Visualising socio-economic data at the regional level

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Abstract

TV Energy (TVE), in partnership with Regional Government in the south east of England, has embarked on a new initiative called 'SEE-Stats' (South East England Renewable Energy Statistics) to track and monitor renewable energy projects. TVE will use methodologies developed for UK national, European and IEA statistics gathering and adapt them to local circumstances. The data to be gathered will show the size and nature of projects, recording MWh_e and MWh_{th} produced along with other physical data. In this way, TVE will enable regional and local Government and others to track developments and determine whether agreed targets are likely to be met.

SEE-STATS will also record socio-economic data on a project-by-project basis. As far as is known, this will be a first attempt to carry out such a task. Data to be recorded will include: jobs created or sustained, new business start-ups, training and educational benefits, health benefits and community benefits. The initiative will link closely to the IEA Bioenergy Task 29 examining socio-economic issues. The results and ongoing work of SEE-STATS will be updated regularly on a website www.see-stats.org.

Key words: Regional, Socio-economic, Statistics.

Background

The need for SEE-stats, and progress towards regional renewable energy targets

SEE-stats will be a measure of progress on the uptake and integration of renewables into the energy mix associated with activities in the south east of England. The South East England Regional Assembly (SEERA) has produced a document entitled 'Harnessing the Elements', a strategy to encourage energy efficiency and to increase renewable energy capacity in the region. Within this document are electrical generating capacity targets for each of the sub-regions of the south east for the years 2010 and 2016, based on the viable available resources attributable to the renewable technologies under consideration. These technologies are biomass (combustion and anaerobic digestion), onshore wind, solar (photovoltaics) and small hydro. Viable resources can be thought of as those which can be realistically expected to contribute to generating capacity given the anticipated constraints attributed to local planning, topography, land use and fuel availability in the case of biomass installations.

Through SEE-stats it will be possible to know precisely how much generating capacity is present from the various sources in each of the four sub-regions (Thames Valley, Hampshire & Isle of Wight, East & West Sussex and Kent), and to use this as a planning tool to guage progress towards the renewable energy capacity targets set out for each sub-region within the SEERA document. Activity can therefore be closely monitored and the wide range of data gathered as part of this exercise will be able to provide predictions of likely capacity expected to come on line in future years based on the patterns of progress experienced thus far, through the stages from prospective project, technical and economic feasibility, planning application and approval, construction, commissioning and generation.

Regionalise and renew national statistics methodology (RESTATS)

The uptake of renewable energy on a national level is currently measured through RESTATS. Funded by the Department of Trade and Industry and Eurostat, this initiative provides generating capacity and aggregated energy output figures from a number of different renewables technologies, updated annually and broken down into sub-regions of the UK. This information feeds into the Digest of UK Energy Statistics (DUKES). SEE-stats will build and expand on this activity, aiming to gather a wide range of information from all individual projects, both technical and socio-economic, through a broad knowledge of the renewable energy landscape of the south east region, and to take this a stage further by predicting future outcomes based on the detailed history of project progress from previous years.

New emphasis on socio-economic impacts – IEA Bioenergy Task 29

The data recorded for biomass projects under socio-economic topics will be fed into the IEA Task 29 activities, SEE-stats will therefore be a useful addition to the information gathering currently ongoing in this area. As this information will be available alongside technical data for each project it should enable links to be made which identify the types of project and circumstances that deliver the best outcomes with respect to social and economic benefits. The patterns of results will provide a basis on which future activities can be estimated, allowing some degree of confidence in predicting the likely socio-economic impacts of the prospects deemed to be probable bioenergy generators in the years ahead.

New regional structure and drive: GOSE, SEEDA, SEERA

All three of the regional bodies will be providing their support to this initiative. The information available through SEE-stats will enable progress to be clearly defined, measurable against the SEERA targets and will assist in being able to understand the changes brought about by increases in renewable uptake on the environment of the region, influencing policy decisions based on knowledge of local activity and prediction of progress. The South East England Development Agency (SEEDA) is currently the leading regional development agency in the UK on renewable energy, and will therefore be closely monitoring outcomes from SEE-stats to assist in its own activities. The web based availability of the statistics will include links to GOSE, SEEDA and SEERA.

Project commissioned by GOSE

The Government Office of the South East (GOSE) is supporting the project through providing a major portion of the funds required to carry out data collection, analysis, prediction and presentation.

Thames Valley Energy

TV Energy is ideally positioned to implement this work as a result of its extensive knowledge of renewable energy activities in the Thames Valley. TV Energy was set up to promote, educate and facilitate renewable energy projects in the region and is in close contact with the many different organisations connected with the implementation of any new renewable energy initiative. These include regional government, local authorities, community and environmental groups, trusts & charities, private companies and individuals. TV Energy already monitors known projects internally through a tracker system, and much of this information will be transferred into SEE-stats, to act as a basis for further enquiries relating to other information required of each project to complete the SEE-stats database for these. Further investigative work by TV Energy will complete the picture of renewable energy in the Thames Valley, and ultimately the entire south east England region.

The Brief

Maps and visual presentation

The information relating to individual projects will be able to be accessed by interested parties via a separate website, also accessed through the TV Energy website. Visitors will be able to gain an immediate understanding of where renewable energy generators are or are likely to be through sub-regional

maps, and to find out a wide range of useful information about each individual case if desired. Generator capacity and energy output for each technology will be available through simple histograms, which will also inform about the number of projects at varying stages of development and how these might project towards the capacity targets for 2010 and 2016.

Project installation details

These will cover the name of the installation and address, its owner, grid reference, sub-regional location (Thames Valley, Hampshire & Isle of Wight, East & West Sussex, Kent), and the development status. The last of these will categorise projects into one of five stages: as a prospect, planning permission applied for, planning permission gained, under construction, and operational.

Project technical data

Included in here will be information principally concerning energy. This will be the type of renewable energy technology employed (biomass thermal, biomass anaerobic digestion, onshore wind, solar thermal, solar PV, small hydro), equipment supplier's name, electrical and/or thermal capacity in MW, annual electrical and/or thermal energy output in MWh, declared net capacity (DNC), and fuel type (for biomass). DNC relates to the intermittent nature of some renewable technologies and from these DNC figures annual energy estimates can be made where actual output data is not explicitly provided. The DNC figures will initially be those used nationally within RESTATS, with the expectation that moving towards regionally derived figures from known generating capacity and energy information will provide more accurate DNC figures for projects in the future. Where energy output information is available, data will be presented aggregated from at least three sites within a category, in this way the confidential nature of energy output information from individual sites will be preserved.

Socio-economic benefits

This will list the number of jobs directly and indirectly attributable to the renewable energy installation, annual economic benefits, project capital cost, the conventional energy source that the renewable energy generating capacity is replacing, tonnes of CO_2 displaced, equivalent number of homes provided with electricity/heat, and the social benefits.

The Solution

Higher education link

As part of its commitment to renewable energy education, TV Energy is employing an MSc student from the University of Reading's 'Renewable Energy and the Environment' course to carry out work in connection with the first stage of the project (developing the database and the methodology, and collecting data for the Thames Valley and Surrey). This work will also form the basis of the student's MSc research project.

Integration of elements

As has previously been indicated, the challenge of SEE-Stats is to integrate the various components of the brief: a logical and modern methodology, a database of projects with installation details, technical and socio-economic data, maps of the region, and a visual presentation of the aggregated data and targets for both the region and its four sub-regions. The solution is an interactive website for policy-makers and implementers, the renewable energy industry and the interested public to find information that is useful, accurate, up-to-date and easily accessed.

Initially a prototype is being developed (to be completed by September 2003) which will ultimately resemble the final version in all but three respects: it is currently not open to public access, it contains data for the Thames Valley and Surrey sub-region alone, and the database is in spreadsheet format. During 2004 SEE-Stats will be available on-line, with renewable energy data from across the entire South East of England region held in a permanent computer database.

The Prototype (1) – Installation database

The most fundamental component of SEE-Stats will be the database of individual renewable energy installations in the region. This list of projects and their details will be the central information pool from which the other elements of SEE-Stats will draw the data necessary for their specific intended uses. It is foreseen that the database will be held by TV Energy and updated quarterly, with the addition of new installations and the latest data for existing installations.

The twin key considerations for database development are (1) the determination of the methodology to be applied when collecting and collating the data (see below) and (2) the selection of the data fields to be included. At present there are 29 data fields, shown in Table I, which have been selected for their perceived relevance to the information needs of SEE-Stats' target users. The first seven are details of the installation, the twelve fields S8 to S19 are technical data, while the last ten are socio-economic benefits derived from the installation.

Installation	
No.	*Data field*
S1	Installation code
S2	Installation name
S3	Owner
S4	Address
S5	Grid reference
S6	Sub-region
S7	Development status

Technical	
No.	*Data field*
S8	Technology
S9	Supplier
S10	Capacity (Electricity)
S11	Capacity (Thermal)
S12	DNC (Electricity)
S13	DNC (Thermal)
S14	Output/yr (Electricity)
S15	Output/yr (Thermal)
S16	Fuel
S17	Operational since
S18	Energy to (Electricity)
S19	Energy to (Thermal)

Socio-economic	
No.	*Data field*
S20	Jobs (Direct)
S21	Jobs (Indirect)
S22	£ Benefits/yr
S23	£ Capital cost
S24	Replacing likely alternative
S25	tCO2 displaced
S26	Homes (Electricity)
S27	Homes (Thermal)
S28	Social benefits
S29	New business startups

Table I SEE-Stats data fields

The Prototype (2) – Methodology

It is crucial to develop a logical and modern methodology for generating a standardised set of data suitable for the database, and ultimately for the presentation of regional statistics. For example, it must enable a fair comparison of the contributions of different energy forms – thermal, electrical and cogeneration/CHP; technologies of varying 'reliability' – intermittent (e.g. wind) versus non-intermittent (e.g. biomass combustion); generators of varying time usage – 'constant' use (e.g. grid-linked thermal power stations) versus seasonal and/or need-dependent use (e.g. domestic boilers). The task in hand is to combine the best elements of existing renewable energy statistics methodologies along with new ideas based on the regional experience, actual data from individual installations, knowledge of the technologies concerned and common sense. The main reference methodologies will be the RESTATS, IEA and Eurostat conventions.

The Prototype (3) – Homepage and regional map

The domain names www.see-stats.org and www.see-stats.com have already been registered for use by the SEE-Stats website; the current test prototype is located at www.tvenergy.org/see-stats. The key components of the SEE-Stats homepage (see Figure 1) are an interactive map of the South East of England region, which is the portal to the installation data, and a declaration of the five sponsor organisations doubling as links to their respective websites. The homepage also contains a site navigation toolbar and links to the RESTATS site, a site feedback questionnaire, and the regional statistics page. Clicking on the appropriate area of the regional map allows access to a page dedicated to one of the four sub-regions: Thames Valley and Surrey, Hampshire and the Isle of Wight, East and West Sussex, and Kent (although currently only the first is active).

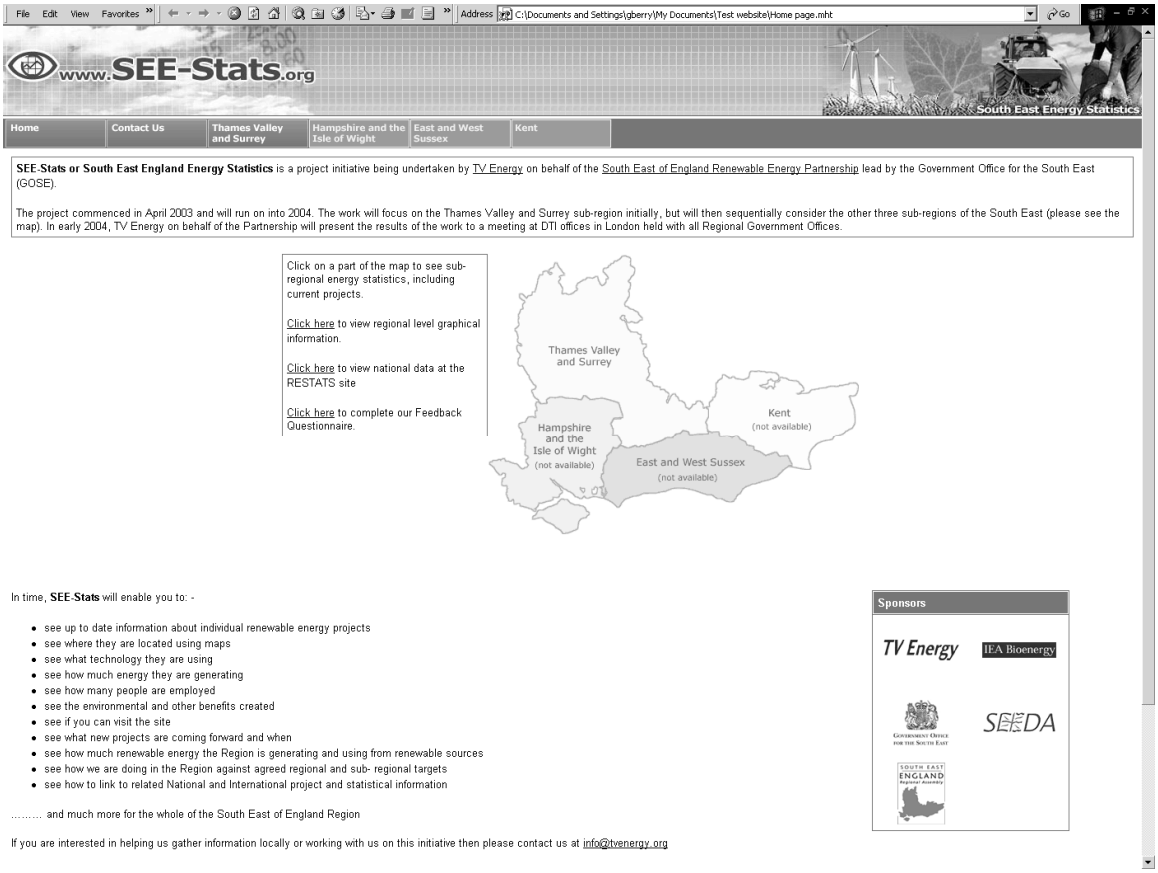

Figure 1 SEE-Stats homepage

The Prototype (4) – Sub-regional pages

This page displays a link to the aggregated sub-regional statistics page, and a map of the sub-region. By selecting from an adjacent list of the five possible development statuses, it is possible to view on this map a set of numbered points, and next to the map a correspondingly numbered list of installation names. These give the locations and names of all the renewable energy installations in the sub-region that match the selected status type. In time it will also be possible to view project locations by technology type, and then select combinations of the two variables, e.g. to view all solar thermal installations under construction, or to see all biomass combustion and anaerobic digestion plants which have either applied for or gained planning permission. Any of the resulting points on the map or names in the list can then be selected to access a data sheet for that installation.

The Prototype (5) – Installation datasheets

These datasheets are based on a standard design quartering the page, with the name and photographs of the installation in one section, the other three sections being dedicated to the three types of data respectively – installation details, technical information and socio-economic benefits. All fields of the database are given, with the appropriate details and values displayed. Eventually there will also be a link to a page providing details of the methodology employed.

The Prototype (6) – Regional & sub-regional statistics pages

From both the regional and each of the sub-regional map pages (currently only Thames Valley & Surrey are active) it will be possible to access a page displaying aggregated technical and socio-economic statistics for the area in question. At present there are four histograms on this page, showing installed

renewable energy capacity in MW (for the years 2003-16), annual renewable energy output generated in MWh per year (2003-2008), the annual amount of greenhouse gases displaced in tonnes of CO_2 equivalent per year (2003-2008), and the number of jobs directly reliant on renewable energy installations (2003-2008). These could be supplemented by the presentation of additional socio-economic data. It is thought that the data used will, where applicable, be year-end data rather than the alternative of quarterly updating. The prototype test site predominantly uses dummy data in addition to the data from five actual installations already entered in the database, imagining that we have already reached 2008 in order to envisage the state of play in that year and visualise how the statistics pages will be able to be used.

The histograms all allow representation of actual current and historical values, but the first also serves as a planning tool by displaying the South East of England renewables targets for 2010 and 2016, along with projections of estimated capacity for the intervening years. It will be possible, by a standardised method of derivation from the capacity figures, to repeat this predictive format for the other data. The capacity projections will be based on historical observations of the relative proportions of installations – respectively for each of the five development status categories – which successfully reached operation status. These proportions will be combined with the latest years' data concerning the numbers of installations corresponding to each development status, to give an estimate of the number of installations likely to become operational in the next few years.

For each histogram it is possible to indicate for each year the relative proportions of the total figure which are contributed by either the various energy technology types or the different development status categories. In the test version the former is used for the 'Energy generated' and 'Jobs dependent' graphs, while the latter is shown in the 'Installed capacity' and 'tCO_2 displaced' graphs.

The Future

Gathering data for Thames Valley & Surrey

The methodology development is to an extent ongoing, but the next stage is the gathering of comprehensive installation data from the Thames Valley sub-region. This will be done in two ways: accessing existing records such as TV Energy's Project Tracker, and a more open-ended research process to find as yet unrecorded installations. In either case, close contact with the project owners and/or operators will be essential for collection of accurate data to complete all database fields.

Expansion to entire SE England region

Once the prototype is nearing completion, work will begin on extending to the other three sub-regions of the South East region. By that time, TV Energy will already have an agreement with partner organisations from the other sub-regions to collect the necessary data in their respective areas.

Consultations with potential users

Commencing with the IEA Bioenergy Task 29 Workshop and Conference in June 2003 at Streatley (UK), an ongoing series of formal and informal consultations will be carried out via both personal communication and by means of the feedback form linked to the test site. Interested parties, especially intended users of SEE-Stats, will be invited to view the website and comment on the usefulness and accessibility of the information it provides.

Conclusions

Wider applicability: Other UK regions?

Given that SEE-Stats is the first regional renewable energy statistics project in the UK, and that the South East of England has been appointed the flagship English region for renewable energy promotion, the project has the potential to lead the way for other regional governments who may in future choose to adopt the SEE-Stats concept and methodology as one of their measures to attain their own renewable energy targets. This possibility is given further impetus by SEE-Stats' pioneering focus on its potential

value as a planning tool, and its focus on the socio-economic benefits of renewable energy. These social impacts represent further regional political drivers for promoting renewables, in respect of targets and aspirations in such wider fields as job creation, new businesses, social exclusion and greenhouse gas emissions.

Linkages: RESTATS, IEA and Eurostat

There is a great deal of synergy between the RESTATS and SEE-Stats projects (apart from their names), both in the attention paid during SEE-Stats' development to the content, methodology and design of the national renewable energy statistics service RESTATS, in the potential benefit to that project of a fresh approach to renewable energy statistics, and naturally in their mutual complementarity in serving different levels. Similarly but to a lesser extent, the European Union renewable energy statistics methodology as used by the Eurostat service provides another model for SEE-Stats, and equivalent regional renewable energy agencies in other EU member states will be consulted on their own views and practice in this area. IEA data gathering for OECD counties is also of interest and a dialogue will be established to investigate linkage.

Promotional & educational value of SEE-Stats

The advantage of the database and website will lie not only in the benefits afforded at the regional government level, for aiding capacity planning and stimulating policies for increasing renewable energy take-up. SEE-Stats can also be expected to prove useful to those in the industry or private individuals wishing to establish their own renewable energy projects. The data provided on technical details such as the names of equipment suppliers and energy outputs, as well as the project location and the contact details of the owner, represent information capable of encouraging and facilitating the plans of prospective developers. Accurate, extensive and attractively designed statistics sources are invaluable for both students and scholars in the energy field (not to mention those of economics and sociology), and although SEE-Stats is intended to be first and foremost for non-expert users, it will nevertheless be an excellent first port of call for researchers interested in the South East region renewable energy situation. In a less focused way but with a potentially wider impact, casual web-users may use the site to familiarise themselves with the renewable energy presence in their area and the varied positive impacts it is having on their community. The role of public education in stimulating broad support for renewables is indispensable, and can help form a fertile bed in which more individual domestic installations spring up and more commercial renewable energy projects gain consent of the local community.