EPD

BELIEVE IT

POWER IT

What to do when Wind & Solar run out of breath?

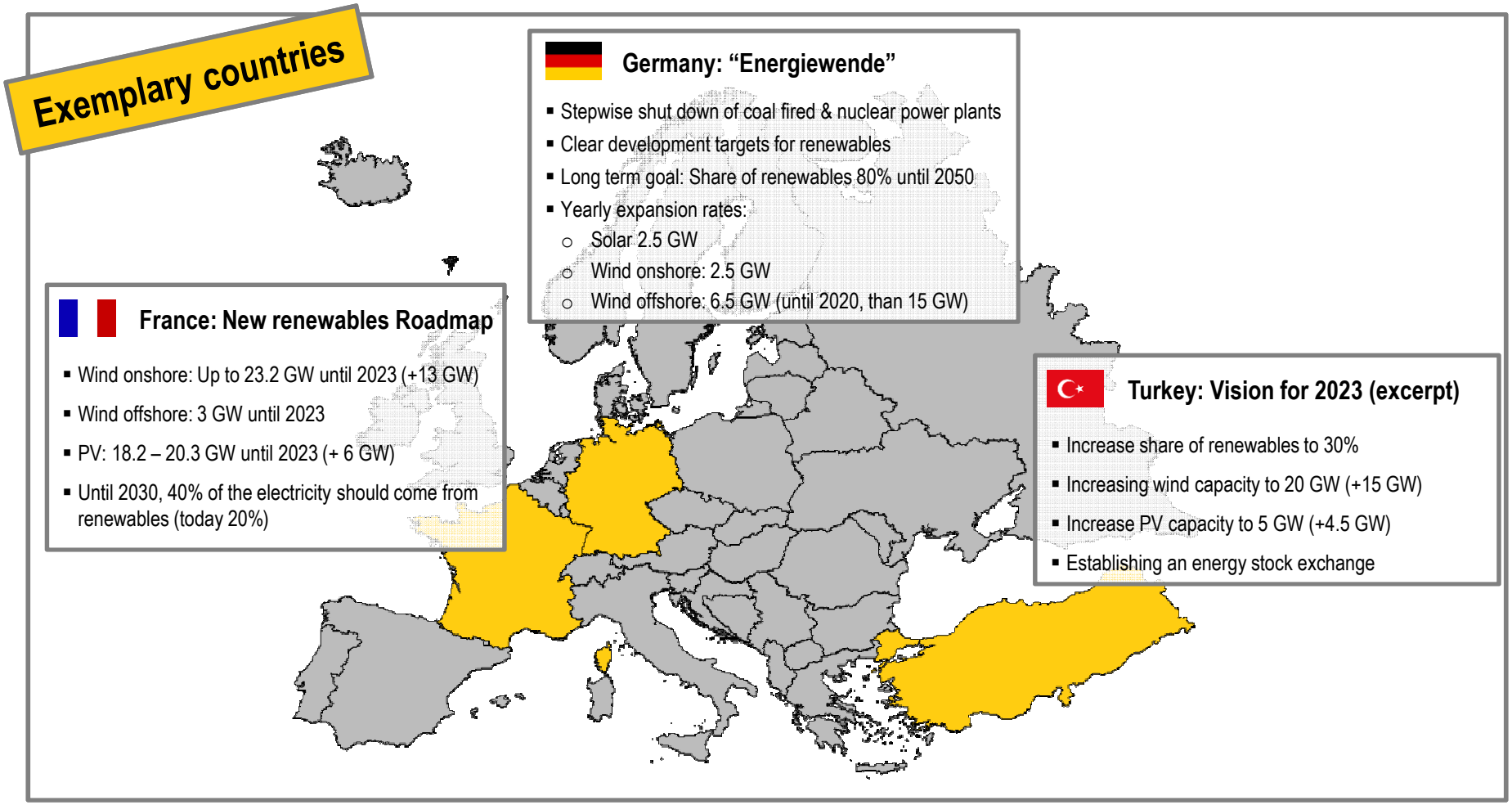
Reciprocating gas engines for the European Power Industry

CIMAC Circle at Power-Gen Europe 2016, Milan – Tuesday June 21, 2016

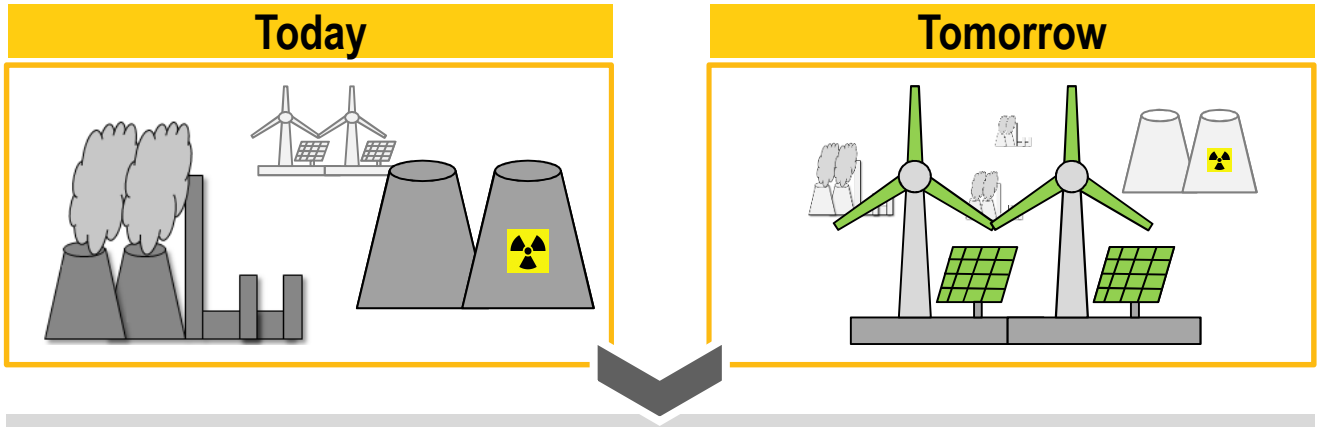
Dipl. Ing. Ulrich Böhm, Caterpillar Motoren GmbH & Co. KG
Sen. Sales Manager – Power Plants

CATERPILLAR®
Electric Power Division

Many countries build their energy strategy on Wind and Solar



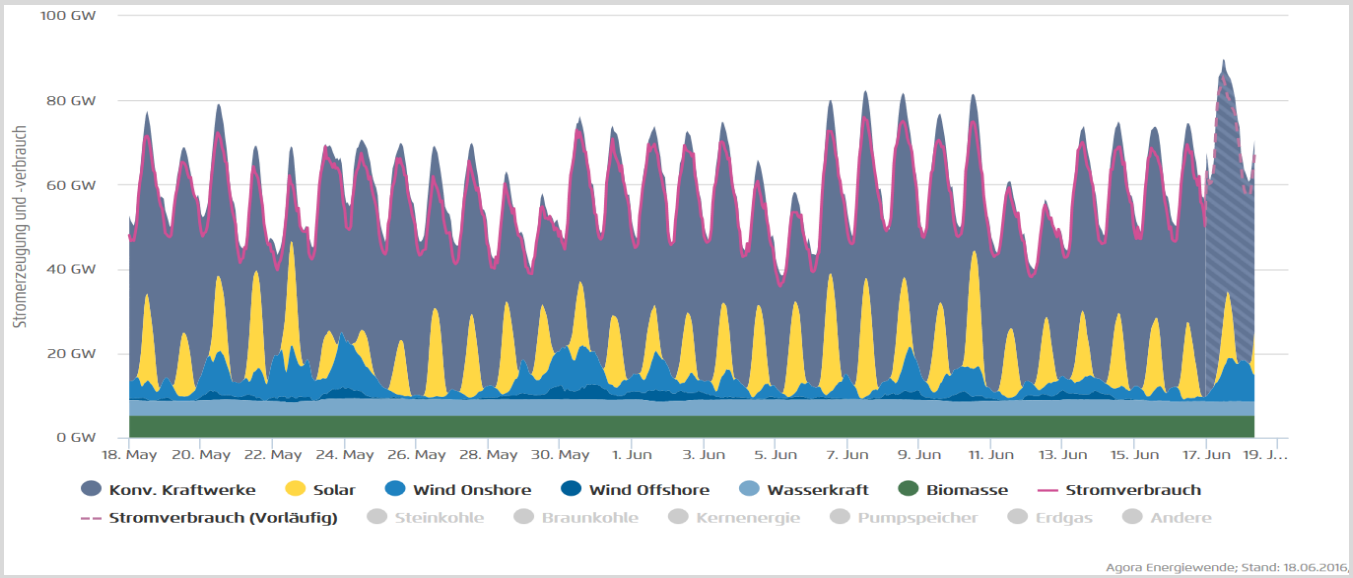
This new energy market design implicates a highly volatile energy production



- Future energy market design with high share of renewables
- Cloud cover and wind gusts can result in large and sudden swings in output from solar and wind
- Results: Grid destabilization, power shortages, probable damage of utility infrastructure and customer equipment

Reliable and flexible solutions are needed

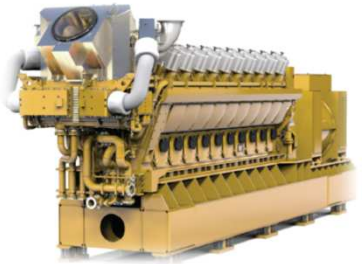
We are convinced that gas engine power plants will play an important role to handle those volatilities



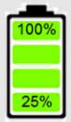
In the future we see more and more renewables in the system but also less conventional power plants, so the volatility of energy production will even increase.

Thesis:

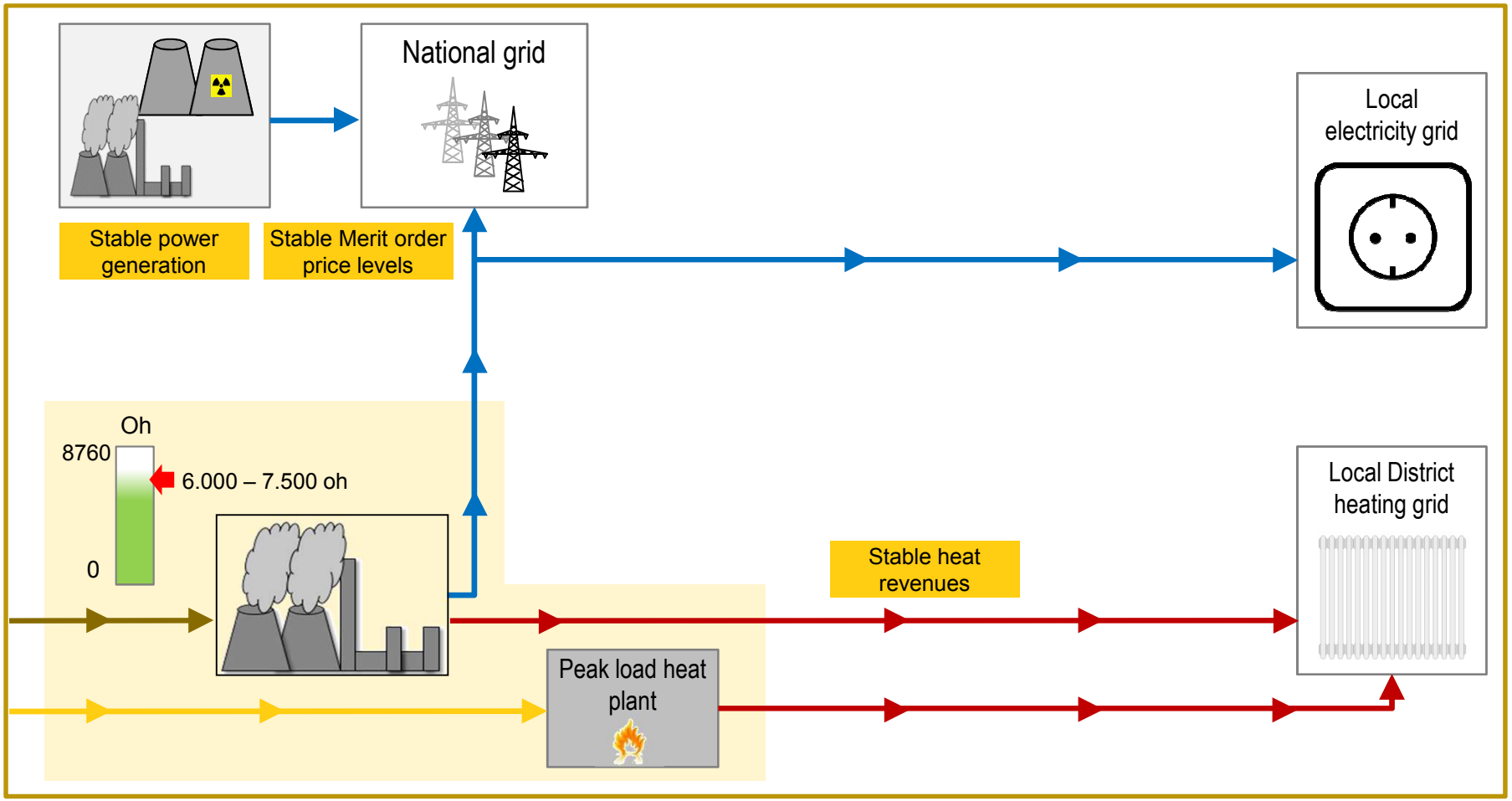
Gas fired Power Plants will be the only technology at least in the mid-term to balance volatile energy production from wind and solar efficiently, quickly and flexibly.



Why gas engines? Compared to other technologies engine Power Plants meet relevant requirements best possible

Possible Flex options	Market readiness	Environmental	Costs	Flexible tech fit
 **Storage**	✓	✓	✗	✓
 **Nuclear**	✓	✗	✓	✗
 **Coal**	✓	✗	✓	✓
 **Gas**	✓	✓	✓	✓

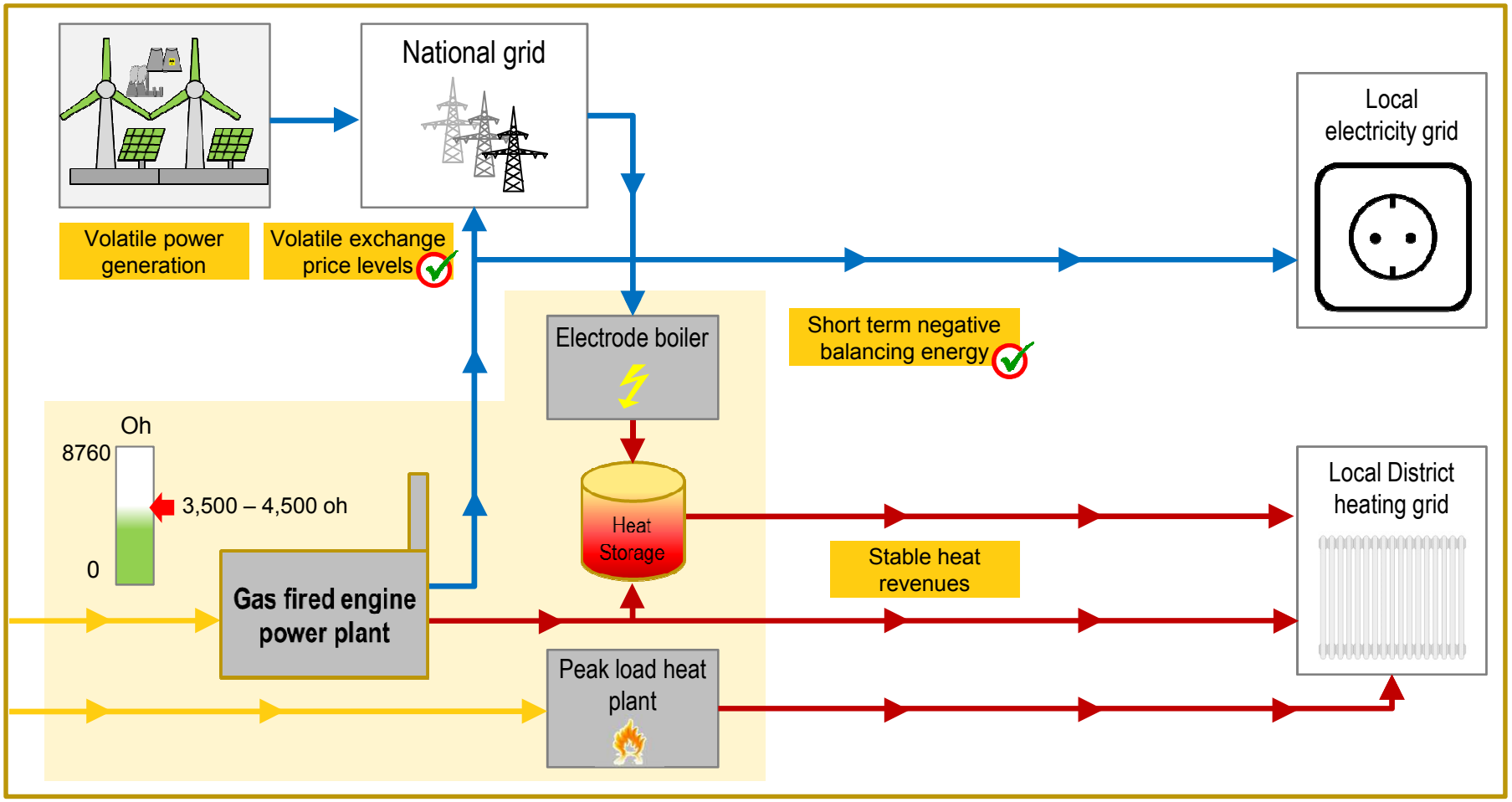
Classic scenario: High operating hours & stable income



Coal
Electricity
Heat
Area of responsibility

CATERPILLAR®
Electric Power Division

New scenario: High flexibility and more revenue potential



Natural Gas
Electricity
Heat
Area of responsibility
Revenue increase potential

CATERPILLAR®
Electric Power Division

Thank you!