

# The potential of Deep Seawater for Island Nations

*Deep Seawater District Cooling and Deep  
Seawater Industry*



Second regional conference of  
District Cooling technologies in  
Latin America and the Caribbean

26 October 2015  
Panama

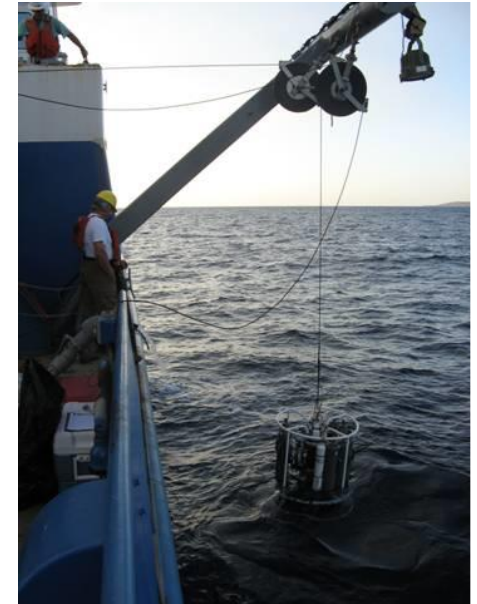
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# Introduction

# Characteristic of Island Nations

- High dependence (over 90%) on foreign fossil fuels
- Mainly diesel generation (HFO some LFO)
- High percentage of export earnings spend on oil products
- Exposed to negative impacts of climate change (sea level rising, hurricanes, floods, coral reef in danger)
- Abundant (untapped) local (renewable) energy sources
  - Solar: (intermittent, backup needed. Most islands)
  - Wind: (intermittent, backup needed. Many islands)
  - Hydro power: (No backup needed. Some islands)
  - Bio mass and Waste to Energy: (dependent on amount waste/bio mass, No backup needed. All islands have waste problems)
  - Geo Thermal: (No backup needed, Some islands)
  - Oil and Gas: (No backup needed, Some islands)
  - Ocean: (No backup needed, All islands)



# Deep Seawater

- Deep seawater
  - A reliable (non intermittent),
  - Sustainable and
  - Cost stable energy sources
- Especially for island nations, deep seawater can be a valuable source of growth. Deep Seawater technology is a logical option in the journey towards green and more self-sufficient islands, independent of foreign fuels and food markets.

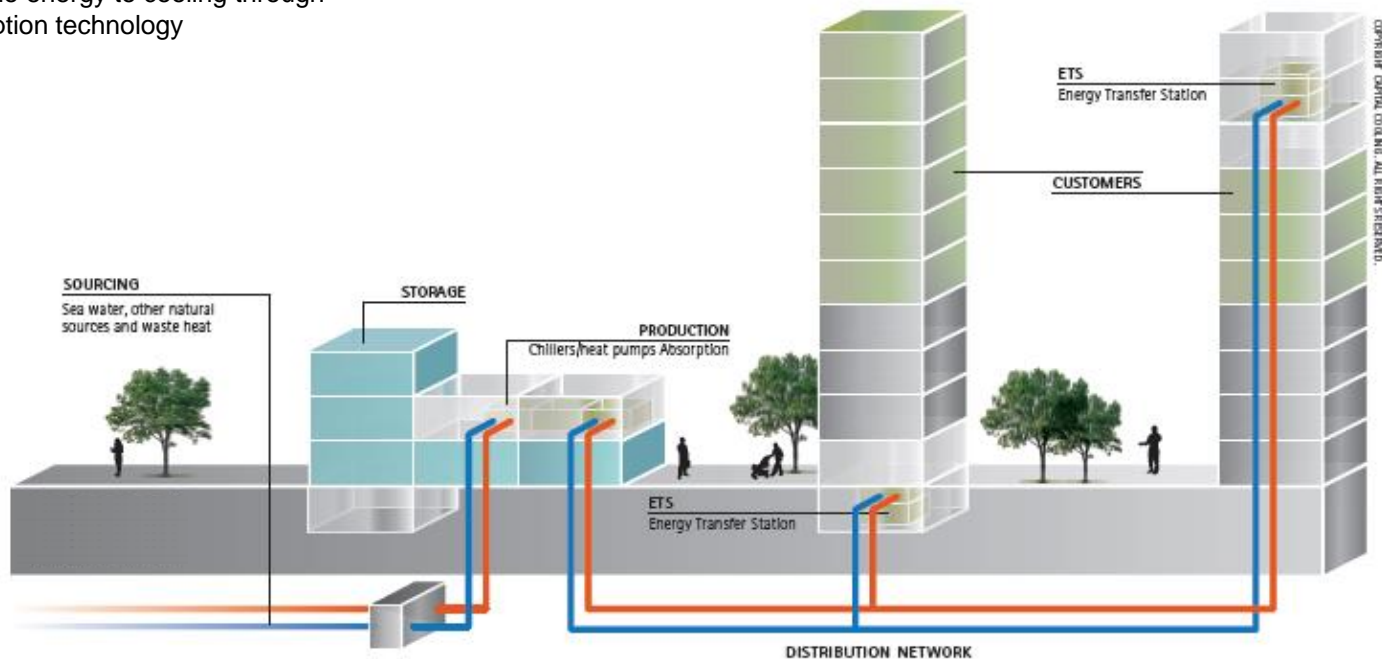
# Seawater District Cooling

# What is District Cooling?

District Cooling is produced centrally and is often based on natural cooling from bottom water of lakes, ground waters, rivers, the sea or conversion of waste heat/bio energy to cooling through absorption technology

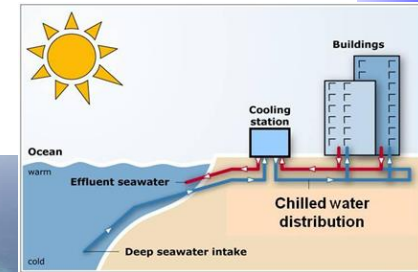
The cold water is distributed to the customers via a **freshwater closed-loop**, ground-laid distribution system

In each building the distributed cold water passes through an energy transfer station (ETS). This ETS is the interface between the distribution system and the customers **conventional internal system** providing the building with air conditioning



*The centrally produced District Cooling can reach up to 10 times higher energy-efficiency than local electricity-driven equipment*

# Seawater District Cooling Fact sheet



- Common practice world wide
- Up to 90% reduction in energy for cooling and Green House Gas
- Offers a reliable and cost stable solution for the building owners and operators
- SWAC is a natural hedge against foreign fuel price volatility
- Enabler for a potential New Economic sector of agriculture, aquaculture and R&D (OTEC) with the seawater effluent in a Deep Seawater Industry.



# Seawater District Cooling Consortium

# Seawater District Cooling Consortium

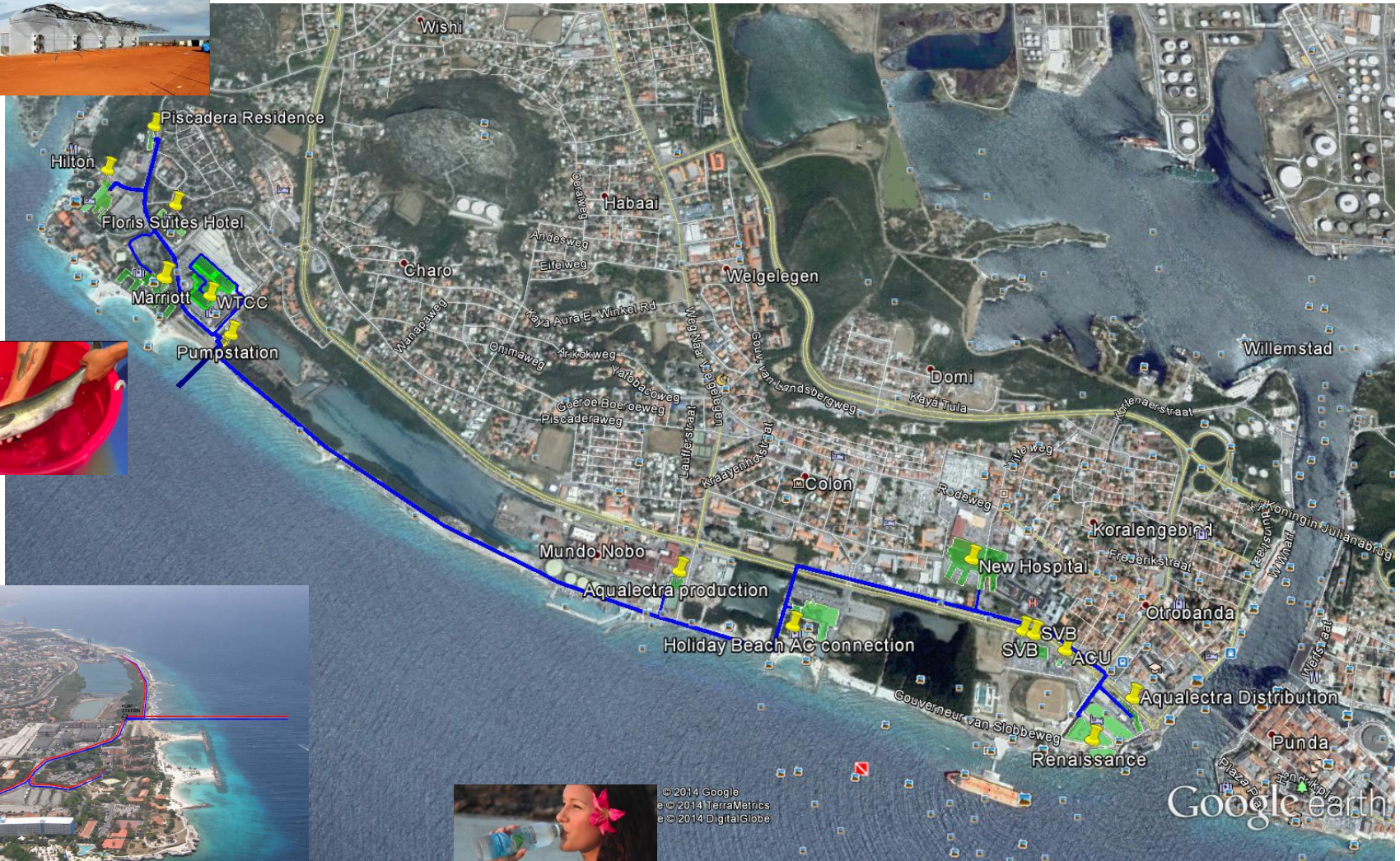
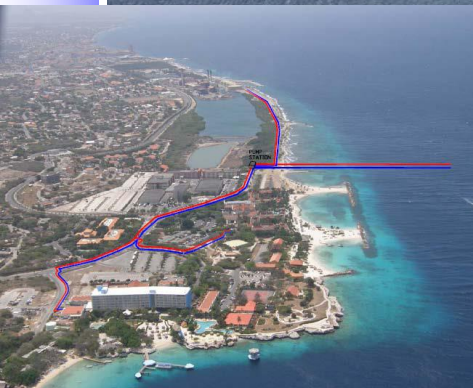
- Ecopower International invests in the development of renewable energy (Solar, Wind and SWDC) projects in the Caribbean and Latin America.
- To develop several Deep Seawater based District Cooling systems for islands in the Caribbean, Ecopower International has partnered with international companies with extensive experience from developing and operating District Cooling systems globally.
- The group consists of companies like Ecopower International, (Curacao), A-Hak international (Netherland), Capital Cooling (Sweden), Deerns (Netherlands), DEVCCO (Sweden) and Makai Ocean Engineering (Hawaii).
- For local activities the consortium has a cooperation with local experts engineering and consultancy companies with SWAC knowhow.
- For the development of the Deep Seawater Industry activities several Public Private Partnerships have been set-up.

# Seawater District Cooling Consortium

- Ecopower International and its partners invest in and develop District Cooling systems
  - Extensive experience from developing and operating Renewable Energy projects and District Heating and Cooling systems
  - Previous completed projects include i.a. Stockholm, Qatar (Lusail), Amsterdam, Paris, Viena,
  - Energy projects in the Caribbean like the Wind Diesel system on Bonaire.
  - Large scale water distribution networks and outfalls and intakes world wide.
  - International partnership network with proven track record from Toronto, Cornell University, Bora Bora etc.
- Current Seawater District Cooling projects include downtown Honolulu, Aruba and Curacao representing a total investment of \$500 million
- Significant potential of new Seawater District Cooling systems for islands
  - Representing a total investment of up to \$1 billion only in the Caribbean.

# Curacao District Cooling

# Curacao District Cooling



# Curacao District Cooling

- Will all the suitable basically centralized cooled buildings between Renaissance and Hilton, including the New Hospital (“the Zakito Area”), 4500 Ton AC.
- Secured minimum revenue.
- Secured all the equity needed for the development and construction of the project
- Design activities and other development activities are ongoing.
- Firm commitments to contribute the debt financing for the investment needed.
- Deep Seawater Industry Public Private Partnership
  - SWDC is Enabler of Deep Seawater Industry
  - Local legislation regarding the exploitation of the natural resource.
- Commissioning end of 2017

# Deep Seawater Industry

- Agriculture: Greenhouses, vegetables, fruits, flowers.
- Aquaculture: lobster farm, fish farm, shrimp farm.
- Pharmaceutical industry: minerals and proteins
- Biodiesel
- Water bottling and export
- Effluent cooling of large cooling houses
- R&D (OTEC)
- Nelha Hawaii, Japan, Korea, Taiwan, India and Bora Bora
- Analysis by the University of Hawaii's Economic Research Organization has found NELHA's economic output to the greater Hawaii economy was \$88 million and 583 jobs in 2010.



# Aruba SeaWater Aircondition Hybrid District Cooling

The movie.....(see Youtube)



# Conclusions

# Conclusion

- The District Cooling technology is economically feasible
- But the business model is complex:
  - It is highly specialized.
  - It is new to the market so you need to convince many stakeholders
  - It is capital intensive development process
- Key is a Multidisciplinary team to develop Seawater district cooling.
  - Local partners
  - Commercial (Customers, culture etc.)
  - Technology (optimization of all cooling sources)
  - Financial (structuring, financing, tax etc.)
  - Local governmental (permitting and consents)
  - Utilities
- Development funds programs are essential to speed up the development process and eventually reduce the cost.

# Sea Water District Cooling

A unique and proven opportunity with great potential for the Caribbean and the rest of the world

Thank you

