

The background features several overlapping circles in various shades of purple, ranging from light lavender to deep magenta. These circles are positioned on the right side of the slide, partially overlapping the text area.

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Long Distance Subsea Power Transmission and Distribution

Peter Baker

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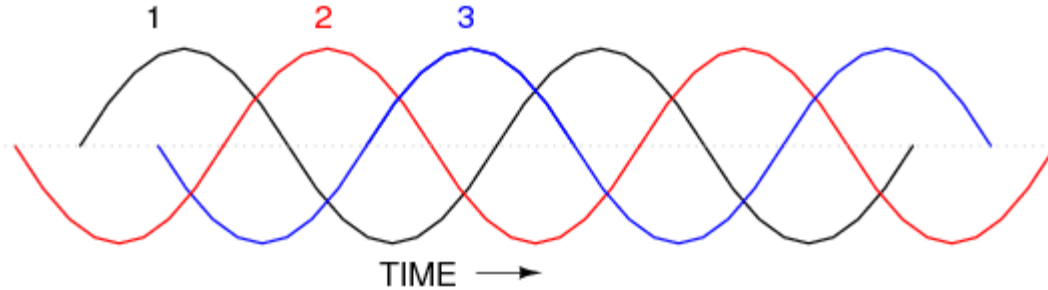
- Parameters used
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Parameters used

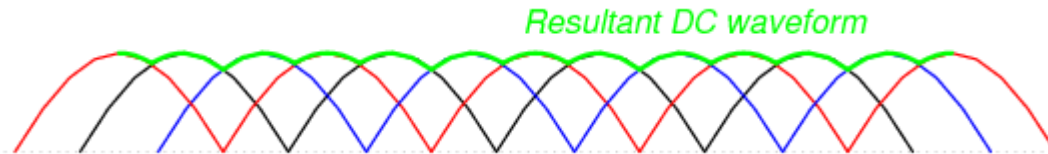
- Power~30MW
- Voltage~110kV
- Distances up to 600km offshore
- Water depths to 1500m

Technology Options

- AC (3 phase)

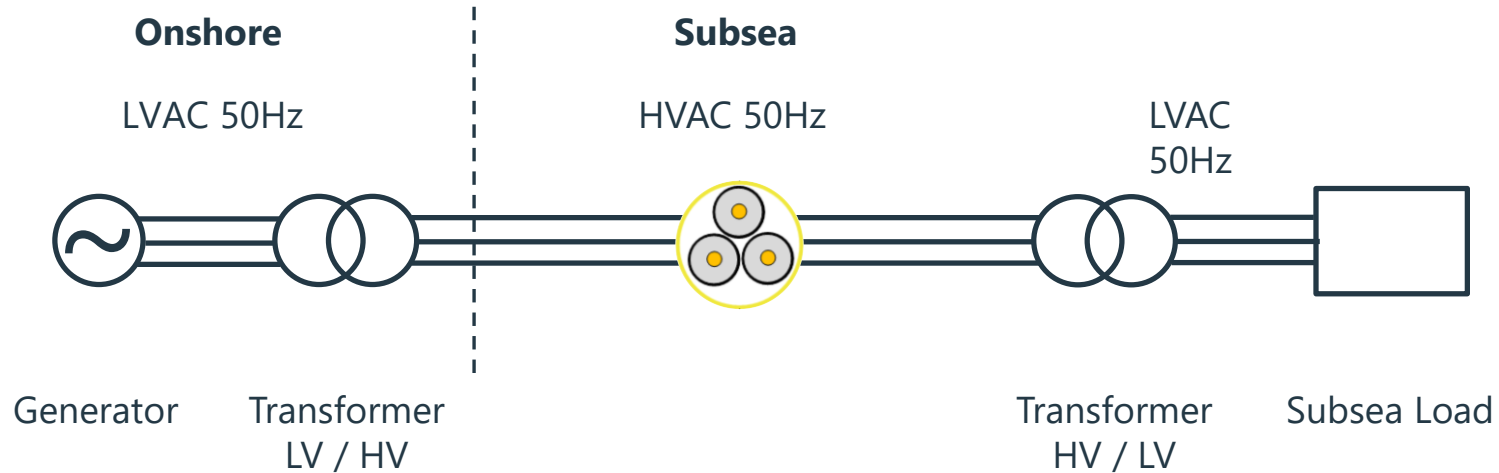


- DC



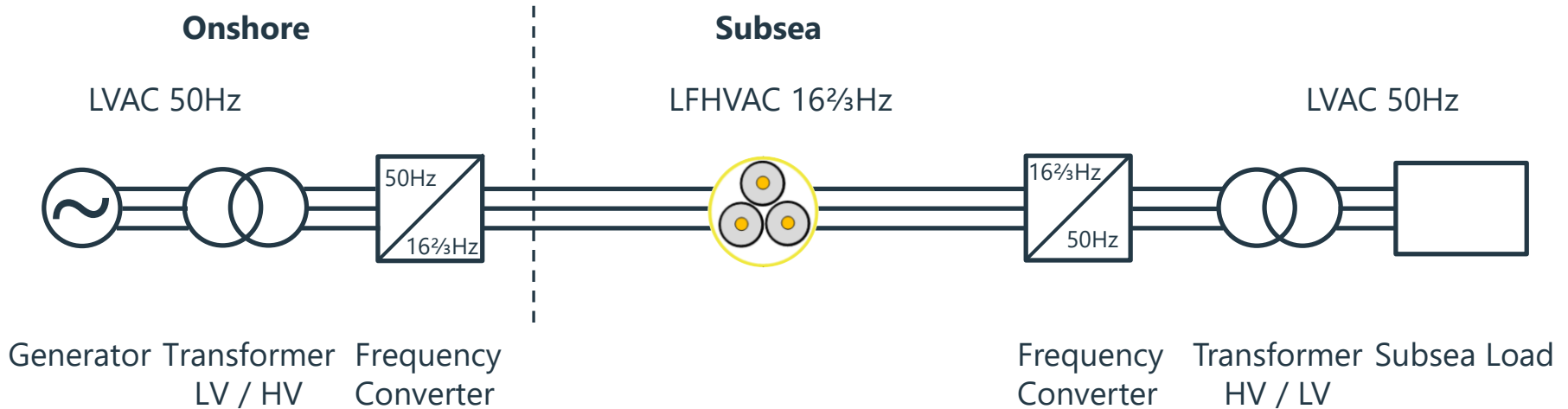
Technology Options

High Voltage Alternating Current - HVAC (50Hz)



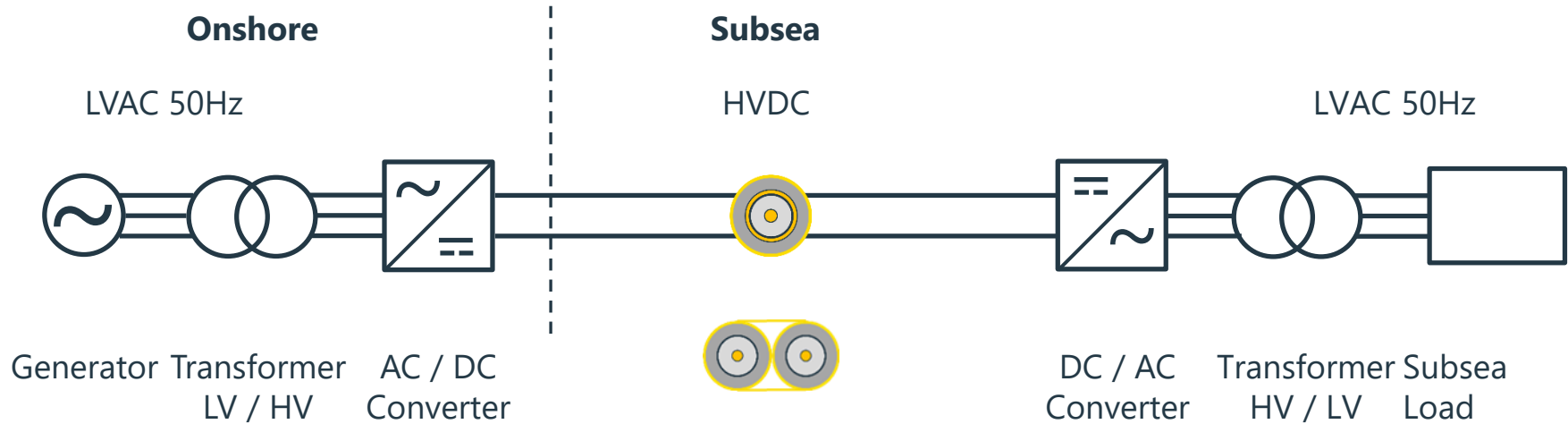
Technology Options

Low Frequency High Voltage Alternating Current - LFHVAC ($16\frac{2}{3}$ Hz)



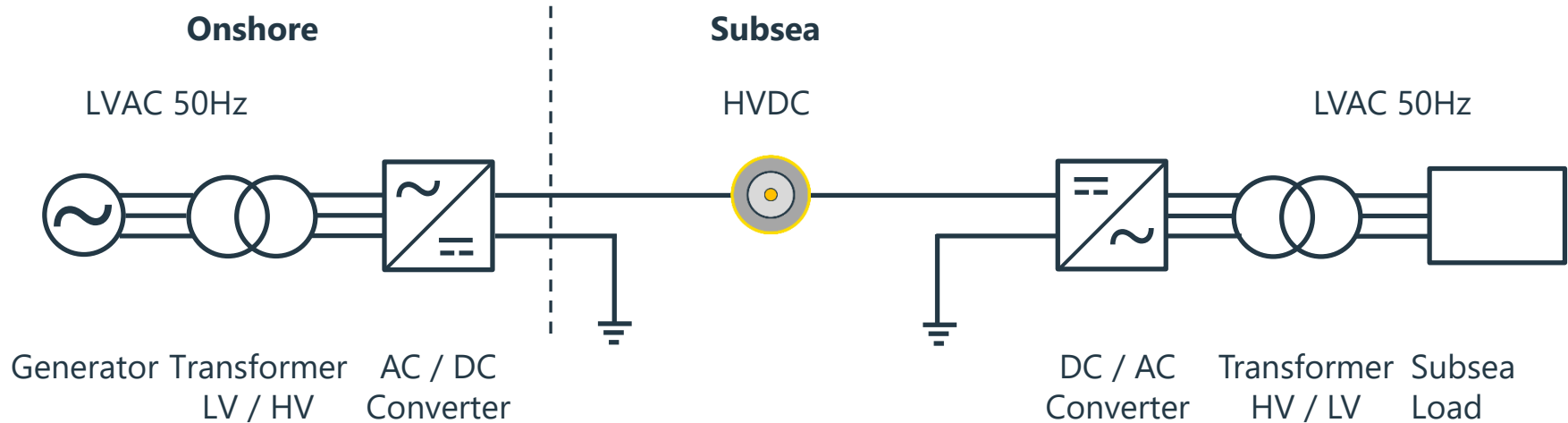
Technology Options

High Voltage Direct Current - HVDC



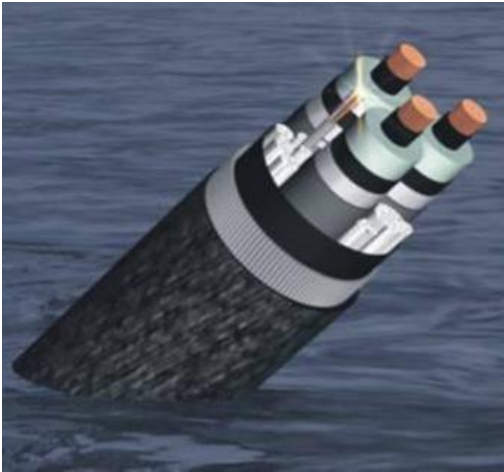
Technology Options

High Voltage Direct Current - HVDC



Cable Options

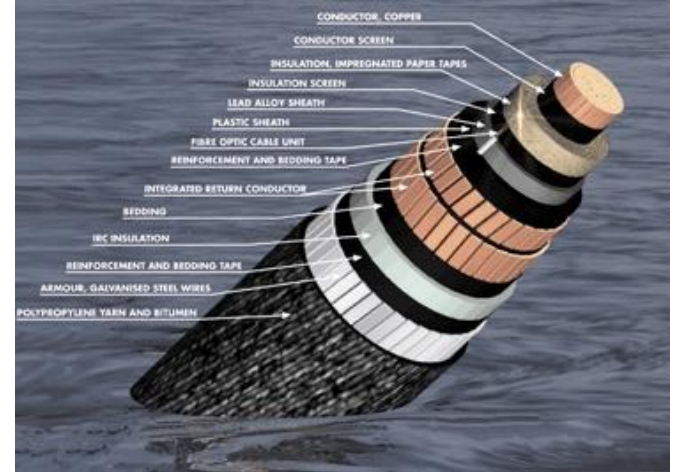
HVDAC & LFHVAC



HVDC Single Core

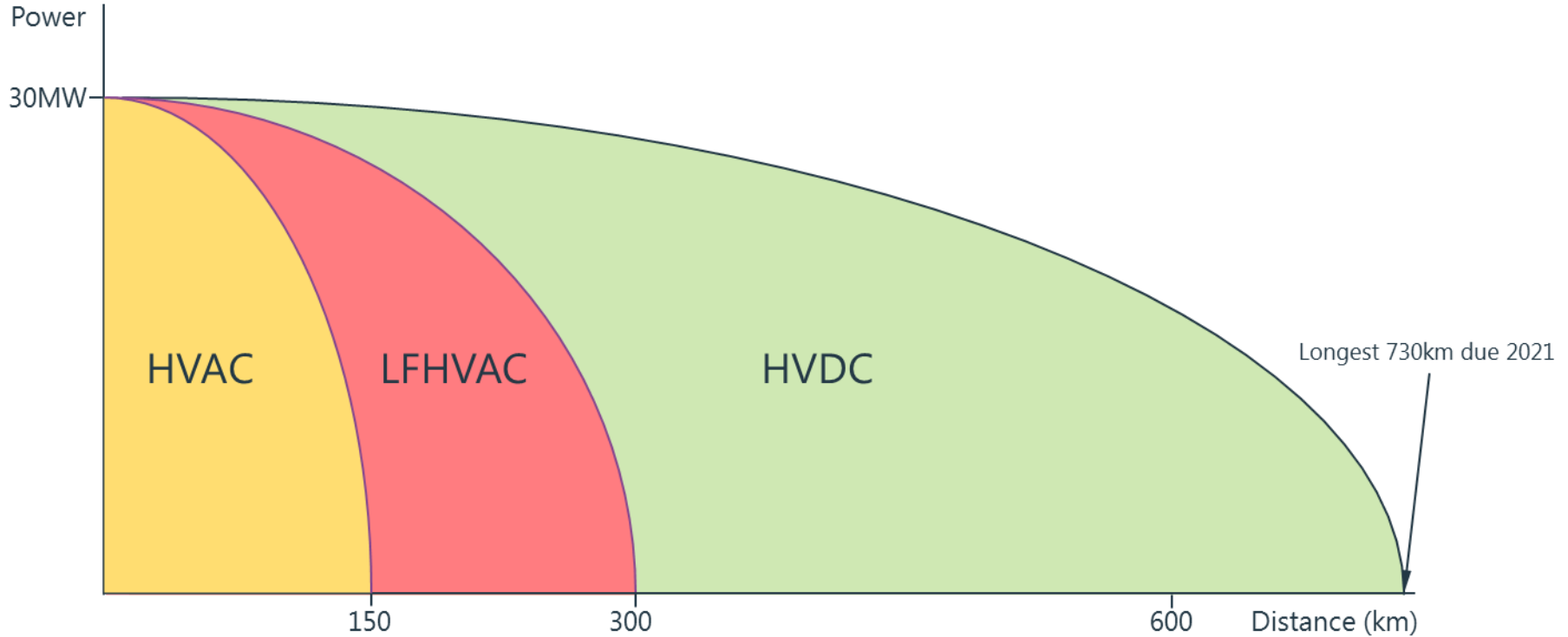


HVDC Coaxial

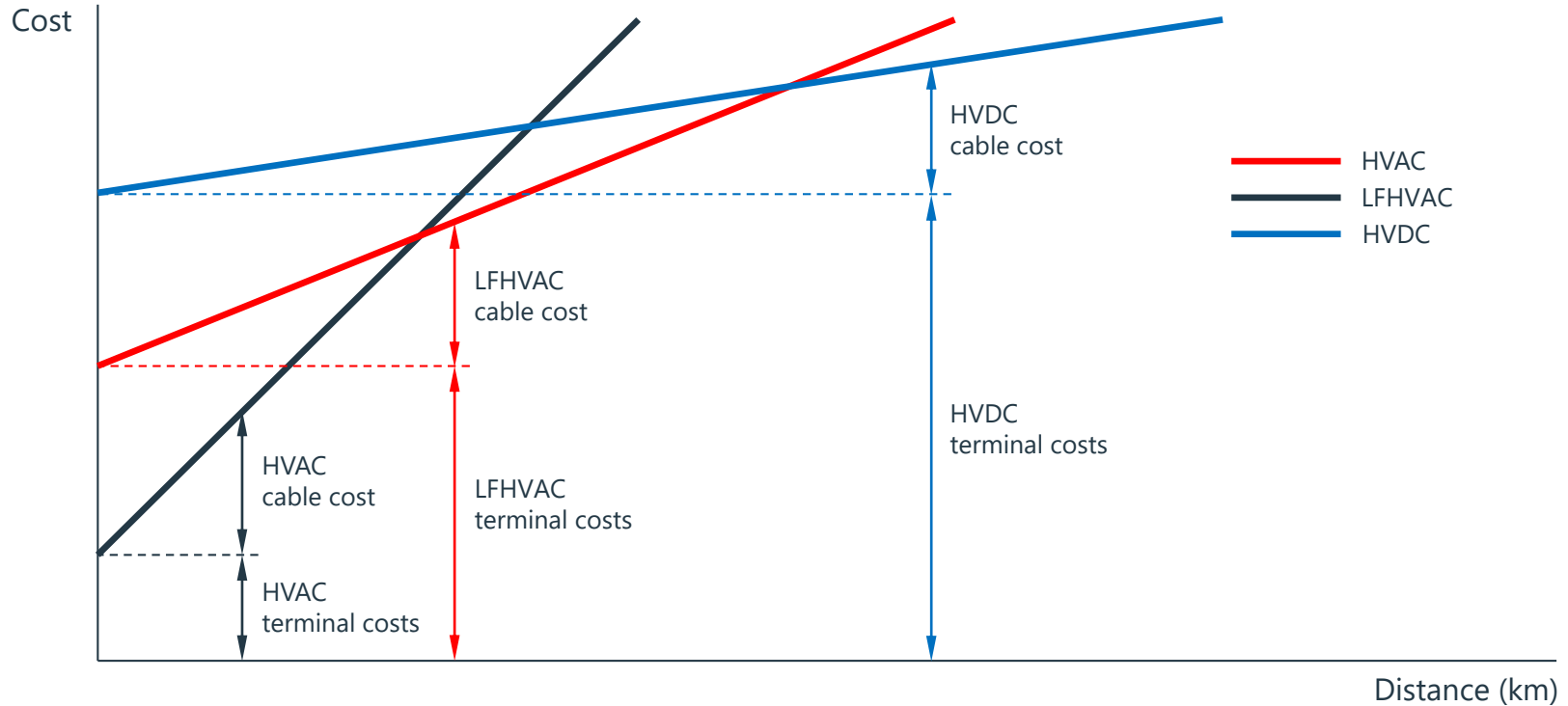


Images courtesy of Nexans

Typical Distance Limitations



Typical Cost Comparison



Qualified Technology

| Item | Parameter | HVAC | LFHVAC | HVDC |
|------------------|-----------------------|------|--------|------|
| Cable | Static | ✓ | ✓ | ✓ |
| | Dynamic | ✓ | ✓ | ✗ |
| Shore equipment | Generator | ✓ | ✓ | ✓ |
| | Transformer | ✓ | ✓ | ✓ |
| | Converter | N/A | ✓ | ✓ |
| Subsea equipment | Transformer | ✓ | ✓ | N/A |
| | Converter | ✗ | ✗ | ✗ |
| | Variable Speed Drives | ✗* | ✗ | ✗ |
| | Power Conditioning | ✗ | ✗ | ✗ |
| | Connectors | ✓ | ✓ | ✗ |

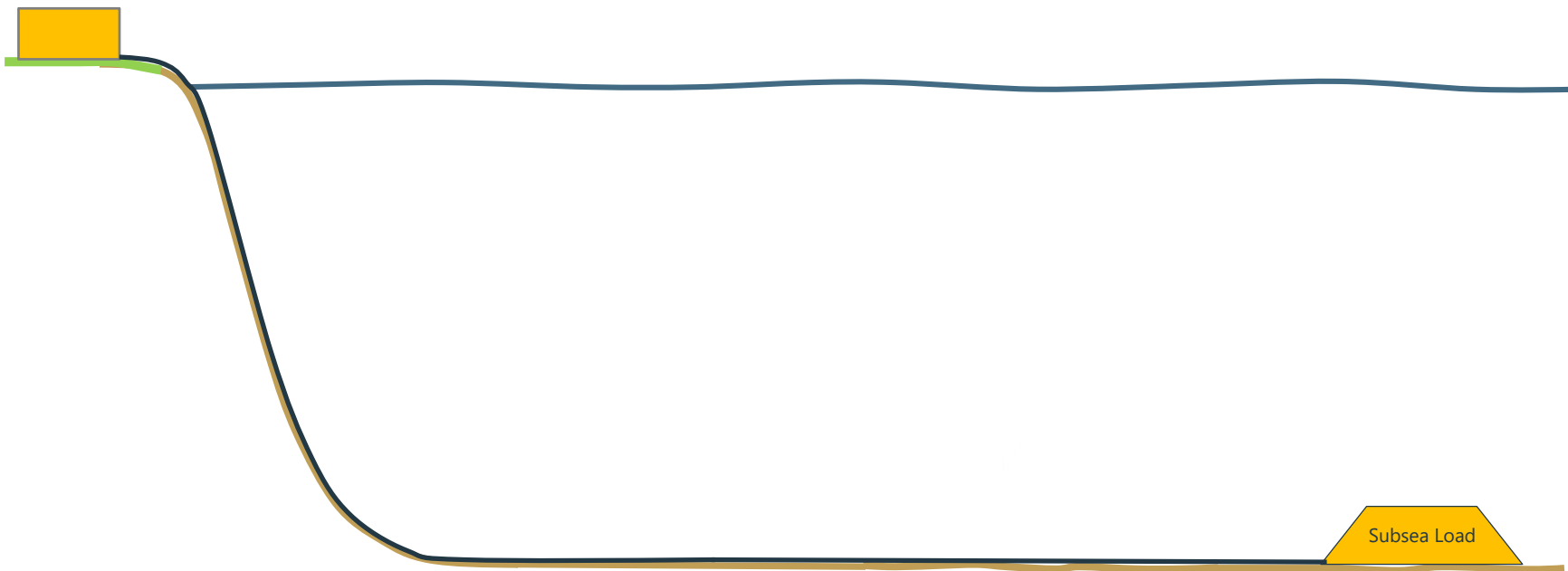
Advantages / Disadvantages

| System | Advantages | Disadvantages |
|--------|--|---|
| HVAC | Conventional subsea cable technology | Cable electrical losses > 100km |
| | Conventional topside hardware technology | Most subsea hardware not qualified |
| | Lowest hardware costs | |
| LFHVAC | Conventional subsea cable technology | Cable electrical losses > 300km |
| | Conventional topside hardware technology | No qualified subsea hardware technology |
| | Lower cable electrical losses compared to HVAC | Higher hardware costs > HVAC |
| HVDC | Conventional subsea static cable technology | Subsea dynamic cable not qualified |
| | Conventional topside hardware technology | No qualified subsea hardware technology |
| | Lowest cable electrical losses | Highest hardware costs > LFHVAC |

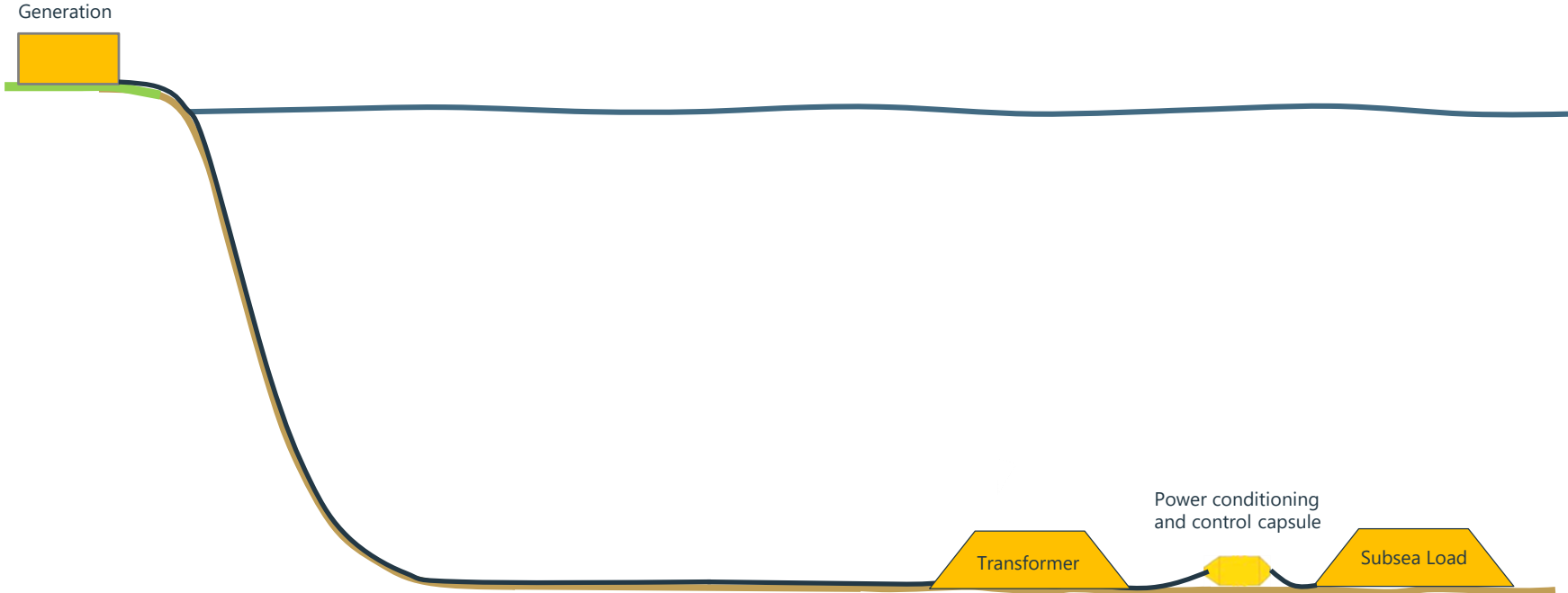


HVAC Power Transmission <50km

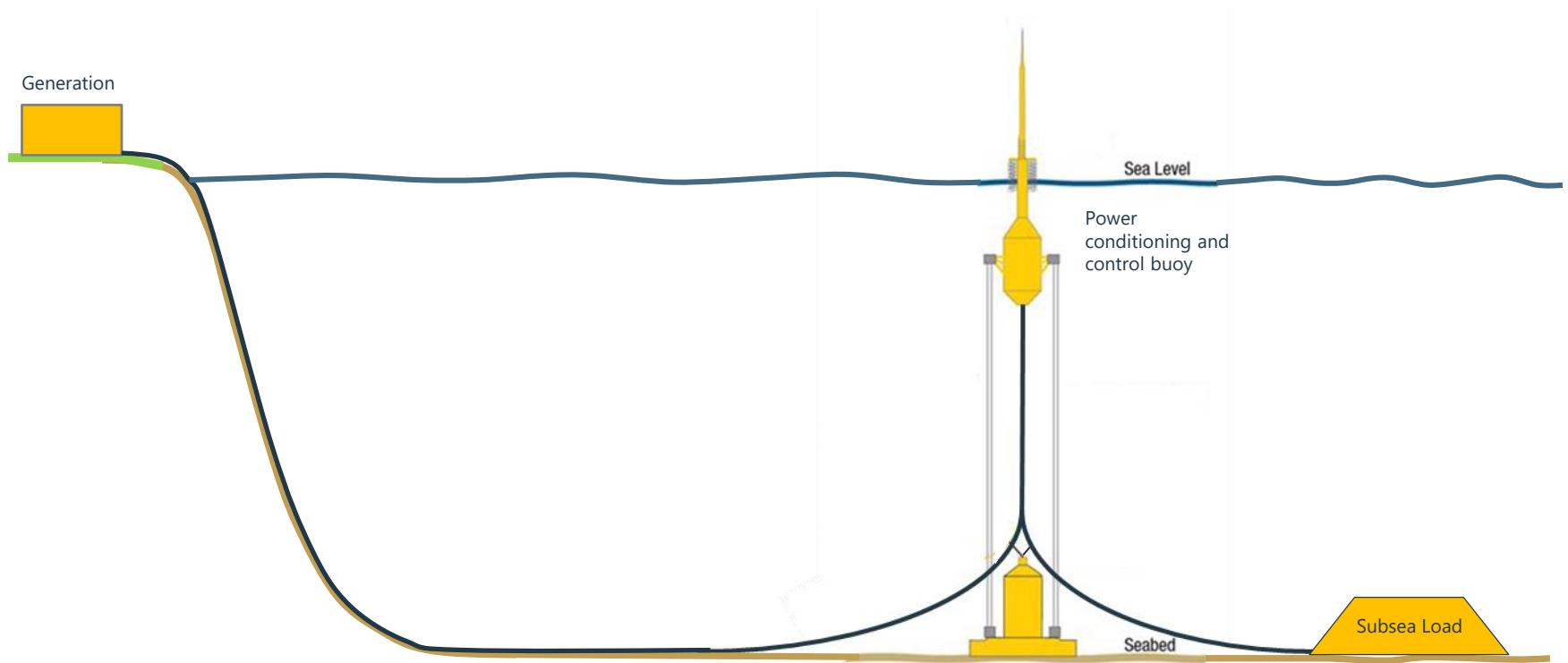
Generation /
Power
conditioning



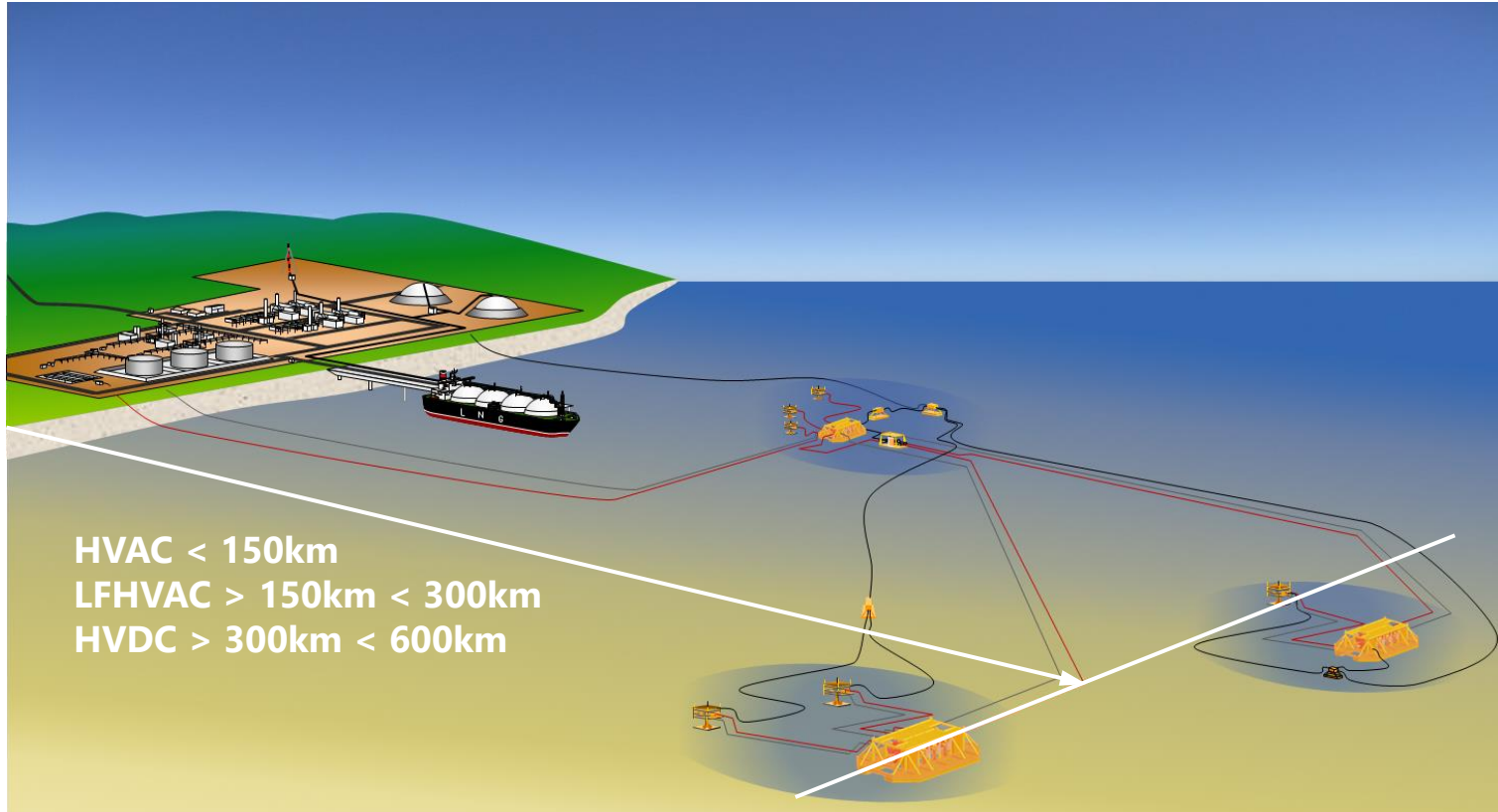
HVAC > 50km, LFHVAC & HVDC Power Transmission



HVAC, LFHVAC and HVDC Power Transmission



Summary



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