Blade Recycling and Repurposing

Lawrence Bank and Russell Gentry
Georgia Institute of Technology, Atlanta, GA, USA
The Re-Wind Network www.re-wind.info

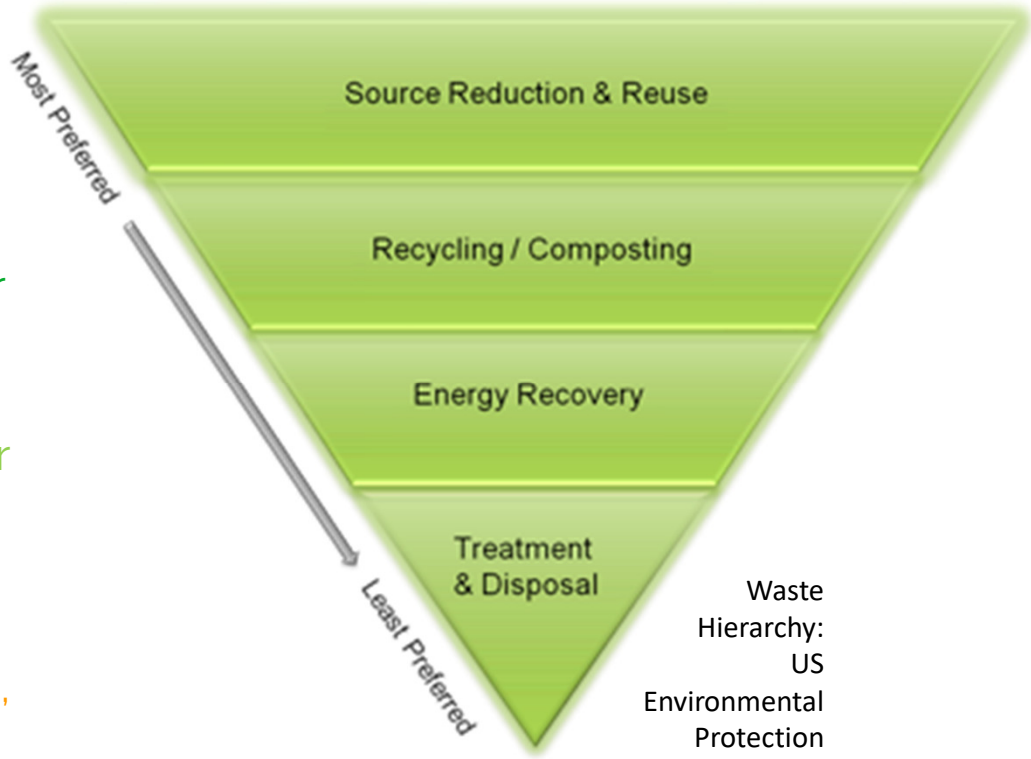
CANADIAN WIND ENERGY RESEARCH NETWORK 2022

April 13, 2022
2:30- PM ADT
Asset Management

US EPA Waste Hierarchy

Waste Hierarchy for wind blades

- **Prevent:** Extend project or blade lifetime
- **Reuse:** Sell blades on secondhand market
- **Repurposing**: Remanufacturing for use in new products
- **Recycling**: Shredding, grinding and milling for filler for FRP or concrete
- **Materials Recovery**: Pyrolysis, thermolysis, solvolysis to recover polymer resins or fibers or gasses for energy
- **Co-processing in cement kilns: raw material substitution**
- **Incineration** – with or without energy recovery, then landfill ash
- **Landfilling**



Waste Hierarchy: US Environmental Protection Agency

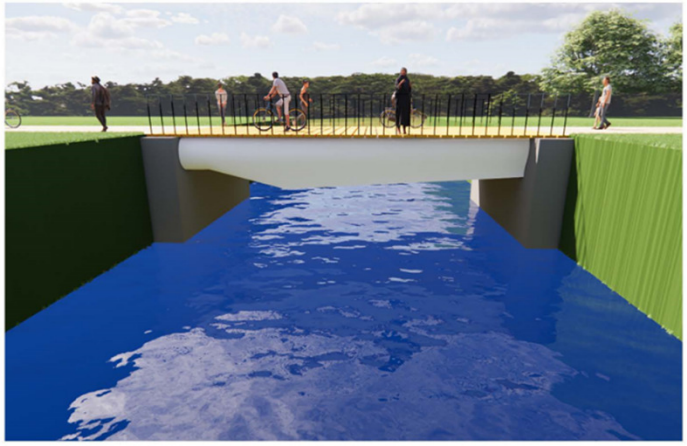
Blade Repurposing Concepts

2021

12m length – 6m width

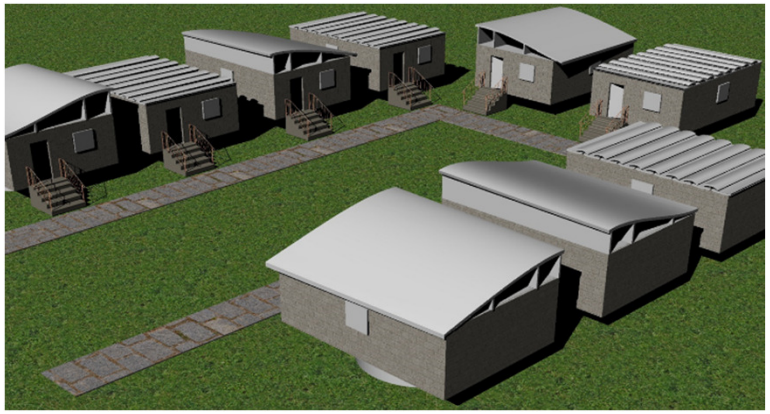
Symmetric Girders - 21m V44 blade

Root ends - 3 girders below deck level at 3m spacing



Three wind blades of the same type are used in the above BladeBridge to support a 6m wide pedestrian deck. The girders are mostly hidden from view in this configuration which may be desirable in certain locations. With the girders placed below the deck the pedestrians have a more expansive view of their surroundings.

Re-Wind Blade Repurposing Concepts



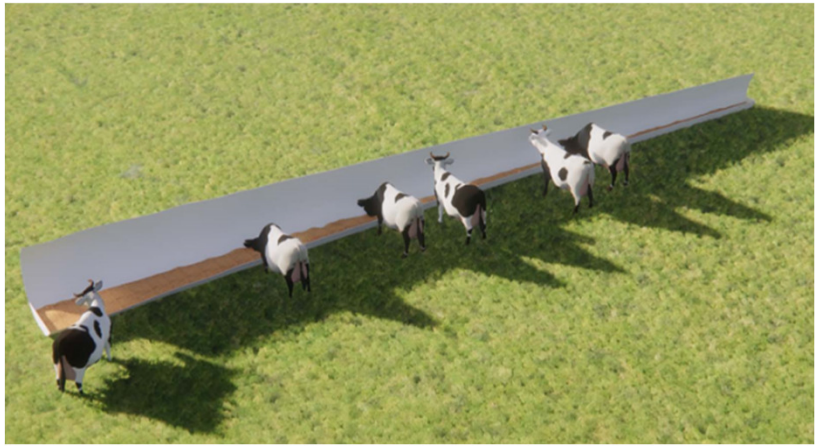
BladeHousing

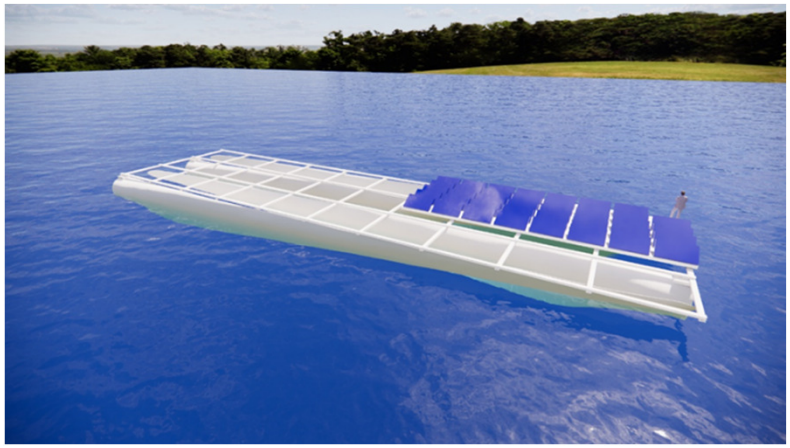
BladeBridge

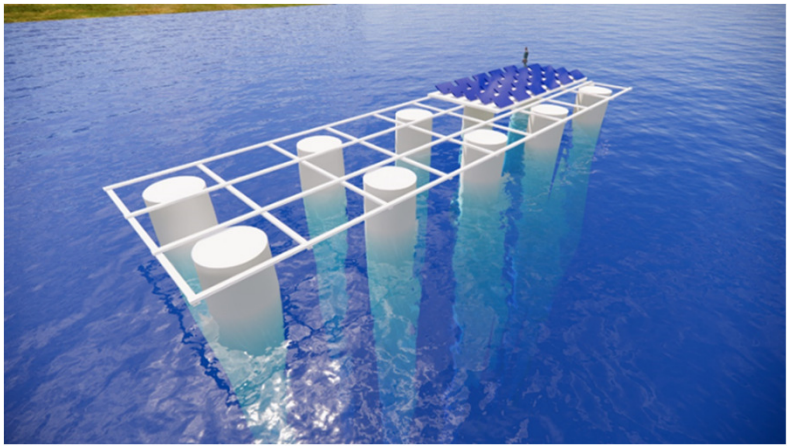
BladePole

BladeBarrier

Re-Wind Blade Repurposing Concepts







BladeBridge

Cork, Ireland, January 2022

Georgia Tech

CUNY THE CITY UNIVERSITY OF NEW YORK

UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh

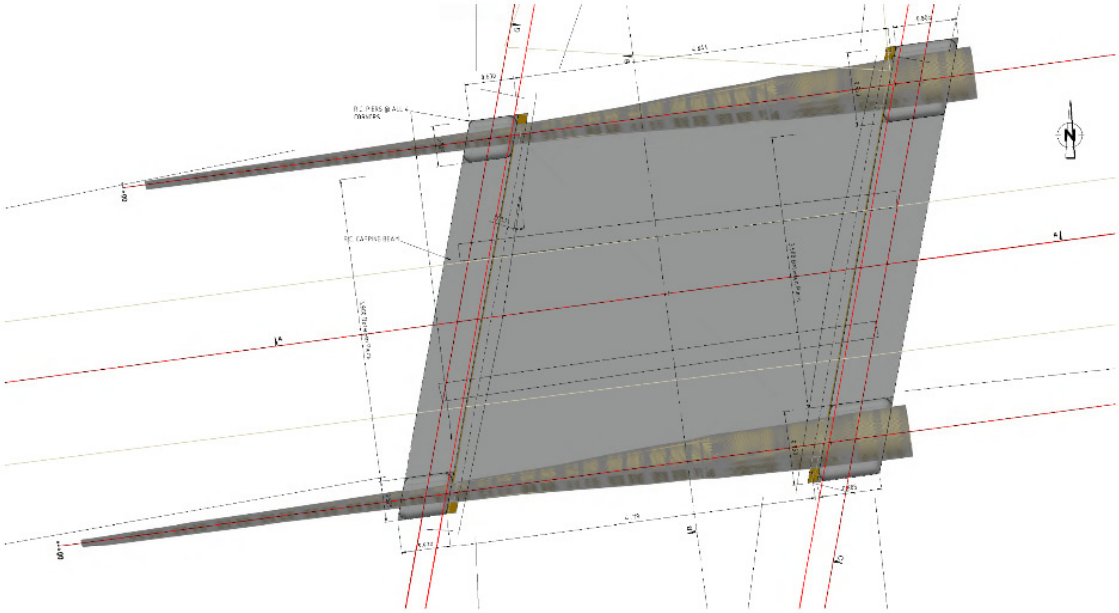
QUEEN'S UNIVERSITY BELFAST

MTU Ollscoil Teicneolaíochta na Mumhan Munster Technological University

RE-WIND NETWORK BLADE REPURPOSING SOLUTIONS WWW.RE-WIND.INFO

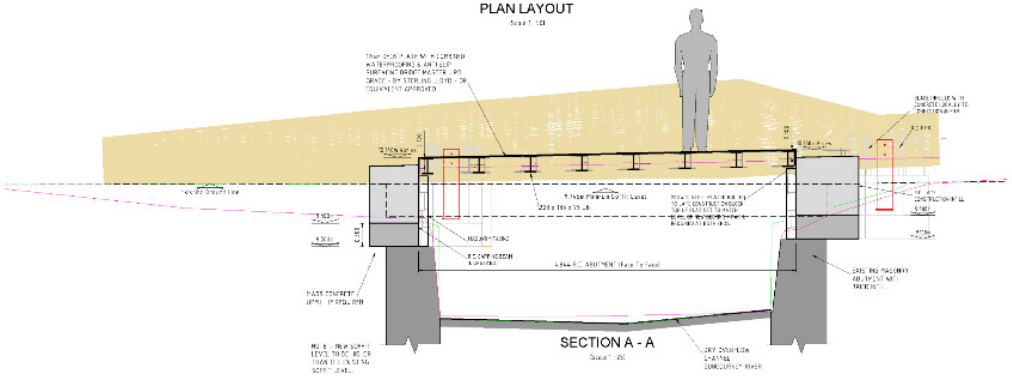
BladeBridge

Video of construction on YouTube at
https://youtu.be/8bmWAX_6uAY



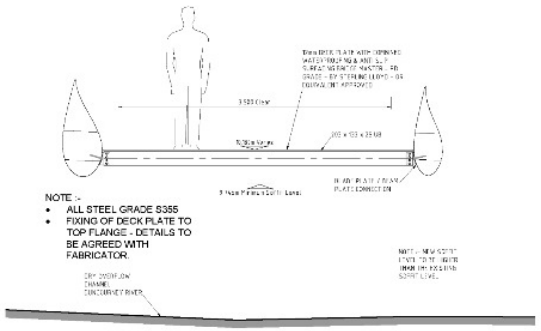
PLAN LAYOUT

Scale 1:100



SECTION A - A

Scale 1:25



NOTE :-

- ALL STEEL GRADE S355
- FIXING OF DECK PLATE TO TOP FLANGE - DETAILS TO BE AGREED WITH FABRICATOR.

SECTION B - B

Scale 1:25

Client	General Notes	D06 Oct '21 DRAFT ISSUE FOR DISCUSSION KR D04 Sept. '21 DRAFT ISSUE FOR DISCUSSION KR D03 Sept. '21 DRAFT ISSUE FOR DISCUSSION KR D02 Sept. '21 DRAFT ISSUE FOR DISCUSSION KR D01 Sept. '21 DRAFT ISSUE FOR DISCUSSION KR No Date Amendment / Issue App	Drawn DC Checked KR Approved KR Date Sept. 2021 Scale @ A3 Shown @ A1 Job No.

Project: MIDLETON - YOUGHAL

Title: Roxborough Bridge at Ch. 20575m
Proposed Layout
(Sheet 1 of 3)

File Ref.: Rox-B-01.dwg

Dwg. No.: Rox-B-02 Rev. D05

RE-WIND NETWORK
BLADE REPURPOSING SOLUTIONS
WWW.RE-WIND.INFO

BladePole

BladePole

February 2022
Full-scale testing of braced line post assemblies for gravity and wind loads.

RE-WIND NETWORK
BLADE REPURPOSING SOLUTIONS
WWW.RE-WIND.INFO

BladePole Phase 2 Installation at Smoky Hills, Kansas

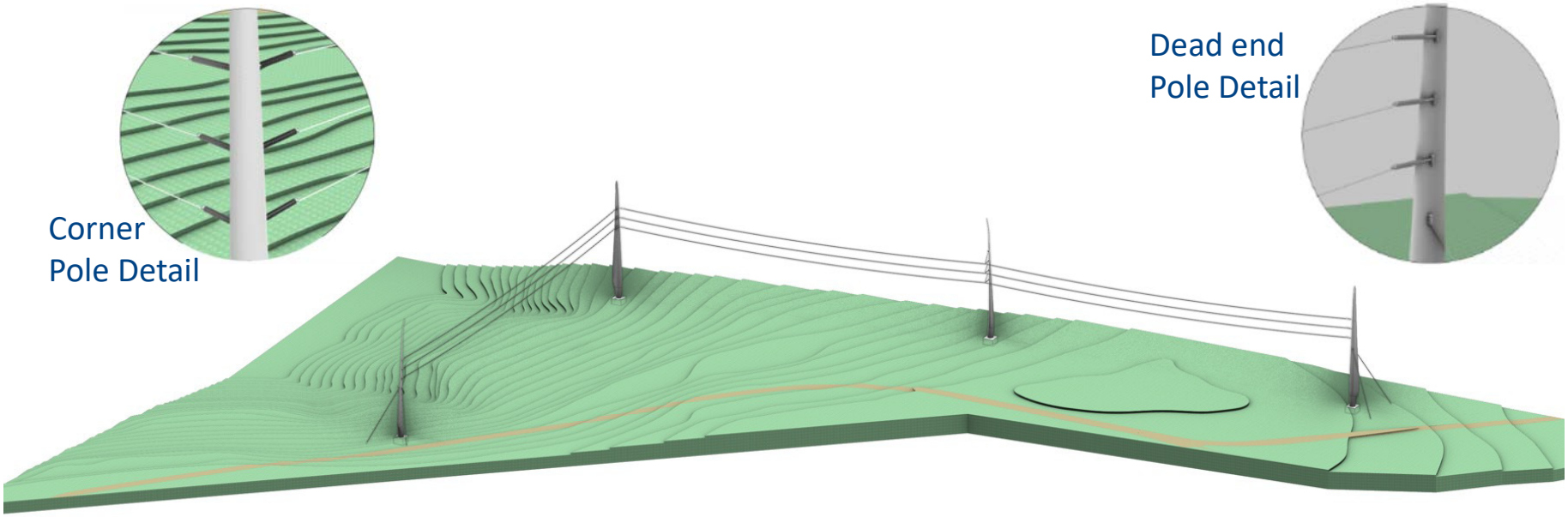


Figure 8: Four-pole configuration of deadend, corner and tangent BladePoles

Re-Wind Partners, Projects, Funding

Network University Members:

- Georgia Tech
- City University of New York
- University College Cork
- Queens University Belfast
- Munster Technological University

Funding (~$2m 2014-current)

- NSF (CBET, PFI, I-CORPS)
- NYSERDA
- SFI
- DfE
- ENEL Green Power

Current Project Partners:

- Logisticus Group
- ENEL Green Power
- Siemens-Gamesa RE
- Cork County Council
- NYC Dept of Design and Construction (DDC)
- NREL Wind Manufacturing

Join with Re-Wind

1. Support responsible de-commissioning of wind turbine blades.
2. Help the industry develop predictions of the types and quantities of blades coming out of service over the next few years – or share this information with us under NDA.
3. For those of you in the blade assessment/monitoring and blade repair business – we need to develop cost-effective ways of screening EOFL blades. We would love to partner with you.
4. Help our team of researchers develop cost models for blade removal, cutting and transportation.
5. Help us demonstrate Re-Wind designs in your communities.

Georgia Tech
CUNY THE CITY UNIVERSITY OF NEW YORK
UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh
QUEEN'S UNIVERSITY BELFAST
MTU Ollscoil Teicneolaíochta na Mumhan Munster Technological University

RE-WIND NETWORK
BLADE REPURPOSING SOLUTIONS
WWW.RE-WIND.INFO