



# Renewable Energy Resource Data for Power Project Development in the Kingdom of Saudi Arabia

Power project developers and financiers want data that is accurate, verifiable, and easy to use. And that's what K.A.CARE is building through its Renewable Resource Monitoring and Mapping Program.

## Why is a Renewable Resource Atlas needed?

The current state of knowledge on renewable resource characteristics in Saudi Arabia is not adequate to support power project development, research, and policy and planning. For example, solar power project developers need to understand the monthly, daily, and even sub-hourly patterns of solar resources, which are heavily impacted by dust levels and clouds, to support project siting and design. Researchers also need to understand dust levels and solar spectral information to design coatings and cleaning methods for power installations, and optimize the power conversion technologies for Saudi Arabia's unique environment. The data in the Atlas will support achievement of Saudi Arabia's sustainable energy mix targets. The Atlas has been launched as part of K.A.CARE's Renewable Resource Monitoring and Mapping Program, to support users such as power project developers and financiers, researchers, government organizations, industry, educators, and the general public.

## How do I use the Renewable Resource Atlas?

The Atlas consists of a web portal that can be accessed at [rratlas.kacare.gov.sa](http://rratlas.kacare.gov.sa). The portal has general information on renewable resources and likely users as well as an interface which allows mapping, graphing, and downloading of datasets. Begin by reviewing the Getting Started section of the Help Page, or watch a short User Tutorial video.

## What is contained in the Renewable Resource Atlas?

The Renewable Resource Atlas of the Kingdom of Saudi Arabia is an online data portal developed by King Abdullah City for Atomic and Renewable Energy (K.A.CARE) which contains the most up-to-date and comprehensive information on renewable energy resources in the Kingdom. The Atlas currently contains extensive information on solar resources, plus limited information on wind resources:

- The solar resource and associated meteorological data come primarily from a newly operational network of approximately 70 ground-based monitoring stations around the Kingdom, which began to be installed in 2013 and will be complete in early 2014. Data for selected stations and time periods from a historical solar resource monitoring network operated by King Abdulaziz City for Science and Technology (KACST) are also included in the Historical Comparisons tab in the graphing interface.
- The Atlas also contains modeled solar and wind resource information, based primarily on satellite datasets.
- The Atlas contains wind resource data (at 100-m height) from a single wind monitoring mast, and this dataset will be expanded to include additional mast locations in 2014.

Additional datasets within the Atlas, such as roads and the electric grid, help provide context for the resource data. Beyond some basic statistics on waste generation in the Kingdom, data on geothermal and waste-to-energy resources are not yet available in the Atlas.



As part of its mission to establish a sustainable energy mix for the Kingdom of Saudi Arabia, the King Abdullah City for Atomic and Renewable Energy (K.A.CARE) is conducting the Renewable Resource Monitoring and Mapping (RRMM) Program.

The RRMM Program will collect spatial renewable energy resource assessment data and make it available via an online Renewable Resource Atlas for KSA.

## The Program Behind the Atlas

K.A.CARE's Renewable Resource Monitoring and Mapping (RRMM) Program, as the name suggests, focuses on monitoring and mapping the renewable energy resources in the Kingdom. The findings of the RRMM Program have been used to establish this online Renewable Resource Atlas. The RRMM Program also includes the operation, calibration, and maintenance of a newly deployed solar resource monitoring network, and collaboration for development of a wind resource monitoring program, throughout the Kingdom. Waste-to-energy and geothermal resources will receive increased attention in the Atlas as the RRMM Program expands. The RRMM Program leverages the collected data to provide useful analysis to a host of stakeholders, and also engages in outreach to data users and providers and with the international renewable resource community, including the International Renewable Energy Agency (IRENA).

RRMM Solar Monitoring Stations



Source: DeLorme World Base Map 2010, DeLorme Publishing Company, Inc. Station data added by Battelle, via K.A.CARE

Partnerships with a wide variety of organizations are critical to the success of the RRMM Program. Many universities, technical colleges, and technical institutes serve as solar resource monitoring station hosts, along with several government partners including the Saline Water Conversion Corporation (SWCC) and the King Abdulaziz City for Science and Technology (KACST). Many Saudi government agencies also contribute datasets and expertise to the Atlas. Among the major organizations that are expected to benefit from the Program are universities, research institutes, project developers, project financiers, and governmental/semi-governmental organizations.

The RRMM Program will support a gradual replacement of conventional energy sources, such as oil, coal, and other fossil fuels, with renewable energy resources, towards a target of renewable energy supplying 50 percent of the Kingdom's energy needs by 2032.

## About K.A.CARE

King Abdullah City for Atomic and Renewable Energy (K.A.CARE) was established by Royal order A/35 of H.M. King Abdullah bin Abdulaziz Al Saud on 17th April 2010 with the fundamental aim of building a sustainable future for Saudi Arabia by developing a substantial alternative energy capacity fully supported by world-class local industries. Currently operating out of a headquarters office in downtown Riyadh, K.A.CARE is making plans to develop a state-of-the-art campus or "city" outside of Riyadh over the next several years. This City will serve as a focal point of research, development, testing, and deployment of solar, wind, geothermal, waste-to-energy, and nuclear technologies and projects.

Saudi Arabia has a rapidly growing population that places ever-increasing pressure on the country's non-renewable hydrocarbon resources. It was, therefore, concluded that alternative, sustainable, and reliable resources of energy for generating power and producing desalinated water should be introduced that will reduce consumption of the nation's fossil fuel reserves. It also was determined that a balanced energy mix of alternative and conventional energy is strategically important to Saudi Arabia's long-term prosperity, energy security, and its leading position in the global energy market.

Following extensive technical and economic analysis, the decision has been taken to introduce atomic and renewable energy for a significant portion of Saudi Arabia's future energy mix. The two sectors will provide substantial capacity, advanced technology, and efficient use of resources and will be fully compliant with international best practices, conventions and treaties. Fulfillment of this decision enables the Kingdom to plan for increased demand for power and desalinated water while ensuring that the rate of national development continues. The introduction of alternative resources now places Saudi Arabia at the forefront of the development and utilization of atomic and renewable energy while providing numerous opportunities for national and international private sector companies to grow their businesses in the Kingdom, and Saudi nationals to enhance their knowledge and skills.

