The IRENA Global Atlas for Renewable Energy

OGC Energy & Utilities Summit
Harnessing the Power of Geospatial Information for Smart Energy Communities and Utilities
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The Global Atlas facilitates access to renewable resource data, analysis and methods in order to accelerate the initiation and development of a broader range of renewable energy projects.

“IRENA’s Renewable Energy Prospector”

- Provide free resource data for all
- Shorten the project life cycle
- Optimize development and cut costs

Support SDG goals
When is the Global Atlas used?

Global Atlas maps can help identify the best general areas for project siting.

Tools and data support prescreening and pre-feasibility analyses by estimating project output and helping attract investors.

Investors can use estimated outputs and resource maps to cross-check developer proposals.

Bankable data is needed here. The Global Atlas can help connect developers with sources of this data.

Better resource data reduces risk over the life of the project, increases valuation and speeds up the process.
Who Uses the Global Atlas?

- Policymakers and Governments
- City and energy planners & land administrators
- Developers and business leaders
- Modelers and analysts
- Educators

How big?
Where?
How much?
Where is the data?
How can I learn?
How the Global Atlas Works

What you see

What is happening

Who’s making it happen

Over 2000 datasets available!

Partner Countries
How the Global Atlas Works

Figure 1. Global Renewable Energy Atlas architecture
Where does the data come from?

Data layers, visualization and analytical tools, in one platform
Where does the data come from?

Online prospection of RE opportunities
Dealing with complexity to help decision making
Derivative output: potentials in numbers

Wind On-grid - suitability above 60%

Solar On-grid - suitability above 60%
Derivative output: technical potentials

Solar potential in gigawatts (GW)
- 60%-70%
- 70%-80%
- 80%-90%
- 90%-100%
- TOTAL

Estimated potential for grid-connected and utility-scale off-grid solar PV across Latin America by sub-region, expressed in gigawatts (GW) and United States dollars (USD). The suitability threshold is 60%, with output indicated for a grid distance of 75 km.
Solar maps

3TIER's Global Solar Dataset provides average annual GHI at a 3km spatial resolution.

Esmap – world bank solar map

www.irena.org/globalatlas
Advanced wind analysis tools
Which Map Should I Use?

Global Technology Maps

Global Wind Atlas

3TIER/Vaisala Solar Map

Bioenergy

Tidal currents
Which Map Should I Use?

Geothermal Maps

Heat Flow data

Gravity Disturbance

Bouguer Anomaly
Which Map Should I Use?

Regional and Country Maps

Solar Med Atlas – Middle East and North Africa

Wind map of the Phillipines

ESMAP Country Maps

West Africa Solar and Wind
Suitability Studies

• Pre-packaged analysis for high-level users

• Each square km is scored based on:
  ▪ Resource strength
  ▪ Grid distance
  ▪ Population density
  ▪ Topography
  ▪ Land cover
  ▪ Protected Areas

• Three regions completed to date
  ▪ Latin America
    • Investment Opportunities report
    • Map # 2012
  ▪ GCC
    • Investment Opportunities report
    • Map #2146
  ▪ Southeast Europe
    • Map #2411
Global Atlas 3.0 – New map gallery

Published Maps:
- Solar irradiation across Africa, Europe and Latin America in 2005
  - Best use: Policy, Potential
  - Preview
- NOVELTIS' Global marine tidal currents
  - Best use: Policy
  - Preview
- DTU Global Wind Atlas 1km resolution
  - Best use: Business, Policy
  - Preview
- Global Solar Atlas - ESMAP
  - Best use: Business, Potential
  - Preview

Published Tools:
- Concentrated Solar Power (CSP)
- IRENA Wind Data Viewer
- Multi Point Solar Irradiation Data
  - Potential Calculator for Norway
Bioenergy Simulator

Global Atlas
FOR RENEWABLE ENERGY

A tool for bioenergy simulation

More

- Crops
- Agricultural Residues
- Livestock Waste
- Forest Plantations

In partnership with:
Masdar Institute
Bioenergy Simulator
Bioenergy Simulator

CROP DATA

Selected Area (ha)
10

Crop
Sunflower

Harvested product (Please select a crop from above)

Seed

Average crop yield (t/ha)
Select a value: Default - Rain-fed crop

- High inputs: 1.4
- Intermediate: 0.9
- Low inputs: 0.4

Moisture content (%)
Default: 0

Oil content (%)
Default: 44

The selected area does not contain any Protected or Water Stress areas

Information
The selected area contains
- Maximum value of population density of 127 people per km² (LandScan 2014 Global Population Database - Oak Ridge National Laboratory)
Bioenergy Simulator

**TECHNOLOGY**

**Bioenergy end-use**
- Electricity

**Bioenergy conversion technology**
- Biodiesel - engine

**Overall energy efficiency of the selected technology**

- Oil extraction efficiency (%)
  - Default: 85

- Overall electrical efficiency
  - Default: 0.35

- Overall thermal efficiency
  - Default: N/A

**TECHNOLOGY INFORMATION**

**Biofuel used**

Biodiesel is primarily a mixture of Fatty Acid Methyl Esters (FAME) made from vegetable oils, animal fats or recycled greases. It is produced mainly through a chemical process called transesterification, in which fat/oil is reacted with an alcohol in the presence of a strong base catalyst. The resulting products are biodiesel and glycerol. Oil extraction efficiency is assumed to be at 85% of the total oil content of seeds. However, users can edit this parameter using their own values.

**Bioenergy conversion technology**

An internal combustion engine (ICE) is a heat engine where the combustion of a fuel occurs with an oxidizer (usually air) in a combustion chamber. An ICE can be fed with fossil fuels such as gasoline, diesel, natural gas or with renewable energy sources such as biodiesel, bioethanol, biomethane and vegetable oils.
SUMMARY OF THE SELECTED BIOENERGY SUPPLY CHAIN

Type of crop      Sunflower
Biomass feedstock Sunflower seed
Biofuel produced  Biodiesel
Bioenergy conversion technology Biodiesel - engine
Bioenergy end-use  Electricity

RESULTS

Land area        10 ha
Crop average yield 0.9 t/ha
Total crop production 9 t
Biodiesel yield: 382.5 L/ha
Biodiesel total production: 3,825 L
Bioenergy yield 12,005 GJ/ha
Total bioenergy production 130.05 GJ
Gross electricity production 12,745 MWh
Gross heat production N/A

POSSIBLE APPLICATION OF THE POTENTIAL BIOENERGY PRODUCTION

Considering that the average annual electricity consumption in Portugal is 4.8 MWh per capita (The World Bank, 2010 - 2013), the estimated electricity production could supply n. 3 person(s)/year.
Bioenergy Simulator - architecture

- Irena Global Atlas
- GAEZ Datasets
- Protected areas, food security risk, water scarcity, high population density etc
- WPS 1: Biomass Supply for the selected area
- WPS 2: Warning notice for the selected area
- GeoServer
- WPS 3: Crops
- WPS 4: Agricultural residues
- WPS 5: Livestock waste
- WPS 6: Forests

API
- Public (user interface)
  - Crops
  - Agricultural residues
  - Livestock waste
  - Forests
  - Feedback
- Restricted (backend)
  - Crops
  - Agricultural residues
  - Livestock waste
  - Forests
  - Feedback

User Interface
- Sencha
- OpenLayers 3

Backend Interface
- Sencha

SQL Database
Global Atlas Mobile App!

Available on:
- Windows
- iPhone
- Android
- Blackberry

GlobalAtlas pocket Mobile App

Available on the App Store

Android App on Google Play

Available on Blackberry and other Smartphones