Wattershed®

TECHNOLOGY: High Temperature Superconducting (HTS) wire transmits electricity with zero losses to resistance. In the past decade, HTS transmission technology emerged from corporate, university, and national labs, to prove itself in High Voltage Direct Current (HTS-HVDC) demonstration projects. In order to maintain its superconductivity, HTS cable must remain at or below the temperature of liquid nitrogen (77 Kelvin). So HTS-HVDC cables are kept under a constant flow of liquid nitrogen inside a vacuum-insulated pipe (or "cryostat"). HTS-HVDC transmission holds the promise to transform the electric grid, able to move huge amounts of power in small cables over very long distances — even across oceans — with no losses.

COMPANY: *Wattershed* will make HTS-HVDC seaworthy, by combining this fundamental breakthrough in material science with proven innovations from the offshore oil and gas industry. Wattershed's patent (U.S. Patent No. 8,655,496) takes advantage of the time-phase shift between demand curves across eight or more time zones. Idle capacity at night or stranded intermittent renewables on one grid (or one continent) will find a demand load on another grid. The company will initially connect regional grids along the coastlines, and ultimately connect continents. In North America and Europe, 60%-75% of generation and transmission assets sit idle during off-peak hours, while India and China suffer brownouts from lack of supply, and post-Fukushima Japanese customers pay peak pricing of $.49/kWh. North America wholesale electricity markets offer idle clean supply and stranded renewable supply for $.02/kWh off-peak and $.04-$.06/kWh almost any time. Wattershed could deliver it across the Pacific at a levelized transmission cost of $.03/kWh. Wattershed cable will enable movement of dynamic energy resources seamlessly and efficiently, increasing the supply of clean energy.

OBJECTIVES: Before crossing oceans, Wattershed will connect major coastal substations, adding transmission capacity and resiliency to regional grids. California offers an optimal proving ground. In just 500 kilometers (illustrated below), Wattershed could connect the state's four largest utilities at substations with 2 to 3 gigawatts of capacity each: from San Onofre (SDG&E) to Long Beach (SCE and LADWP) to Oxnard (SCE) to Diablo Canyon (PG&E). Connecting the Hawaiian Islands offers a perfect test case for Wattershed's trans-oceanic subsea HTS-HVDC cable. Connecting the inner islands (O'ahu, Maui, Moloka'i, Lana'i) separated by shallow waters presents a challenge similar to connecting grids along continental shelves along the coasts. Connecting the outer islands of Kauai and Hawaii would require a deep-water solution similar to stretches of the Pacific and North Atlantic.

TEAM: Wattershed has partnered with Hawaii's Makai Ocean Engineering on sea floor mapping, and the Southwest Research Institute of Texas on the Concept Design Audit, prototyping, and pressure testing. Our management and advisory team includes the inventor and serial entrepreneur who graduated twice from Stanford with top honors, the leading physicist in superconductor manufacturing, the former head of business development for American Superconductor, the marine architect who helped stabilize an ocean barge for the SpaceX rocket landing, the head of McKinsey's Global Infrastructure Initiative, and entrepreneurs with backgrounds in finance, infrastructure, and renewable energy.

ASK: Wattershed seeks partnership opportunities with utilities, universities, national laboratories, states, and the federal government. Our team is eager to complete a proof of concept and prototype the subsea cable in a valid test setting, such as the Wave Energy Test Site at Marine Corps Base Hawaii. We believe that this technology could be transformational — for improving the resilience of our national grid, for increasing penetration of clean energy resources by removing the constraint of local demand on intermittency, and ultimately for wheeling energy around the world and improving the lives of billions in developing countries while helping avoid the build-out of coal plants to satisfy growing demand in China and India – all with an investment in U.S. innovation that can change the way our world moves energy.