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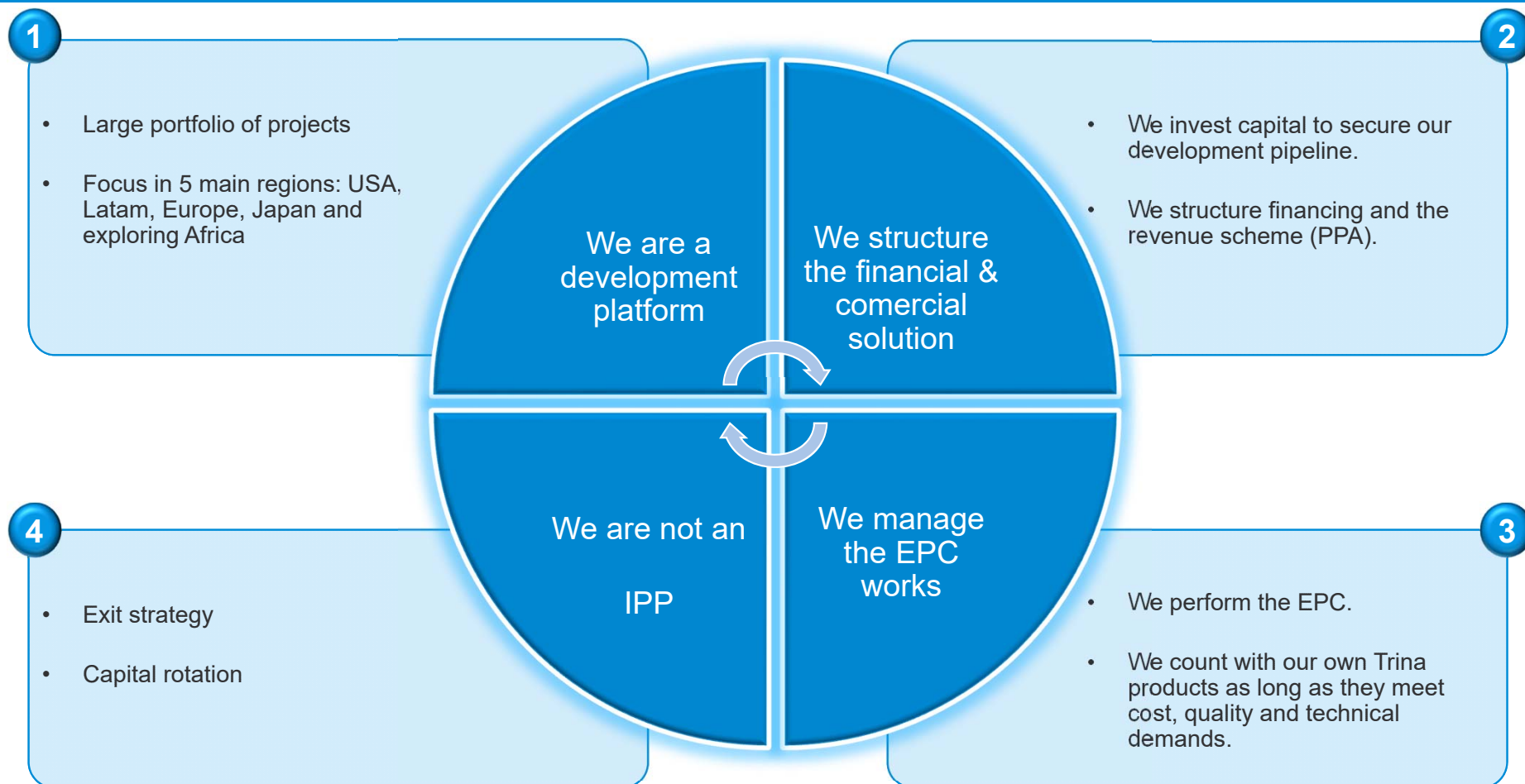
Exploring opportunities from the Spanish solar rebirth

Madrid, October 8th, 2019



TRINA ISBU (INTERNATIONAL SYSTEM BUSINESS UNIT)

A DEVELOPMENT PLATFORM THAT DEVELOPS, STRUCTURES, BUILDS AND RECYCLES THE CAPITAL

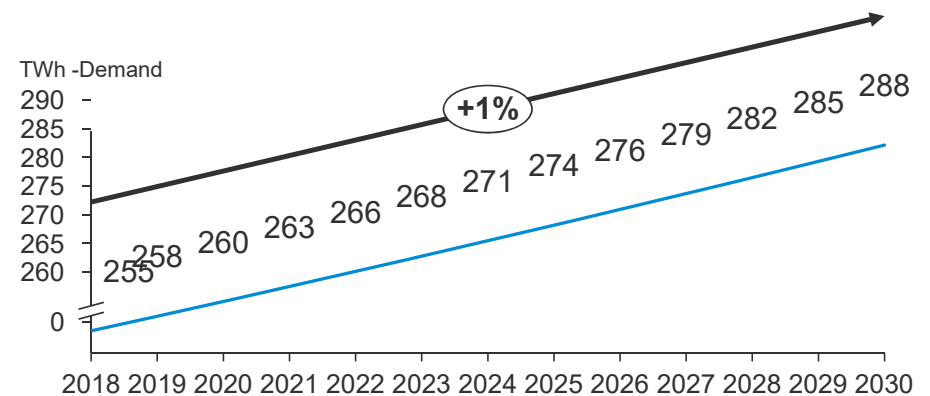
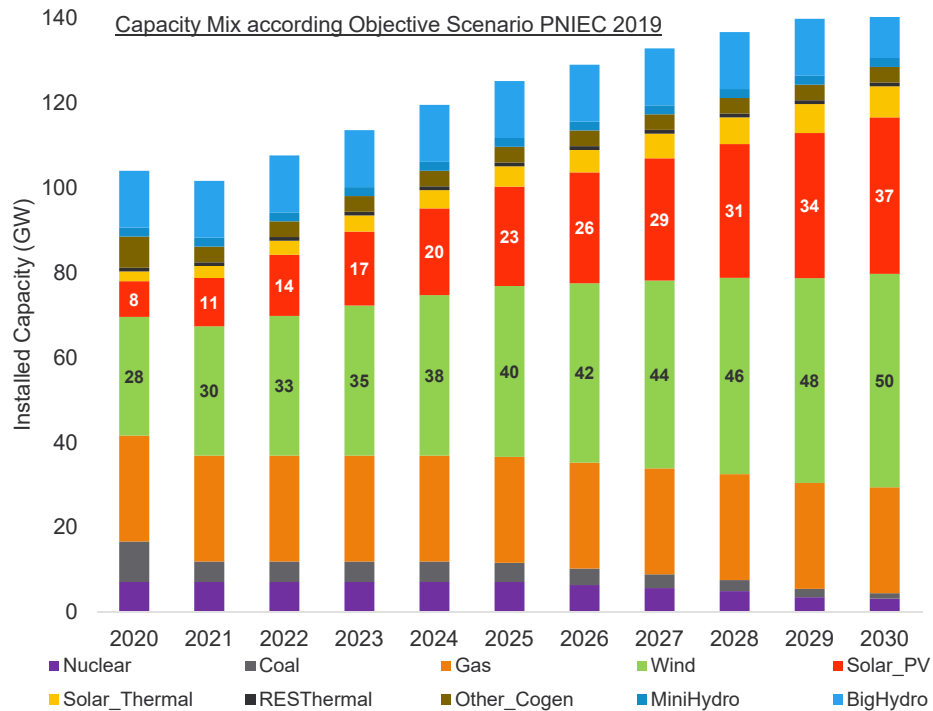


SPAIN POWER MARKET PROFILE

KEY MESSAGES



- **8 GW** of PV installations are operating in Spain.
- **Strong renewable policy** according to European Directives:
 - 2019-30 PNIEC “Plan Nacional Integrado de Energía y Clima”.
 - Increase renewable capacity (by 2030: +30 GW PV & +22 GW Wind).
 - Phasing out draft plan for coal by 2030 and nuclear generation plants by 2035
- **Stable region:** unsubsidized PV plants are currently financed by the main players



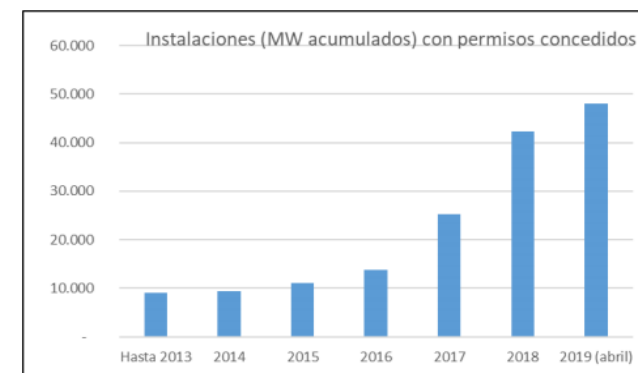
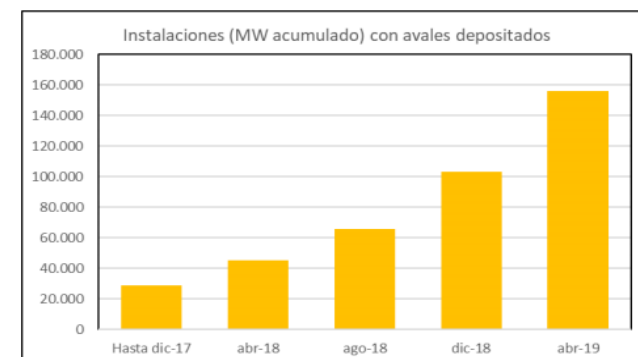
Source: UNEF & Draft CNMC (CIR/DE/001/19)

SPANISH PV DEVELOPMENT STATUS OVERVIEW

THE MARKET IS HOT AND WE NEED TO BE PRAGMATIC



- **~150GW requested with grid bond deposit (40 k€/MW), mainly related to the HV transmission grid)**
 - Time, the TSO and budgets will impact on the real number to be accepted and granted
 - At least >8 months to obtain the POC acceptance by REE (TSO). 90% cases would be conditioned to a high investment related to the interconnection in high voltage (HV)
 - 60% of capacity will entry thanks to the new transmission infrastructures still to be executed according to the REE planification
 - 20% capacity requested for planned substations that will be constructed within 2020 and 2021
 - The rest 20% (approx.. 30 GW) is the real capacity that could be injected to the current transmission grid
- **~50 GW of POCs are in different status of POC approval (Wind & Solar)***
 - A big portion is pending to be confirmed by the developer, solicitor, reducing in that way to, at least 20GW of projects fully confirmed in terms of POC
 - **How many will be granted? : difficult to size:** they need to receive confirmation and acceptance from the TSO, and accept the tecno-economical conditions from the Utility. After the acceptance of the developer, (they have 6 to 9 months to do it), if REE allows, then they will receive the final confirmation.
- **Release of 30 GW POC due to mainly:**
 - Smaller developers hold the majority of POCs. Lack of economic resources to afford the construction
 - Negative Environmental Impact Assessment (EIA)
 - Land contracts impact
 - After oct'18 increase of deposit payment from 10 k€/MW to 40 k€/MW to request a POC



Source: UNEF & Draft CNMC (CIR/DE/001/19)

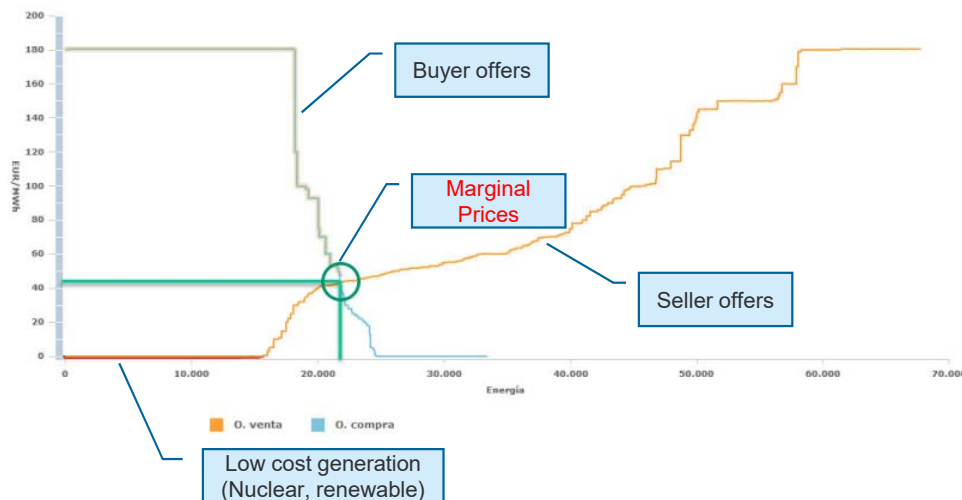
THE IMPACT ON THE REVENUE STREAM BY THE PENETRATION OF RENEWABLES

NEW MARKET RULES COULD PROVIDE ADDITIONAL REVENUES

Wholesale Energy Market:

- The price and volume of energy over a specific hour are determined by the point at which the supply and demand curves meet, according to the marginal pricing model adopted by the European Union
- Marginal market. Thermal units fix the wholesale energy price.
- Next future possible decorrelation between wholesale prices and commodities. Low prices during renewable generation hours (i.e. solar).
- PV Participation in ancillary services markets. Extra revenue e.g. in secondary.**

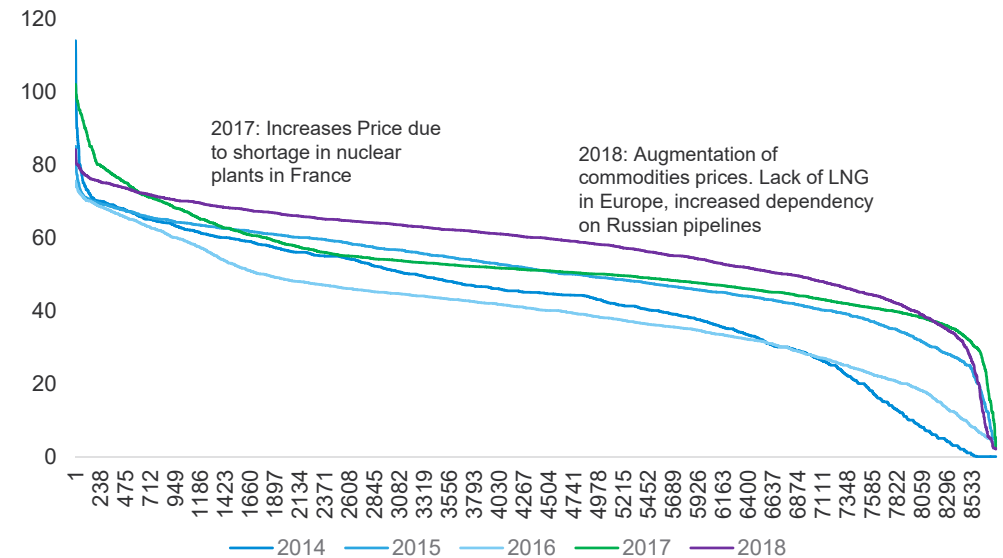
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Increase of low cost generation capacity (renewable) will push downward the marginal price

€/MWh

Historical Monotone Curve (n° hours/year at particular price)



Marginal price varies on the renewable resource, commodity price and interconnection

1. Minimizing speculation and enlarging the grid capacity

Draft CNMC (CIR/DE/001/19) access to the grid:

- Higher control: firmness in the request access and connection permits: land, environmental assessment.
- Enlarging the capacity:
 - Update of technical parameters, such as short circuit power.
 - Maximize the integration of renewables where there is a low rate of concurrency, allowing hybridization (i.e. PV + Wind).
- Simplification of the administrative procedure.

2. Supporting the growth to fulfill the European Union targets

- **No timetable for future renewable auctions.** Last renewable auction was held in 2017, but according to PNIEC new auctions will be needed to support the renewable deployment and accomplish with PNIEC's targets.
- **Energy storage: an opportunity to have a flexible grid and define new business models**
Nowadays no regulation for utility scale battery storage systems in Spain. However, REE (TSO) and regulators should define its role.

3. International interconnections

- **Current import from**
 - **France impacted by energy price increase there**
 - **Morocco impacted by low cost but high carbon foot print**
- **Future reinforcement of international interconnection** will allow to export oncoming extra and low-cost renewable generation to our neighbors (i.e. Morocco) and mitigating the reduction price effect. REMO Project: New third interconnection line (400 kV) between Spain – Morocco by 2026.

KEY MESSAGES

THE MARKET IS HOT AND NEW INGREDIENTS ARE AN OPPORTUNITY TO DRIVE THE FUTURE



Future

- **+30GW of PV by 2030**
- **High penetration of renewable** and the effect of their intermittency, requires the need of new firm and flexible power that guarantees security of supply
- **Energy Market:** Marginal market. Decorrelation between wholesale prices and commodities. Low prices during renewable generation hours. Participations of PV in ancillary services. Extra revenue in i.e. in secondary.
- **Possible New Capacity Market:** Need for additional income, in addition to the energy income, to guarantee the viability of new investments in firm power and keep existing facilities operation
- **Cohabitation of auctions and subsidy free**
- **Energy storage is an opportunity for new business models**



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