

PUBLIC

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# Large scale RES integration by HVDC

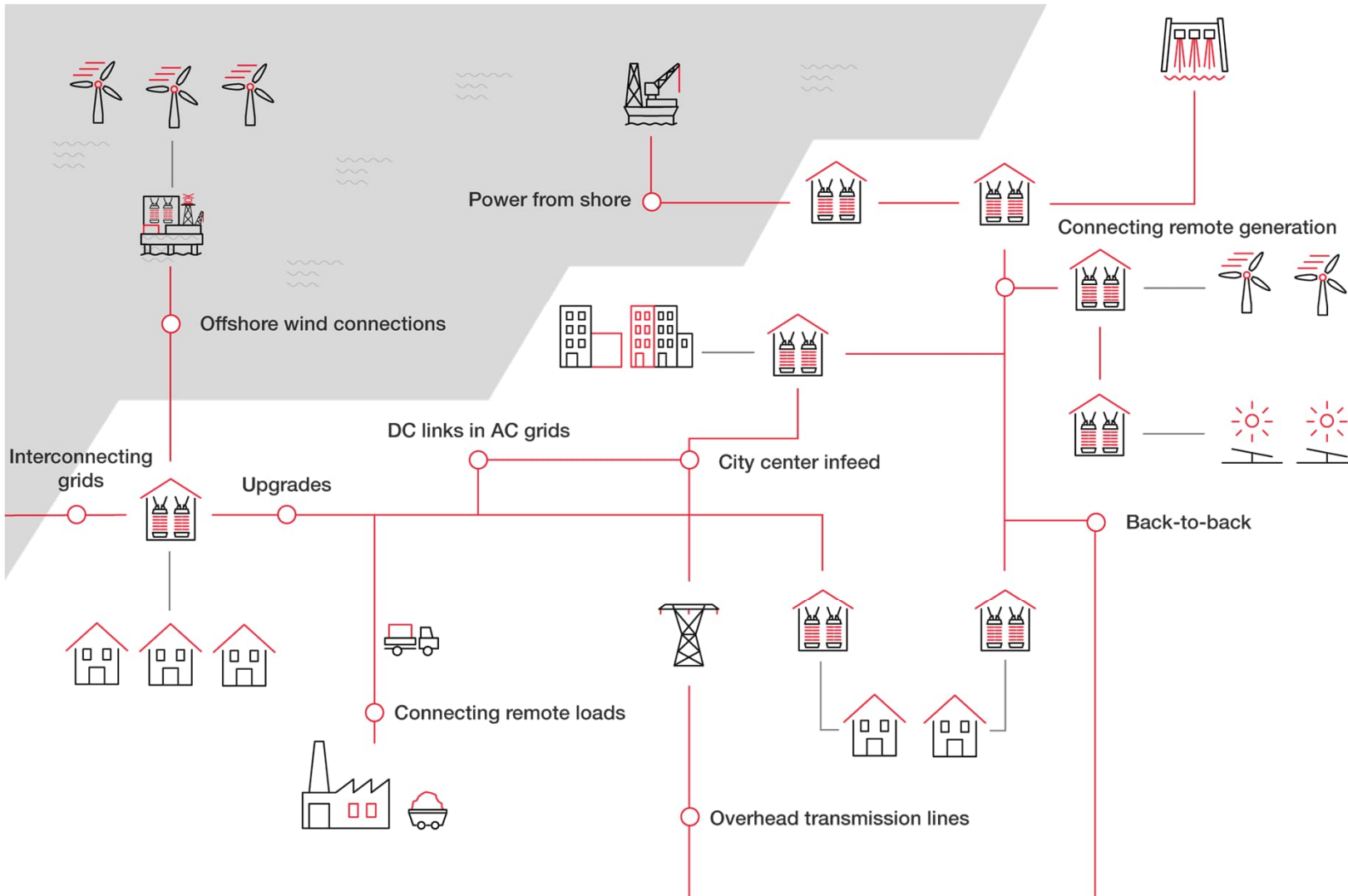
Staying ahead - Next Phase

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# HVDC applications - Shaping the grids of the future



Connecting remote generation



Interconnecting grids



Offshore wind connections



Power from shore



DC links in AC grids



City center infeed

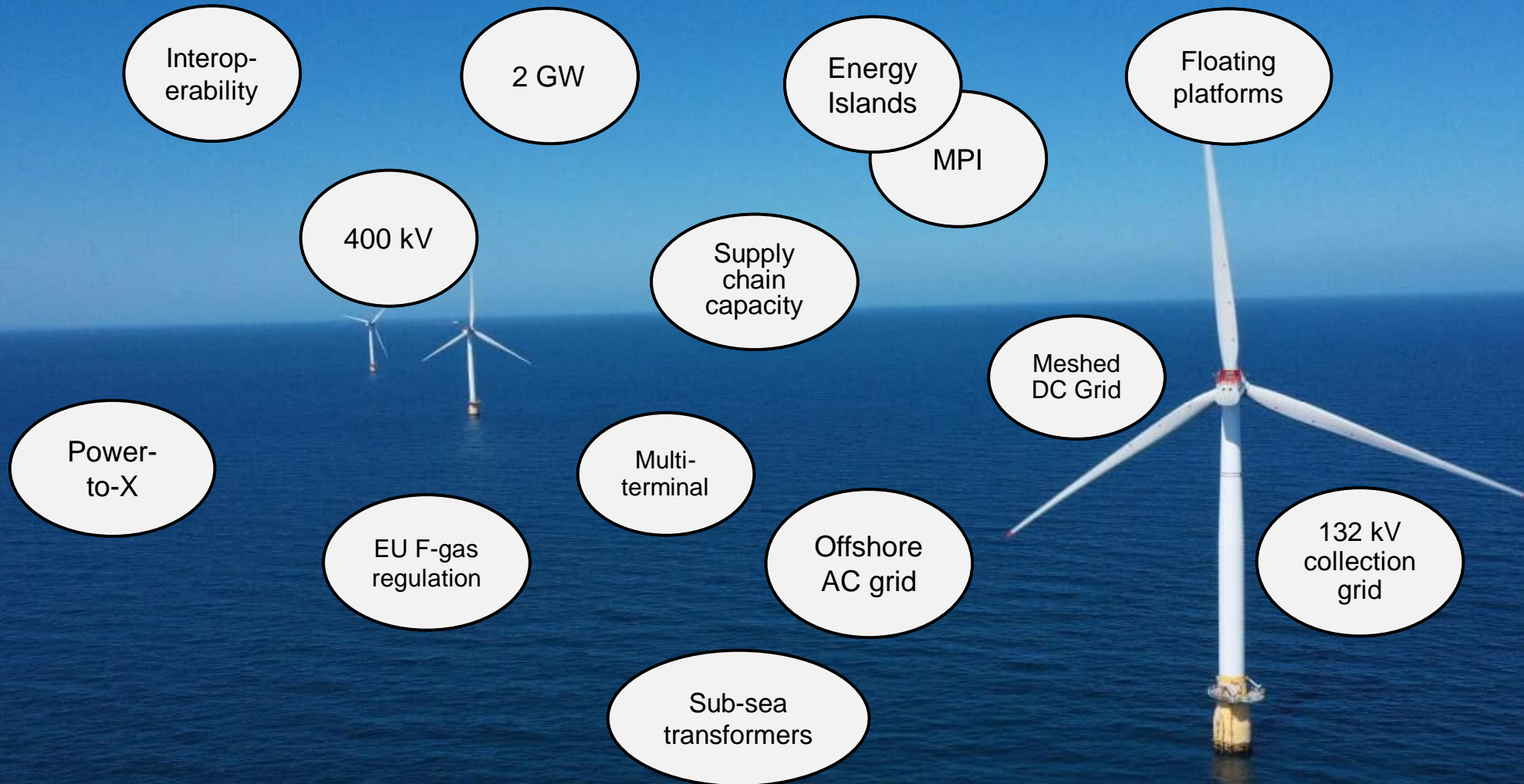


Connecting remote loads

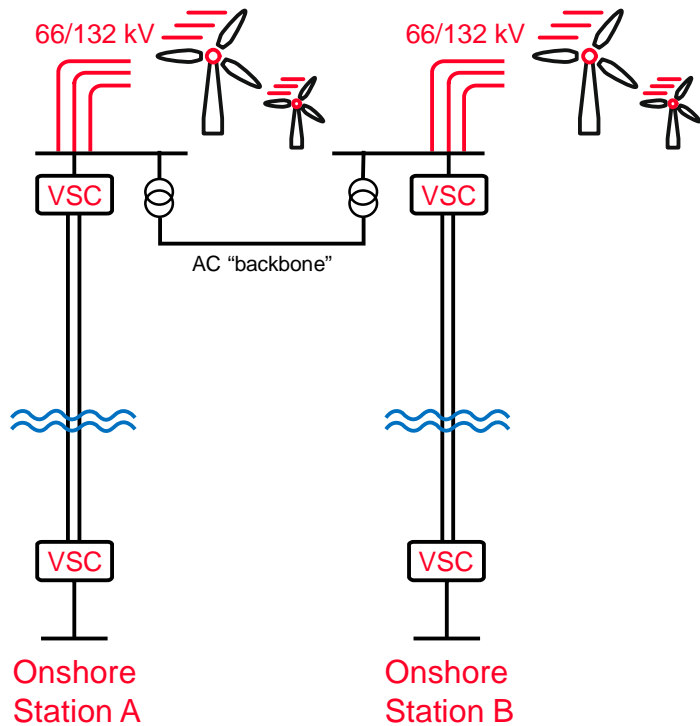


Upgrades / life cycle services

# Offshore Wind – what's cooking?

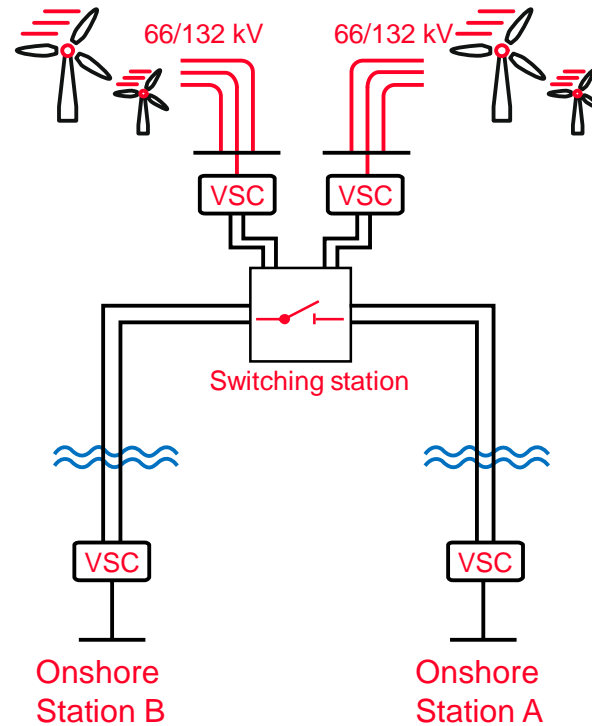


## Radial Connections



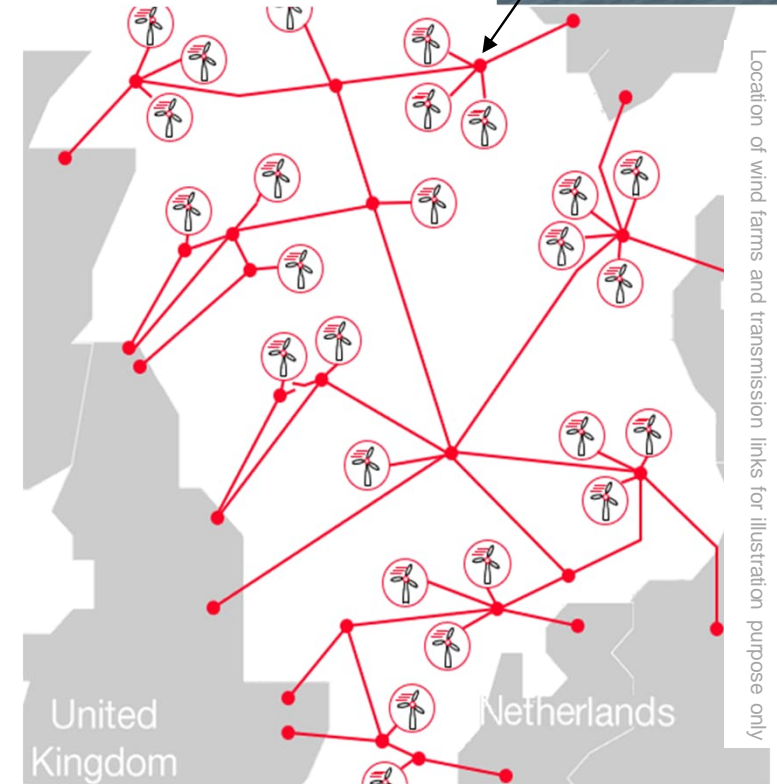
Cascading trips / AC Chopper  
Resonances / Harmonic Filters  
Converter Interaction / V/f control coordination

## Multi-Purpose Interconnections



DC Circuit Breaker  
Interoperability  
Control mode coordination

## Meshed DC Grid



Expandability  
Power flow controllability  
Regulatory challenges

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