Case study

Title:	Housing Stock Energy Management: An Open Source GIS Web Application
Developed for:	Sustain Ltd
Sector:	Carbon Reduction
Date Completed:	September 2010

Goals

Housing Associations or Registered Social Landlords (RSLs) in the UK are striving to reduce the carbon emissions of their rented housing stock, to improve the energy efficiency of their homes, and to lower heating costs for their tenants. This application aims to make property-level indicators of cost and energy efficiency available to Asset Managers and other staff in a lightweight web interface, at low cost. The application also allows additional data layers, be they internal, publicly-available or commercial, to easily be added.

Background

Many RSLs are small, without the resources to support their own GIS infrastructure or staff. However almost all of their data has a geographical component, and in many cases properties are already geocoded. Sustain's approach was therefore to support the delivery of its existing services to RSLs by providing a low-cost mapping service, which added Sustain's data layers to customer's own to create a lightweight, flexible application that could be configured for the needs of a particular customer. The source data being produced by Sustain included property stock energy analysis and modelling, and solar photovoltaic feasibility.

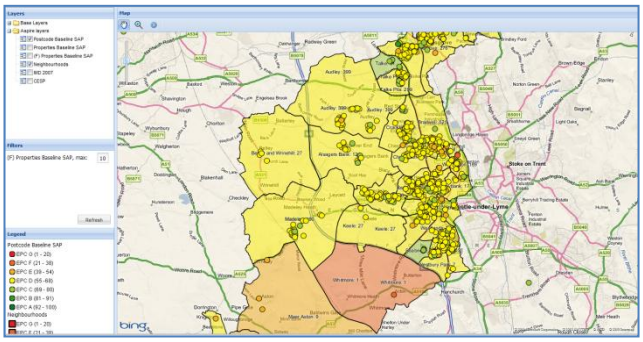

Figure 1: Overview map showing postcodes and management areas

Process

With a limited GIS team, Sustain did not want to take on a large development effort, focusing on established, 'out-of-the-box' solutions where possible. It was therefore not the intention of Sustain to deliver a comprehensive mapping service to RSLs – this would be better provided by more specialist companies. However RSLs wanted easy access to their data, and an open source approach provided the opportunity to do this in such a way that overheads and maintenance were kept to a minimum, and established tools could be adopted.

Having identified a candidate architecture, Sustain developed a simple web delivery application stack, and trialled this, at no cost, with an existing customer, as part of the delivery of a standard energy analysis product. Based on feedback from the customer on usability, performance, and scope and styling of the data, this was then incrementally refined over a period of months. Once the application was stable, it was rolled up into the product, and is now being delivered as a standard component to all customers.

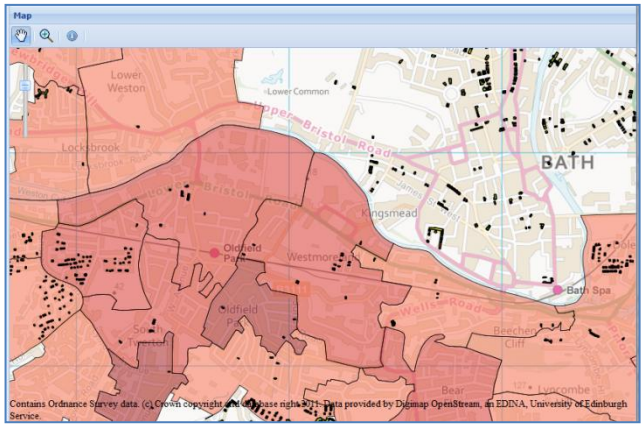

Figure 2: Fuel Poverty data overlay

Outcome

Benefits can be seen in two areas. First, for the end customer, access to energy-related property data in a mapping interface is able to support decision making on resource allocation, and highlight spatial variations and similarities. Where GIS is not currently used, the mapping application also acts as an introduction to the domain, allowing the RSL to assess the value of interacting with their (and others') data in this way.

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For Sustain, the application adds value to its offering, not just through its ability to provide visualization of the data, but also by the spatial analysis possibilities which are now opened up. For example, analysis of the pattern of connections of properties to mains gas – cheaper and more efficient than electricity for heating – allows the identification of those properties close enough to the gas network to be connected.

An added benefit is that the platform, once established for one purpose for an RSL, can be used as a delivery channel for other purposes. Sustain is carrying out solar PV feasibility studies for a number of its customers, and the main deliverable is a mapping layer containing polygons for each suitable roof surface, together with an estimate of the number or panels that can be fitted, and the expected yield. This is simply added to the existing map application.

Architecture

In developing the architecture, the key criteria were stability and ease of configuration, in order to keep maintenance and development costs low. Components were therefore selected which were widely used, well-documented and integrated tightly with each other.

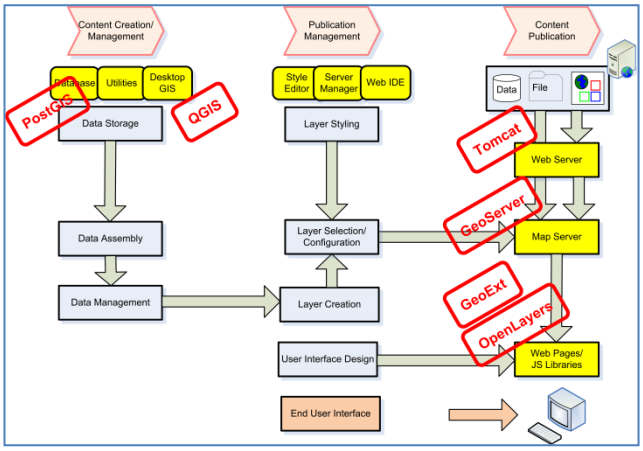

Figure 3: Architecture and key application components

The principal components used were:

- PostGreSQL 8.4 with PostGIS 1.5
- Apache Tomcat 6.0
- GeoServer 2.1
- GeoExt 1.0
- OpenLayers 2.10
- Quantum GIS 1.6

In addition, a number of other tools were used for more specialised tasks, for example layer styling.

Application

The application itself is primarily intended to allow end users to browse the mapped data, with popups providing access to the detail for a particular property. Data has been aggregated to higher levels of geography (for example postcode or management area) where appropriate, and additional map layers created to represent these. In addition, layers representing area-based data have been added to some maps, showing, for example, areas of high fuel poverty or low gas use.

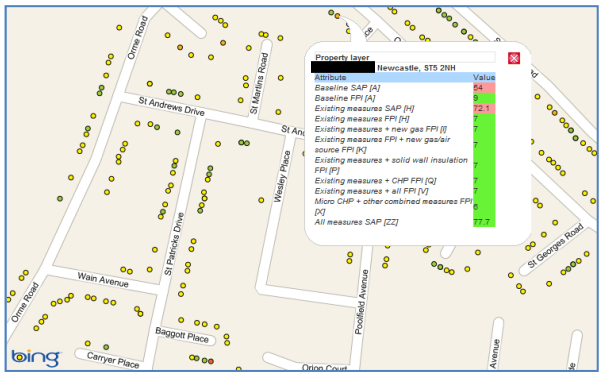

Figure 4: Detail shown in popup

Advantage was taken of the SQL capability introduced with GeoServer 2.1 to introduce simple filters for key parameters, allowing users to select a subset of properties. The application is hosted on a remote Virtual Private Server, on a Windows platform.

Conclusion

The application as implemented has proved popular with customers, and has also been used for internal applications. It is compatible with commercial GIS software used by some RSLs, who are considering using the platform to publish non energy-related data. Through the use of Quantum GIS, and ODBC interfaces, it has also been straightforward to integrate data from MS Office products.

Functionality is less extensive than some other commercial mapping systems, but Sustain's view is that where more functionality is needed, it can provide a service to its customers by bringing in specialist mapping providers, rather than diverting its own resources, and the virtue of simplicity means that in many cases, the application already meets immediate needs.

Future development is therefore more likely to focus on identifying and publishing further relevant datasets. If this data can be appropriately analysed, styled, and filtered, and combined with RSLs' own data, the value of the application will continue to be enhanced.

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