may not submit.

Market Aggregator

According to Decree-Law 76/2019, of June 3, 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 will include deviations from the schedule programming, the network access tariff and other charges.

During 2021, SU ELETRICIDADE was the aggregator of around 300 producers, with total installed capacity of 15MVA and, during 2021, acquired about 2.7 GWh, representing roughly 0.3M€.

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. SU ELETRICIDADE was designated as the entity responsible for placing on the market, through auctions, these guarantees. During 2021, 5 auctions took place - whose total



net income (EUR 9 million) National Electric System, allowing the reduction of access costs and thus slightly mitigating the energy costs.

Coming Prospects

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 be helded. 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 a play a role in the growing market of the implementation of hybrid power plants associated with photovoltaic solar plants resulting from competitive auctions towards hybridization. SU ELECTRICITY will be responsible for monitoring the equivalent hours of use of the solar plants and the application of penalties in case of non-compliance.



3. CLIENT-FOCUSED PRODUCTS AND SERVICES

Throughout its value chain, EDP makes available 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 systems¹.
- 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 2021, and despite the pandemic situation, the EDP Group generated around EUR 261 million revenues from energy efficiency products and services (up 7% vs. 2020) and invested EUR 136.2 million, which represents 3.5% of EDP's gross CAPEX..

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

Some of these products and services are described in the following subchapters, by energy services category, and main improvements during 2021 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).

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 86.784 check-ups being carried out since then. The Lighting auditing service was called Lighting Check-up, and 49.445 check-ups were performed. Additionally, we have sold 45.529 lamps throughout our channels.

In 2021, 1 company were audited in Spain.

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 2021, EDP sold around 32.000 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 2021, 5 efficient lighting projects were developed in Spain.

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 and 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 2021, the Customized Projects area delivered 654 Projects for a total amount of 71.3 M€.

In Spain the EDP Services area offers companies different projects to help improve their competitiveness, through a commitment to energy efficiency and energy savings, a key aspect in a scenario of volatility and high prices, while reducing the company's emissions in a commitment to decarbonization and sustainability as a whole.

As the most outstanding project in terms of self-consumption during the 2021 financial year, EDP has established partnerships with companies from various sectors. Among them:

• Burger King: reached an agreement in February this year for the installation of photovoltaic panels in nearly 300 restaurants in Spain, betting on sustainability and

energy savings. The photovoltaic panels will prevent the emission of 2,300 tons of CO2 per year, a positive impact equivalent to planting 150,000 new trees.

- The Sovena Group, a leading agri-food company, has started up a photovoltaic installation at its factory in Brenes (Seville) with a power of 1.4 MW, which translates into a reduction of 1,100 tons of CO2.
- In this same food sector, the supermarket companies Masymas and El Arco have also installed photovoltaic plants, which will save 285% in electricity consumption in Masymas' logistics centers in Gijón and Riaño, and in the case of El Arco, 30% in a supermarket in Sama de Langreo (all in Asturias, Spain).
- In the wine sector, the company Aalto has installed a photovoltaic plant in its winery located in Valladolid, enabling the company to reduce its consumption by 25%.
- The El Castillo Group, a business group dedicated to the care of dependent persons in the eastern part of Spain, has undertaken photovoltaic self-consumption projects at nine of its sites. These projects have a total power of 474 kWp and are expected to generate a total of 700 MWh per year, contributing to the efficiency and sustainability of its processes, which already have a high contribution to the community due to their social nature.
- DFM logística, De Heus, Exide, or Klépierre in its three shopping centers in the Community of Madrid, also established projects with EDP for the installation of photovoltaic plants to power some of their facilities.
- The Tudela Veguín cement plant, part of the Masaveu Industria group, has also installed a 3 MW photovoltaic plant on the roof of one of its warehouses at the Cement Factory in La Robla, the most powerful installation of this type that EDP has built for its industrial customers to date."

In all these cases, these installations not only provide an advantage over their competitors in the sector thanks to savings in energy consumption, but also allow better energy management with digital control of the installation to optimize its operation, industrial production and the reduction of CO2 emissions.

Among the custom projects, Industrias Doy stands out. In its coke factory in Trubia, a smoke treatment plant has been built and commissioned, consisting of desulfurization and particle filtering, which also achieves the energy use of the gases from its process by means of a 3.9 MW electrical production facility, which does not use any additional fuel. This is a clear commitment to circular economy, efficiency and sustainability.

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.

During 2021 this service was contratted by 95 customers in Portugal for a total amount of 154 k€.

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).

In Spain, a similar service is provided for the corporate and large customers segment – ACTIR platform. This service gives access to up-to-date information about customers contracts and was complemented in 2015 with "Óptima +". This service facilitates the energy management of the companies, through a system that allows the monitoring and supervision of consumption in real-time, receiving immediate consumption warnings for both active and reactive power.

Also in Spain, the Building service is a service focused on providing integral energy solutions for buildings in the tertiary sector, mainly Neighbourhood Communities. During 2018, a total of 569 bids were made, with 221 energy and services contracts between new contracts and renewals amounting to € 8.43 million. The portfolio managed by the area amounts to 413 installations. The installations, mainly centralised boiler rooms with a thermal power of 175 MW, consumed a total of approximately 199.1 GWh of natural gas during the year and provided heating and sanitary water services to more than 18,000 homes.



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 2021, 35 customers used this service for a total amount of 30,2 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 and Spain | B2C and B2B segments)

For the residential and business segments, EDP's B2C portfolio includes Funciona, a valle 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.

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.

By the end of 2021, around 519.000 B2C customers were part of total Residencial Funciona portfolio, including Funciona Stand Alone and Packs Living customers. Additionally, around 16.367 B2B Funciona customers were part of the service by the end of 2021.

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 RECS (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.

During 2021, this service was contratted by 179 customers, with a total amount of 210k€.

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 project 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 2021, EDPC sold and installed over approximately 2.800 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 2021, EDPC sold and installed over 1.000 HVAC systems. Functiona Service at the same time created an Add On to address the maintenance needs for the HVAC B2C 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, Espain 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 2021, EDP had 541,168 B2C electricity customers with an electricity offer 100% from renewable sources, and 1,258 B2B customers, representing a total annual consumption of 985 GWh and 366 GWh respectively.

Regarding the B2C market, since 2020 EDP's green electricity customers increased 2,4 times, representing in 2021 around 15,1% of EDP's total electricity residential clients. EDP provided for free the green electricity attribute to all the new electricity customers since march 2021, explaining the boost in green electricity portfolio, which will mean that by 2025 52,3% of the total B2C customers are expected to have a green electricity tariff.

From May 2021, EDP provided for free the first natural gas offer with carbon offset in the Portuguese market to all new customers. This offer aims to compensate the CO2 emissions, and neutralize the carbon footprint generated by residencial consumption. By contributing economically to projects that compensate CO2 emissions, EDP receives credits that certify the compensation of CO2 emissions for natural gas residencial consumption of EDP clients.

Therefore, by December 2021, EDP had 47.661 B2C natural gas customers with a natural gas offer with carbon offset, representing 7,5% of of EDP's total natural gas residential clients.

In Spain, all our B2B customers (300) were supplied with "green" electricity, certified uder 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 2021, EDP Comercial sold approximately 10,000 home appliances leading to a total portfolio of more than 25,000 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 was piloted in 2020 and the roll-out started in 2021 with 60 installations (https://www.edp.pt/particulares/servicos/casa-eletrica/).

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

This service is 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 2021, more than 27.5k 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,	Portugal	Portugal, Spain	B2B segment in	B2B Portugal
Spain and	_	and Brazil	Brazil	and Brazil
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| B2C and 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 (<u>https://premio.cinco-estrelas.pt/vencedor/edp-2019/edp-save2compete/</u>).

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 Efficient in Brazil EDP makes a complete facilities' assessment, 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 2020, the Company invested R\$22.15 million in energy efficiency initiatives with Distribution customers, which led to energy savings of 5.05 GWh/year in São Paulo and 1.27 GWh/year in Espírito Santo, resulting in approximately 362 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 2021, EDP C installed 1.013 solar plants, with a total amount of 55.7 M€.

3.2.2 Spain

Domestic self-consumption has experienced outstanding growth in recent years in Spain. More and more families are opting for this cheaper and cleaner technology thanks to the elimination of administrative barriers and local incentives for installations. EDP Solar exemplifies the EDP Group's commitment in this area.

EDP Solar offers self-consumption energy solutions to individuals and companies that promote savings, sustainability, energy transition and decarbonization. It offers a value proposition focused on service quality, with individualized commercial and technical support throughout the process of purchasing, licensing, installation and operation of the photovoltaic plant.

The objective is to increase the capacity sold of solar within distributed energy as one of the objectives within the EDP 21-25 Strategic Plan, for this purpose important agreements have been reached with reference companies in the retail field to facilitate access to information and the acquisition of maximum efficiency energy solutions for the home by individual customers.

Solar and SMEs:

Following the line of facilitating photovoltaic installations to small companies to improve their savings and sustainability, collaboration was established with Central Lechera Asturiana S.A.T. In this agreement, photovoltaic solutions that adapt to their needs are made available to 1,100 livestock farmers. These installations contribute to the maintenance of sustainable family farms with an average annual saving of 40%. In addition, it will reduce the emission of 3.7 tons of CO2.

The commitment to sustainability of large companies:



The energy solutions offered by EDP Solar also include large companies such as Orange and Cellnex. Between 2020 and 2021, EDP Solar has commissioned various photovoltaic installations at the sites of both telecommunications services and infrastructure companies.

Thus, in 2020, 390 photovoltaic installations were installed at sites of Cellnex and Cellnex will install 58 in 2021 and 642 in 2022telephony allowed EDP to start up photovoltaic installations at sites that house its telecommunications facilities. It will increase the company's competitiveness by generating savings of 30 % and also makes these installations more sustainable by saving the emission of 800 tons of CO2 per year.

Energy solutions for individual savings:

For the solar energy market to continue to grow, it is essential that these installations reach the domestic customer. The CaixaBank and EDP agreement allows its customers access to photovoltaic solutions through financing packages with advantageous conditions. Through these installations, CaixaBank customers will be able to achieve savings of 50% in their annual electricity consumption. The use of e-commerce platforms such as Wivai will also provide the necessary software for the management of photovoltaic installations. It would also provide facilities such as apps that would allow monitoring of production and consumption.

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 non-regulated market, through large investments in distributed solar generation. With plants focused on selling energy quotas to small companies, the strategy provides cheaper and cleaner energy. The solar energy front has three business models:

- <u>Large Customers</u>: For customers searching for predictability and guarantee that the source of the energy purchased is renewable, EDP offer the solution of self-production in large solar parks. In this segment, we have focused on long-term contracts, where we develop the plant for the customer and lease the plant for a pre-established period, with energy cost predictability over time. We are responsible for managing the plant, supplying the lack of energy when the plant's volume is exceeded, selling the surplus on the market when the plant's production is greater than demand.
- <u>Retail</u>: We offer the Location self-consumption solution, which aims to produce solar energy on the customer's own buildings, on roofs and in garages. In this case, the energy is generated and consumed at the same time. We also offer a remote self-consumption solution, for customers who do not have the physical space for selfproduction. In this case, we generate energy in areas within our concession area, which is injected into the grid and compensates for their Location consumption.
- <u>Shared Generation</u>: A new product launched in 2021, the Shared Generation consists of a distributed modality and was one of the main highlights in 2021 by EDP Smart. Also called "solar subscription", the modality makes it possible to share mini or micro generation energy between two or more consumers, as long as all participants are in the same concession area. Shared energy can be used by a group of individuals or companies, through a consortium or cooperative, in locations served by the same energy distribution

network. By means of the initiative, it is possible, for example, to share photovoltaic energy among a group of residents or companies. Shared generation offers a number of advantages, including the guarantee of financial return to users, since the installation costs are eventually covered from the self-generation of energy.

During 2021, through EDP Smart, we delivered two solar plants in the states of São Paulo and Minas Gerais, for the companies NGK do Brasil and Smart Fit. Together, both plants will avoid the emission of 231 metric tons of CO2 per year, of which 104 for NGK and 127 for Smart Fit. Besides the environmental benefits, the plants also offer economic advantages for the companies, with a significant reduction percentage in electricity consumption – 24.3% at Smart Fit and 7% at NGK. Regarding the latter, it is also worth mentioning how quickly the project was executed, in less than three months, from the mobilization to the plant's energization.

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 more than 100% renewable installed capacity in 2030 and reducing its specific emissions of CO2 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 CO2 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 (PT)

EDP is committed to keep on developing new commercial offers and solutions that promote the electrification of transport, including electric vehicle charging infrastructures. For residential customers this solution includes:

- Supply of green electricity with premium tariffs, home tariff with 20% discount at night and EDP CEME tariff with 20% discount for public charging
- Supply and installation of renewed solutions for electric vehicles (EV) charging station for B2C and B2B:
 - For B2C clients, EDP Comercial offers 4 distinct solutions:
 - Premium Charger EDP up to 22kW of charging power, with online charger management through EDP EV.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;
- For B2B clients, the offer available on the Save to Compete platform has been updated with charging solutions suited to the real needs of business customers, both for proven access spaces and public access spaces, more specifically in 5 different products, with different levels of customization and also available as a service.
- Promoting a digital customer experience through mobile apps and portals EDP EV.Charge and Move On allowing customers to manage and monitor charging sessions and consumptions in both public and private chargers.
- EDP has been positively contributing to the creation of a wide public charging network, by increasing the number of charging points in key locations with strategic partners and has now over 2.500 charging points (public and private) in Portugal, Spain and Brazil.
- Focusing on fleet electrification and creating strong partnerships with key stakeholders also playing in the mobility arena such as automotive brands and renting companies.
- 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.

To advance on I&D and create the best possible offers we are also partnering with global organizations, municipalities and entities from other sectors, with innovative and potentially scalable pilots.

- We understand that EDP plays a central role in creating and streamlining mobility solutions, which is a central priority in EDP's strategic agenda, for three main reasons:
 - i. Our customers now have electrical mobility needs and look to EDP as the natural partner and enabler to solve those same needs;
 - ii. We believe that, in the long term, mobility will be a very important business growth vector;
 - iii. We understand that it is a social responsibility for EDP to dynamize and bet on electric mobility, for the environmental benefits that it entails.



- In this sense, EDP is materializing a set of initiatives aiming at accelerating the development of new projects in this area:
 - i. EDP is leading EV charging infrastructure deployment and 2021 was the year with the highest growth in the use of the public charging network operated by EDP.and was the player that grew the most in 2020, in terms of installed charging points in the public network (~60% higher pace than the remaining market) and. EDP has now more than 1.100 contracted charging points in 90 120 municipalities and over 38.000 CEME cards issued.
 - ii. We are 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. In order to respond to the consumer needs that are beginning to emerge, and knowing that grid balancing is a challenge, EDP is working in some innovative products that will take advantage of the flexibility provided by electric vehicles, through smart charging and Vehicle-to-Grid, that can significantly improve the efficiency of buildings, local grids and the overall electricity system, improving the business case for EV owners and allowing the integration of more renewables.
 - iii. EDP is creating a partnership ecosystem: i) for public charging wth strategic locations and ii) promoting fleet electrification through the offer of charging solutions integrated in the vehicle sale.
 - iv. 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 (Jaguar Land Rover, Hyundai, Volvo, etc), Auto Retailers (Santogal) and Leasing Companies (Kinto Mobility, Locarent, Arval) that try to simplify the adoption of electric cars and fleets.
 - v. Internally, we also want to be at the forefront of electrification, and so we have an internal commitment to different initiatives in this area, including:
 - Commitment to have a 100% electric fleet by 2030;
 - Development of new offers and commercial solutions that promote the energy transition;
 - Joining the EV100 initiative.
 - And in 2021, EDP launched an internal initiative to promote electric mobility called "Pack Colaborador Mobilidade Elétrica". This package offers special conditions to EDP's employes that adopt electric mobility and buy an EV through discounts in the vehicle acquisition or leasing and EDP's charging solutions.
 - vi. For EDP this is a global opportunity, so our ambition goes through both the markets where we already meet and new markets.

EDP is also actively engaged in several partnerships and initiatives to promote electric mobility:

- Strategic partnership with the Association of Users of Electric Vehicles (UVE) in the promotion of electric mobility in Portugal and to become more close to EV users and their pain points in electric mobility. EDP has been actively participating in the national EV users event ENVE.;
- EDP is a board member in ChargeUp Europe, an association representing companies from the electric vehicle (EV) charging infrastructure industry. EDP was the first Portuguese company to join this association that aims to facilitate the creation of modern and quality EV charging infrastructures across Europe, that meet the needs of EV drivers;
- Within WBCSD, EDP also integrates a multisector program addressing business solutions and guidelines to Transforming Urban Mobility.
- Participation as speakers at national and international events, such as eVision by Eurelectric, Fleet Management Conference (organized by Fleet Magazine), eMobiliy Forum by Accenture and EV Charging foruns.
- Participating as a founding member of the Transport Decarbonization Alliance (TDA), which aims to bring together entities from the 3Cs (Countries, Cities / regions and Companies) as major drivers of sustainable, low carbon mobility, with a view to accelerating the global transformation of the transport, towards a net-zero emissions mobility system before 2050 and therefore contribute to the Paris objectives;
- EDP is also active participant in Eurelectric and the Conseil de Cooperation Economique, 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 continues to promote "Portugal Mobi Summit", the largest urban mobility event in Portugal for the fourth consecutive year, in partnership with the Global Media Group;
- EDP launched a new drivers license for EV's "Carta Elétrica" with the largest media group in Portugal, Grupo Impresa. This project included several contents both in tv, print and digital such as tv episodes, debate sessions, podcasts, news (digital and print), sponsored contents and an EV draw through the last 4 months of the year.
- EDP launched a new partnership with StandVirtual, the major web based car dealer in Portugal. The project will increase EDP charger solutions awareness, provide several digital contents and the launch of the electric week with special conditions for the final customers.

Since 2018, EDP Comercial has an business area of smart mobility and to accompany the evolution of the sector and the growth of the business area, the organizational structure of the Smart Mobility team became more complete in 2021. The team is now divided into four areas, supported by two transversal support areas of Regulation & European Affairs and Marketing & Communication:

• 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.

- Commercial Management: 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.
- New Business: 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.
- Operations Management: 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.

Moreover, ninety per cent of the growth of global fleet of passenger vehicles is set to take place in developing and transitional economies. Ensuring people and freight are mobile as efficiently and safely is an essential component of the energy transition.

And whilst advancing the access to sustainable energy agenda, SEforALL is also developing the nexus of energy and transport in the urban environment to support the design and development of a line of work that provides value and impact, that helps deliver multiple SDG benefits including human health, productivity, and economic development in fast-growing cities in developing countries.

- The centerpiece of the vehicle efficiency accelerator is a partnership of the International Energy Agency (IEA), United Nations Environment Program (UNEP), International Transport Forum of the OECD (ITF), International Council on Clean Transportation (ICCT), Institute for Transportation Studies at UC Davis, and the FIA Foundation, aiming at reducing emissions and doubling vehicle efficiency by 2050.
- Also, following inputs from key partners including Sustainable Mobility for All (World Bank); FIA Foundation; Islamic Development Bank; SLOCAT and BMZ, SEforALL will target the fast-urbanizing cities of Africa and Asia and the challenges and opportunities for providing energy efficient mass transport for those who are most exposed to polluted modes of transportation.

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.

Throughout the last year, we expanded our operations with the implementation of new charging locations and the launch of the EDP EV.Charge Br app, which allows our customers



to sign up and use EDP Brasil's public electroposts, improving their experience. We also strengthened the Operation & Maintenance work of the electroposts, focusing on maintaining a high availability rate of chargers and excellent support to users.

EDP moves forward in the electric mobility segment, highlighting investments to expand the electric vehicle charging infrastructure in the country. In tune with our commitment to lead the energy transition, the investments in electric mobility is one of the technologies needed to avoid the planet's temperature increase. To ensure the necessary infrastructure to meet this segment's growing demand, in 2021 we implemented two more recharging stations at the São Paulo International Airport, in Guarulhos. As a result, the airport now has electric vehicle recharging infrastructure in all its passenger terminals.

Another year' highlight was the installation of nine ultrafast charging points. Thanks to this initiative, we closed 2021 with ten ultrafast points already installed, one of which being 350 kW, Latin America's most powerful. Among EDP Smart's projects in electric mobility presented via Research & Development to ANEEL, representing investments close to R\$ 50 million, the installation of an ultra-fast charging network is expected to cover the entire state of São Paulo by 2022. The stations will connect the main electric corridors in the country, interconnecting the São Paulo capital to the countryside and to other state capitals, such as Rio de Janeiro, constituting a corridor exceeding 2,500 kilometers in length.

In 2021 EDP started incorporating the first 100% electric trucks in our fleet, aimed at providing field services. We were, therefore, the first company in the sector to introduce trucks with a fully electric motor and aerial basket equipment in Brazil. The operation started with one truck in Vitória, at the Espírito Santo distribution center, and another in São José dos Campos, to serve the distribution center in São Paulo. The intention is to acquire new trucks as factors such as recharging infrastructure and specialized labor advance in our region of operation. In Espírito Santo state, we already have truck-compatible chargers in the 5 cities. According to our expansion plan, all the Distribution Service Centers will have charging points by the end of 2022.

Another effort to increase the electric fleet occurred in Ceará with the introduction of a solar electric bus. This is the first Brazilian bus specially developed for long-distance passenger transportation, powered entirely by solar energy. The technology is the result of a Research & Development project by TPP Pecém, which received R\$4.85 million in investments. The vehicle, which has a battery bank capable of providing 300 km of autonomy, is used to transport the company's employees, and the trip performance data is monitored by the team responsible for the project. By the end of the year, the bus traveled more than 30 thousand kilometers in intercity trips between Fortaleza and São Gonçalo do Amarante, in the state of Ceará. The vehicle is charged in the break between trips, in the plant's parking lot, by means of a carport supplied by 183 solar panels, ensuring its independence in relation to the energy generated by TPP and the distribution system.



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 2021, E-REDES reached 13% of electrification on its fleet. In the coming years, E-REDES plans to replace a significant number of diesel vehicles by electric ones in order to contribute to EDP Group's ambitious goal of reaching 100% of electric light vehicles by 2030.

This fleet, naturally, comes with the necessity of charging points for electric vehicles. E-REDES has two coordinated initiatives to assure a strong and reliable network of electric charging points on its office buildings:

- Installment of 400 Alternate Current/Direct Current charging stations by 2022;
- A well thought network of 50 kW fast chargers in 24 strategic locations.

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 an ongoing smart charging pilot on its office buildings of São Sebastião in Setúbal. This building has a total of 20 charging points, controlled by an online smart charging platform from GreenFlux, a dynamic load balancing is implemented locally between the building consumption and the electric vehicle charging. This project will allow for the demonstration of smart charging benefits in terms of a smarter investment and future grid stability.

3.3.4 EDP Spain

2021 closes as a year with very positive figures for EDP in terms of sustainable mobility, with its more than 400 active recharging points some 710,000 kWh have been supplied, enough energy to travel 4.7 million kilometers. More than 50,000 electric vehicle recharges have been registered, 66% more than in 2020. Thanks to this sustainable mobility proposal, the emission of 475 tons of CO2 has been avoided.

At EDP's vehicle recharging points in public access spaces, drivers have recharged, in 2021, 413,000 kWh. This is the energy needed to cover 2,750,000 kilometers, which is equivalent to covering the 4,097 km between Madrid and Moscow more than 670 times. The energy supplied evolved during the year from 9,700 kWh in January to 52,200 kWh in December, with a peak of almost 63,000 kWh in August.

EDP also recorded very positive data from its 250 private charging points, they have totaled 300,000 kWh of energy recharged, 39% more than in the same period of 2020. With this



energy, 2,000,000 kilometers could be covered, which is equivalent to driving 787 times round trip from Madrid to Paris, while avoiding the emission of 200 tons of CO2.

In addition, EDP is participating together with Mastercard and Sabadell in a project to promote the use of electric vehicles through the deployment of 1,000 recharging points equipped with contactless technology for payment by bank card or mobile device. The first prototype recharging point equipped with this technology is located in Asturias, the region that will host the first five recharging points of this pilot project. [photo]

The EDP charging points are managed through the 'EDP MOVE ON' app, which allows recharging at more than 800 points throughout the country. With this application, users have control of their recharges, the map of chargers and can know, among other features, the distance to each facility, its availability and the type of connector.

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 is to provide electric vehicle users with the necessary infrastructure so that they can recharge their cars on their journeys.

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 685 thousand in 2020, E-REDES installed more 868 thousand smart meters in 2021 in several Portuguese municipalities. By the end of 2021, a total of more than 3.9 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 1.7 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)

InovGrid is the innovative project that makes the electricity grid more intelligent.

As relevant events and developments in the Inovgrid area in 2021, we can highlight the start of remote management of supply records, whose main advantage is the reduction of response times, without the need to visit the consumption site. In the same line of remote operations, customers have the possibility of consulting instantaneous consumption values from the My Consumption website. In the field of digitalization and automation of processes, the app "Meters" was created to facilitate the reading, review and programming of smartmeters, when they are not remotely accessible. The app has made field work more flexible, simplifying the operation and facilitating the management of available resources, while ensuring data reliability and security for its subsequent processing in the different systems.

It was also included in the website a new platform for managing access and connection to distribution networks to facilitate and standardize this type of management by renewable energy generators. The new platform has two fundamental parts. The first is a map of available capacity in all the nodes of our networks so that in an easy and intuitive way the promoters of this type of energy can see where it is possible to connect their facilities. The second is a fully digital system in which to make requests and track the entire process of access and connection.

The Flash BT project for fast, precise, and real-time monitoring of the LV network also continued, enabling the challenges of electrification of the economy to be met in an efficient manner. In terms of data analysis, improvements were achieved, on the one hand in the prediction and detection of faults in the distribution network and, on the other, in the reduction of energy losses in the network and in the fight against electrical fraud.

During 2022, a massive deployment of Flash BT will also be carried out in the Viesgo and Begasa networks. Until now it was residual and it is planned to install more than 400 low voltage panels for advanced supervision of transformer substations. This would reach about 10% of the transformer substations with advanced supervision.

3.5 ENERGY STORAGE AND FLEXIBILITY

This is one of the main strategic areas of innovation EDP is focused on. The following projects were or 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

Development of a 30 kW battery with Spanish technology, for commercial and industrial use, and testing in real an environment on the Asturias low voltage power grid.

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-lon 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.

Distributed Generation with Storage (BR)

A project carried out jointly with the Federal University of Santa Catarina (UFSC), Brazil, for the use of distributed urban generation with decentralized photovoltaic solar systems and short-term storage. The initiative also evaluates auxiliary services for grid stability and impacts, as well as enabling new business models through distributed solar generation.

Energy storage pilot - EDP Redes (ES)

To improve the quality of supply, especially in rural areas, the pilot energy storage system has been operational since June 2020 in the municipality of San Vicente del Monte (Valdáliga, Cantabria), whose main technical characteristics are 250 kVA of power and 232 kWh of energy. It is a lithium battery storage system and a converter. In the installation, the system monitors the quality of the energy supplied by the grid so that, in the event of a breakdown or power failure, it sends an automatic warning to the control center, which starts up the corresponding operation to correct the incident. At the same time, the system automatically starts supplying customers from the batteries, guaranteeing continuity of supply until the main power supply is restored.

New energy storage projects are under development in 2021, in Fonsagrada, and 2022/2023 in SE Toranzo, SE La Olla and SE Carrión.



3.6 OTHER INNOVATION PROJECTS

DOMINOES

The DOMINOES project aimed to enable the discovery and development of new demand response, aggregation, grid management and peer-to-peer trading services by designing, developing, and validating a transparent and scalable local energy market solution. The market can be leveraged to share local value, increase renewable energy accessibility, and make better use of local grids by Distribution System Operators (DSO), Prosumers/Consumers, Energy Retailers and other key stakeholders. The project showed how DSOs can dynamically and actively manage grid balance in the emerging future where microgrids, ultra-distributed generation and energy independent communities will be prevalent. Best value will only emerge if these resources and stakeholders can be connected to both DSO activities and the centralized market mechanism. The architecture and services combined will help contribute to achieving the European Commission's key energy-related targets. The project began in October 2017 and was concluded in June 2021.

As a conclusion from the DOMINOES project, the project main idea of the scalable local energy market solution is relevant for the future. The developed ICT architecture and market design, tools, and services were validated in a simulation environment and three validation sites, supporting the local market concept. The regulation environment is driving in the direction of involvement and engagement of end-customers and an increased role of DSOs in enabling flexibility provision. Regulation of the energy communities might be a key step for the local markets (http://dominoesproject.eu/).

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.