Resolute Marine

Clean Water From Ocean Waves

Wave$_2$O^{TM} in Cabo Verde

"Renewable Energy Development in Macaronesia and West Africa"

Praia, Cabo Verde

May 31, 2016

- *Winner of European Innovation Platform for Water (EIP Water) award (2016)*
- *Winner European Technology Platform for Water (WssTP), SME award (2015)*
- *Winner Overall Maritime Excellence Award (2015)*
- *Winner Excellence in Marine Renewable Energy (2015)*
- *Winner FACCNE Award (2015)*
- *Winner West African Forum for Clean Energy Financing Competition (2013)*
- *Engineer of the Year "Sustainable Development", Usine Nouvelle (2012)*
- *Global Hot 100 Award, World Summit on Innovation and Entrepreneurship (2012)*
- *Winner, MassChallenge (2011)*
- *Runner up, Global Ideas Competitions (2011)*
- *Winner, Startup Open during Global Entrepreneurship Week (2010)*
- *World Top 100 Emerging Marine Technology Company (2009 & 2010)*

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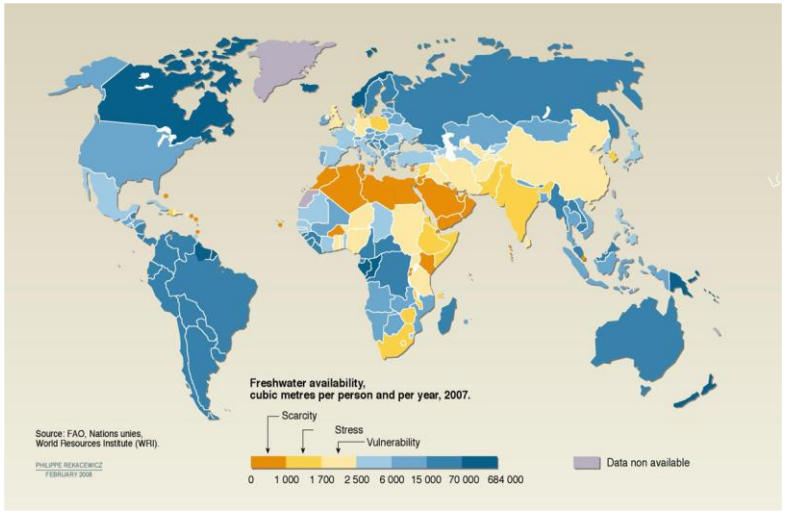
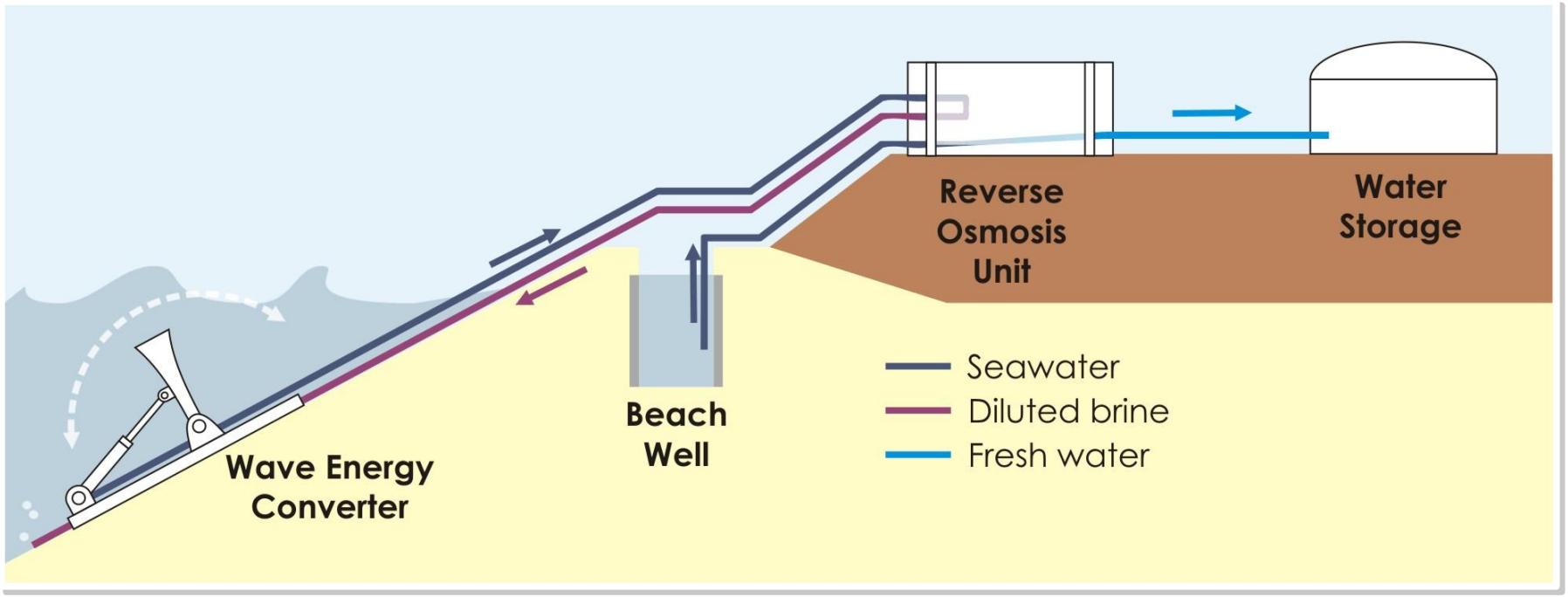
Ocean waves can help solve the global water crisis



- Worldwide, over 1.1B people lack access to adequate supplies of clean water (i.e. meet UN-mandated minimum requirements)
- Over 2.5 million people die every year as a direct result
- Seawater desalination is an IDEAL solution (70% of earth's surface is oceans) but is an extremely energy intensive process
- Utility-scale water production requires large, long-term investments in infrastructure that are unaffordable to customers in our target markets
- The alternative solution, diesel driven desalination, is expensive and environmentally unsound

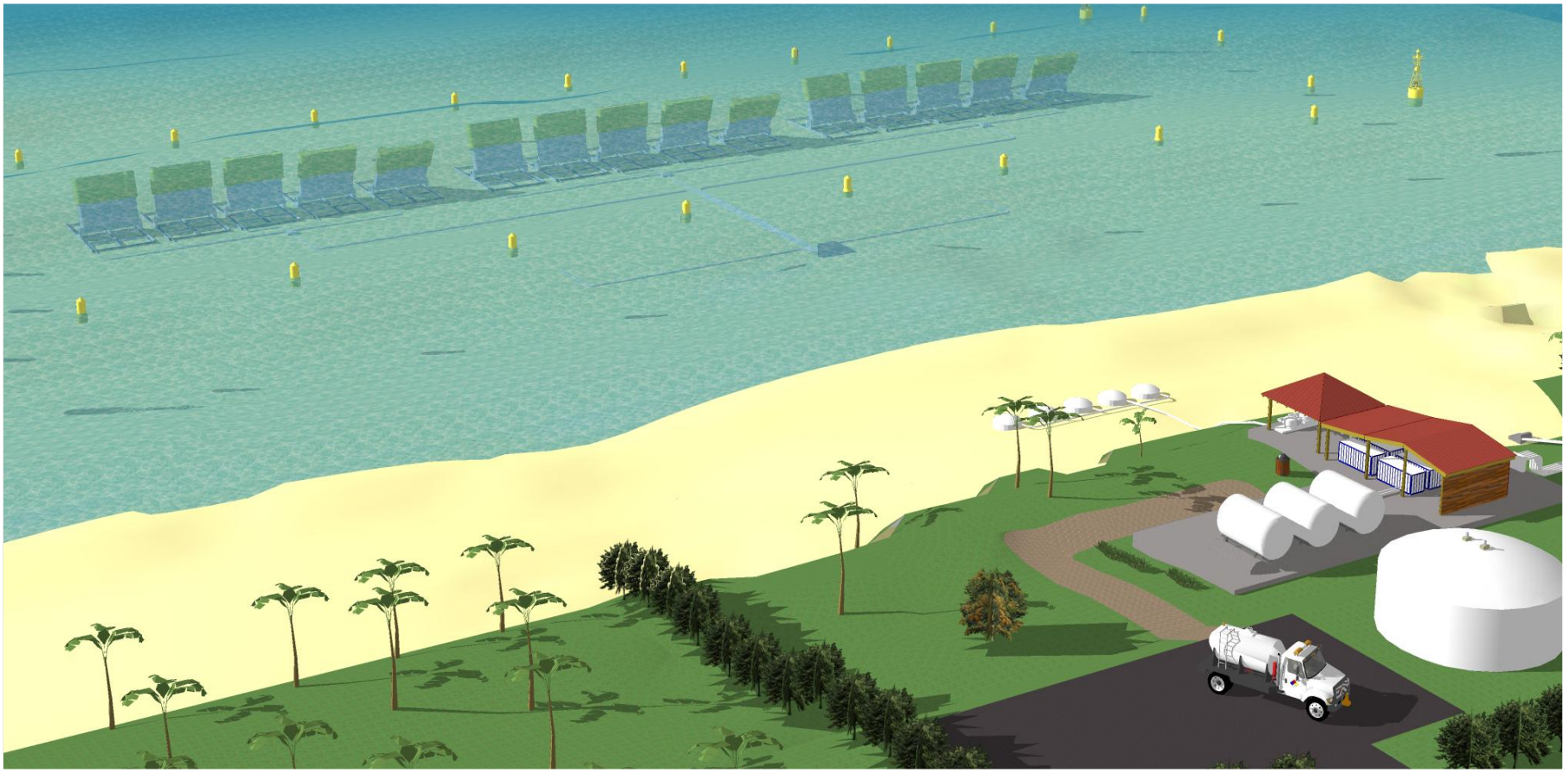
Fortunately, 40% of the most severely affected people in the world live in coastal areas with access to unlimited "free" energy from ocean waves

Our solution: the world's first wave-powered desalination system ($Wave_2O^{TM}$) that requires NO ELECTRICITY to operate



Wave Energy Conversion → Power Take-Off → Pressure regulation system → Desalination

At commercial stage a 15-WEC plant could produce 4,000 m^3/day of fresh water



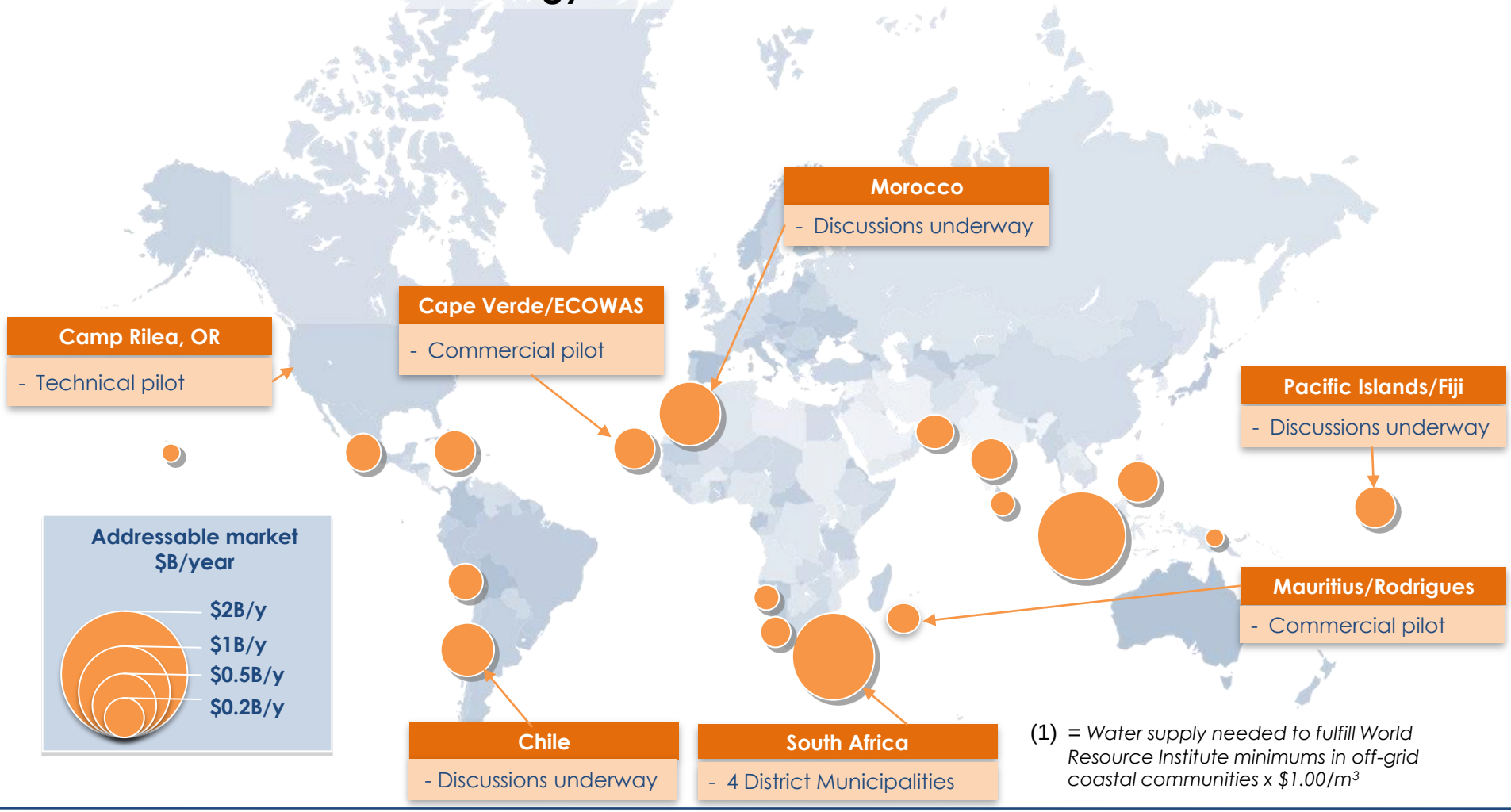
Impactful Provides water for 48,000 people	**Low capital cost** $25M total cost	**Quick recovery** 6-year payback for customer	**Financial return** Equity IRR >25% in launch market	**Low cost water** $1.30/$m^3$ before profit & financing

$Wave_2O^{TM}$: The Scalable Mid-Market Solution.

Desalination today involves either billion dollar facilities in the developed world or expensive, environmentally-unsound diesel generators at the local level. $Wave_2O^{TM}$ has been designed to displace diesel-driven desalination systems wherever there are adequate wave resources.

Global Addressable Market Estimate: $10B/Year (1)

Over 40% of the most severely affected people in the world live in coastal areas with access to unlimited "free" energy from ocean waves.



(1) = *Water supply needed to fulfill World Resource Institute minimums in off-grid coastal communities x $1.00/m³*

Prodes Report – Waves Beat Other Energy Sources

	Capacity, m^3/day	Water generation costs, $/$m^3$
Wave RO	**1,000 – 3,000**	**0.70 – 1.30**
CSP MED	> 5,000	2.30 – 2.90
Wind RO	50 – 2,000	2.00 – 5.00
Solar SD	< 0.1	1.30 – 6.50
Solar MEH	1 - 100	2.60 – 6.50
Wind MVC	< 100	5.20 – 7.80
PV RO	< 100	> 6.50
PV EDR	< 100	> 10.40
Solar MD	0.15 - 10	> 10.40

Reference:

"Roadmap for the development of desalination powered by renewable energy" PRODES. $1.30/€ exchange rate used. SD = Solar Distillation; MEH = Multiple Effect Humidification; MD = Membrane Distillation; CSP = Concentrating Solar Power; MED = multiple effect desalination; RO = Reverse Osmosis; EDR = Electro-Dialysis Reversed; MVC = Mechanical Vapor Compression

Social & Environmental Benefits

RME has a profitable business model that helps people around the world face one of the critical challenges of our time.

- 1.1 billion people worldwide lack clean drinking water; RME will help.
  - By 2020, RME will provide clean drinking water for 240,000 people, with much greater scale to follow;
  - Our system produces water at an approximate cost of $1.30/m^3; diesel systems (our primary competition) are nearly triple the price, not taking into account environmental externalities.

- 2.6 million people die each year from water-related diseases; RME will help.
  - We produce water that is 99.9% pure and complies with U.S. EPA standards for drinking water safety;
  - RME is projected to save nearly 1,000 lives between now and 2020, with many more thereafter.

- Millions of women and children suffer most from the World Water Crisis; RME will help.
  - Women and children spend 200 million hours/day collecting water, or $29.5 million/day in lost productivity;
  - Our system reduces personal and community resources devoted to obtaining water.

- Existing desalination technologies depend on energy sources that pollute.
  - Large desal plants need co-located power plants that have many negative environmental impacts;
  - Smaller diesel-driven systems for local use produce pollution of several types, including carbon and sound;
  - Fossil fuel transport, storage and use are hazards for local communities that use diesel to produce water;
  - Our system has no adverse environmental impact and brine *disposal issues are easily mitigated.*

Extensive Research & Supply Chain Network

US DOE
(Funding)

MIT
(R&D)

IMERC
(R&D)

Parker Hannifin
(Desalination)

Chubb
(Insurance)

Electra
(Water utility)

US DOI
(Funding)

Univ. Michigan
(R&D)

ITC
(R&D)

PPG Industries
(Coatings)

South Africa
(DWA, DEA)

Univ. Cape Verde
(Social Impact)

USACE
(Testing support)

Univ. Minnesota
(R&D)

HWU - ICIT
(Social Impact)

Fiberspar
(Piping system)

CSIR
(R&D, Feasibility)

INDP
(Feasibility studies)

AfDB
(Funding)

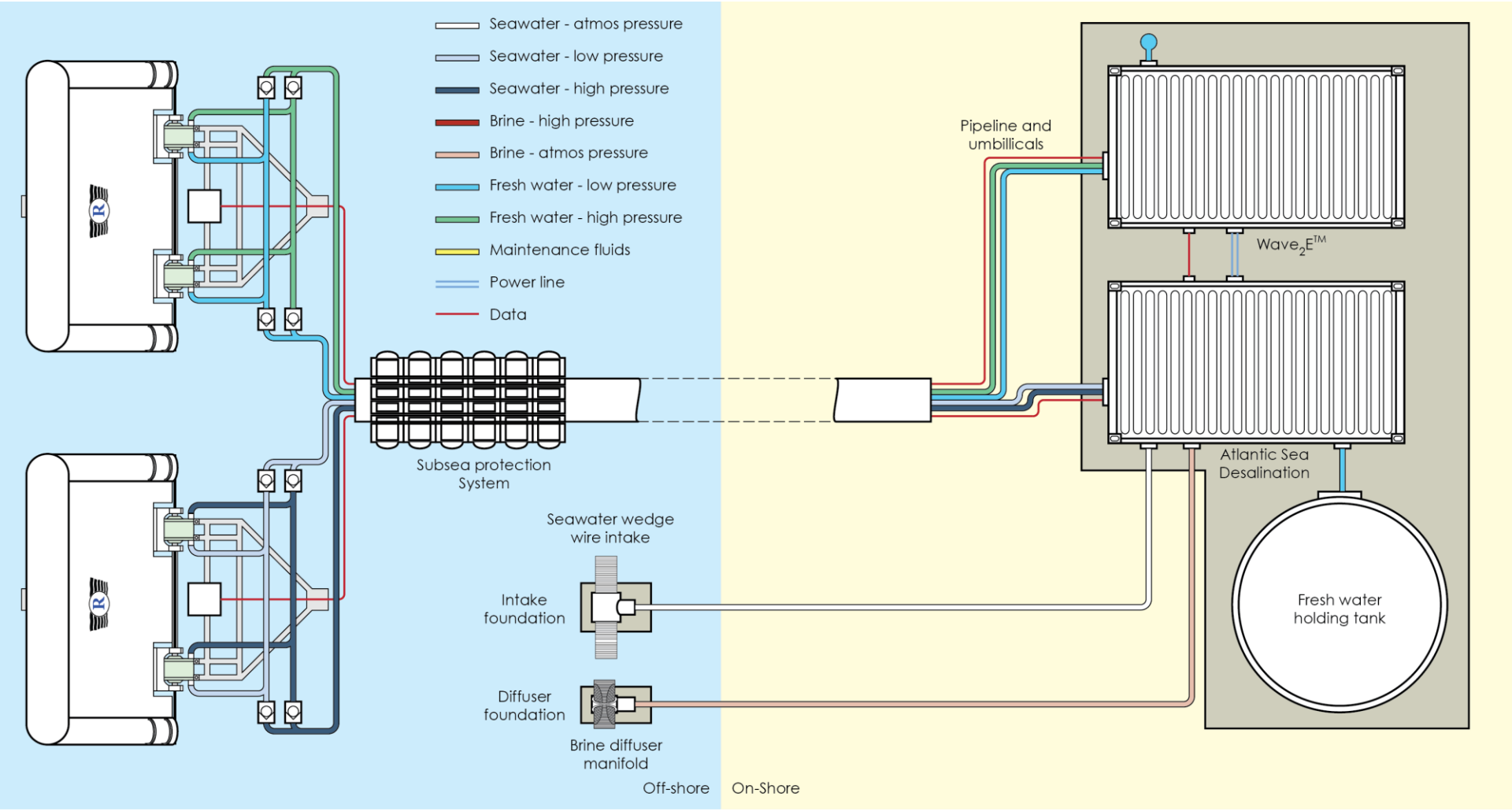
Tallinn University
(Water system modeling)

Bureau Veritas
(Certification)

Aquatera
(Environment)

Cape Verde
(MTIE, MAHOT)

The Wave$_2$O^{TM} pilot in Cabo Verde would have a production capacity of 500 m^3/day



½ - scale WEC tested in North Carolina

Unique Deployment Methodology

SEFA grant

Amount: USD $930,000

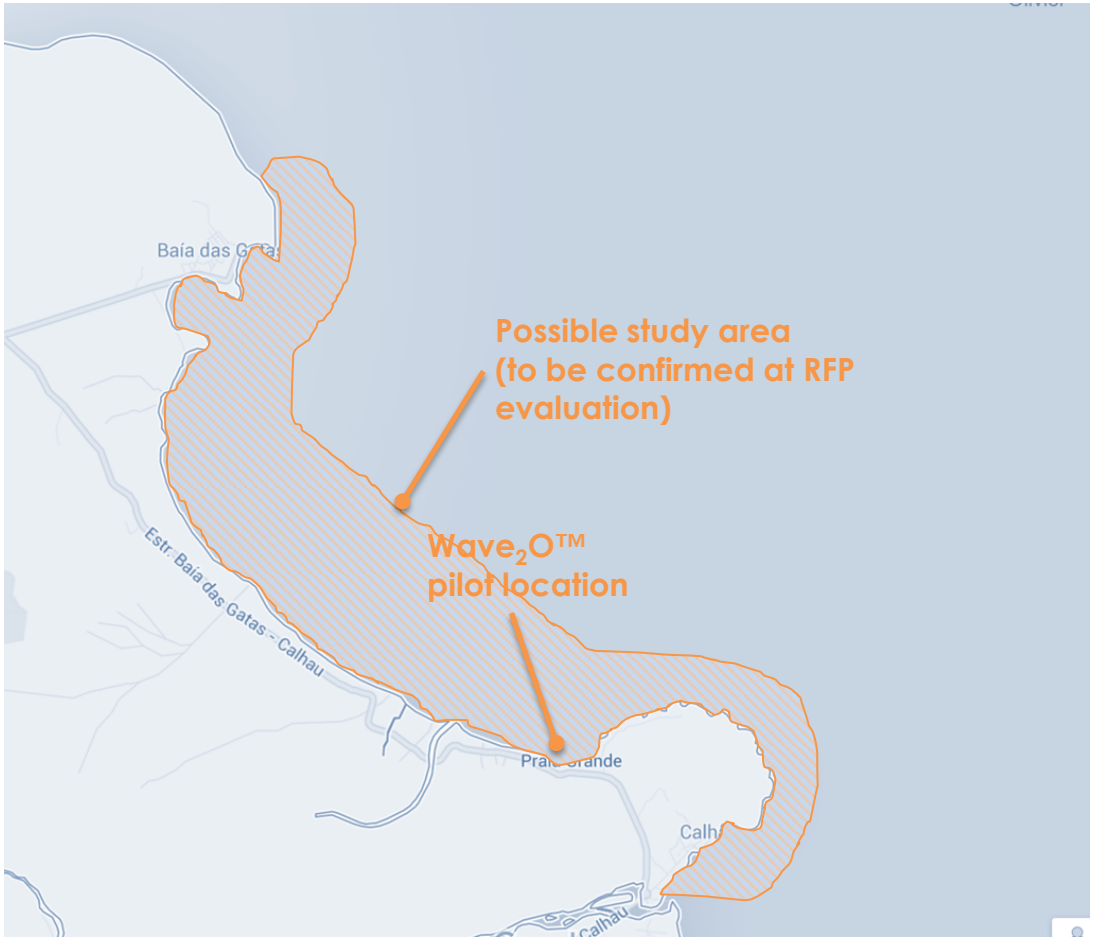
Purpose

- Finance feasibility studies related to the proposed test site at Praia Grande
  a) Includes wave resource assessment, bathymetric & geotechnical surveys, water quality assessment, Environmental Impact Assessment
  b) Provides for local capacity building @ INDP
- Prepare final project design to estimate costs
- Calculate project bankability and prepare for pilot deployment including selection of local supply chain partners

Work packages

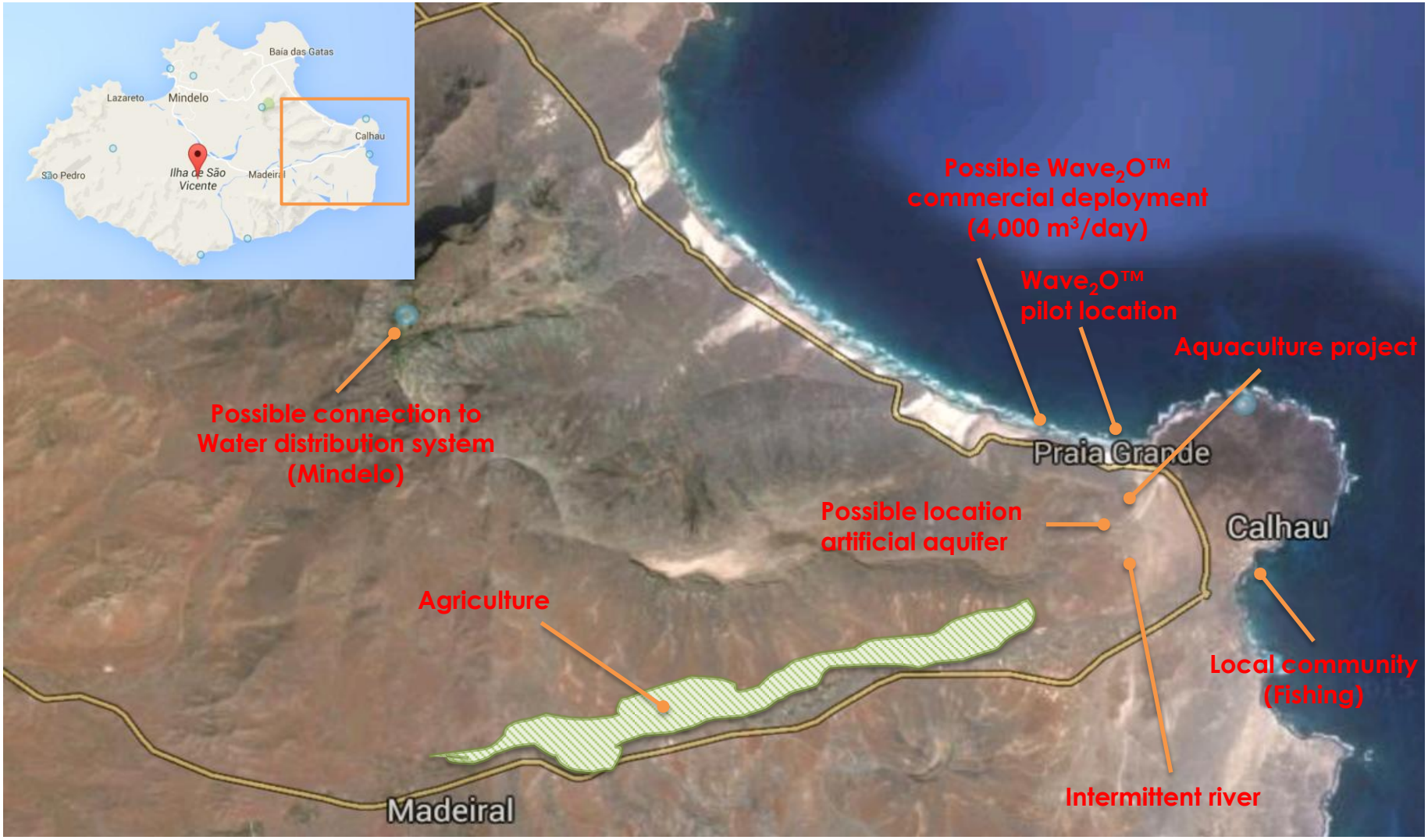
- WP1 – Site characterization of the bay of Praia Grande
  a) Incl. training of INDP personal + purchase of equipment for INDP
- WP2 – Technical/financial feasibility
- WP3 – Management: Recruitment of a local project and procurement manager to oversee project implementation including consenting.

WP1 - Depending on budget, the zone of study could expand beyond the pilot location



The proposed Praia Grande site can accommodate significant scaling up to a commercial-scale plant (4,000m³/day or more)

The pilot presents numerous opportunities for project expansion or integration into other components of local economy



THANK YOU!

"Whiskey's for drinking
Water's for fighting over"

Attributed to Mark Twain

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