NA BRA WIND
ADVANCED WIND TECHNOLOGIES

XXL Windturbines Challenges

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AGENDA

1. XXL WINDTURBINES CHALLENGES

- Size Trends
- Size Barriers & Solutions; Nabrajoint® Nabralift®

2. NABRALIFT®

- XXL Towers Challenges
- Nabralift® Technology

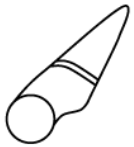
3. NABRAWIND TECHNOLOGIES

- Projects Pipeline

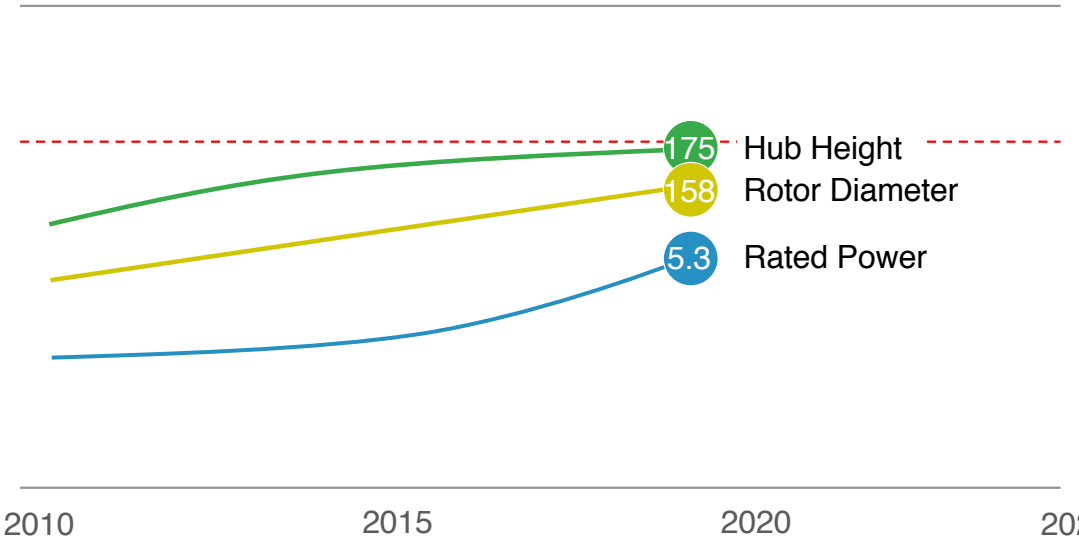
4. CONCLUSIONS

1 XXL WINDTURBINES CHALLENGES

Size Trends



Modular Blade Joint



Self Erecting Tower


WELDEX

1 XXL WINDTURBINES CHALLENGES

Size Barriers & Solutions

Modular Blade Joint

Self-Erecting Tower

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nabrajoint®

modular blade system

- Minimum Cost
- Lightest Solution
- Robust Assembly
- Maintenance Free

nabralift®

self-erecting tower

2 NABRALIFT®
XXL Towers Challenges

Cost Increase
Exponential Cost

Most Expensive Component HH>120

Logistics
Roads / Bridges Limiting Concepts

High Logistic Cost

Assembly Cranes
Lack of Availability

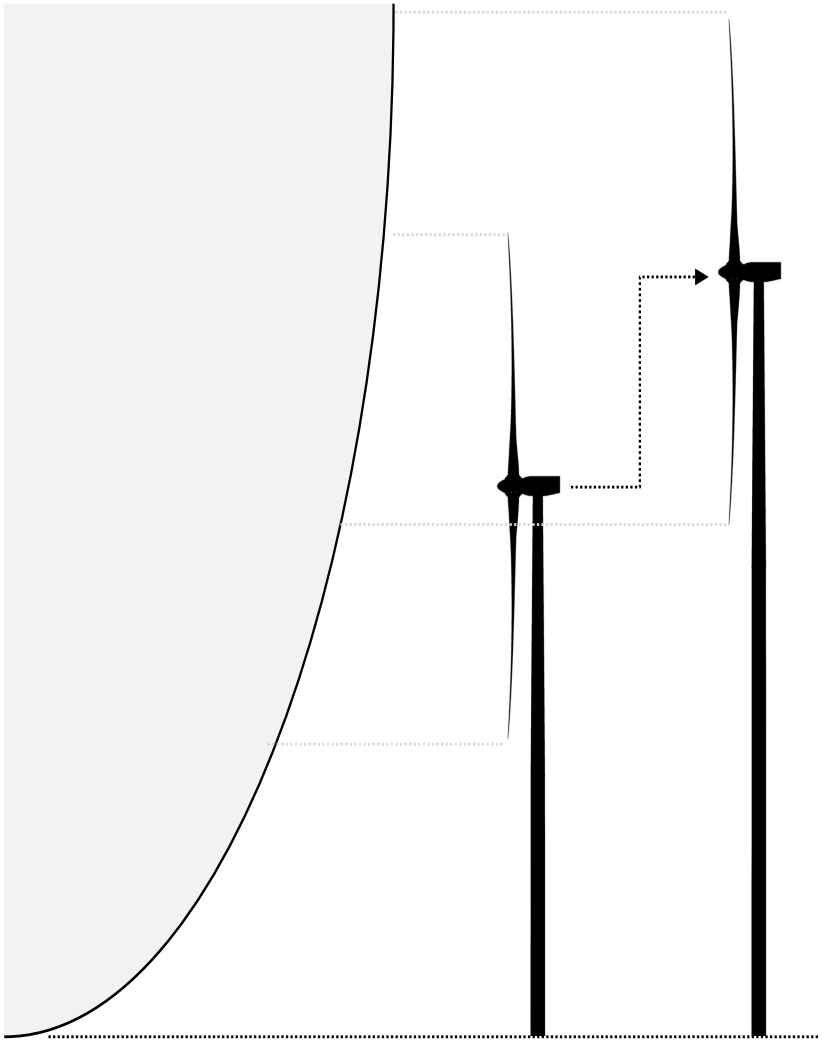
Large Mobilization and Rental Costs

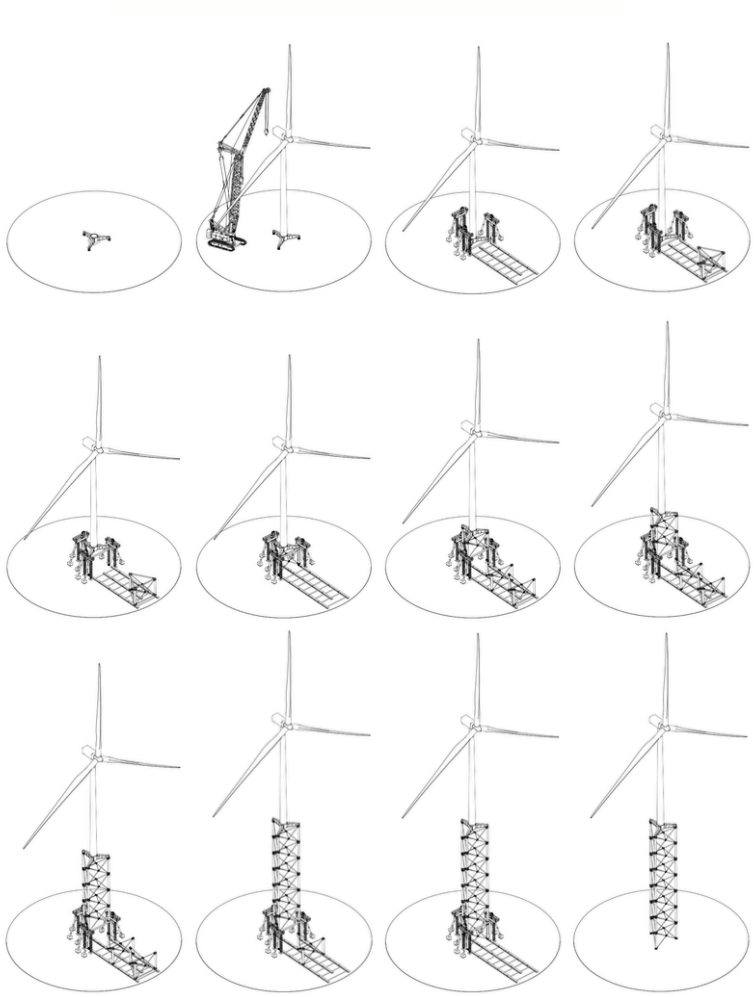
Installation Rates
Slow Wind Farm Installation Rates

Inefficiency Time Increase

WTG Integration
Control Challenges in Soft-Soft Towers

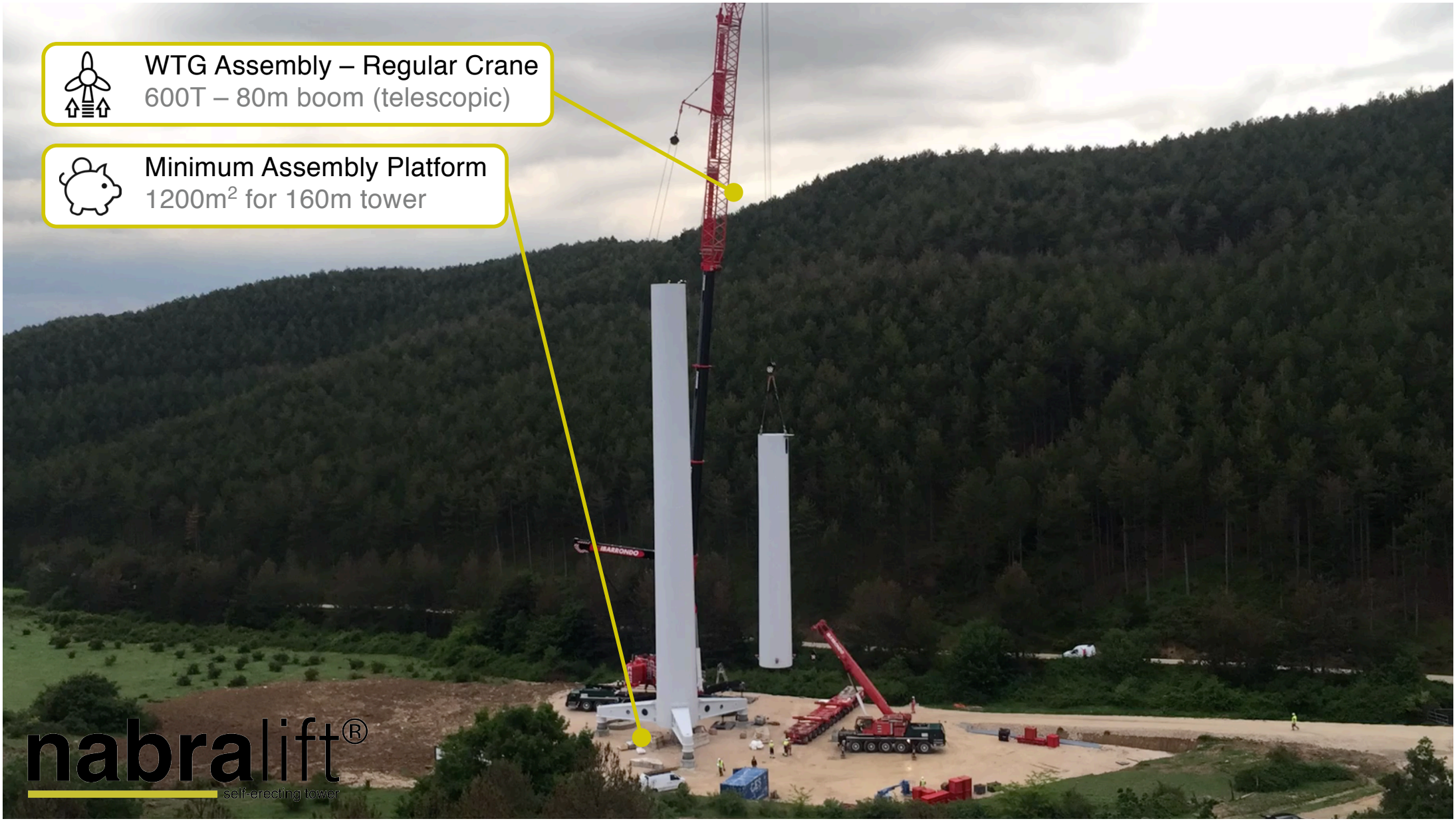
Soft-Stiff Unfeasible for XXL Steel Tow.





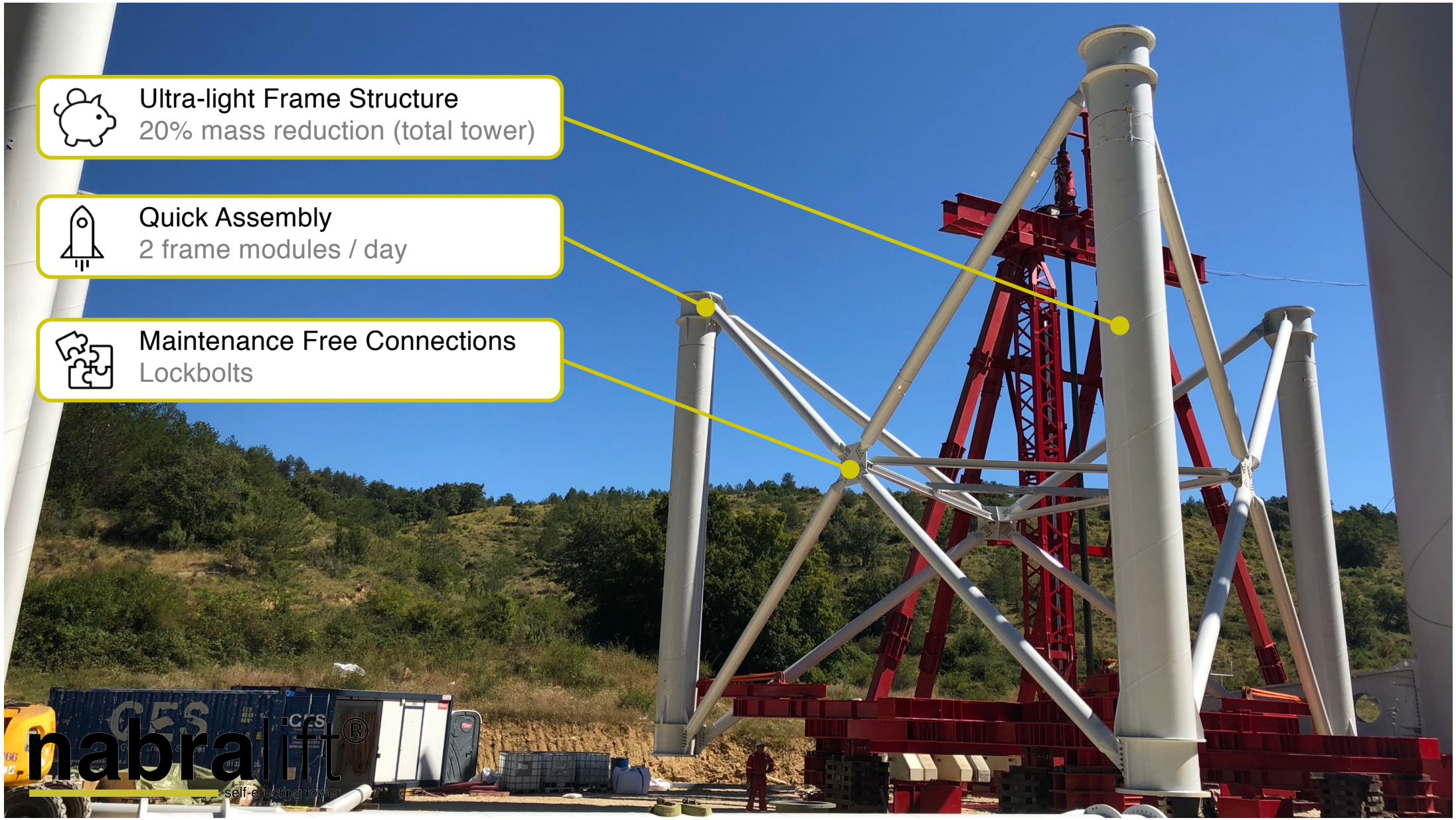
nabralift®

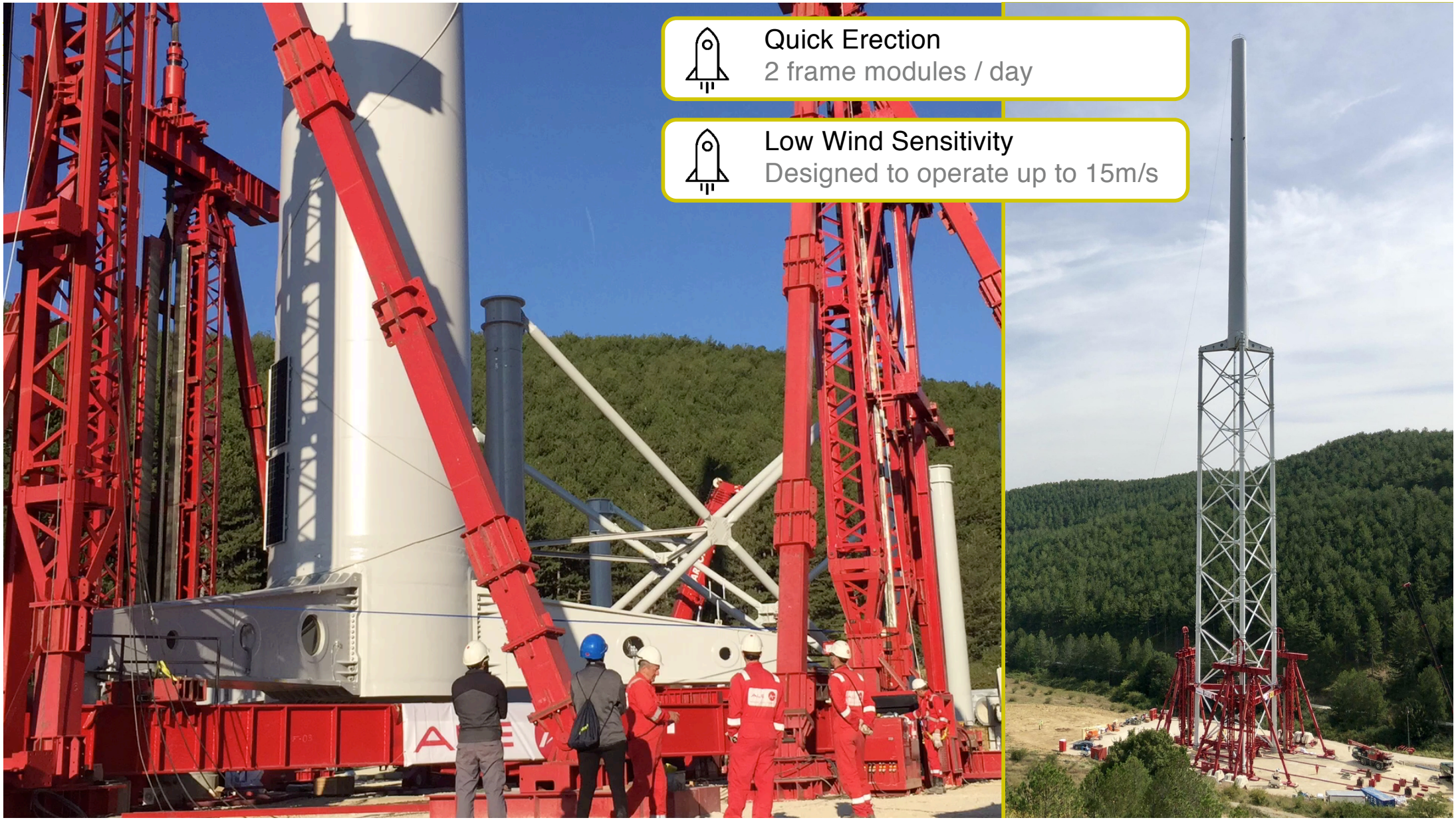
self-erecting tower


WTG Assembly – Regular Crane
600T – 80m boom (telescopic)
Minimum Assembly Platform
1200m² for 160m tower
nabralift®
self-erecting tower

Frame Designed for Logistics
HxWxL as per standard trucks

nabralift®
self-erecting tower


Ultra-light Frame Structure
20% mass reduction (total tower)
Quick Assembly
2 frame modules / day
Maintenance Free Connections
Lockbolts
nabralift®
self-erecting tower

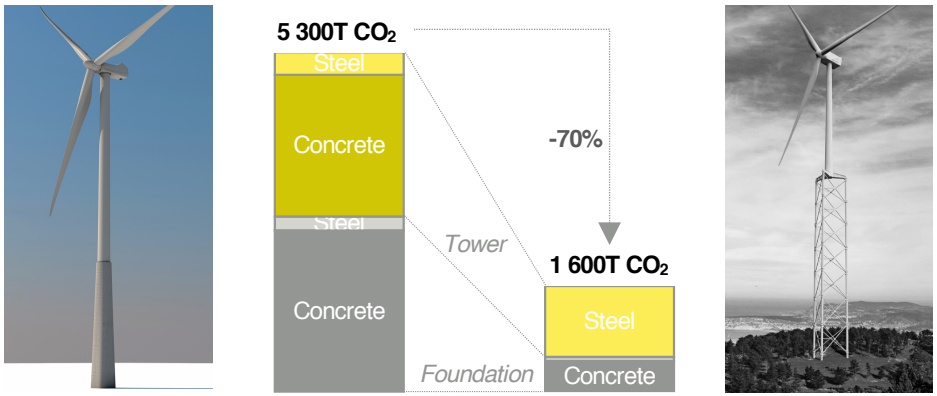


Quick Erection
2 frame modules / day

Low Wind Sensitivity
Designed to operate up to 15m/s

2 NABRALIFT®
Environmental Impact

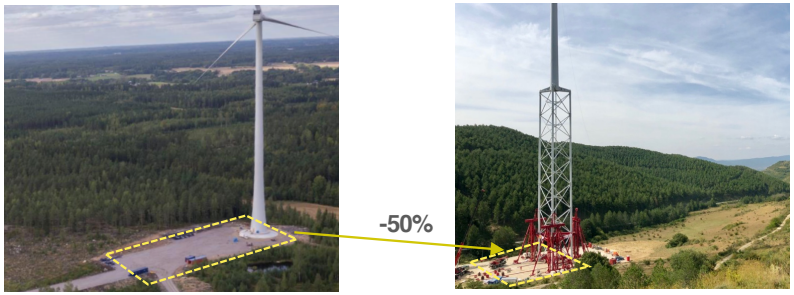
CO_2 Emissions Reduction
Massive Concrete & Steel Reduction



200 towers/year:

Savings equivalent to 120 000 UE-people emissions

Footprint
1000m^2 reduction of assembly platform



Removable & recyclable structure
Steel to be reused in future structures


Concrete tower waste after demolition


Nabralift components after disassembly

nabralift®
self-erecting tower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3 NABRAWIND TECHNOLOGIES

Projects Pipeline

2018	2019	2020	2021

1 x 3.5MW - HH160

1 x 3.6MW - HH144

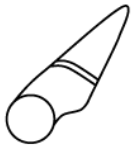
1 x 4.5MW - HH167
1 x 4.5MW - HH200

FULL SCALE PROTYPE

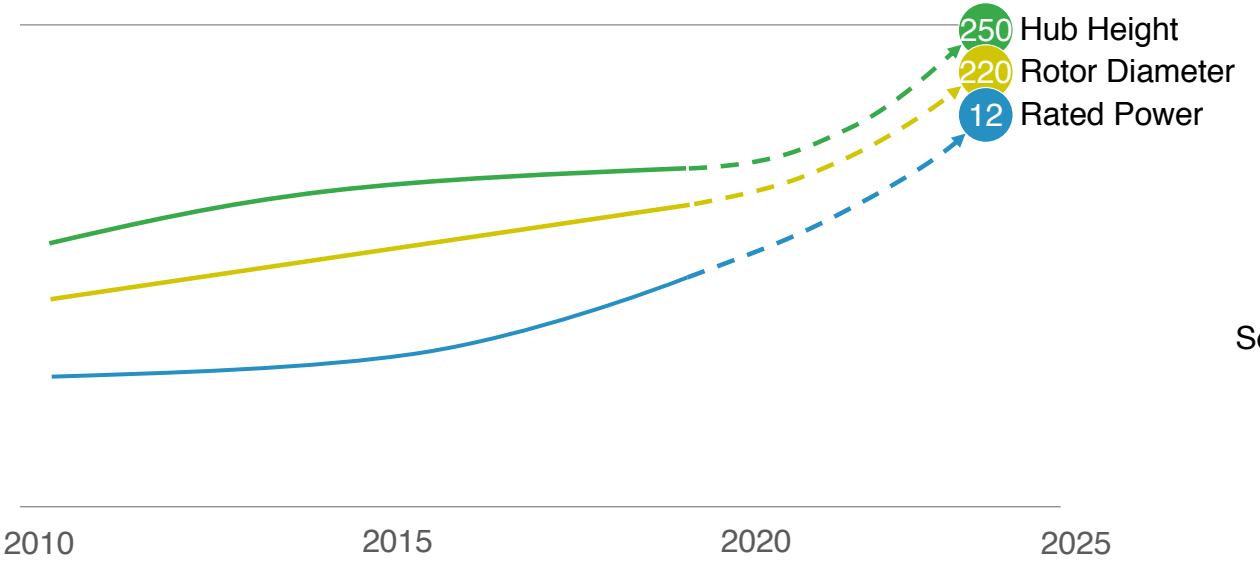
FIRST COMMERCIAL DEVELOPMENT

4 CONCLUSIONS

WTG Size Acceleration Boosted



Modular Blade Joint



Self Erected Tower

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Thanks for Your Attention