

# SPIRE 2

## Northern Ireland Demand Flexibility Map

**SPIRE 2**  
Storage Platform for the Integration  
of Renewable Energy



In the past, output from fossil generators was flexed in order to match energy supply and demand. However, the move to clean energy from renewable sources and the challenges posed by decarbonisation of heat and transport have created the need for flexible demand. These challenges include managing system frequency and voltage variation, overloading of network equipment due to the uptake of heat pumps and electric vehicles, the problem of excess generation at times of low demand and the costs of conventional network infrastructure to transport wind energy from remote locations to load centres. Demand Flexibility is the capacity to shift the time when energy is drawn from or exported to the grid by behind-the-meter (ie, consumer-owned) resources in response to an external signal (such as electricity price). This is achieved either by using energy storage or changing the activity time.

[ulster.ac.uk/spire2](http://ulster.ac.uk/spire2)



### NORTHERN IRELAND DEMAND FLEXIBILITY MAP

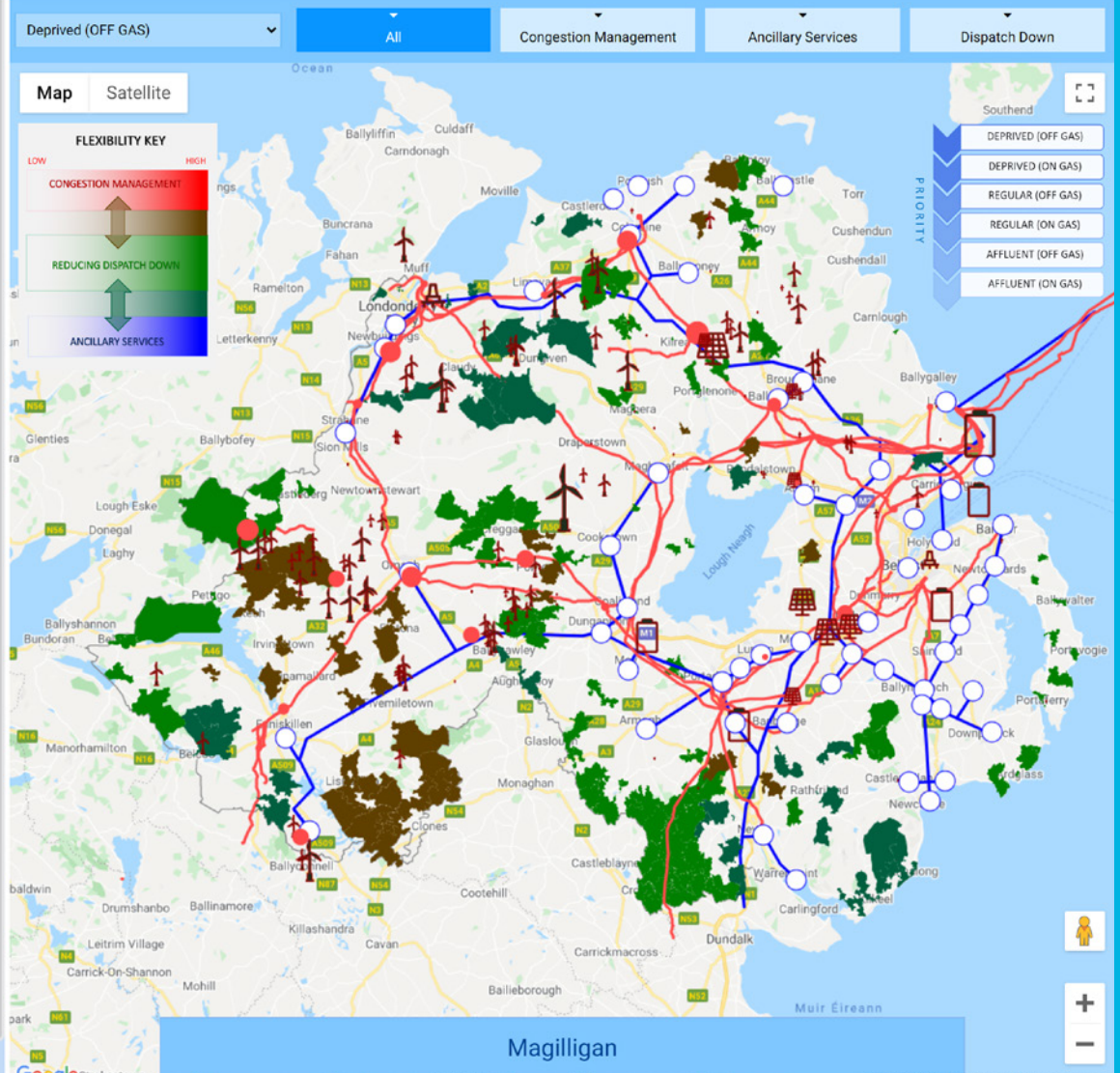
Layers	Description	Credits
<input type="checkbox"/>	Flexibility Potential	
<input checked="" type="checkbox"/>	Consumer Segmentation	

Select a layer to display the layer on the map. You can select multiple layers

Color: #50e63f

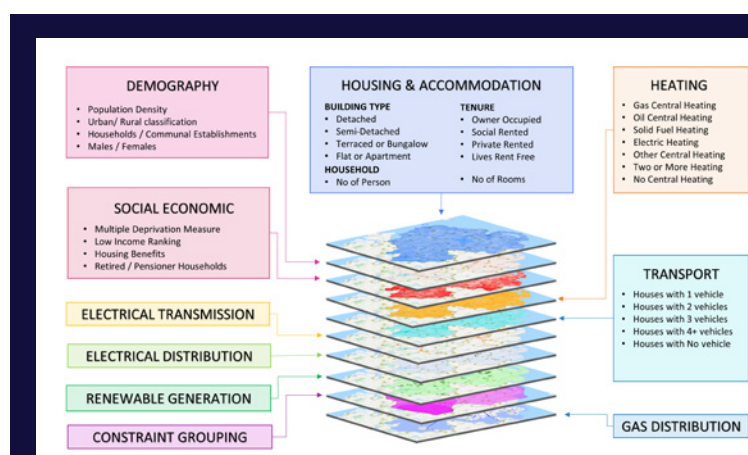
Select a Color to style each layer

- Demography
- Social Economic
- Housing and Accomodation
- Heating (Fuel Type)
- Transport (No of Vehicles)
- Electrical Transmission
- Electrical Distribution
- Renewable Generation
- Constraint Groups
- Gas Network
- Case Studies



For policy makers and regulators to effectively plan decarbonisation for NI, they must understand the geospatial relationship of various energy assets and consumer groups. For example, what areas have excess wind energy available? How do flexibility needs and opportunities differ from location to location? How can we estimate the amount of flexibility or response available at local level? Is there enough local flexibility available to solve a congestion or power quality problem? Where would activating demand flexibility create most value? How do we prioritise flexibility activation in the event of competing resources? Only with a clear picture of the location and nature of demand flexibility can policy makers, regulators, system and network operators have a chance of developing an energy system that is both fair and economically efficient.

Ulster University's Interreg-funded SPIRE 2 project has developed a Demand Flexibility map ([niflexmap.web.app](http://niflexmap.web.app)), an interactive tool designed to help develop an effective flexibility strategy and implementation pathway for Northern Ireland. The map was developed by PhD Researcher Osaru Agbonaye who is researching business models for demand flexibility. The tool provides a whole energy system model, linking socio-demographic, housing, heating and transport data with known congestion and constraints on the electrical transmission and distribution systems. The tool currently has 12 map layers with over 110 sub-layers and contains features to assist with filtering and visualisation. It has various map views such as satellite, terrain and street view for a more detailed picture and geography tour. The tool is in active development and updated frequently with new features.



## HOW HAS THE TOOL BEEN USED?

- We have used the tool to perform a geospatial assessment of flexibility needs and opportunities at neighbourhood level
- We have used it to identify neighbourhoods at risk of being left behind in the energy transition
- We have developed a flexibility distribution and prioritisation model that gives precedence to vulnerable consumer groups to ensure that there is increased justice in the energy system.

## HOW COULD IT BE USED IN THE FUTURE?

- Forecasting uptake of low carbon technologies at neighbourhood level
- Mitigating against fuel poverty
- Understanding the impact of clean technologies on the grid
- Understanding the opportunities for investments
- Help in siting of district heating schemes or large energy storage or renewable generation.