Energy CoP

Thierry Ranchin with the help of Marion Schroedter-Homscheidt, Lionel Ménard, Richard Eckman, Emile Elewaut
Activities

• EN-07-01 and EN-07-03
• EN-07-02
• Link with ADC through the AIP
• GEOSS Professorship

• Other activities
EN-07-01 and EN-07-03 Update

ENDORSE

- FP7 Project: ENergy DOwnstReam SErvices - Providing energy components for GMES
ENDORSE Concept

• user-driven development of new, and/or enhancement of existing, downstream services in renewable energies
• regional services for sun, wind, and biomass, electricity grid management and building
• development of sustainable and transferable downstream services.
ENDORSE

• Based on proven facts, the ENDORSE Consortium states that the energy community is mature enough to exploit EO data in an efficient, replicable and sustainable manner, especially with the advent of stable and reliable data streams from the GMES Core Services: MACC for irradiance and other atmosphere-related parameters, SAFER for defining hazardous areas, and Geoland 2 for data on land use, hydrography, protected areas, inhabited areas and buildings.

• GEOSS catalogues are an entry point to access other EO-derived data that can be necessary. GEOSS results on standards, tools, and best practices in service architecture, data and services interoperability, will be exploited.
COST action WIRE

- WIRE = Weather Intelligence for Renewable Energies
- Wind- and solar energy
- Forecasting for electricity grid integration
- [http://www.wire1002.ch/](http://www.wire1002.ch/)
- Chair Dr. Alain Heimo, Meteotest, Switzerland

[Map showing European countries with USA, Japan, and Australia highlighted]
• NREL (National Renewable Energy Laboratory, USA) has published
  (NREL/TP-550-47465)
Use of GEMS aerosol data set in solar resource assessment

Climatology databases do not allow correct representation of irradiance distribution

AOD monthly climatology

AOD daily values

Valladolid (Spain)

missing extreme values
Portugal (Conceição and Lúcio, University of Algarve) has dealt with the use of a numerical model simulating the thermal behaviour of buildings using atmospheric input information on radiation and temperatures. The occupant’s comfort levels are assessed. Work has been performed for school and kindergarten buildings in an Mediterranean environment.

Evolution of the thermal comfort index (PMV) in classrooms with windows facing North (90) and South (86).
  Berlin, D; Sept. 2011
  Session on Energy Meteorology

Develop Earth observation systems for the monitoring and prediction of environmental impact from energy resource exploration, extraction, transportation and/or exploitation.

Emile Elewaut,
Netherlands Organisation for Applied Scientific Research (TNO)

29/04/2011
Recent Activities

Concentrated around two major topics:

• EnerGEO (FP7 project European Commission Sponsored)
  – Contribution to Beijing Ministerial exhibition
  – Contribution to AIP3
  – Definition of impact assessment framework
  – Definition of data needs and availability
  – Preparation of summer school

• Definition of Geological Carbon Storage monitoring for leakage (Norwegian Research Council)
GEOSS AIP-3 Scenario Goals

- Assess the Environmental Impact of the production, transportation and use of energy. Use case of photovoltaic systems
  - What is the most favorable material for PV panel construction? (Installers)
  - What are the overall environmental performances of PV systems related to their implementation? (policy planners, energy operators)
  - What is the carbon footprint of a PV system according to its lifecycle? (policy planners, energy operators)

Participating Organizations

- MINES ParisTech (France) - Leader
- Ecoinvent (Swiss), EnerGEO (FP7), GENESIS (FP7) – Partners

Scenario Data & Components

- Needed Data and Algorithms
  - Solar radiation (kWh/m²) (MINES ParisTech)
  - Environmental outputs of PV technology (Ecoinvent)

- Web Services (OGC WPS and WMS) @ Renewable Energy Community Portal
- Environmental Impact Assessment – GENESIS Intecs Legacy Toolbox (FP7)
- FP7-EnerGEO OGC Catalogue for Services Web (CSW) - ESRI GeoPortal solution
- GENESIS Visualization Client - Spacebel Liferay Portal – GIM Visualization Portlet

Deliverables

- Engineering report and demonstration video

Links with ADC-2010
AIP-3 Map based Scenario providing Environmental Impact Parameters for a given PV system and impact assessment method (IMPACT 2002+) over a given AOI (Area Of Interest)

# For each impact a legend with proper units and min. max values is available

Mash-up build on FP7 GENESIS Portal (http://gppf.genesis-fp7)
Results provided by computation from Energy Community Portal (www.webservice-energy.org) OGC WSP (Web Processing Service)
AIP-3 Map based Scenario providing Environmental Impact Parameters for a given PV system and impact assessment method (IMPACT 2002+) over a given AOI (Area Of Interest)

# List of Environmental Impact Parameters

Mash-up build on FP7 GENESIS Portal (http://gppf.genesis-fp7)
Results provided by computation from Energy Community Portal (www.webservice-energy.org) OGC WSP (Web Processing Service)
AIP-3 Point based Scenario providing Environmental Impact Parameters for a given PV system and impact assessment method (IMPACT 2002+) over a given AOI (Area Of Interest)

# Numbers matrix and Graphical display

Mash-up build on FP7 GENESIS Portal (http://gppf.genesis-fp7)
Results provided by computation from Energy Community Portal (www.webservice-energy.org) OGC WSP (Web Processing Service)
Energy thoughts and possible response to AIP-4 CFP

- AIP-2 and AIP-3 have established the GGI capacity to disseminate Energy and Environment related Web Services using existing standard (OGC).
- The on-going FP7 MACC project has established Quality and Uncertainties, as key parameters to be part of any data set for Energy and/or Environment.
- Focus for AIP-4 will be made on:
  - Providing end-user with Quality and Uncertainties parameters for any relevant data set at Metadata level for Search & Discovery purpose and at Web Service level for end-user full information presentation.
  - Selecting the suitable development framework for building Graphical User Interface that has the capacity to trigger remote Web Services (WMS, WFS and WPS) in operational services such as SoDa.
- Support will be needed from existing initiative such as QA4EO to help Energy Web Services providers to properly build Metadata taking into account the Quality and the Uncertainties parameters associated to the data sets. Metadata should latter be deployed on a GEOSS compliant Catalogue.
- Collaboration with GEO Portal developers should be considered in order to ensure a proper and consistent dissemination and presentation of Energy and Environment data sets on the GEO Portal.
- A persistent example addressing Quality and Uncertainty parameters should be deployed as a Web Service, preferably exploited in an operational service such as SoDa. This Web Service should be able to properly carry those parameters for end-user’s information.
- Search, Find Bind mechanism must be addressed and demonstrated through the GEO Web Portal facilities.
- Web-based applications using generic framework and triggering Energy and/or Environment related Web Services must be realized. These Web-based applications must ensure that they properly display the Quality and Uncertainties parameters attached to the geo-localized data. Collaboration with IT partners offering existing frameworks is foreseen.

Reference to MACC project: http://www.gmes-atmosphere.eu/documents/deliverables/r-rad/D_R-RAD_2.1_1.RAD.MACC.v1.0.pdf
• Set up an industrial professorship aiming the demonstration of the benefits, the development and/or the improvement of the use of EO data within the energy domain
Objectives

• To develop a research based on GEOSS and dedicated to a specific SBA in order to prove the usefulness of the GEOSS concept.

• To develop dedicated program and/or develop modules for training program to provide high level students with high understanding of the potential of GEOSS.

• To diffuse information about GEOSS, its potentials and its uses within the users communities linked with each SBA
Next steps

• Convince industrial/institutional sponsors to fund the GEOSS professorship for energy
• Build the work programme
• Recruit the professor
• Launch activities
Others:
Selected NASA Climate and Energy Projects

• Building Climate Zone data sets (DOE, ASHRAE)
  – NASA-funded Feasibility Study: 1 year duration
  – Purpose: Demonstrate usefulness of developing building climate zone maps in regional areas from downscaled assimilation and satellite products

• Advanced Long-term Solar Mapping (NREL, NCDC, SUNY)
  – NASA-funded: 4 year duration (starting FY10)
  – Purpose: Develop and deliver methodology to NREL for production of solar resource maps from NASA Science to NCDC operations

• Near-Real Time Products for Energy/Ag Applications
  – Purpose: Enhance/Maintain data product from from CERES FLASHFlux to web sites for energy and agriculture applications

• Solar Resource Knowledge Management (IEA, Task 36)
  – Purpose: Benchmark and determine best practices for validation of satellite-based solar resource, improve dissemination of data sets through web based tools, evaluate long-term variability and forecasts
NASA Products to Enhance Energy Utility Load Forecasting

• Funded by the NASA Applied Sciences Program
• Project Goal: develop applications of NASA products to meet the needs of energy companies for both short-term and long-term planning
• Partners: Battelle, Ventyx, NASA Langley Research Center, NASA Marshall Space Flight Center
POWER Project for High Resolution Building Climate Zone Maps

• Long-term climate zone maps determine building codes and guidelines for buildings by US county

• Current maps statistics

• Interpolated surface Measurements of
  – Monthly/annual T
  – Annual HDD/CDD
  – Annual precipitation

• Investigating use reanalysis for these maps
POWER Project for High Resolution Building Climate Zone Maps (cont’d.)

- NASA MERRA Climate zones using ASHRAE/DOE definitions at 1/2 x 2/3 degree resolution
Building Monitoring and Targeting

- Monitoring and Targeting: gaining and maintaining control over energy consumption through measurement and analysis followed by well-directed actions.
  - Purpose: energy cost savings for budgeting, evaluation of energy efficiency upgrades, product/service costing

- NRCAN CETF RETScreen leading effort for newly formed building monitoring and targeting program
  - Need global near-real time (within 1 month) solar and meteorological (i.e. heating degree day) data sets
  - FLASHFlux with operational GMAO assimilation perfectly suited by providing daily and monthly estimates of parameters
  - Testing on NASA Langley Research Center buildings
Estimating Accomplishment Value

• **Usage Statistics:** Measure of relevance and value
  – Overall usage and by domain including international (i.e., .com, .org, .gov, .mil; Au – Australia)
  – Statistical information on data requests: location, parameters
  – New user information: indicates growth
  – User question & comments; web links to sites

• **Direct Decision Support Usage:** Specific Value
  – Ex: RETScreen (over 255,000 users in 36 languages, est. $5B in cost savings), HOMER, Ventyx Velocity Suite (Electric Utilities)

• **Usage by Government reports:** Policy Value
  – Ex: Dept. of Interior, PNNL Climate Change assessments

• **Industry Standards:** Industry wide influence
  – Ex: IEA, ASHRAE

• **Specific Case Studies:** Measureable impacts by case