

A solution for a 100% renewable energy based island system

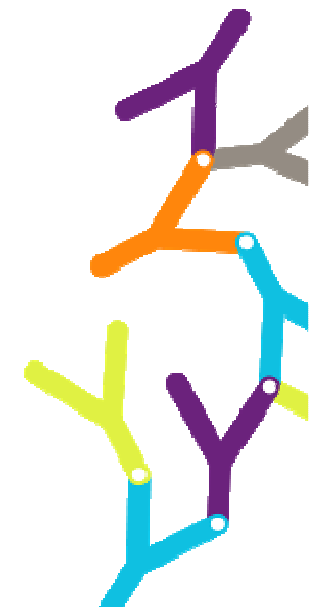


Younicos

Let the fossils rest in peace.

We are working on a world in which all energy produced is CO2-free on the basis of renewable generation sources.

We deliver safe, reliable, cost-efficient energy systems built on renewable generation, commercial-grade storage systems and innovative grid controls.



More than seven years of experience in storage systems and energy management

Investment, research & development



Venture capital firm with €115m investments in next generation renewable energy technologies



R&D laboratory focused on energy autonomy solutions (storage & grid management)

2005

2006

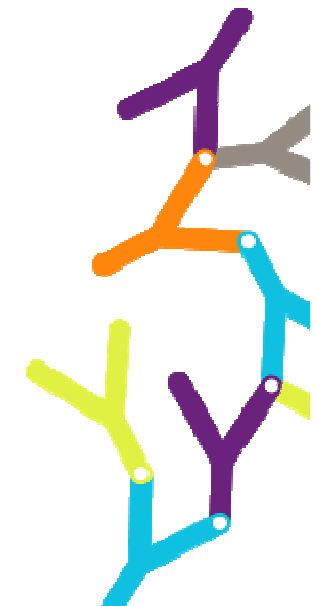
2007

2008

Commercialization

YOUNICOS

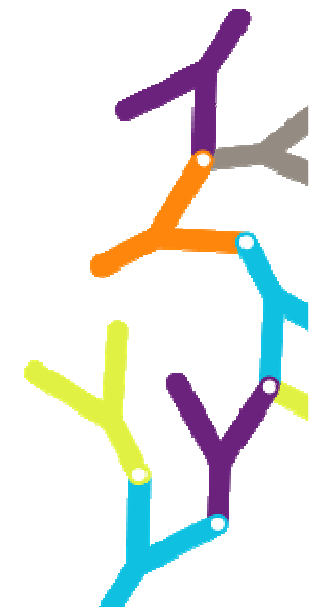
Merger of Solon Laboratories and selected I-Sol Ventures activities



Renewable Autonomous Energy Systems (RAES)

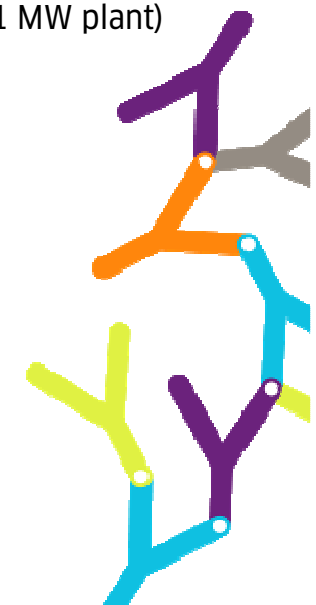
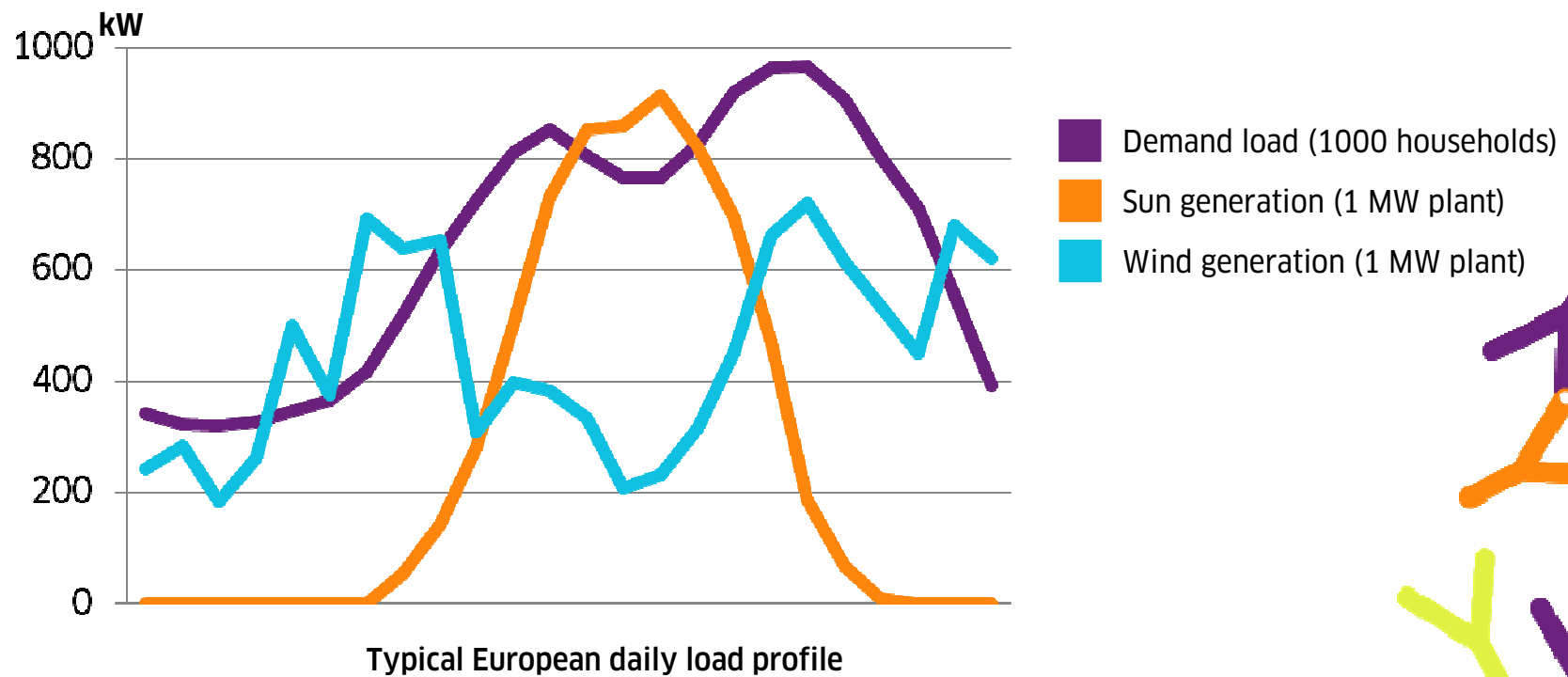
Benefits for Pacific Islands

- Predictable and lower and energy prices
- Lower greenhouse gas emissions and reduced air pollution
- Freedom from dependency on oil imports
- Use of excess energy for desalination and electrification of vehicles



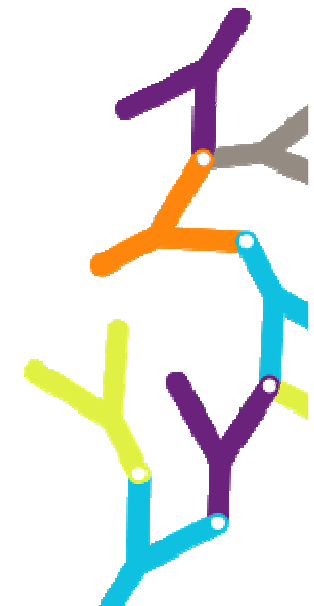
Why do we need storage systems?

Renewable generation sources, random by nature, require energy storage and grid management technologies to guarantee a stable energy supply



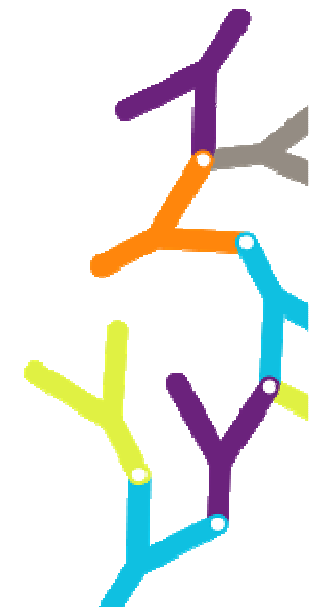
Yunicos Hardware Test Facility

Within the Test Facility YOUNICOS demonstrates the stable operation of an island grid without the need of a running diesel generator and the interaction of highly dynamic renewable energy sources and intelligent battery inverters.



Yunicos Hardware Test Facility

Based on customer supplied load, irradiation and wind measurements, our test facility allows us to simulate and test island systems, using physical hardware, for any location in the world, **including technical due diligences.**



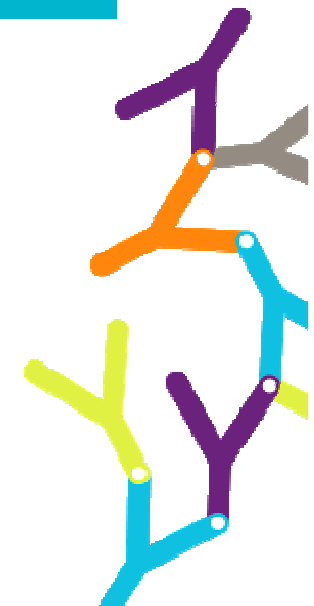
Graciosa Island (Azores)

Key facts

- 4500 inhabitants
- 9 MW wind
- 1 MW PV
- 3 MW/18 MWh NaS
- 100% renewable generation during the majority of the year
- >75% of total annual consumption generated by renewable sources
- Competitive to current system
- Project to be completed in collaboration with local utility, EDA

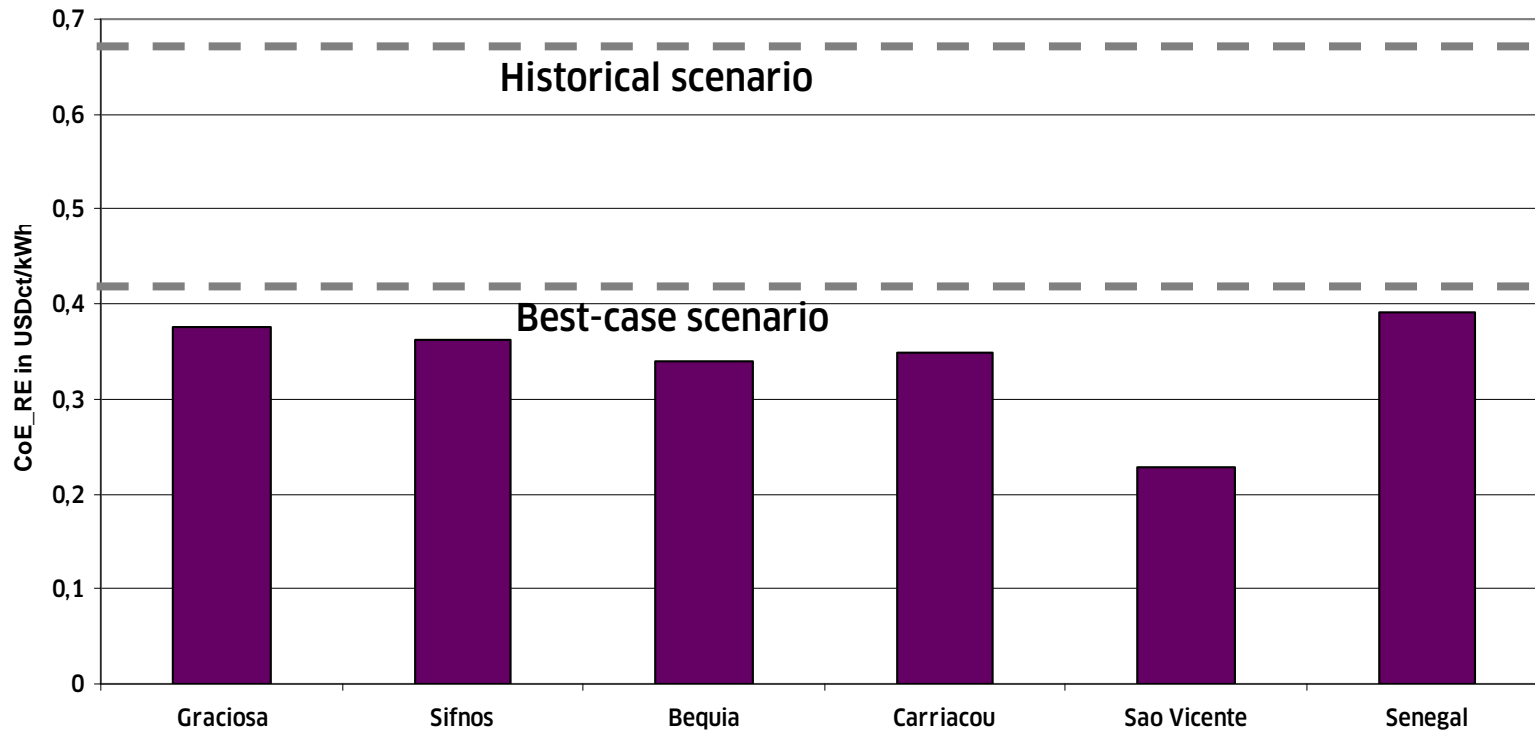


Commissioning Q3 2013
Operation Q4 2013



RAES COE vs Diesel COE

Our simulations for RAES systems all over the world make a strong financial case for immediate implementations



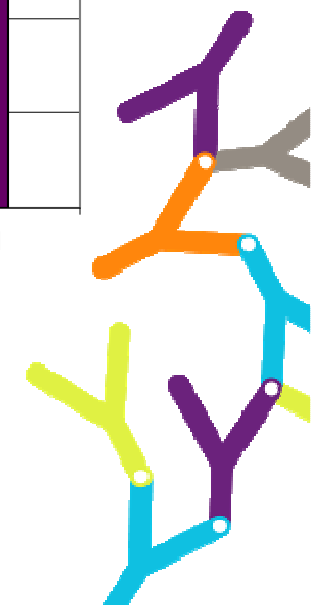
Assumptions

Diesel prices based on world market pricing (Source: EIA)

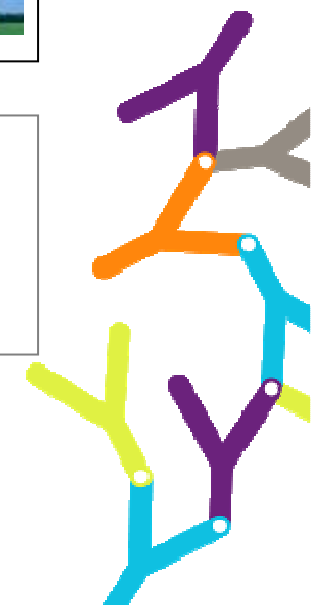
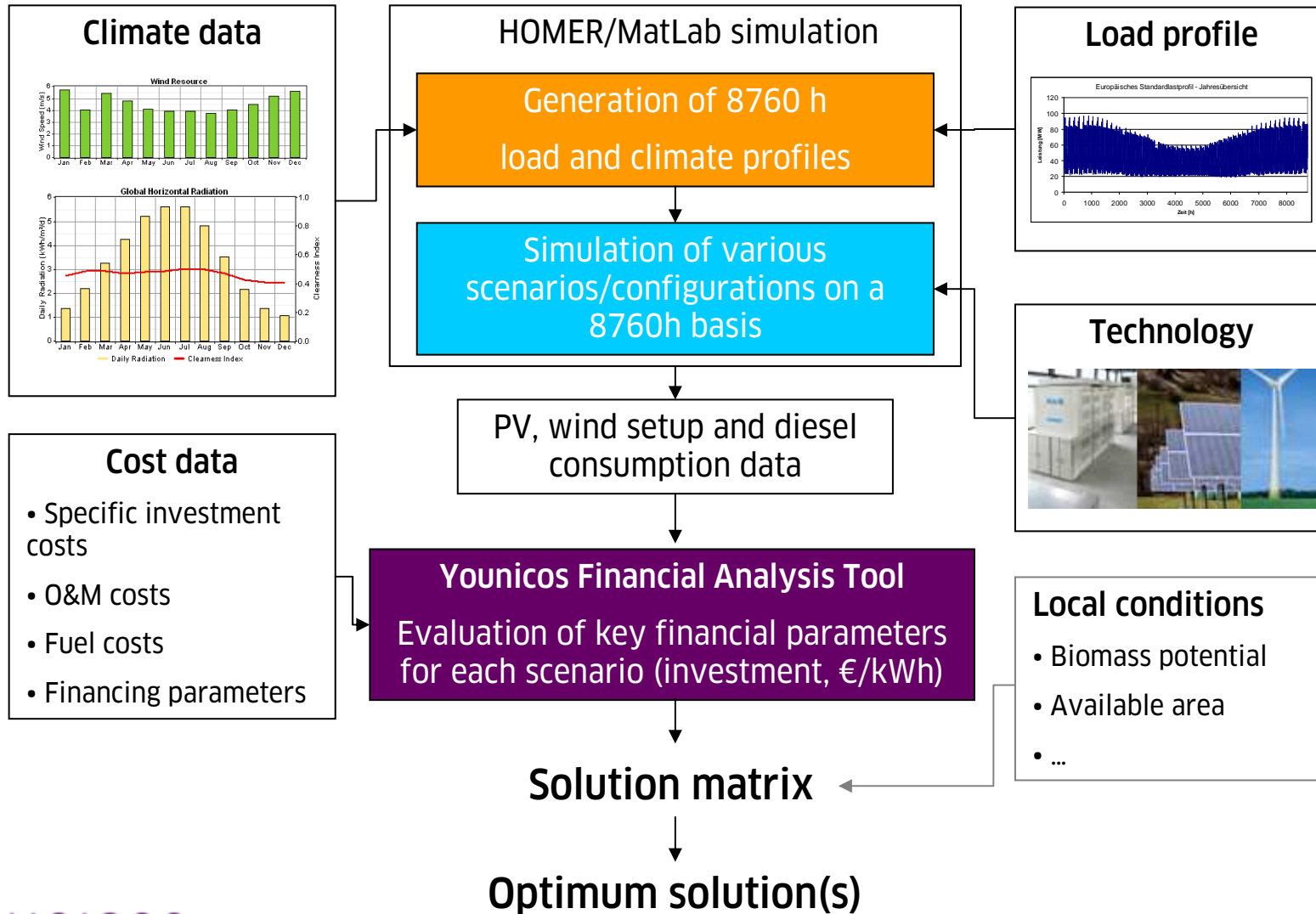
Historical scenario: 7% annual increase (USD2.20/ltr 20 average)

Best-case scenario: assumes 5% increase for 5 years, then constant

Specific fuel consumption: 0.30 l/kWh



System simulation and optimization



Examples of an optimized hybrid-system

Tongatapu

Economic optimum: 72% RE share

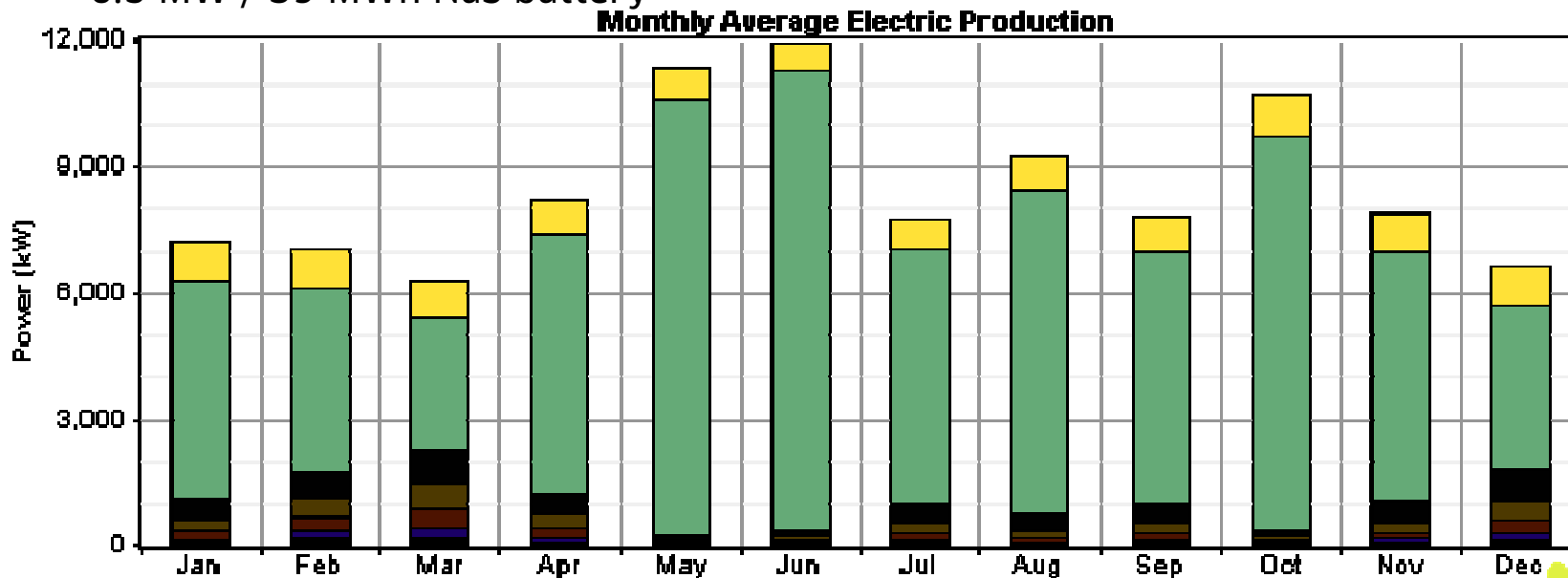
COE 0.38 US\$/kWh as a 20 year avg

29 MW wind

5 MWp photovoltaic

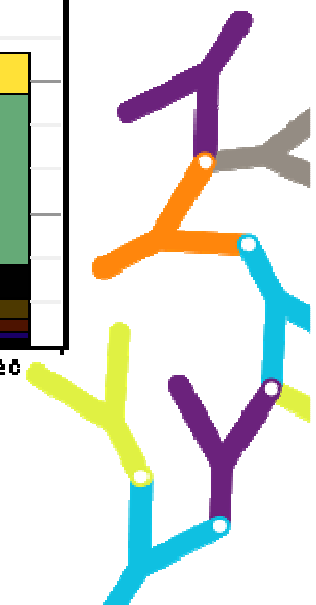
6.5 MW / 39 MWh NaS battery

■ Wind
■ PV
■ Diesel



*Biomass use could possibly lead to 100% RE

COE calculations based on NASA data and internet research



Examples of an optimized hybrid-system

Rarotonga

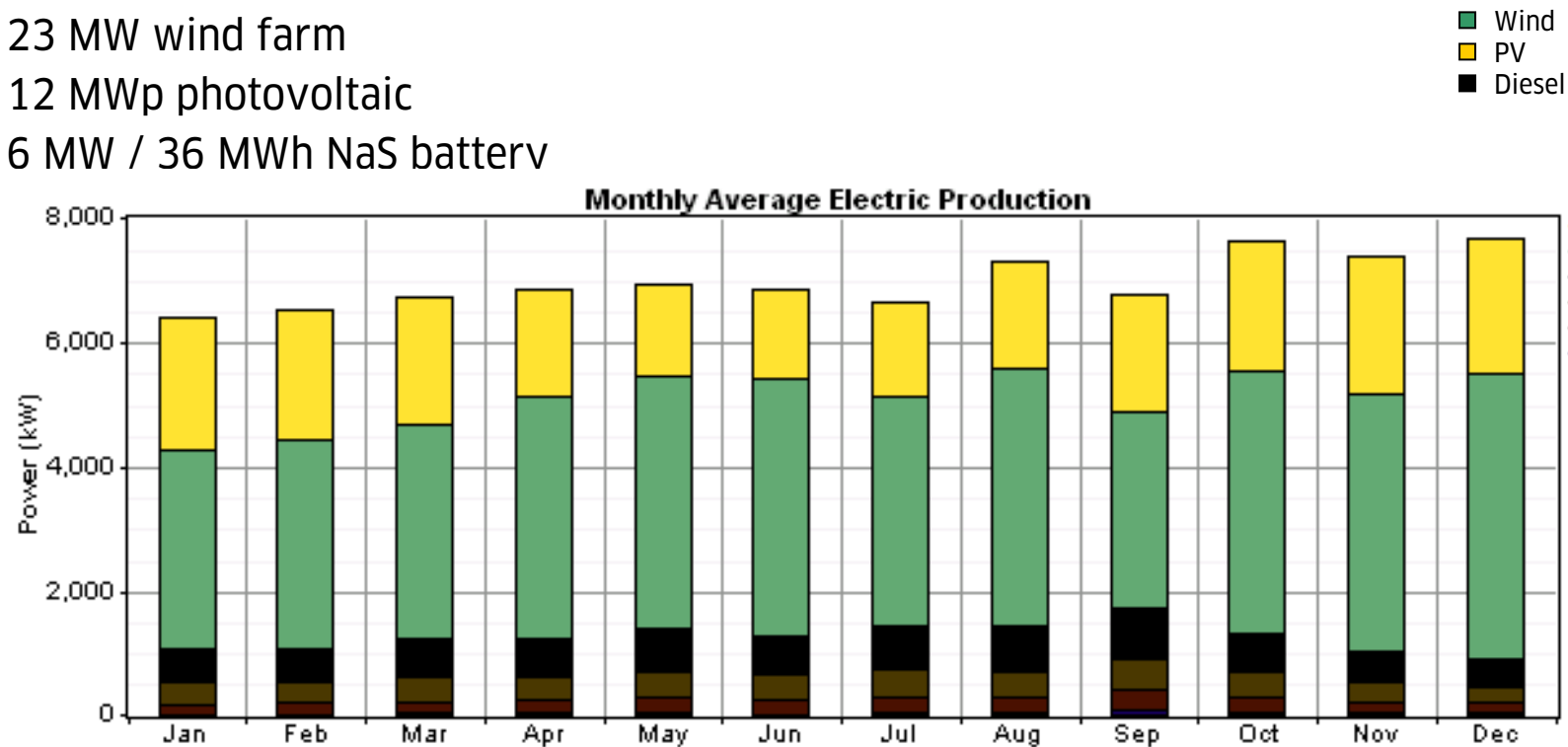
Economic optimum: 74% RE share

COE 0.48 US\$/kWh as a 20 year avg

23 MW wind farm

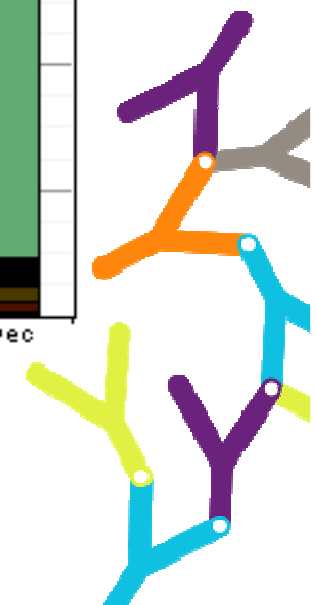
12 MWp photovoltaic

6 MW / 36 MWh NaS battery



*Biomass use could possibly lead to 100% RE

COE calculations based on NASA data and internet research



Thank you!

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