

Repowering: understanding technical, tax and contractual considerations in repowering and how they impact availability of financing

Kevin Knight
SVP, Renewables Underwriting
GE Energy Financial Services

January 29, 2019
UTCLE – Renewable Energy Law

RePower Overview

- What is RePowering?
- Benefits
- Results to date



Overview

- Repowering : Retrofit vs. “Full scrape”
- Conversion of legacy turbines → improve output, reliability and extend life

GE examples:

Legacy Unit	Repowered Configuration Options
1.5 S (70.5m rotor)	1.5/1.62 (77m, 82.5m, or 91m rotor)
1.5 SLE (77m rotor)	1.5/1.62 (87m or 91m rotor)
1.5 XLE (82.5m rotor)	1.5/1.62 (91m rotor)
Clipper C96-2.5 (96m rotor)	GE 2.5 (116m rotor)

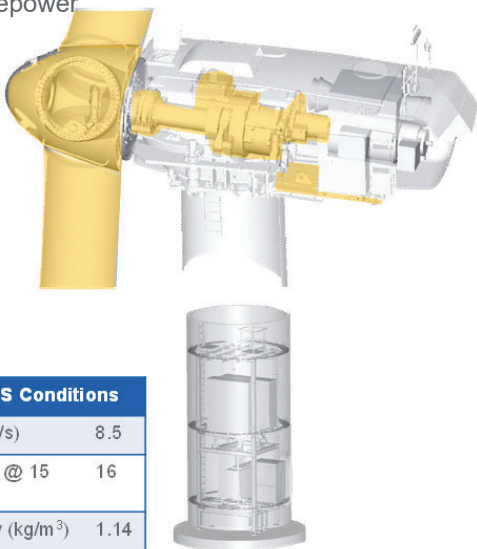
- **Basis:** leverage existing current mechanical configurations (1.x and 2.x platforms)
- **Re-use:** Components evaluated to new wind conditions & 20 years of additional life from repower COD: Towers, Foundation, BOP and existing siting, other
- **Replace:** Components being used in other GE new unit designs



Not to be copied, distributed, or reproduced without prior approval.

Scope of replaced and reused components

Example scope based on 1.5 SLE Repower



IEC 2S Conditions	
V _{avg} (m/s)	8.5
CTI (% @ 15 m/s)	16
Density (kg/m ³)	1.14
V _{ref} (m/s)	40
Shear	0.2

Component	Re-Use	Replace	Warranty	Description
Blade		✓	✓	LM42 Blade Design
Pitch bearing		✓	✓	AR500, Gleitmo Pitch Bearing
Pitch system		✓	✓	Non-ESS 575V GE Pitch System w/ Spline
Hub		✓	✓	Current 1.85-87 Hub
Main shaft		✓	✓	Current 1.85-87 Main Shaft
Main bearing		✓	✓	Current 1.85-87 Main Bearing
Gearbox		✓	✓	1.6-100 GBX with Non-ESS Auxiliaries
Flex Coupling		✓	✓	Current 1.85-87 Coupling
Slipring		✓	✓	Non-ESS compatible slip ring
Bedplate	✓			No change to existing component
Gen Frame		✓	✓	Modified gen frame with shear plates
Yaw system	✓			No change to existing component
Nacelle	✓			No change to existing component
Top Box	✓		New IO	Retrofit Kit for compatibility with GE Pitch
Tower	✓			No change to existing component
DTA	✓			On site Upgrade/Refurbishment
Generator		✓	✓	On site refurbishment kit
Electrical Power Path	✓			No change to existing component
Controls HW	✓	✓	✓	Upgrade to MC205
Controls SW		✓	✓	New SW to have equivalent capability of the MK0e GEN1 controllers with the new mechanical platform



Not to be

Find the full text of this and thousands of other resources from leading experts in dozens of legal practice areas in the [UT Law CLE eLibrary \(utcle.org/eLibrary\)](https://utcle.org/eLibrary)

Title search: Repowering: understanding technical, tax and contractual considerations in repowering and how they impact availability of financing

Also available as part of the eCourse

[2019 Renewable Energy Law eConference](#)

First appeared as part of the conference materials for the 2019 Renewable Energy Law session "Repowering Wind Projects"