

# **NEW BUSINESS OPPORTUNITIES**

**DSM AND ENERGY EFFICIENCY INITIATIVES**

**EDP GROUP 2019**



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## 1. FRAMEWORK

In recent years, Energy Policies worldwide have reinforced the need to promote the improvement of energy efficiency and, in some cases, such as in Europe, set ambitious goals and introduce new challenges/opportunities for the business sector. The current framework – “Clean Energy for All Europeans”, including a reload of EU legislation (e.g, Energy Efficiency, Renewables and Energy Performance of Buildings Directives) - envisages to achieve the 2030 32.5% headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date.

Under this framework, Portugal set the ambitious target of 35% minimum reduction of primary energy consumption in 2030 and Spain 39.6%, supported on the National Energy and Climate Plans (NECPs) - <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans>.

These ambitious goals, combined with the market opportunities they induce, have led to the development of demand-side management (DSM) initiatives, for instance in the fields of energy efficiency (EE), fuel switching, load optimization and distributed generation. Additionally, the economic crisis experienced in southern Europe increased the appetite for energy savings that can be achieved through energy services.

Active promotion of demand side management 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 products and services related to energy efficiency and distributed generation, supported on communication campaigns and partnerships with other operators in the industry.

EDP has assumed energy efficiency as one of the most material issues for the company’s performance with high impact on our business, in line with its climate strategy.

Moreover, EDP considers innovation as a key element to energy efficiency improvement. Under this framework EDP Group implemented an innovation governance model based on 5 strategic areas: Cleaner Energy; Smarter Grids; Customer- Focused Solutions; Data Leap; and Energy Storage & Flexibility.

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

In this respect, EDP assumed the following commitments:

Generate Economic Value		
Provide customers with continuous access to energy efficiency products and services: Reduce overall consumption by 5 TWh before 2022 (accumulated since 2015).	Encourage partnerships in promising and unproved clean energy technologies, energy efficiency and smart grids research, by investing €200M in innovative projects by 2020 – this target was already reached in 2019.	Expand the installation of smart meters to more than 70% of EDP’s low voltage power network delivery points in Iberia by 2022 and 100% before 2030, utilizing new smart grid technology.



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Moreover, on an Iberian level, three strategic objectives regarding the commercial activity were set in the Business Plan for 2016-2020: to maintain the energy market leadership, to be the preferred company to customers and to have oriented profitability.

In Brazil, as a strategic objective for 2020, EDP aims to achieve an excellent service to customers by improving supply quality, and thus ensuring high levels of customer satisfaction. EDP Brasil strategy further contemplates specific positions and developments to each of its business units. For Commercialization and Energy Solutions, the main strategy is to consolidate leadership position on the supply and services segment. This includes a set of activities focused on development of energy services offer with higher added value (Energy Efficiency, Distributed Generation, among others) and growth through the acquisition of an energy services company (APS – Soluções de Energia). For the regulated market, the National Electric Energy Agency (ANEEL) imposes to distribution companies the regulatory obligation to apply 0.4% of its net operational revenues in energy efficiency projects, according to specific criteria, and 0.1% for the National Program for of Electric Energy Conservation (PROCEL).

Anticipating the new energy paradigm, we are convinced that EDP is preparing its presence in a future where production, distribution and consumption will be increasingly decentralized. Therefore EDP provides a wide range of energy solutions oriented to the specific needs of the different customers' segments, through a diversified offer of competitive 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 24% of global CO<sub>2</sub> 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 industrial and transport sectors.

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 EDP Serviço Universal), as well as projects and initiatives that are being developed by EDP Distribuição (distribution company in Portugal) and EDP Inovação (innovation company), regarding smart grids, electric storage, microgeneration and other energy services.



## 2. CLIENT-FOCUSED PRODUCTS AND SERVICES

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Throughout its value chain, EDP provides 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 decentralized solar solutions offered by the supply companies.

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

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

The set of measures envisaged in the European Commission's Winter Package of Dec 2016 "Energy Clean For All", 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 Comercial (EDPC) has been developing a strategy and enabling the organization to leverage the technological change and access in the energy retail market to develop and commercialize innovative solutions 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 aligned with the Group's strategic objectives.

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



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## ENERGY SERVICES

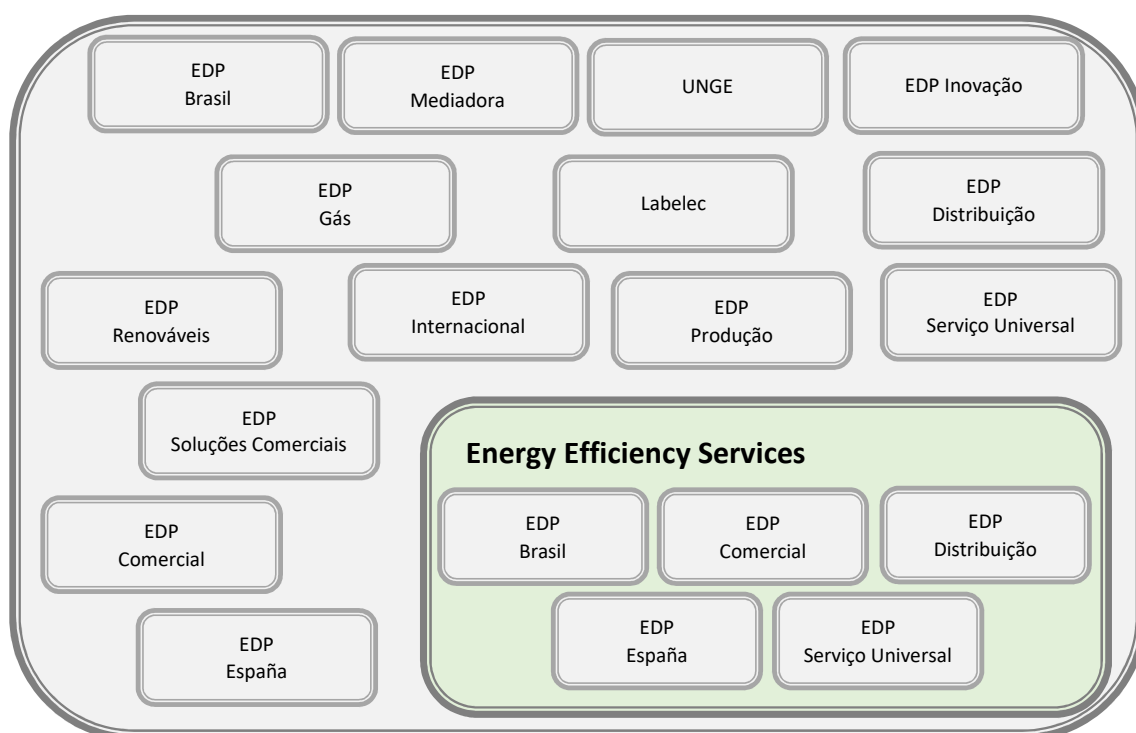


Figure 1- EDP Group Companies involved in energy services initiatives

The following subchapters describe the Business Units that are involved in energy efficiency services.

## 2.1 BUSINESS UNITS

### 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 electric sector value chain.

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 liberalised 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-users services.

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

The company also introduced the offer of a number 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.



In 2019, the largest decentralized solar energy complex ever implemented by EDP Brasil was inaugurated, in the state of Minas Gerais, with an installed capacity of 8.33 MWp. The system will generate 16.6 GWh per year, enough to supply around 8,600 houses. In line with the company low carbon strategy, the complex will avoid CO<sub>2</sub>eq emissions of 31,107 tons over 25 years of operation, equivalent to planting over 190,000 trees. It will drive savings of R\$ 55 million in the course of 10 years.

The energy efficiency projects implemented at customers premises totaled energy savings of 18,285.69 MWh in 2019, and, together with steam co-generation projects, avoided emissions of 29,883.97 tCO<sub>2</sub>eq. The solar energy projects have resulted in the generation of 469.17 GWh, avoiding 35,215.27 tCO<sub>2</sub>e during the course of their lifetime.

Aligned with global decarbonization, decentralization and digitalization trends, one of the EDP Group's strategic focus worldwide and in Brazil has been electric mobility. Accordingly, in 2019 a new area was created with a focus on the development of products and services for the electric vehicle, both for the residential and the business markets.

EDP Brasil already had some key initiatives in this area, such as the Rio-São Paulo electric corridor which connects the two largest state capitals along the Via Dutra highway with six fast charging stations. With the creation of the new area, the company portfolio was expanded with the offer of a range of small to large scale electric chargers for private use.

In 2019, three R&D projects were approved by ANEEL (National Agency for Electrical Energy) totaling R\$ 50 million, involving the plan for the first and largest ultra fast charging network for electric vehicles in Latin America; the integrated supply solution project (e-Lounge) and a development project for electric buses in Espírito Santo.

Since May 2016, the regulated distribution companies 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 ANEEL. In 2019, BRL 25.8 million were invested in such initiatives, which led to energy savings of 15.3 GWh/year (São Paulo) and 10.25 GWh/year (Espírito Santo).

Continuing the strategy initiated in 2018, the Company increased its share in Celesc, the largest electricity distribution and supply in the state of Santa Catarina, through the acquisition of additional preferred stock in . With an investment of R\$28.5 million, EDP Brasil increased its stake to 4.6 million preferred shares in Celesc, as well as its 5.14 million ordinary shares, representing an increase from a 23.56% to a 25.35% shareholding in the company's stock.

One of the company's main investment focuses during the year, the Transmission segment, ended 2019 with six projects that have a total extension of 1,441 km, 113 km of which in operation in Espírito Santo and 1,328 km under construction in another five Brazilian states – Santa Catarina, Rio Grande do Sul, São Paulo, Minas Gerais and Maranhão.

In line with EDP Brasil business expansion strategy, worthy of note during the year was the acquisition of Lot Q (auctioned in the 1st stage of the 13/2015 transmission auction on 13/4/2016), by means of a purchase and sale contract with CEE Power and Brafer. Comprising two sub-stations and 142 km of transmission lines divided into two sections, it is located between Santa Catarina and Rio Grande do Sul, reinforcing the company's position in the South of the country. Another positive factor was the progress in work on all the projects, which are ahead of schedule. Particularly noteworthy was lot 11, with an



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extension of 203 km, with the delivery of the Chapadinha Miranda (Maranhão) section in 2019. A total of R\$ 2.2 billion, representing 57% of the amount contracted, has already been disbursed. The company also ensured the installation licenses for all the lines, bringing forward the licenses for lots 18 and 21.

### **EDP Comercial**

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

During this period, from 2012 to 2019, EDPC has promoted several protocols (#12) with sectorial and business associations to promote Energy efficiency opportunities covering some of the more intensive processing industry as plastic, ceramic, chemistry, melting, textile and metallurgical as well as the fast-growing tourism sector.

In the Business Plan 2016-2020, 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.

Our main purpose is to lead the energy transition to address global change in the energy sector and to create superior value. In 2019, EPD announced a new Retail Strategy 2019-2022, based on 3 strategic priorities:

- 1) Lead the energy transition downstream, obtaining accelerated growth in distributed generation and ensuring comprehensive in-home charging portfolio;
- 2) Anticipate new growth opportunities beyond our direct customer base, building new business models in new downstream, through organic and M&A & strategic partnerships;
- 3) Enhance profitability through VAS, increasing VAS penetration rates and enhancing “As a Service” energy efficiency portfolio across all segments.

In 2019, numerous macro initiatives were maintained to boost the business, residential and innovative energy services offer, worth highlight:

In B2B, we continued our effort to promote bundle offers, putting together electricity and energy efficient services. Some successful examples of this approach include Grupo Ferpinta, Câmara Municipal de Portimão and Exide Technologies .

Our portfolio of energy and efficient services continues to grow. EDP and Sakthi Portugal signed a long-term (18 years) PPA – Power Purchase Agreement, the largest agreement ever signed by the Group in Portugal. Power Purchase Agreements offer greater price stability and significant price cuts, resulting in savings of about 20% in electricity costs compared to short-term contracts. The energy supplied under this agreement will consist of renewable energy produced in the Iberian Peninsula. It is also important to mention the participation in the PPEC program, with 13 initiatives to reduce the energy consumption in B2B segment. This program represents a total sales amount of more than 14.9 M€ in energy efficient solutions.



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To communicate all these new business strategies, we have been intensively using digital channels like our own website [edp.pt](http://edp.pt), LinkedIn, YouTube, customized email marketing, google AdWords and portuguese press.

In B2C, a new organizational area was created to bring together Solar Energy, Batteries, Electric Mobility, Energy Management and Energy efficiency products and services. EDP Re:dy is a key component of EDP's smart energy strategy and allows remote and convenient monitoring and remote control of energy production and consumption. This concept won the world energy retail award in Barcelona in 2017, which awards innovation in retail to the level of customer relationship and new models of energy retail.

The EDP Re:dy app won a prize at the World Summit Award 2017 - a competition launched by the United Nations to recognize the best creative applications and interactive content. The app was awarded in the "Environment & Green Energy" category.

Also, in B2C, main achievements in solar energy worth emphasis: with the installation of more than 30.000 solar energy systems, we managed to lead this emerging market with an estimated 80% market share in solar.

In 2019, EDPC has generated EUR 85.9 million (vs. 2018 = EUR 66.5 million) in energy efficiency services, including, for instance, energy audits and certifications, Save to Compete program and initiatives under the Plan for Promoting Efficiency in Electricity Consumption (PPEC), promoted by the Portuguese Energy Services Regulatory Authority (ERSE - <http://www.erse.pt>). Please see EDPC's website with all offered products and services (<https://www.edp.pt/>).

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, 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.

- The EDP group's commitment to this area has been to raise awareness and promote electric mobility, an objective fulfilled through the launch of EV.X, an app created with the objective of simulating the life of a customer with an electric vehicle; it provides users with information about potential financial savings and carbon reductions that they could achieve if they were to drive an EV in lieu of their standard internal combustion engine vehicle; As of today, EV.X has registered more than 417,000 trips and 8 million kilometers, with an average saving of 0.90 € per trip, 94% of the recorded trips didn't require mid-trip charging and an average of 0.6kg of CO<sub>2</sub> would be saved per trip. EV.X has garnered both national and international recognition, including the award for the 'Best Automobility App/Site', at the Portugal Digital week (Prémio ACEPI Navegantes XXI 2019).
- In March, EDP also launched a TV campaign to promote its home and out of home offers. The home offer is based on a charging solution with an intelligent distribution of energy and a special night time tariff with 20% discount. The out of home offer is anchored on EDP's Electric Mobility



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Card, which enables public charging on MOBI.Es infrastructure with a 20% discount on the energy consumed – for EDP's home customers only.

- In October 2019, EDP innovated again and launched its condominium charging solution, which enables customers to charge their electric vehicles in shared parking areas, allowing them to segregate consumptions and automatically settle energy costs with the condominium, providing a transparent and seamless experience for both EV driver and condominium. All the charging information is available to users and condominiums via mobile app and web portals.
- EDP is investing in a new network of fast electric charging stations for company fleets. This network, which will be complementary to the public infrastructure of loaders, represents an important step in the mobility strategy of the group and gives a clear response to the growing consumption needs and the challenges currently facing cities in urban planning.
- EDP is also launching, by Q2, a charging solution for companies in Portugal. This solution will leverage much of the experience and capabilities gained in the residential segment, and will allow companies to manage chargers and users; This solution will be a key enabler for the development and ramp-up of electric mobility in Portugal.
- In the public network, according to the model defined by the management entity MOBI.E, in a fast charging station, the customer has paid since November 1<sup>st</sup> 2018 a component related to the use of the station (OPC tariff), to which is added the value of charged energy (CEME tariff) and the cost of taxes.
- The advantages of EDP's tariff, the most competitive in the market, are:
  - It is the simplest for the customer: it 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 EDP Wallbox (home charging solution), we offer a flat rate plan for the house with a 20% discount in the low-load period (night time, where the shipments are concentrated). Thanks to the incorporation of the re:dy consumption management app, EDP Wallbox ensures a more efficient load management. If customers opt for this solution, they can save 36% in the face of electric charges away from home.

### **EDP Distribuição**

In what concerns energy efficiency, EDP Distribuição, as the Portuguese Distribution System Operator, has a public obligation and a mission to promote energy efficiency, contributing to a more rational use of electricity, endogenous resources and reinforcing its position in terms of innovation and sustainability.

With that goal in mind, EDP Distribuição has established partnerships with Universities and Research Centres, namely 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, EDP Distribuição also participates in R&D programmes, under the European Commission's FP7, promoting research and innovation fostering Energy Transition. One example is the InteGrid project, lead by EDP – Distribuição, 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.



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EDP Distribuição prepared in 2016 the Development and Investment Plan on the National Distribution Network (High Voltage and Medium Voltage network) for the 2017-2021 period, which was approved by the Portuguese Government in June 2018. This plan includes EUE 30.9 million (primary costs) associated with the promotion of access to new services, which includes the promotion of Smart Supervision, Operation and Telecommunication Systems, and Innovation, fostering the transition towards a smart grid.

In 2018, EDP Distribuição delivered to the Portuguese Government the Development and Investment Plan on the National Distribution Network (High Voltage and Medium Voltage network) for the 2019-2023 period, still waiting to be approved. This plan is on track to proceed with the investment in projects fostering the access to new services, which is proposed to be around EUE 26.9 million for the period.

In 2019 EDP Distribuição installed around 692,000 smart meters in end-user's facilities, reaching a total of around 2,580,500 smart meters (around 43% of LV installations)

EDP Distribuição 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, EDP Distribuição installed 243 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.

EDP Distribuição 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.

### **EDP España**

In Spain, Energy Efficiency activities have been carried out since 2010 by the Energy Services Company. The aim of this unit is to develop and coordinate the necessary mechanisms to achieve an appropriate positioning of the energy services business, allowing the Group to expand its commercial offer. Promotion of Energy Efficiency is namely encouraged through the website <https://www.edpenergia.es/eficienciaenergetica/es/>, which describes the activities undertaken by the Group and details the products and services offered by segments and technologies: optimisation and consumption management, facilities management, distributed generation and integrated energy solutions.

During 2019, EDP Energy Services saved around 12.2 GWh, avoiding the emission of 3,553 tCO<sub>2</sub>.

In 2019, important sales values were reached with a turnover over 18 M€. For this result, we would highlight the first two sales through the service model of Exide's solar project and Solvay's compressed air supply project, whose implementation will start during the first half of 2020, with an amount of 2.7M euros, and the increase in business in Building, with a turnover of more than 8M€.

In 2019, we have also implemented important reporting projects through Power BI and the implementation of the Salesforces platform that will allow us to perform our work more productively in 2020. On the digitalization front, we are moving forward with the implementation of new improvements to the Save to Compete 2.0 platform to serve the SME market, increasing the potential for generating solar offers focused on the new regulation of self-consumption, as well as the productive implementation



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of lighting offers with high-efficiency equipment, Signify (Phillips), providing even more value in the technical commercial process of preparing offers.

It should also be noted that only in 2019 we have signed photovoltaic contracts for self-consumption with a total power of 7MWp.

### **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 entrepreneurial ecosystem.

EDP seeks to integrate in its 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 established to foster and interact with startups lie the startup engagement program (EDP Starter), the acceleration program (EDP Starter Accelerator Programme) 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.

The Governance model for Innovation in the EDP Group is based on five strategic areas:

- **Client-focused Solutions**, addressing retail, and focusing on diversification, by channelling its innovation work towards a wider range of supply with innovative products and services and new business models and improved customer satisfaction and involvement. The solutions developed seek to transform EDP into an agile, customer-oriented company through intelligent pricing and aggregation systems, energy efficiency and increased electrification;
- **Smarter Grids**, focusing on the development of smart grid infrastructures and customer-focused applications and operations, to ensure that their central role in the energy system meets business needs. These new smart grids will have to address, in particular, energy efficiency improvement targets, with the growing integration of intermittent renewable sources, as well as the increasing penetration of electric vehicles and storage;
- **Cleaner Energy**, focusing on identifying and promoting the development of new energy generation methods through renewable sources or through reductions in greenhouse gas emissions and new technologies to improve the operations and efficiency of existing energy production assets;
- **Data Leap**, a cross-cutting area, which seeks to leverage the latest developments in Information and Communication Technologies (IT) to accelerate innovation in all business areas. Its main focus is the use of new ICTs, such as Big Data, Cloud Computing, Advanced Analytics and the Internet of Things and the identification of opportunities for operational optimization and business development through digital innovation and data use.
- **Energy Storage & Flexibility**, seeking to understand the rapid changes in energy storage & flexibility technologies and their application to energy systems. The challenges of intermittent power, microgeneration, electric mobility and increased customer training require technological solutions that



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increase the flexibility of electrical systems in which supply and demand must be constantly balanced. Storage & Flexibility is therefore a key tool in addressing these areas throughout the energy value chain.

For each of these strategic areas there is an Innovation Workgroup operating under the sponsorship of EDP Group's Executive Board.

### **EDP Serviço Universal**

EDP Serviço Universal is the portuguese last resort supplier, and its main activities include the acquisition of all the Special Regime Production (PRE, 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.

According to these 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 electricity, as well as facilitating the transition to a cleaner and decentralized energy production and consumption communities, which will empower much more Demand Side Initiatives to be developed into the market.

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 march 2020, to ensure enough time for a smooth transition to liberalise players, as the regulated tariffs, still serving around 1 million customers (5% of the market in volume), will be maintained as a business commitment in alignment with the objective of a liberalized european energy market.

Through the presence and remote contact, EDP Serviço Universal will provide all sort of clarification about how to move to the liberalised market and where the customer can find information about the commercial players available in the market.

Over the years, the customer has recognized the commercial quality of service and the company's commitment to do counselling on savings in energy consumption. This result is reported in the annual market research directed by EDP Serviço Universal Service and management information monitored by the Portuguese Energy Services Regulatory Authority (ERSE - [www.erse.pt](http://www.erse.pt)).

During 2019, EDP Serviço Universal prepared the Brand change to "SU ELECTRICIDADE" as well as a set up of 18 independent shops, one in each district, as a regulated imposition in order to increase the transparency of the distinction of EDP regulated and liberalized markets and its supply companies.

In accordance with the EU Directive 2018/2001, from 11 december 2018, the concepts of renewable energy autocomsumption and collective communities, allows them to produce, consume, store, share and sell energy without increasing costs disproportionately.

Regarding the activity of buying the Special Regime Production (PRE), as the producers reach the end of subsidized tariffs, EDP Serviço Universal will perform new 2 functions: Market facilitator (DL76/2019) and Market Agregator. EDP SU is obliged to acquire the energy of PRE producers once in the market without subsidized tariffs, under the conditions approved on the auctions already occurred and to be held in the future (already 1,000 MW for 2022 has been auctioned) and then sell it in the market or in systems services.



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EDP Serviço Universal, since 2008, has been an important participant in the Plan for Promoting Efficiency in Electricity Consumption (PPEC)( see chapter 7.7 ). In the last edition of 2017/2018, it was awarded in this competitive program two measures : one tangible – the offer of 80,000 Standby Killer outlets – and one intangible – Twist – an educational program to educate high school students, their families and communities on energy end-use efficiency best practices. The investment in this 2 measures amounted to around 1.3M€ and the results were very positive:

- Twist: Directly involvement of 195 schools, 328 teams, 2,746 students, 433 teachers which mobilized through social media 200,000 viewers and indirectly reached around 1M people with the most important efficiency messages.
- Stand-by killers: 80,000 units were delivered. An independent Measurement & Verification auditing has assessed the reduction of standby consumption per year to be in the order of 7,142,400 kWh, around 1M€ savings per year, and 3.3kton of CO<sub>2</sub> avoided.



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## 2.2 PRODUCTS AND SERVICES

In 2019, the EDP Group generated around EUR 158 million revenues from energy efficiency products and services, a 5% increase compared with 2018.

Some of these products and services are described in the following subchapters, by energy services category, and main improvements during 2019 are highlighted.

For each category, a brief description on 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 throughout its value chain (Energy Services Guide for the EDP Group).

### 2.2.1. 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.

#### 2.2.1.1 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 service is done only for B2B customers. A remote auditing was launched to fasten penetration of this basic initial service. In 2016, following the publication of the Royal Decree 56/2016 in Spain, 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 2019, as an integral part of the Funciona service, EDP launched the Plan *Renove de Electrodomésticos* (Household appliances Renovation Plan). This service allows the replacement of an appliance in two ways: purchase (where the customer has the possibility to pay up to 24 months) or renting (where the customer enjoys a full warranty on the appliance).

Throughout 2019, work has also continued on the Boiler Renewal Plan, including the replacement of the boiler within the plan, with the same conditions that the boilers had been enjoying.

Since September 2019, Funciona service ended up being commercialized standalone, and became an integral part of Packs Living EDP. Nevertheless, its configuration remained the same. Every year, the client has the possibility to have a technical and personalized meeting in his own house with a specialized EDP technician, which gives advice on how the client can be safer or become more efficient. The client can choose among (i) a Gas & Electricity installation check-up, (ii) a Lighting Check-up or (iii) an Equipment Check-up. Both Lighting and Equipment check-ups have proven to be very helpful for the clients to obtain reduction on energy consumption. In 2019, were carried out 40,456 Equipment check-ups and 13,389 Lighting check-ups.



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#### ***2.2.1.2 Building 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 leader since 2012. In 2019, the company maintained its leadership issuing approximately 9.000 Energy Certificates. EDP has sold over 100,000 energy certifications throughout the years.

A gas certification service, aiming at facilitating gas contracting and subsequent promotion of the dual offer (electricity + gas) is also provided by EDP. In 2019 edp sold around 200 B2B Gas certificates.

#### ***2.2.1.3 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.

### **2.2.2. 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.

#### ***2.2.2.1 Efficient 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 reduction 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.

#### ***2.2.2.2 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.

During 2019, the Customized Projects area in Spain analyzed 70 opportunities, for an approximate amount of 66 million euros, and was awarded 13 projects for a total amount of 6.8 million euros. Around 80% of



the open opportunities are related to solar self-consumption projects due essentially to the regulatory change that took place from the second quarter of 2019 on.

Of the projects awarded, special mention should be made of the projects in the service mode for customers Exide and Solvay consisting of the supply, installation, commissioning and maintenance during the years of the contract of a PV installation for self-consumption and compressed air respectively.

During 2019, several photovoltaic projects awarded during that year have also been put into operation, which have benefited from the regulatory change in the self-consumption part:

- Customer Mundosol where a 790.5 kWp photovoltaic plant was installed in the no-surplus mode that will allow the customer to reduce its dependence on electricity by 21%;
- Customer Mas y Mas León, where a 105.6 kWp photovoltaic plant was installed in the mode without surplus that will allow the customer to reduce 38% of its dependence on electricity;

It is also worth highlighting the efficient lighting projects that were implemented in several premises of the Saint Gobain Group company (the Construction Platform).

The area of Standard Projects for companies closed the 2019 financial year with very significant contracting figures. During the year, a total of 3,822 service offers were made for a total of 85.8 million euros, with a total of 1,029 services awarded for a total of 2.75 million euros.

In terms of both sales and service provision, it is important to highlight the contracting of specific services with invoicing of more than 20 k€, for example:

- Photovoltaic solar installation of 60kWp in self-consumption mode at the Los Alamos Residence. This project is the first major project sold from the S2C platform and taking advantage of the new regulations.
- Transformation centre for auxiliary services in the SEE of Lada de REE. This investment allows REE to make its consumption of auxiliary services independent from the Lada Thermal Power Station.
- Implementation of a LED lighting system for the sports courts at the Oviedo Tennis Club. This investment has enabled the lighting levels required for high-level competitions to be reached

During 2019 there have been changes in the range of products and the sales model that this area will offer customers:

- The sales offer through the S2C 2.0 platform has been increased by incorporating a high quality brand recognizable by customers as Signify (formerly Philips) to cover the part of the demand that we have detected that not only values the technical characteristics of the equipment.
- In 2019 a project was launched to sell through external channels for the first time in the B2B segment. A process of selection, training and monitoring of channels has been initiated, producing the first offers and sales according to this model.
- The sale of equipment in the "as a service" mode has appeared for the first time with a significant share of the offer and sales figures.

#### **2.2.2.3 B.O.T (Portugal and Brazil | B2B segment)**

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



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### 2.2.3. Energy Management

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

#### 2.2.3.1 Energy management systems (Portugal and Spain| B2B Segment)

In Portugal, 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.

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.

Furthermore, the Building service is a service focused on the provision of integral energy solutions for buildings in the tertiary sector, fundamentally Neighbourhood Communities.

During 2019 a total of 415 offers were made, with 182 energy and service contracts between new contracts and renewals amounting to The portfolio managed by the area totals 395 facilities, of which 331 are located in Asturias, 43 in the Basque Country, 3 in Castilla y León and 18 in Cantabria. The facilities, mostly centralized boiler rooms with a thermal power of 164 MW, consumed a total of approximately 175 GWh of natural gas during the year and provided heating and sanitary water services to more than 17,000 homes.

The facilities include 11 boiler rooms with natural gas micro-cogeneration with an installed electrical power of 61 kW and 26 boiler rooms equipped with solar panels with an installed thermal power of 2.4 MW and a solar surface area of 987 m<sup>2</sup>. Likewise, 6 facilities have LED lighting with a total of 1,953 lights and an installed electrical power of 22 kW.

The area contracted 13 new projects for the transformation of gas oil/coal into natural gas in boiler rooms.



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The refurbishment of these facilities for an amount of 2.55 million euros enabled the capture of 5.3 GWh/year of natural gas, an estimated annual saving of 1.5 GWh while avoiding the emission of approximately 899 tons of CO<sub>2</sub> into the atmosphere per year.

The renovation was carried out in 6 boiler rooms in Asturias, 2 in the Basque Community, 4 in Cantabria and 1 in Castilla y León. The company replaced the heating and sanitary hot water production facilities that operated with diesel, LPG or coal with new facilities, with natural gas equipment, which are more efficient and produce less environmental impact.

In the maintenance section, a total of 7,594 interventions were carried out in the installations for preventive and corrective maintenance.

In addition, and with the intention of continuously improving building services, work has been carried out on the following projects, among others:

- Remote management: unification of the remote control systems of the facilities, in order to have on-line information on the operation of our customers' boiler rooms, as well as to reduce response times in the facilities to customer requests or equipment incidents. Launched the RFP bidding process.
- Tender of the maintenance service in Asturias for the next 3 years (2+1).
- Tender for the meter reading service for the next 3 years (2+1).
- Implementation of a billing system: process of analysis of a billing system, which allows us to manage and speed up this process, avoiding or minimizing the errors inherent in current manuals.
- Survey of the potential markets of Miranda de Ebro and Getxo

In addition, at the end of 2019, the process of analysing the digitalisation project within the Save to Compete (S2C) platform was started up for the entire commercial offer of the building service, which is expected to go into production in 2020.

#### **2.2.3.2 Energy management systems (Portugal 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.

In 2017, for communication purposes, EDP has built a new landing page in its website, with a interactive simulator that indicates to the client if it's a good opportunity and if it's mandatory.

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).

#### **2.2.3.3 TRE (Portugal | B2B Segment)**

EDP Comercial makes available an Operational Technician responsible for the facilities (TRE - Técnico Responsável de Exploração), as well as for facilities well functioning and energy decision making.



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#### 2.2.4. Monitoring and evaluation of savings

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

#### 2.2.5. Maintenance and Operation

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

##### 2.2.5.1 *Funciona (Portugal and Spain | B2C and B2B segments)*

After the success of this service in Spain in 2005, EDP launched it in Portugal in 2013. For the residential and business segments, EDP provides electricity and natural gas services regarding installation check-ups and repairs. It delivers technical assistance to the main kitchen appliances and urgent services whenever required. Together with equipment maintenance it contributes to the increase of the customers' safety, savings and comfort – **Funciona**.

In the recent years, the main novelties in Portugal were the launch of the lighting check-ups and the equipment check-ups, both as alternatives to the installation check-ups. Lighting check-ups basically consists in identifying the bulbs with potential for replacement and informs the customer about the best options to reduce lighting consumption in their home by changing to the LED technology. Equipment check-ups - launched mainly to provide an alternative for the clients who had already requested both installation or lighting check-ups - were developed with the purpose of identifying kitchen appliances with potential to replacement and inform the client about the best options to decrease its electric consumption.

In Portugal, as the product was stabilized and mature, the main strategy was to reconfigure the offer itself. As mentioned in the previous chapter, since September 2019, Funciona service ended up being commercialized standalone, and became an integral part of Packs Living EDP. Nevertheless, its configuration remained the same. By the end of 2019, around 400,000 customers had joined the service (approx. more 60,000 customers than in 2018).

In Spain, EDP offers two modalities for small businesses, which include the revision and maintenance of air conditioning equipment and appliances (Funciona Luz and Funciona Clima).

It is expected that, by 2020, there will be about 1 million customers in the Iberian market using this service.

##### 2.2.5.2 *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.



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For 2015, the offer was revised, some features were adjusted, the price reduced and other options added, such as the Technical Exploration Officer. For EDP Comercial customers, this service can be paid in monthly instalments. In 2017, a new service variant for low-voltage installations was launched. It is called 'Integra BT' and it attracted 101 customers.

#### **2.2.5.3 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.

In 2017, for communication purposes, EDP built a new landing page in its website, with a interactive simulator that indicates to the client if it's a good opportunity and if it's mandatory.

#### **2.2.6. Property/Facility Management**

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

#### **2.2.6.1 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.

#### **2.2.7. 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.

#### **2.2.7.1 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](http://www.erse.pt)). Launched every two years, PPEC is a voluntary project based on a national tender in which all electricity related entities might 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, EDP Distribuição and EDP Serviço Universal.



In 2016, a new competition was launched to be implemented in 2017-2019. The EDP Group had 19 measures approved (3 more than in the previous competition), representing 67% of the funding available (<http://www.erse.pt/pt/planodepromocaodaeficiencianoconsumoppec/ppec17-18/Paginas/default.aspx>). It is estimated that the implementation of these measures will allow for savings of roughly 1,157 GWh and a reduction of 428,105 tonnes of CO<sub>2</sub>, considering the lifetime of the equipment.

Table 1 – 2017-2018 PPEC Measures

Measures	# applications	Budget 2017-18 (€)	Savings (MWh)	CO <sub>2</sub> avoided (t)
<b>Intangible</b>				
Education and awareness-raising project for Energy Efficiency, aimed at students and teachers of secondary education - TWIST 3.0 (EDP SU)		332,587	-	-
Energy Audits and Training for Energy Efficiency in Institutions of Social Solidarity (EDP C)	133	260,000	-	-
<b>Tangible – Domestic sector</b>				
Replace your light bulbs with LEDs (EDP C)		325,000	65,700	24,309
Smart multi-socket (EDP SU)		802,240	82,687	30,594
Heat Pumps for water heating and Flow Reducers II (EDP C)		436,200	38,503	14,246
Efficient Water Heater and Flow Reducers (EDP C)		247,500	26,784	9,910
<b>Tangible – Commercial and Service sector</b>				
Installation of LED traffic lights (EDP C)	18	499,492	71,699	26,529
Replacement of Halogen Spotlight with LEDs in Small Business (EDP C)		298,750	56,160	20,779
Efficient lighting solutions for public buildings (EDP C)	321	618,740	41,264	15,268
Public lighting with LEDs (EDP C)	82	844,100	58,867	21,781
Variable Speed Drives (EDP C)	32	289,842	24,894	9,211
Optimization of HVAC Systems in Hotels (EDP C)	27	370,403	26,409	9,771
Optimization of HVAC Systems in Public Buildings (EDP C)	113	372,903	26,409	9,771
<b>Tangible – Industry &amp; Agriculture sector</b>				
High efficiency motors (EDP C)	132	896,767	127,666	47,236
Variable speed drives (EDP C)	139	1,131,059	174,443	64,544
Consumption management systems - Load interruption and management (EDP C)	14	578,086	76,722	28,387
Implementation of energy efficiency solutions for compressed air systems (EDP C)	151	900,982	93,518	34,602
Integrated Energy Efficiency Solutions (EDP C)	115	757,153	79,384	29,372
Replacement of T8 Fluorescent Lamps and Bells with LEDs (EDP C)	151	1,266,794	85,932	31,795



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EDPC B2B had a concretization rate of around 74%, which means an investment of 14.9 M€, namely Motors, Variable Speed Drives and Lighting Solutions, being well on track to completion. The development of an application management platform along with the use of low-cost digital tools allowed for more efficient, transparent and Client-centered management.

The three B2C measures of ECPC were successfully closed in 2019 and proven to be very helpful for the clients. We highlight the measure to replace obsolete water heaters with heat pumps, which allowed the promotion of market transformation, favoring the penetration of a very efficient and innovative technology, with high savings potential to the beneficiary.

#### ***2.2.7.2 Heat pumps and water heating systems (Portugal and Spain | B2C and B2B segment)***

In the B2C segment, EDP replaces obsolete water heaters with heat pumps, Intelligent Water Heaters, hybrid water heaters, and Gas Instant Boilers which guarantee a much more efficient water heating process. Part of this services was leveraged in PPEC initiatives as showed in Table 1.

In 2019, EDP Comercial sold and installed over 2,000 efficient water heating solutions. In EDPC's website, detailed information and a simulator are provided to help customers assess the best solution for their specific needs and to give customers information about potential energy savings.

Water heating integrated systems for companies focus on boilers, heat pumps and thermal solar systems. All B2B solutions are composed by the following steps: design the system; replacement of the equipment's; optimization of the system use; and periodic maintenance.

#### ***2.2.7.3 Home Appliances (Portugal | B2C Segment)***

In 2019, EDP Comercial launched an offer focused on Big Home Appliances such as refrigerators, washing, drying and dishwashing machines, for the B2C Segment. Throughout the past year, the company sold and installed over 3,000 units.

Additionally, the company created the Green Friday initiative, a promotional campaign over these equipment. Part of the revenues generated were donated to a portugese environmental association.

EDP supplies the most energy efficient equipment in the market, enabling its customers to replace older equipment and, thus, reduce their overall energy consumption. The service includes not only the installation but also collection of the older unit that will be further included in a recycle process.

#### ***2.2.7.4 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.

#### ***2.2.7.5 HVAC System (Portugal and Spain | B2C and B2B segments; Brazil | B2B segment)***

EDP Comercial offers an integrated solution for HVAC systems optimization, from the design to the system installation and maintenance.

In 2019, EDPC sold and installed 487 systems. Funciona Service at the same time maintains 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



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system use; and, periodic maintenance. These optimization systems allow savings until 30% of the energy consumption and ensure comfort and safety for building users.

#### ***2.2.7.6 High Efficient Motors (Portugal 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.

#### ***2.2.7.7 Green Electricity (Portugal and Spain | B2C and B2B Segment)***

The origin of electricity is increasingly valued by domestic customers in the comparison of commercial offers, as a result of a growing concern of society with the impact of its consumption patterns on the environment and on the sustainability of the planet.

EDP Comercial has been adapting its commercial offer to this trend since 2018, increasing the number and variety of 100% green offers in its portfolio. In 2019 this portfolio included a **Green Electricity Plan** (targeted to customers who value the green attribute but do not want to contract additional services), an **Electricity plan associated with Packs Living EDP** (targeted to customers who subscribed a Pack Living), a **Solar Electricity Plan** (targeted to customers with EDP solar panels) and a **Mobility Electricity Plan** (targeted to customers with EDP Wallbox or electrical vehicle).

Domestic customers with a green tariff receive a green certificate proving that their energy consumption was generated from renewable sources.

By December 2019, EDP had around 18 thousands B2C green energy customers, representing a total annual consumption of 56 GWh and contributing to the reduction of CO<sub>2</sub> emissions by 14.1 kton CO<sub>2</sub>.

Regardless of the electricity plan they choose, every year, all customers receive a brochure explaining the origin of the energy they consumed. For a customer with a standard electricity plan in 2019, around 55% of electricity was generated from renewable sources.

The green electricity offer is available at EDP's website for the residential market (for the normal and bi hours tariffs options) and corporate liberalized market (for the normal, bi and tri hours tariffs options). All customers receive annually, around May, a brochure explaining the origin of the green energy they consume – 55.4% for B2C clients and 55.3% for B2B clients - and promoting the 100% renewable option of Green Tariff for B2C and B2B.

In Spain, more than 1 million customers were supplied with "green" electricity: all domestic customers in the liberalized B2C market and some of the B2B customers, representing a total consumption of 5.28 TWh.

#### ***2.2.7.8 EDP Solar Energy (Portugal, Spain and Brazil | B2C and B2B segments)***

In 2019, EDP Comercial launched a new solar energy Above the Line campaign aiming to increase the access to self-produced and self-consumed electric energy, with photovoltaic solar panels offered in monthly payments starting at € 14.90, over a period of 48 months. The company was able to perform over 8,000 installations in 2018 alone.



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In addition, customers who subscribe to EDP's solar energy are also entitled to an exclusive energy tariff, that gives a 10% discount on the electricity consumed from the grid over a 1 year period and 4% in the following 4 years. These customers are also entitled to install EDP ready for only € 19.90, a service that allows customers to monitor the production of their solar system, to know how much they are saving and to manage their energy consumption from home (<https://www.edp.pt/particulares/servicos/solar-energy>).

EDP Comercial makes available to its B2B customers in Portugal different payment methods. In 2019, EDP installed 90.000 solar panels and, with the remaining B2B portfolio, 25 GWh will be generated during the year. This energy production avoided the emission of 123.000 ton of CO<sub>2</sub>.

In the distributed solar and self-consumption segment, EDP Brasil made important progress with the inauguration of the largest decentralized solar energy complex ever implemented by EDP Brasil in the state of Minas Gerais, with a capacity of 8.33 MWp. The system will generate 16.6 GWh per year, enough to supply around 8,600 residences.

In addition, in 2019 a photovoltaic solar solution for residential and small business consumers was launched. Initially EDP Smart strategy focused on the EDP Brasil concession areas in São Paulo and Espírito Santo, increasing the offer to other regions in accordance with the company expansion strategy. Moreover, EDP Smart has a simulator for the acquisition of photovoltaic panels that indicates the estimated monthly savings with a solar system, the number of modules necessary to meet the customer's consumption requirements, as well as the cost and the return on investment and the possibility of arranging finance.

The year 2019 has been marked by the creation in Spain of EDP Solar, a new company within the EDP group that reinforces the strong commitment of the multinational to renewable energies and to be at the forefront of the sector. EDP Solar was created at the end of 2019 with the ambition of leading the residential market for distributed generation in Spain, accompanying all our current and potential customers in the energy transition towards a more efficient model of electricity consumption based on an inexhaustible source of energy such as the sun.

The important legislative changes produced in Spain in 2019 under the guidelines established by the European Union, had a relevant milestone in the approval in April of the Royal Decree 244/2019 which regulated the conditions of self-consumption that together with the repeal of the so-called "sun tax", opened in the Spanish market a new energy context providing at the same time certainty and security to all users. EDP, always at the forefront of the sector and faithful to its commitment to offer innovative solutions to its customers, has since then begun to develop and market different packages of energy solutions based on photovoltaic installations for residential use throughout Spain, adapted to the needs of each customer.

Faithful to the objective of achieving the highest possible satisfaction and user experience, EDP Solar has been able in a very short time to combine the latest technology on the market, the best advice to customers (through the management of administrative procedures, permits and licenses, along with identification and assistance in the management of possible subsidies) and various forms of personalized financing, encompassing a differential and very competitive turnkey solution within the sector.

At the same time and understanding that the first step to have a solar installation in homes started with information and personalized advice, EDP developed and launched its solar calculator (<https://www.edpenergia.es/solar/es/calculadora/>), where any user could simulate the best performance scenario for their home and obtain personalized information.



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Similarly, at the end of 2019 and after the publication by the National Commission of Markets and Competition (CNMC) of the communication protocols necessary for electricity distribution and marketing companies to make the surplus calculations, EDP was a pioneer in Spain in switching to paying its solar installation customers for these surpluses from the energy generated in their homes, offering additional savings from day one for the energy they feed into the grid.

Without a doubt, 2019 has been a year of very intense work and great challenges in terms of self-consumption and distributed generation for EDP on which to continue working with the firm objective of reaching more than 4 million decentralized photovoltaic solar panels installed globally as a goal for the EDP Group by 2030.

#### ***2.2.7.9 Voltage Level Increase (Portugal 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 with their energy needs.

#### ***2.2.7.10 Efficient Lighting (Portugal and Brazil | B2C and B2B Segment)***

Efficient lighting solutions for residential customers and small and medium-sized enterprises, allowing them to reduce costs and, at the same time, ensuring the maintenance of lighting comfort levels. Customers 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.

In July 2018 it was launched the online sale of LED bulbs on the website [edp.pt](http://edp.pt) and sold another 6.317 bulbs.

### **2.2.8. Provision of Service**

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

#### ***2.2.8.1 Re:dy (Portugal and Spain | B2C segment)***

This domestic energy management service was first launched in Portugal in 2013 and, two years later, was made available in the Spanish market. It allows 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/edy-en/>.

The operation of edp re:dy is made possible by a set of hardware - re:dy Box, re:dy Plug, re:dy Meter, re:dy Switch and re:dy plug A/C - an application in the EDP servers where the service is configured, and a set of mobile applications for remote access.

Some of the energy efficiency features available are:

- Scenario programming according with the users needs habits and away periods.
- Individual equipment control and energy consumption analysis.



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- Alerts that help customers 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

The re:dy offer was reviewed, the interfaces of the mobile application and energy report reformulated and several communication initiatives were launched. The edp re:dy, in addition to being sold by itself, is offered to customers in bundle with solar energy, batteries and electric mobility solutions to control the energy production or consumption associated with the electric car. By the end of 2019, a total of 13,000+ edp re-dy customers was achieved in Portugal.

#### **2.2.8.2 Set of energy services for B2B segment**

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

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

It is worth mentioning the programme for modernization of the Public Lighting (PL) park in Portugal. In 2019, around 223,700 LED technology luminaires were installed, which generated energy savings of about 87 GWh, thus avoiding the emission of 23 ktCO<sub>2</sub>. At the end of 2019, approximately 683,000 LED luminaires had been installed, corresponding to approximately 22% of the total number of PL luminaires in Portugal.

#### **2.2.9. 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.

##### **2.2.9.1 Save to Compete (Portugal and Spain| B2C and B2B segment)**

Since 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.

In 2019, the Save to Compete program launched two new products: Energy Audits / Certifications and Electric Mobility.



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Since its launch in Portugal (2012) and Spain (2013), the programme has led to accumulated savings of around 321 GWh, corresponding to about 116 thousand tonnes of CO<sub>2</sub> emissions avoided.

#### ***2.2.9.2 Cuota Ahorro (Spain | B2B segment) and E:cient (Brazil | B2B segment)***

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

#### ***2.2.9.3 Energy Efficiency Programme – PEE (Brazil | B2C and B2B segment)***

In 2019, EDP Brasil invested R\$ 25.8 million in energy efficiency initiatives which led to energy savings of 15.3 GWh/year in São Paulo and 10.25 GWh/year in Espírito Santo and cost avoidance from energy savings of R\$ 5.87 million in São Paulo and R\$ 3.25 million in Espírito Santo.

Among the initiatives carried out under the PEE programme, the project “Boa Energia nas Escolas” (Good Energy in Schools) consists of training teachers from the public network of São Paulo and Espírito Santo so that they can share with their students the information on the safe and efficient use of energy. For this purpose, it includes distribution of educational kits with materials to be used in the classroom.

The project also has the “Caminhão da Energia” (Energy Truck), an itinerant truck that travels through the cities located in the EDP São Paulo concession area, disseminating the basic concepts and information about energy through face-to-face actions, playful experiences and interactive with educators, students and the community in general.

Another energy efficiency initiative with low-income communities is the “Boa Energia na Comunidade” (Good Energy in the Community) project, which promotes the adequate and safe use of electricity. The actions involve replacing inefficient light bulbs with led lamps, giving guidance on the efficient and safe use of electricity and donating standard energy input kits to ensure safety and quality in the energy supply. In 2019, more than R\$ 13 million was invested in more than 35,400 consumer units, resulting in savings of 4.7 GWh in low-income homes.

#### **2.2.10. 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.

##### ***2.2.10.1. Electric Mobility (Portugal, Brazil and Spain| B2C and B2B Segments)***

EDP decided to assume, in a pioneering way, a set of commitments 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 75% renewable installed capacity in 2020 and reducing its specific emissions of CO<sub>2</sub> by 75%, 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



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transition, already started, will now be accelerated and will allow the reduction of the CO<sub>2</sub> emissions of the current fleet, consisting of close to 4000 service vehicles, by 70%.

At the same time, EDP is also committed to continuing developing new commercial offerings 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;
- Supply and installation of solutions for electric vehicles (EV) charging points for B2C and B2B;
- Additional innovative services including re:dy for power management of residential EV charging points, digital solutions for energy segregation and automatical costs settlements, access to other modules within the mobile application edp ev.charge still in development and access to the mobi-e card for charging in public charging stations;
- A specific webpage with relevant information to help customers overcome the initial barriers of this new paradigm of sustainable transportation:  
<https://www.edp.pt/particulares/servicos/electric-mobility>.

Since 2016, several digital campaigns to promote the concept were developed and the number of autopartners, summing up by now 13 partnerships.

In 2017, the emphasis was on boosting electric mobility in Portugal, especially through initiatives in partnership with 13 automobile manufacturers and the development of Fast Loading Stations.

EDP Comercial has 13 fast charging points connected to the public network MOBI.E, located in some cities across Portugal and in the highway that connects Lisbon to Oporto. By the end of 2019, EDP Comercial has more than 13820 active CEME cards.

Moreover, for business customers, EDP makes available a simulator for the comparison of the total cost of ownership of 3 types of vehicles – 100% electric, plug-in hybrids and combustion models. This analysis allows customers to have a real perspective on their total fleet costs.

In Spain, for the B2B segment (Companies and large customers), the PARK-e service includes the integration of combined solutions for electric and/or natural gas vehicle, as well as projects to industrial installations. In terms of charging points, both mono and multi points are available.

We are actively contributing to accelerate this transition to sustainable mobility and are electrifying all our fleet (target to reach 100% of electric light duty vehicles by 2030) and developing new offers and commercial solutions to our clients (including deploying charging infrastructure). To advance on R&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.

EDP plays a central role in creating and streamlining mobility solutions, which is a central priority in our strategic agenda, for three main reasons:

- Our customers now have electrical mobility needs and look to EDP as the natural partner to solve those same needs;
- We believe that, in the long term, mobility will be a very important business growth vector;



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- 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:

- EDP is actively involved in the deployment of public charging infrastructure in Portugal and Spain. In Portugal, EDP has 19 charging points within the MOBI.E network (6 of them waiting for final confirmation), located in the different cities of the country and 196 charging points already contracted. In Spain, we already have 80 charging stations installed and have participated, together with the main charging infrastructure managers, in the European project CIRVE, which promotes the development of a network of forty fast recharging points along the main Spanish corridors. In Brazil, EDP implemented a new 430-kilometre corridor (Presidente Dutra Highway linking Rio de Janeiro to São Paulo), with six new fast-charging stations for electric vehicles.
- EDP already has a set of services for residential and business customers that include:
  - Tariff for electric vehicles with special discounts. Today we have already (i) 2 energy tariffs for our customers - electricity and gas mobility plan (with 10% discount on electricity at night + up to 5% discount on gas) green electric mobility plan (10% discount on electricity at night and energy produced through renewable sources) and (ii) Wallbox as-a-service offer - installation of the EDP charging station in the customer's home with potential integration with the Re:dy service;
  - Re:dy, app-based system for monitoring and managing electricity consumption of home and electric vehicle;
  - In order to respond to the consumer needs that are beginning to emerge, and knowing that loading remains a barrier, we will launch a new solution for customers' homes, which will solve the power management issue and will be available in two modes;
  - At the same time, we want to solve the difficulty of power in condominiums and we are already working on a solution that can also be used in shared parking lots by companies. In the case of condominiums, for example, this solution will allow the condominium to understand the available power for EV charging solutions through an audit process, will make it possible to adapt the electric infrastructure to allow the differentiation of the consumption related to the EV charging points from the remaining electricity consumption of the condominium and to facilitate costs settlements between the respective parties.
- We have developed new solutions to facilitate the adoption of electric vehicles that include:
  - An advisory app – EV.X - that simulates a true electrical experience. In essence, this app (developed within EDP) will help users realize the benefits of adhering to electric mobility in economic and environmental terms, and will allow the experience to be adapted to their day-to-day life with real information on frequency of charging or battery available.
  - Rapid charging stations for fleets, which as it grows will create a network complementary to that of the public charging stations, responding to a need for cities to clear loading points for what is an atypical use of fleets.



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- 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.
- 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;
  - Accession to the EV100 initiative.
- 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 international partnerships and initiatives:

- 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.
- Within the World Business Council for Sustainable Development (WBCSD), on a multisector program addressing business solutions and guidelines to the Transforming Urban Mobility.

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.

An 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 to 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.

#### **Electric Mobility in EDP Distribuição - Project MOBI.E**

Portugal has been promoting an integrated strategy for Electric Mobility in order to ensure that this is a real alternative to the circulation of internal combustion vehicles, contributing effectively in the decarbonization of the economy, and EDP Distribuição has been an important stakeholder in order to achieve these goals.



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In 2010, the Portuguese Government started the Program for Electric Mobility, aimed to define and regulate the electric mobility services and activities, and establish a nationwide Network of Electric Vehicle Charging Points – Project MOBI.E.

EDP Distribuição has participated since the beginning of the Project MOBI.E, as a Charging Point Operator (EDP MOP) and its main responsibilities were to install, explore, make available and maintain a Pilot Network of Electric Vehicle Charging Points.

With the growth of electric mobility, the role of the DSO and the distribution grid will be strengthened. The DSO will take a relevant role in the management of local distribution grids, market facilitator and manager of energy metering data.

With this in mind, EDP Distribuição has created an area for electric mobility within the organization that, amongst other activities such as the participation in cross-sectional projects, is approaching 4 main pillars:

- Follow-up on the electric mobility target, set by EDP Group, by operating a sustainable transition of EDP Distribuição light vehicle fleet to electric until 2030;
- Facilitate the growth of the electric mobility ecosystem;
- Promote “smart charging” by supporting the development of technological, commercial and regulatory solutions;
- Keep track of the electric mobility evolution and its impact in the distribution grid.

EDP Distribuição also collaborates in several initiatives to promote Electric Mobility, both within EDP Group and in partnership with public and private entities nationwide.

### **Spain: sustainable mobility services**

The transport sector currently accounts for about one third of global final energy consumption, and 90% of the energy used in this sector comes from fossil fuels. The decarbonisation of this sector will imply a strong electrification of the sector, which will represent a great opportunity for electric mobility, which is one of EDP's priorities for the immediate future.

One of the main obstacles facing electric mobility is the installation of a public recharging infrastructure in which electric vehicle users can recharge outside their home or office. In this sense, EDP continues with the commitment it had already begun and has already exceeded 100 public access recharging points. Most of them are located in Asturias, where EDP is clearly the most relevant player, although the recharging network has already expanded to other communities such as Cantabria, the Basque Country, Valencia, and plans to extend the network to Castilla y León, Murcia, Galicia and Andalusia.

The strategy followed by EDP is to provide the electric vehicle user with a recharging infrastructure available both in urban environments and on the main roads and motorways, to complement the user's home recharging, which will certainly be the main form of recharging.

The locations in Asturias of the points are spread out in areas of interest, fulfilling the objective of covering the whole territory:

- Central Asturian area and connection to the country's center
- A8 Cantabrian motorway, (including Asturias Airport)



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- Protected natural areas and rural environment.

This public infrastructure is accessible to any electric vehicle user through the EDP MoveOn application. The application allows the user to locate the recharge points, see their availability and characteristics, start and stop the recharge and pay, receiving immediately afterwards the invoice associated to the recharge in his/her e-mail.

In 2019, more than 200 MWh of electricity were consumed through the EDP MoveOn network's recharge points, equivalent to about 1.33 million km. This means a 6-fold increase over the previous year's consumption, with a clearly upward trend month by month.

In addition, EDP MoveOn will serve during 2020 as a platform to facilitate interoperability with other operators. Interoperability consists of opening EDP's charging network to users of other applications (which would display EDP's points in those other apps), and also adding other operators' charging points to EDP MoveOn, which could be used by its users.

EDP is strongly committed to interoperability, and proof of this is the already achieved integration with the leading e-roaming platform Hubject. In addition, sey is working on direct integration (peer-to-peer) with other operators, which is expected to be available throughout 2020.

As regards so-called linked recharging, which takes place at home and at work, EDP is committed to an as-a-service subscription model:.

- For the domestic customer, this model consists in the payment of a monthly fee that covers the customer's recharging needs both at home (including the installation of a recharging point with power balancing) and on public roads, through the EDP MoveOn network. Additionally, within the subscription, a series of services will be offered that add value to the offer. This product, which is currently being developed and will be launched in 2020, will have a web configurator in which the client will be able to customize the product and adapt it to their needs.
- For B2B customers, EDP is also committed to an as-a-service subscription model, which can be customized according to the customer's needs. As in B2C, this product is currently under development and will be offered in 2020. The offer includes the installation of recharge points with connectivity and the option for EDP to take over the entire commercial cycle with the end customer. Thus, a range of possibilities is offered, from a B2B client that wants to offer the possibility of recharging its employees and wants to retain control over that activity, to a B2B client that wants to use the recharging infrastructure as an incentive to attract new customers, enabling such infrastructure in EDP MoveOn.

Finally, it should be noted that in a changing and attractive sector such as mobility, the emergence of new players who want to participate will be inevitable. This may be a risk but also an opportunity, and the establishment of strategic alliances with some of these actors such as automotive brands, dealers, real estate agents, etc., is another strategic point on which EDP is currently working.



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### 3. SMART GRID PARADIGM, ELECTRIC STORAGE AND OTHER SERVICES

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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 75% of clean installed capacity by 2020 and the goal of reduce CO<sub>2</sub> specific emissions by 75% until 2030 (vs. 2005), 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.

#### 3.1 INOVCity/INOVGRID

##### 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 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.

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 450,000 smart meters in 2016, 600,000 in 2017 and 680,000 in 2018, EDP Distribuição installed more 690,000 smart meters in 2019 in several Portuguese municipalities. By the end of 2019, a total of almost 2,578,000 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.

The implementation of other innovative systems in 2019, such as 3,441 DTC (distribution transformer controller), the conclusion of remote metering in 100% of secondary substations and in 100% remote of 75% 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.



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As of 2018, EDP Distribuição is leading the InteGrid project, financed by the EU and promoting a demonstration of smart grid, storage and system integration technologies with increasing share of renewables.

## **Spain**

The InovGrid project in Spain ended in April 2018 with the replacement of regular meters by smart meters. This milestone was reached not only before the deadline set in the legislation, but also has expanded the range of customers from the legally established 15kW to 50kW, so it can be said that "100% of customers of EDP HC Energy are digitized".

With regard to digitalisation, the EDP Group's electricity distribution business in Spain continues to be strongly committed to innovation projects through InovGrid, which in 2019 integrated the commercial cycle and service orders into its department, in order to adapt efficiently to new business processes and changes in field operations resulting from remote management, automation and remote execution of many traditional tasks.

Progress has continued with projects such as Flash BT and Alerta, which are already providing value in the operation and exploitation of the network in real time, and at the same time initiating new ones such as the Mars network or SNMP (Simple Network Management Protocol) Prime monitoring, focused on the analysis and use of the new information generated for use in network management, fraud detection or equipment maintenance.

With respect to the E-REDES web portal, new functions have been added in 2019 that provide great value to the end customer, such as online management of self-consumption, the incorporation of type 4 supplies in the *My Consumption* consultation space or the calculation of the cost of power modifications in the contracting simulator.

## **3.2 ENERGY STORAGE AND OTHER INITIATIVES**

### **Energy Storage**

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.

### **V2G – Vehicle to Grid**

Development of a demonstrator to test the V2G solution, acquire technological knowledge and assess the challenges and opportunities offered by V2G technologies. The V2G charger is installed at EDP's headquarters and different use cases will be performed. The potential to use electric vehicles as a stationary vehicle to support renewable penetration and grid stability will be key drivers.

### **Akkurate**

Advanced lithium battery diagnostics software, which allows for independent analytics for preventive maintenance and life prediction.



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### ***Storage of MV Power in Évora***

A pioneer project in Portugal, consisting of an electric power storage system, with the functions of a backup for the University of Évora and network management support, notably through its features of grid voltage control and loss reduction, contributing to improve its energy efficiency. An effort was made, through tests and implementation of added functionalities, to ease the adaptation of this project into other case studies of grid management support. An example is its integration on the H2020 SENSIBLE.

### ***SMARES***

Design, manufacture, testing, validation and certification of smart, modular energy storage technology with an advanced management system based on a multi-level converter with output power of up to 6 MVA at 20 kV for use in systems powered by renewable sources, such as offshore wind farms..

### ***STOCARE***

Demonstration pilot project to define and specify a storage system with a battery connected to the grid, incorporated in a wind farm. The project aims to identify critical aspects related to real-time system maintenance operations and to evaluate the technical capacities for increasing the flexibility of the plant's operations.

### ***2nd life batteries***

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***

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.

### ***Incident Forecasting***

The "Incident Forecasting in the National Distribution Network" project started in 2017 and was developed in partnership with a Portuguese company SmartWatt (communication in development of optimization solutions for the energy sector). The project is an application of machine learning algorithms with the objective of, based on the meteorological forecasts, providing a forecast of the number of incidents in the High and Medium Voltage network by geographic area, based on the associated risk level. The data, based on various sources of information, is sent to EDP Distribuição to support decision making, contributing to the immediate improvement of quality of service through the optimized installation of non-terrain resources.



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### ***Low Voltage grid monitoring tool***

EDP Distribuição started in 2018, together with an external partner, the development of a BT network monitoring solution based on the application of IoT sensors and cloud computing. The pilot project aims to gain knowledge in this part of the network where, in the coming years, it will likely be the major challenges, namely due to the increase of electric vehicles, proliferation of prosumers, or asset management. The main Use Cases considered were real-time BT fault detection, power quality measurement, correct BT asset register mapping and energy balance.

### **Other innovation initiatives**

#### ***LisCool Nedo project***

EDP Inovação is participating in a project that will test different DSM (Demand Side Management) solutions, using a Daikin new cold storage technology. The equipments to be tested are installed at LNEG's and Lisboa City Hall premises and the aggregation platform technologies are being developed with Next Kraftwerke and Daikin/Efacec.

#### ***DOMINOES***

H2020 project aiming at the creation of a platform for demand response services in the distribution network through the use of local energy markets. This project foresees the participation of prosumers in these markets, providing flexibility for the network operator or as a source of other market services, including the ability to trade energy between them with possible use of Blockchain technology.

#### ***eHUB***

Development of a modular structure which can be easily adapted and quickly installed, offering electric vehicles rapid charging.

#### ***Red MARTE***

To create a model of a real BT network that is flexible, accessible and tailored to the needs of data visualization and analytics for the management of SmartGrids.

#### ***Integrid***

The project aims to demonstrate how DSOs can promote the engagement of all stakeholders in order to obtain an active participation in the energy markets and in the management of distribution networks.

#### ***EU-SysFlex***

The project aims to study efficient and safe ways of providing system services that allow reaching high levels of RES-E penetration.



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*Smart Grid Laboratory*

Development of innovative automation, measurement and communication features for Smart Grids and validation of solutions through systemic tests in a controlled environment.

*EV.X*

Smartphone application which presents users with the possible financial and environmental savings and CO<sub>2</sub> emission reductions that they could make if they were driving an electric vehicle (EV) instead of their internal combustion vehicle.

*E-Lounge*

Development of an infrastructure to electric mobility and energy storage, including integration of renewable energy sources.