

CONFIDENTIAL



Study for the Bulgarian Ministry of Energy
**2023 Bulgarian Energy Strategy
for the Bulgarian power sector**

ETC power demand scenario

August 2023



REPUBLIC OF BULGARIA
Ministry of Energy



Disclaimer

- This presentation has been prepared by FTI France SAS (“FTI”, trading under “Compass Lexecon”) for the Bulgarian Ministry of Energy (the “Client”) under the terms of the Client’s engagement letter with FTI (the “Contract”).
- This presentation has been prepared solely for the benefit of the Client in connection with the study on the Bulgarian Energy Strategy for the Bulgarian power market. No other party than the Client is entitled to rely on this presentation for any purpose whatsoever.
- This presentation may not be supplied to any third parties without FTI’s prior written consent which may be conditional upon any such third party entering into a hold harmless letter with FTI on terms agreed by FTI. FTI accepts no liability or duty of care to any person (except to the Client under the relevant terms of the Contract) for the content of the presentation. Accordingly, FTI disclaims all responsibility for the consequences of any person (other than the Client on the above basis) acting or refraining to act in reliance on the presentation or for any decisions made or not made which are based upon such presentation.
- The presentation contains information obtained or derived from a variety of sources. FTI does not accept any responsibility for verifying or establishing the reliability of those sources or verifying the information so provided.
- Nothing in this material constitutes investment, legal, accounting or tax advice, or a representation that any investment or strategy is suitable or appropriate to the recipient’s individual circumstances, or otherwise constitutes a personal recommendation.
- No representation or warranty of any kind (whether express or implied) is given by FTI to any person (except to the Client under the relevant terms of the Contract) as to the accuracy or completeness of the presentation.
- The presentation is based on information available to FTI at the time of writing of the presentation and does not take into account any new information which becomes known to us after the date of the presentation. We accept no responsibility for updating the presentation or informing any recipient of the presentation of any such new information.
- This presentation and its contents are confidential and may not be copied or reproduced without the prior written consent of FTI.
- All copyright and other proprietary rights in the presentation remain the property of FTI and all rights are reserved.

© 2022 FTI France SAS. All rights reserved.

The 2023 Bulgarian Energy Strategy – ETC scenario explores the set of options to meet full decarbonisation by 2050 accounting for recent market evolutions

The 2023 Bulgarian Energy Strategy scenario using ETC demand outlook “**BES-ETC**” explores the set of options to 2050 to meet full decarbonisation in 2050 while being compliant with the European “Fit for 55 package” in 2030 accounting for recent market evolutions.

- This scenario uses commodity prices accounting for recent market evolutions and technology cost assumptions of the EU 2020 Reference scenario completed with Bulgarian specific inputs from the Bulgarian Ministry of Energy (MoE), the Bulgarian transmission system operator (ESO) and the Energy transition committee (ETC). It also uses updated EU ETS price projections reflecting current price level and future decarbonisation objectives.
- The scenario is completed with a sensitivity analysis assuming lignite phase-out in 2030 (*ETC-L30*) as well no new gas investment (*ETC-wogas*) and the combination of the two (*ETC-L30&wogas*).

1 2023 Bulgarian Energy Strategy – ETC Demand

- *BES-ETC* -

- **Development** of generation capacity based on RRP, Ministry of Energy and ESO inputs.
- **Upscaled EU target to reach 55%** of emission reduction by 2030 compared to 1990
- **Full decarbonisation for the power sector by 2050**
- **EU ETS price** in line with current price level reaching +100€/tCO₂ by 2030 and reaching 250€/tCO₂ by 2050 (lower band of EC 2050 Roadmap 2018)

- *ETC-L30* -

- **Lignite phase-out in 2030**

- *ETC-wogas* -

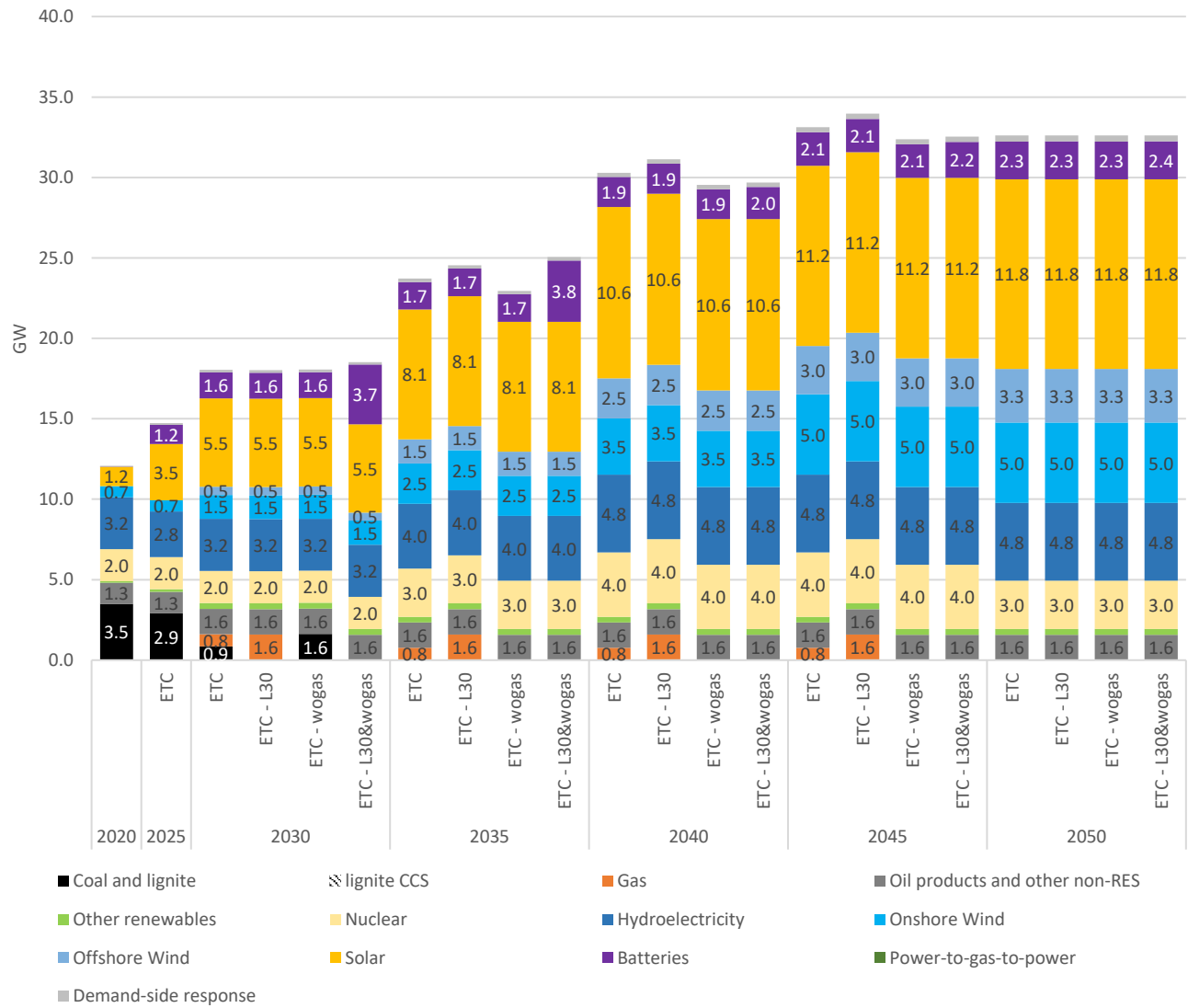
- **No new gas investment**

- *ETC-L30&wogas* -

- **Lignite phase-out in 2030**
- **No new gas investment**

In the BES-ETC, Bulgaria progressively transitions away from lignite by the 2030s, coupled with a strong growth of low carbon capacity from 2025 to 2050

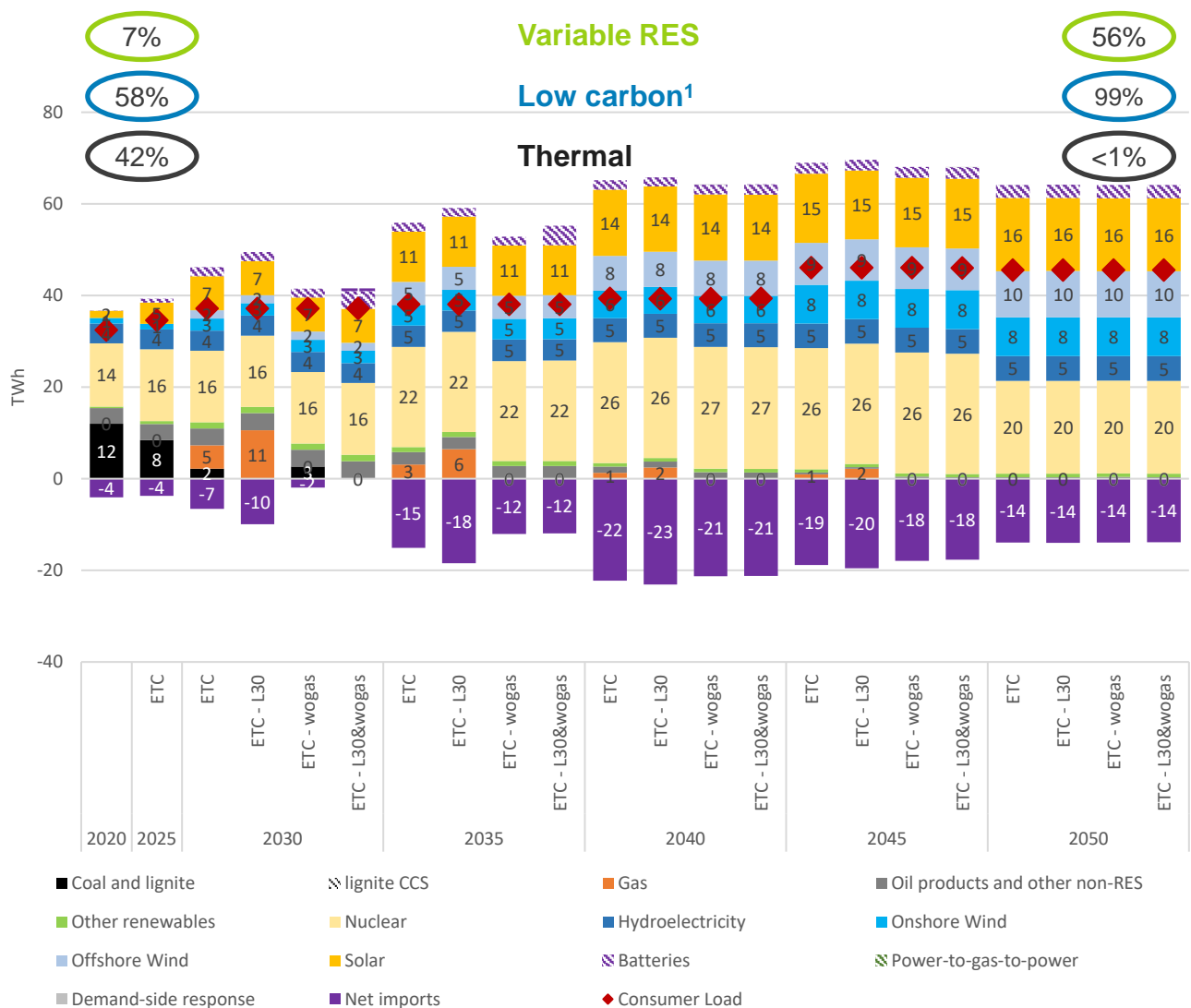
Installed capacity (net GW)



- In BES-ETC, lignite plants are progressively replaced from 2025 onwards by batteries as set by RRP (1.2GW in 2025), new gas (800MW in 2030), variable RES, hydro and nuclear in the longer term.
- Overall, installed capacity increases by c21 GW by 2050 relative to today.
 - This increase is primarily driven by the growth of renewables, with both wind and solar reaching c19 GW of installed capacity by 2050.
 - The growth of variable renewables is also accompanied with an increase of nuclear capacity (+2GW from 2035 onwards and an increase in storage capacity with c4GW installed by 2050.
- The lignite phase out in 2030 would translate into additional gas capacity (+800MW) in the transition thus locking-in additional gas capacities.
- Without new gas, ensuring security of capacity in the early 30s would require either to delay the closure of some lignite capacity (+700MW) or more batteries (+2.1GW) in case of lignite phase out in 2030.

In line with the capacity mix evolution, the BES-ETC sees a strong growth of low carbon generation, with lignite production phasing out around 2030

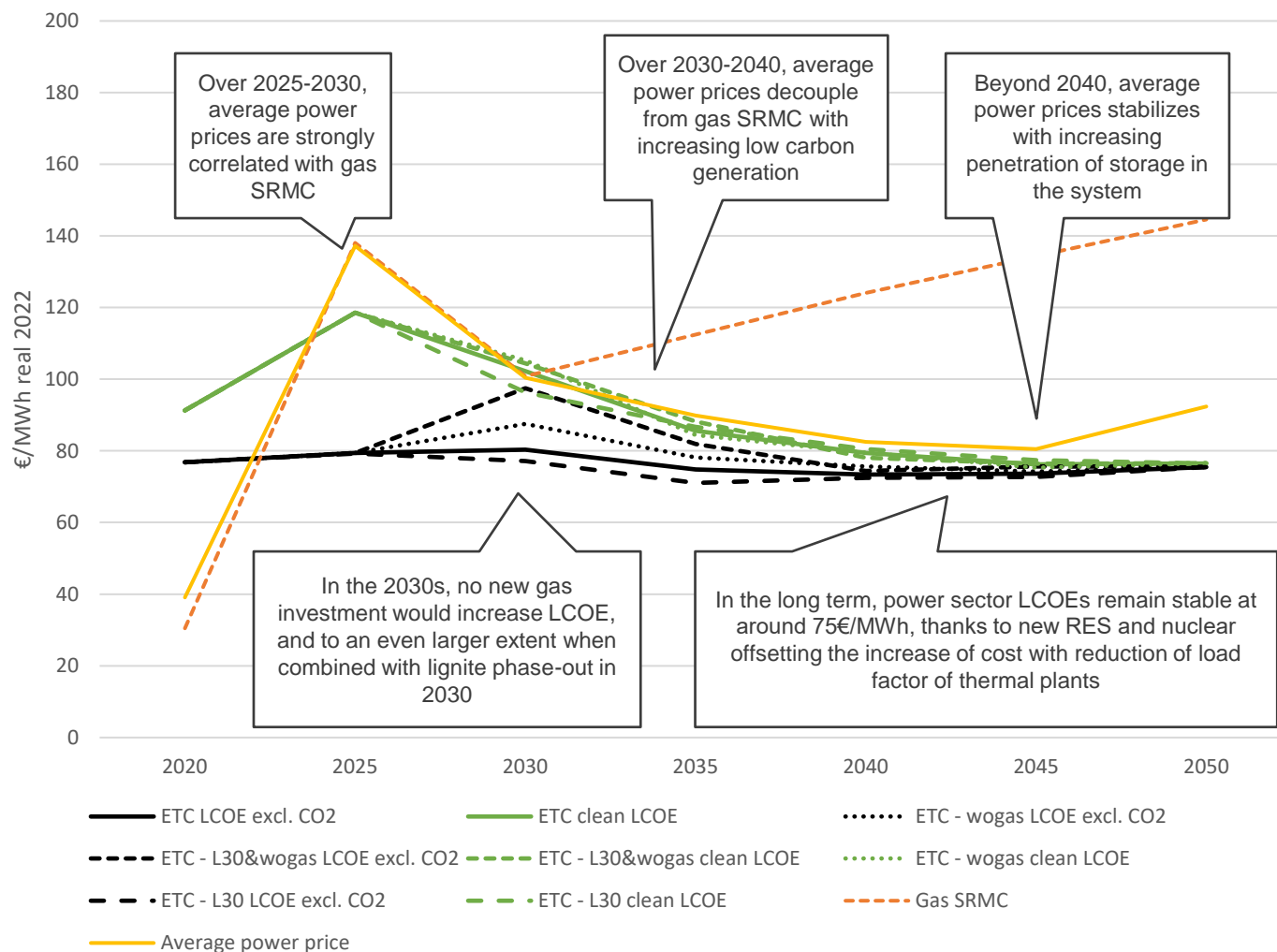
Generation (TWh)



- Bulgaria still strongly relies on lignite generation up until 2025/30, before phasing-out after 2030.
 - From 2020 +10TWh generation level, lignite generation reduces to 2-3TWh by 2030.
- With lignite phase out in 2030, lignite generation is either replaced by gas generation (ETC-L30) or with reduced net export balanced (ETC-L30&wogas)
 - The lignite phase out by 2030 would translate into a reduction of c2TWh of lignite generation compensated by new gas generation of c6TWh in 2030 and c3TWh 2035.
 - With no new gas investment, this would be compensated by a reduction of net export of 7TWh in 2030 and 3TWh in 2035.
- Overall, variable renewable generation grows substantially over the 2020-2050 period, reaching a share of 56% in the production mix by 2050.
- Combined with nuclear generation, Low carbon generation share nearly doubles from 58% in 2020 to c100% in 2050

While LCOEs remain stable throughout the horizon, average power prices decrease from highs in 2025 to below 100€/MWh in 2050

Average power sector LCOE and average power price (€2022/MWh)



- Over the forecast horizon, power sector LCOEs remain stable at around 75€/MWh, thanks to new RES and nuclear increased penetration combined with cost reduction partially offsetting the increase of cost from thermal plants.
 - The lignite phase-out in 2030 would translate into slightly lower power sector LCOEs in the 2030s thanks to increased commercial balance.
 - However, when combined with no new gas investment, this would materially increase the power sector LCOEs.
- When looking at average power prices, the contrast is quite stark:
 - Average power prices starts from all time highs in 2025 before continuously decreasing until 2040 in line first with gas SRMC outlook and then progressive decoupling with increasing low carbon generation.
 - In the long term, average power prices stabilizes below 100€/MWh with increasing penetration of storage in the power system
- The lignite phase-out in 2030 or new gas investment have limited impact on average power prices.

Contacts



Fabien Roques

Executive Vice President

+33 (0) 1 53 05 36 29

froques@compasslexecon.com

Yves Le Thiès

Vice President

+33 (0) 1 53 05 36 26

ylethies@compasslexecon.com