

(NREI)

NEVIS RENEWABLE ENERGY INTERNATIONAL



THERMAL
ENERGY PARTNERS

*On-Site: The Next Generation of
Geothermal Power*



NEVIS PRESENTATION

January 25, 2017 | BY THOMAS S. DROLET Chief Operating Officer, On Behalf of Bruce Cutright and Daniel Pfeffer

A CARIBBEAN CLEAN ENERGY PROJECT



A Clean Energy Utility Goal. Nevis Island has established a goal to eliminate CO₂ emissions from power generation by leveraging its proven geothermal resources to become the greenest place on the planet.



PROJECT UPDATE

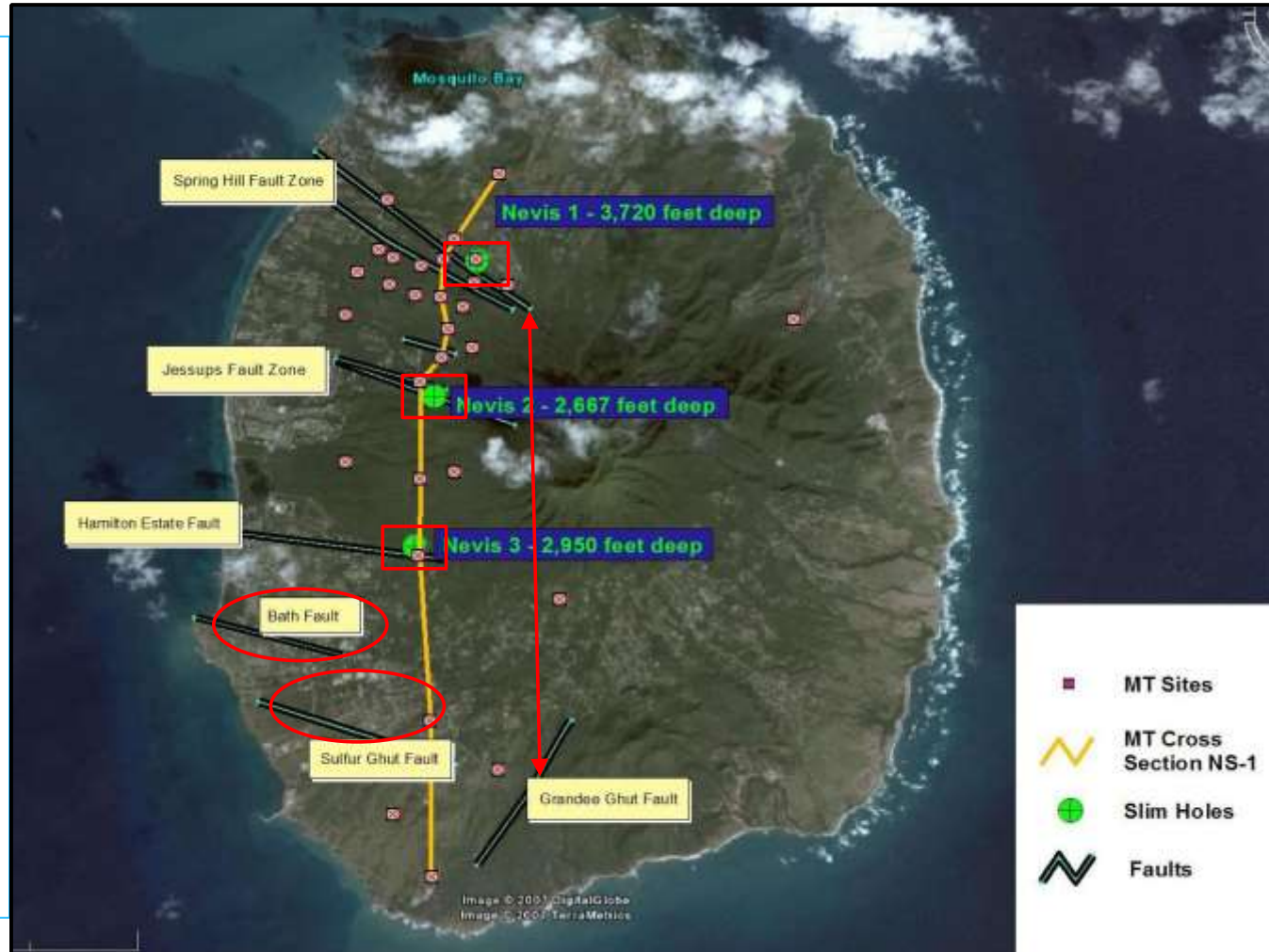
PHASE ONE TARGET - TEST WELL

COMPANIES INVOLVED: TEP-NREI, ICELAND DRILLING, MANVIT ENGINEERING

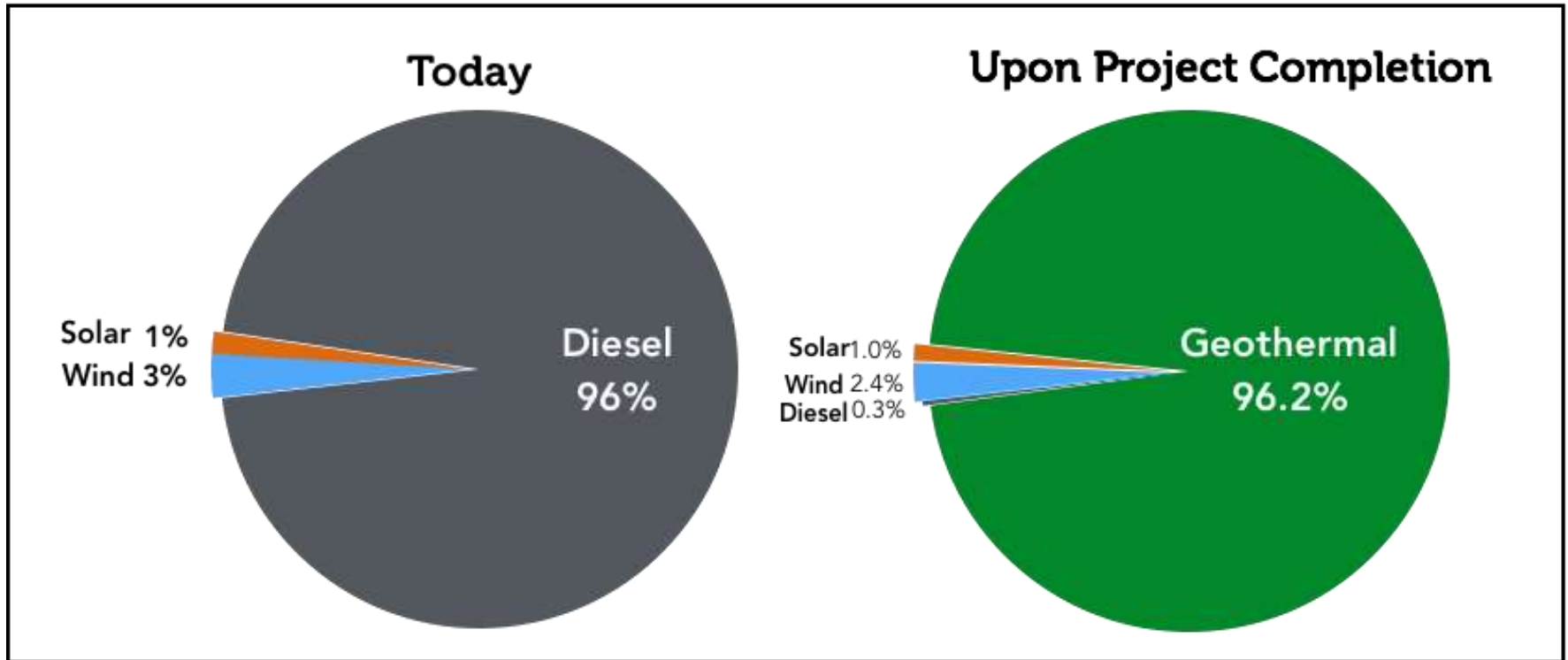
NEXT STEPS:

- TEST WELL PROJECT START JAN 2017
- SITE VISIT JAN 24-26
- BREAKING GROUND IN FEB 2017
- WELL DRILLING COMPLETION & TESTING COMPLETE JUNE 2017
- **Phase Two Target: Production Drilling and Plant Construction**

COMPANIES INVOLVED: TEP -- NREI, HGI, ORION DRILLING, TURBODEN, CLEMESSEY



NEVIS POWER GENERATION MIX



THERMAL ENERGY PARTNERS (TEP) through its subsidiary NREI teamed up with the Nevis Island Administration (NIA), Nevis Electrical Company (NEVLEC), the island's utility and the people of Nevis in developing this sustainable geothermal resource to generate electricity and, in the future possibly export electricity to other nearby islands. NEVLEC, worked on a plan with TEP-NREI's geothermal team to review its electricity demand and determined a yearly growth of 2-3% with a currently maximum demand at 10 MWe.



GEOHERMAL: SUSTAINABLE CLEAN POWER – 24 x 7 x 365

How Clean is Geothermal vs. Other Power Sources?

Binary geothermal power plants emit zero carbon dioxide, simply because geothermal fluids are never vented to the atmosphere.

		Geothermal Power			Fossil Fuels		Details
		Dry Steam	Flash Steam	TEP Binary ORC Approach	Natural Gas	Coal	
		lbs/MWh	lbs/MWh	lbs/MWh	lbs/MWh	lbs/MWh	
Carbon Dioxide	CO ₂	59.82	396.3	0	861.1	2200	Binary Geothermal plants with air cooling are a closed-loop system and emit no carbon dioxide, as geothermal fluids are never exposed to the atmosphere. However, even without discounting the non-anthropogenic emissions the overall comparative amount of CO ₂ from geothermal plants is from small to nil, depending on technology utilized with binary power technology emitting essentially zero GHG emissions.
Methane	CH ₄	0.0000	0.0000	0	0.0168	0.2523	Methane emissions from geothermal plants do not even register on the table as they are several orders of magnitude smaller than coal and natural gas methane emissions
Particulate Matter	PM _{2.5}	0	0	0	0.01100	0.5900	Fossil fuel plants generate PM emissions: Particles ≤10 micrometers in diameter pass through the throat and nose, enter the lungs, and cause severe health impairment.
Particulate Matter	PM ₁₀	0	0	0	0.1200	0.7200	Fossil fuel plants generate PM emissions: Particles ≤10 micrometers in diameter pass through the throat and nose, enter the lungs, and cause severe health impairment.
Sulfur Dioxide	SO ₂	0.0002	0.3500	0	0.0043	18.75	Geothermal dry-steam and flash power plants produce only minimal sulfur dioxide emissions or about 0.0002 lbs/MWh for dry-steam and about 0.35 lbs/MWh for flash plants. Meanwhile, binary geothermal power plants release no hydrogen sulfide or sulfur emissions.
Nitrous Oxide	N ₂ O	0.0000	0.0000	0	0.0017	0.0367	Binary Geothermal power plants <i>do not</i> burn fossil fuels, thus they emit <i>zero</i> nitrous oxide

Sources: Climate Registry 2012, EIA 2013c, EPA 2009, EPA 2011, NRC 2010

Promoting Geothermal Energy. Air Emissions Comparison: http://geo-energy.org/events/Air%20Emissions%20Comparison%20and%20Externality%20Analysis_Publication.pdf

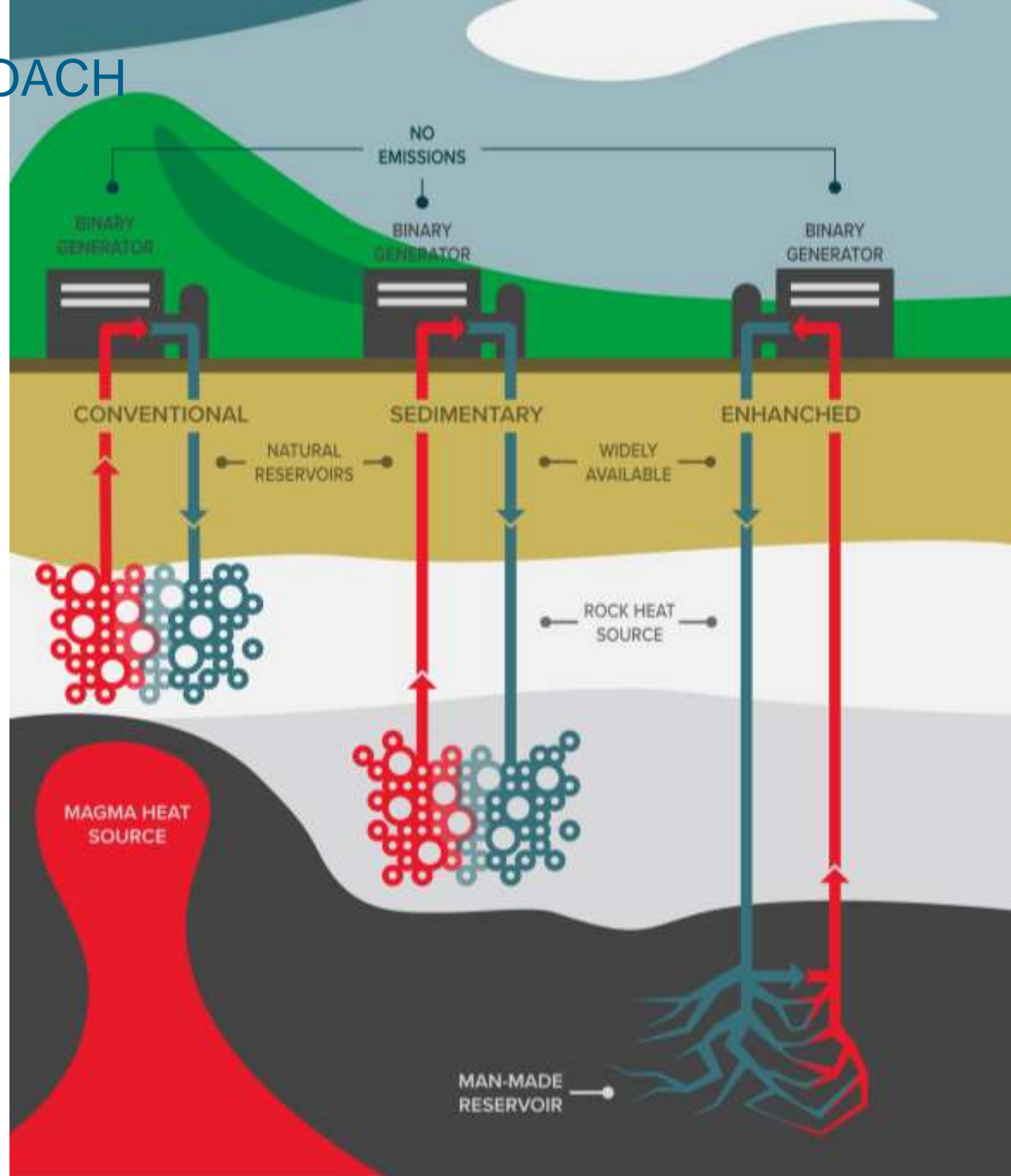


TEP-NREI BINARY APPROACH

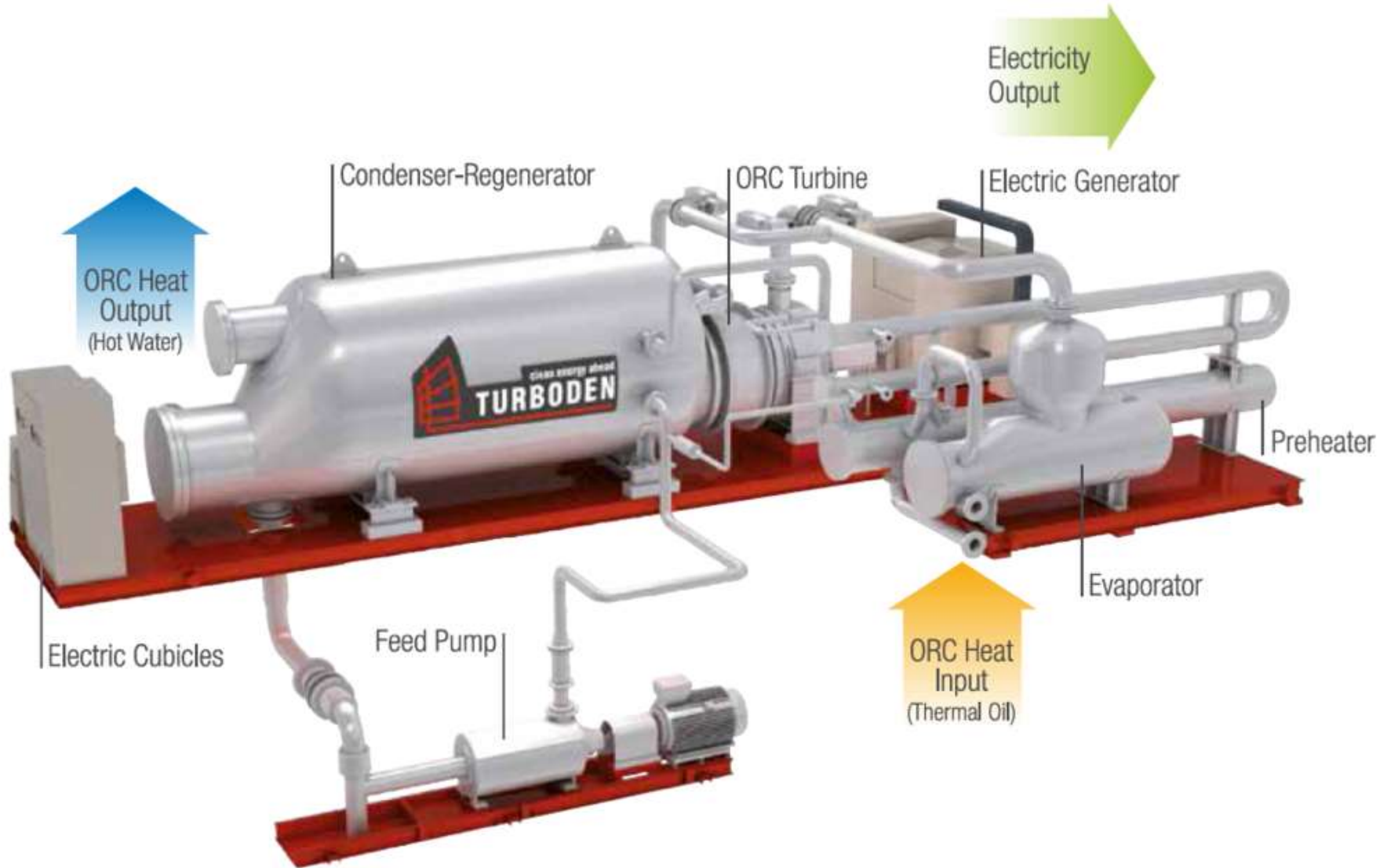
➤ TEP-NREI NEVIS IS UTILIZING **BINARY TECHNOLOGY** FOR THE ISLAND ENVIRONMENT WHICH IS MORE EFFICIENT AND PRODUCES ZERO EMISSIONS.

➤ TEP-NREI NEVIS IS THE 1ST CARIBBEAN PROJECT TO UTILIZE BINARY ORC TECHNOLOGY

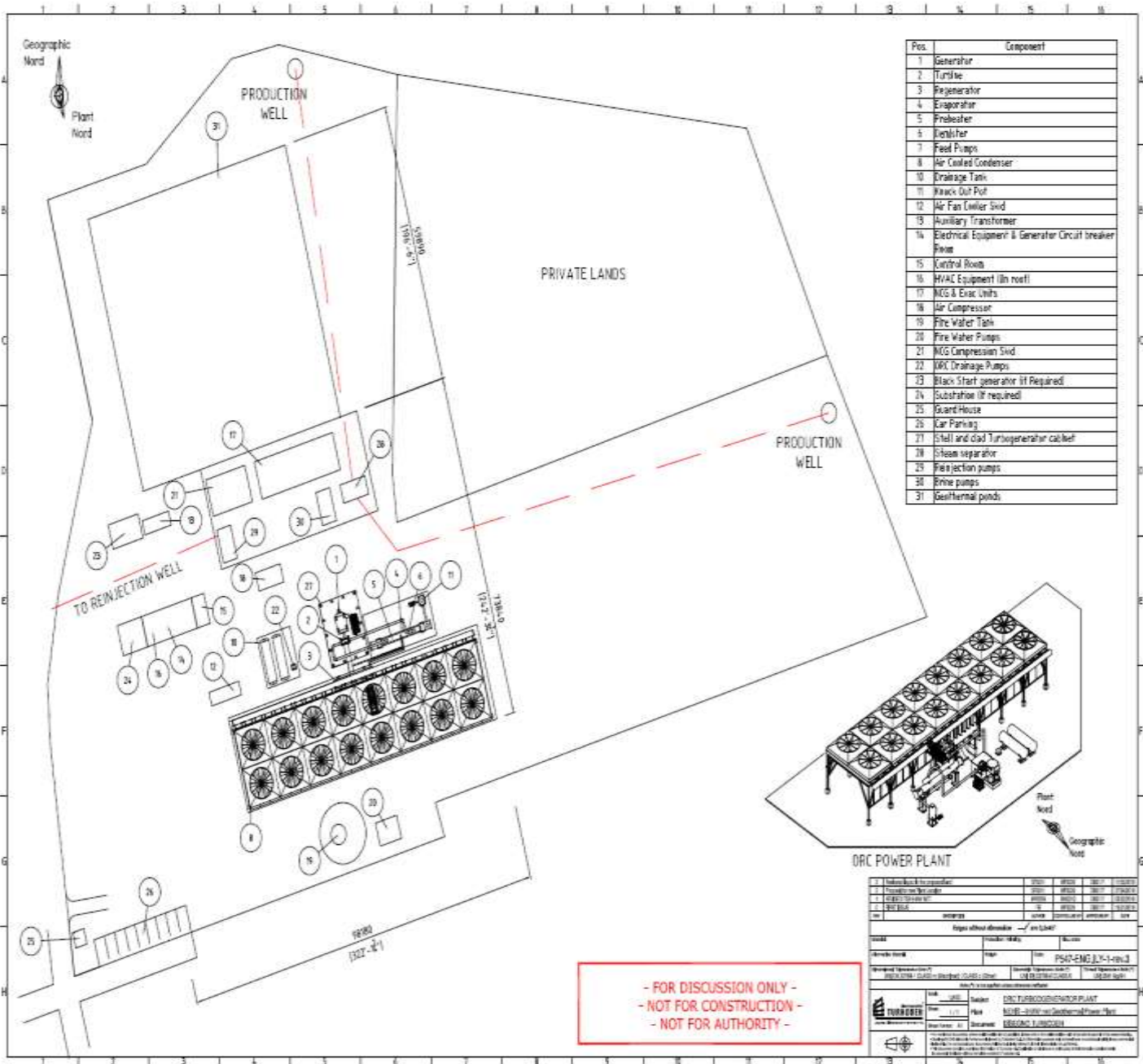
➤ TEP-NREI NEVIS IS A MODEL FOR FUTURE CARIBBEAN PROJECTS



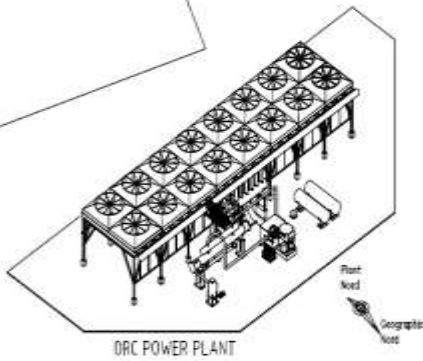
BINARY ORC TECHNOLOGY



The power plant modules are preassembled and prequalified to facilitate ease of installation and startup. Each contains standardized components designed according to proven processes to ensure high quality.



Pos.	Component
1	Generator
2	Turbine
3	Regenerator
4	Evaporator
5	Preheater
6	Denkifer
7	Feed Pumps
8	Air Cooled Condenser
10	Drainage Tank
11	Black Out Pot
12	Air Fan Cooler Skid
13	Auxiliary Transformer
14	Electrical Equipment & Generator Circuit breaker Pans
15	Control Room
16	HVAC Equipment (In roof)
17	NGS & Exac Units
18	Air Compressor
19	Fire Water Tank
20	Fire Water Pumps
21	NGS Compression Skid
22	ORC Drainage Pumps
23	Black Start generator (if Required)
24	Substation (if required)
25	Guard House
26	Car Parking
27	Stall and dad 7 (in generator cabinet)
28	Screen separator
29	Fire Injection pumps
30	Exine pumps
31	Geothermal ponds



Item	Quantity	Unit	Material	Remarks
1	1	kg	Steel	Structural Steel
2	1	kg	Steel	Structural Steel
3	1	kg	Steel	Structural Steel
4	1	kg	Steel	Structural Steel
5	1	kg	Steel	Structural Steel
6	1	kg	Steel	Structural Steel
7	1	kg	Steel	Structural Steel
8	1	kg	Steel	Structural Steel
9	1	kg	Steel	Structural Steel
10	1	kg	Steel	Structural Steel
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26	1	kg	Steel	Structural Steel
27	1	kg	Steel	Structural Steel
28	1	kg	Steel	Structural Steel
29	1	kg	Steel	Structural Steel
30	1	kg	Steel	Structural Steel
31	1	kg	Steel	Structural Steel

- FOR DISCUSSION ONLY -
 - NOT FOR CONSTRUCTION -
 - NOT FOR AUTHORITY -

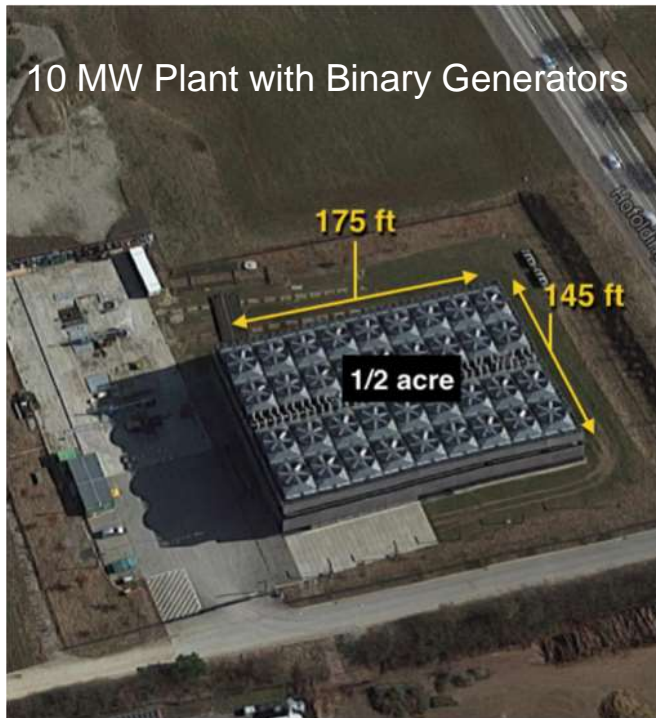




TEP-NREI POWER PRODUCTION TECHNOLOGY OVERVIEW

TEP utilizes closed loop Binary Generators to extract power through highly permeable sedimentary formations which are consistently hot, easily accessible and more broadly available than volcanic or geyser formations.

- Generators are small footprint, modular, mobile units which can be combined to scale operations, moved to new locations or removed for servicing
- Generators (and wells) are highly efficient, require minimal maintenance, virtually no human intervention, and have operating lifetimes of 20+ years
- Binary Plants require a hot fluid, a relatively high flow rate and a secondary cooling system
- Binary plants operate at lower heat source temperatures (150 F to 350 F), than flash steam plants, thus, applicable at more locations
- Closed loop systems minimize potential for seismic disruptions



PARTNERS & COLLABORATORS



Financial Advisory / Risk Intelligence



Technology



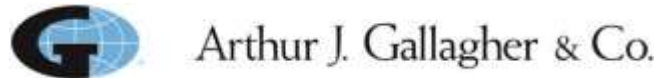
ORC
Generators



EPC & Construction Management, Drilling



Project Insurance / Project Risk Management



Government Collaborators



Nevis Team

