

Okinawa's OTEC Demonstration Project



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 Department of Commerce, Industry and Labor
 Okinawa Prefectural Government
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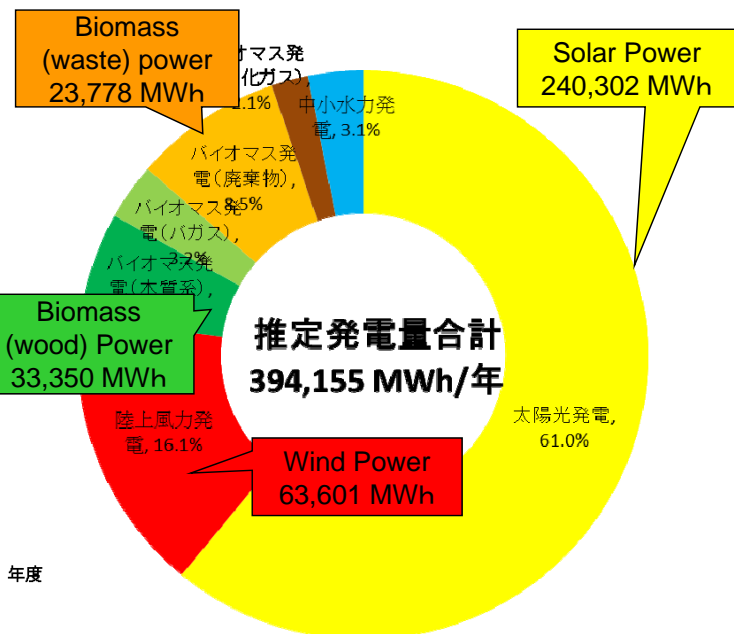
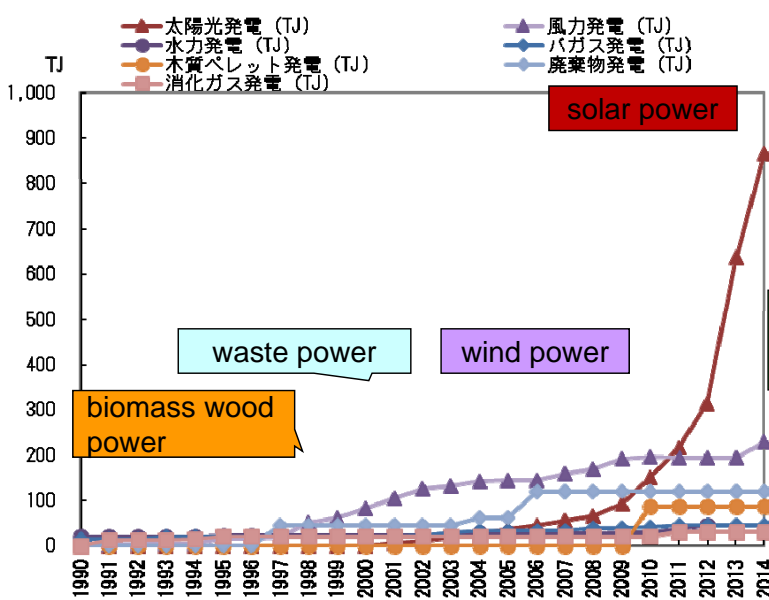


Renewable Energy in Okinawa

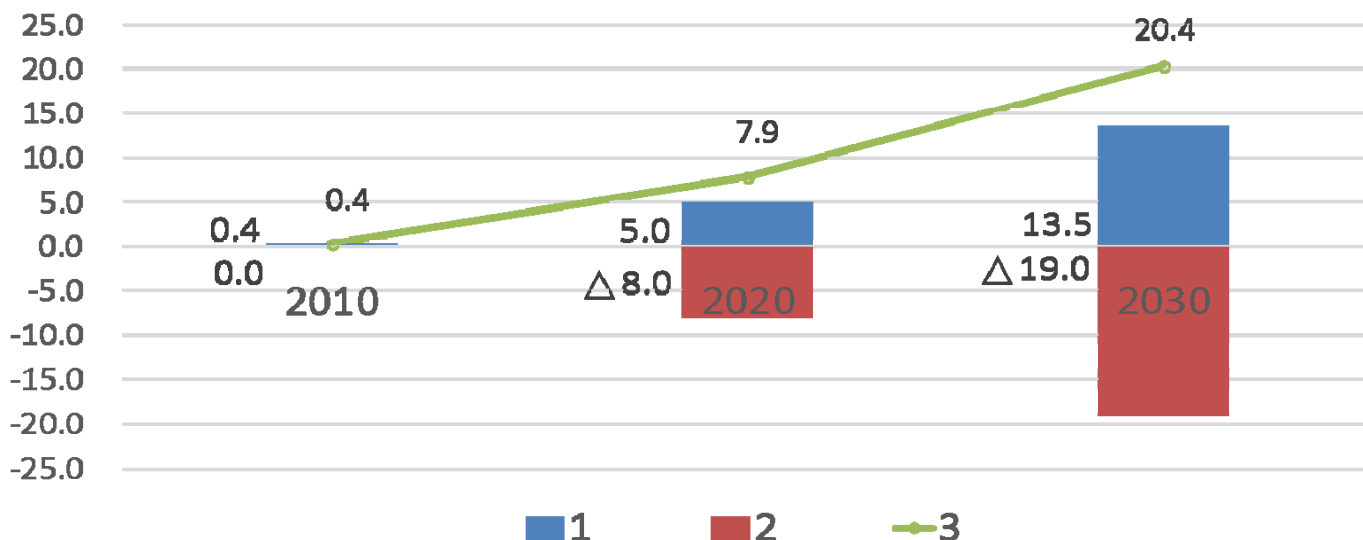


○ Ratio of R.E. to Primary Energy Supply 1.1%

○ Ratio of R.E. to Final Electricity consumption 5.2%



- 1 Introduction of Renewable Energy (Ratio of Primary Energy(TJ))
- 2 Energy-Saving Diffusion (Ratio of Energy Final Demand index(TJ))
- 3 Energy Self-Sufficiency Rate (Ratio of Primary Energy+Conversion(TJ))



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OTEC Demonstration Project on Kumejima

Background

- The diversification of energy supply sources and the improvement of our energy self-sufficiency rate are Okinawa's challenges.
- A reduction of the discharge of CO₂ is needed.



The Okinawa Gov. promotes research & development of ocean energy, and aims to reduce the environmental impact of energy production by making clean energy available locally

Outline of project

- Demonstration plant was completed on Kumejima April 2013.
- Gathering and analysis of various data such as electricity output in relation to weather, temperature, and water temperature changes
- Demonstration of technology for output stabilization
- Examination of more advanced multiple use of deep and surface seawater

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- Was able to run the power cycle continuously and autonomously throughout the year
- Performance matched or exceeded expectations based on simulations
- External factors such as lightning and typhoons caused peripheral equipment failure, which provided valuable lessons for the next stage of development.
- Developed cost estimate equation for minimizing maintenance costs
- Confirmed the potential for Okinawa and organized candidate sites in land and sea based OTEC
- Obtained a research model for the advanced use of post-OTEC water
- In addition, we were able to obtain data to verify many technical aspects of the small scale facility.

Selection as Marine Energy Demonstration Field

The Japanese Govt. made a public request for marine renewable energy experimental waters

Chosen as "Demonstration Field (OTEC)"

Second Half 2015

**NEDO
Ocean Energy Development
Research Work**

**Japan Marine United Co.
&
Saga University**

Planned demonstration of 2-stage Rankine Cycle. This verification test will be the first use in Japan.



- Contribution of Demonstration Field to OTEC commercialization
- The next stage for Kumejima is the realization of a 1MW scale power plant
 - ★ With initial investment costs on the scale of 10-15 billion yen (80-120 million USD) including intake pipelines, there is a need to discuss and consider procurement with relevant organizations
 - ★ There is also a need to carefully consider the impact of large scale deep seawater discharge on the local environment
- Establishment of cascade use for the profitability of 1MW class facilities
- Expand to Miyako, Ishigaki, and the main island of Okinawa with an eye towards the improvement of energy self-sufficiency.