‘Engaging Communities on future re-use options for decommissioned wind turbine blades.’

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16th April 2019 – Environ Conference, Carlow

Environmental Research Institute

Fondúireacht Eolaíochta Éireann
Dá bhfuil romhainn
Science Foundation Ireland
For what's next

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Research Context:

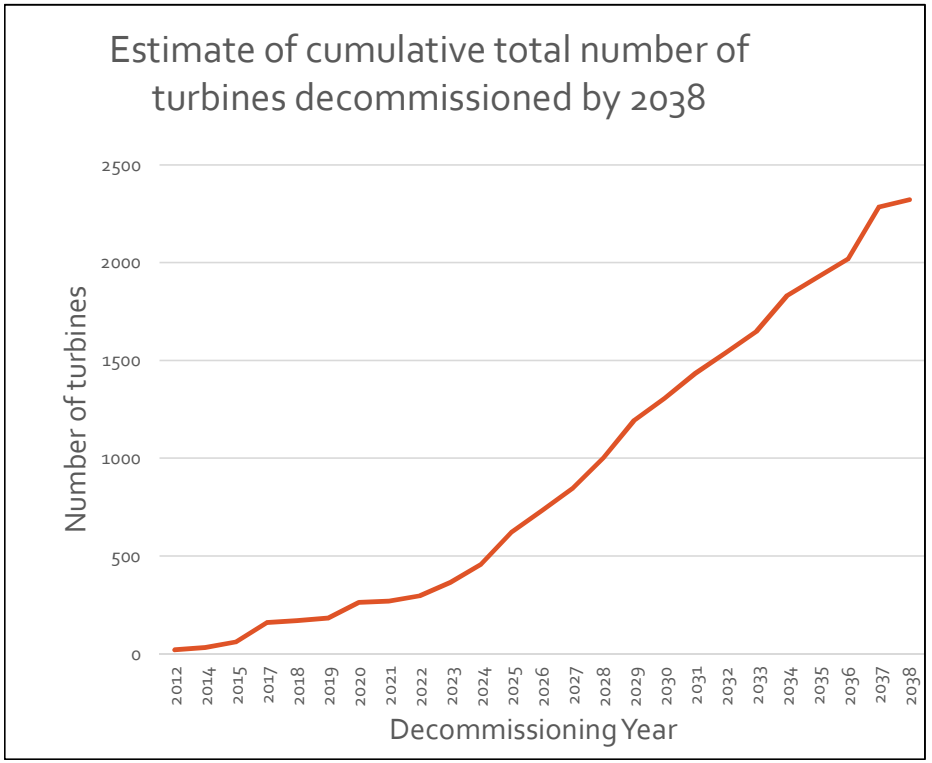
- Wind Power is a rapidly growing renewable energy source world-wide (Renewables 2018 Global status report)
- In Europe in 2018 , Denmark had the highest penetration of wind power in its electricity last year (41%), followed in 2nd place by Ireland (28%) and 3rd place Portugal (24%). (Windeurope 2019)
- In 2018 there were 346 Wind Farms operating on the Island of Ireland with a wind energy capacity of 4,635 MW of Energy (IWEA 2019)
- Wind Turbine (on-shore) Depending on Manufacturer Avg. Hub Height (100-140 m) and Blade Length (35-55m) (www.aweo.org)
- In Ireland there still remains considerable community opposition to Wind energy due to noise, shadow flicker and perceived reduction in property values. (Brennan & van Rensburg 2016)

The Problem:
Wind Turbines have a finite Life Span (20-25 years)
At end-of-life & the blade 'waste' issue arises:

Approximate total number of turbines to be decommissioned in Ireland by 2038:

2323

Annual **global** FRP blade waste is expected to reach **40 million tonnes** by 2050



E. Delaney, QUB

Wind Blade @ end-of-life

The Potential Solution : Re-Wind Project 2018-2020: a unique trans-disciplinary approach.

- The Challenge is to find **socially, environmentally** and **economically** sustainable end-of-life blade re-use applications
- To move away from a siloed approach – *Trans-disciplinary* thinking is required
- Re-Wind team consists of of Engineers, Architects, Sociologists, Geographers, Political Scientists & Local Development Experts.
- Collaboration between QUB; UCC; Georgia Tech & City University of New York

Team

Wind Energy
social, environmental and economic aspects

Structural Mechanics
understanding residual properties and structural design for new purposes

Geographic Information Services-
Developing an open system for reuse and recycling: Network analysis

Design
design of systems and processes that drive change; best practice in design for new applications, repurposing- from surface to structure, object to operation

QUEEN'S UNIVERSITY BELFAST

Georgia Tech

UCC
University College Cork, Ireland
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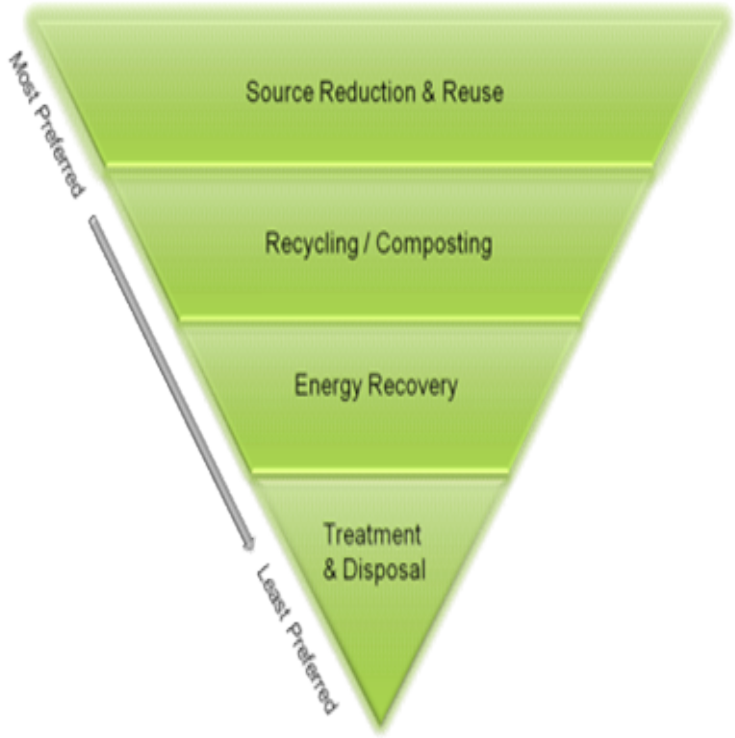
CUNY THE CITY UNIVERSITY OF NEW YORK

US EPA Waste Hierarchy

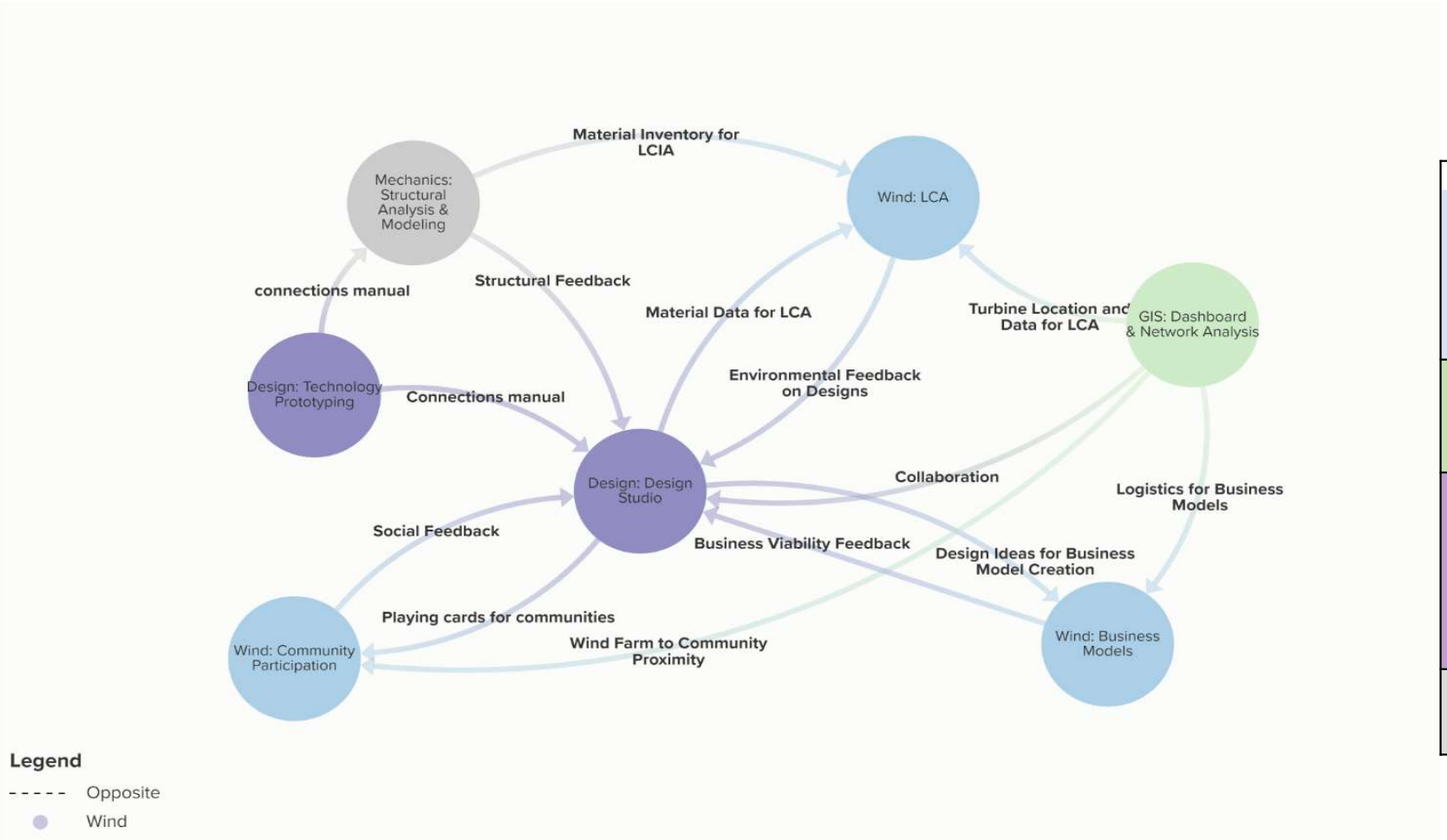
Re-Wind fits within the Circular Economy paradigm

- **Reuse**: Remanufacturing for use in new products
- **Recycling**: Shredding, grinding and milling for filler for FRP or concrete
- **Recovery**: Pyrolysis, thermolysis, solvolysis to recover polymer resins or fibers or gasses for energy
- **Incineration** – then landfill ash or with energy recovery and "Cement-Kiln" process
- **Landfilling**



Credit: US EPA Waste Management Hierarchy

Internal Project Work-Flow Map



Thrusts	*Topics*
Wind	*LCA*
	Economic/Business Models
	Community Participation Engagement
GIS	*Dashboard*
	MC-Decision
	Network Analysis
Design	*Digital Twin Blade Machine*
	Technology Prototyping
	Cutting Machine
	Design Studio
Mechanics	*Structural Analysis*
	Modeling

Credit: A. Nagle, UCC

But how to engage with communities….

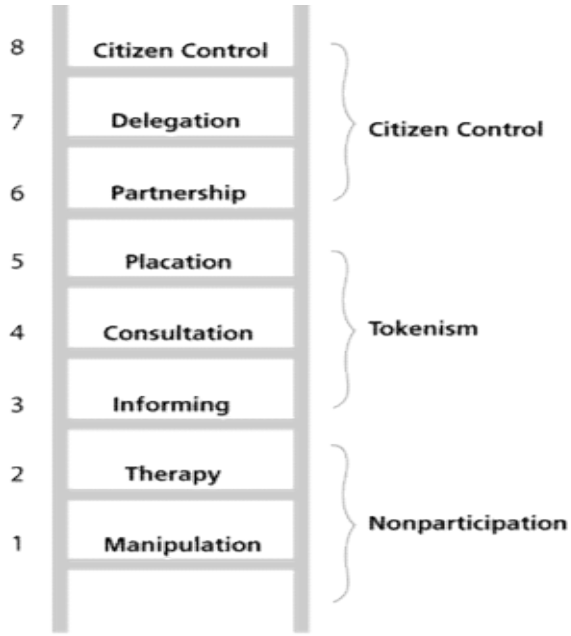
INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

SOURCE: IAP2 THE INTERNATIONAL ASSOCIATION FOR PUBLIC PARTICIPATION

Methods of Community Engagement have Evolved.

From: Arnsteins Ladder of Citizen Participation (Sherry Arnstein, 1969)



Arnstein's Ladder (1969)
Degrees of Citizen Participation

To: Fung's Deliberative Mini-Publics (Archon Fung 2003)

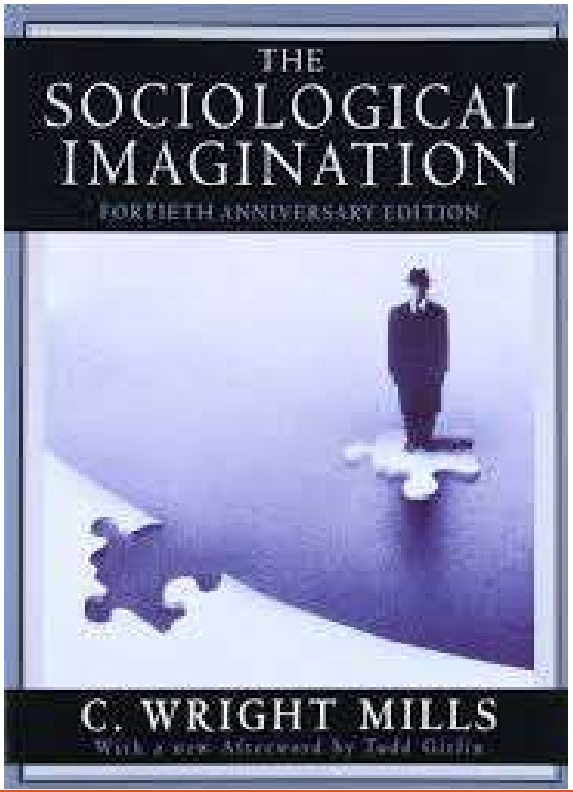
A Citizens' Jury is a mechanism of participatory action research (PAR)
Citizen juries involve creating a "jury" a representative sample of citizens (usually selected in a random or stratified manner) who are briefed in detail on the background and current thinking relating to a particular issue or project. The issue they are asked to consider will be one that has an effect across the community and where a representative and democratic decision-making process is required. The "jury" is presented with a range of possible alternatives. Citizen jurors consider the alternatives and make a judgment as to the most attractive alternative for the community.

Re-Wind Methodology

- To date: more than 50 + repurposing concepts have been identified.
- Full Partner Meeting and GIS/Blade/Design & Scenario Workshops , Atlanta 6-8 February 2019
- Suitable communities for deep engagement will be identified through GIS & Practitioner analysis
- Innovative Community Engagement Techniques under development

  e.g. 'Walking' as a Methodology & 'Creative Co-Design' methods
- Preliminary Design studio will help to identify and short-select re-use options
- The full Re-Wind Design Studio will develop and refine a sub-set of options in to a 'Design Atlas' to test further acceptability with communities
- The success of any new re-use application will also depend on comprehensive social, environmental and economic LCA assessment.

Sociological Imagination underpinning Methodology



What is Imagination ?

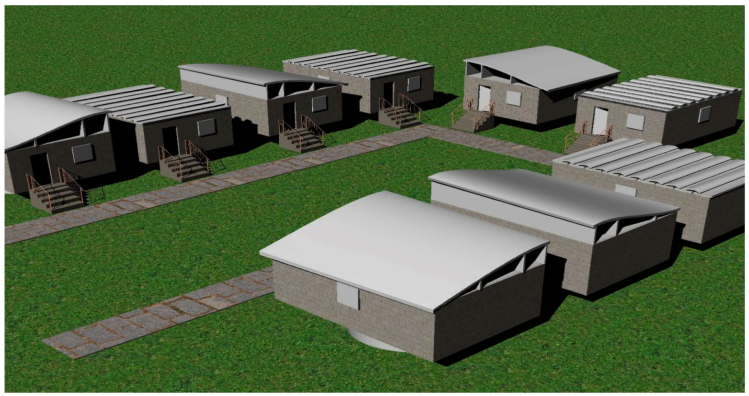
noun
'the faculty or action of forming new ideas, or images or concepts of external objects not immediately present to the senses.'

'The sociological imagination, in considerable part consists of the capacity to shift from one perspective to another, and in the process to build up an adequate view of a total society and of its components.'

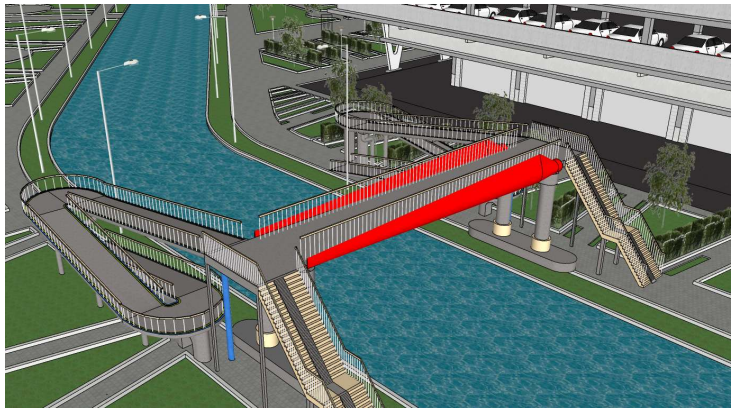
Wright Mills, C. (1959)

Re-using blades can benefit local communities and offer the prospect of greater acceptance of wind turbines, while addressing wider societal goals linked to de-carbonisation of energy systems:
The scale of Climate Change demands an imaginative response.

'Engagement for Climate Action' Potential EOL Uses of the Blades



Emergency Housing



Pedestrian Bridge

Playgrounds

Beach Groynes

Fergal Gough

All Input to the Project Welcome
For updates subscribe to:
www.re-wind.info

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