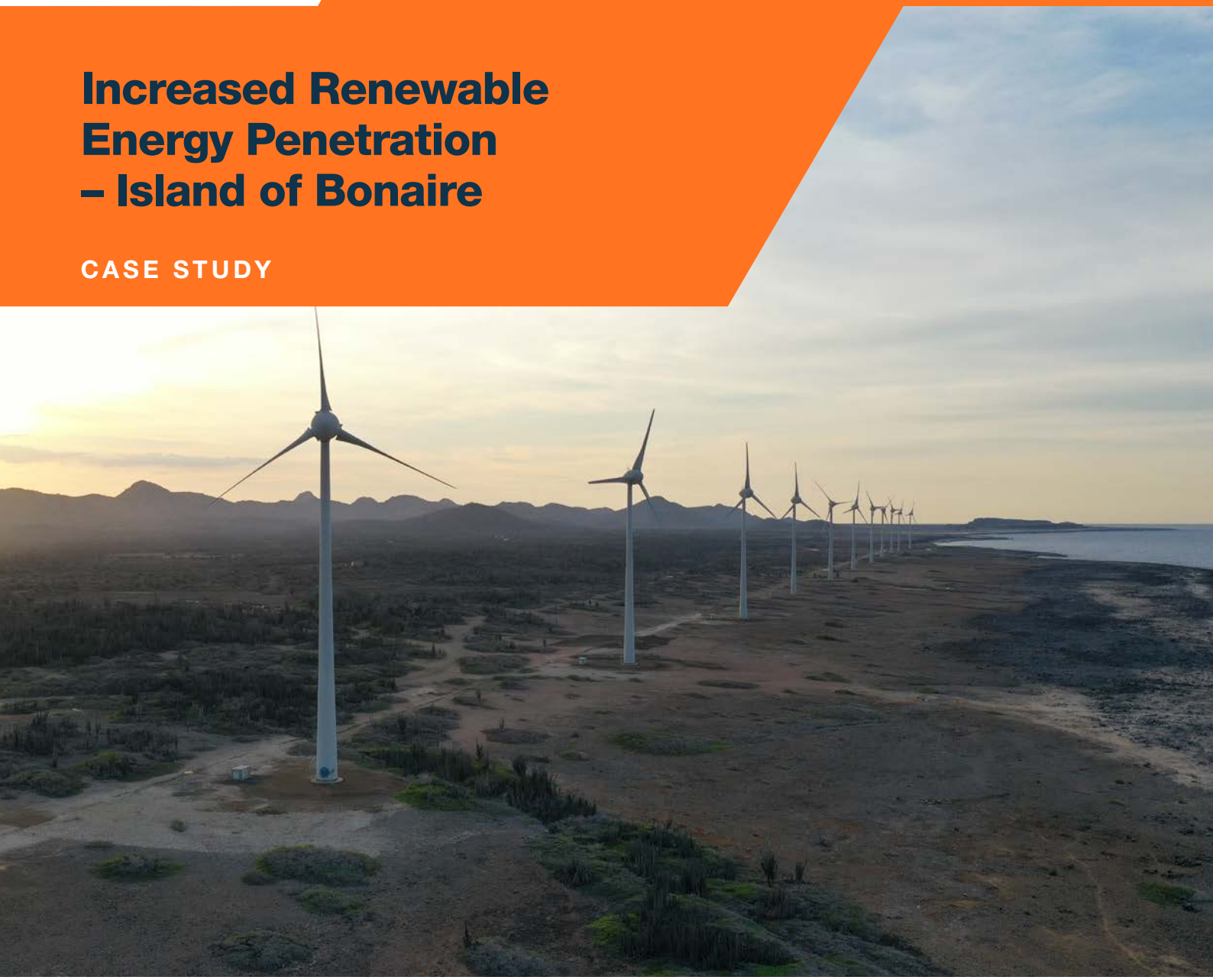
Increased Renewable Energy Penetration – Island of Bonaire

CASE STUDY



Sophisticated energy management system signals a boon for Bonaire

Utility provider ContourGlobal Bonaire, in cooperation with the Caribbean island of Bonaire's power company, Water en Energiebedrijf Bonaire N.V., sought out an advanced energy storage system with Wärtsilä Energy to ensure the reliability of energy supply and increase its renewable energy generation. ContourGlobal Bonaire commissioned the project following years seeking solutions to integrate more renewable power into the existing island grid. This project is the beginning of a longer-term plan to fully modernise the island's system and add additional capacity and renewable energy generation to the grid, while setting Bonaire on the path to achieving its 100% renewable target.

"During our commissioning tests, several load rejections were tested, including loss of wind, loss of engines and loss of demand, and in every circumstance GEMS instantaneously tracked and maintained the quality of the generation avoiding the load shedding of the grid. This is just one example of how this project will improve operations through automation while helping the island avoid blackouts, achieve greater efficiencies and use more wind power."

Giorgio Narminio, Caribbean assets COO of ContourGlobal

After completing the first phase of the project with Wärtsilä, the island has stopped curtailing excess energy losses from its wind resources, increasing annual wind energy by 6-8%, and preparing the system for additional capacity to accommodate peak demand during tourist season. A special municipality of the Netherlands, and a popular holiday destination, the Carribean Island of Bonaire now hosts a 6 MW / 6 MWh energy storage system to reduce excess energy losses by a substantial margin. The energy transition is not only about adding new renewable generation capacity but also must consider how to integrate such assets into existing energy systems.

A REAL SOLUTION IN REAL TIME

Wärtsilä's GEMS energy management platform enables customers to tap into the full potential of renewable energy resources. GEMS software enables intelligent energy applications that deliver a true "renewables as baseload" solution that increases resilience and efficiencies and can be supported by a power producer's existing grid infrastructure. The GEMS energy management platform is a linchpin for renewable commitments like Bonaire's because it is able to synchronise all power assets within a hybrid system, and new resources can easily be integrated. GEMS controls the majority of the island's power and eliminates issues of renewable intermittency by using artificial intelligence (AI) and historic and real-time data analytics to calibrate what type of generation is needed at a specific time.

PHASES FOR A PROFITABLE FUTURE

A big hurdle for utilities today is figuring out where to begin when it comes to modernising traditional thermal-based systems to integrate more renewable generation assets without compromising reliability. Bonaire provides a real-world case study for how it can be done.

ContourGlobal took a phased approach to the project, allowing time for system operators to add new hybrid solutions and spread out costs, and leaving room for new technologies to come online.

For Bonaire, the first phase of the project involved GEMS managing and optimising the dispatch and operation of existing generation assets. It also provided spinning reserve requirement with energy storage to reduce fuel consumption and emissions. Furthermore, Phase One involved unlocking curtailed wind energy and improved system reliability by providing frequency and voltage control. To optimise the system, GEMS factors in real-time asset performance, as well as load and renewable energy forecasts. GEMS can also balance Bonaire's resources and seamlessly optimise thermal, wind and energy storage assets.

The additional phases of the Bonaire project have included the addition of five new HFO engines on top of the existing thermal technology, plus adding more wind and solar to the generation mix. As the island grid increases in size, GEMS will enable further renewable penetration and lower the cost of energy.

KEY DATA

CUSTOMER: ContourGlobal Bonaire

SITE SIZE: 6 MW / 6 MWh

SITE LOCATION:
The Caribbean island of Bonaire

APPLICATIONS: Island Grid control, renewables integration, wind curtailment

SCOPE OF SERVICES: EPC

DELIVERY: 2019

GEMS machine learning and artificial intelligence capabilities will incorporate weather, electricity demand and other variables and data into its forecasting models. This data will inform the automated decisions managing ContourGlobal's entire fleet.

THE CHALLENGE	WÄRTSILÄ'S SOLUTION	BENEFITS
Replace outdated thermal technology and integrate renewables	Hybrid solution optimising thermal, wind and storage assets	Nearly doubled renewable energy penetration, ensuring the island is on target to achieving a 100% renewable target
Curtail wind resources	Phased approach to spread out costs and ensure cutting-edge technology integration	Improved operation through automation, lower cost of energy, reduced blackouts
Prepare the island for additional capacity to accommodate peak energy demand during tourist season	Provision of spinning reserves to reduce fuel consumption and emissions	Enabled the growing share of renewables to the island's generation mix

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