The IRENA Global Atlas for Renewable Energy

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GEO-XIV Plenary

Side Event: GEOSS, Renewable Energies, research community and commercial sector: GEO Vision for Energy Initiative

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“IRENA’s Renewable Energy Prospector”

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.

Support SDG goals

- Provide free resource data for all
- Shorten the project life cycle
- Optimize development and cut costs
When is the Global Atlas used?

- Bankable data is needed here. The Global Atlas can help connect developers with sources of this data.
- Tools and data support pre-screening 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.
- Global Atlas maps can help identify the best general areas for project siting.

**Renewable energy project development process**

- Prospecting opportunity areas
- Site selection & prescreening
- Feasibility analysis
- Design and development
- Financing
- Construction & Operation

Better resource data reduces risk over the life of the project, increases valuation and speeds up the process.

*Renewable energy project development 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

Partner Countries

Over 2000 datasets available!
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

Layers Map view Interactive legend Time series Suitability areas Energy calculations
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.
Esmap – world bank solar map
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
Bioenergy Simulator

Global Atlas
FOR RENEWABLE ENERGY

A tool for bioenergy simulation

- Crops
- Agricultural Residues
- Livestock Waste
- Forest Plantations

In partnership with:
Masdar INSTITUTE
Bioenergy Simulator
Selected Area (ha): 10
Crop: Sunflower
Harvested product: Sunflower
Average crop yield (t/ha):
- High inputs: 1.4
- Intermediate inputs: 0.9
- Low inputs: 0.4
Moisture content (%): Default
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)
**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**

Biofuel 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.
Global Atlas Mobile App!

Available on:
- Windows
- iPhone
- Android
- Blackberry

GlobalAtlas *pocket* Mobile App
Thank you

www.irena.org/globalatlas