Wärtsilä 135MW Lombok Plant: A catalyst for net zero and renewable integration

Modelling the Energy Transition around the World

We have modelled over 190 power systems across different countries and regions.

135MW Lombok power plant

- Customer: PLN. Delivered year: 2019
- 135MW Flexicycle Engine Power Plant
- 13 Wärtsilä 34 Dual Fuel (LNG & LFO) - Engines for fuel flexibility

Power Plant's Function:

- Providing baseload and peaking
- Supporting frequency control
- Balancing solar power's intermittency
- Enabling even more solar PV capacity in the future
- Future-proof solution for modern power system

Photo credit: PLN

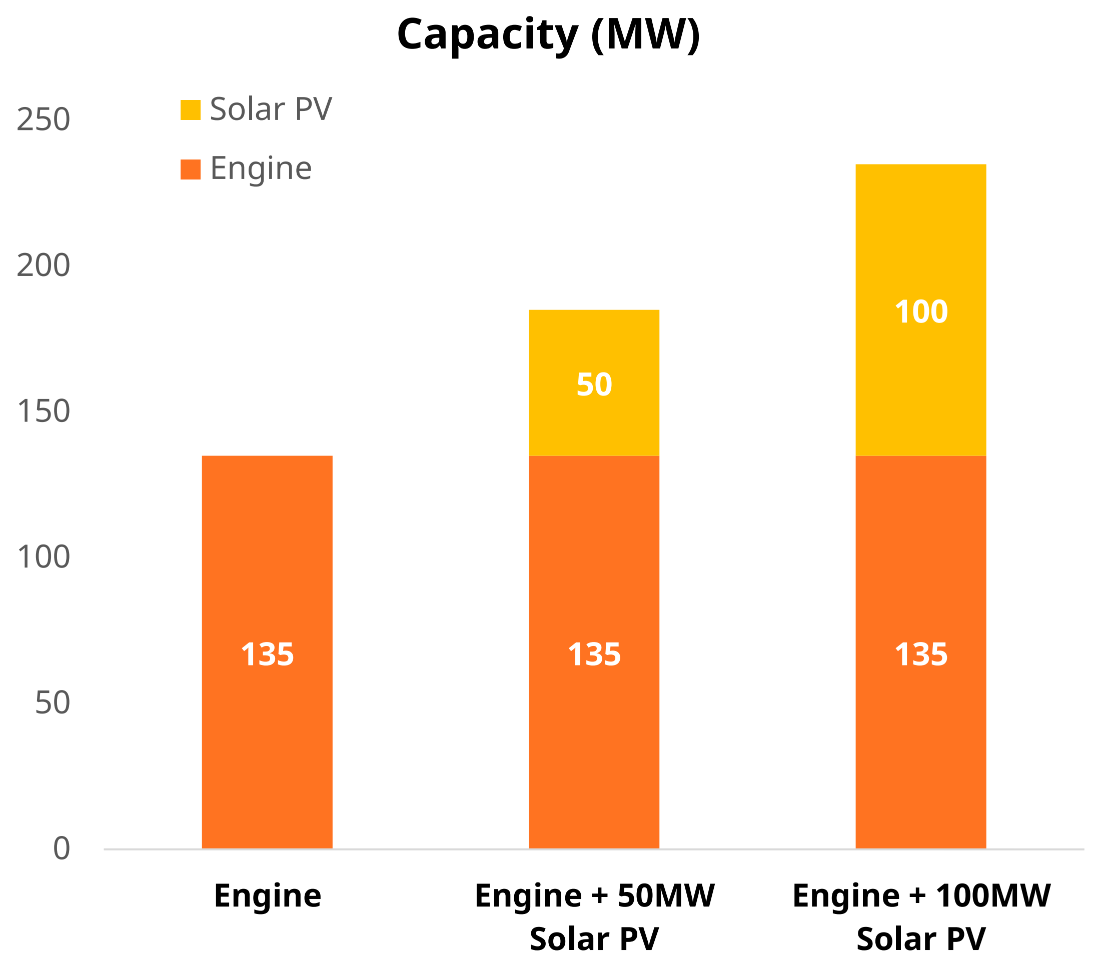
How can the Lombok engine power plant help integrate more renewables into the system?

Lombok case study – assumptions and scenarios

Assumptions:
Testing the impact of integrating more solar PV into the system with the existing engine to meet Lombok's load profile.

Scenarios:
Comparing the cost (LCOE) and emissions of three different options:

- Stand-alone existing engine
- Existing engine with 50MW of new-built solar PV
- Existing engine with 100MW of new-built solar PV



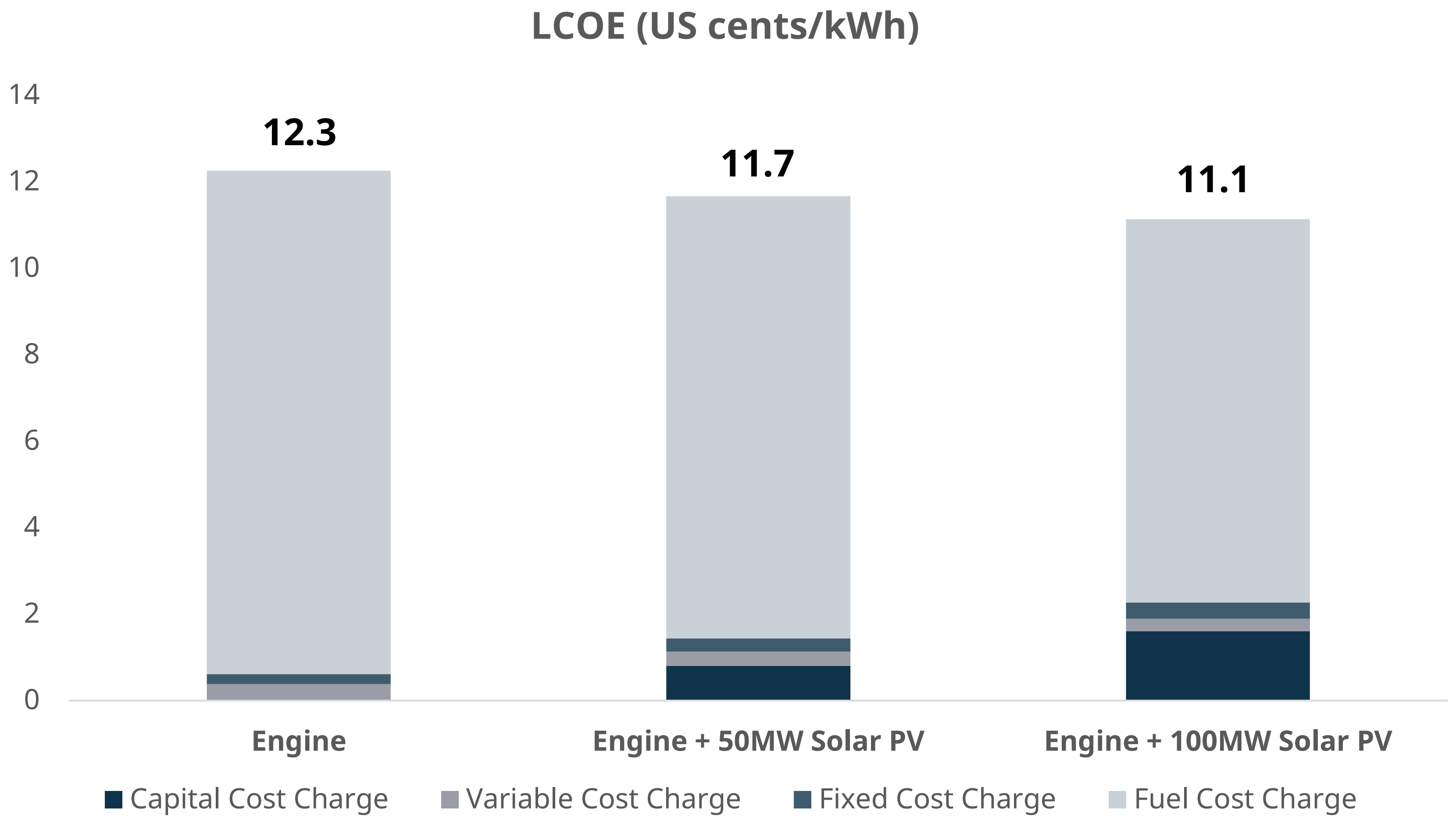
How can hybrid power plants provide baseload power?

Hybrid power plants can be defined in various ways. Here, a Hybrid is defined as a combination of Variable Renewables and Flexible Gas Engines to meet a given load profile as an alternative to traditional baseload assets.

Objectives:

- Dispatchable power
- Available and reliable
- Minimal carbon (Towards Net Zero)

Lombok Case Study – Levelized Cost of Electricity (LCOE)

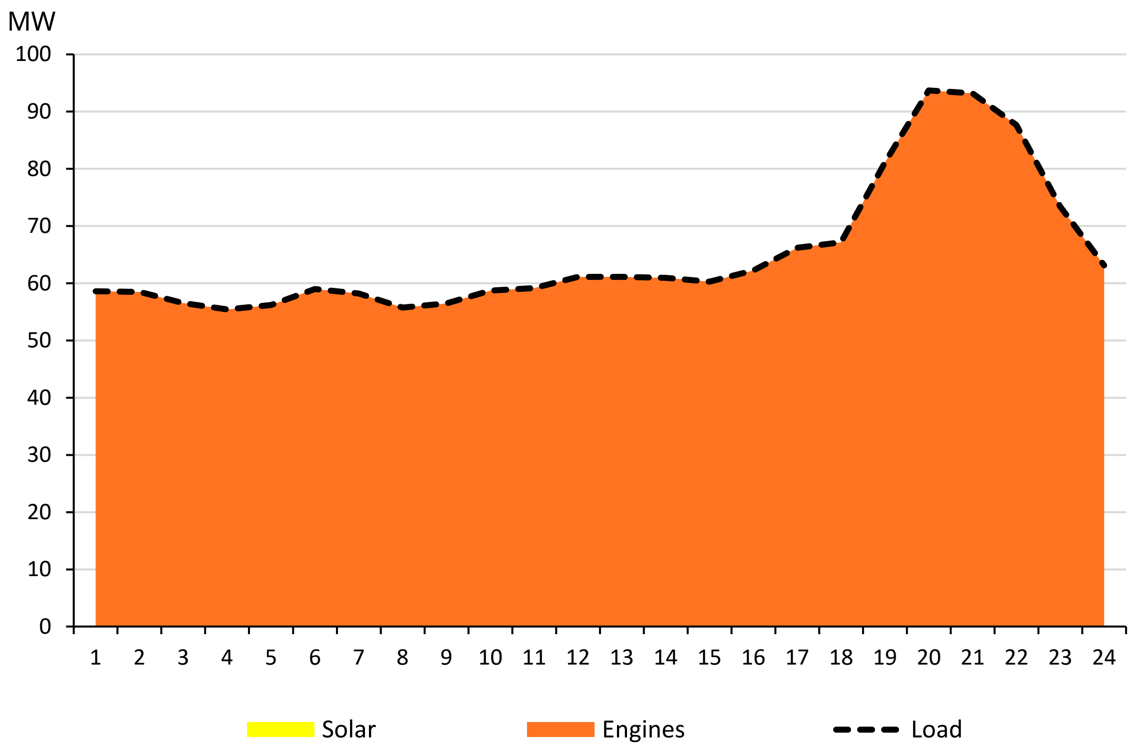


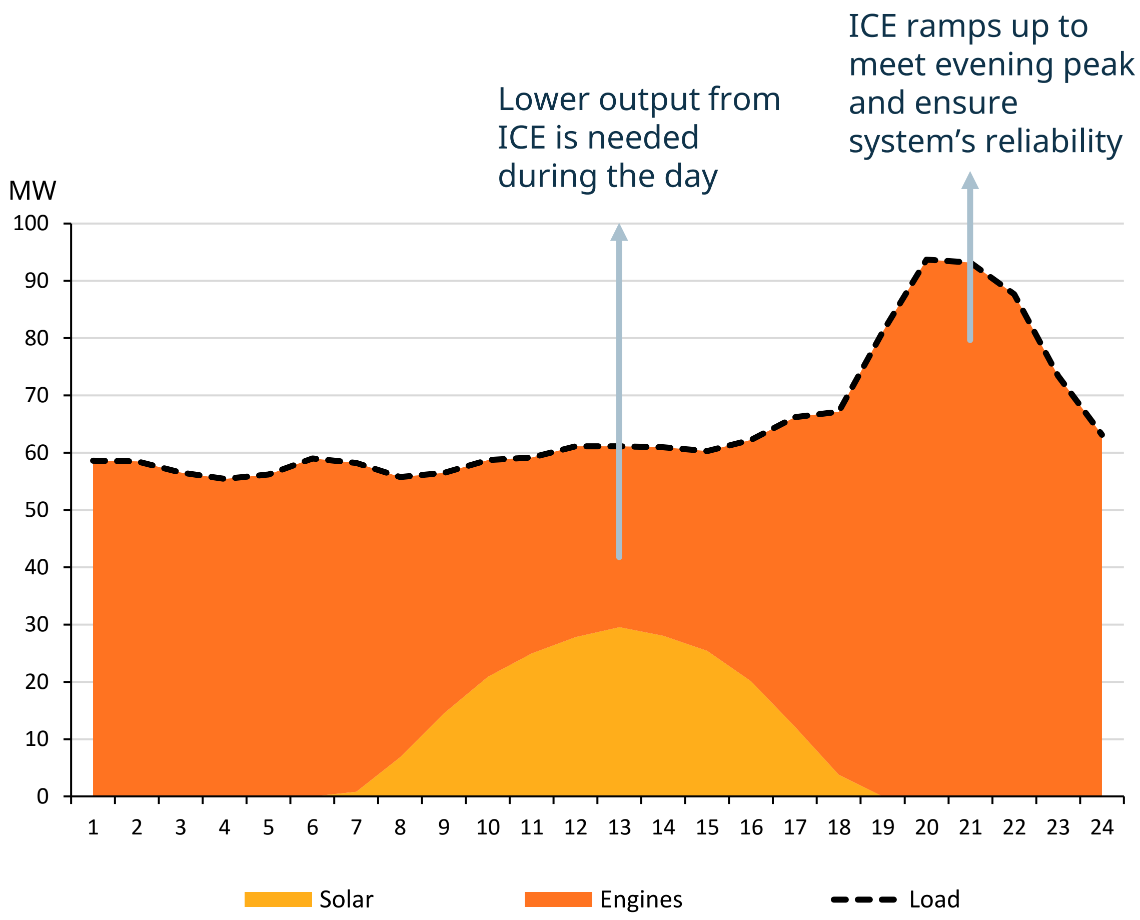
The existing Lombok engine can balance renewable output and enable more solar additions to the system

7.4 MUSD

In annual savings if pairing engine with 100MW of solar PV

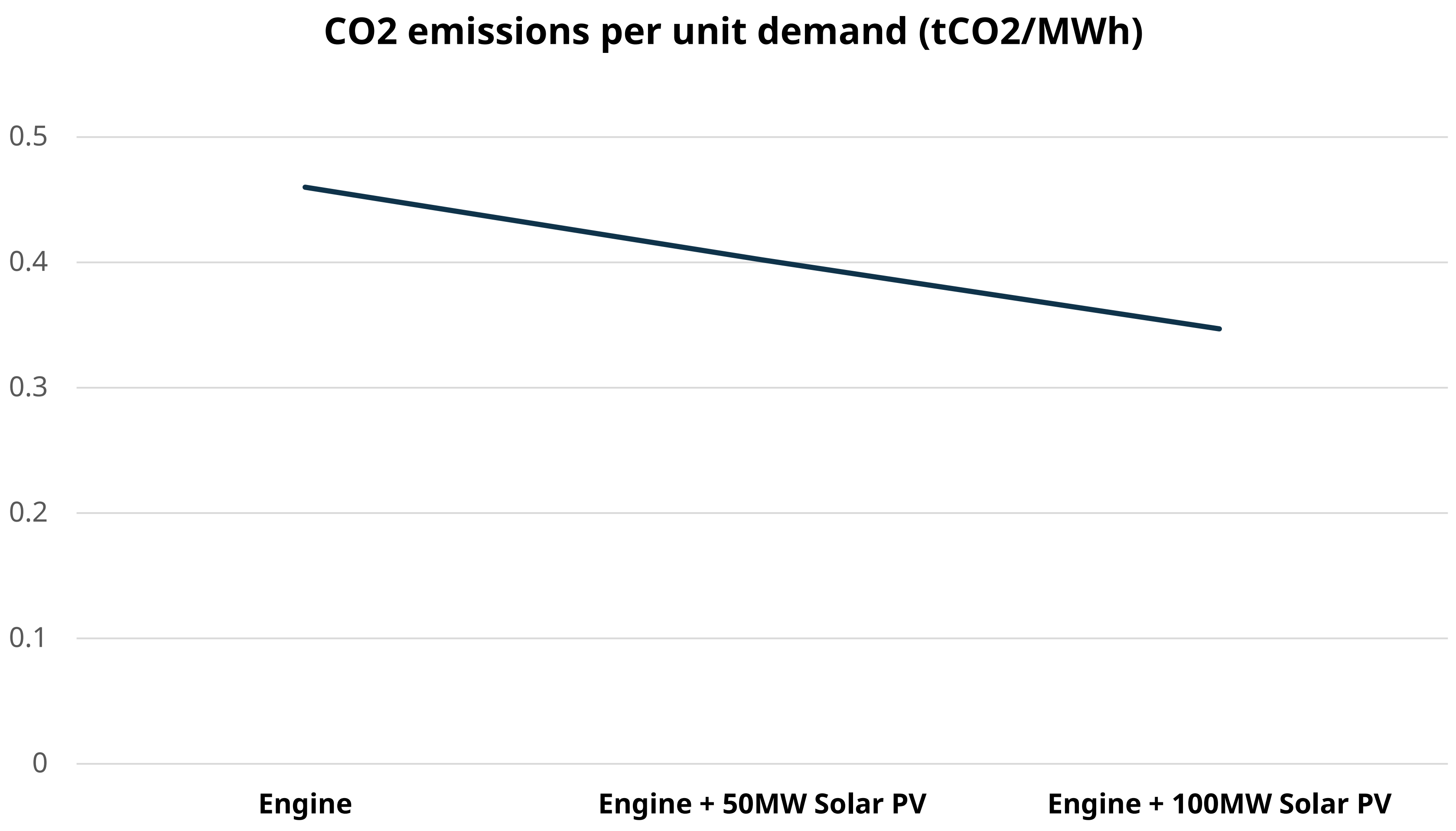
Lombok Case Study – Dispatch Graph





Note: Load profile comes from Lombok's historical data in February 2019

Lombok case study - emissions



Pairing existing engines in Lombok with solar PV will lead to lower emissions for the system

Conclusions

- ✓ PLEXOS simulation show a future system of renewables, which need to be complemented with balancing sources such as engine power plants.

- ✓ Benefits of a hybrid system (existing balancing engine + new solar PV):
  - Reduced generation costs
  - Higher system availability & reliability
  - Lower emissions

- ✓ The 135MW engine power plant in Lombok is a versatile asset and can be a catalyst to enable more solar PV additions to the island.

WÄRTSILÄ