End of Life Decisions for Wind Farms:
An Opportunity for Climate Action and for Energy Communities

Report: Industry Meets Academia Summer Seminar
Work Packages 4.1 and 5.1

Month 18/48, August 2023

Authors: Kevin Campbell, Peter Deeney, Paul Leahy
Benoit Mayol, Dorcas Mikindani and Aaron Luke Smith

Wind Value Funding Ref: IRC*21/PATH-A/9348 Peter Deeney SFI-IRC Pathway Prog
December 19, 2023

Contents

The Wind Value project is based in the Environmental Research Institute of University College Cork (UCC), Ireland. The PI, Peter Deeney, may be found at the Cleaner Production Promotion Unit, G0.3, Environmental Research Institute, Ellen Hutchins Building, Lee Road, Cork T23 X10. The Research Team comprises: Luca Bernardi, Kevin Campbell, Peter Deeney, Claire Ducourtieux, Niall Dunphy, Fabian Gogolin, Paul Leahy, Benoit Mayol, Dorcas Allan Mikindani, John O'Brien and Rebecca Windemer.

The DOI for this report is 10.5281/zenodo.10407915.

Executive Summary

This research project seeks to estimate a financial valuation for onshore wind farms in Ireland. It will develop decision support tools which will assist wind farm managers to decide between decommissioning, repowering and life-extension for the end-of-life of a wind farm. This research will also assist local communities who may be interested in buying part or all of their local wind farm.

The seminar allowed professional insights from the hydrogen and finance industry to assist in the work of the Wind Value project. The hydrogen industry provides a viable market for renewable energy when there is reduced demand on the grid, and may help to stabilize the electricity price when renewable energy is not being produced (WP 4.1). The suggestion that compliance bonds be used to finance sustainable decommissioning, will increase the residual value of wind farms (WP 5.1).

Funding Acknowledgement

The Summer Seminar was a shared action of Wind Value and H-Wind which is funded by Science Foundation Ireland. The Principal Investigators of H-Wind are Dr Paul G. Leahy (UCC) and Dr Nguyen Dinh.

H-Wind Funding: Science Foundation Ireland (SFI) and Industry Partners – DP Energy, ESB, Equinor ASA, Gas Networks Ireland

Figure 1: Summer Seminar Participants

1 Introduction

The Wind Value and H-Wind projects combined their resources to produce the Summer Seminar 2023 which was held the Ellen Hutchins Building, Lee Road, Cork on Thursday 31st August 2023.

The Summer Seminar presented two topics, a technical study on hydrogen in co-generation engines and a proposal to use compliance bonds to encourage a circular economy. These were presented by Benoit Mayol,an intern, and Kevin Campbell, a research assistant, who were working on the Wind Value project during the summer of 2023.

2 Participants

There were 16 participants in the room (Fig. 1), including people from UCC[1], MTU[2], UCD[3], the ESB[4] and a retired engineer. The event was also hosted online using Teams where we had 11 participants from DCU[5], Georgia Tech, UCC, Bord Gais, DP Energy and Gas Networks Ireland. The event was adopted by the Re-Wind Network as its August 2023 Student Research Meeting.

3 The Use of Hydrogen as a Fuel

Benoit Mayol, (Fig.2) works for Clarke Energy and is completing his Masters degree in Energy, Environment, and Innovative Materials, at the Université Côte d'Azur. Benoit talked about the use of hydrogen as a fuel which can provide wind energy with a market and address the intermittency problem See slides here, Download slides here, Watch video here, Download video here. The presentation dealt with the use of hydrogen mixed with methane to run generators and combined heat and power plants. A conclusion is that the cost of hydrogen can be a problem, but that techinical problems can be overcome.

[1] University College Cork
[2] Munster Technological University
[3] University College Dublin
[4] Electricity Supply Board
[5] Dublin City University

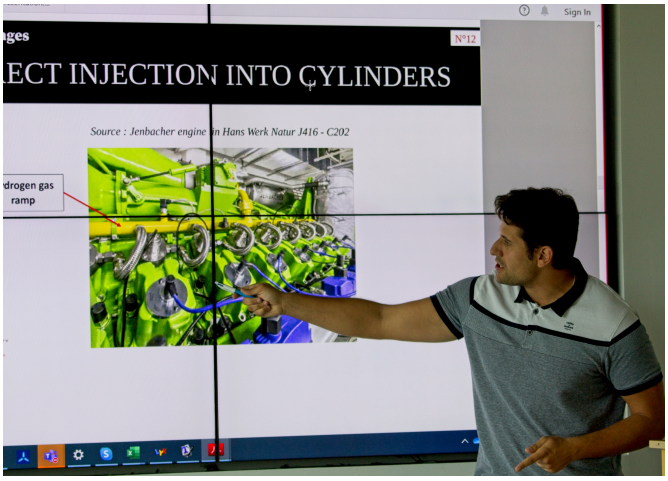

Figure 2: Benoit Mayol

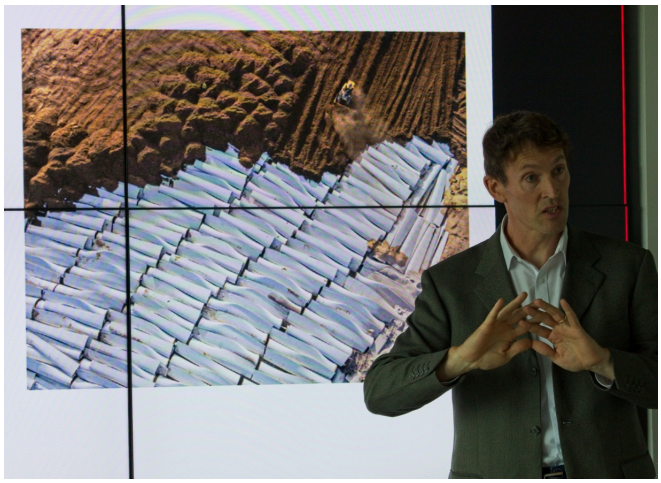

Figure 3: Kevin Campbell

4 The Use of Compliance Bonds for Wind Turbines

Kevin Campbell, (Fig. 3) is about to complete a H.Dip. in Sustainability and Climate Action for Enterprise in University College Cork (UCC) and has previously worked in the finance industry. Kevin talked about the use of a type of financial bond, known as a compliance bond which pays out on successful recycling/repurposing/reuse of wind turbines See slides here Download slides here, Watch video here, Download video here. The presentation dealt with the use of a strong financial incentive to encourage a circular economy approach to wind turbine end-of-life. Part of the difficulty with wind turbine decommissioning is that it happens when the wind farm is least profitable. The use of a compliance bond will release funds at a most appropriate time to ensure that turbines are sustainably dealt with at end-of-life.

5 Relevance for Wind Value

The event served the purposes of the Wind Value project in two ways:

- Investigating the use of hydrogen as an energy vector is relevant because hydrogen provides a way to store the energy produced on wind farms. This gives wind farms an additional market, and offers a dispatchable supply of electricity which will help to reduce price volatility. (WP 4.1)

- Wind turbine blades are quite difficult to recycle and are usually perceived as a problem at decommissioning. The use of compliance bonds changes them into assets, which offer added value at the decommissioning stage of a wind farm when sustainably processed. (WP 5.1)

6 Acknowledgments

The Wind Value project has received the bulk of its funding from the Irish Research Council under the Pathway Scheme for early career academics, reference number IRC*21/PATH-A/9348 Peter Deeney SFI-IRC Pathway Prog. The H-Wind project has received its funding from Science Foundation Ireland (SFI) and Industry Partners – DP Energy, ESB, Equinor ASA, Gas Networks Ireland

We would like to thank Paul Bolger, Helen McMahon and Chris Rogers of the Environmental Research Institute for their assistance.