Energy Scenario
Engineering Report 3
GEOSS Architecture Implementation Pilot

Version <Final>
# Revision History

<table>
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<tr>
<th>Version</th>
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<th>Comments</th>
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<td>1.0</td>
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<td>Lionel Menard</td>
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</tr>
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</table>

# Document Contact Information

If you have questions or comments regarding this document, you can contact:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lionel Menard</td>
<td>MINES ParisTech</td>
<td><a href="mailto:lionel.menard@mines-paristech.fr">lionel.menard@mines-paristech.fr</a></td>
</tr>
</tbody>
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Energy Scenario

1. Introduction

1.1 Scope of this document

This scenario intends to provide spatial information on the life cycle environmental impacts of the production of photovoltaic electricity. As the production of energy is a major contributor to Greenhouse Gases (GHG) emissions, decision makers and policy planners need a better knowledge of the impacts on environment induced by the various technologies used for energy production, in order to select the most appropriate technologies. Renewable energies do contribute to the reduction of GHG compared to fossil fuels. The scenario focuses on the assessment of such impacts for photovoltaic systems by a proper exploitation of data available within GEOSS.

1.2 GEOSS AIP

The GEOSS Architecture Implementation Pilot (AIP) task develops process and infrastructure components for the GCI and the broader GEOSS architecture as a means of coordinating cross-disciplinary interoperability deployment. The AIP Task provides phased delivery of components to GEOSS operations, with each phase consisting of: architecture refinement based on user interactions; component deployment and interoperability testing; and SBA-focused demonstrations.

This Engineering Report (ER) is a key result of the second phase of AIP. AIP-3 was conducted from January 2010 to December 2010. A separate ER describes the overall process and results of AIP-3 and thereby provides a context for this Community SBA ER.

1.3 Summary of SBA development

Energy SBA, benefits from new technologies that have been provides in the AIP-3 framework. An extended set of Web Services related to Energy and Environmental Impact Assessment has been made available as OGC Web Services and has been integrated with the service-energy Community Portal. A new OGC Catalogue for Service Web (CS-W) has been deployed and registered in the GEOSS Registry. These achievements have been reported at the GEO-VII Plenary and Ministerial Summit in Beijing 3-5 November 2010. Detailed information is available in the Beijing Ministerial Summit “Observe, Share, Inform” Report on Progress book and on the GEO-VII GEO Community of Practice brochure.

1.4 Future work

Among the recommendations for a wider GEOSS architecture regarding Energy SBA, one can list:

- In regards to GEOSS recommendations, make available a much larger set of Energy related resources including (Wind, Biomass, Ocean, Geothermal, Hydro, Coal, Nuclear, Fossil Fuel…)
- When available in the data processing chain, take into account Quality Assessment and Uncertainties at both Metadata Profile and Web Service level for existing and/or new Energy related resources

2. Community SBA Objectives

The overall scenario is directly linked to the Energy Societal Benefit Area (SBA). It fully contributes to the Energy GEO 2009-2011 Work Plan goals and to the GEOSS 10-Years Implementation Plan that declares: “GEOSS outcomes in the energy area will support: environmentally responsible and equitable energy management; better matching of energy supply and demand; reduction of risks to energy infrastructure; more accurate inventories of greenhouse gases and pollutants; and a better understanding of renewable energy potential.”

The specific environmental impacts assessment of the photovoltaic sector scenarios directly addresses the Task Number: EN-07-02-Energy Environmental Impact Monitoring. This task’s objective is defined as follow: “Promote the development of Earth observation systems for the monitoring and prediction of environmental impact from energy resource exploration, extraction, transportation and/or exploitation. Build upon the contribution of the European project EnerGEO (Earth observation for monitoring and assessment of the environmental impact of energy use).”

1 A listing of all AIP-3 Engineering Reports: http://www.ogcnetwork.net/AIP3ERs
The scenarios objectives also enhance contributions made in the GEO Task Number: EN-07-01-Management of Energy Sources, where the key contribution to the management of energy sources relies on the GEOSS Community Portal (www.webservice-energy.org) to assess different surface solar irradiance through GEOSS Interoperable Web Services. The AIP-3 Energy scenario response enrich existing web services already deployed on the Energy Community Portal and provides new Web Services in the field of environmental impacts life cycle assessment (LCA).

In this AIP-3 scenario, a new Community Catalogue following OGC CSW 2.0 (Catalog Service for the Web) standard has been deployed and registered in the GEOSS Registry (http://energeo.researchstudio.at). Moreover two dedicated Geospatial Web clients have been developed on the basis of the EC FP7 GENESIS Portlet technology providing end-users with an intuitive graphical user interface to perform environmental impacts assessment of PV systems.

As a whole the achievements of AIP-3 Energy Scenario enhances the assets of the Energy policy planners and therefore copes with the Task Number: EN-07-0-Energy Policy Planning, which has previously benefited from the Energy AIP-2 scenario outcomes. Energy policy planners have now the opportunity with this pilot to consider geo-localized environmental performances with a life cycle perspective for several available technologies of PV systems.

The development of specific Web Services within AIP-3 Energy Scenario might be of interest for cross SBA such as Climate, Water, Ecosystems or Health. For example the current development of web service Impact Assessment methods might be of interest for health issues and Ecosystems.

As on the level of life cycle assessment databases (like e.g. the ecoinvent database) a broad variety of data for energy production is available, an expansion to further energy systems would be easily possible. Similar expansions are also possible for further environmental impacts – as today’s impact assessment methods cover a broad variety of environmental indicators.

From the user side, it might be of interest for energy policy planners to have the opportunity to consider – for one specific localization – a variety of different energy systems with a variety of different environmental indicators.


3.1 Actors

Actors that fully benefit of the AIP-3 Energy Scenario have been identified at the early stage of the proposal.

- **Community Resource Providers**: for the energy scenario they include data providers in energy and environmental impacts assessment. They provide the raw or transformed Earth observation components (data, metadata, catalogue, model, services, tools…) in a GEOSS interoperable compliant form for the realization of the scenario. MINES ParisTech provides access to solar energy datasets. ecoinvent provides access to environmental impact assessment parameters via its LCA data of various energy production systems – like e.g. the photovoltaic sector used in this pilot here.

- **GEOSS Integrators**: The scenario aims at providing value-added indicators of the environmental impacts of the production of energy (Use case of the PV sector) by combining the required but distributed resources coming from GEOSS members. Based on the use of the GCI and Community Resources, the GEOSS Integrators have developed and deployed the persistent applications required to achieve the scenario goals. Within the EC FP7 GENESIS consortium, Thales has coordinated the development of Rich Web Clients for geodata visualization and data retrieval.

- **GEOSS Users**: from high end-users like policy planners, who need synthetic assessment and report, energy operators, who conduct top-level studies to installers of renewable energy systems, for large dissemination activities, the scenario tackles a wide range of different users and needs. Dissemination through a large set of users will be eased by strong connection of EnerGEO members and MINES ParisTech to the Energy Community. Various networks, consortia, projects, associations, groups of interest will be aware of the AIP-3 Energy scenario achievements. This includes of course the GEOSS Energy Community of Practice, International Energy Agency members, …
3.2 Context and pre-conditions

In order to assess environmental impacts of PV electricity production, two different sets of information are needed before the scenario begin.

1. Firstly, we need geo-localized information about solar irradiation. This information should be made remotely accessible in an interoperable manner. OGC WMS (Web Map Service) as well as OGC WPS (Web Processing Service) have been selected as standard means to remotely access and process such information. This information has been made available by MINES ParisTech on the Energy Community Portal (www.webservice-energy.org).

2. Secondly, Life Cycle Assessment information of Photovoltaic Systems is needed. This information is mandatory to report about the environmental impact of PV systems regarding the complete supply chain of each system taking into account geo-localized solar radiation parameters. OGC WMS and WPS have been selected as standardized means to access and process such information. Based on Life Cycle Inventories of PV systems (the first step in a life cycle assessment calculation) that have been provided by ecoinvent, MINES ParisTech developed Web Services that encapsulate the environmental assessment computation process. These Web Services have been deployed on the Energy Community Portal (www.webservice-energy.org).

Information as well as processes made available following GEOSS interoperability recommendations must be properly registered in a catalogue allowing Search and Discovery within the GCI (GEOSSS Common Infrastructure). A dedicated Energy/Environment Catalog Service compliant with OGC CSW 2.0 (Catalog Service for the Web) has been provided by EnerGEO RSA (Research Studio) partner. This catalog has been properly registered in the GEOSS registry.

The information and processes offered described above are offered as Web Services but also need to be made accessible for exploitation by human users. A Web based customizable Graphical User Interface allowing user interaction with the geospatial data and computation processes has been provided by the GENESIS Portal.

3.3 Scenario Events

<table>
<thead>
<tr>
<th>Steps</th>
<th>Description</th>
<th>Number (#) and Use Case Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>A Policy planner, an Energy Operator and/or an Installer of Renewable Energy System is searching for services providing value added information of the environmental impacts of the production of PV electricity on a given area. These services are discovered through the GEOSS Portal. The GEOSS Portal provides minimum information about available services and how to access them.</td>
<td>#4 Search for resources in Registry, Clearinghouse, Community Catalogs and Portal.</td>
</tr>
<tr>
<td>01</td>
<td>Based on services found at Step 00, the Policy planner accesses a Visualization Portlet integrated within the EC FP7 GENESIS Portal to initiate the environmental impacts assessment. The Environmental impacts assessment Web Services available through OGC WMS and WPS compliant interfaces for respectively visualization and value adding processes are also available for either direct machine to machine access or further integration.</td>
<td>#5 User presentation of information about available client applications and services. #8 Construct Processing Service #11 Execute Processing Service</td>
</tr>
</tbody>
</table>
The Client Portlet is triggering various OGC compliant Web Services (WMS, WFS, WPS) to perform the Environmental Impacts Assessment life cycle analysis. The Client Portlet as well as Solar Radiation and Environmental Impacts Assessment Web Services have been previously registered in the GEOSS Catalog and Service Registry (CSR) by the Community Resource Providers. In order to allow Search & Discovery mechanism the Community Resource Providers have previously registered the OGC Web Services with the EnerGEO OGC/CSW Energy Catalog Portal. The Community Catalog Provider has created the appropriate Metadata and ingested this into the Catalog to allow harvesting by the GEOSS Clearinghouse.

The Client Portlets have previously been deployed on the GENESIS Energy/Environment Community Portal. According to the type of results expected, the Policy planner invokes the appropriate Client Portlet and selects the relevant parameters (POI or AOI, PV system, Environmental Impacts Assessment Method, Azimuth, Inclination Angles) for his Environmental Impacts Assessment study of PV electricity production.

Two different Client Portlets are available for the scenario.

#1- One for selecting one or several (Up to five) Point Of Interest (POI).
#2- One for selecting an Area Of Interest (AOI)

According to the Policy Planner choices, the Client Portlet invokes various OGC Web Services.

- For case #1 the Visualization Portlet inside the Client Application displays the results as tabular and graphical representation (WPS returning GML) of Environmental Impact Indicators for up to five Points Of Interest (POI).
- For case #2 the Visualization Portlet displays the results as maps layers with corresponding legends (WPS returning references to a set of WMS layers through use of Web Map Context) of Environmental Impact Indicators for a given Area Of Interest (AOI)

A download option (CSV, GML, KML, Shape file formats…) of Environmental Impact Indicators data is provided.

Reference to the GEOSS Data Providers, datasets, IPR (Intellectual Properties Rights), data quality, will be provided if appropriate within the Client Portlets.

Legend: Services in blue, Products in red, Actors in orange

### Table 1 – Steps in the Energy Scenario

#### 3.4 Post-Conditions

The end user (e.g. policy planner) has been able to visualize and download the environmental impact indicators for the selected cases in graph and tabular format and on an interactive map. The user can adjust his input parameters and rerun the scenario.

Results of different service execution are persisted on the Portal: both the user and the resource provider can access and display results from previous executions at any time.

#### 3.5 Special Requirements

N/A

4. Use Cases

4.1 AIP Transverse Use Cases

The GEOSS Architecture provides an easy process to use GEOSS components in support of the several SBA
communities. At the core of this reusable process are community Scenarios and transverse Use Cases\(^2\). Scenarios are implemented by use cases. Use cases describe reusable functionality of the GEOSS service oriented architecture implemented through Interoperability Arrangements.

AIP has developed a set of Use Cases that are useful across the several communities. The SBA scenarios use the Transverse Use Cases in some cases with specializations. The transverse technology use cases supporting the community scenarios are grouped in five categories, as shown in Figure 1 and in Table 2. The use cases are described in details in a separate AIP-3 Engineering Report\(^3\).

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**Figure 1 GEOSS Transverse Technology Use Cases**

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Title</th>
<th>Actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration and Harvesting Use Cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Register Resources</td>
<td>Register resources in GEOSS Components and Services Registry (CSR) or (CSR-registered) Community Catalog</td>
<td># GEOSS Provider&lt;br&gt;# GCI Operator&lt;br&gt;# Community Catalog Provider</td>
</tr>
<tr>
<td>10. Register New Interoperability Arrangements</td>
<td>Register in the GEOSS Standards and Interoperability Registry (SIR) new and recommended interoperability arrangements as well as utilized standards.</td>
<td># GEOSS Provider&lt;br&gt;# GCI Operator</td>
</tr>
<tr>
<td>3. Harvest &amp; Query via Clearinghouse</td>
<td>This use case describes the steps for harvesting and/or querying service or content metadata from community catalogs or services via a GEOSS</td>
<td># GEOSS Provider&lt;br&gt;# GCI Operator</td>
</tr>
</tbody>
</table>

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\(^3\) [http://www.ogcnetwork.net/AIP3ERs#UseCases](http://www.ogcnetwork.net/AIP3ERs#UseCases)
<table>
<thead>
<tr>
<th>Clearinghouse</th>
<th># Community Catalog Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Share Best Practices</td>
<td>Share Best Practices for participating in GEOSS and addressing SBA’s in the Best Practices Wiki (BPW)</td>
</tr>
<tr>
<td>Clients and Portals Use Cases</td>
<td></td>
</tr>
<tr>
<td>4. Search for Resources</td>
<td>Steps for portals and application clients to support the GEOSS user in searching for resources of interest via the GEOSS Clearinghouse or Community Catalogs</td>
</tr>
<tr>
<td>5. Present Services and Alerts</td>
<td>Present GEOSS User with services and alerts as returned per the user’s search criteria</td>
</tr>
<tr>
<td>7. Exploit Data Visually and Analytically</td>
<td>Steps for exploitation in Client Applications of datasets served through Web Services and online protocols as used within GEOSS.</td>
</tr>
<tr>
<td>Deployment and Access Use Cases</td>
<td></td>
</tr>
<tr>
<td>2. Deploy Resources</td>
<td>Deploy Resources for use in GEOSS</td>
</tr>
<tr>
<td>6. Interact with Services</td>
<td>Interact with Services</td>
</tr>
<tr>
<td>Service Testing Use Cases</td>
<td></td>
</tr>
<tr>
<td>9. Test Services</td>
<td>Service Provider tests its service using a proper Test tool discovered in the GEOSS CSR.</td>
</tr>
<tr>
<td>Processing Use Cases</td>
<td></td>
</tr>
<tr>
<td>8. Construct Processing Service</td>
<td>Design, implement, compose (if composite), deploy, and publish a processing service</td>
</tr>
<tr>
<td>11. Execute Processing Service</td>
<td>Discover, bind, and orchestrate a processing service, to produce new derivative data resources</td>
</tr>
<tr>
<td>Semantic Use Cases</td>
<td></td>
</tr>
<tr>
<td>12. Perform semantic mediation</td>
<td>Register, mediate, and map between disparate vocabularies used to describe GEOS resources.</td>
</tr>
<tr>
<td>13. Conduct semantic search</td>
<td>Utilize mediated vocabularies to extend GEOSS search queries across disparate domains or communities.</td>
</tr>
<tr>
<td>Network Use Cases</td>
<td></td>
</tr>
<tr>
<td>14. Develop data sharing network</td>
<td>Discover GEOSS resources, establish federation “contract” between them to assemble and publish a larger-scale system resource.</td>
</tr>
</tbody>
</table>

**Table 2 – AIP-2 Use Case Summaries**

### 4.2 Specialized Use Cases

N/A
5. Implementation

5.1 Deployed Components

In this scenario various components have been provided or re-used. This includes, a Community Portal, a Catalogue, OGC compliant Web Services, Geodata Visualization Portlets and a Generic Portal. The Figure 2 AIP-3 Energy Scenario Wiring Diagram below shows how they are linked together and a detailed description of each of those components with screenshots is presented hereafter.
Two sequence diagrams are also provided: one for the Map based (Figure 3) and one for the Point based scenarios (Figure 4). They illustrate user interaction with the scenario components.

![Figure 3 Map based scenario sequence diagram](image-url)
Figure 4 Point based scenario sequence diagram
• **GEOSS Energy Community Portal** – [www.webservice-energy.org](http://www.webservice-energy.org)
  
  o Several W3C Web Services (WSDL) giving access to Solar Energy, Forecast, Hydro, Shadow, Elevation, datasets and maps
  
  o Several OGC, Web Map (WMS) and Web Processing Services (WPS) giving access to Solar Energy, Elevation, Shadow and Environmental Impact Assessment datasets, maps and Algorithms

  This [Energy Community Portal is registered in the GEOSS Registry](http://www.webservice-energy.org) since 2009 (see Figure 5 and Figure 6).

![Image of Community Portal](http://www.webservice-energy.org)

**Figure 5** [www.webservice-energy.org](http://www.webservice-energy.org) Community Portal
• **EnerGEO OGC Catalogue Service for the Web (CSW)**

The EnerGEO Catalogue serves as a prototype demonstrator to generally communicate architecture, logic and value of SDI and as a platform for the integration of discovery potential of different user groups in industry, science and management. It is also an example for collaboration of various partners (see Figure 7). It offers a single Internet access point for users seeking data, imagery and analytical software packages relevant to all parts of the globe. It connects users to existing databases and portals and provides reliable, up-to-date and user-friendly information – vital for the work of decision makers, planners and emergency managers.
The community portal with search facilities is currently designed and implemented based on international standards for catalogue discovery (OGC Catalogue Services CSW 2.0.2). The current state of a community-adopted metadata editor for ENERGEO is shown in Figure 8.

![EnerGEO Metadata Editor](image)

**Figure 8 Metadata editor for EnerGEO metadata**

One first and obvious mission of such a portal is the ‘find’ task which is ideally planned to be intrinsically linked to the ‘bind’ task referring to the OGC “publish-find-bind” logic (see OGC reference model ORM: www.opengeospatial.org/standards/orm and Figure 9). The first logic step for the user is referred to as discovery services and is intrinsically linked to the definition of metadata. “How-To” documents are developed to assist users with specific tasks (e.g. how to document metadata information, how to convert ASCII to raster files,…). All these approaches are integrated in the portal (see Figure 10)
ENERGEO enables users to register and publish data and services to a directory (such as a registry or catalogue). Initially, ENERGEO allows publishing service metadata describing the capabilities of the services and the network address.
• **The GENESIS Legacy interconnection Toolbox** (Figure 11) is a software component to easily transform legacy applications into Web Services with Standard compliant interfaces to facilitate the integration of existing applications into Service Oriented Architectures. It supports OGCs Web Processing Service Specification to launch processing jobs on remote servers. In addition it facilitates the deployment of catalogue services implementing the EO and CIM extension Package of the OGC CS-W ebRIM application profile.

![Figure 11 Webservice-energy.org Legacy Toolbox WPS Management](image)

• **The GENESIS Portal** is a Portlets (JSR-286) based Portal (Figure 12) that allows to easily generate the user interface (client applications) to interact with remote web services via standard interoperable interfaces such as OGC Cataloguing using ebRIM profile of CS-W (CIM, EOP, Sensor) and the OGC WPS. The client applications on the GENESIS Portal are grouped according to their thematic domain. A specific category has been created for the Energy Scenario: “Energy Environmental Impact”. Two services can be discovered within this category: the Environmental Impact Assessment Map Service and the Environmental Impact Assessment Point Service. These two services are based on the GENESIS generic WPS client that includes portlets for the WPS service invocation and service results display. The GENESIS Portal also provides a generic workflow for the remote WPS interactions.
The GENESIS Geodata Visualisation Portlet system (Figure 13, Figure 14, Figure 15, Figure 16, Figure 17) provides a powerful and flexible WebGIS Client that can be instantiated in various forms and with varying functionality inside any JSR286 compliant portal or used standalone. Each GENESIS Service Client (e.g. WPS client) can be shown with a customized geographic Web interface to capture geographic input into services and to display geographically referenced results. GENESIS service providers can make use of a configuration portlet to entirely configure their cartographic interface to their liking. The map configurations are fully managed through an internal geographically enabled Content Management System with versioning, access right control and gathering of usage statistics.

The Geodata Visualisation Portlets allow:
- Connecting to OGC Web Map, Feature, Coverage and Sensor Observation Services
- Import and visualize vector and raster data in various formats with on the fly-reprojection
- Export maps and data in various formats
- Configurable layer management: functionality with grouping, legends, transparency control, …
- Range of typical map navigation tools including zooming and panning tools, overview map and zoom to gazetteer
- Advanced querying functionality for feature data with customizable query forms and dynamic result tables for each specific feature data set.
- Possible to display graphs on the basis of feature datasets (Bar, Pie, Column, X-Y charts) and Observations (time series plots)
- Play animations of time-varying geographic data (WMS & features)
Figure 13 Map based scenario AOI selection

Figure 14 Map based scenario Impact results (with one legend per impact)
Figure 15 Map based scenario results displaying all available impacts

Figure 16 Point based scenario with 3 points of interest query
5.2 Interoperability Arrangements

In the Energy AIP-3 Scenario a focus on implementing OGC compliant solutions for resource deployment has been promoted. All Web Services allowing Environmental Impacts Assessment for PV electricity have been made available using OGC Web Map Services (Version 1.1.1 and 1.3) and Web Processing Services (Version 1.0.0). All Web Services have been registered in an OGC CSW compliant Catalogue at the EnerGEO Portal. (e.g. Helioclim-3; see Figure 18)

The EnerGEO Catalogue has been successfully registered in the GEOSS Registry on June 2010. It is continually operating since then and properly disseminates its content through the search and discovery mechanism of the GEO Portal.

Figure 17 Point based scenario with 3 points of interest results
In addition to the aforementioned Web Service Standards, the scenario also employs the following data model/encoding specifications:

- OGC Web Map Context Specification (Version 1.1.0) for transferring the results of the map-based scenario to the GENESIS GeodataVisualisation Portlet. The results of the Web Processing Service in this scenario consist of a set of on-the-fly generated coverage datasets that are automatically published to a WMS Service. In order to visualize these map layers within the Geodata Visualisation Portlet, an OGC Web Map Context document is created by the service and passed as output parameter to the Portal.

- OGC Geography Markup Language (Version 3.1.1) for encoding the results within the point based scenario. In the point based scenario, the results of the Web Processing service consist of the impact values (relative and absolute) for a set of point locations together with other information like units of measure, impact category, impact name, … This information is encoded according to a specific GML application schema. GML files are created by the WPS and transferred to the Geodata Visualisation Portlet for display in charts, on the map and in tabular format.

- OGC Symbology encoding (Version 1.1.0) is used to define the symbology rules with which the point features are styled.

5.3 Use of the GCI

ENERGEO establishes a distributed system based on GEOSS architecture (Figure 19) and international standards, namely four main elements: 1) the GEO Portal allowing the user to search for information and services available in GEOSS; 2) the GEOSS discovery is the element that collects search and presents the Web Services deployed at the Energy Community Portal to the users via the GEO Portal; 3) the GEOSS Component and Service Registry allowing GEOSS organizations to contribute components and services to the community; 4) the Standards Registry which enables contributors to GEOSS to configure their own systems to be compatible and interoperable with others systems (Blaschke et al., 2010).
Regarding improvements, some discrepancies exist between information holds in the metadata files and their presentation in the GEO Portal. The GEO Portal query result “Summary” view in its current version does not take full advantage of the available information contained in the metadata file that the GEOSS clearinghouse has harvested. It worth to mention that the “Full Description” view of the GEO Portal holds this information. A mechanism for being able to display map layers as part of the “Summary” view in case of a Web Map Service should be also a handy feature for the end-user.

5.4 Demonstrations

A video explaining the global energy context and illustrating the benefit of making available Environmental Impacts Assessment of the production of PV electricity has been provided. Environmental assessment expert’s testimony explaining expert concerns and user needs is presented. The proposed solution is described and the contributed components underling and echoing references to the GEOSS recommendations are detailed. A screen-cast of user interaction between the various contributed components is shown. Achievements regarding component contribution as well as overall benefits for the Energy and Environmental SBA conclude this video.

The video can be viewed at the OGC website:


The final energy scenarios AIP-3 pilots are available on the GENESIS Portal in the “Energy Environmental Impact” section. You need to login with the given credentials to be able to run the scenarios:

http://ref.genesis-fp7.eu/web/guest

Login: demo
Password: demo
5.5 Future plans for deployment

Several extensions and deployment to this energy pilot would deserve additional work and involvement considering good feedbacks from this first version applied to PV systems:

- Conduct/Elaborate this environmental assessment along life cycle (meaning considering both direct and indirect impacts) for other renewable energies systems such as windmills, solar thermal systems for example.

- Enlarge the geographical coverage. In AIP3, the geographical bounds was restricted to the solar irradiation database used, SODA which is covering part of Europe. Extensions to the whole European continent and all continents would bring a real added value for various users. For policy makers aiming at enlarging their view angle considering potential energy importations and exportations for example

- Uncertainties would also deserve to be tackled to enhance confidence in these scientific results assessment.

6. References


