



ORDEM
DOS
ENGENHEIROS



**WORLD
ENGINEERING
DAY**
FOR SUSTAINABLE
DEVELOPMENT



In support of UNESCO
World Engineering Day



Com o Alto Patrocínio
de Sua Excelência

Under the High Patronage of the
President of the Portuguese Republic



O Presidente da República

ORDEM DOS ENGENHEIROS/WORLD ENGINEERING DAY THE ECONOMIC SUSTAINABILITY OF THE ENERGY TRANSITION

Lisbon

March 4th 2024

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Ordem dos Engenheiros

I-THE ENERGY TRANSITION

II-THE EUROPEAN ENERGY CRISIS

III-PORTUGUESE ENERGY SYSTEM UNDER THE IBERIAN FRAMEWORK

I-THE ENERGY TRANSITION

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March 4th 2024

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The world has seen several **energy transitions**: from wood to coal, from coal to oil and from oil to oil and natural gas.



Today, in a context of decarbonisation:

Emergence of intermittent renewable energies, wind and solar (solar thermal and photovoltaic panels)

Launch of renewable gases, such as hydrogen and biomethane, as non-fossil alternatives to natural gas.

I-THE ENERGY TRANSITION

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Previous energy transitions have been led by the market in a decentralised approach between producers and consumers

With a gradual transition in which emerging forms of energy are assisted in their development by existing forms of energy.

Nowadays, transition is being led in an enlightened way by the **visible hand of political power**

Particularly in the European Union and the USA, where the aim was to do away with incumbent energies overnight, replacing them abruptly and hastily, an approach that is not realistic.

This political approach raises serious questions about the **economic and social sustainability of the transition**

It could well be said that the aim was not an energy transition, as in the past, but a genuine energy disruption!

I-THE ENERGY TRANSITION

We are also witnessing a resurrection of nuclear energy for the following reasons:



Along with wind power, it is one of the lowest emitters of CO₂ per unit of energy produced, which makes it attractive in a decarbonisation context

it has a high energy density (a lot of energy produced per space occupied) while wind and solar energy have a low energy density, which makes it unrealistic in terms of space occupation to completely replace nuclear energy with wind and solar power

it's a reliable and stable energy source ,well adjusted to supply base-load consumption without the problems created by the intermittency of solar and wind power

It is therefore common sense to recommend to countries that have nuclear power stations: keep them!

I-THE ENERGY TRANSITION

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- This **transition aims to eliminate fossil fuels but is highly intensive in mineral resources and rare metals** to power wind and solar energy, batteries, fuel cells (FC), electric motors for both battery-powered vehicles (*BEV-Battery Electric Vehicles*) and hydrogen-powered fuel cell vehicles (*FCEV-Fuel Cell Electric Vehicles*), and in general all the electrification that is intended.
- **Problems on the supply side**, such as the scarcity of these mineral resources and rare metals, and dependence on areas of the world that we do not control, such as China, or the constraint of available space for renewables, **will create serious supply shortages slowing down the pace of the transition**, although the circular economy and recycling can alleviate this active constraint.



II-THE EUROPEAN ENERGY CRISIS

Before Ukraine invasion the world economy and namely Europe began to deal with the **first energy crisis under the decarbonisation framework.**

Europe and USA underinvested in fossil fuels, oil, coal and natural gas

- Underinvestment was made under the political commitment I explained before, and with after-Covid strong economic recovery the world demand for fossil fuels increased dramatically creating a big shortage of fossil fuels supply.
- So the prices for coal, oil and natural gas increased dramatically.

The Ukraine invasion exacerbated this energy crisis and has shown the dramatic dependence from Russia of European energy system

- Namely the huge German dependence from Russia on natural gas.

Europe launched after the war an energy diversification strategy from Russia, namely in natural gas, and tried to increase either the energy efficiency or the energy savings.

- Under this diversification, US became the main liquefied natural gas (LNG) exporter for Europe.

III-PORTUGUESE ENERGY SYSTEM UNDER THE IBERIAN FRAMEWORK

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Portugal needs to have again a true energy planning system :

- **with economic sustainability, not taking into account only the CO2 reduction (EU and Portugal account only for 7% and 0.11% of CO2 world emissions!)**
- To deal with energy surplus of renewable sources, wind and solar, to have redundant power from classical power plants when wind doesn't blow and sun doesn't shine
- To build, under the Iberian energy system, new electrical and natural gas connections between Spain and France to address the Iberian energy autarky towards Europe.

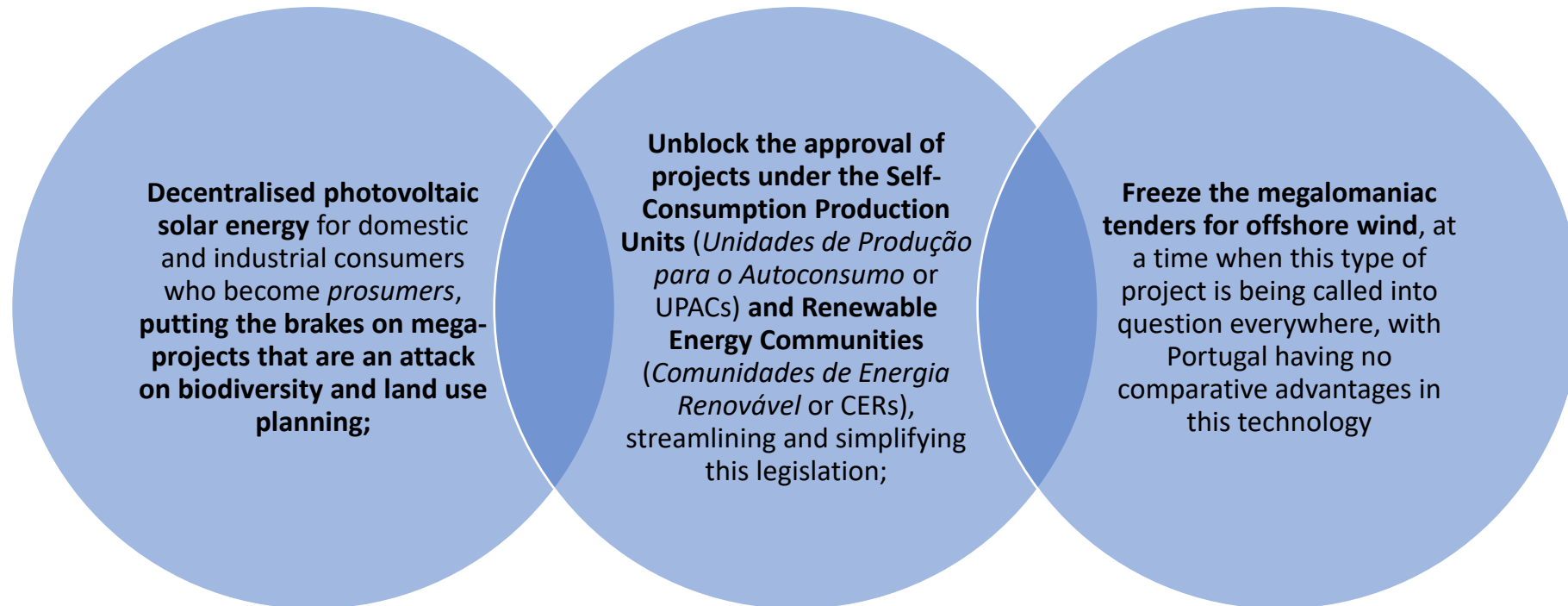


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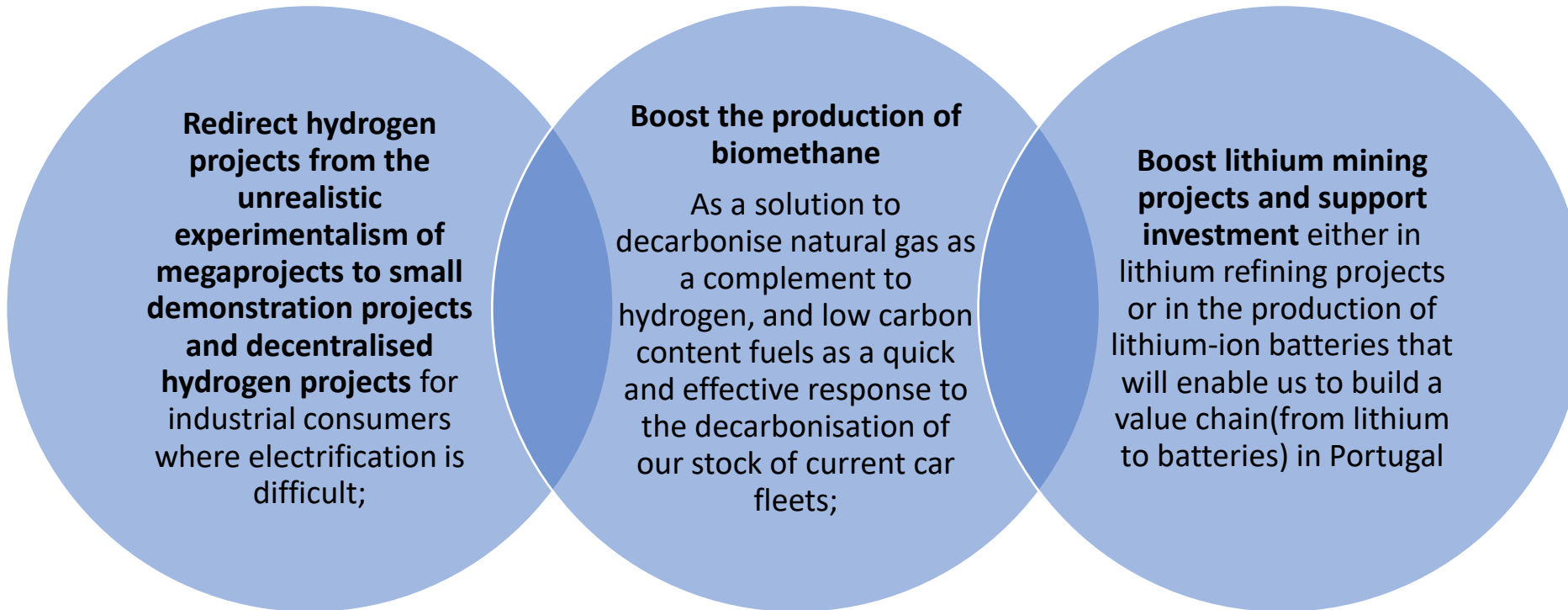
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In Portugal, and in the context of the energy transition with sound economic sustainability, a new government after the March 2024 elections should give priority



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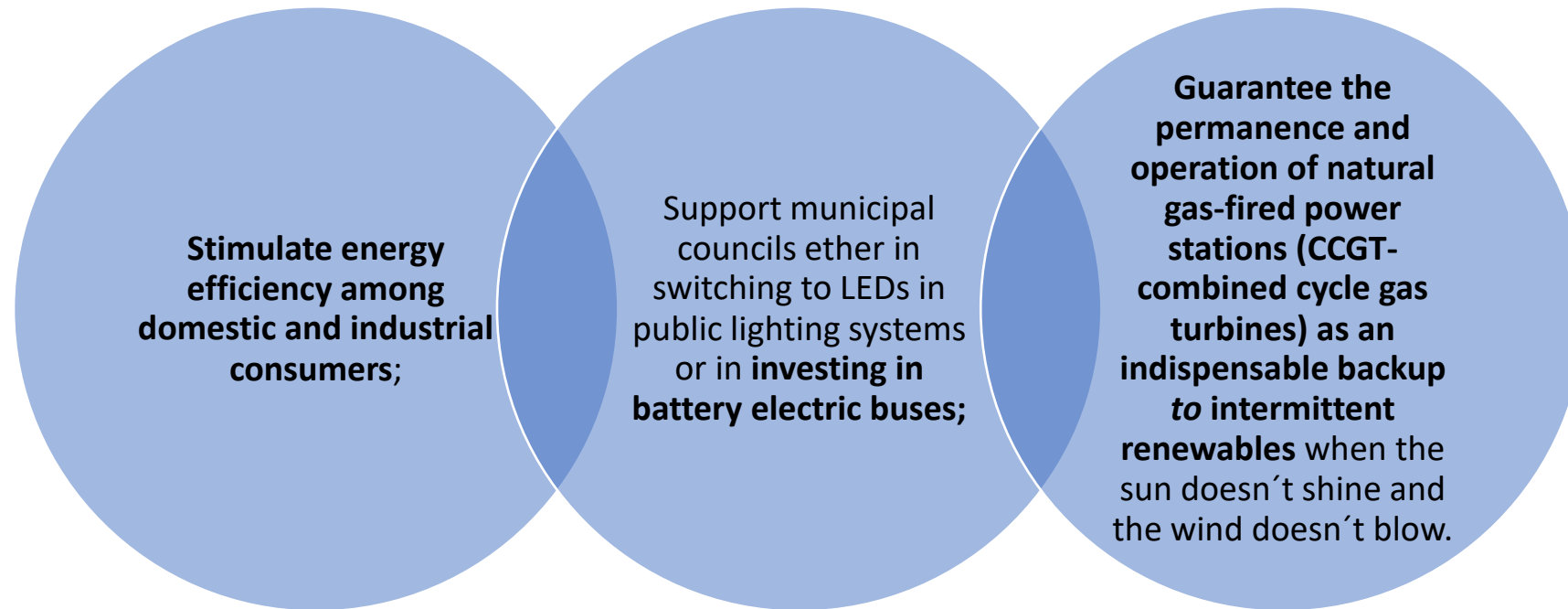
The aim is to support our automotive cluster, and in particular vehicle assembly/production units (namely VW Autoeuropa in Palmela and Stellantis/Citroen in Mangualde) in the transition to the electric vehicle;

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And the last but not the least, under a long term framework, we should return to:

Real indicative economic planning in our power system, moving on from the National Energy and Climate Plans (*Planos Nacional Energia e Clima* or PNECs), which are basically nothing more than National Energy and Climate *Intentions* (*Intenções Nacionais de Energia e Clima* or INECs)..., taking into account only CO₂ reductions, managing the production/consumption sides with minimum costs in the context of a global plan that would give it coherence, articulating interconnection and storage capacities with exports, production surpluses with pumping and other storage devices such as batteries, and economic analysis of the production cost/surplus cut (curtailment) binomial.

 PNEC 2030
PLANO NACIONAL ENERGIA-CLIMA





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