The Global Atlas for Solar and Wind Energy

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Knowledge for Tomorrow

Political Background

- The Major Economies Forum (MEF) is an alliance of the 19 large industrial countries within the climate negotiations and is headed by the US.

- The MEF decided to draft Technology Action Plans (TAP) on different technolgoies for COP 15, among them two for solar and wind energy. The solar work was headed by Germany and Spain

- The next step is the implementation of the TAP. It was decided to work on two action items of the solar and wind TAP: Capacity Building and a global solar and wind energy atlas

- The political process is now split:
  - MEF: climate related issues
  - CEM: Clean Energy Ministerial (started with the ministerial meeting in Washington DC): Clean Energy Topics
  - Follow ups, April 6th/7th 2011 in Abu Dhabi, 2012 London.
  - The processes are open to additional countries

Historic evolution

- Project started out as a CEM initiative with the lead countries Germany, Denmark and Spain in 2010

- Set up of a governing structure after CEM WG Meeting in Summer 2011
  - IRENA acts as the secretariat of the initiative
  - Steering Committee composed of Lead Countries, IRENA, UNEP and DLR (Technical Coordination)

- Presentation of the Global Atlas at CEM3 in London

- The Global Atlas is one of the key initiatives of IRENA

- SWERA data sets are available as web-services

- User interface is available as a prototype, first version to be presented at the IRENA General Assembly in Januar 2013.

The Global Atlas vs. A Global Atlas

- A truly international initiative to jointly develop the reference for Solar and Wind potentials

- Building on the existing systems and databases and available knowledge
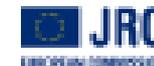
Contents of the Atlas

- Resource data (Solar and Wind)

- Georeferenced environmental data

- Policy information

- Socio-economic data

- RE technology data

- Collaborative platform for exchange of best practices

Possible Target Groups

- Policy makers, public agencies and governments

- The energy modeling community and global impact assessment models

- NGO's and academic institutes

- Industry and investors

- The general public

- Grid operators and utilities

Building the global Atlas

- Develop data which is not yet available
    - Global high resolution solar data set
    - Global high resolution wind data set

- Many elements are available as single services
    - REN21 (Interactive map), REEGLE, PVGIS, SolarGIS, NASA (SSE) Surface Solar Energy data Set, World Bank
- This information needs to be linked and integrated

Collaborative Information Systems

Implementation Design

- 3 Working Streams
  (the wording "streams" illustrate the continuous nature of the work)

  - **Stream 1: End-user and stakeholder involvement**
    Specify end user needs for data and web portal; linking to capacity building

  - **Stream 2: Data development and compilation**
    Provision of the various data sets, solar, wind, geographical, policy, socio-economic, technology, statistics

  - **Stream 3: Data provision through web portal and mapping tools**
    Initial user interface version 0, collaborative information systems, tools, improved user interfaces

Summary of Global Wind Atlas project

The global wind atlas objectives are:

- provide wind resource data accounting for high resolution effects
- use microscale modelling to capture small scale wind speed variability
- use a unified methodology
- verify the results in representative selected areas
- give comprehensive uncertainty estimates
- publish the methodology to ensure transparency

- be applied for aggregation and upscaling analysis and energy integration analysis for energy planners and policy makers

SRREN report: range tech. pot. 19 – 125 PWh / year (onshore and nearshore)

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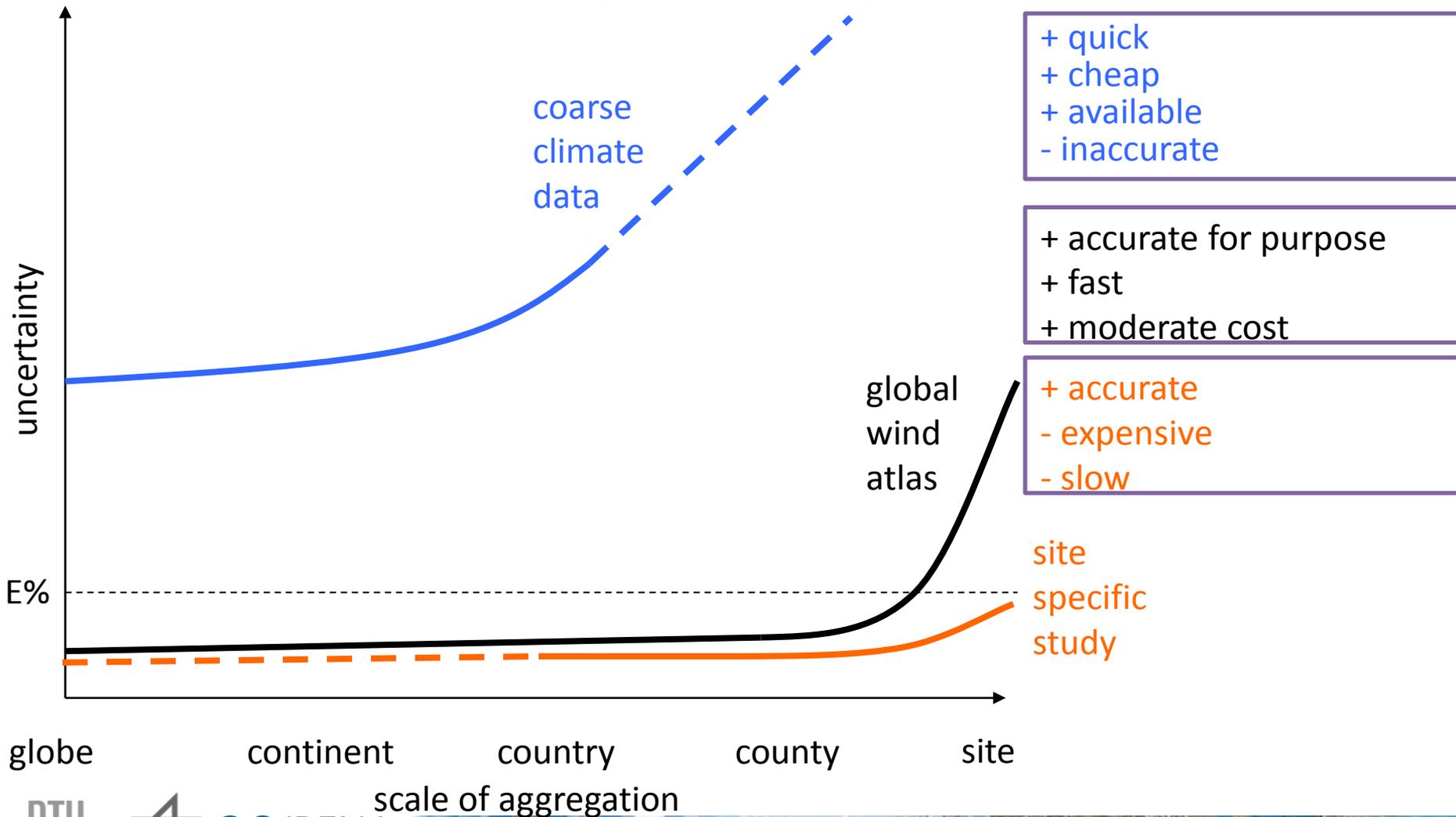IRENA
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Wind Project Overview
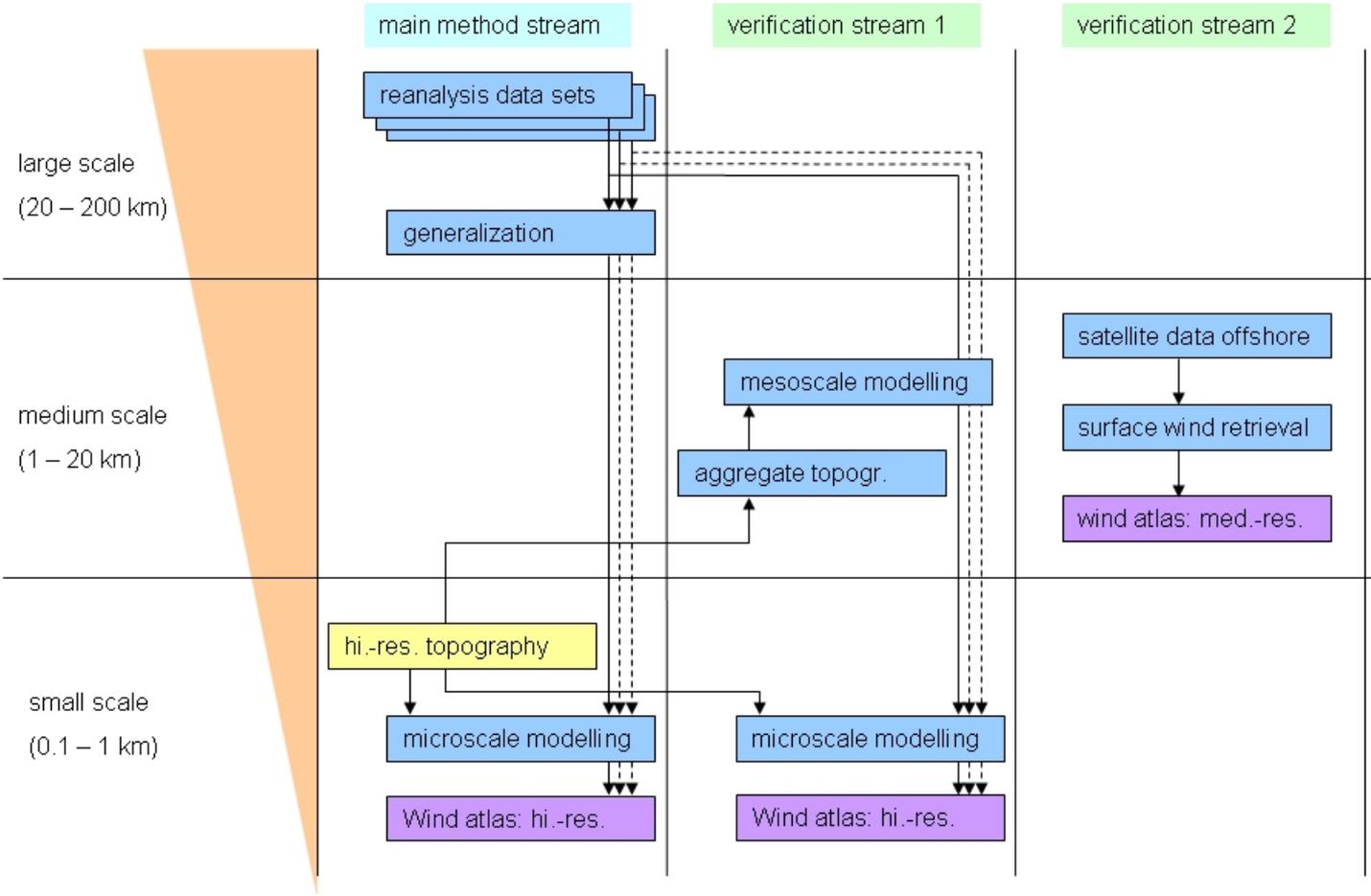
Aggregation

Schematic graph showing uncertainty as function of scale of aggregation
for various wind resource mapping methodologies

coarse climate data

+ quick
+ cheap
+ available
- inaccurate

+ accurate for purpose
+ fast
+ moderate cost

global wind atlas

+ accurate
- expensive
- slow

site specific study

uncertainty

E%

globe   continent   country   county   site

scale of aggregation

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Time Table for the Wind data

- Year one completion of input data 2/2013. We are using a 4-5 test case regions for testing/validating the methodology, including Columbia Gorge region in collaboration with NREL. This is testing/validation exercise is running from now and result will be coming out autumn and spring.

- Year two completion (2/2014) of main part of global coverage - but not published yet. Some smaller areas will probably be released for testing.

- Year three completion and publication and open access to global results (2/2015).

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Summary

Discover the true global wind resource and make it available for all
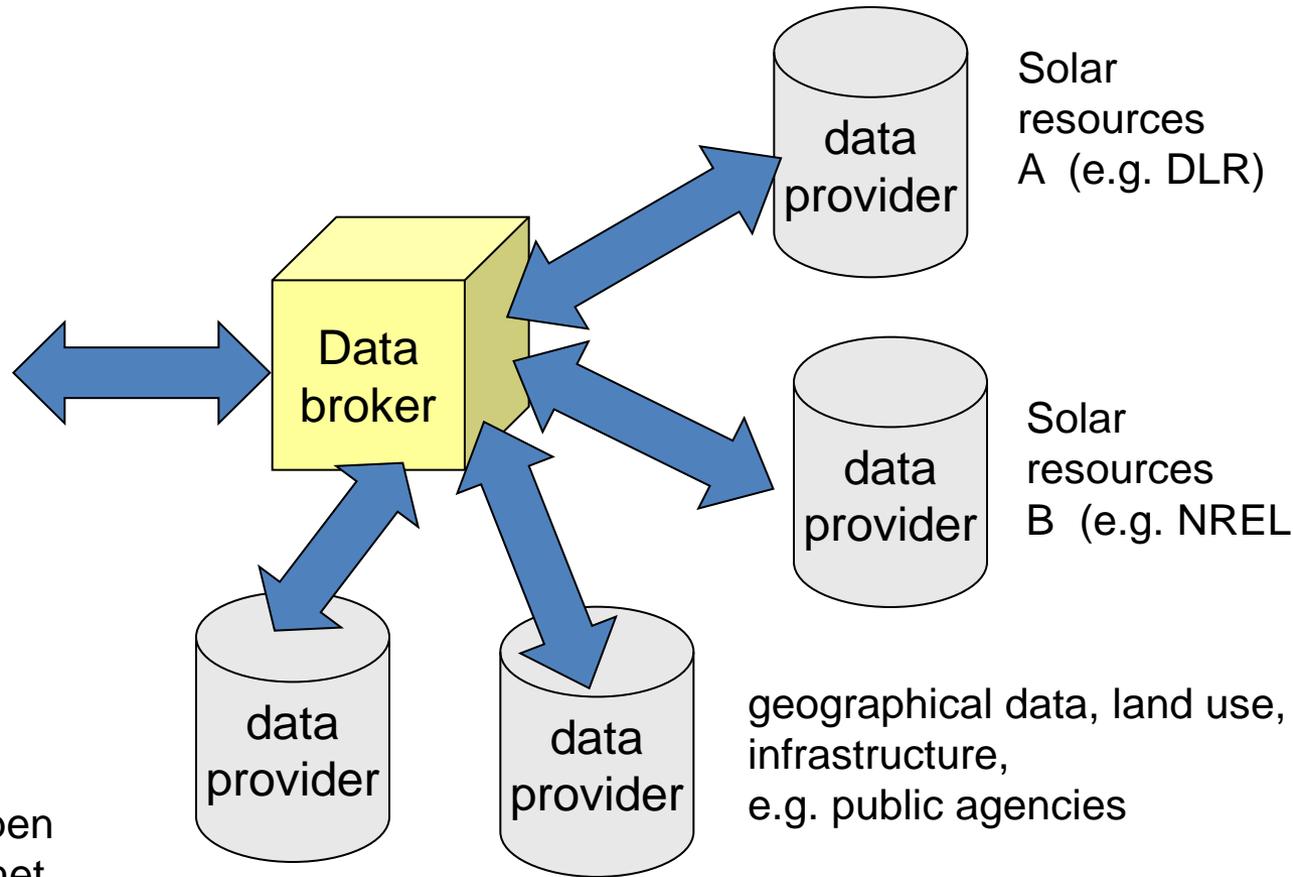
- provide wind resource data accounting for high resolution effects
- use microscale modelling to capture small scale wind speed variability
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- verify the results in representative selected areas
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- **be applied for aggregation and upscaling analysis and energy integration analysis for energy planners and policy makers**

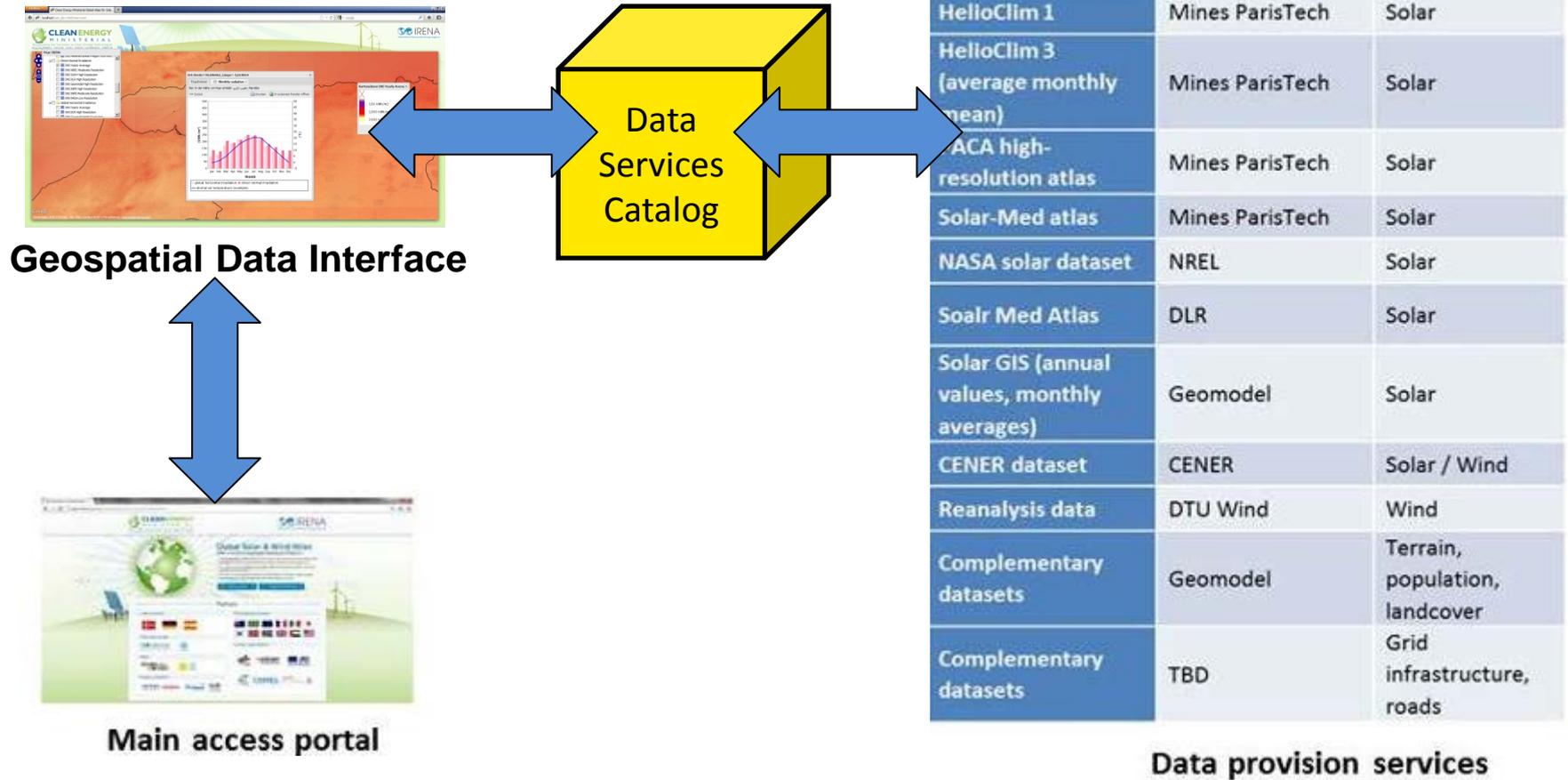# Networking with Collaborative Information Systems

Solar resources A (e.g. DLR)

data provider

Data broker

data provider

Solar resources B (e.g. NREL

user interface

data provider

data provider

geographical data, land use, infrastructure, e.g. public agencies

Communication with open and standardized internet protocols

Policy data base e.g. IEA, UNEP, REN21

set up of the architecture within the framework of GEOSS

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Current Desgin

Geospatial Data Interface

Data Services Catalog

Main access portal

Source	Shared by	Scope
SWERA Archive	NREL	Solar / Wind
HelioClim 1	Mines ParisTech	Solar
HelioClim 3 (average monthly mean)	Mines ParisTech	Solar
ACA high-resolution atlas	Mines ParisTech	Solar
Solar-Med atlas	Mines ParisTech	Solar
NASA solar dataset	NREL	Solar
Soalr Med Atlas	DLR	Solar
Solar GIS (annual values, monthly averages)	Geomodel	Solar
CENER dataset	CENER	Solar / Wind
Reanalysis data	DTU Wind	Wind
Complementary datasets	Geomodel	Terrain, population, landcover
Complementary datasets	TBD	Grid infrastructure, roads

Data provision services

Short Live Demo

Assessing potentials in the Global Atlas

Global Atlas time table

End 2011	First prototype interface
January 2012	First end user workshop
CEM London - 25 April 2012	Enhanced partnership – 12 countries
Rio+20	High level event on the Global Atlas
CEM Madrid	Prototype interface
	End user group review
IRENA Council Nov. 2012	Operational system demo – SC meeting
IRENA Assembly Jan. 2013	Online operational system – wind / solar
From 2013	Adding analysis tools – wind / solar
	Adding datasets – wind / solar
2013	Bioenergy, hydropower, geothermal

Towards a Global Renewable Atlas

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Advantages for the Global Energy Modeling Community

- Easy access to global resource data

- Development of global high resolution homogeneous data sets for solar and wind energy

- Upcoming regional validation and measurement campaigns through the World Bank ESMAP program.

- Development of tools for advanced geospatial data analysis
  - Assessment of technical potentials
  - Assessment of priority regions
  - Tools to provide imput into IAM e.g. though cost-potential curves, full load hours potentials, etc.

Important Things to do with the Energy Modeling Community

- Agree on common methodologies to assess RE potentials
  - The is a paper in a drafting process (see presentation from Dave Renné)

- Find common ways to describe parameterizations of (single) RE in IAMs. We do not want to develop a tool for each IAM (some of it will be part of the EU Advance project).

- Find common ways to describe the volatility of some RE sources and the balancing and averaging effects of spatial distribution and technology diversification.