

De-Risking the O&M of the T&D Assets of Renewable Plants

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How comfortable are you with your risk exposure?

You own a 125 MW
wind farm

It is 2:00 o'clock in
the morning

The single MV/HV
transformer at the
farm has just been
taken out of service
for a yet unknown
reason. **All power
production has
stopped!**

Can this become a
devastating event
for your business?

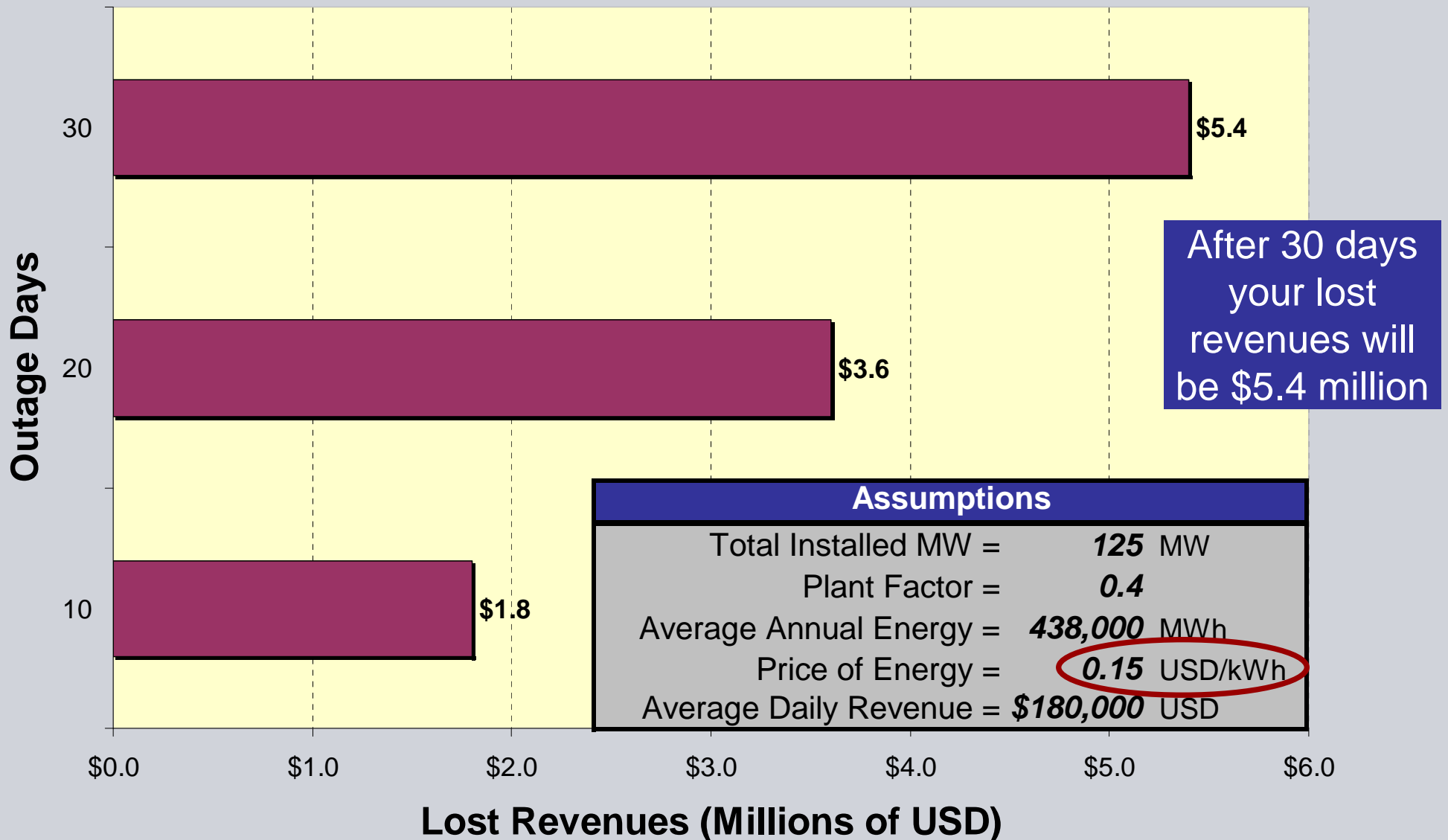
Strong winds are
blowing tonight

The answer is a function of **decisions** you made in the past

De-Risking the O&M of T&D Assets



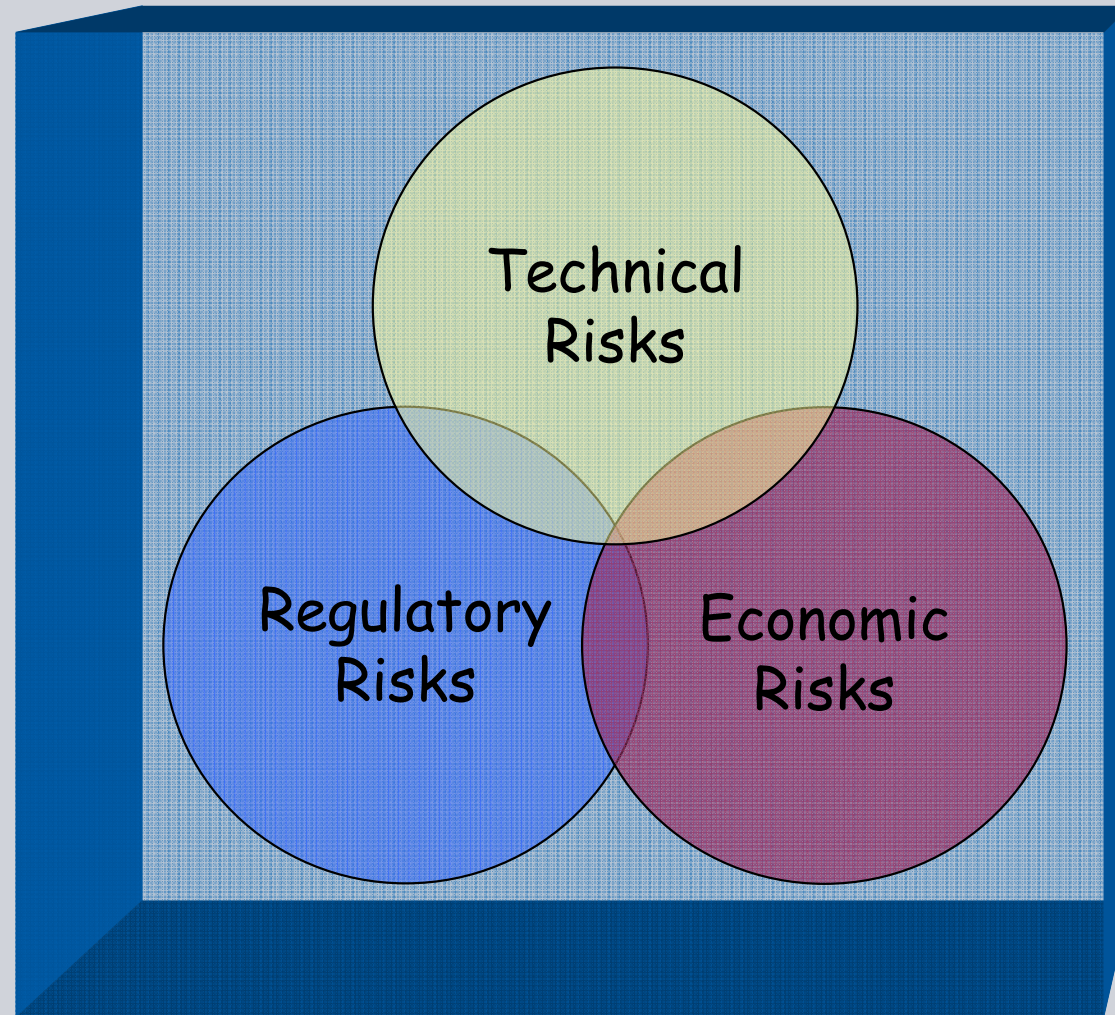
How large can the impact of the outage be?



De-Risking the O&M of T&D Assets About risk

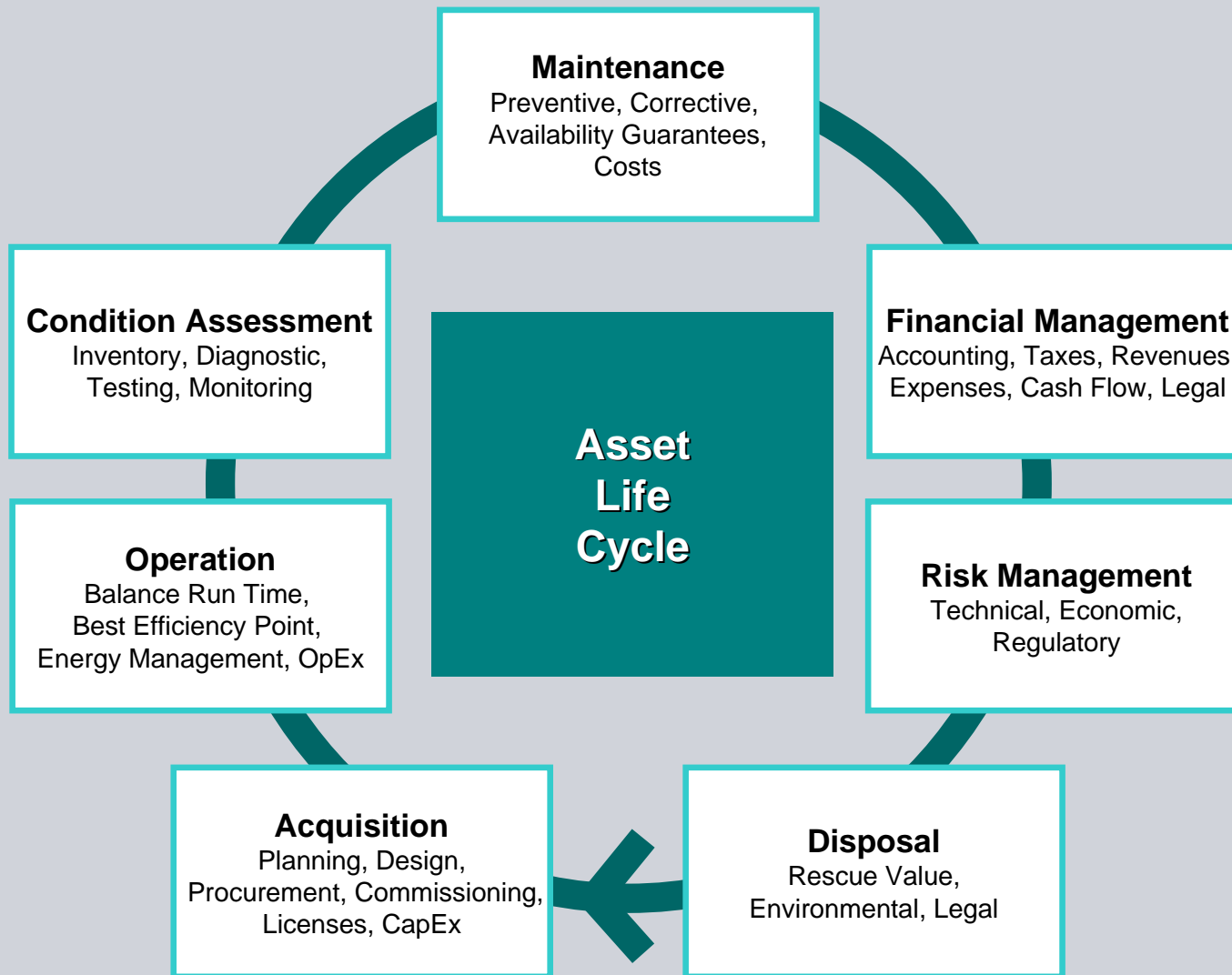
Risks are the hazards to which one is exposed because of **uncertainty**

Risk is a characteristic of **decisions**, with two dimensions: (1) **robustness**, or the likelihood of a decision being regrettable, and (2) **exposure**, the amount by which the decision is regrettable

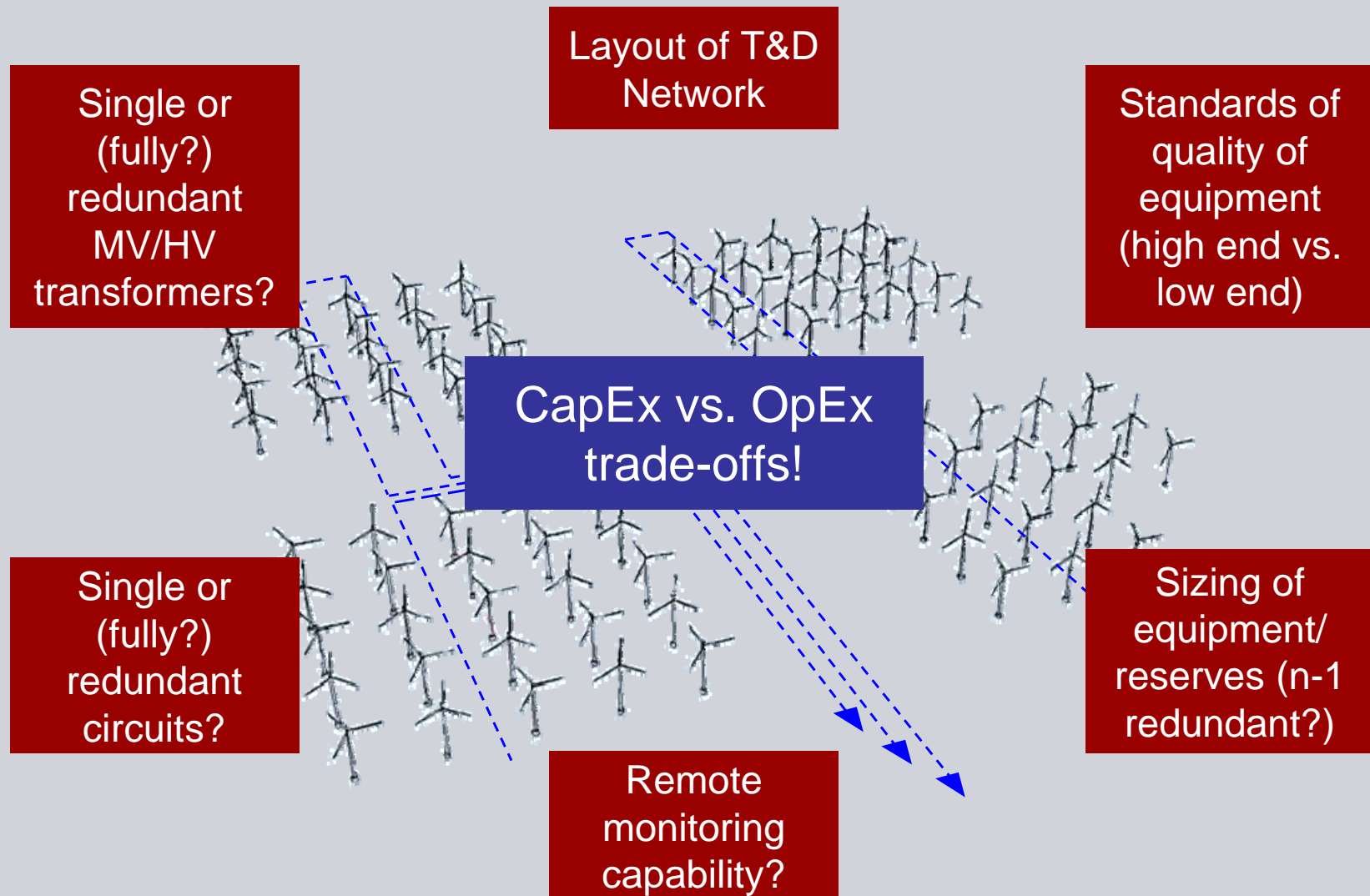


The risk profile is ultimately a function of the **decisions** that are made

Decisions are made throughout the life cycle of the assets



Important decisions are made during the network design phase



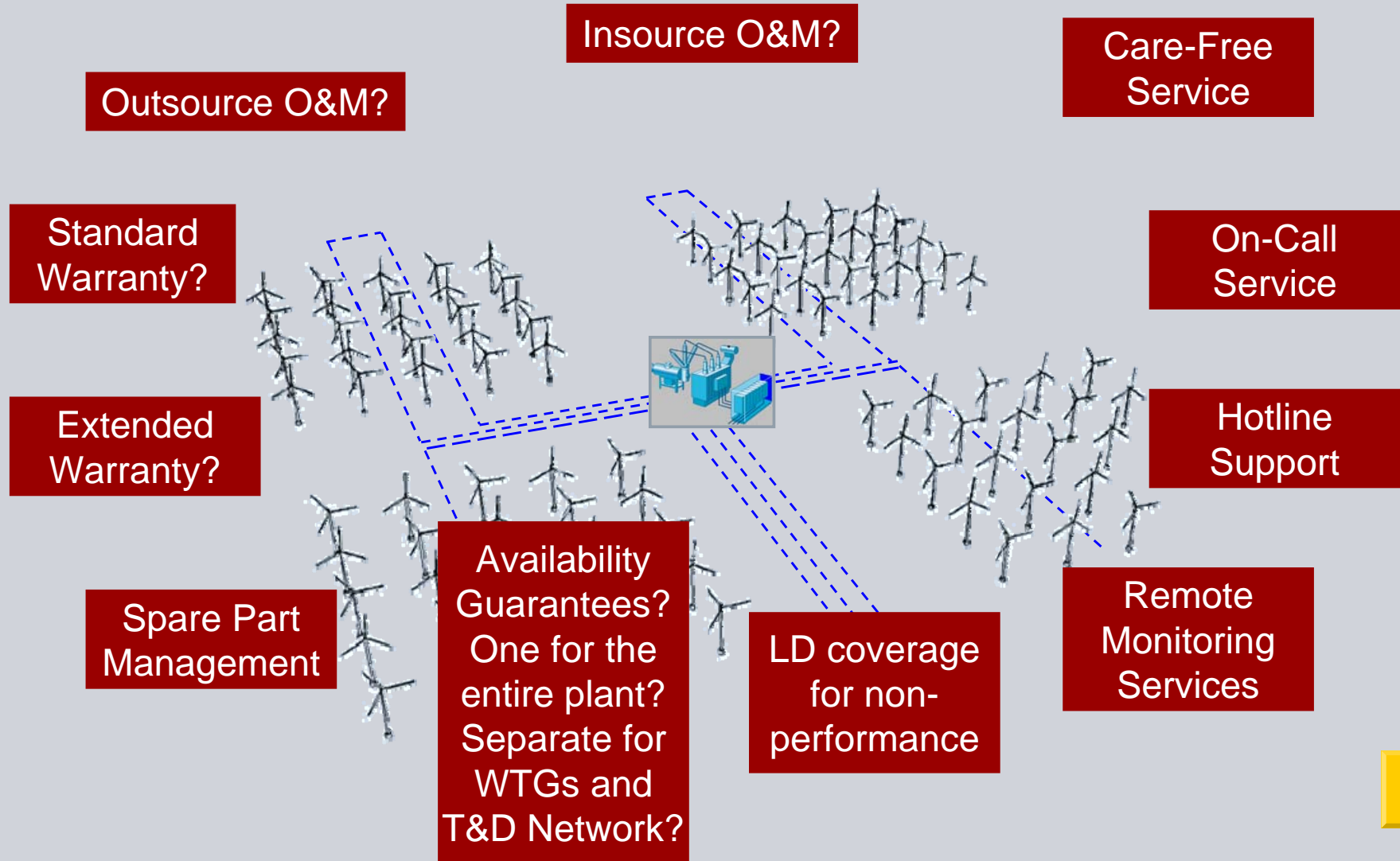
Important decisions are made during the network design phase

Formal **network planning studies** of the integration of the renewable power plant into the T&D network need to be undertaken. These must address all relevant technical, commercial, and regulatory risks



De-Risking the O&M of T&D Assets

Important decisions impact the O&M performance



The key is to be able to assess and mitigate the risks

Risk Identification

- Network Analysis and Reliability Studies
- Equipment Sizing
- Scenario Analysis
- Benchmarking Analysis



**Network
Performance
Assessment**



Risk Management

Examples of possible risk mitigation measures

Measure	Upside	Downside
Purchase a spare MV/HV transformer (Risk Reduction)	<ul style="list-style-type: none"> • Reduces risk exposure against catastrophic transformer failure events 	<ul style="list-style-type: none"> • Increases CapEx requirements • No risk mitigation for the failure of other equipment (e.g., array or interconnection cables)
Install redundant MV/HV transformers (Risk Reduction)	<ul style="list-style-type: none"> • Minimizes risk exposure against catastrophic transformer failure events • T&D network becomes n-1 resilient for transformer failures 	<ul style="list-style-type: none"> • Further increases CapEx requirement • No risk mitigation for the failure of other equipment (e.g., array or interconnection cables)
Purchase Business Interruption Insurance (Risk Transfer)	<ul style="list-style-type: none"> • Makes asset owner whole for specific, catastrophic events (i.e., low probability, high impact) 	<ul style="list-style-type: none"> • Only provides coverage for certain pre-determined failure events • Tends to be costly. Carries relatively large deductibles
Enter into a care-free service contract (Risk Transfer)	<ul style="list-style-type: none"> • Care-free option for asset owners for the entire O&M of the assets • De-risks the O&M of the T&D assets: (1) costs are predictable, (2) performance is guaranteed, (3) shields asset owner from the consequences of all failure events (excluding force majeure) 	<ul style="list-style-type: none"> • Could be relatively more costly than measures above

Less

Degree of Comfort

More

De-Risking the O&M of T&D Assets



Make sure to have a risk profile you are comfortable with!

Care-Free Service Program

PERFORMANCE GUARANTEES

- Mobilization Time
- Spare Parts Availability
- EBoP Availability
- Extended Warranty

SPARES MANAGEMENT

- Required Stock
- Storage & Dispatch
- Procurement

FAULT RECOVERY

- 2nd Line of Support
- Corrective Maintenance

FIRST LINE OF SUPPORT

- On-Site Staff

MONITORING

- Hot Line
- Remote Diagnostic Center
- Cable Condition Monitoring

SCHEDULED MAINTENANCE

- Inspections
- Preventive Maintenance EBoP
- Preventive Maintenance Other



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Thank you for your attention!

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For further information please contact



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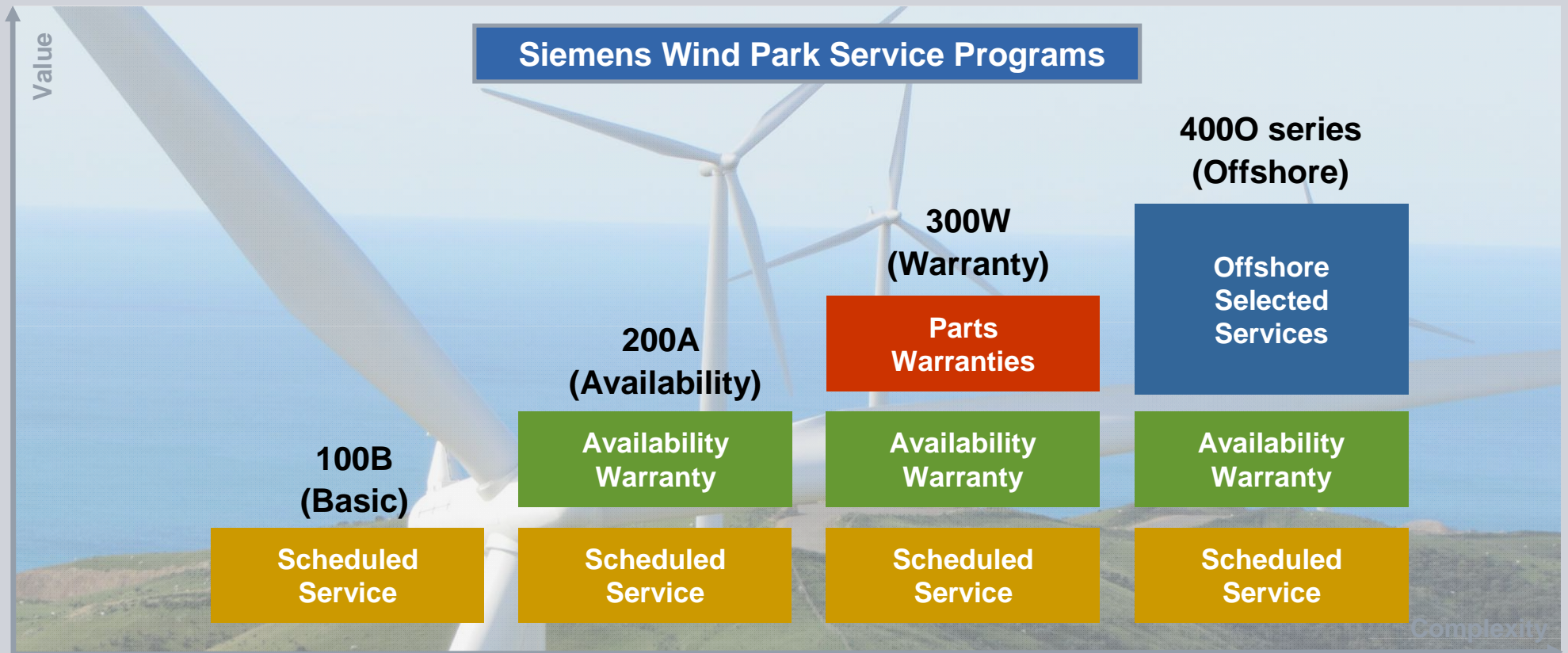
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Important decisions impact the O&M phase



This may/shall include our innovative service portfolio elements like condition monitoring, remote diagnostics, availability guarantees, extended warranties, hotline services etc.

