Orchestration of Renewable Integrated Generation in Neighbourhoods

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D5.2 Energy Orchestration System Activated

WP5 – Deployment & validation of the ORIGIN energy control and orchestration algorithm

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Energy Orchestration System Activiated

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2   Introduction

2.1   Scope of this Deliverable

The intention of this short deliverable is to mark a deployment milestone in the ORIGIN project, highlighting the initial live deployment of an end-to-end ORIGIN smart energy management system, now operating 24/7 for three communities and several hundred users.

2.2   Context of this Deliverable

Development of the ORIGIN system to date has involved several stages in community consultation, algorithm design, approach design, hardware procurement, hardware installation, simulation, software design, communications and database engineering, user interface design, and other activities.

One view of that set of activities is the bullet point list below, which broadly and partially follows the stream of deliverables from the ORIGIN project:

- Audit community energy characteristics;
- Survey community goals and behaviour;
- Establish a community communications network for data collection, monitoring and actuation;
- Predict localised weather variables (Weather Prediction Algorithm - WPA);
- Predict localised renewable generation (Renewables Prediction Algorithm - RPA);
- Predict electrical demand in individual households and buildings (Demand Prediction Algorithm - DPA);
- Predict opportunities for load shifting in individual households (Opportunities Prediction Algorithm - OPA);
- Provide an optimised set of load-shift actions that will ideally serve community goals for increased renewables utilisation (balanced with cost) (Gap Analysis and Orchestration/Control Algorithm - OCA);
- Develop a User Interface that delivers updated forecasts and performance information to communities and individual building users;
- Integrate the developed algorithms and communications infrastructure to develop an end-to-end working ORIGIN smart energy management system;
- **Launch the system and initiate live, 24/7 operation in the ORIGIN validation communities**

The activity in **boldface** represents the current milestone that is marked by this deliverable. All activities and algorithm developments listed in the earlier bullet points are complete, and the initial deployment version of the ORIGIN system is now live and operating. Technical validation of the majority of this initial deployment is recorded in Deliverable 5.3 "Initial Deployment Validation".

3   Community Launch Days

The live, 24/7 operating version of the ORIGIN smart energy system was launched to the three communities (imminently, in the case of Tamera) as follows:

- Findhorn: 5th November 2014
- Damanhur: 22nd November 2014
- Tamera: 3rd December 2014

Each of the launch days involved the following:

- Presentations from the ORIGIN team to the community; these recapped the project to date, but focussed on explaining the technology behind the live version of the system, and its user interface;
- provision of logins/access to all members of the community (previously logins were available only to ORIGIN community contacts and residents of test homes);
- walkthrough of the user interface by the ORIGIN team.

A reminder of the user interface – presented to the communities for the first time at launch days (although having been developed with their advice) is in Figure 3.1, which shows snapshots of the screen seen by users at each of the three communities.
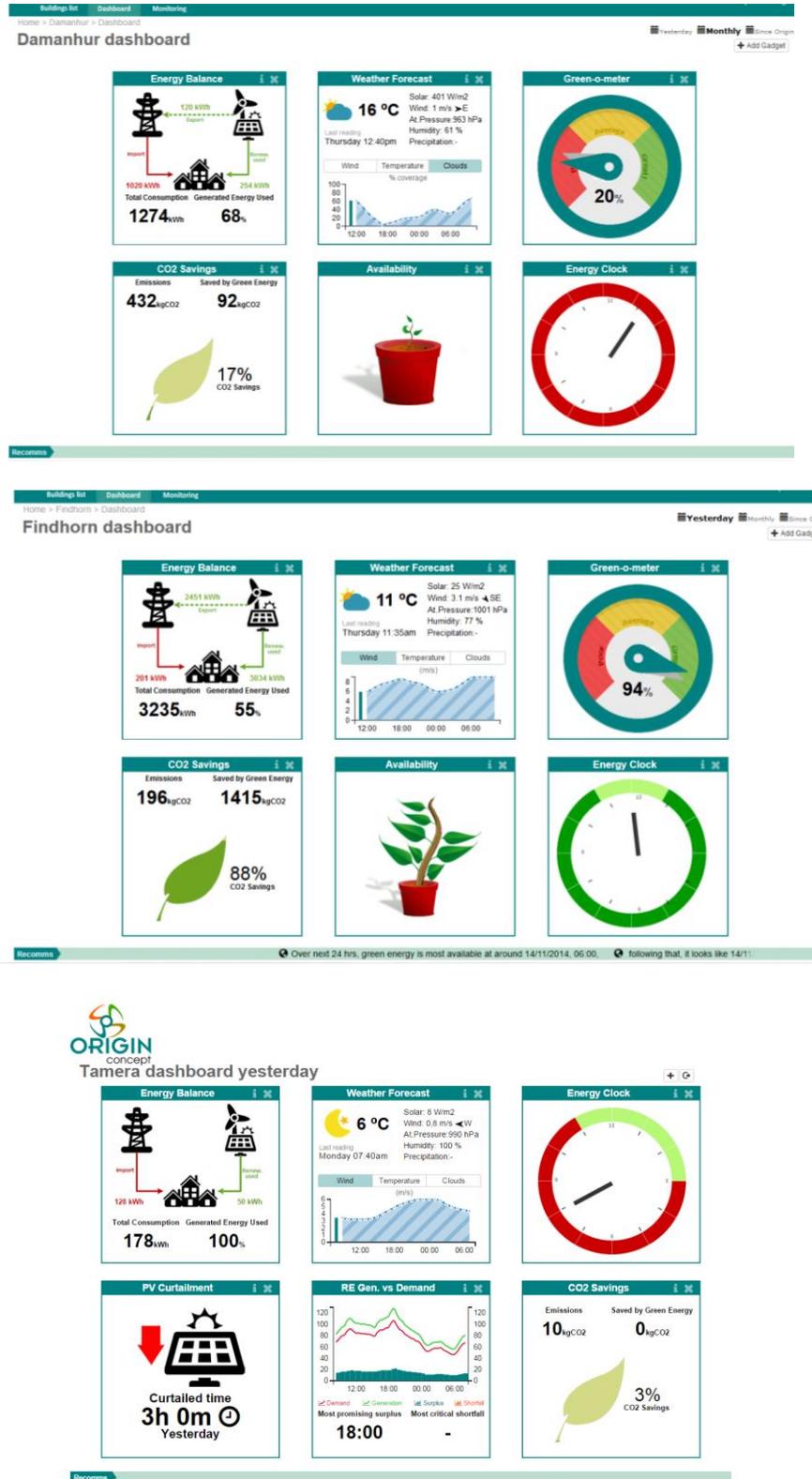

Figure 3.1. ORIGIN dashboards: Damanhur (top), Findhorn (middle), Tamera (lower)

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As can be observed in Figure 3.1, the Tamera (lower) dashboard differs from the Damanhur and Findhorn dashboards in the lower left and lower middle 'gadgets'; this arises from differences in both the Tamera community's renewable/demand circumstances, and their preferences for information display. In short, Tamera frequently generate more renewables than they need, with the result that (owing to the details and circumstances of their grid interconnect) they need to 'curtail' local generation at times of (typically) both high demand and supply. For Tamera, ORIGIN information and actuation will be aimed in part at avoiding such curtailment by shifting demand appropriately, based on longer term planning. The lower left and lower middle gadgets on the Tamera dashboard reflect this, respectively providing information about curtailment the previous day, and visualising renewables availability over the next 48 hrs in the way requested by Tamera (to help plan to avoid curtailment).

Some snapshots from the Findhorn and Damanhur launch days are in Figure 3.2.

Figure 3.2 Snapshots from ORIGIN Launch days: Damanhur (upper), Findhorn (lower)

The Damanhur launch photos (figure 3.2, upper) show, from left to right:

- some of the ORIGIN team, with Damanhur community leaders, with some Damanhur 'nucleo's in the background (these are multi-occupant residential buildings of the type participating in the ORIGIN project);
- part of the Damanhur audience at the launch event;
- Dr Eddie Owens speaking at the launch event;

The Findhorn launch photos (figure 3.2, lower) show, from left to right:

- Dr Paul Tuohy explaining the user interface to members of the Findhorn community;
- part of the Findhorn community audience;
- Dr Paul Tuohy, again, presenting at the launch event.

4   Concluding Notes

Continuing work on the ORIGIN project will focus on evaluation of now-deployed systems in the three ORIGIN communities (Findhorn, Northern Scotland; Damanhur, Northern Italy; Tamera, Southern Portugal). In parallel there will be continued maintenance and occasional improvement of the algorithms themselves, and further development of 'spinoff' technology – in particular ORIGIN's approach to localised short-term weather forecasting. Other activity will also investigate and design variants of the generic approaches and their components that may be required for communities quite unlike the ORIGIN validation communities.