



RENEWABLES

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# Rota Island Feasibility Study

Renewable Energy Network Modelling

ENGINEERING | STRATEGY | ANALYTICS | COMPLIANCE



# Project Partners



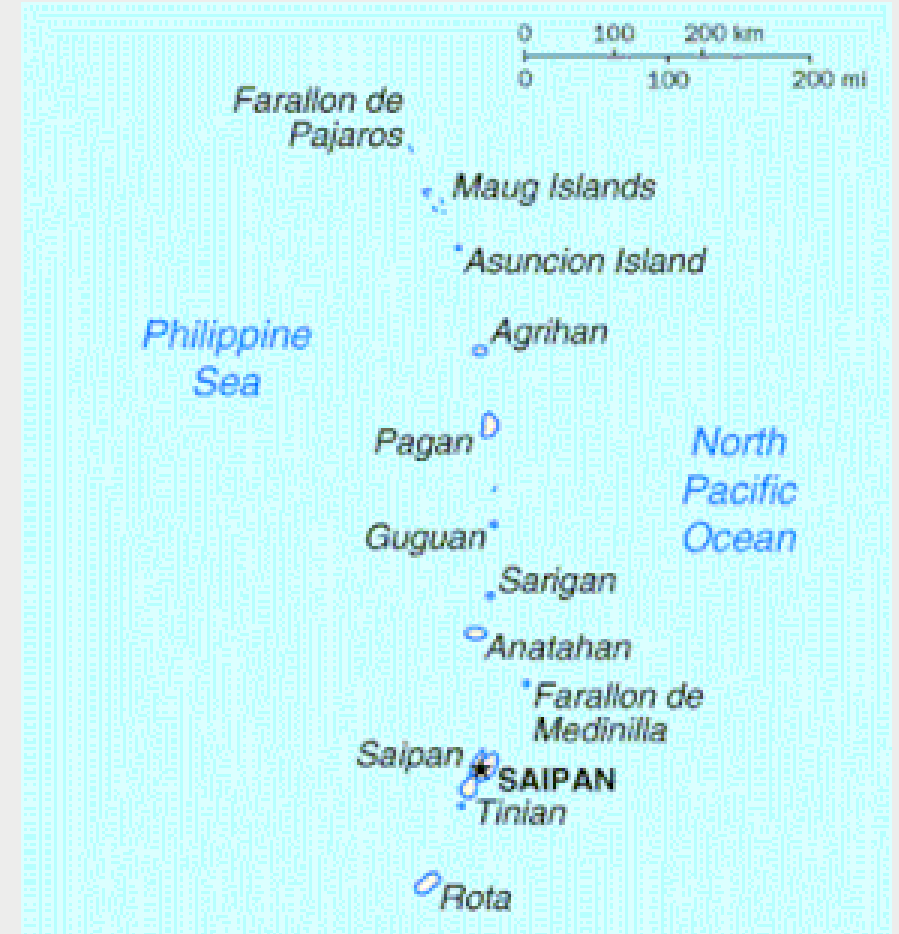
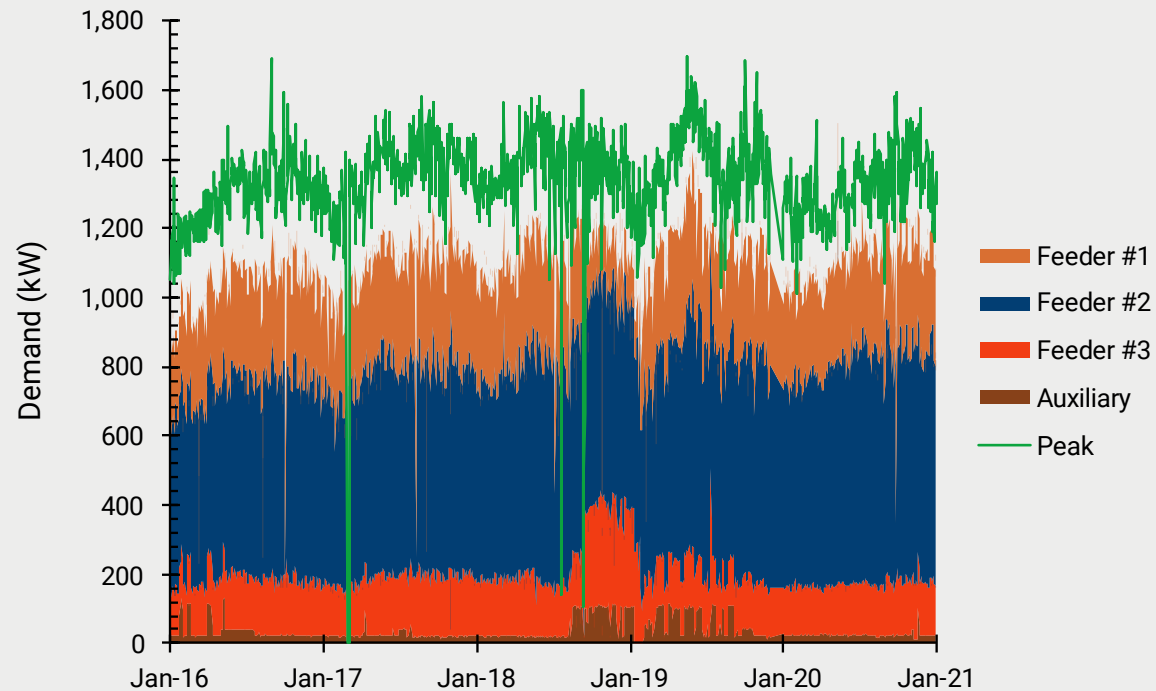
- Commonwealth Utilities Corporation
- HY Construction & Rental
- AP Consulting Group



# Project Overview



- Rota Island
- Population ~2,000
- Peak demand ~1,900 kW



# Project Overview



- Feasibility study
  - Desktop review, site assessments
  - Techno-economic optimisation
- Network modelling
  - Load flow
  - Dynamics



# System configuration & economics



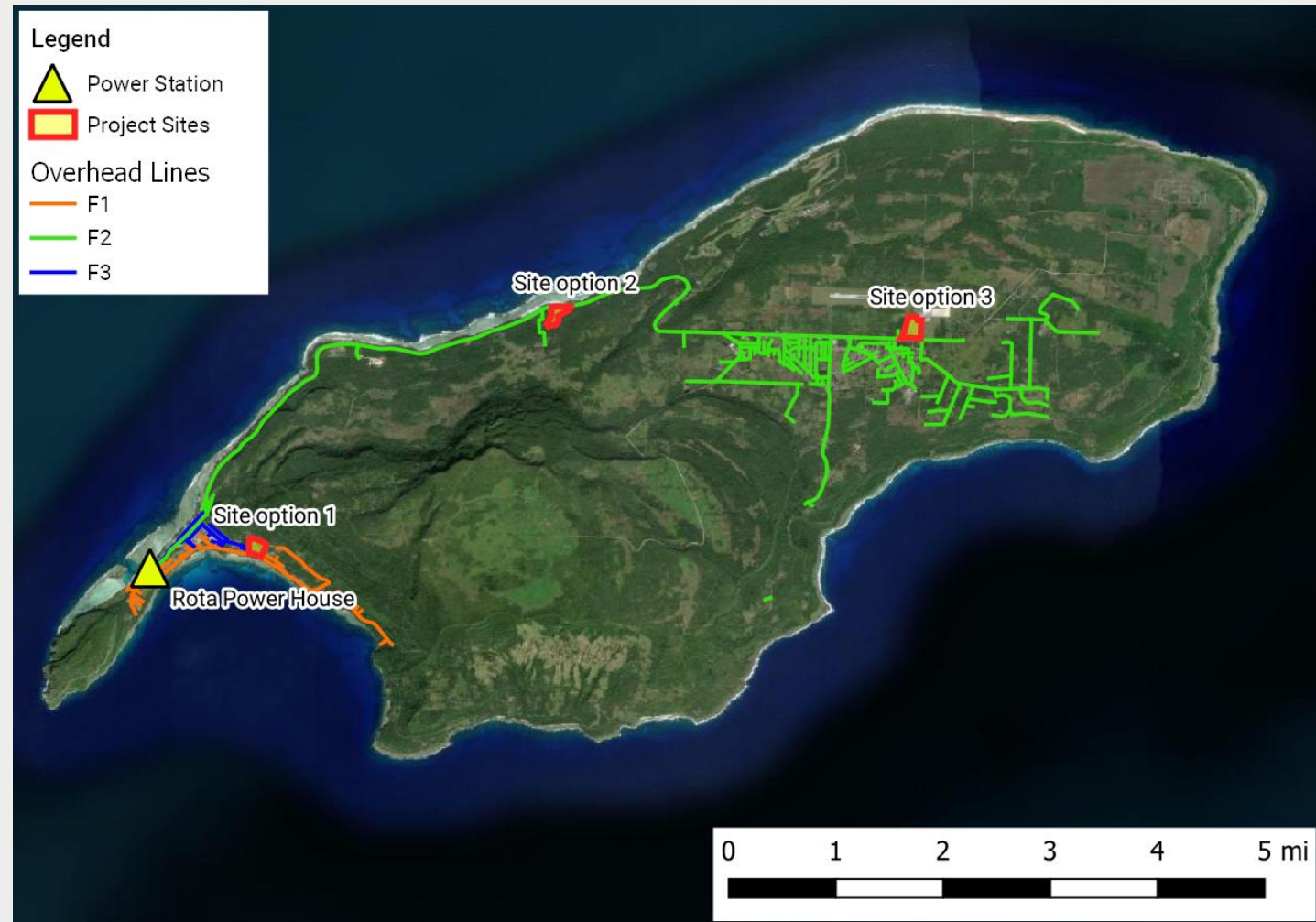
- ~30% RE fraction
- Buildable on single site
- Positive business case
- Reduced exposure to global fuel prices

Parameter	Diesel/PV/BESS Hybrid
Diesel	3 x 1.5 MW
Solar PV	3.28 MWp / 3 MWac
BESS	3 MW / 3.2 MWh
RE fraction (15-year)	31.8%
RE capex	US\$7.97m
Opex saving	US\$1.57m / year
Diesel fuel saving	1,100 kL /year
Net present value	US\$10.8 m
LCOE	\$0.324 / kWh

# Network map



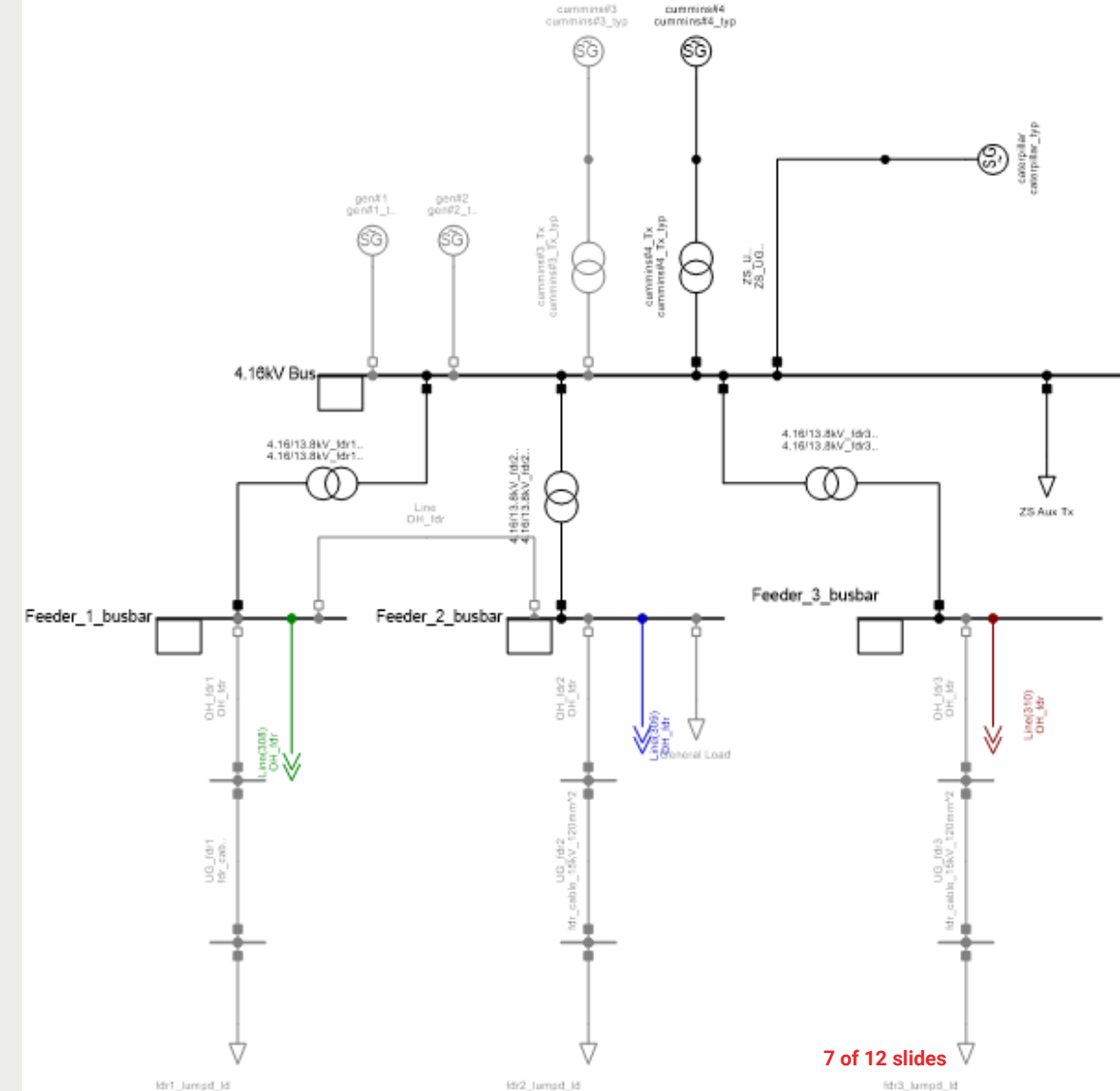
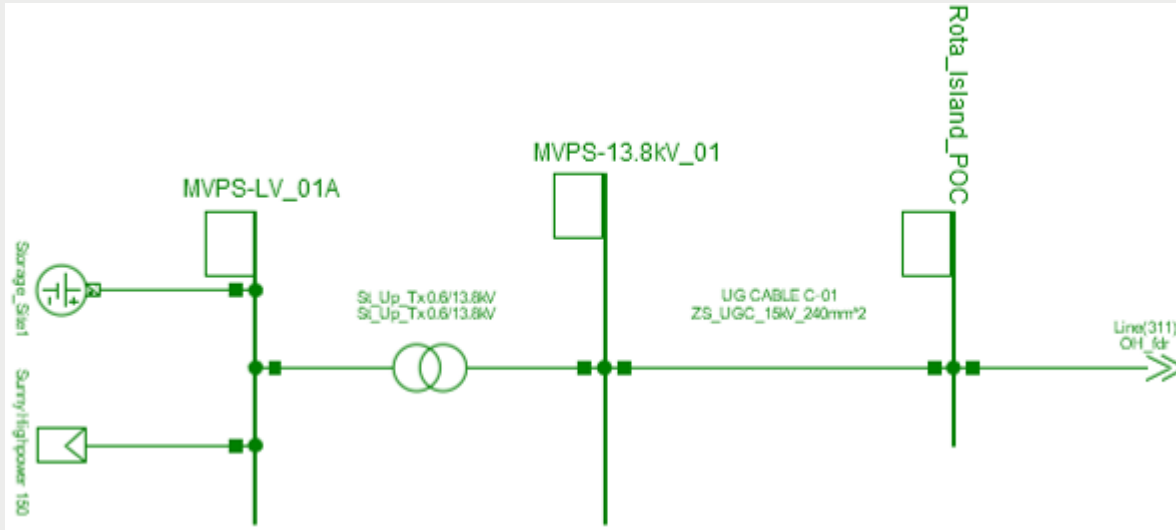
- Radial network
- All 13.8 kV overhead
- Powerhouse in Songsong
- Main load centre at Sinapalo
- Three sites studies in detail



# Load flow model



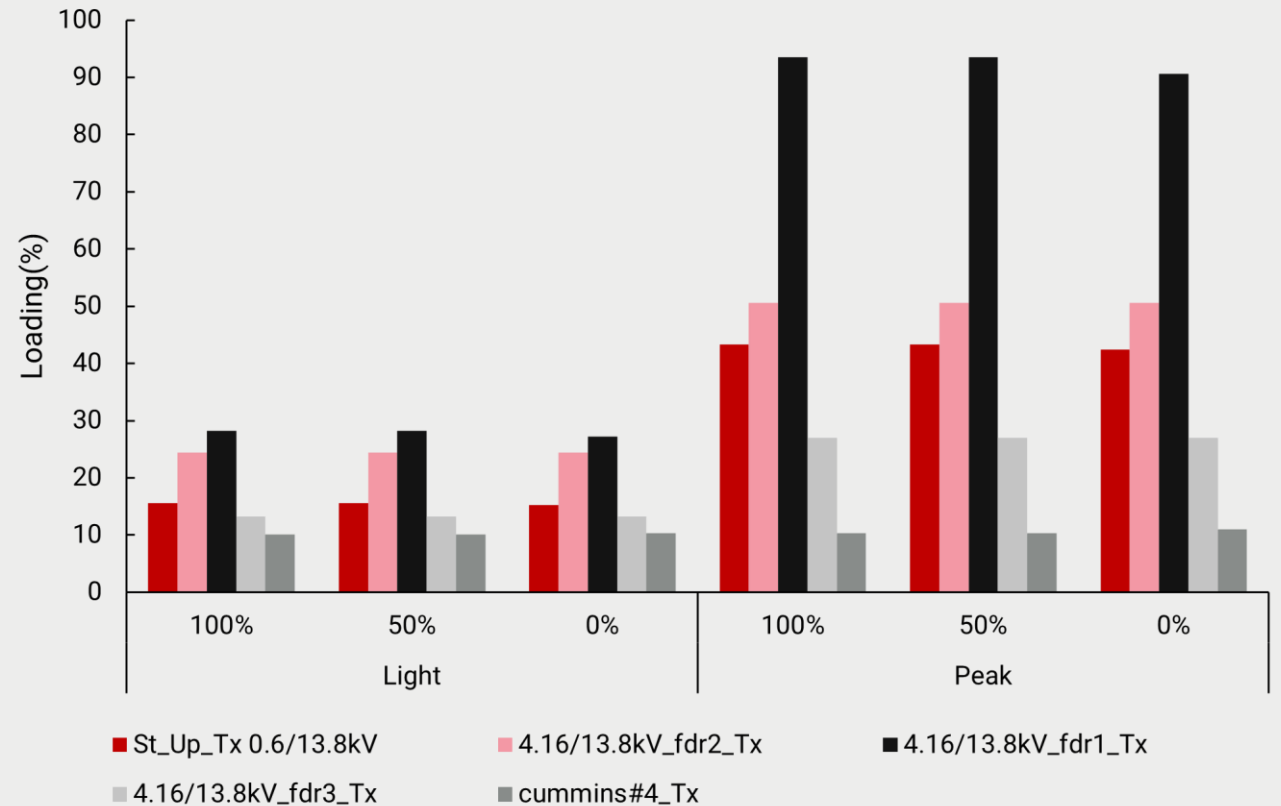
- Network imported from GIS
- Diesel power station built from SLD
- Proposed PV+BESS added at project site



# Load flow results



- All sites feasible
- Site 1 required network augmentation
- Site 2 & 3 required limit on BESS charging from grid
- Site 2 or 3 preferred

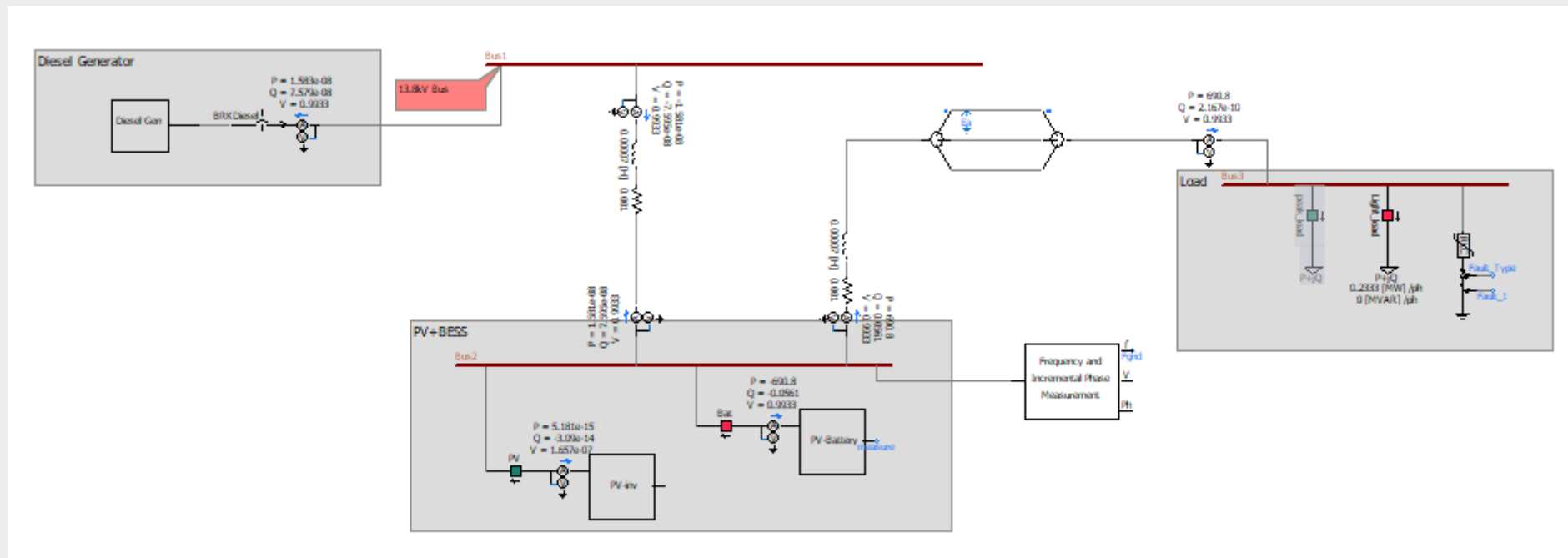




# Dynamics model



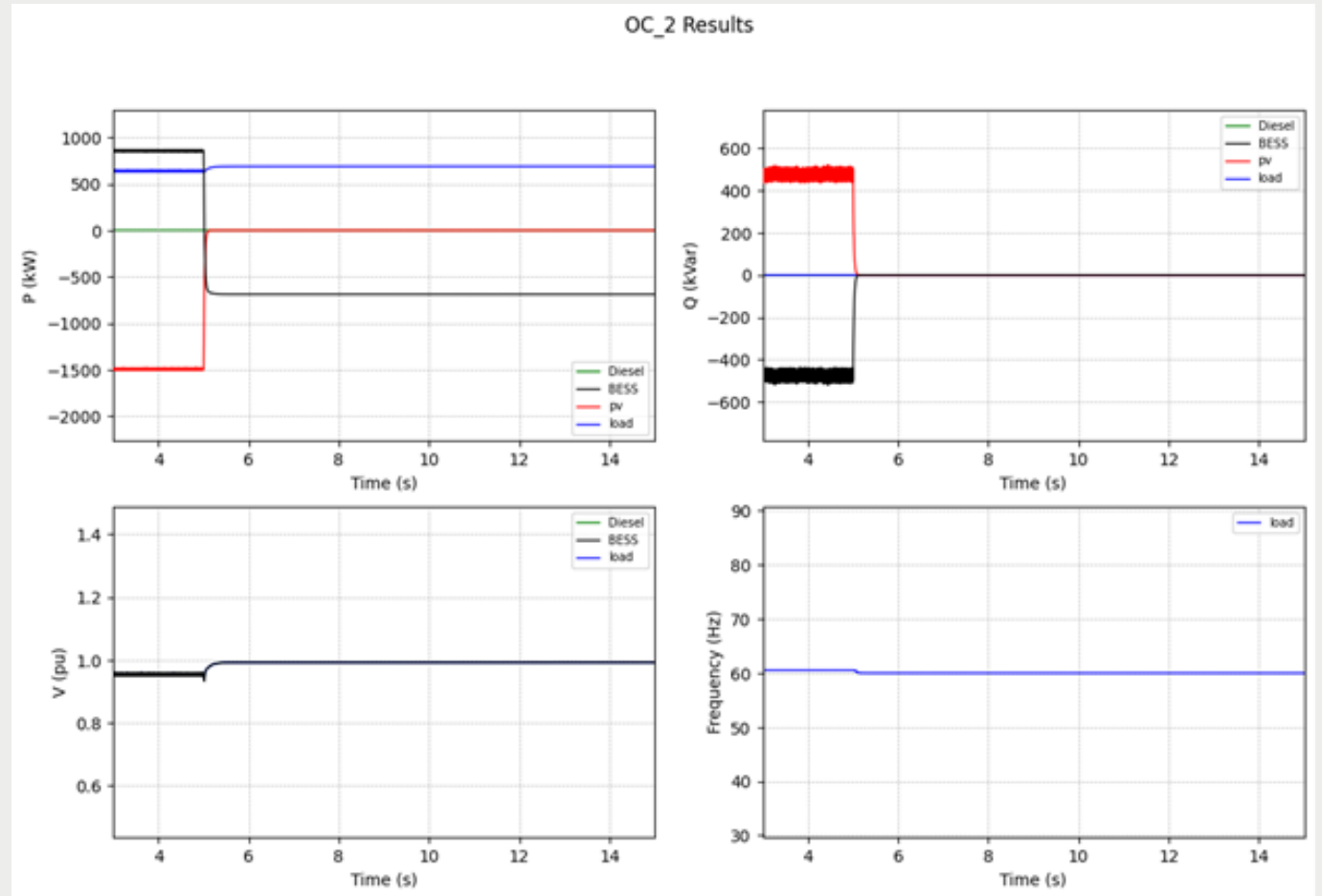
- PSCAD model – PV, BESS, diesel hybrid
- Operating cases – peak/light load, diesel on/off, PV 0/50/100%
- Fault responses - line faults, load change, generator trip



# Dynamics results



- Line faults
  - Single phase to ground
  - Three phase to ground
  - Phase to phase
- Generator trip
  - PV trip
  - BESS trip
  - Diesel genset trip
- Load step change
  - 20% drop
  - 70% drop

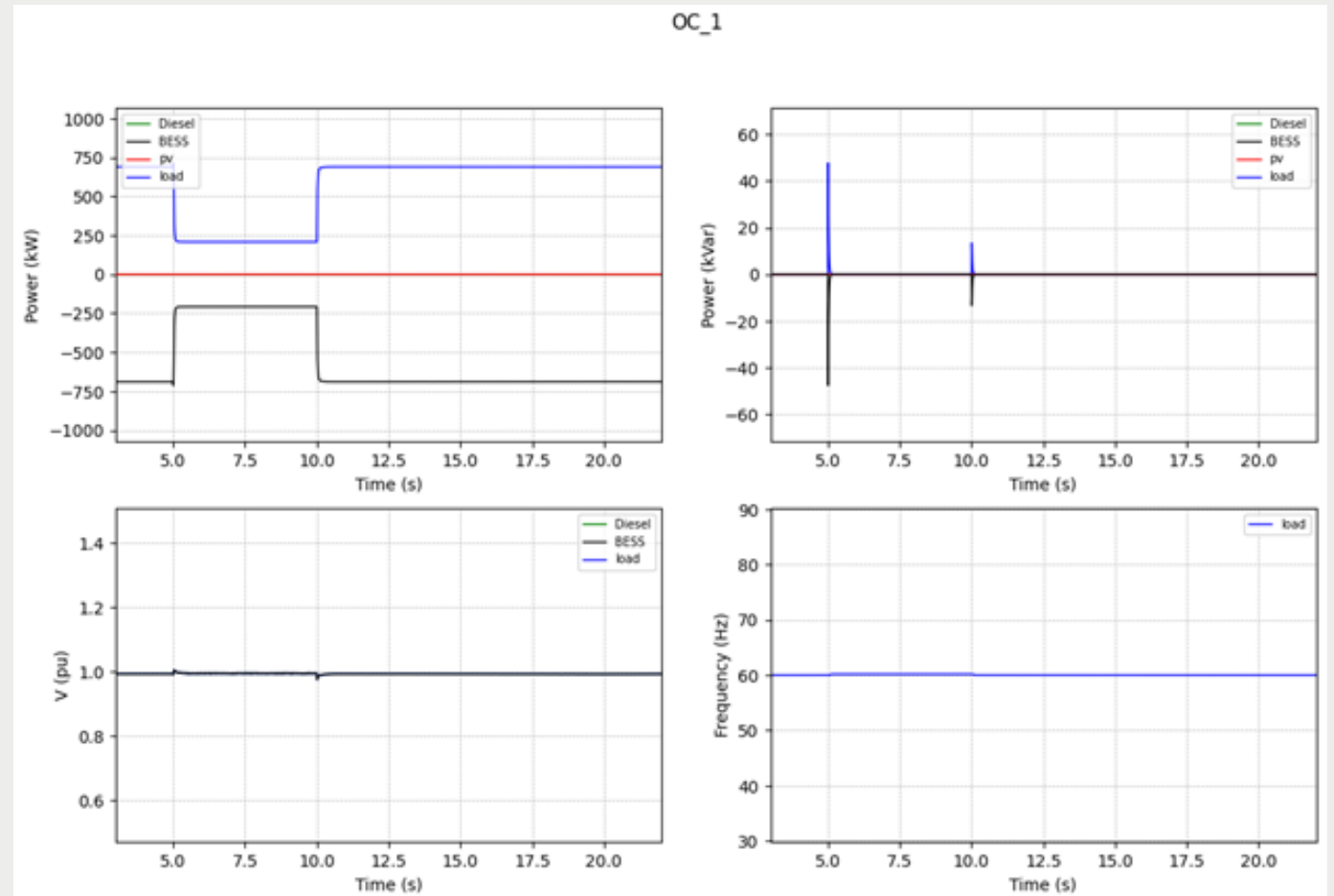


PV trip at light load, PV at 50%, diesel off

# Dynamics results



- Line faults
  - Single phase to ground
  - Three phase to ground
  - Phase to phase
- Generator trip
  - PV trip
  - BESS trip
  - Diesel genset trip
- Load step change
  - 20% drop
  - 70% drop



70% load drop at light load, 0% PV, diesel off



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