

Energy Transition in Portugal Based on Environmental, Political and Social Factors: Critical Analyses with Uncertainty

Nuno Domingues

Instituto Superior de Engenharia de Lisbon, Portugal.

***Corresponding author**

Nuno Domingues, Instituto Superior de Engenharia de Lisbon, Portugal.

Submitted: 22 Jan 2022; **Accepted:** 27 Jan 2022; **Published:** 06 Feb 2022

Citation: Nuno Domingues. (2022). Energy Transition in Portugal Based on Environmental, Political and Social Factors: Critical Analyses with Uncertainty. *Petro Chem Indus Intern*, 5(1), 07-17.

Abstract

Portugal is under an electoral process after the state budget was led in October 2021. At a time when climate change, energy prices, energy poverty and environmental impacts are the focus of discussion and intervention in the other countries of the European Union, Portugal is managed by twelfths and without the possibility of changing public policies. The electoral decision will take place on 30 January 2022 and will then have a set of coalition negotiations, governance program adjustment and presentation of a new state budget for approval and discussion in specialty, and a long period is expected before real changes to the twelfth management system can be made. Among the various themes, the economic, social and environmental impacts of energy, especially oil and its replacement, of future decisions are unknown. Portugal has committed to achieving carbon neutrality by 2050 as a contribution to the global and European targets undertaken in the implementation of the Paris Agreement. Meeting this target requires a reduction in greenhouse gas emissions of more than 85% compared to 2005 emissions and a carbon sequestration capacity of 13 Mton. Decarbonisation is also an investment and job creation strategy. By 2030, Portugal is expected to reach a target of 47% renewable energy in gross final energy consumption and a 20% renewable energy target in transport. Accelerate the implementation of the National Energy and Climate Plan 2030 and the Roadmap for Carbon Neutrality 2050, promoting regional roadmaps for carbon neutrality, elaborating five-year carbon budgets that define a multi-year horizon, defining methodologies for assessing the legislative impact on climate action and eliminating administrative constraints that create disproportionate context costs without capital gains. Portugal has exceptional conditions to become an example of environmental sustainability vis-à-vis its European partners. Instead of using the environmental perspective as a weapon against economic development, the dimension of sustainability must be incorporated into the growth model itself.

The specificity of Portugal, situated in the far west of Europe and with the Atlantic as its second frontier, makes the transatlantic relationship more important than for any other European country. Not ignoring the geopolitical forces centered on Asia and the Pacific, it is necessary to strengthen the Atlantic community, to deepen the relationship with the US and to strengthen the link to the countries of Latin America, to enhance Portugal's role in the point of access to Europe of goods and energy.

Current energy characterization of Portugal

According to global oil production is about to exceed demand, with non-OPEC+ countries being responsible for the 1.8 Mbpd increase Omicron [1]. A settlement was observed in internation-

al markets in anticipation of the potential negative impact on oil demand.

Figure 1 shows the evolution of the price of crude oil from January 2019 to December 2021 [2].

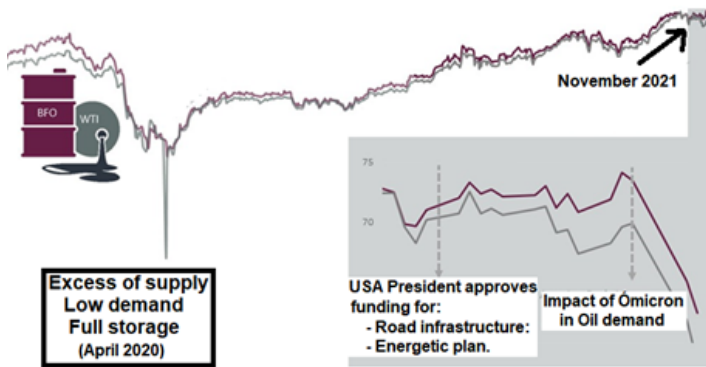


Figure 1: Daily prices BFO and WTI, FOB (2019-2021)

Figure 2 shows the average monthly prices of BFO and WTI, FOB. There was a correction in the price of bfo and wti quotes during the month of November [2]. The spot price of wti fob decreased 2.86% in November to an average value of 79.15 USD, compared to the barrel traded in October. The spot price of BFO FOB had an identical behavior, decreasing 2.52% compared to October, to an average value of 81.42 USD. There was a range of 14 and 18 USD per barrel, respectively for BFO and WTI, in the daily closing quotes of the month. The price of futures contracts purchased during November 2020 for Brent and WTI deliveries remained lower than in the spot market, demonstrating a backwardation situation.



Figure 2: Average monthly prices of BFO and WTI, FOB.

In the international oil derivatives market, according to the IEA, it is expected that the emergence of new cases of COVID-19 will negatively affect the recovery of oil demand, with a significant impact on air traffic and consequently on the price of the jet. The demand forecast was revised down for 2021 and 2022 at 0.1 Mbpd compared to the November Oil Market Report, with demand expected to increase by 5.4 Mbpd and 3.3 Mbpd in 2021 and 2022, respectively. In November, refining capacity increased by 1.9 Mbpd, anticipating an increase from 0.6 Mbpd in December to more than 80 Mbpd, which had not happened since the beginning of 2020.

Figure 3 shows the Evolution of oil derivative quotes during November 2021 [2, 3].

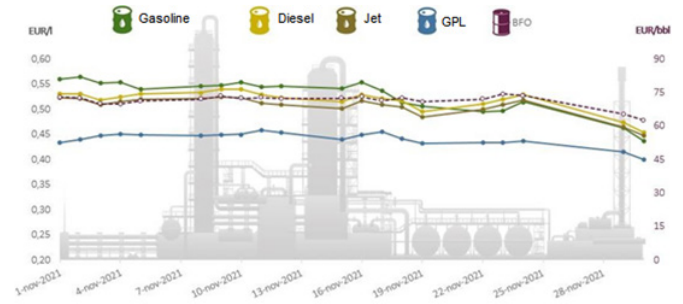


Figure 3: Evolution of oil derivatives quotes

According to the IEA's December Oil Market report, OECD oil barrel stocks declined by 21 Mb in October. The average value of international oil derivatives quotes followed the correction in the price of a barrel of oil, with the exception of the Auto LPG. The sharpest decrease was observed in the diesel and jet prices (-2.4% in both), followed by gasoline (-0.4%). In contra cycle, the auto LPG price increased (+5.6%).

Figure 4 shows the average monthly prices of petroleum derivatives [2, 3].

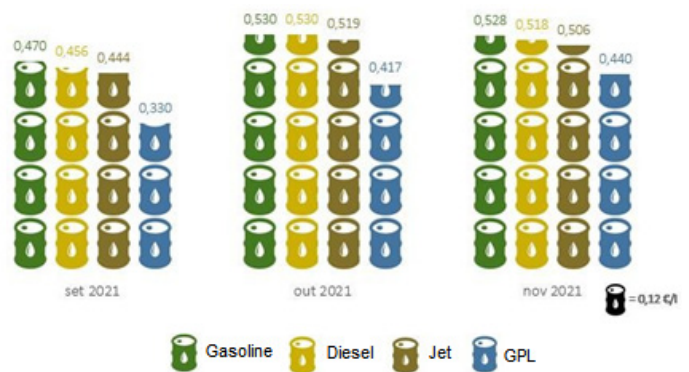


Figure 4: Average monthly oil derivative prices

In November, the price of diesel on the NWE market declined compared to the previous month, in line with the price of a barrel of oil. Markets reacted negatively to the increase in COVID-19 cases in Europe, with price correction in anticipation of new restrictions and consequent lay declining demand. Economic arbitrage conditions remained unfavorable due to the worsening backwardation situation in the futures market, the product of European refineries was low and exports high, which contributed to the scarcity of supply. The price of gasoline also fell in November in the NWE market. Early news on the new VARIANT of COVID-19 has shaken markets, resulting in the liquidation of a high volume of gasoline. The price collapse at the end of the month resulted in demand for other alternatives to the European market by several regional distributors. The price of the jet on the NWE market behaved similarly to the price of diesel and petrol, with a fall from October to November. News of the Omicron variant has shaken the international market, with stakeholders anticipating a slowdown in demand recovery. In November, restrictions were imposed in Europe on air traffic from southern African countries contributing to market uncertainty.

Figure 5 shows the Evolution of propane and butane quotes [2, 3].

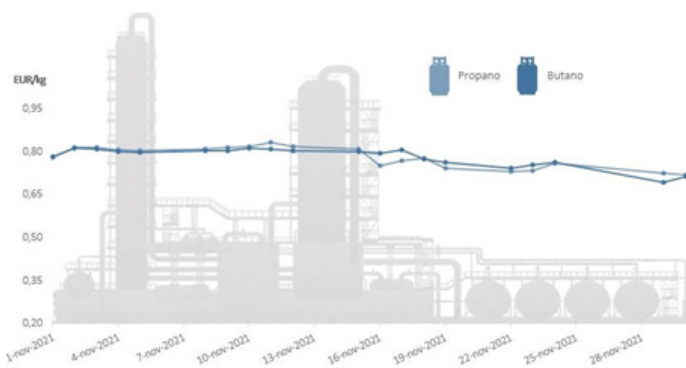


Figure 5: Evolution of propane and butane quotes

The price of liquefied petroleum gas (LPG) propane in Europe declined in November. In contra cycle, the price of LPG butane increased (+1.6%). It should be noted that butane traded, on average, 0.9% above propane. The differential between the maximum price and the minimum price transacted was more expressive in butane than in propane, respectively, 11.9 cent/kg and 11.2 cent/kg. The decrease in propane prices in the ARA region accompanied the drop in barrel prices. On the other hand, the price of LPG butane, in average terms, increased compared to the previous month. Refineries have continued to use LPG as fuel in their internal processes rather than natural gas, due to the high price that has been in recent months for this fuel. Uncertainty about supply conditions in December generated a high spread in the markets. While a high percentage of winter needs were safeguarded in October, the forecast of lower temperatures puts pressure on demand.

In Road Fuels, Figure 6 the Decomposition of the average retail price of simple gasoline 95 [1-4].

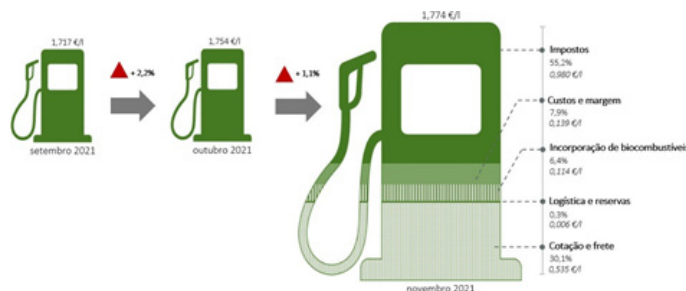


Figure 6: Decomposition of the average retail price of plain gasoline 95

In November 2020, the average price to consumers of simple gasoline 95 increased (+1.1%), motivated by the increase in the generality of the components. The incorporation of biofuels was the heading that recorded the largest variation (in relative and absolute terms) compared to the previous month. Although gasoline prices in the international market decreased compared to October, the freight value justified an increase in the quotation and freight component (+0.8%) in the national average price to consumers. The most important price to consumers component corresponds to taxes, which represented in November approximately 55.2% of the total gasoline bill, followed by quotation and freight (30.1%). Operating costs and marketing margin, the incorporation of biofuels, logistics and the constitution of strategic reserves together represent about 14.6% of the average price to consumers of simple

gasoline 95. Hypermarkets continue to show the most competitive offerings: 1.5% below low-cost operators and 5.8% lower than filling stations operating under the insignia of an oil company, representing a difference of 10.5 cent/l. Also, during November, 95 additive gasoline cost consumers an average of 2.2% more than 95 simple gasoline. The increase due to the additive was more pronounced in gasoline 98 (about 4.3%), as has been usual in the national market.

Figure 7 shows the Price Differentiation of Simple Gasoline 95 in retail [1-4].

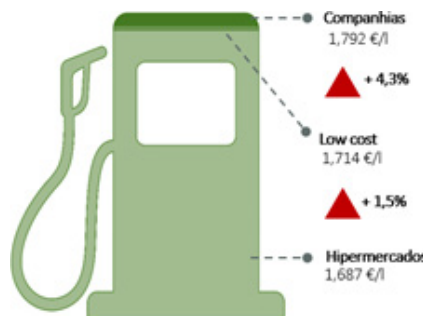


Figure 7: Differentiation of prices of single gasoline 95 in retail

Figure 8 shows the Price Difference between single and additive gasolines [1-4].

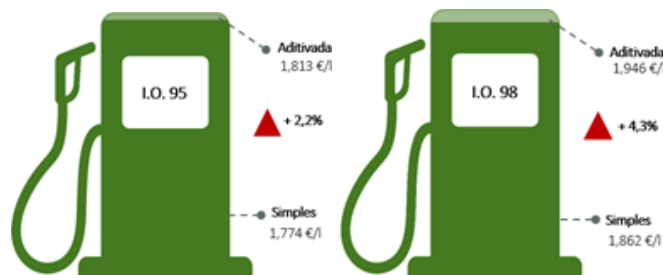


Figure 8: Price difference between single and additive petrol

Figure 9 shows the Decomposition of the average retail price of single diesel [1-4].

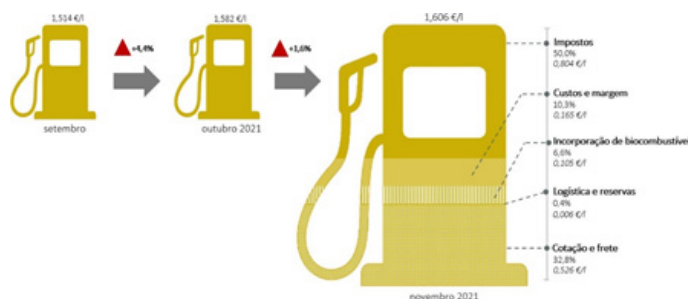


Figure 9: Decomposition of the average retail price of single diesel

The price to consumers of single diesel increased in November (+1.6%), mainly motivated by the components of biofuel incorporation and costs and margin. The latter heading continued to record values in line with those recorded in pre-season. The largest share of PRICE TO CONSUMERS paid by the consumer corresponds to the tax component (50.0%), followed by the value of

the international quotation and freight (32.8%). Operating costs and marketing margin, the incorporation of biofuels, logistics and the creation of strategic reserves together account for about 17.5% of the average price to consumers of single diesel. Hypermarkets continue to be the most competitively priced operators, with average prices of about 9.5 cent/l below the national average PRICE TO CONSUMERS. Operators with low cost offers simple diesel at an average price of €1,534/l, an additional 1.4% compared to the price of hypermarkets. Flag oil companies reported average prices of €1.629/l, about 2.3 cents per liter above the national average price.

Figure 10 shows the Price Differentiation of simple diesel in retail [1-4].

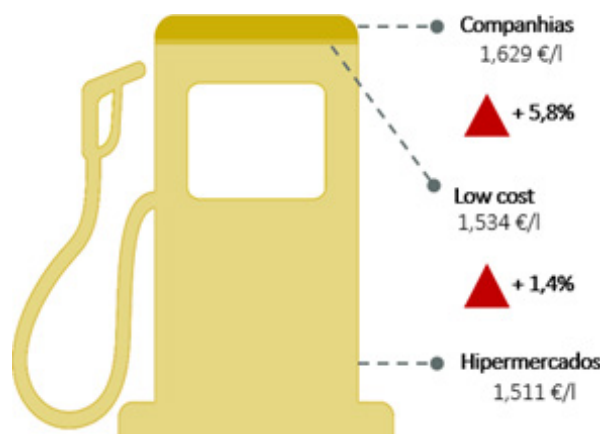


Figure 10: Differentiation of prices of simple diesel in retail

Figure 11 shows the Price Difference between single and additive diesel [1-4].

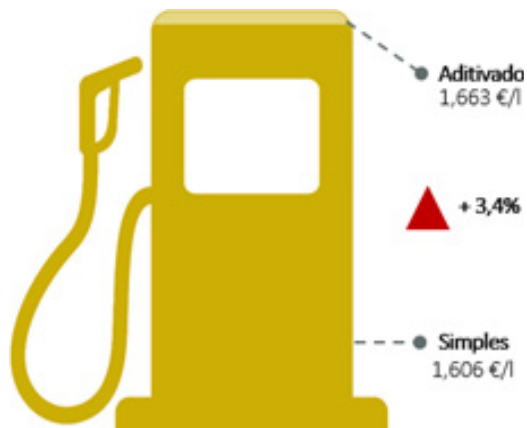


Figure 11: Price difference between single and additive diesel

In November, acquiring additive diesel represented an increase of 5.7 cents per liter compared to single diesel.

Figure 12 shows the Decomposition of the average retail price of Auto LPG [1-4].

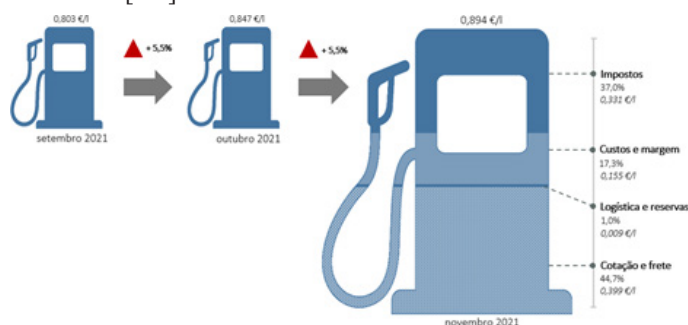


Figure 12: Decomposition of the average retail price of LPG Auto

In November, the average retail price of The Auto LPG increased compared to October (+5.5%), following the trend observed in international markets. The largest share of PRICE TO CONSUMERS paid by the consumer corresponds to the quotation and freight component (44.7%), followed by the value of taxes (37.0%) and operating costs and marketing margin (17.3%).

Figure 13 shows the Price Differentiation of The Auto LPG in retail [1-4].

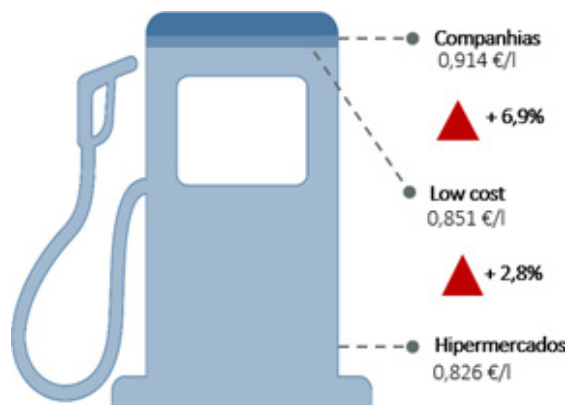


Figure 13: Price differentiation of LPG Auto in retail

The lowest-expression component of the average retail price remains logistics and reserve, as with other road fuels. Hypermarkets maintain the most competitive offer, followed by low-cost operators. In November, the average PRICE TO CONSUMERS of hypermarkets, operators with low cost offers and flag oil companies was 0.826 €/l; 0.851€/l and 0.914 €/l, respectively. The filling stations operating under the insignia of an oil company sold, on average, 2.0 cent/l above the national average price and 8.8 cent/l higher than the price charged by hypermarkets.

Figure 14 shows Breakdown of propane prices for G26 (smaller) and G110 (larger) bottles [1-4].

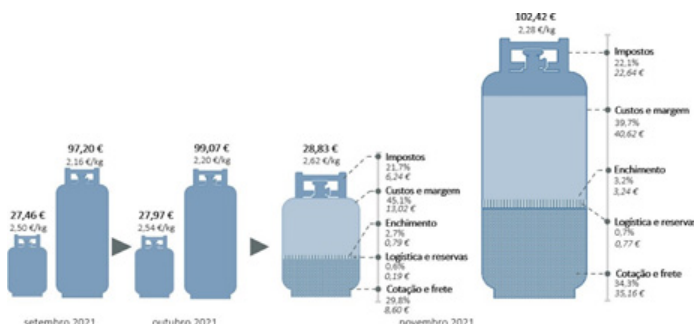


Figure 14: Breakdown of propane prices for G26 and G110 bottles

Figure 15 shows the breakdown of butane gas prices for the G26 (smaller) and G110 (larger) bottles [1-4].

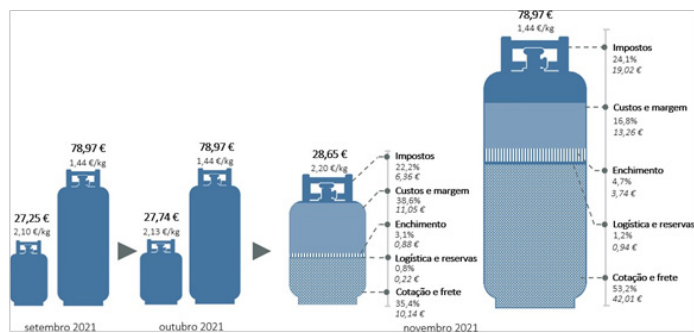


Figure 15: Breakdown of butane gas prices for G26 and G110 bottles

For G110 propane and butane gas bottles, the average retail price of propane increased by 3.39%, and the average retail price of butane remained unchanged. The methodology used to calculate the PRICE TO CONSUMERS has as reference the simple arithmetic mean of the prices reported by the operators for bottles of 11 kg (G26) and 45 kg (G110) of propane and 13 kg (G26) and 55 kg (G110) of butane.

Figure 16 [1] [3] [4] shows the Introductions to the consumption of petroleum-derived fuels.

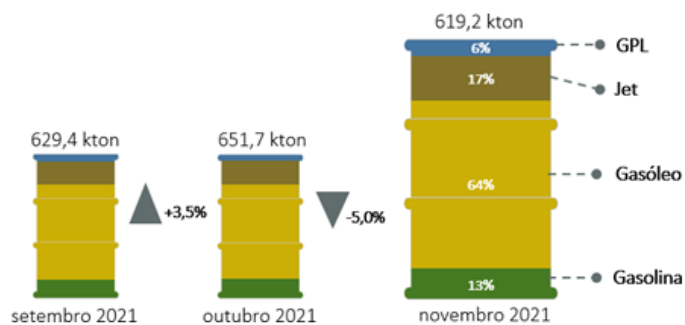


Figure 16: Introductions to the consumption of petroleum-derived fuels

The consumption of petroleum-derived fuels, considering gasoline, diesel, jet and LPG, decreased compared to October. In November, global consumption decreased by 32.5 kton compared to October, representing a decrease of 5.0%. The decrease in the consumption of petroleum-derived fuels in November occurred

in gasoline (-15.0%) and diesel (-5.9%), in contra cycle the consumption of jet (+2.3%) and LPG (3.78%) increased. It should be reported that consumption in November 2021 was 12.3% higher (68.0 kton) than the same period in 2020, with increases in jet consumption (159.7%), gasoline (8.9%) and reductions in LPG consumption (-7.7%). On the other, diesel consumption remained unchanged. The consumption observed in November 2021 was lower than the same period of 2019 (-28.0 kton), pre-pandemic, observing a decrease in all derived products, in LPG (-8.9%), jet (-5.6%), gasoline (-3.9%) and diesel (-3.6%).

Figure 17 shows the Comparison of introductions to consumption between homologous periods [1-4].

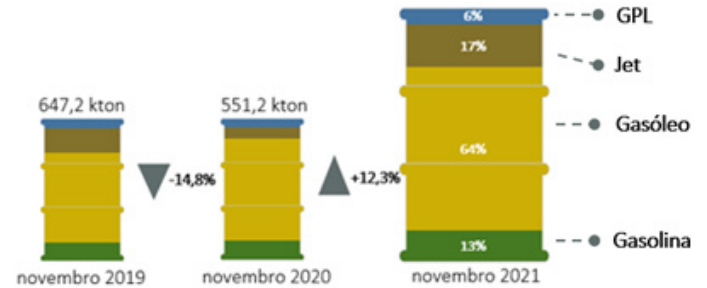


Figure 17: Comparison of introductions to consumption between homologous periods

Current economic characterization of Portugal

The indebtedness of the non-financial sector comprises the end-of-period positions of non-financial corporations, public administrations and private governments (including households, individual entrepreneurs and non-profit institutions serving households), relating to liabilities in the form of loans, debt securities (face value) and commercial credits. In the case of the central administration, the company's certificates, Treasury certificates and other treasury responsibilities are also included. Unconsolidated values. The annual change rates of end-of-period balances are in a consolidated perspective. In November 2021, non-financial sector indebtedness arose at €766.9G, of which €344.9 billion was in the Public Sector and €422.0 billion for the Private Sector.

Figure 18 shows the evolution of non-financial sector debt from 2017 to 2021 [5].

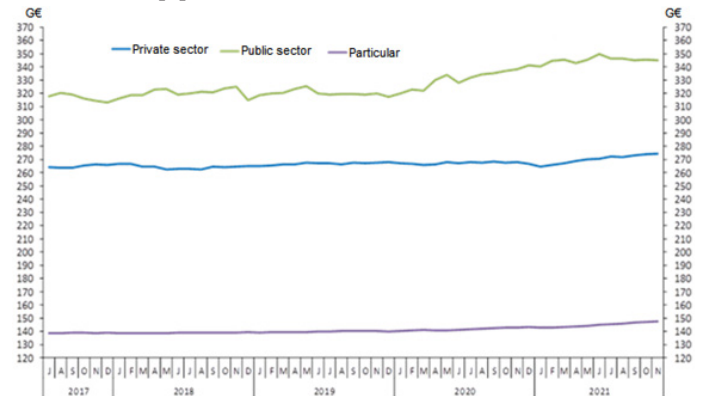


Figure 18: Non-financial sector debt developments from 2017 to 2021.

In the Private Sector, €274.6G is related to private companies and

€147.5G to Private Individuals. Compared to the previous month, non-financial sector indebtedness increased by €0.5G, due to a €0.5G decrease in public sector indebtedness and a €1.0G increase in Private Sector indebtedness.

Figure 19 shows the evolution of Portugal's national debt [5].

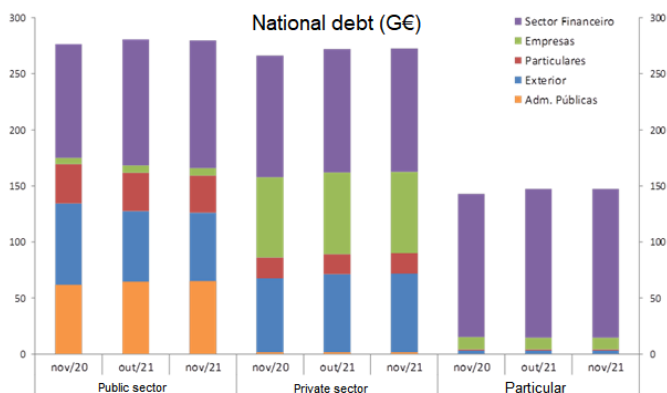


Figure 19: Evolution of Portugal's national debt

For November 2020, non-financial sector indebtedness increased by €17.6G, resulting from a €6.6G increase in public sector indebtedness and an €11.0G increase in private sector indebtedness. At the private sector level, there was an increase in corporate indebtedness by 6.6G€ and an increase in private debt by 4.3G€. In November 2021, the annual change rate (TVA) of the total indebtedness of private companies was 2.65%, 0.3 percentage points higher than the previous month. The TVA of the total indebtedness of individuals remained at 3.3%.

More than the direct impact on economic growth and GDP, the implementation of the funds in the PRR provide for structural reforms aimed at modernizing the business fabric, including through digital transition measures and resource qualification and capacity building, but also cross-cutting impact measures. Investments will have long-term effects on the resilience and structural transformations they can leave in business and the economy, making the country more competitive and prepared to deal with the increased challenges created by the pandemic. In total, there will be more than 16.6 G€ 13.9 G€ in grants and 2.7 G€ in loans - divided by three dimensions, 20 components, 37 reforms and 83 investments, to support public and private entities.

The expectation about the impact of the Recovery and Resilience Plan (PRR) on the national economy predicts a multiplication of GDP that, without this strategic strengthening, would not be possible. Transforming the 16.6 G€ that Portugal will receive in the form of funds to support the economy and companies into 23.3 G€ by 2025 is the current Government's target, according to the estimate of the Ministry of Finance predicts a gain of 40% of GDP by the amount invested in the PRR. Banco de Portugal estimated (Economic Bulletin, March 2021, Department of Economic Studies, www.bportugal.pt, ISSN 2182-0368) that the impact of the PRR on national GDP would not exceed 2%. In the long run, the expectations of the Ministry of Finance point to an accumulated impact of 4.8 in 20 years, which means that for every euro invested between 2021 and 2026, the economy will have a five-fold cumulative gain.

However, these optimistic forecasts have a full implementation of the funds available until 2026, which requires the congratulation of all investments by the end of 2023. The EU statistical office, Eurostat, reports that at the end of the third quarter of 2021, the government debt-to-GDP ratio in the euro area was 97.7%, compared with 98.3% at the end of the second quarter of 2021. In the EU as a whole, the ratio also decreased, from 90.9% to 90.1% in this period. Portugal maintained the EU's third largest public debt in the third quarter of last year, at 130.5% of GDP, second only to Greece (200.7%) and Italy (155.3%).

Eurostat states that "in both the euro area and the EU, the decrease in the government debt-to-GDP ratio at the end of the third quarter was due to an increase in GDP, while debt continued to increase due to the financing needs of the policy measures adopted to mitigate the economic and social impact of the pandemic".

The proposals of the candidate parties

According to their electoral programs, a conjectural analysis can be made for the next few years. The current Government intends to make the climate transition to reduce GHG emissions by 2030; increase the weight of renewable energy in electricity production to 80% by 2026; increase the weight of renewable energy in gross final energy consumption by 2030 to 47%; 40% of emissions from the transport and mobility sector by 2030. For the energy transition, the current government intends to implement the investments foreseen in the PRR as follows: 610 M€ divided into 300 M€ for the energy efficiency of residential buildings, paying particular attention to households with lower incomes, and 310 M€ allocated to the energy efficiency of private sector and public sector service buildings, in line with the Public Administration Resource Efficiency Program (ECO. AP); 715 M€ in the context of the decarbonisation of industry; 185 M€ in the framework of hydrogen and renewable gases, including the creation of a network of hydrogen filling stations. Also, launch hydrogen auctions by mobilizing up to €50M per year of existing CO2 revenues to support the decarbonisation of industry and the heavy passenger and freight sector; increase solar power production capacity by at least €2 GW by 2024, continuing auctions for new plants and promoting and facilitating self-consumption and creating energy communities; strengthening electricity production capacity; existing wind farms and foster hybrid systems, reducing the need to build new infrastructure; focus on offshore renewable production, consolidating and extending the industrial cluster associated with the wind sector; promote the digitization of the energy system and the development of smart electricity grids, creating better conditions for the significant increase in the electrification of consumption in the different sectors of activity; promote the storage of electricity generated from renewable sources; implement the interconnections envisaged; promote the production of advanced and synthetic bio-fuels, including green ammonia and methanol, by contributing to the decarbonisation of the national chemical and petrochemical sector and to the decarbonisation of the transport sector, in particular in air and sea transport; assume that decarbonization can and should be a strategy of competitiveness and industrial valorization, boosting the incorporation of low carbon processes, products and technologies, betting on the promotion of innovation clusters and the creation of new business models, promoting the development of regional industrial clusters and fostering the widespread

adoption of renewable energy sources in industry; present a National Biomethane Strategy, produced from biomass, wastewater or TARS slams; adopting green taxation in line with the objective of fair transition with a progressive transfer of the tax burden on labour to pollution and resource-intensive, continuing the elimination of environmentally harmful tax exemptions and benefits, and conferring a clear tax advantage on electric vehicles and hydrogen, which alters the tax framework of employers by favouring the sharing of public transport over the availability of establishing incentives for energy efficiency, in particular in housing buildings; promote the issuance of green bonds, fostering the development of microcredit platforms oriented to investment in low carbon solutions, promoting the articulation between the Fund for Innovation, Technology and Circular Economy and the Environmental Fund in support of decarbonization projects and increased efficiency in the use of resources. In the area of mobility, considers that much of the impacts of transport are inseparable from excessive use of the car, advocating the continuity of policies that make sustainable mobility options more competitive than the use of individual vehicles, investment in the railway, expanding transport networks and services, either through the Program to Support The Densification and Strengthening of Public Transport Offer (PROTransP), wants to implement the plans for the expansion of heavy passenger transport networks in metropolitan areas and in territories with high population and economic density, in particular the projects approved and underway in the Portugal 2020 and PRR financing programmes, and the projects to be developed under Portugal 2030.

The party that disputes directly with the ruling party is moderate right and intends to take climate action as an effective priority and advocates a "green" constitutional revision; implement Municipal Decarbonization Plans and Reward municipalities that most contribute to the fulfillment of Portugal's environmental objectives through its Municipal Plans for the Decarbonization of its Municipal Climate Action Plans; activate the PACTE Programmed for Climate Action, Energy Transition and Eco-Innovation – a new framework of measures and incentives aimed at business agents for the development of innovative projects in line with the objectives of climate action, sustainability and the use of opportunities to create new products and services; activate the AIA 2.0 Program – Artificial Intelligence applied to the Environmental Impact Assessment Creation an instrument to support environmental impact assessment procedures, using artificial intelligence technologies. modernize the existing regime, improving the quality of basic information and ensuring more informed decision-making; activate the Neighborhoods + Sustainable Program – Creation of a program aimed at the implementation of Energy Efficiency measures in urban territories with greater social vulnerabilities and risks of energy poverty, aiming to have joint interventions, with greater dimension, achieving economies of scale, allowing to intervene also in common spaces (condominium areas, for example in the isolation of facades) and have shared energy systems (solar panels, boilers, heat pumps); update strategic planning instruments in line with the recognition of the climate state of emergency. With this, it intends to study the anticipation of the horizon for carbon neutrality for 2045, and to ensure the revision of the Roadmap for Carbon Neutrality (RNC 2050) and the National Energy and Climate Plan (2030) in the face of the commitments made in the Ba-

sic Climate Law and the revision of the European Union's targets. Portugal is a chronic importer of energy goods and, therefore, subject to the volatility of energy prices, very associated with risks of a geopolitical nature, and which constitutes a very relevant vector of economic risk. The need to endogenize energy by reducing energy dependency should be done in such a way as to increase the competitiveness of the economy, and it is necessary to ensure that energy is a competitive factor for national industry and that it is accessible to consumers.

Energy prices, in particular petrol, diesel, natural gas and electricity, reached unthinkable values in 2021. It is in this context and within the margin of maneuver of Community obligations that the country has proposed to promote the technological adaptation of industry without distorting competition in the internal market and to deepen the dialogue with European partners to reform domestic energy markets, particularly those of electricity. Resume Ordinance 24-A/2016 in the adjustment between the ISP and oil prices and look for ways to reduce the cost of electricity, including constantly analyzing in this matter the tax differential with Spain, seeking to mitigate cross-border problems. It also proposes to overcome the consumer paradigm and promote the citizen as a true energy actor, in his housing and mobility, through better use of energy, and greater focus on decentralized renewables and decentralized storage, encouraging energy communities in electricity generation, heat generation and distribution and encouraging civil society participation in investment in renewable-based power plants, creating a regulatory framework conducive to citizen participation in investments in renewable-based power plants. However, it is not possible to redesign the markets in an exclusively national area: the country is integrated into the Iberian Electricity Market and is compliant with the applicable European Directives. Nevertheless, and within the margin of maneuver that the country has, we propose to cancel the tariff debt, affecting the funds from the Extraordinary Contribution on the Energy Sector (ESI) exclusively to this desideratum. Once the tariff debt is written off, the Energy Sector Systemic Sustainability Fund (FSSSE) should focus on ensuring that the transition to a new energy paradigm takes place smoothly and without significant cost-to-citizens. Therefore, it intends to implement mechanisms necessary for the massification of the establishment of Power Purchase Agreements, bilateral or multilateral, direct between generation and marketing / industrial consumers, direct and to strengthen the consumer's ability to compare the various tariffs, through the information contained in the invoice itself. It also proposes to encourage the replacement of natural gas in industrial processes by gases of renewable origin as well as the diversification of the power supplies of gas networks with gases of renewable origin, the definition of a framework that fosters mechanisms for promoting cooperation between agricultural operators and those responsible for biogas production facilities, and establishing a regulated remuneration for the sale of bio methane to the network, support the development of P2G (power-to-Gas) pilot facilities for the production of renewable gases in joint projects with the National Scientific and Technological System and establish a National Plan for Forest Biomass, promoting the construction of a network of small biorefineries throughout the national territory, with overall income of more than 60%.

The liberal party has the following objectives in energy efficien-

cy incentives: decentralisation of production; decreased energy consumption; equity monetization with the deduction in IMI of the costs associated with the implementation of energy efficiency measures in buildings, duly certified. Decentralized production is streamlined by changing legislation to enable and facilitate the introduction of technology for the transaction of peer-to-peer energy (P2P) to do business with real people and not with large electricity companies, reducing bureaucracy and administrative regulation associated with the electricity sector and minimizing the costs of Third Party Access to the Network (ATR). They believe that green mobility should be exempted from taxes and fees to speed up electric mobility; simplify the process of installing electric vehicle charging stations; Democratize the electric vehicle as the preferred form of individual mobility; create a competitive market for energy supply operators for mobility; resumes "ZERO CO2" for end-of-life vehicles (VFV) with the support of the purchase of vehicles with zero emissions and allow the installation of charging stations with direct sale of energy by the OPC, without the obligation to connect to the Mobile network. They will study how to promote and finance the increase in structural extensions where future energy consumption needs of urban and inter-municipal electric vehicle charging plants, as well as other means of light mobility, or even other economic operators are already anticipated. The "ZERO CO2" recovery for end-of-life vehicles is based on the creation of an incentive program for the slaughter of end-of-life vehicles (VFV) with the support of the purchase of vehicles with zero emissions, from the revenue collected with the ISP and CO2 Rate.

The extreme left urgently intends to redirect the national energy model towards carbon neutrality, socially anticipating the goals of the 2050 Roadmap, without compromising energy independence indicators, focusing on the forms of energy production from renewable sources that they consider proven (photovoltaic solar, wind on land, wind at sea and waves), as well as the promotion of new forms of storage and energy production, including greenery, alongside co2 emission capture mechanisms and their re-use. It proposes a 50% increase in installed capacity by 2030: an additional 6GW of centralized solar production, an additional 2GW of self-consumption solar production, an additional 1GW of wind production. The installation and operation of this new capacity should exclude mega solar plants with excessive environmental impacts and on local economies. Decentralized photovoltaic solar production, in the roofs of buildings, water mirrors or unused areas, reduces emissions and losses in the network, increasing the efficiency of the system and reducing the energy costs of the State. In the long term, it will make it possible to realize public revenues relevant to the objectives of the energy transition. The public instruments to promote energy efficiency in the housing stock are directed, now to social housing, or to the upper middle and middle class through mechanisms for the participation of investments or tax incentives. The implementation of the National Energy Efficiency Action Plan (PNAEE, 2013) is mediocre (60% in 2016 and 40% for 2020). In agriculture, this implementation is 0% and in the state is between 10% and 20%. Lower the bill, eliminate excessive rents and eradicate energy poverty, extending the automatic allocation of the social tariff to eligible households, from 100,000 to 800,000 households. They advocate a new European model of the electricity market because they believe it was

designed two decades ago to monetize the oligopoly out of the privatization of the electricity sector, when production from fossil sources predominated, where the price paid for electricity in the wholesale market does not reflect the environmental and production costs of each MWh. which translates a division of the wholesale market into two complementary markets: the renewable electric market, based on long-term contracts, and the flexible delivery market, which resolves production deviations in the short term. The renewable electric market provides security for investments and should provide an adequate mix of generation (centralized and decentralized) and technologies (dispatchable and intermittent). The flexible delivery market is designed to provide the momentary security needs of energy supply from gas production or dispatchable renewable sources (biomass or water, for example), but also from system services, energy storage, demand management, grid-connected electric vehicles or renewable energy conversion technologies into fuels. Current short-term markets, with variable prices, must also be modified to allow the participation of demand and storage management resources. This new organization of the market should have an impact on the calculation of tariffs for final customers and advocate the reduction of electricity and gas VAT from 23% to 6%. Finally, they advocate the free provision of 5 KWh/day to persons receiving the social tariff, a measure with a budgetary cost of EUR 30 million (including loss of VAT), and financing by traders of the costs of extending the social tariff to bottled gas.

The other far left, without parliamentary representation today, assumes that combating climate change is one of the greatest global challenges that humanity has ever had to face and demands a global articulation between nations with a truly civilizational degree of responsibility, given the enormous contribution to global greenhouse gas emissions than production, distribution and consumption of energy provide, the evolution of energy policies in the European Union and Portugal and reject the Energy Charter Treaty, streaming within the European institutions for a coordinated exit from the various EU Member States. It argues that Portugal needs to take on more ambitious targets than those defined by the Kyoto protocol, the Paris Agreement and the Glasgow Agreement to accelerate the step and play a leading role at European and global level: actively decarbonise, reduce consumption, rapidly transition to the full use of renewable energy and prioritise energy efficiency. And because it is essential to ensure that the transition is made in a socially just and equitable manner, the fight against energy poverty and the increase in inequalities expected by the effects of climate change deserve the same priority in order to avoid a "climate apartheid". Give priority to increasing energy efficiency, framed in a renewed National Energy Efficiency Plan (PNAEE) and adopting a methodology based on energy intensity indicators. The efficiency increase will cover all sectors of activity, including industry, transport, housing, equipment, among others. Promote Carbon Neutrality of Public Services by 2030; through the electrification of all vehicle fleets, in different categories, in all municipal, regional and national administrations; betting heavily on photovoltaic and solar thermal use throughout the public building and offsetting the carbon footprint of all services. Cease incentives for energy sources with a high impact on biodiversity by cancelling subsidies for the construction of new dams or associated infrastructure. Encourage the development of the solar

photovoltaic and thermal industry, giving special emphasis to the decentralized production of energy for self-consumption and the preferential occupation of urban surfaces; by reducing VAT on the acquisition of solar equipment; strengthening programs to support the acquisition of equipment, and financing the connection to the network of systems of Production Units for Self-Consumption. Promote renewable energy communities (RECs) and democratise access to electricity production from renewable sources, including by encouraging the formation of producer cooperatives and supporting existing ones, providing public buildings through these cooperatives, where possible, promoting citizen participation in Renewable Energy Communities and Citizens' Communities for Energy, without discriminatory conditions, consumer rights should be respected, citizens and citizens should be supported in accessing technical and financial information related to the creation of energy communities and encouraging renewable energy communities to develop social objectives such as combating energy poverty and developing models of solidarity to help their most vulnerable members. Study the commitment to green hydrogen, investing in research and development, as well as in the realization of production and distribution projects through national network, and in the eventual creation of a public company Hydrogen of Portugal. Create a universal carbon tax, in the framework of an environmental tax reform, thereby internalising the externalities generated, ensuring social equity through an approach that results in fiscal neutrality, for example by reducing taxation on labour, complementing the elimination of environmentally harmful subsidies or eco-taxes, applying the principles of polluter pays and user pays and encouraging the payment of ecosystem services or investment in energy efficiency or other environmental measures. Reduce the VAT scale from 23% to 6% on all essential energy supply services, specifically electricity and bottled gas, to reduce the burden on households, as only one-off tariff reductions have been made so far. Reject open pit mining for the extraction of lithium or other ores necessary for the energy transition whenever the natural conditions of mineral deposits allow, licensing safer and more responsible extraction modes, subjecting all potential concessions not only to Environmental Impact Studies (EIA) but also to Strategic Environmental Assessments (AAE) in the context of regions and at the country level. The use of these mineral resources should give priority to obtaining from mine workers, recycling of equipment already produced and the import of these raw materials should be subject to sustainability criteria in the countries of origin. Carefully follow the development of new nuclear energy production technologies (such as small modular reactors, or nuclear fusion), which could contribute to decarbonisation as well as address increasing energy consumption.

The pan-European party, which is a progressive and pragmatic and does not consider itself either left or right because it seeks to base its decisions on best practices, scientific evidence and the defense of human rights, advocates the creation of a European federation with the existence of a common European identity and various national identities. Considers that in order to meet such ambitious decarbonisation targets there are the following measures: greenhouse gas reduction of 80% by 2030 and 100% by 2040 (compared to 2019); revision of the carbon tax, favouring renewable energy to the detriment of fossil fuels and sustainable transport to the detriment of high-emission transport; a tax burden aligned

with carbon pricing, originally planned by France, and the High Level Commission's suggestions on carbon prices, advocating a value of €65.40/ton, gradually increasing to €205/ton by 2030 to regulate the energy market in order not only to encourage energy transition economically but also to generate public revenue to finance the fair transition and in all regions of the country; prohibit the sale of new combustion vehicles (including hybrid vehicles) by 2035; end all fossil fuel subsidies, which can reach €137G a year across the EU, and redirect these subsidies to compensate higher-cost citizens and fund the EU's green transition and refrain from investing in experimental Carbon Capture and Storage projects as long as there is no robust evidence of their success, since the long history of development of this technology is characterized by many and very expensive failures; strengthen electrification and increased energy production capacity from renewable, alternative, clean and sustainable sources (solar, hydroelectric, wind, geothermal, tides and waves); support research on the development of smart energy networks and new energy production and storage solutions; study offshore energy production and storage, including through the development of innovative solutions such as floating marine platforms. More efficient use of intermittent renewable energy sources, such as solar and wind power, requires a high capacity for storing electricity. This storage is also essential for greater resilience of our electricity grid in the face of disruptions such as those resulting from extreme weather events. The floating platforms, designed specifically for the storage of energy through reversible hydroelectric generators, allow to support the development of the blue economy by also providing energy, storage space, berths, cranes, helipad, communications and many more facilities essential for the development of this new economic activity. Promote microgeneration and renewable energy cogeneration, as well as local storage, making its adoption simpler and more beneficial, stimulating shared and community investment, for example through cooperatives and energy communities to maximise the decentralisation of electricity production and greater security and energy sovereignty. Nuclear energy is one of the sources of electricity with the lowest carbon emissions per unit of energy produced, along with small water energy. It is also the source of electricity with the lowest extractive impact, use of area, and impact on the surrounding environment. The introduction of new generation nuclear power in the form of Small Modular Reactors (SMR) in Portugal. This introduction may have several aspects, with the state-of-the-art nuclear power plants, in addition to a very high degree of safety, a great potential for the creation of electricity on demand with zero GHG emissions and the SMR recently developed a vehicle for the decentralized production of electricity, but also of heat, enabling the total elimination of the use of natural gas in Portugal. Finally, it is essential to consult the local population, after adequate information on the characteristics of the project in question, with the result of this consultation being binding. Research on advanced concepts of fission and nuclear fusion that implement passive safety of origin, such as molten salt, GenIII+, Gen4, fast breeders and small modular reactors, as well as the use of nuclear research reactors and radioisotopes for power generation and other applications such as medicine, food sterilization and space exploration. They envision a more efficient and environmentally friendly transport system, believing that the mobility of the future is an electric, smooth and shared mobility. The financing of the climate transition must be based on the pol-

luter-pays principle, serving the revenue thus obtained to finance the inherent and necessary incentives and tax benefits, to the energy transition that is required and which is required in an increasingly accelerated manner. It is intended that the nominal public incentives for the electrification of the car park, both about the acquisition of 100% electric vehicles, or about the installation of the necessary infrastructure, be increased up to 30% of the annual revenue collected through ISP (tax on petroleum products).

Increase the total allocation for incentives for the acquisition of 100% electric light vehicles (Incentive to Introduce the Consumption of Zero Emissions Vehicles) from €3,000 to €6,000, equaling the average value of the incentive in the European Union, also encouraging electric mobility for mopeds, motorcycles and electric quadricycles, in the amount of 50% of price to consumers, up to a maximum of €2,000, thus creating an autonomous category. Provide a proportional incentive for the conversion of combustion vehicles into electric vehicles, a process that is already developed for example in France. This would allow, on the one hand, to anticipate the readjustment of the market for workshops and suppliers in the field of mechanics (from combustion traction to electricity) and to shoot down combustion engines more quickly, with significant savings. Creating a market for used batteries is also a way to increase circularity and reduce the negative impact related to battery production. Progressively transfer incentives to plug-in hybrid vehicles for 100% electric mobility, as this is only zero emissions and therefore compatible with the carbon neutrality target, which should occur within 18 months. Creation of an incentive to slaughter a vehicle with internal combustion engine, variable according to its age, which accumulates with the incentive to purchase a 100% electric vehicle. Creation of an Incentive for the Installation of Electric Vehicle Chargers at the private or condominium level, like other European countries, with a 50% share of the value of the equipment with a maximum limit to be established.

Conclusions

Portugal is in a very weak phase and with prospects of aggravation not only due to the health, economic and social crisis, but also to the imminent rise in interest rates and financing restrictions. The concept of energy efficiency is present in all discussions on climate change and responsible use of natural resources. However, this concept is often confused with the introduction of renewable energy into the generation mix rather than applying to reducing consumption while maintaining household comfort and industrial needs.

There is a whole value chain associated with energy with a very significant weight in the national economy. It is a dynamic that must be stimulated, initiating policies aimed at enhancing innovation, both technological and business models, as part of the DNA of a new energy sector translated into economic benefit for the country as a whole, devoting special attention to the knowledge capital accumulated in the various centers of knowledge and design models of energy contracting capable of attracting and boosting industrial ranks.

Transport is responsible for about 25% of greenhouse gas emissions and 74% of oil consumption in Portugal and is also one of

the main sources of noise and air pollution, in particular emissions of nitrogen oxides and particulate matter, the cause of respiratory diseases and a large number of premature deaths. For these reasons, the sector should reduce its emissions by 40% by 2030. A large part of the CO₂ emissions in our country come from the transport sector, in particular from individual transport, and there are emission-free alternatives, these should be encouraged. The Portuguese car park is one of the oldest in Europe, with an average age of 13 years, encouraging the purchase of zero CO₂ vehicles without combating the end-of-life of more polluting vehicles can create wrong incentives, because the market value of the most polluting vehicles can put them on a competitive level, ultimately cancelling the incentive effort. With the pandemic increases in fossil fuel prices in the markets, has led to the means of transport that depend on it representing an increasing share of household incomes, and as a rule zero-emission vehicles are typically more economical in consumption and maintenance, this is an incentive in the right way to return income. The importance of electric mobility in the process of decarbonising the economy is undeniable. It will be impossible to achieve the targets set out in the European Ecological Pact for carbon neutrality without significant progress in the transformation of car fleets. Improving the environment of cities and their air quality should be a priority of any municipality, while being a form of savings for Portuguese families, stifled by the costs associated with fossil fuels. Policies are urgently needed to stimulate the expansion of charging infrastructure, and speed up the entire renewable electricity supply system, be it solar, wind or the promised green hydrogen. In all activities related to the energy market, there is a bureaucratic administrative bottleneck in Portugal, and this bottleneck is particularly visible in the market for the installation of the load network of plug-in electric and hybrid vehicles. This strangulation gradually becomes more critical the more Portuguese show appetite for electric mobility.

There are several fears associated with the source of nuclear energy, Portugal has chosen not to invest in it. Modern nuclear power plants (known as Generation 3 Plus or GenIII+ nuclear power plants) have a lower fatality rate than any other form of electricity production³³. The scientific consensus, demonstrated by the Joint Research Center³⁴, is that modern nuclear energy is safe, green and sustainable. The scientific consensus also demonstrates that current solutions for dealing with nuclear waste are acceptable and safe, but that more advanced forms of treatment should be investigated.

Promote the added value of the energy industry by decentralised production. Decentralized production means the production of electricity from small sources of electricity generation, typically ranging from less than 1 kW to a few tens of MW, which is not part of a large production plant and is located near the consumption site. These sources can be connected to the network or operate independently of the network. Decentralised production systems connected to the network are normally connected to the distribution system, with the possibility of being dispersed rather than concentrated in a single location allowing for a reduction of energy costs for producers and indirect costs for the system, when accompanied by network control mechanisms.

The energy transition that is ahead of the next decade will have

to mobilise more than €25G of investment, which involves complex concertation of wills and alignment of policies, incentives and means of financing. In order to facilitate this transition, a set of legal and planning instruments should be mobilised to achieve effective emission reduction, while promoting investment, employment and innovation [6-11].

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Acronyms, definitions and diplomas

Backwardation – Condition in which the price of futures contracts traded in the month is lower than the price of transactions in the spot market;

BFO – Crude oil originating from fields in the North Sea (Brent-Forties-Oseberg-Ekofisk-Troll) and used as a reference in oil prices in international markets;

FOB – Free on Board

G26 and G110 - The size of the gas bottles is normalized. Two models can be distinguished according to their capacity.

LPG - Liquefied petroleum gas (butane and propane);

I.O. - Octane index;

Jet - High quality fuel for aviation engines;

OECD - Organisation for Economic Cooperation and Development;

OPEC and OPEC+ - Organization of Petroleum Exporting Countries and allies; price to consumers - Retail Price

WTI – West Texas Intermediate. Type of crude oil.



Nuno A. S. Domingues, Pós Doc in Science Communication from FCSH-UNL (2021), Pós Doc in Electrical Engineering and Computer Science from IST (2020), PhD in Electrical Engineering and Computer Science from FCT-UNL (2015), Master in Electrical Engineering and Computer Science from IST (2008), Undergraduate (5-year) degree in Electrical Engineering from ISEL (2005). His topics of research include e-learning, science communication, education, electricity markets modeling and simulation, energy systems, SCADA and DSS, decision making, intelligent optimization, evolutionary algorithms, machine learning, sustainability, efficiency, clean technologies, mobility and transport, sustainable consumption and regulation.

He is a Professor in ISEL. He holds a Problem Based Learning and Excellence in Teaching and Learning diploma by UNESCO and the internationally Information Technology ECDL qualification. <https://publons.com/researcher/1176435/nuno-domingues/metrics/>

<https://www.isel.pt/docentes/nuno-alexandre-soares-domingues>

<https://scholar.google.pt/citations?user=-mtxKk8AAAA-J&hl=pt-PT>

<https://www.linkedin.com/in/nuno-domingues-a1401916/>

<https://orcid.org/0000-0003-0763-8106>

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