## Making the Business Case for Private Participation in SWAC & District Cooling

Private investors are paying closer attention to seawater air conditioning (SWAC) and deep-water district cooling, and the momentum is directly relevant to my recent work in Grenada, a low income and small island developing states (SIDS) country in the eastern Caribbean Sea.  What makes SWAC compelling for a PPP, is the combination of utility-grade, long-life marine infrastructure and predictable contracted revenues, paired with measurable decarbonization outcomes. In the right coastal districts, these systems routinely cut cooling electricity consumption by 80–95%, creating durable operating savings that translate into investment-grade cash flows over 20–30 years. As we build the business case for Grenada, the story is increasingly clear: with well-structured concessional funds to de-risk the marine asset and a pathway for private developers to finance and operate the system, SWAC becomes not only a climate-resilient solution for the country's tourism and public-sector loads but also a bankable opportunity aligned with global low-carbon infrastructure investment trends.

*In this blog, I lay down key fundamentals to make SWAC/district cooling a compelling business opportunity.*

While SWAC is comparatively new technology, it has been tested in several countries.  I highlight three such examples in Toronto (Canada), Tahiti (French Polynesia), and Honolulu (Hawai'i).

Toronto's Deep Lake Water Cooling system offers a mature example of an urban deep-water district cooling utility that has scaled through incremental customer connections. Enwave operates the system under a long-standing partnership with the City of Toronto, using shared water infrastructure governed by an Energy Transfer Agreement, a model that effectively blends public assets with private operation. Expansion continues through private capital, most recently a CAD 100 million investment to boost system capacity by 40%, reinforcing a PPP structure where major backbone CAPEX is privately financed and marginal "plug-in" customer connections benefit from low incremental cost.

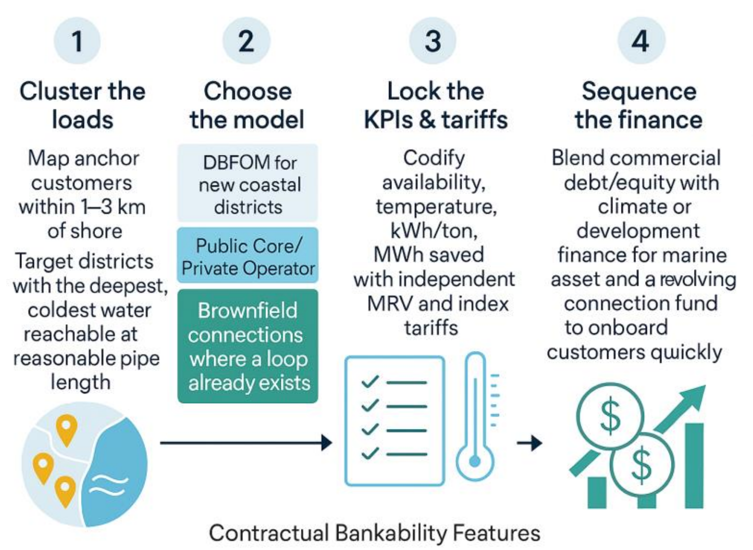
In French Polynesia, the Tahiti hospital SWAC system demonstrates how deep-ocean cooling can be deployed for mission-critical facilities using public-sector-led blended finance. The 6 MW installation cost XPF 3.7 billion (≈EUR 31 million), financed through a mix of ADEME grants, EIB and AFD concessional loans, and French Polynesia's own capital contribution. This public–multilateral financing model ensures long-term service reliability while achieving a dramatic 93% reduction in cooling energy use and over USD 3 million in annual electricity savings, with an estimated 8-year payback. Earlier systems in Bora Bora and Tetiaroa, albeit smaller but long-operational, reinforce SWAC's technical maturity across island environments.

In Hawai'i, studies of seawater district cooling for Honolulu's coastal districts show strong potential for large-scale energy savings and grid benefits. Environmental and feasibility analyses outline a system that could reduce cooling electricity consumption by up to 75%, serving downtown commercial loads through deep-water intakes, onshore pumping, and a distribution loop. While not yet built, the State has enabled a conducive PPP environment, including authorization of USD 145 million in special-purpose revenue bonds for planning, design, and construction, which is an early indicator of a financeable model centered on efficiency revenues and long-term service concessions.

Drawing from these cases, there are several features which make SWAC more attractive to the private sector, as follows:

- Bankable savings & contracted demand: Central plants using deep ocean/lake water displace most compressor work; customers buy chilled water under long-term Cooling Sales Agreements (CSAs). This model is proven at scale in Toronto, where Enwave's deep lake water system serves 100+ buildings, showing how anchor loads and dense customer clusters underpin stable revenues.
- High, verifiable efficiency: Peer-reviewed and field evidence report global coefficient of performance (COPs) often >25 and up to ~85 depending on design, an order of magnitude higher than split A/C, directly converting into lower kWh/ton and clear MRV (measurement, reporting, verification) for lenders and climate finance.
- Peak relief & mitigation value: On Oʻahu, analysis shows district seawater cooling in coastal districts could displace ~150–170 GWh/year compared to modern chillers, cutting peak-hour demand and reducing the renewable/storage build needed for full electrification. These system benefits can be monetized in PPPs via availability/capacity payments or tariff design.
- Resilience & blue-economy spillovers: Proper diffuser design and discharge depth minimize marine impacts, while SWAC eliminates cooling towers (saving water), frees rooftops for solar, and can co-locate with aquaculture or cold-chain industries leading to ESG attributes that help unlock sustainability-linked finance.

However, no two SWAC projects ever look exactly alike, and there's no single PPP model that fits every island, every coastline, or every customer mix. That's been especially clear through my recent work in Grenada. Each context brings its own bathymetry, anchor loads, risk appetite, and fiscal space, which means the structure must follow reality on the ground rather than the other way around. With that in mind, I've distilled the options for SWAC PPP into three broad modalities, each offering a different balance of public stewardship, private capital, and concessional support.



1. DBFOM Concession (Design–Build–Finance–Operate–Maintain)
   - When to use: New stand-alone coastal districts without an existing loop; clear anchor loads and enforceable connection plan.
   - How it works: A private SPV raises debt/equity, builds the seawater intake, plants, and distribution network, and sells cooling under long-term cooling sales agreement (CSAs). Government grants rights of way and permits; they may offer limited credit support. Developing countries may tap into concessional money from development financial institutions (DFIs) and climate funds.
   - Why investors like it: Single point of accountability; ringfenced cash flows; scalable to additional customers; robust security package for lenders.
   - Precedent logic: Mirrors mature district-energy concessions and the growth pathway seen in Toronto (albeit with lake water).
2. Public Core / Private Operator (Lease-Operate)
   - When to use: Where public or concessional funding can lower weighted average cost of capital (WACC) for the “hardest to finance” marine line and shore station, but private O&M is desired.
   - How it works: Public owns the intake and core plant; the private partner leases and operates the system, collects CSA revenues, and meets key performance indicators (KPI) linked service standards.
   - Why investors like it: Lower capital stack risk; clearer downside protection; performance upside remains via bonuses and shared-savings.
   - Precedent logic: Aligns with SIDS financing where public climate funds or development credits reduce first-costs; compatible with EERF for customer retrofits and connections.
3. Brownfield Expansion via Connection Agreements
   - When to use: A loop already exists (e.g., a pilot downtown circuit).
   - How it works: Private operator finances and connects new buildings to the existing backbone using standardized connection charges and building-side retrofit financing.
   - Why investors like it: Lower marginal CAPEX, fast load aggregation, visible EBITDA ramp.
   - Precedent logic: Enwave’s incremental customer connections in Toronto.

Whichever path countries pursue, the real foundation of bankability lies in the contract with practical, often invisible provisions that allocate risk, secure predictable revenues, and give investors’ confidence that the system will perform over decades. Many are standard in energy service companies (ESCOs) and district energy projects. I have made some suggestions as follows:

- Take-or-Pay / Capacity Reservation under the cooling sales agreement (CSA): Each anchor customer pays for reserved tons of cooling, regardless of draw, ensuring base revenue for debt service.

- Availability & Temperature KPIs: Availability ≥ 98% and supply temp 6–7 °C ±0.5 °C; failure reduces the operator's availability payment or triggers rebates, aligns incentives with reliability/comfort.
- Efficiency & Mitigation MRV: Independent verification of kWh/ton, MWh saved vs. baseline, peak-kW reduced, and $tCO_2e$ avoided (quarterly/annual). This is key for climate funds, green-linked loans and results-based finance.
- Tariff Formula & Indexation: Transparent tariff tied to inflation and power price indices, with shared-savings if the operator beats baseline pump/distribution energy targets, aligning upside.
- Connection & Expansion Commitments: Government commits specific public loads (airport, hospital, commercial buildings) by milestone dates; the operator commits a phased connection plan within a defined service area, locking demand density.
- Environmental & Marine Safeguards: Contracted diffuser design, discharge depth, thermal plume limits, and monitoring with adaptive management. This will de-risk permits and ESG scrutiny.
- Resilience Standards & Force-Majeure: Hurricane-rated anchoring, buried technical rooms, redundancy, and black-start procedures; clear relief and recovery timelines.
- Lender Step-In & Cure Periods: Ensures continuity of essential service and protects collateral; lowers financing costs.

In the end, what draws private partners to SWAC, and deep-water district cooling isn't just the engineering or the elegance of tapping the ocean's cold but it's the promise of a different kind of infrastructure future. These systems generate long-term, contracted cash flows anchored in something tangible: real, metered energy savings and verifiable emissions reductions. And when you look across the world, the pattern is unmistakable. Toronto shows how replication breeds confidence; Tahiti proves resilience in the most demanding settings; Hawai'i demonstrates the system-level value for islands striving to electrify and decarbonize at the same time. Together, they sketch a horizon where sustainable cooling becomes both a climate solution and an investable asset class. For Grenada and for many islands like it; the opportunity isn't just ready to scale; it's already taking shape.