



DES2iRES: A web-GIS platform to support public authorities and investors in strategic planning of desalination plants powered by renewable energy sources.

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Drought constitutes one of the major impacts of global climate change in the Mediterranean region, leading to freshwater scarcity. This problem is more evident in eastern Med regions especially during the summer time when the population grows exponentially due to tourist activities. On the other hand, the Med region presents substantial renewable energy source potential to power critical infrastructures and secure energy efficiency.

This work focuses on the web_GIS module of the DES2iRES platform that consists of three independent but interoperable modules (GIS, Geostatistical and Optimization). All modules collaborate to inform in minimum time the users about the optimal design of desalination plants powered by renewable energy sources based on their preferences. Solar, wind and wave energy sources are taken into consideration. DES2iRES platform incorporates advanced geostatistical tools and an optimization algorithm for optimal design of the desalination plant.

The sequence of operation of DES2iRES is as follows: (1) The user selects the type of renewable energy source that wants to power the desalination plant, (2) the type of desalination plant, (3) the technologies and specific hardware that may be used (PV models, battery charges, wind generators, DC/AC converters, batteries, etc.), (4) the water demand profile and (5) the location where the desalination plant is to be established. Upon retrieval of the request, the DES2iRES web-GIS triggers the other two modules: Geostat to implement spatiotemporal geostatistical analysis of the existing ground meteorological data and/or models for the user-defined location and the Optimization module to apply the respective algorithm and design the desalination plant. The outcome of the design is automatically sent to the user via email.

This end-to-end process is entirely controlled and supervised by the web-GIS that relies upon cutting edge geospatial and non-geospatial technologies to share geospatial data and allow asynchronous tasks for processing and data dissemination. Developed under open geospatial standards of OGC, DES2iRES web-GIS module is easily expandable to include more renewable energy sources, diverse desalination technologies and meteorological data and models.

One of the most important features of DES2iRES platform is that it permits the users to enter and store their own parameters and configurations, other the ones already integrated in the respective database, including ground meteorological data series of a specific location.

At the moment, DES2iRES is accessible via the address <http://desires.tuc.gr/> and is operational for two pilot areas in Greece and Tunisia. Nevertheless, the inclusion of more data for the entire Mediterranean region is envisaged to take place in the near future. We are confident that DES2iRES is a powerful tool for public authorities and investors to perform strategic planning in critical infrastructures that assure water and energy efficiency.

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