

“CEBREN Pumped Storage HPP” in North Macedonia

Webinar on Energy Storage projects – their future in the Energy
Community
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Creating Markets, Creating Opportunities

Dr. Nick F. Frydas
Senior Energy Specialist
World Bank Group

Corporate Transactions Advisory – IFC

AGENDA

- ❑ The Project
- ❑ Energy Transition in WB6
- ❑ Main findings of the Market Feasibility study
- ❑ Two alternative proposals for CRM

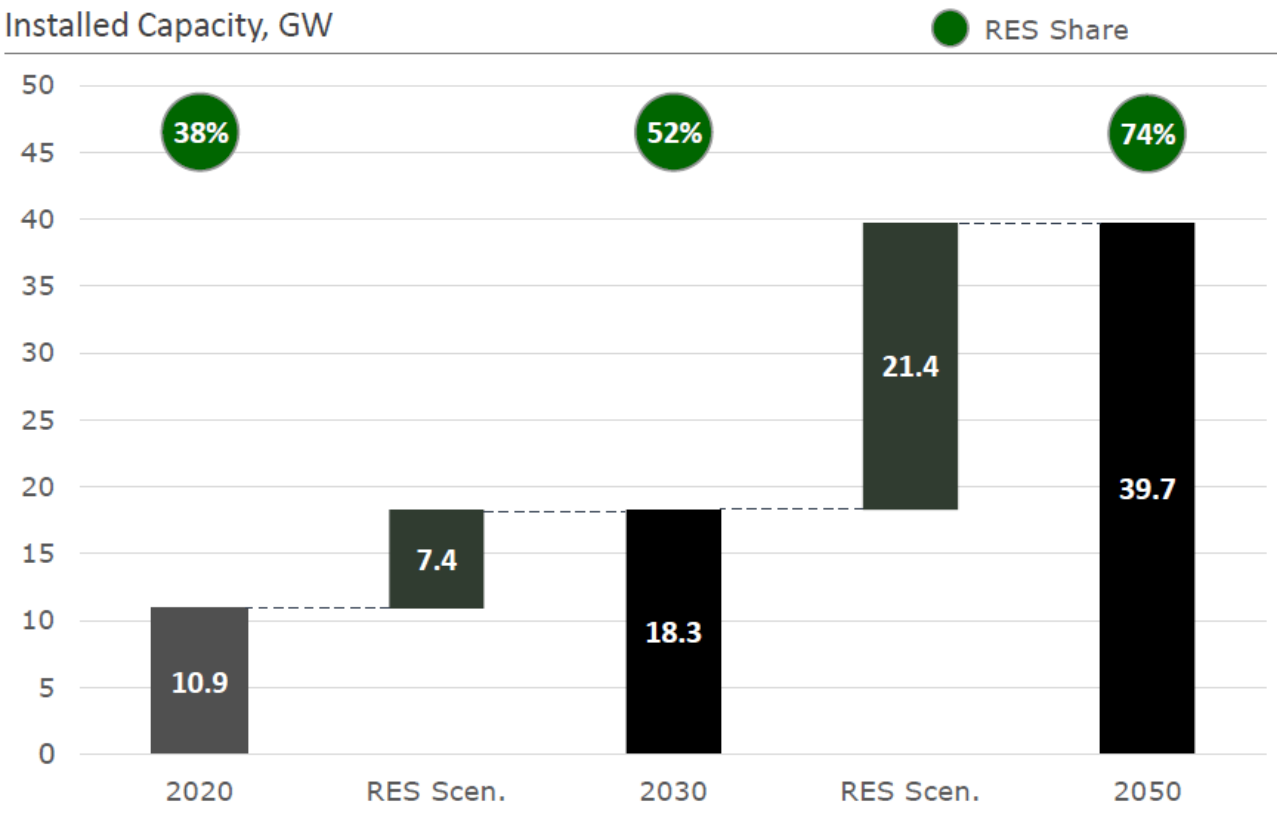
THE PROJECT



- ❑ The GoNM intends to develop a “PSHPP” at Crna River in the Mariovo region, with a total capacity in the range of 360-460 MW
- ❑ The project features 2 new dams (Cebren 192m, Orlov Kamen 55m). The cascade together with existing Tikveš plant further downstream will be offered to a private investor as a single Concession Contract for 50 years. The project is to be structured as PPP whereby the winning bidder will create a SPV with ESM. The latter will participate in the SPV through the transfer of ownership of Tikveš
- ❑ The SPV will design, finance, build, operate and maintain the PSHPP “Cebren” (333/429 MW – 840 GWh/y), and the two associated reservoirs, and optionally the HPP “Orlov Kamen” (28MW – 89 GWh/y); and refurbish, operate and maintain HPP Tikves (92 MW – 140 GWh/y).
- ❑ It is anticipated that the SPV’s cascade, will operate as unregulated (“IPP”) on the domestic and regional electricity markets.

MASSIVE DEPLOYMENT OF NEW RES CAPACITY IN WB6

Renewable energy scenario in Western Balkans¹



👉 To reach the ambitious decarbonization targets

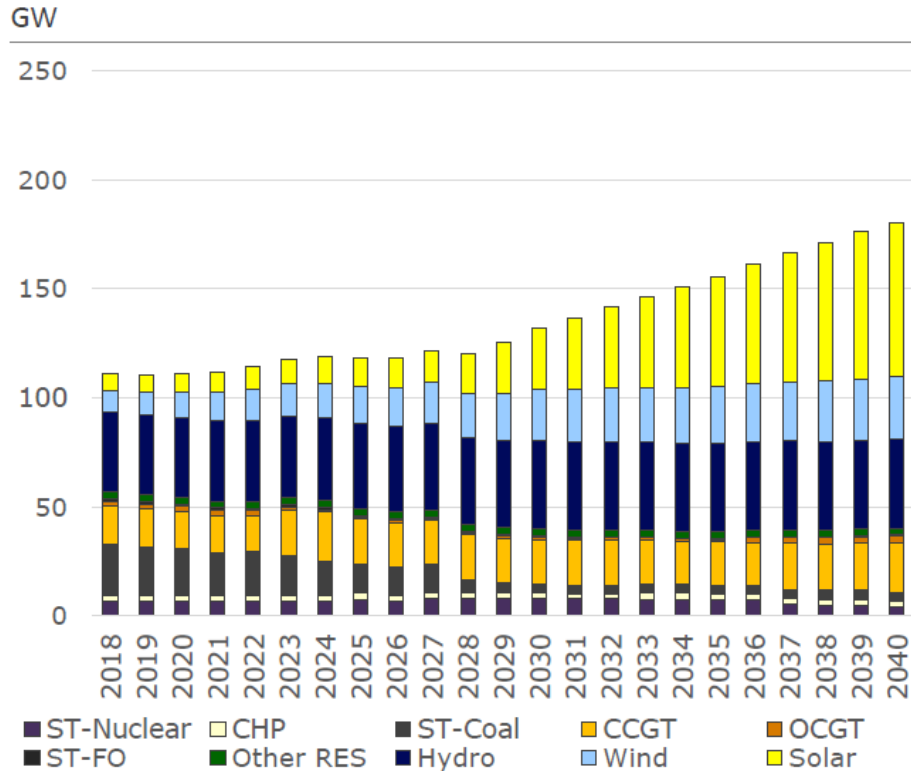
- 7.4 GW of RES required by 2030
- And 21.4 GW by 2050
- Corresponds to capacity additions of 740 – 1100 MW per year

IFC IN SUPPORT OF GONM UNDERTOOK A DETAILED MARKET FEASIBILITY STUDY

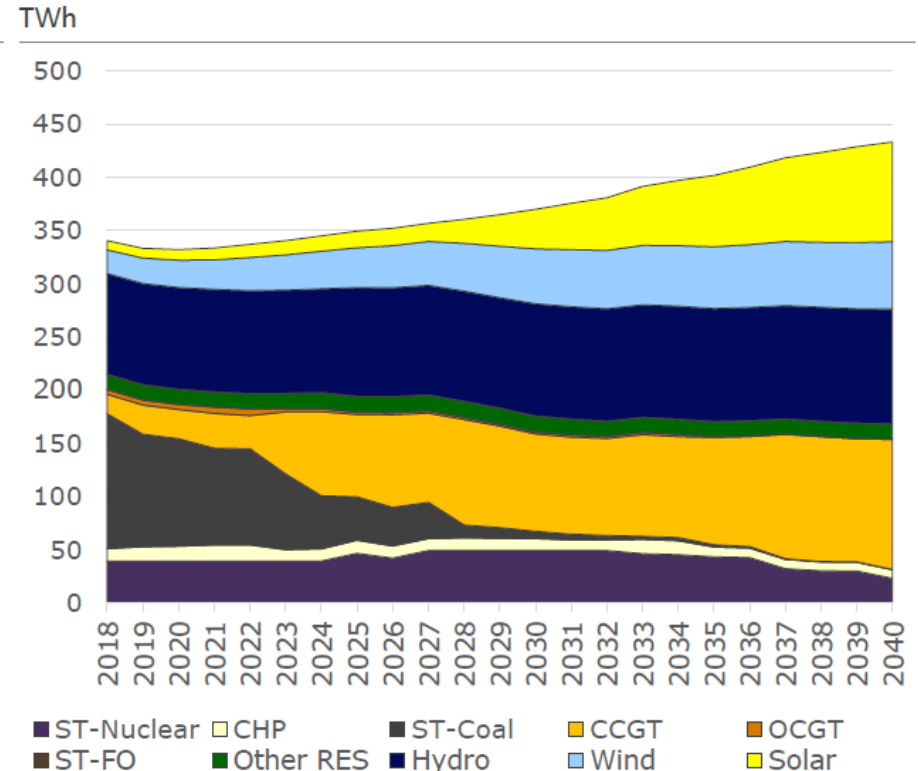
Category	Description of hypothesis made
RES CAPEX	<ul style="list-style-type: none"> Intermediate cost reductions Capex reaches EUR 451 per kW for solar PV and EUR 1,173 per kW for wind by 2050
CPM adoption	<ul style="list-style-type: none"> WB countries enter the EU ETS by 2028
ETS price by 2040+	<ul style="list-style-type: none"> The ETS price reaches 80 EUR/ton in 2040
Fuel costs	<ul style="list-style-type: none"> World Bank Commodities Price Forecast April 2019, after 2030 the coal price would be 47.70 USD/bbl, brent 55.65 USD/bbl and natural gas 5.56 USD/MMBtu
LCPD and IED	<ul style="list-style-type: none"> Compliance as agreed in Jan 2018
Coal mining subsidies	<ul style="list-style-type: none"> Elimination of subsidies for coal extraction by Jan 2022
CB exchange of reserves	<ul style="list-style-type: none"> Across South East Europe by 2025
DSM	<ul style="list-style-type: none"> Limited development of electric vehicles with smart charging strategies

COAL TO BE SUBSTITUTED BY CCGT + RES AS CO2 PRICE RISES

Installed capacity in South East Europe

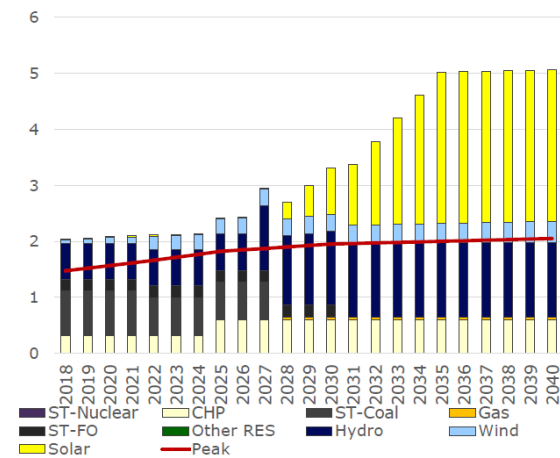


System dispatch in South East Europe

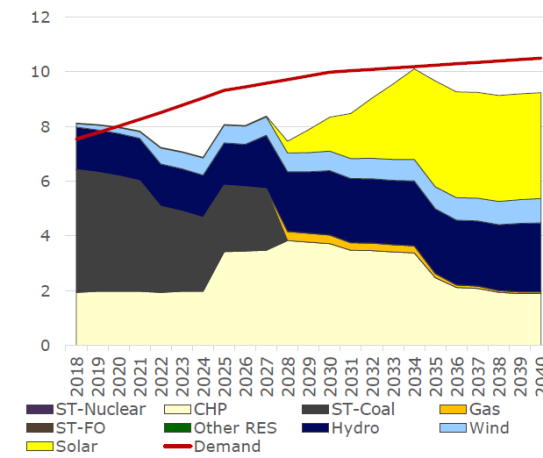


CEBREN IS A 460 MW OPPORTUNITY TO IMPROVE SOS AND RES INTEGRATION - € 84M FUEL & CO2 SAVINGS – 7 TWH RES CURTAILMENT

Installed capacity in North Macedonia
GW



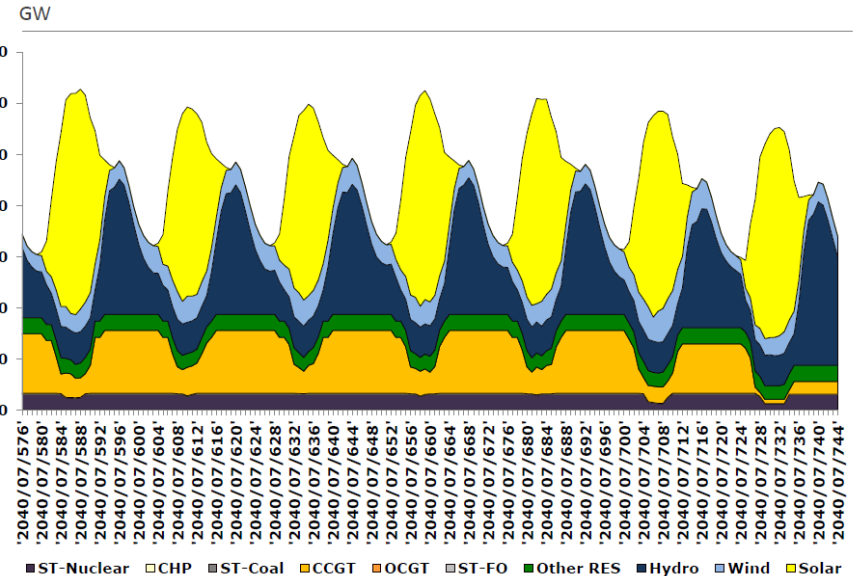
System dispatch in North Macedonia
TWh



Coal Substitution is also Confirmed in N Macedonia

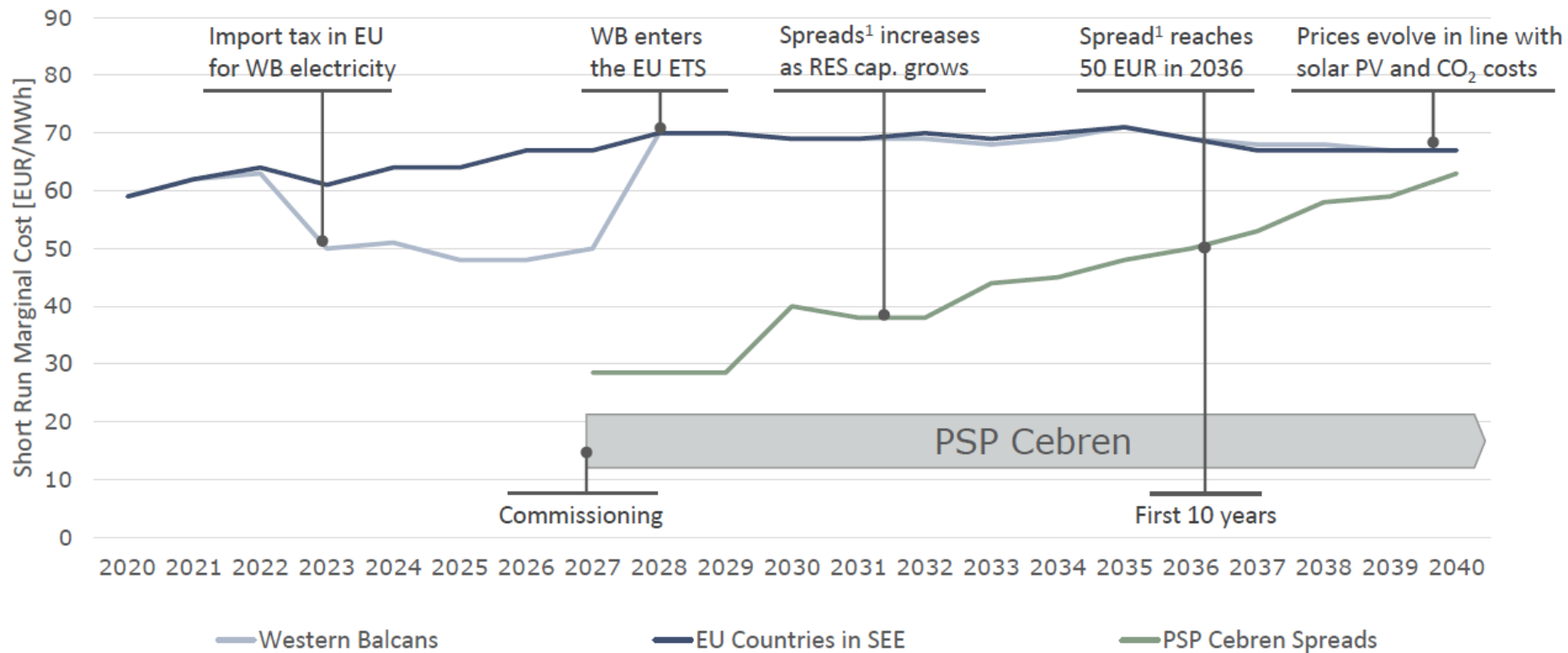
in July 2040, the SEE system presents ramps of the residual demand of up to 9.6 GW/h

Demand coverage in the last week of July 2040



UNTIL SPREAD REACHES €50/MWH CRM SUPPORT IS NEEDED

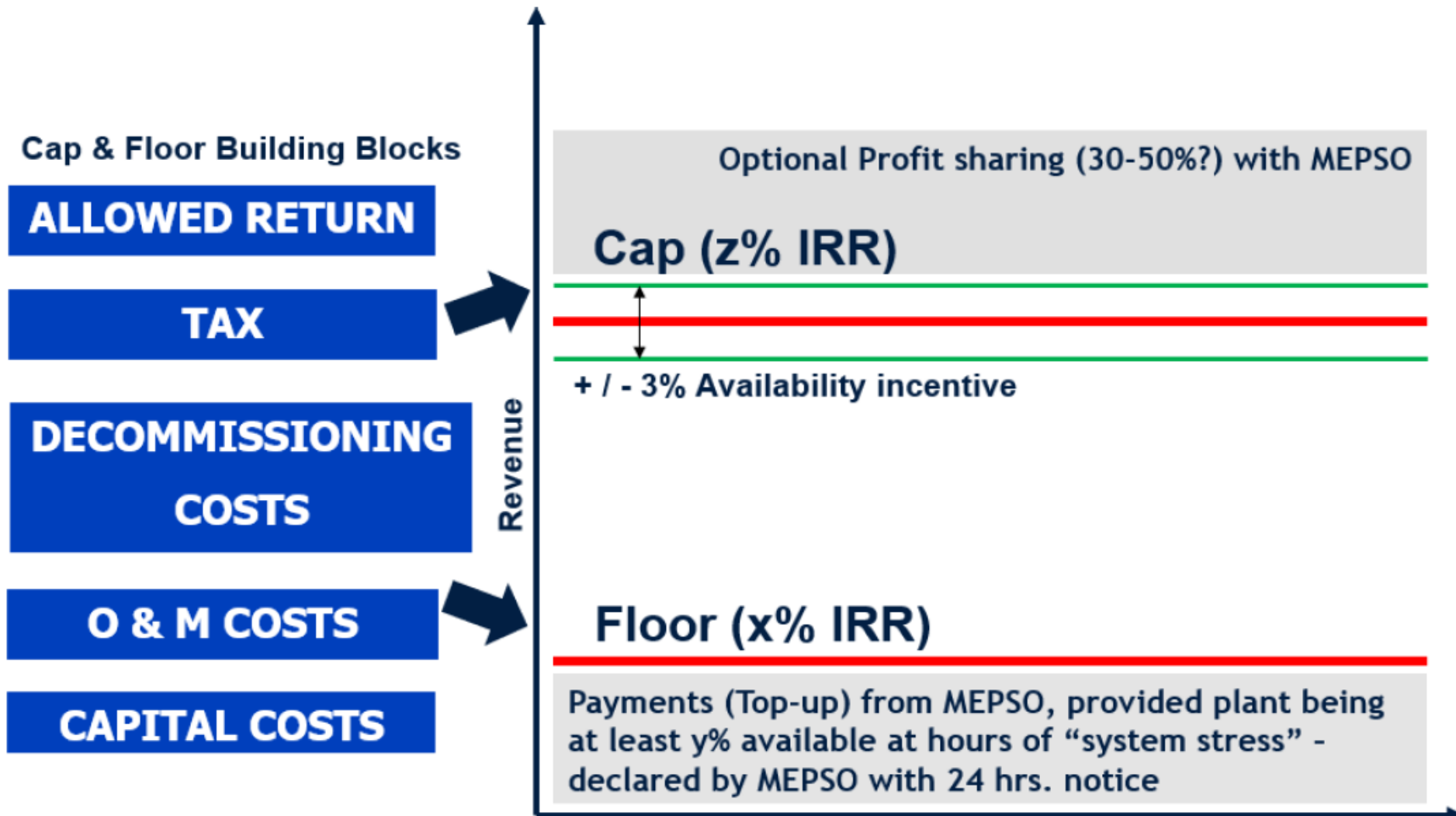
Short Run Marginal Cost and spreads captured by PSP Cebren
EUR2018/MWh



CRM DESIGN PRINCIPLES

- Must be temporary;
- not create undue market distortions and not limit cross-zonal trade;
- not go beyond what is necessary to address the adequacy concerns
- select capacity providers by means of a transparent, non-discriminatory and competitive process;
- provide incentives for capacity providers to be available in times of expected system stress;
- ensure that the remuneration is determined through the competitive process;
- set out the technical conditions for the participation of capacity providers in advance of the selection process;
- CRM shall be constructed so as to ensure that the price paid for availability automatically tends to zero when the level of capacity supplied is expected to be adequate to meet the level of capacity demanded;
- Capacity mechanisms shall incorporate the following requirements regarding CO₂ emission limits: Generation capacity that emits more than 550 g of CO₂ of fossil fuel origin per kWh of electricity shall not be eligible for CRM. With reference to the above criterion it must be emphasized that the study demonstrated that PSHPP Cebren in the “pumping mode” consumes electricity which on average is produced by emitting no more 10g of CO₂ per kWh.

CRM MODEL 1: "THE CAP AND FLOOR" MECHANISM



CRM MODEL 2: CONTRACT FOR DIFFERENCES

- ❖ An alternative CRM would be a Contract for Difference ('CfD'), providing revenue support.
- ❖ The CfD would be a private law agreement between Cebren SPV and MEPSO. A separate agreement will be signed between the Minister of Energy and the shareholders of the Cebren SPV. This separate agreement will only relate to parts of the terms of the transaction, in particular those related to potential shutdown events and gain-share mechanisms.
- ❖ Under the CfD, Cebren SPV will receive an amount of revenues which is determined by the sum of the wholesale market(s) price at which it sells electricity and a difference payment corresponding to the difference between the pre-determined (implied as a result of the tender) **Strike Price ("SP")**, and the **Reference Price ("RP")** observed in the previous reference period of the Wholesale Market of North Macedonia. Other revenues (like selling Balancing Energy or AS capacity) will be taking into account when calculating the IPPs revenues. The RP can be set as the weighted average of wholesale prices indices in the electricity market of North Macedonia. In particular, the RP can be set so as to use daily price data reported in the North Macedonia

THANK YOU

Nick Frydas: Nfrydas@ifc.org