

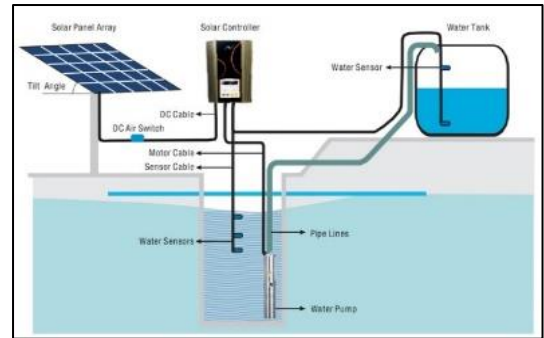


# POWERING WATER SYSTEMS WITH SOLAR ENERGY

## TECHNOLOGY DESCRIPTION

### TECHNICAL DESCRIPTION

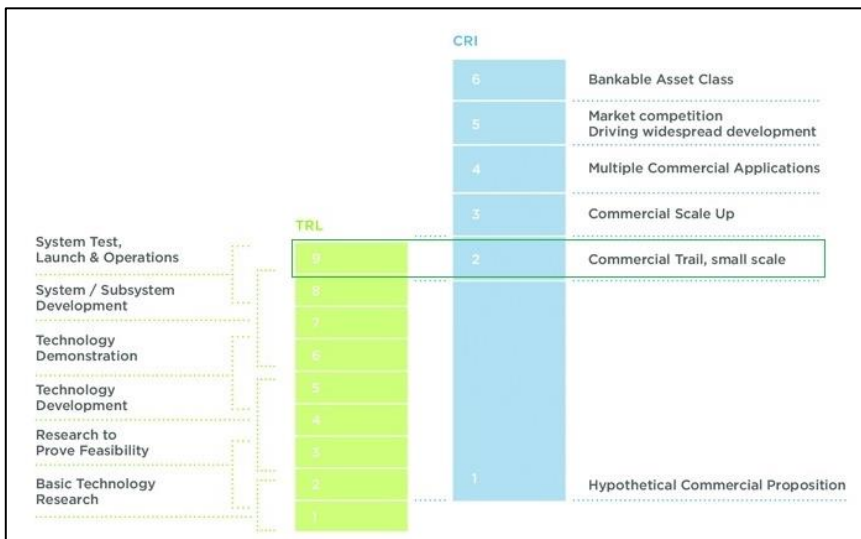
**Solar pumping systems** substitute grid electric and diesel powered water pumps, for specialized equipment run on energy generated by solar photovoltaic (PV) panels. Systems can vary in size and complexity, with *some* or *all* power requirements being met by solar generation, or alternately they can work in tandem with back-up generator and/or grid power. Some utilize batteries and a full array of DC<sup>1</sup> electronics, while in others power is inverted to AC<sup>2</sup> for continued use of standard equipment. Further, simple stand-alone systems only allow for pumping during daylight hours.<sup>3</sup>



Source: Lorentz P2S Solar Water Pump<sup>4</sup>

### CURRENT COMMERCIAL READINESS INDEX

The **Commercial Readiness Index (CRI)** is a framework used to assess the *commercial maturity* of the technology under investigation using six (6) indicators (*see figure*). It complements and is often used in tandem with the **Technology Readiness Level (TRL)** method which measures the technology's *technical* maturity.



**Solar pumping systems** are currently at **Level 2 small scale commercial trials** - which indicates that solar pumping has been limitedly tested in a few smaller commercial projects. While, solar-powered pumps have been installed for extraction and distribution, full-scale, 'off-the-shelf' units/systems are not marketed as an alternative to traditional electric or gas powered pumps.

\*CRI Level 1 indicates that solar pumping systems are in the 'limited' Deployment phase of Technology Readiness.

<sup>1</sup> Direct current

<sup>2</sup> Alternating current

<sup>3</sup> World Bank. 2018. "Solar Pumping: The Basics." World Bank, Washington, DC.

<sup>4</sup> Dr. Solar: Engineering the Solar Revolution. "Solar Water Pumping System for Your Home".



## CLIMATE RATIONALE OF THE TECHNOLOGY

In Antigua and Barbuda’s updated Nationally Determined Contributions (“NDC”), communicated to the UNFCCC in September 2021, there is a commitment that 100% of water supply infrastructure will be powered by their own grid-interactive renewable sources. This aims to ensure that there are limited interruptions to water distribution when the power grid is down, particularly following extreme climate events. While this NDC target focuses on reducing the fossil fuel consumption / dependence of the Water Utility, private citizens are also encouraged to consider transitioning to *solar* for their pumping needs. Residential and commercial property owners can install on-demand pumping systems that utilize battery storage, while resorts, private residential developments and the Utility are encouraged to invest in systems that invert solar power to alternating current (AC) for continued use of standard equipment – until such that that they choose to changeover to specializes solar pumps and accessories.

## AMBITION OF THE TECHNOLOGY

### SCALE FOR IMPLEMENTATION AND TIME-LINE

**Solar pumping systems** will be deployed in the residential, commercial, and agricultural sectors, with up to 5% of population and 10 small to medium sized farms being targeted to transition their pumping, distribution, and filtration (micro-, ultra-, nano-filtration and reverse osmosis) equipment to solar. To achieve this scale of adoption there will be specially defined incentive programmes – for retailers to stock equipment and private citizens to acquire units, along with an education training programme to upskill technicians to install and maintain systems when they become commercially available. The timeline to achieve this initial quantitative target is forty-eight (48) months with a budget of approximately USD 1 500 000 | XCD 4 032 300, and an expected private sector investment of USD 550 000 | XCD 1 478 510.

### AMBITION FOR COMMERCIAL READINESS INDEX

The proposed goal for commercial readiness after the four (4) year period is to achieve **Level 4 multiple commercial applications**, with potential for **Level 5 competitive market driven by widescale industrial acceptance**, which corresponds to the *deployment phase of technology readiness*. This represents the installation of solar-powered pumps and complementary filtration systems (*where applicable*) in up to fifteen hundred (1,500) residences or commercial buildings and on at least ten (10) farms.

## EXPECTED IMPACTS OF THE TECHNOLOGY

**Solar pumping** will provide off-grid systems that allow for quick on-streaming of water distribution from storage tanks, cisterns, surface water reservoirs and wells. This will be particularly convenient after an extreme climate event – prior to restoration of grid-power. These systems will reduce dependence on grid-power for daily water distribution and support farming operations with efficient, cost-effective, low maintenance standalone systems – particularly where farmlands are located in areas not serviced by grid power. Secondary effects include providing business and job opportunities for suppliers and service technicians and aiding in the achievement of NDC targets.



## POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

### EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

Antigua and Barbuda does not have currently have particular policies relating to solar (or other renewable technologies) specific to the water sector. However, the National Energy Policy speaks to increased adoption of renewable energy sources – including the use of solar photovoltaic panels, for water production. This is aligned with the national climate change adaptation targets that aim to offset water sector power demand with renewables. The National Energy Policy will be used to support the widescale introduction of **solar pumping** equipment for residential and commercial applications across the State.

### PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

The TAP does not specifically address the need for new policies or strategic plans to support the diffusion of **solar pumping systems**. However, a key institutional arrangement would be the establishment of Solar Water Professionals Business Association in close collaboration with the Antigua and Barbuda Chamber of Commerce. This group would provide a register of companies and experts that are vetted and approved for implementation. While, consumers will not be prevented from individually importing equipment, access to the incentive scheme and concessional financing provided through the DOE’s SIRF Fund<sup>5</sup> will be given preferentially to residents working with this collective. There is currently no national precedence that guides the introduction of new goods, and the market is traditionally self-regulating with retailers and consumers determining acceptable quality and price. However, residents have the recourse of accessing Antigua and Barbuda’s Prices and Consumer Affairs Division – the national consumer protection agency if there is a legitimate concern about the cost of a retailer’s goods or services.

### COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

The cost associated with the establishment of the Solar Water Professionals Business Association is estimated at USD 13 000 | XCD 34 950.

<sup>5</sup> Sustainable Island Resources Framework Fund



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## USEFUL INFORMATION

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### LINKS TO TNA REPORTS

<https://tech-action.unepdtu.org/country/antigua-and-barbuda/>