Newsletter GreenCap

Energy and Planning

Issue Nr. 2

Interreg Mediterranean

RENEWABLE ENERGY

Project co-financed by the European Regional Development Fund

Summary

editorial

Energy and Planning

How do visualization tools help to energy planning development?

Dear readers,
I am glad to present you our second newsletter. In this occasion, the thematic scope is **energy and planning**. The aim is to highlight the relevance of incorporating energy strategies in planning development. Most of the infrastructures considered for energetic plans require an occupation of space. That means that energy infrastructures should be integrated into urban planning as part of the functions that territory has to assume.

At territorial scale, knowledge of local renewable energy sources is key information to develop energetic plans for short, middle and long-term implementations. Energy management also requires accurate information that links energy consumption and energy production. In this sense, visualization mapping tools help from strategic planning process until management performance. The utilization of Geographic Information Systems (GIS) and various spatial or resource planning methodologies allows a more efficient and sustainable land-use.

Currently, several practices have been developed in order to establish different applications of GIS in energy planning. We may find several applications of GIS and Wemaps for energy matters. GIS represents a format where variables and database are mostly centralized and used to be designed according to assessment indicators guidelines. Webmaps is a format which is probably based on simpler variables, but in comparison to traditional GIS, has a wider potential impact because it allows linking databases as well as create a collaborative database.
For this matter, this issue aims to make an overall reflection about the different scopes and applications of both types. In this issue, we also count with the special participation of PRISMI, FORBIOENERGY and COMPOSE Projects, explaining their vision about energy planning and mapping tools.

During the last months, our Renewable Energy Community carried out the first Thematic Event in Barcelona: Challenges for Energy Model in Islands and Rural Contexts. Over half of the population of the European Union lives in intermediate or rural areas, and islands. Rural areas and islands have intrinsic fragility in terms of energy security, environmental sustainability, and socio-economic potential; they rely heavily on the implementation of renewable energies in these regions as it has multi-faceted and massive benefit to the environment, as well as offering ways to diversify and secure various sources of income for the local population. The Thematic Event in Barcelona brought out the opportunity for all MPs of the RES community to work together through three thematic working groups: 1) Technology & Smart

grids, 2) Local Renewable Energy Cluster and 3) Policies and Governance. During the event, it was highlighted several times the relevance of integrating energy and urban planning.

We are convinced that planning techniques focused on improving resource allocation, optimizing rural and island production, and developing environmentally sustainable communities can drastically improve the energy landscape and economy of Europe.

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BCN event - Thematic Event: Energy Challenges in Islands and Rural contexts.

September 2017, Barcelona

Last 27th of September, GREENCAP project held an event in Barcelona hosted by Urban Ecology Agency of Barcelona. The event count with the participation of all Renewable Energy Community Modular Projects as well as representatives from Greengrowth and Sustainable Tourism Community.

The development of renewable energies in islands and rural contexts requires a holistic vision that allows establishing strategies according to the reality of these contexts, such as economic revitalization or territorial planning. The event aimed to identify strategic and priority aspects from a legal, social, technological and planning point of view.

The agenda of activities was organized in two main parts:

Training Session
Workshop

The training sessions were held by four local experts in renewable energy. The first lecture was given by Piet Holtrop, who talked about the **main constraints of RES Legal Context in Spain**. One of the points highlighted by Piet was the **importance of establishing a new framework for RES prosumers as a legal figure**.

Joana Mundó from Ecoserveis talked about **Energy Poverty**. Joana showed the current situation of European countries in terms of energy poverty. One of the main conclusions to fight this social affection is the fact **of having energy services as part of the public management in order to control prices and conditions to consumers**.

Pep Salas from Smartgrid, explained the **current electrical grid in Spain and Catalonia**. His lecture highlighted the limitations of the current grid to incorporate RES on the mix of energy. One of the conclusions is to **promote off-grid solutions in order to establish the optimal efficiency for smartgrids**.

Fabian López from Societat Orgànica, talked about **Near Zero Energy Buildings**. His presentation highlighted the lack of a common methodological criteria between countries to define the energy consumption of a near zero energy building.

After experts' lectures, each Modular Project explained the current outcomes of their project progress:

- LOCAL4GREEN, represented by Andrea Vignoli (ANCI Lazio) and Francesco Filippi (MUSOL)
- PEGASUS, represented by Marco Caponigro and Ivana Ostoic (City Council PREKO).
- COMPOSE, represented by Virginia Domingo (City Council Granollers).
- PRISMI, represented by Antun Pfeifer (FMENA)
- SToRES, represented by Juan José Mestre (SARGA)
- FORBIOENERGY, represented by Rebeca Aleix (AMUFOR)

As an introduction to the discussion of the workshop session, the event count with the round table with three Horizontal Projects: GREENGROWTH, represented by Laia Llenas from University of Vic; SUSTAINABLE TOURISM, represented by Anna Martínez from Diputació de Barcelona; and GREENCAP, represented by Paola Zitella from Environment Park.

The Workshop was structured in three thematic working group:

Technology and Smartgrids: Which are the most adequate microgrids scales in rural areas and islands? The main identified solutions were:

- Promote Local/regional scale
- Prosumers at District scale

Local Renewable Energy Cluster: How can be organized the potential clusters related to the renewable energy? Who are the main actors (stakeholders)? The most voted ideas were:

- Smart Islands Energy Cluster
- Energy Cooperatives for RES exploitation.
- Micro-investors helping to spread RES exploitation.
- The crowland company returning the economic benefit to micro-investors

Policies and Governance: Lack in legislation and possible strategies to promote RES consumption in MED area. Most voted ideas were:

- Cooperative organizations that encourage the involvement.
- Include EE criteria in financial risk assessment

- Legalize PROSUMERS and PUBLIC COMMERCIALIZE
- Include the energy model in urban planning as part of main considerations

ForBioEnergy Transferring activities - Technical panels

May-July 2017, Italy, Spain, Slovenia and Croatia

A Technical Panel has been established in each country involved in the project, with the aim to ensure the information exchange and the active involvement of the regional and local key actors in the achievement of the main project results.

Panels will work through 6 workshops: two workshops in plenary session at the beginning and at the end of this activity and four thematic. The four thematic workshops aim to ensure the identification of shared and integrated actions and solutions for fostering the bio-energy production in the protected areas, reducing barriers that hinder the development of the sector and planning models able to exploit the full potential of biomass and at the same time preserving the biodiversity of the natural areas.

The first plenary workshops have been already held in Italy, Spain, Slovenia and Croatia from May to July 2017. The first workshop aimed at the establishment of the technical panel and at the description of the work mode of the panel: main purposes, expected results and effects on the territory, contribution to the achieving of project results, synergies with the technical panels of the other country partners, organization of workshops, and description of thematic sessions and workshops calendar.

Participants were selected in a careful and balanced way among qualified actors, experts in the faced thematic topics, knowledgeable on the economic and social local needs and able to provide technical contributes and solutions to the problems identified during the workshops. So the technical panels are attended by regional and local public authorities, sectorial agencies, associations, universities and research institutes, enterprises and professionals.

The next workshop, which is a thematic workshop, will focus on the assessment of threats and benefits of forest biomass harvesting/extraction and will held on November-December 2017.

For each workshop, a report is drawn up by each country with the aim to describe the activities carried out during the workshop and the results achieved for each working phase. Reports are available here (link to the website).


Forest Bioenergy in the Protected Mediterranean Areas
interreg
Mediterranean
ForBioEnergy
Rezultati projekta

PRISMI midterm meeting - Promoting RES Integration for Smart Mediterranean Island

ZAGREB, July 2017

PRISMI, having duration of 18 months, aims to develop an implementation strategy for assessing and mapping local potential of renewable sources and for developing energy scenarios and techno-economic feasibility studies, offering local authorities the opportunity to join a network to which the results of the projects will be reported.

PRISMI project mid-term meeting was hosted by the University of Zagreb. Almost 30 stakeholders coming from a variety of organizations that support islands in issues pertaining to green development have gathered to share experiences and discuss on the capitalization of project results.

The Prismi project will develop two main outcomes: a tool dedicated to map local potential of renewable sources and the creation of a network, for the project capitalization and promotion. The Prismi network has been implemented and it is possible to register here: http://bit.ly/join-prismi

COMPOSE is implementing EE and RES measures at 15 pilot cases.

Maribor, 7.11.2017

Development trends are fast changing and local communities are becoming open to foreign markets and influences; offering development opportunities on one hand and challenges to overcome in making good of these opportunities on the other hand. RES and EE projects achieve positive social and environmental impact, but they often need involvement of different stakeholders on different levels. Being able to implement these projects in a holistic way, considering not only technological aspects, but also their socio- economic impact in the local environment is challenge that many communities are struggling to do and therefore missing on important development opportunities.

Partners in project COMPOSE recognized the potential of the RES and EE sector of being a cross- sector development opportunities meaning that stakeholders from different sectors could complementary contribute to the identification of potential RES and EE projects and their implementation by working together. In order to be able to carry out EE and RES measures, experience, knowledge and exchange of good practices is needed from as broad of environments as possible.

International cooperation between different stakeholders adds an important new dimension of achieving knows how, exchange of good practice examples and complement approaches and methods in business development that can be transferable throughout the EU. Smaller local communities often lack the capacity to even tackle this challenge, therefore COMPOSE supports them by establishing platforms for expert support at transnational level, establishing local initiatives as well as by increasing capacities for planning and implementation of the proposed RES and EE pilot projects.

After the first half year, COMPOSE project started to implement 15 pilot cases in 11 MED regions. Core activities are oriented to integration of RES and EE measures in development planning. Within 15 pilots, partners will test the common approach, firstly developed in previous “Green partnership” project. This holistic testing involves large group of decision makers, experts and interested public groups. COMPOSE model and its use value attends to be promoted at different occasions and events as a European good practice.

To increase the share of renewable energy, COMPOSE promotes local energy sources within energy mix strategies and plans, what ensure new development opportunities as well as new working places. There is estimated, that within 15 implemented projects, local biomass will substitute more than 35 MWh/a heat energy from fossil fuels, sun will contribute 60 MWh/a, wind power 200-230 GWh/a

and energy savings about 13MWh/a. The foreseen impact, measured as economic, environmental and social capital, will not only produce energy, but will also raise common environmental and social capital of Mediterranean regions, cities and islands

COMPOSE methodological approach for implementation of RES development and EE measures

GREENCAP HP Meeting Seville - 2 nd JS/HP Coordination Meeting

Seville, September 2017, Agencia Andaluza de Cooperación Internacional para el Desarrollo

Last September, the second Horizontal Projects Coordination Meeting was held in Seville One of the main objectives of this meeting was to make an overall discussion about the current state of Horizontal Projects and to identify the current development within their communities. It has been decided that common tools such as a shared calendar and mapping activities will be implemented in the next period.

At this moment, there are some concrete links within communities.

Finally, each Thematic community exposed their current situation in terms of capitalization strategies. In some cases, technical and knowledge issues have been prioritized that political approach. Most of the communities are working on identifying target stakeholders and spreading networking.

3rd JS/HP Coordination Meeting

Athens, November 2017

Last 22nd and 23rd of November was carried out the 3rd JS/HP Coordination Meeting in Athens. Renewable Energy Community was represented by Danilo Ceh from BISTRA (LP); Cynthia Echave from BCNecologia and Vasilis Kapogiannopoulos from Patras Science Park.

The aim of the meeting was to coordinate with all Horizontal Projects the upcoming communication activities, such as next events and communication tools. At the same time, during the Meeting, PANORAMED exposed their strategy for Governance Community.

22nd November Axis 2 Low Carbon Economy Meeting

The objective of this meeting was to discuss concrete common measures that could be monitored across projects from all 3 communities (Urban Transport, Efficient Buildings and Renewable Energy) using a shared method, and which ones would be more relevant according to the priorities of each Community. This could be used as a unifying element for the "achievement" of the MED low-carbon economy communities and reinforce our message. The conclusion of the session was to use as main indicators: CO_2 emissions and Return on investment (ROI) as economic impact.

Another aspect discussed was the possibility of a joint Capitalization Event in October 2018 in Slovenia between the three Thematic Communities. This could help to strengthen the impact of all Modular Projects of Axis 2.

23rd November Preparing Mid-Term Event in Rome

Mid-term Event is going to be carried out on April 2018 in Rome. The purpose of this event is to demonstrate, through concrete results of modular, horizontal and governance projects, how the MED Programme architecture has become a "living" integrated process with tangible results, where thematic communities speak in one voice. The overall ambition is to deliver focused messages to policy level therefore influencing future perspectives and planning actions, both at transnational and national levels. The event expects to have about 600-700 participants which include the whole MED Community and also key national and regional stakeholders.

During the second day meeting in Athens, JS presented the concept and preliminary agenda for the event. Roundtables discussions were classified in

communication and cross-cutting themes. The Communication working group discussed about the overall strategy and some alternatives for the title of the event, finally deciding: **MADE in MED**.

The Working group for Cross-cutting themes agreed to organize sessions through the following conceptual themes: **Climate Change, Blue economy and Inclusive Societies**. The aim is to expose how Interreg MED Programme contributes through its structure in Axis 1,2 and 3 to these challenges in the context of Mediterranean.

The next step for all Thematic Communities will be to organize their contributions and prepare the corresponding material by February 2018.

key events

Save the Date for MADE in MED Event

18 – 19 April 2018 , Auditorium del Massimo (Via Massimiliano Massimo 1 – 00144 Rome, Italy)

The first 18 months of implementation have seen the birth of the MED thematic communities – this is the result of how projects can effectively work together to enhance their action. Synergies across projects are becoming a reality.

The purpose of this Mid-Term event is to demonstrate how the MED Programme architecture has become a "living" integrated process with tangible results, where thematic communities speak in one voice and contribute to different challenges in the context of Mediterranean and also at European level.

The overall ambition is to deliver focused messages to policy level therefore influencing future perspectives and planning actions, both at transnational and national levels.

The event will be carried out in the beautiful City of Rome in the Auditorium del Massimo and aims to involve several target groups and key stakeholders.

Events on Renewable Energy sector in Europe

In our web-page you can find some of the events related to Renewable Energy Sector in the regions of Europe. This content will be updated once a month and soon a live calendar will be available. Check it now for the events of December.

https://renewable-energies.interreg-med.eu/news-events/external-events/

Case RES planning

Mapping tools in Renewable Energy Planning

The management of energy has a close relationship with urban planning. Nowadays there are several examples of the use of geographic information systems (GIS) as a support tool planning and design of energy infrastructures.

Below are some examples for GIS applications. The examples are differentiated into two main themes: 1) The identification of renewable energy potential from local resources and 2) Characterization of the energy demand.

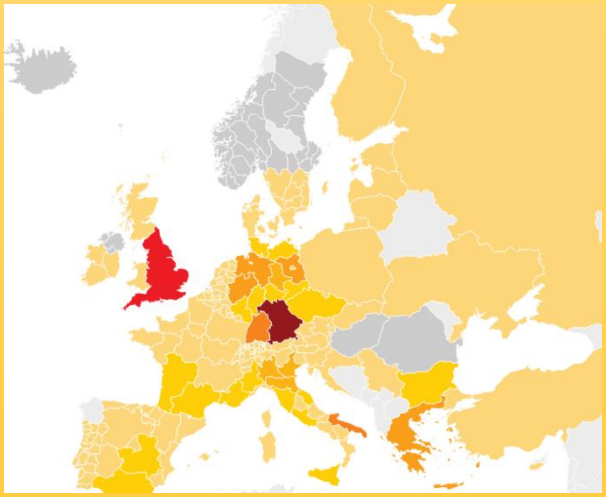
Local Energy Resources Potential

Identify renewable energy potential at the local level, requires to know territorial characteristics and the available energy sources. Among energy sources in the Mediterranean area we may find solar energy, biomass and wind energy as the most potential.

In any of these cases the potential of the sources are intimately related to the characteristics of the territory. It is therefore essential to use visualization tools such as geographic information systems to link environmental variables, energy potential and the ordering of sites.

SOLAR PV MAPPING

Solar PV energy is one of the most relevant resources in Mediterranean. The Solar Power Europe website, which shows the solar energy production in European countries, represents a useful tool for the development of solar energy market in European countries.

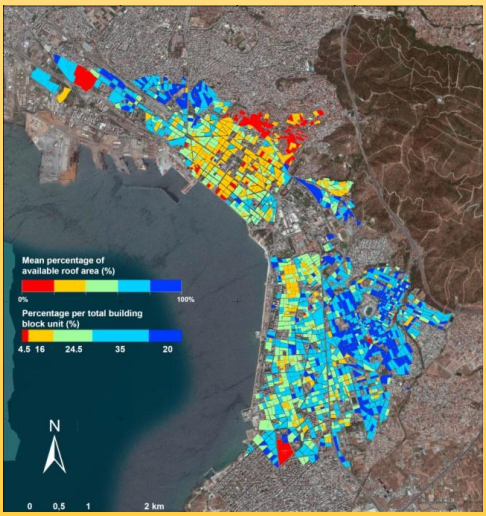


At urban scale, most of the strategies for Solar PV present the complexity to identify the solar potential within the city. Urban fabric characteristics such as the height of buildings and the shadows projected between them are some of the physical constraints to consider. GIS tools help to calculate and organize this kind of variables according to cartographic data base.

In Mediterranean areas, rural abandonment and rapid urbanization have given way to complex environmental problems. The unrestrained growth in cities puts pressure on the existing infrastructure, affecting buildings, transportation, water quality, waste collection and public health. Also, globally relevant issues arise such as the over-exploitation of natural resources and the emission of greenhouse gases. Geographic Information Systems (GIS) have proven crucial to the environmental planning that can mitigate these issues; in the case of Greece´s second largest city, the technology is utilized to generate effective, large-scale retrofitting of buildings, termed ´Green Roofing´.

The specific issues facing Thessaloniki are air pollution and flood hazard, due to a prior fire that left the region with minimal vegetation. Utilizing geo-spatial data and simulations, the roof areas and other impervious surfaces of the city were analyzed in terms of potential to reduce greenhouse gases and pollutant concentrations, and to improve rainwater runoff mitigation. The mapping techniques mostly involved modeling the spaces, and providing a detailed roadmap of areas where different types of vegetation to meet these goals.

The assessments for green roofing in Thessaloniki highlight the vast utility of GIS in sustainable planning. For example, roof space can be categorized by certain parameters such as percentage of suitable space or intensity of vegetation to apply. From here, factors may be extrapolated such as theoretical CO2 savings, level of run-off mitigation, and energy savings in heating and cooling due to insulation. The maps are able to convey important information and become invaluable tools when politically and scientifically addressing climate change.



BIOMASS ENERGY IN MUNICIPALITY IVANJICA[1]

Ivanjica is located in southwest Serbia and has developed a GIS approach for biomass potential under the current conditions (technological, economic, environmental and social). Proposed approach includes mapping of biomass potential with defining both potential primary storage locations and potential locations of plant using GIS technologies. RES Biomass has the greatest importance amongst renewable energy source because it has low negative environmental impact in terms of CO2 emissions. It is nearly CO2 neutral fuel which can contribute to reduction of CO2 by replacement of fossil fuel.

Forest operations are commonly oriented towards logs production from the main stem which accounts for about 65–70% of the total timber volume. The remaining 30–35% becomes forest residues that can be potentially used as a biomass. The use of GIS technology can be of great importance in the analyzing potential resources, storages and plants locations and defining transportation routes and costs.

In the case of GIS based methodology has been used for determination of biomass potential and biogas plants locations, in order to assess the regional potential for biomass production as well as for analyzing potential locations for biogas plants and determination of plants capacity, biomass collection areas and transportation distance.

The system is characterized by three modules: GIS, data base and optimization. Its aim is to be supportive for strategic decision on community level about the most cost-effective way of using biomass in the current conditions and it is based on mathematical optimization and GIS. Mapping the available resources and their locations is important in order to determine the optimal quantities that can be used. GIS provides visualization of each sectors with corresponding resource potential which allows the selection of both potential plant locations and primary storage locations and calculation of transportation distance between them.

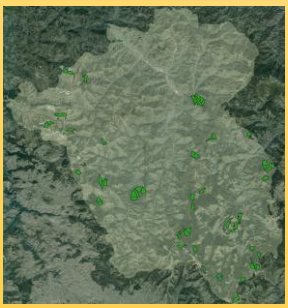


Fig. I: Visualization of section using GIS.

Fig. II: Potential Primary storages locations and potential plants locations.

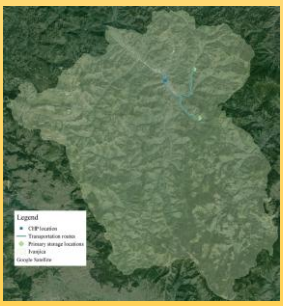


Fig. III: Primary storages locations and congregations plant locations.

[1] Vladimir Vukašinovic, Dušan Gordic. "Optimization and GIS-based combined approach for the determination of the most cost-effective investments in biomass sector"

Electrical Energy Demand (EED) in Greece

Another application of GIS in energy management is to analyze energy demand profiles. Electrical Energy Demand has been analyzed in a study developed in Greece[1]. The study investigates various electrical uses (agricultural use, commercial use, domestic use, industrial use) and examined their relationship with variables such as population and the Gross Domestic Product (GDP). The objective is perform a spatial cluster and outlier analysis to visualize the results. The definition of the spatial patterns of the aforementioned variables in a GIS environment provides meaningful insight and better understanding of the regional development model in Greece to determine different energy projects in each region.

The EED variable depends on variables such as the GDP and the population. The spatial distribution of these variables is non-uniform. The EED is distributed to various uses in Greece. Even the spatial distribution between the various EED uses is extremely non-uniform. We can observe various spatial patterns, possibly associated with regional development plan of Greece, due to the EED spatial variability.

The EED for agricultural use could be to classify a region as agricultural, the same for the others variables. For example, agricultural uses seem to be dispersed in mainland and it's slow in Attica and Thessaloniki and in the islands because they are the highest GDP regions. Islands are near the sea and it has different uses that agriculture, in this case could be classified as commercial or touristic. The Middle Greece could be classified as an industrial region, it has high values of the energy intensity in industrial regions. In overall, various types of activities are dispersed in Greece, with the exception of the islands which are oriented towards commerce and the industrial Middle Greece.

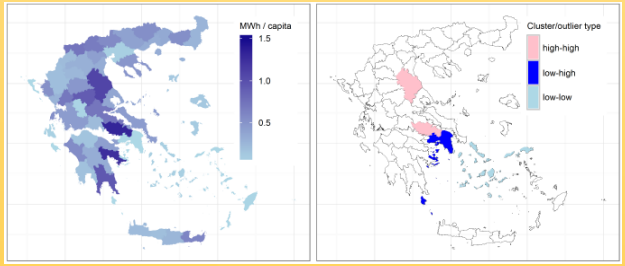


Fig. I: EED for agricultural use per capita of the Greek prefectures (left) and corresponding cluster and outlier analysis (right) in 2012.

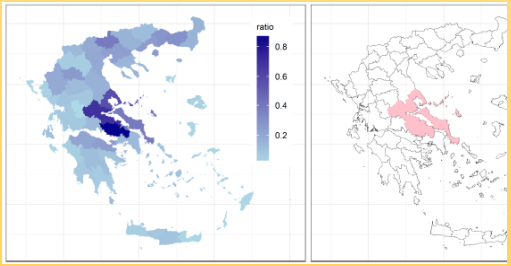


Fig II: Ratio of EED for industrial use to total EED of the Greek prefecture corresponding cluster and outlier analysis (right) as at the year 2(

For this reason, GIS allow us to clearly visualize the different types of regions in order to be able to plan the energy mode more closely to each region.

[1] Spatial analysis of electrical energy demand patterns in Greece: Application of a GIS-based methodological framework.
European Geosciences Union General Assembly 2016, EGU Division Energy, Resources & Environment.

References:

http://www.solarpowereurope.org/live-map/

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Case_GIS – WEBgis

GIS vs Webmaps

Urban planning has traditionally used Geographical information systems (GIS) to analyze territory dynamics. Since a few years ago, webmaps have an increasing use for several issues, including energy matters. This note aims to expose the difference between GIS and Webmaps making reference to some relevant examples in urban planning.

Geographical Information Systems

Geographic information systems (GIS) are computer-based information systems that enable capture, modeling, manipulation, retrieval, analysis, and presentation of geographically referenced data. A GIS map is a platform where you can consult, work and extract information about a region. Most of the information is based on statistics and data bases from countries, states, provinces including towns or regions of a city that has values and elements that can be consulted. GIS Mapping can improve many things in the territory. For example assessing the interest of launching a renewable energy development project in a given area implies first identifying:

- The local resource of renewable energy
- The demand and potential market for this type of energy
- The advantages that can be derived from the implementation of a renewable energy project
- The cost and impact of the project
- The funding possibilities and the available support mechanisms.

In this case GISMAP gives us the tools to be able to visualize more clearly the different points where the renewable energy is more efficient.

Open data

The Institute of Open data say “Open data is data that anyone can access, use and share”. Open data is the idea that some data should be freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control. This idea of open data where governments, organizations, and institutions give complete access to data is not very new but its effects and the appreciation of the power certainly is.

The benefits of Open Data are diverse and range from improved efficiency of public administrations, economic growth in the private sector to wider social welfare. The European Data portal establishes as a good open data when:

- can be linked to, so that it can be easily shared and talked about
- is available in a standard, structured format, so that it can be easily processed
- has guaranteed availability and consistency over time, so that others can rely on it
- is traceable, through any processing, right back to where it originates, so others can work out whether to trust it
- Transparency and democratic control
- Participation
- Self-empowerment
- Improved or new private products and services
- Innovation
- Improved efficiency of government services
- Improved effectiveness of government services
- Impact measurement of policies
- New knowledge from combined data sources and patterns in large data volumes

World Open Data

European Data Portal: The European Data Portal harvests the metadata of public data made available across Europe. The data catalogues of origin may contain datasets with errors. The Portal will assess these errors and communicate them back to the owners of the catalogues. This will contribute to improving the quality of the metadata and data available throughout Europe.

The World Bank or Data Bank: Data displayed on this site are a subset of those available in the World Bank's Databank, which contains extensive collections of time series data. The Databank has advanced functions for selecting and slicing the datasets, performing customized queries and data downloads, and creating charts and other visualizations.

Open Data United States of America: Federal Open Data also helps guide business investment, foster innovation, improve employment opportunities, and spur economic growth.

Webmaps

A WebMap on the World Wide Web is both served and consumed, thus web mapping is more than just web cartography, it is service by which consumers may choose what the map will show. The term location-base services refer to web mapping consumer goods and services. Web mapping usually involves a web browser or other user agent capable of client-server interactions. Questions of **quality, usability, social benefits, and legal constraints** are driving its evolution.

Web mapping has brought many geographical datasets, including free ones generated by OpenStreetMap and proprietary datasets owned by Navteq, Google, Waze, and others. A range of free software to generate maps has also been conceived and implemented alongside proprietary tools like ArcGis. As a result, the barrier to entry for serving maps on the web has been lowered.

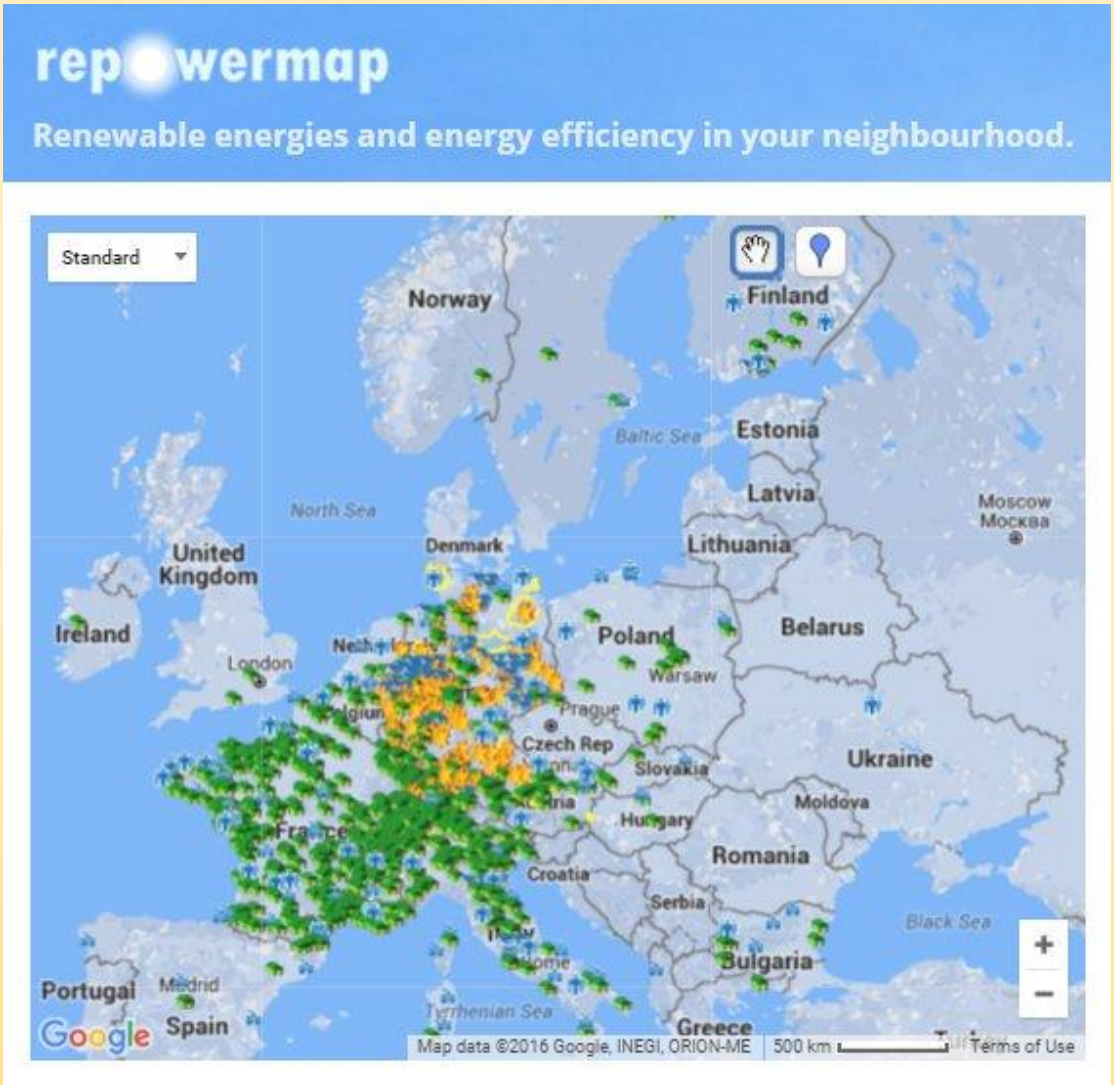
- Generation of maps all required elements including tools for navigation.
- Overlay of layers of information.
- Display descriptive information of map elements.
- Execution of spatial type queries.
- Interaction with databases

Web maps can easily deliver up to date information. If maps are generated automatically from databases, they can display information in almost real time. They don't need to be printed, mastered and distributed. Software and hardware infrastructure for webs maps is cheap, product updates can easily be distributed, Web maps can combine distributed data sources, allow for personalization, enable collaborative mapping similar to web mapping technologies and also support hyper-linking to other information on the web.

Examples

-**Eurostat**: is a directorate-general of the European Commission located in Luxembourg. Its main responsibilities are to provide statistical information to the institutions of the European Union and promote the harmonization of statistical methods across its member states and candidates for accession as well as EFTA countries.

-**Repowermap.org**: is a non-profit initiative whose aim is the promotion of renewable energies and energy efficiency by displaying an interactive map of local concrete examples as well as additional information in the neighborhood of each person.



-**Natural Earth.**

-**REmon**: radioactivity environmental monitoring.

-**Eurobserver**: measures the progress made by renewable energies in each sector and in each member State of the European Union in an as up-to-date way as possible.

-**Stratego**: project aims at supporting national authorities to draft their National and Cooling Plans (NHCP).

-**Heat RoadMap Europe**: This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement. HRE4 involves the most detailed spatial mapping of heat demands and renewable heat resources up to date; includes the potential for reducing heat demands through cost-efficient energy efficiency measures in both the heating and the cooling sector; integrates industrial sectors to quantify heat demands; and models

both long term projections and hour-by-hour energy systems. Our consortium includes leaders in all the respective fields that HRE4 aims to bring together, and the Advisory Board provides an additional way in which HRE4 can draw on the expertise of various organizations.

-**Pan-European Thermal Atlas 4.2**: It's the first ever Pan-European digital geographical model of heating and cooling demands, investment costs of infrastructures, and prospective supply areas at a geographical resolution of 100m grid size

-**Electricity map**: A real time visualization of the greenhouse gas (in terms of CO2 equivalent) footprint of electricity consumption built.

-**ENTSOE**: central collection and publication of electricity generation transportation and consumption data and information for the pan-European market.

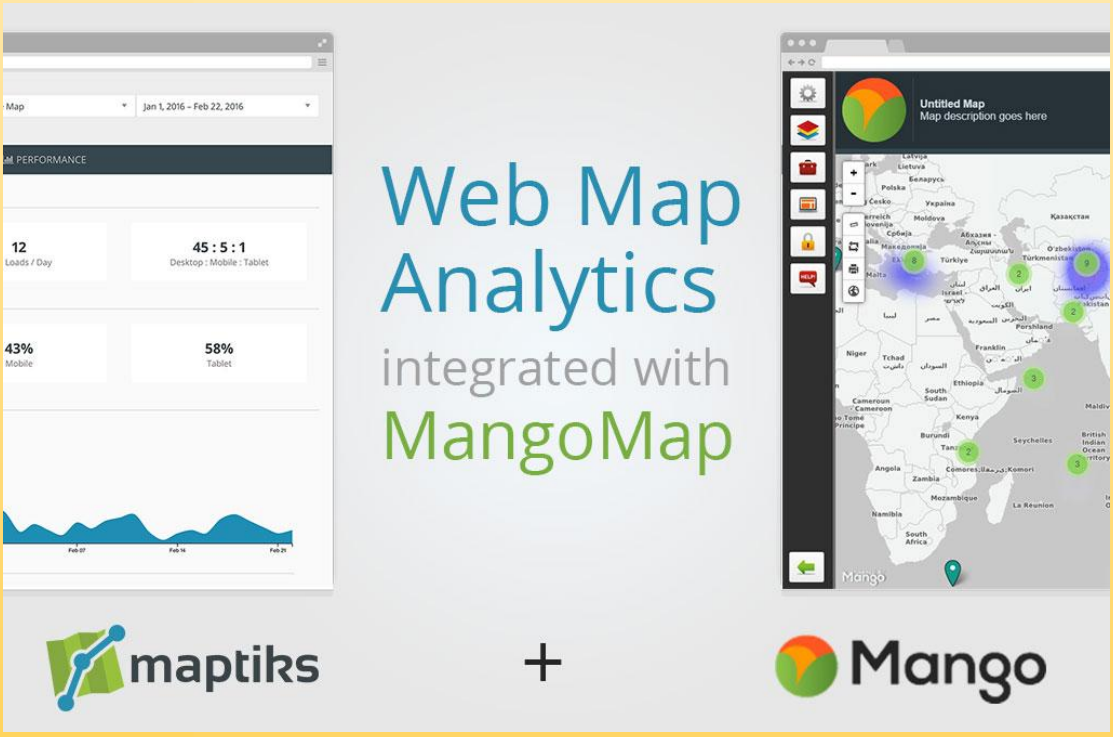
-**Bester**: uses technologies for the exploitation of renewable energy for sustainable development, with the aim that current and future generations enjoy a better life, providing value to all stakeholders of interest thank to its excellent quality of service.

Collaborative web maps are a developing potential. In proprietary or open source collaborative software, users collaborate to create and improve the web mapping experience. Some collaborative web projects are: google map maker, here map creator, openstreetmap, Wikimapia.

-MANGO
-INSTAMAPS
-CARTO
-MAPBOX
-KARTOGRAPH

Conclusions

We may conclude that GIS is a precise tool for planning, where we may have an expertise use of information. The way information is created is more complex and requires of deep knowledge. In the case of webmaps, the main difference between a GIS, is that information is synthesized in order to have a wider impact through the web. Webmaps can arrive to a wider number of people and not necessarily need of thematic scope expertise knowledge. Even that variables and queries are limited, webmaps have a higher didactical potential and help to engage different target groups (experts, researchers, citizens, stakeholders, etc).



Case PRISMI

Mapping tools as key aspects in energy planning and management – Experience of the PRISMI project

The role of Geographic Information Systems (GIS) mapping has become more significant in the planning process of renewable energy systems. Through a number of projects, it has been demonstrated that GIS approaches can contribute for solving questions in the energy domain. However, the further integration of GIS and energy system models is highly advised. Integration would enable to obtain a more complete picture while designing the energy system. This allows to take into consideration both, spatial constraints and potentials, i.e. energy demand, availability and the effectiveness of conventional and renewable resources, capacity and load patterns of energy infrastructures. GIS can serve for the renewable energy potential assessment, energy consumption modeling, planning specific energy infrastructure projects, building energy demand estimation, site planning for renewable energy power plants or visual impact assessment. [1]

GIS is especially suitable for mapping of renewable energy sources, i.e. biomass, solar irradiation, geothermal, wave, wind and hydro power. Moreover, it can be used for the identification of the suitable place for the installation of renewable energy technologies, such as wind and solar farms as they are highly depended on the location.

When evaluating the most suitable location, geospatial data on land use, elevation, buildings, infrastructure and distance between population and the energy source utilized are taken into account. [1,1]

In PRISMI project, the GIS geo-database will contain data about RES potential (solar, wind, wave and tidal) but it will also show information about environmental restrains, the existent energy systems (thermoelectric plants, PV plants, wind turbine generators etc.) and buildings. This will be for the benefit of all Mediterranean island communities, since they will be able to view the abstract scenarios of energy system development in more visual way. This helps both the awareness raising and in precise sitting of the planned new installations.

[1] B. Resch *et al.*, GIS-Based Planning and Modeling for Renewable Energy: Challenges and Future Research Avenues, Review, Geo-Inf. 2014, 3, 662-692; doi:10.3390/ijgi3020662

[1] https://www.gislounge.com/gis-sustainable-energy/

ADDITIONAL THOUGHTS AND ELABORATION

Regarding renewable energy technologies and sources in island energy systems, solar and wind are prioritized followed by biomass and marine energy. Hydropower and geothermal energy are rarely exploited on island systems. District cooling is to be considered in the densely populated urban areas on islands while heating is not of interest due to climatic conditions.

By using GIS, an estimation of available rooftop areas for PV and solar thermal can be obtained. Data availability in specific area is correlated with the precision of the information which could be obtained through GIS. That information can vary from exclusively the rooftop area size and orientation to the more detailed data on rooftop slopes, type of building, etc.

Example of GIS mapping can be found in the Stratego[1] project in a form of Pan-European Thermal Atlas for 28 countries of European Union. For each country heat and cooling demand, local density of both demands, basic geometry of DHC supply, available waste heat resources and potential for renewable energy sources are modelled. The purpose of heat atlas is to enhance heating and cooling plans. Furthermore, it aims to upgrade district heating and cooling systems through more efficient utilization of energy resources and optimized energy planning of distribution network.

In order to estimate the feasibility of district cooling systems the economic costs of cooling production, transmission and distribution needs to be estimated. Cooling network mapping and network planning represents initial steps. By using GIS, cooling density, pipeline length and other geographic boundaries are included into the calculation.

[1] http://stratego-project.eu/

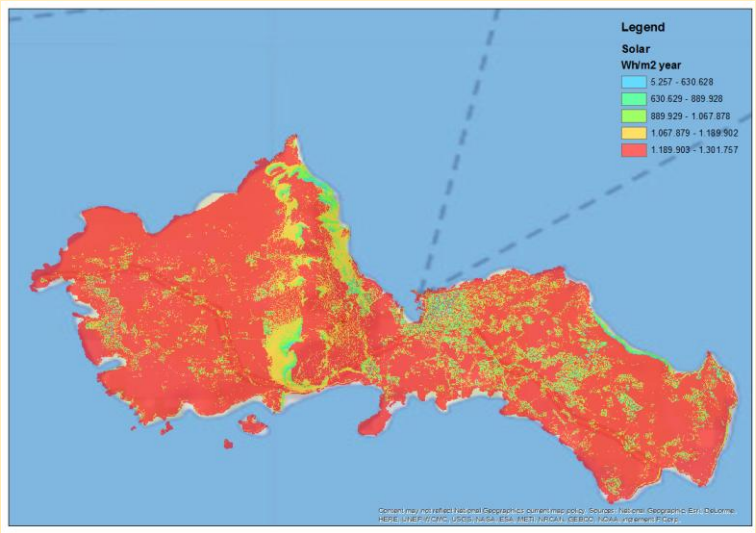


Figure 1 Solar potential mapped on Favignana

Figure 2 Environmental constraints mapped for Croatian islands of Vis and Korcula

Case EMHIRES

Modeling Energy for the Future: EMHIRES

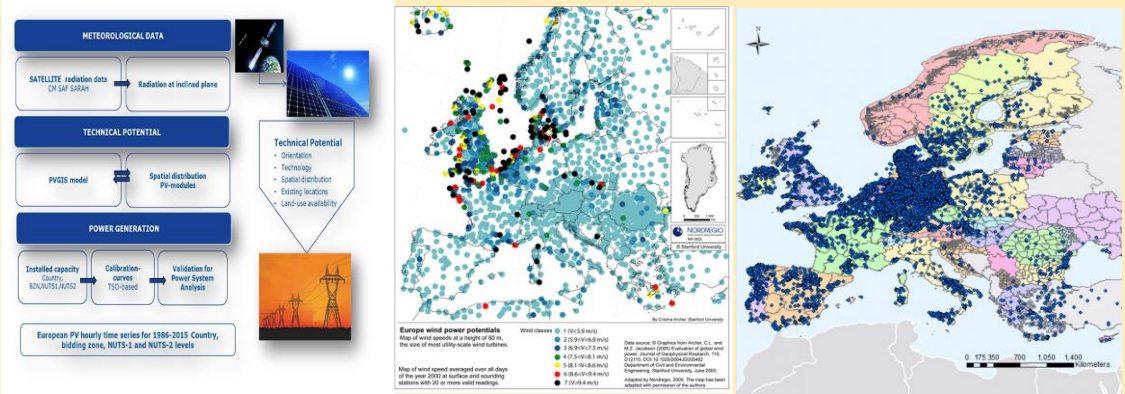
European Meteorological derived High resolution Renewable Energy Sources generation time series

European Union 2015

The transition to clean energies is reshaping the global energy markets. The ´´Clean Energy for All Europeans´´ project is focused on three aspects: prioritizing energy efficiency, achieving global leadership in renewable energy, and providing a fair deal for customers. However, the intermittent nature of wind and solar energy production necessitates an updated methodology in analyzing as well as predicting and planning the sources of renewable energy.

In order to assess the efficacy and potential for RES sitting, as well as produce robust policy advice, power system models are deployed to analyze former energy production and simulate future energy production. The EMHIRES dataset is an innovative approach to incorporate wind and solar power time series at the national and regional levels, spanning Europe. The purpose is to accumulate and analyze former energetic data, to outline the meteorological context and explain energy ramps and peaks from various regions, thus reducing the unpredictability of renewable energy production. Using the aggregated data, prospective simulations and assessments can be made regarding sustainable generation, renewable energy research and development, and market assessments for flexibility technology, such as energy storage.

EMHIRES is the first open-source, publically available dataset of European wind and solar generation time series at high temporal and spatial resolution. Validated by Transmission System Operators (TSOs), EMHIRES is effectively able to capture the variability of solar and wind energy, including the seasonality of production and explanations for peaks and ramps. However, the statistics were formerly non-dynamic; they were limited in that they do not account for outages, grid maintenance and other incidences, and do not naturally account for new infrastructure development and rapidly advancing technology. The EMHIRES data encompasses a range of geologic, energetic, and spatial/temporal information to mitigate inaccuracies or inconsistencies. Therefore, the data has utmost utility for planning and integrating a renewable-based energetic model.



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