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The SAGE4CAN project: The use of shallow geothermal energy from oceanic volcanic islands

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The use of shallow geothermal energy (SGE) resources in oceanic volcanic environments entails additional challenges when compared to continental sedimentary/plutonic settings. The efficiency of shallow geothermal heat exchangers heavily depends on the geology and hydrogeology of the terrain where are placed. Volcanic rocks in small oceanic islands (<5,000 km^2) are the result of volcanism, erosion, and tectonic collapse. All these processes conform highly heterogeneous formations with complex hydrogeology whose thermal response to shallow geothermal systems requires a good understanding of heat transfer in such environments. The SAGE4CAN project will concentrate on SGE resource assessment taking into account heterogeneity characteristic of volcanic formations, both at local and insular scale. To this end, the Canary Islands are selected as representative volcanic oceanic islands, to define SGE implementation barriers including but not limited to (1) heterogeneities of thermal properties intrinsic to volcanic formations (volcanic dikes, red layers, landslides, etc.), (2) heat advection in the context of complex groundwater flow in the unsaturated (dominate in midlands and highlands) as well as in the saturated medium (coast), (3) enhanced geothermal gradients, (4) transient effects of urban and volcanic activity, (5) heating and cooling demand, (6) shallow geothermal energy installations design and optimization, as well as (7) energy transition strategies in energy-dependent islands. The SGE4CAN project will investigate novel approaches to overcome such boundary conditions of oceanic volcanic islands in the estimation of the renewability of the resources, developing novel procedures to conduct cost-efficient and open-access Thermal Response Tests (TRTs), investigate the performance of existent SGE systems, assessing environmental impacts associated with SGE use. The knowledge generated from this project will be used on its final stage to identify adequate strategies for the integration of SGE into heating and cooling policies and action plans, as well as to raise awareness about the

technology so that it gets recognition.