

2019 PORTUGAL RENEWABLE SUMMIT

Da transição ao compromisso energético
From transition to energy commitment





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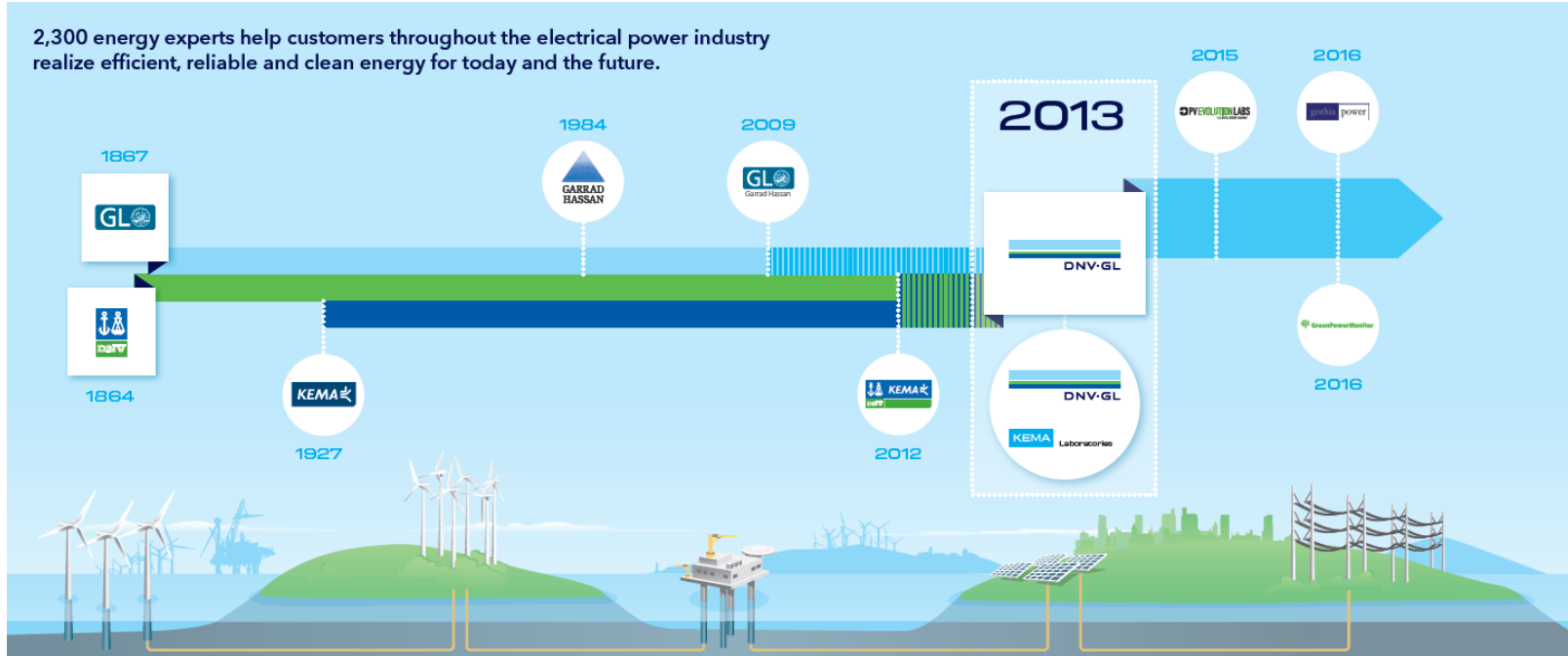
Impacts of price developments in 2030

DNV·GL

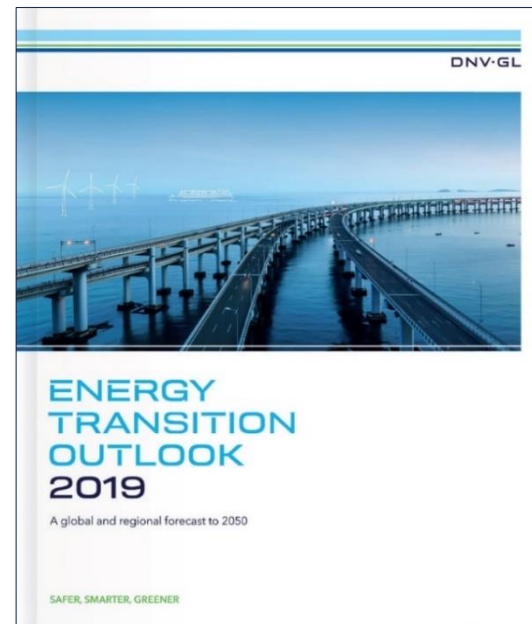


Impacts of price developments in 2030

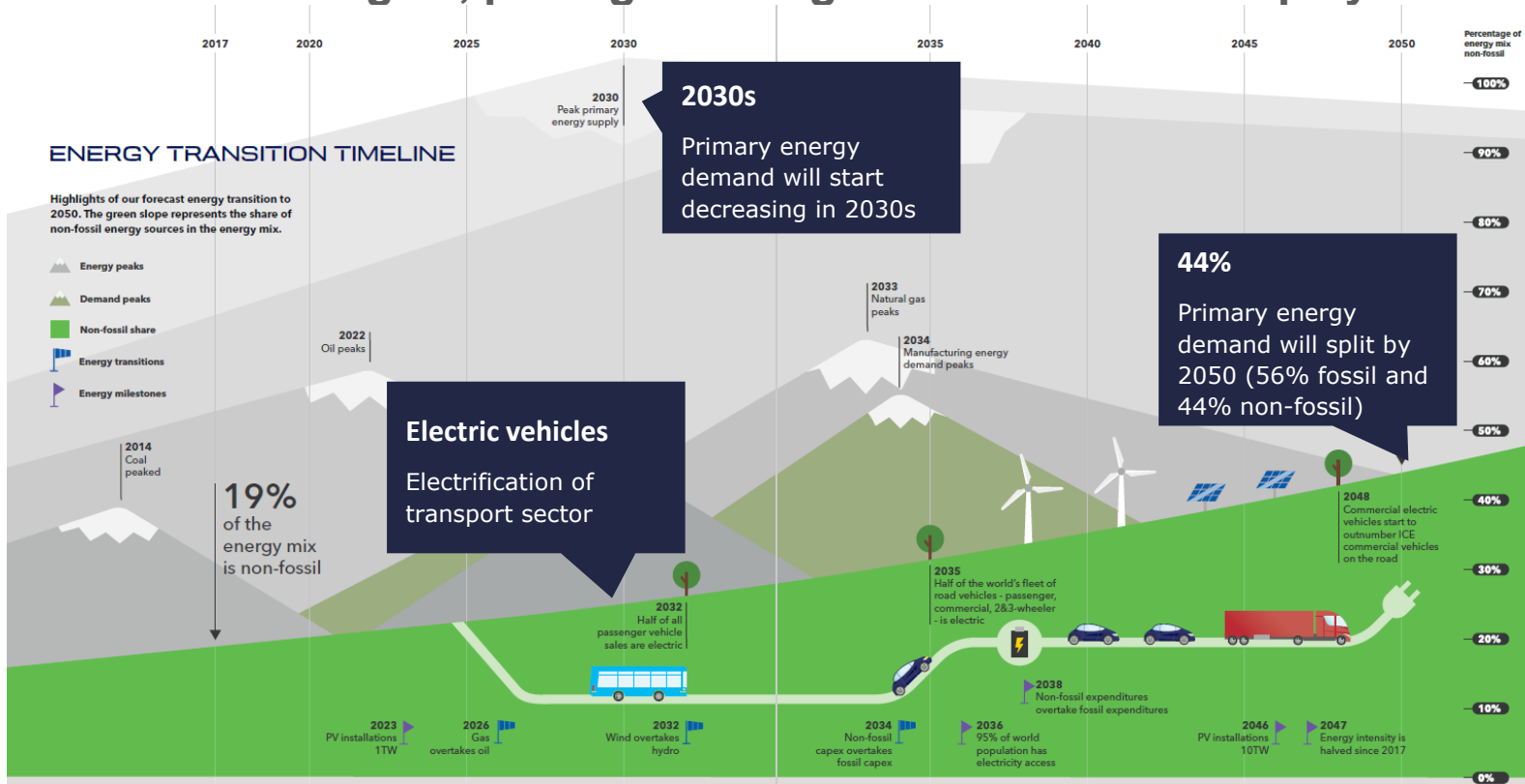
2,300 energy experts help customer throughout the electrical power industry realize efficient, reliable and clean energy.



Energy Transition Outlook (ETO, www.eto.dnvgl.com) is our Global and Regional Forecast



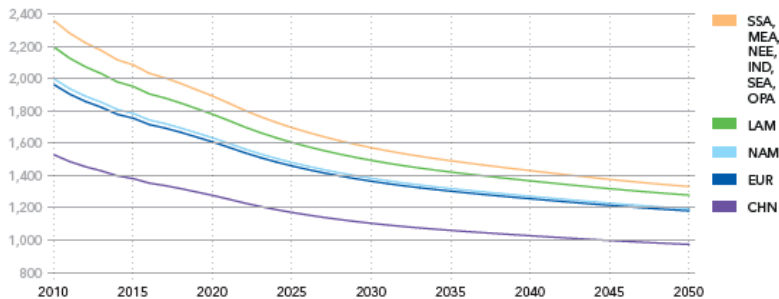
The energy transition will require a significant investment in new technologies, posing challenges and risks to new players



Learning curve effects in Renewable will continue and in conjunction with CO2 prices, they are game changer

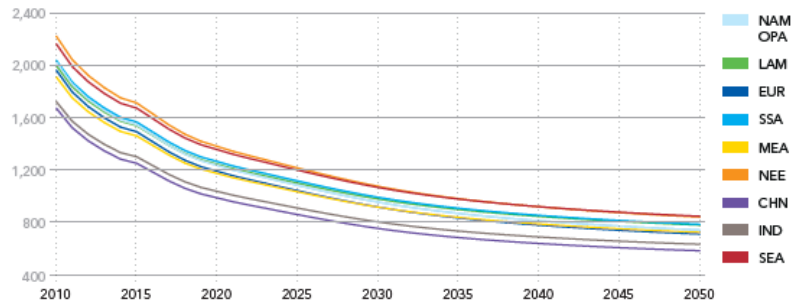
Onshore wind average unit investment cost, before support

Units: USD/kW installed



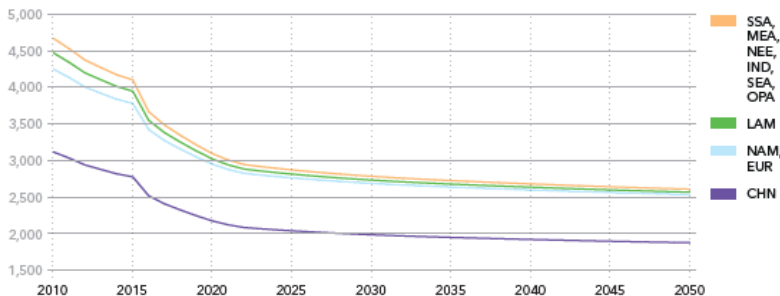
Solar PV average unit investment cost, before support

Units: USD/kW installed

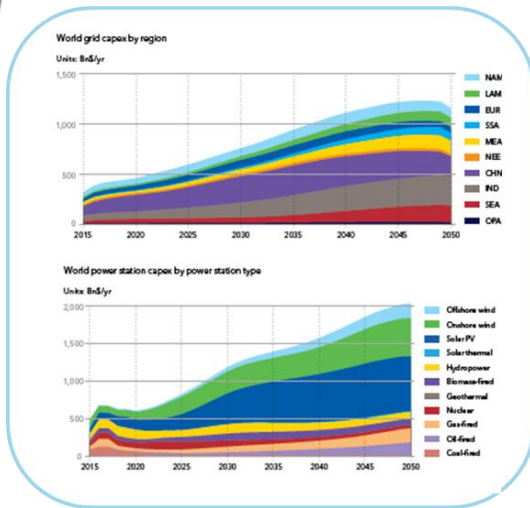


Offshore wind average unit investment cost, before support

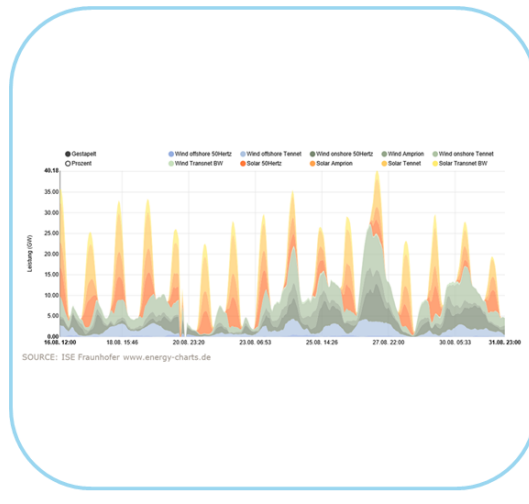
Units: USD/kW installed



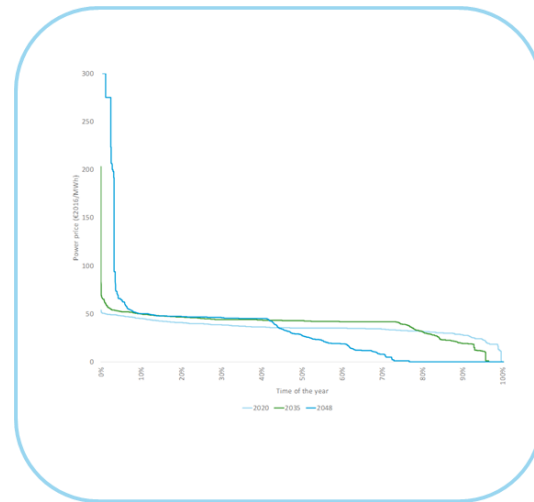
The economics of a more CAPEX intense system will change and new market designs needs to tackle upcoming risks.



Large CAPEX required



Substantial periods of surplus renewables creating new risks



New market arrangements including grid services emerging for generators

Main drivers for the development of electricity prices

Drivers

International commodities markets

- **Commodities** are key drivers that have **higher impacts** on electricity prices

Load growth

- New **customers behaviours** (electrification of transport sectors and rise of EVs, etc.) lead to higher **needs for new generation capacity**

Policies

- **National policies** (decarbonisation, decommissioning of nuclear, renewables support) may **impact the dispatch** of different generation units, and thus prices

Hydro

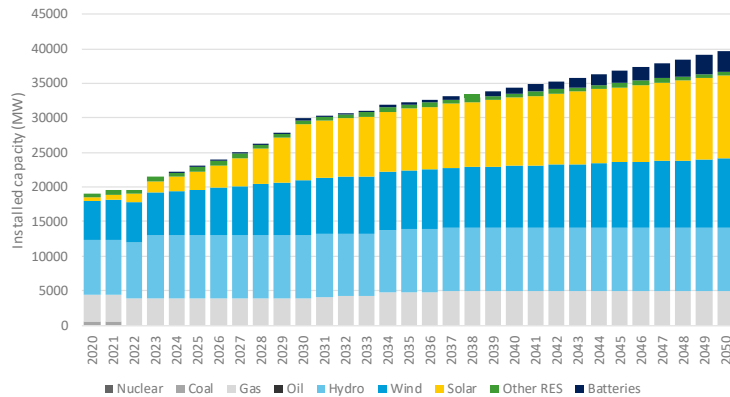
- **Dry and wet years** play an important role and lead to **significant variations** in prices

Renewables

- The **development of renewables** have a direct impact on generation **dispatch of other technologies** (e.g. gas-fired peak plants)

DNV GL's central view on future developments of generation capacity considers the current national policies for 2030

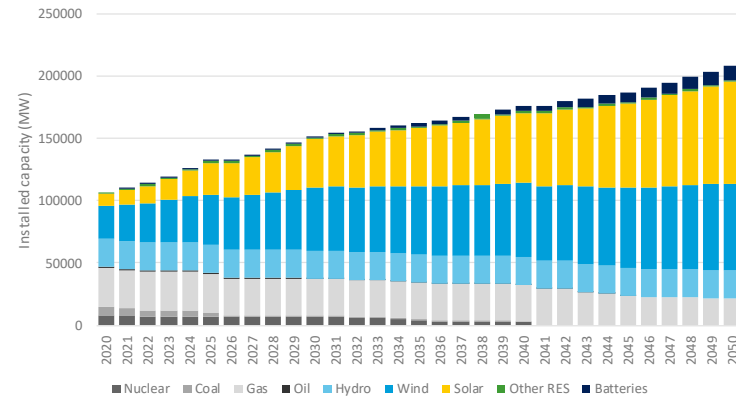
Development of installed capacities in Portugal



Source: DNV GL

- Decommissioning of coal-fired capacity by 2021 in Portugal.
- Solar PV capacity increases from up to 8.1 GW in 2030 and 10 GW in 2040. Increase in solar-PV is from rooftop installations and large scale projects.
- Installed capacity of wind onshore will increase up to 8 GW in 2030.

Development of installed capacities in Spain



Source: DNV GL

- Nuclear capacity is expected to be fully decommissioned until 2040, decreasing from around 7 GW of installed capacity in 2020 down to 4.3 GW in 2035 and 3.2 GW in 2040.
- Solar PV generation capacity increases from 9 GW in 2020 up to 40 GW in 2030 and 56 GW in 2040.
- Installed capacity of wind onshore in 2030 around 50 GW.

Cross-border interconnection exchanges play an important role, impacting prices the European level

High correlation of solar generation in the same hours at the European level

Decommissioning of nuclear plants in France, leading to higher prices

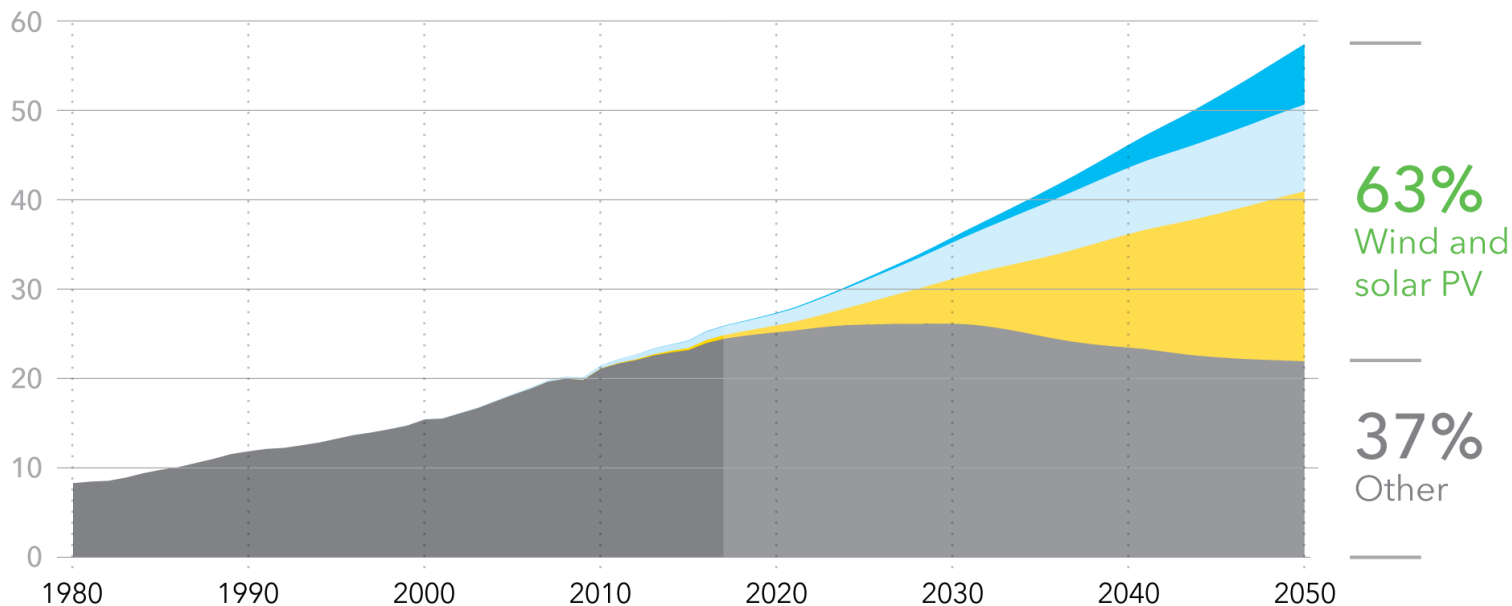
Decommissioning of nuclear and coal-fired plants Germany)

High solar and wind installed capacities in Portugal and Spain leading to high exports to Central European markets

Source: DNV GL

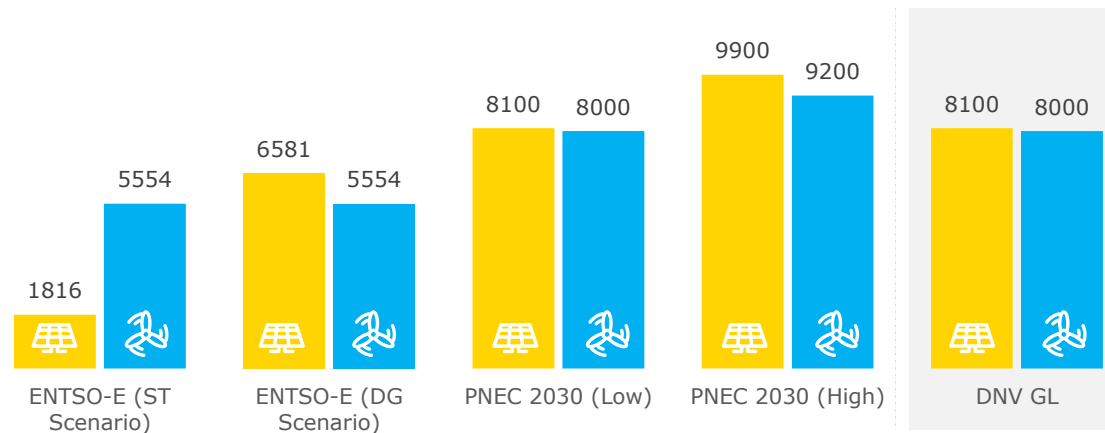
The effect of high generation from solar and wind will drive down baseload and capture prices in the long-term, leading to uncertainty about future projects

Units: PWh/yr



High future developments of renewables driven by cost-reductions, however further growth will depend on the cannibalization effect

Development of installed capacities for solar PV and wind in 2030 (values in MW)



- Cost-reductions for new solar PV installations is one of the major drivers for the capacity increase over the past years.
- New investments in solar PV is expected in the near future and new large scale projects are planned to be installed.
- Potential cannibalization effect of a high expansion of renewables (especially solar PV) on future developments.

Rapid changes in the energy sector require an assessment of how to address these challenges in the future

Diário de Notícias

INÍCIO / LUSA

Consulta pública do Plano Nacional de Energia e Clima decorre até 05 de junho

Lisboa, 07 mai 2019 (Lusa) -- A consulta pública do Plano Nacional de Energia e Clima (PNEC) delineado pelo Governo arrancou hoje e prolonga-se até 05 de junho, período durante o qual é possível apresentar contributos para a elaboração do documento final.

Lusa
07 Maio 2019 — 18:04

Em comunicado, o Ministério do Ambiente e Transição Energética lembra que o PNEC "será o principal instrumento de política energética e climática para a década 2021-2030".

O ministério tutelado por Matos Fernandes realça que Portugal, para estar na vanguarda da transição energética, estabeleceu "metas ambiciosas para 2030, das quais se salientam a redução entre 45% e 55% das emissões de gases com efeito de estufa relativamente aos níveis de 2005".

O executivo destaca ainda "o aumento da quota de energia proveniente de fontes renováveis no consumo final bruto para 47%".

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Portugal bate su récord de renovables: el 90% del consumo eléctrico solo de origen eólico

• Sucedió el 1 de febrero, cuando se confirmó que el país vecino le ha tomado la delantera a España en este sector

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Las grandes eléctricas alcanzan un acuerdo para prorrogar la vida de la central de Almaraz

Endesa, Iberdrola y Naturgy pactan unas inversiones de 400 millones con una posible oscilación al alza del 50%

REN

QUEM SOMOS O QUE FAZEMOS INVESTIDORES MEDIA SUSTENTABILIDADE CARREIRAS

MIGUEL A Madrid

CONSUMO DE ENERGIA ELÉTRICA RECUA 10% EM MARÇO

03/04/2019

ENERGIA

Produção renovável abasteceu 52% do consumo em 2018

Consumo de energia eléctrica totalizou 50,9 Terawatts-hora (TWh) em 2018, mais 2,5% face ao período homólogo

Lusa - 2 de Janeiro de 2019, 18:11

91 PARTILHAS

Regulation is tasked to manage the transition adequately

Main policy and regulatory challenges:

- How should regulation deal with the “new assets” and “old assets” in the transition period?
- How can investment be ensured by the right market designs
- How can solar PV and wind be integrated into network operations?
- How can security of supply be guaranteed

Despite the known risks, future uncertainties can impact future developments and new investments

LCOE decreasing

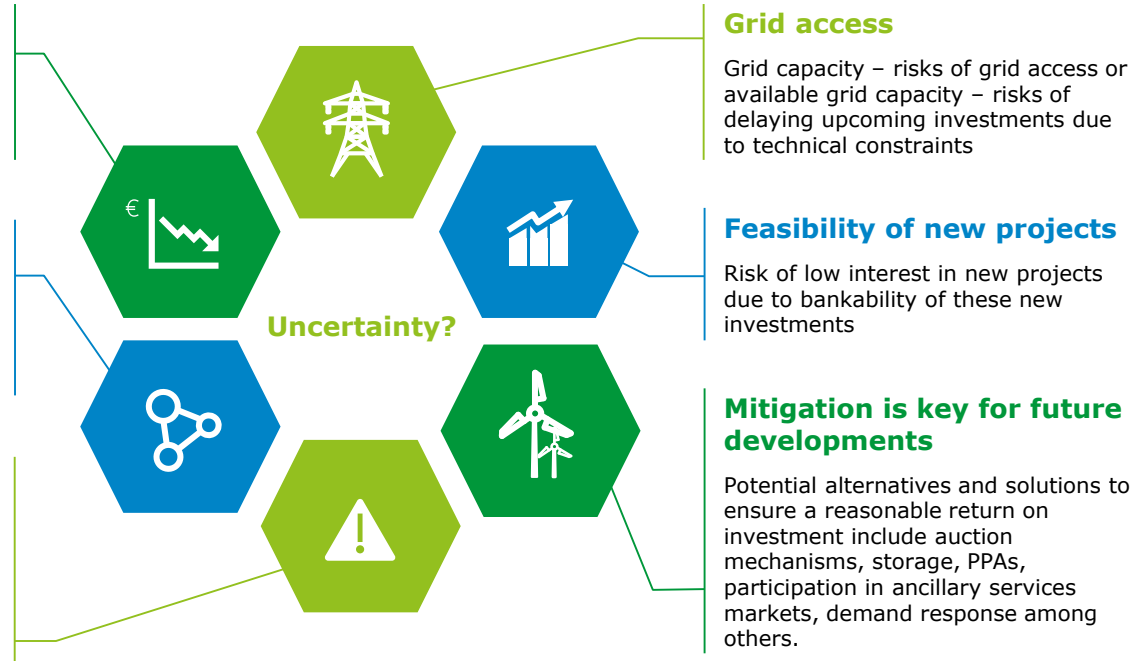
Low LCOE have driven new investments in new wind and solar projects

New paradigm

This new paradigm shift leads to a high exposure to market risks

Cannibalisation and curtailment

Cannibalisation is expected to grow after 2030 driven by high growth of wind and solar projects, increasing curtailment



Key messages



Exponential growth of renewables

New policies under discussion in Portugal (among other European countries) propose an **exponential growth of renewables** (especially wind and solar) towards a decarbonization path



Addressing future challenges

Potential challenges for market players resulting from the **renewables expansion** will require **detailed market assessments** of uncertainties around **key drivers** such as the developments of commodities prices, energy policies (e.g. decommissioning of nuclear in France, decommissioning of coal-fired plants), variations in demand and future renewables growth rates.



Effects on price developments after 2030

Further developments of renewables after 2030 will **impact captured prices** for new projects and **new mechanisms** will be required to be discussed (for instance auctions, long-term PPAs) for **ensuring the climate policies** targets and for **avoiding less appetite** for new investments in projects only based on energy only markets.

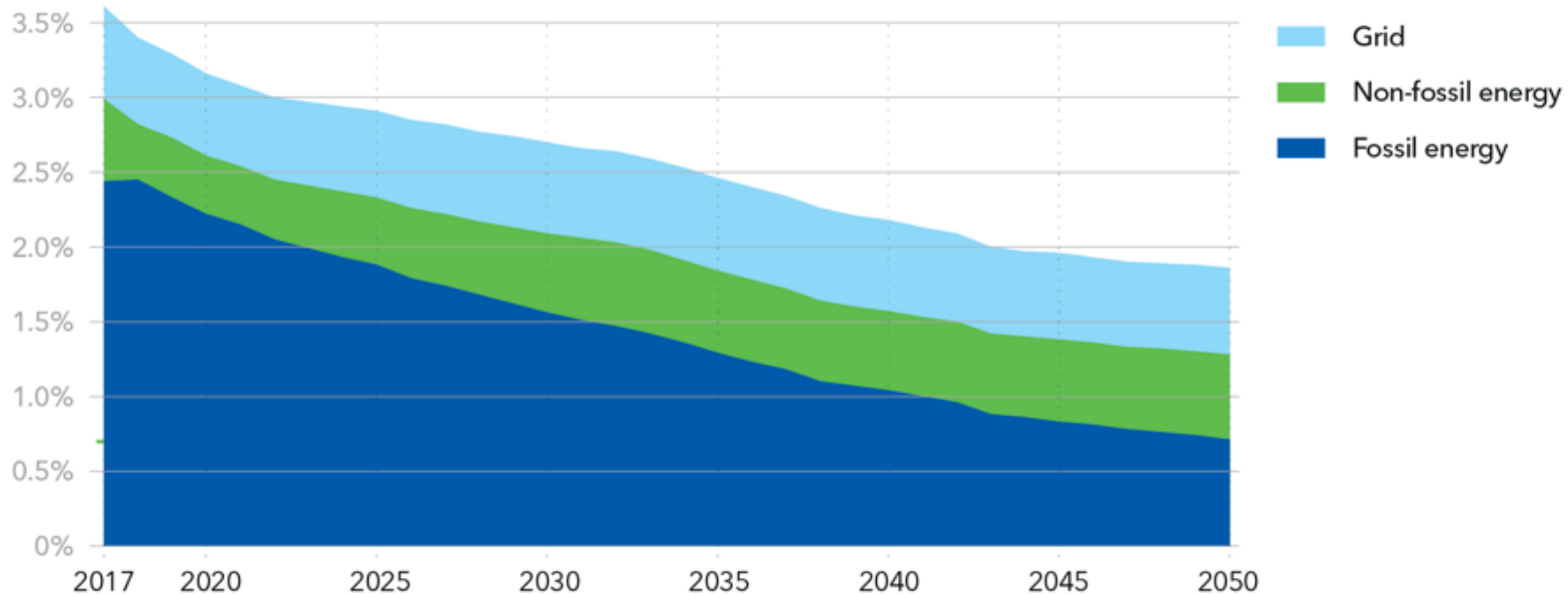


Need for independent vision

DNV GL service **provides a long-term vision** of potential future impacts on European power markets. DNV GL's power price curves provide **insight into key drivers** and **sensitivities**. DNV GL diligently identifies technical, environmental, commercial and regulatory risks to support your investment decision.

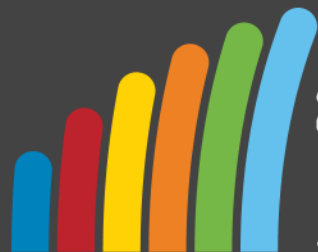
The transition is affordable

Units: Percentages



We are not on course to achieve the climate objectives of the Paris agreement





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APREN Associação
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