

# Dundalk Institute of Technology (DkIT) is working with SPIRE 2 stakeholder Ulster Farmers' Union (UFU) to address issues with distributed single wind turbines.

## SPIRE 2

Storage Platform for the Integration of Renewable Energy



## THE CHALLENGE

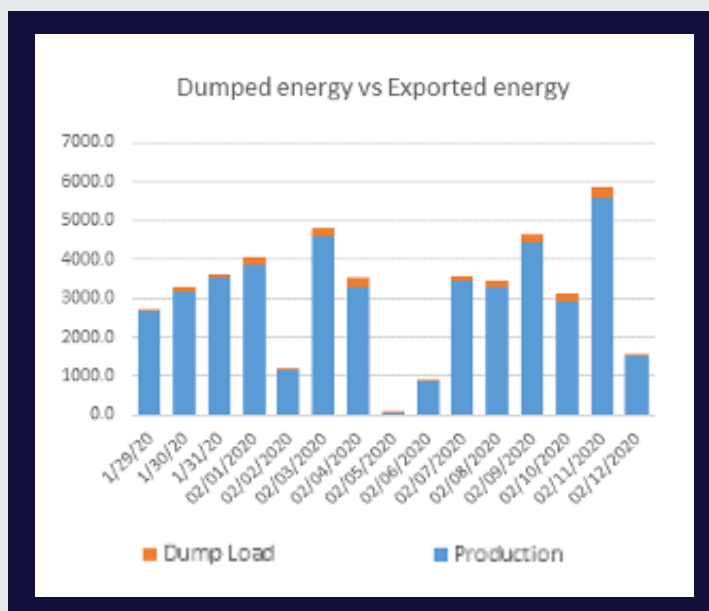
Northern Ireland has exceeded its target of electricity generated from renewables by 2020 with the 1200 distributed single wind turbines contributing 141 MW to that total. However, many of these turbines were reconditioned or relocated turbines from elsewhere in Europe and many are older with less capable control systems and electronics. Furthermore, in order to adhere to grid connection limits, modifications were made on some turbines to change the power output with wind resource. Assessing the extent and impact of these changes is a focus of Ulster Farmers' Union (UFU) members as many of them own wind turbines. Issues such as the power quality, frequency changes, control and communications are a focus as energy regulators need to keep grid connected assets in line with standards to preserve overall grid quality. Rectifying the issues and future proofing their investment is a priority to keep these turbines turning. Some turbines also find that they could possibly produce too much energy at certain times and therefore dump loads must be used or other amendments of the turbine to avoid exceeding what the turbines can produce.

## THE RESEARCH

Dundalk Institute of Technology researchers are members of the International Energy Agency Wind task 41 entitled “Enabling wind to contribute to a distributed energy future” and have experience with the Dundalk Institute of Technology 850kW turbine and other distributed turbines around the island. The researchers installed power quality metering and energy metering on a UFU member owned turbine and monitored power quality, voltage, frequency and the energy flows in the turbine during that time. This is tied with wind measurements taken locally to determine the effect of the modifications on the output of the turbine.

## THE CONCEPT

There are many turbines in the sector which have similar issues and by working through the Ulster Farmers Union (UFU) the SPIRE 2 researchers are able to identify the solutions which will assist the sector to remain viable and assist in further decarbonising energy in the cross border territories. The power quality issues, and overall grid compliance issues are being addressed through a combination of suppliers and the project will assess the impact of these technologies on the turbine and its output. Turbines can occasionally produce too much energy and so we are assessing the role of electricity storage in the context of local energy use.



## THE IMPACT

Northern Ireland is a leader in the area of distributed wind energy generation and while this has been recently installed, there are opportunities for further optimisation and utilisation of the carbon-free energy produced. The initial research has focused on making the turbines more responsive to the needs of the grid and future proofing the turbines to comply with grid codes. Further research will focus on the role of the energy generator in the locality, as the grid connected electricity is not directly impacting the energy use of the farms on which the turbines are sited. SPIRE 2 is researching ways in which the electricity generated can benefit the farm and decarbonise the heat and transport uses on the farm as well as in the locality.