

SEAI National Energy Research, Development & Demonstration Funding Programme

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Sustainability Dingle

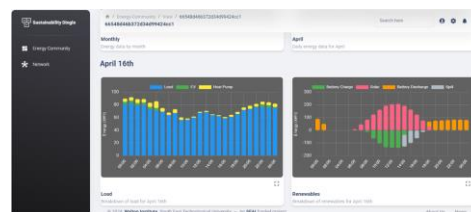
Abstract

Sustainability Dingle enables Energy Communities (EC's) to take control of their energy profiles and become prosumers to play a central role in the Clean Energy Transition. New EU Directives have been implemented which place the energy citizen at the centre of this transition. Ireland is in the process of transposing these Directives into law and an opportunity exists to implement mechanisms which will have a lasting impact on our Sustainability as a nation. Key to these developments is the creation of EC's where Renewable Energy Technologies can be implemented locally such that they can be sustainably balanced with local loads using mechanisms such as Energy Sharing, Demand Side Management, Load Shifting and Battery Storage. The project acquired and analysed energy data and developed models to maximise energy elements against mechanisms for Energy Communities and Renewable Energy integration in line with these EU Directives.

Research Outcomes

A software platform was developed that encapsulates all of the functionality required to control and balance an EC. Load profiles were developed for every end user group in the Dingle Peninsula and these points were geographically mapped on to the location of every meter and transformer in the area. This enables an end user to design an EC along any portion of the network where the platform will sustainably balance it with renewable technologies, batteries and smart grid techniques. A geographical representation of the local grid was developed to build models of the energy loads at every node in the network. Scenarios for when heat and transport are electrified were also included. Multiple EC's were designed on the platform starting with smaller branches

and then expanding the EC out along the network until the entire feeder was included. This resulted in varying sustainability scores – a mainly Industrial area secured a sustainability score of 30.2%. As this EC is expanded out along the entire feeder, more residential loads are added, increasing the sustainability score to 42.6%. As heat and transport are electrified, these loads are mainly night based which will reduce the sustainability score as a low match with solar output. A graphic of the platform is shown below.



An electrical analysis was also included and interestingly, the current feeder has the capacity to fully electrify heat and transport, almost trebling the load, and remain within voltage and line loading parameters when matched with balancing renewable energy without any grid reinforcement. Wind energy is not permitted in the area and was not included in the analysis but could calculations show sustainability levels of the feeder could be improved above 66%.

Recommendations

Transpose the EU Energy Directives in full into Irish law.
Implement physical energy sharing and Collective Self Consumption mechanisms to realise the advantages of EC's.
Review EC implementations across the EU to realise best practice of the rules, mechanisms and sharing coefficients.
Enabling frameworks for Energy Communities to facilitate them to participate in the Energy Transition.
Enable Energy Parks where supply and demand can be locally balanced using smart grid techniques.