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Next Generation Power Systems for the New Digital Era

Ana Gorgyan
Independent Power Corporation PLC

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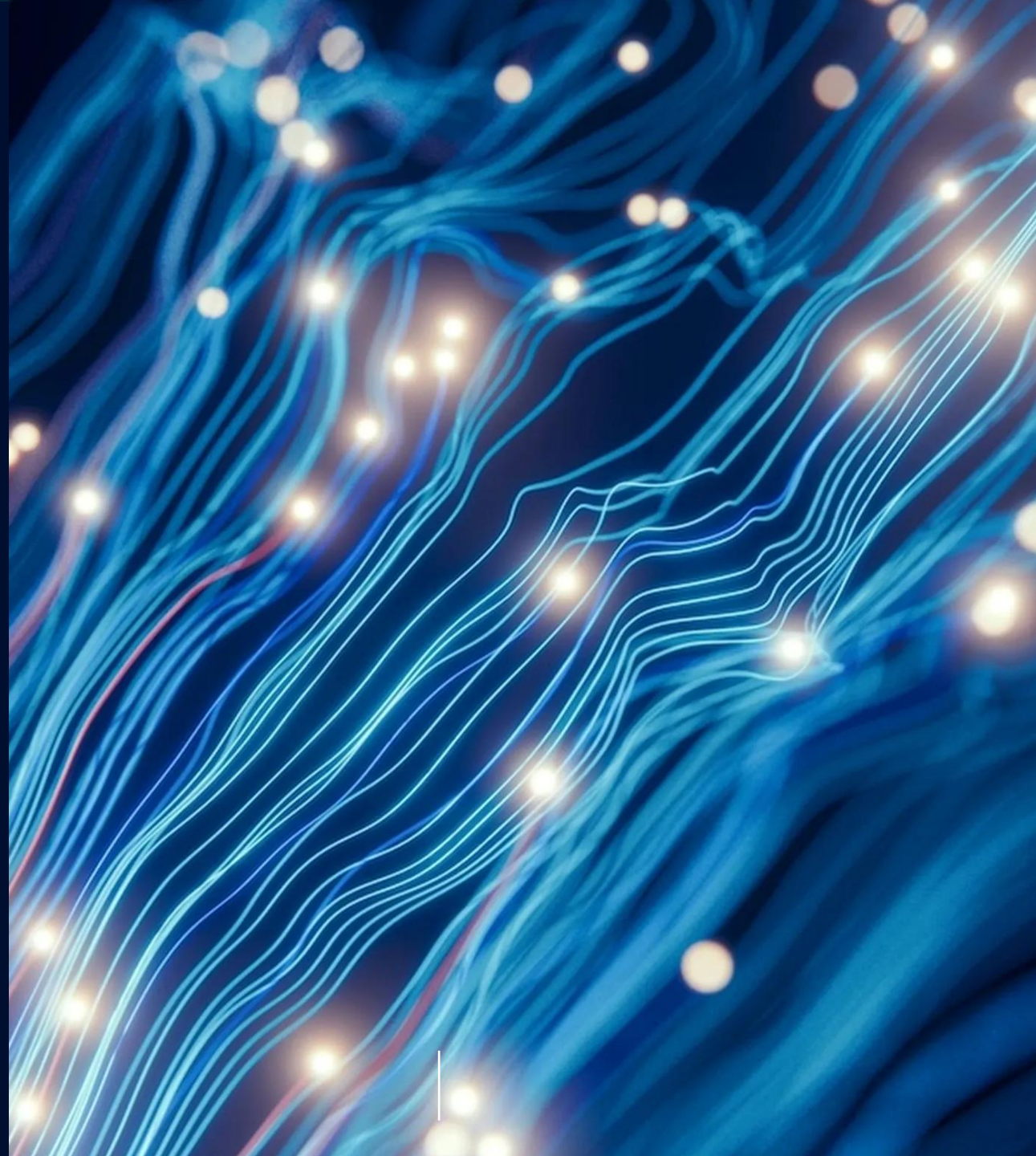

Independent Power Corporation PLC

- British Power Developer
- 30-Year Track Record
- Delivering Reliable, Conventional Power
- 10 GW of Ownership / Operatorship
- 7 GW New Projects

Karaganda GRES II

608 MW Coal

Second largest coal fired plant in Kazakhstan

Guaracachi

O&M > 500 MW of gas-fired capacity in Bolivia

Installation of new OCGT and CCGT capacity > 300 MW

Chaco

90 MW OCGT

BPs aeroderivative fleet for a gas field Bulo Bulo, Bolivia

Newcastle Cogeneration

18 MW CHP Syn Gas

First IPP in South Africa, KwaZulu Natal

Al Hamra I

45 MW OCGT

First aeroderivative GTs in Ras Al Khaimah, UAE, built on fast-track

Energia del Sur

134 MW CCGT

First CAF forward sale agreement for CERs in Argentina

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Why We're Evolving

- The world is changing rapidly.
- Decarbonisation, ESG responsibilities, and digitalisation are redefining the energy sector.
- IPC is evolving to stay relevant and lead innovation, while building on our strong foundation in power generation.
- Our goal - through our new IPC New World Energy subsidiary - is to transition from traditional power towards carbon-free, digitally-enabled solutions.
  - ✓ Carbon Capture
  - ✓ Offshore Wind beyond border
  - ✓ Battery Energy Storage
  - ✓ Fuel Cells
  - ✓ Hybrid Integrated Systems
  - ✓ Co-location with data centres





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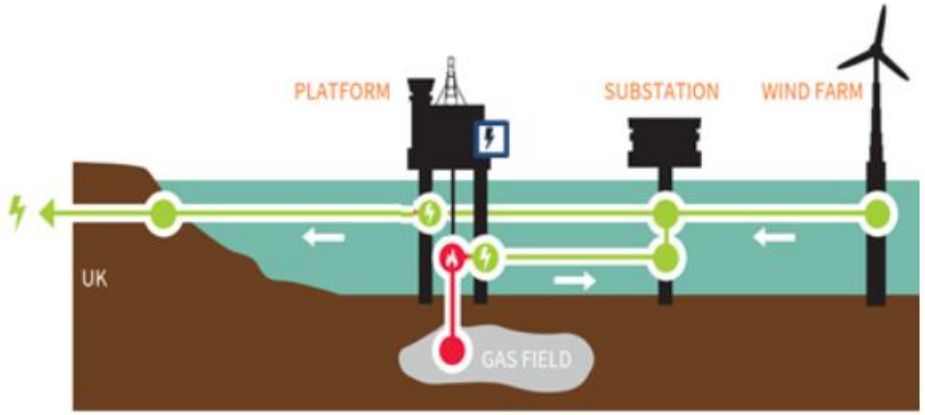
A New Path to Decarbonised Power Systems

Adapting Conventional Power to a Carbon Free Future

- Gas-fired power remains essential but must evolve to meet today's grid and customer needs for flexibility, resilience, and carbon-free generation.
- Conventional power, reimagined for: ✓ Fast response ✓ Reliability ✓ Low-carbon

- Next generation Carbon capture system developed by:
  - IPC
  - Marine Low Carbon Power (MLCP), IPC's offshore carbon capture subsidiary
  - GE Vernova

✓ Amine free
✓ No toxic by-product
✓ Energy-neutral process
✓ Non-hazardous medium
✓ Boosted efficiency
✓ Boosted output



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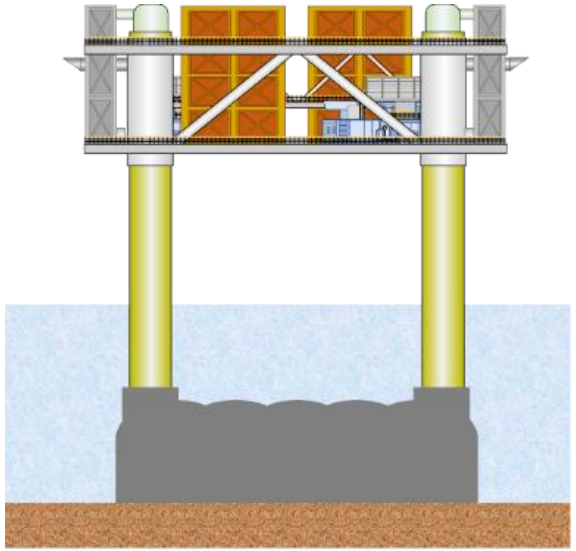
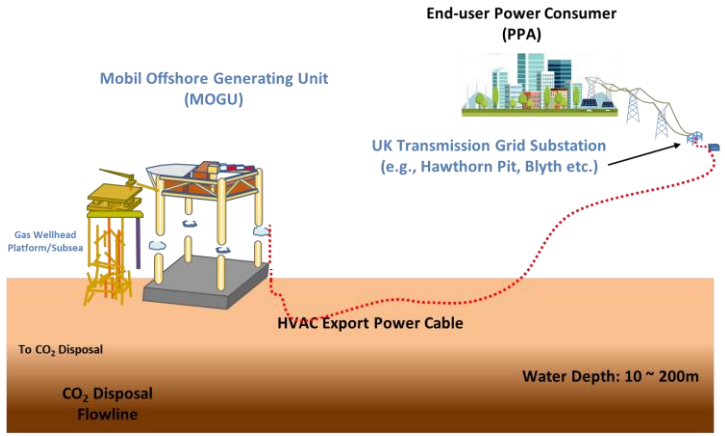
Offshore Integrated Solution for Decarbonisation

MLCP's Mobile Offshore Generating Unit with CCS



MLCP Mobile Offshore Generating Unit (MOGU)

- Offshore Advantage:
  - Co-location of fuel source and CO2 disposal reservoirs
  - Abundant cooling medium (sea water) simplifies heat exchange and reduces auxiliary power burden
  - Natural access to undersea CO_2 storage sites minimizes transport and disposal costs



- Economic Logic:
  - Even accounting for power export cable costs, offshore generation + CO2 capture remains cost-competitive
  - Ideal for co-locating with oil & gas fields & monetising off-spec (high inert content) gas sources
- Operational Efficiency:
  - Enables autonomous operation with remote monitoring and control
  - Maintenance optimised through scheduled unmanned operation cycles

Advantages of Offshore Power Generation with CCS

Southern North Sea: Earlham Gas Field

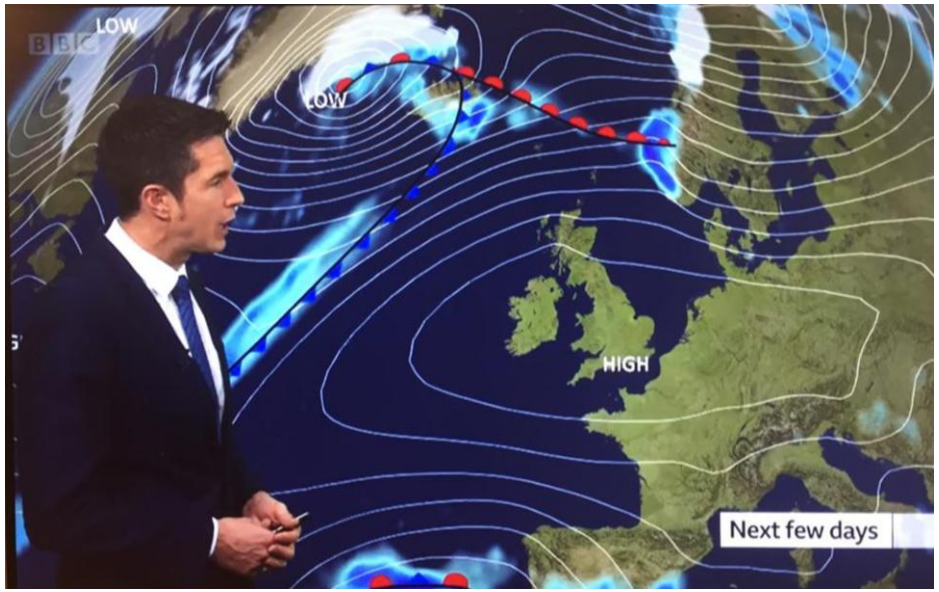
➢ Offshore Advantage:

- Locating a MOGU on the Earlham site eliminates the need both for a natural gas pipeline to shore or a long-distance CO2 disposal pipeline .
- The Earlham MOGU treats gas offshore to reduce the field's off-spec CO2 content within the combustion limit of LM-6000 gas turbines.
- Captured pre-combustion CO2 is combined for subsea storage with post-combustion captured CO2.
- The combined CO2 stream is then be reinjected into Earlham to provide both long term storage and enhanced gas recovery for the Earlham field.
- This distributed, low-cost CCS system is effective and affordable.

Offshore Wind Beyond Borders

Connecting Complementary Offshore Wind Zones for More Renewable Power

- Challenge: Offshore wind fluctuates with regional weather patterns.
- Opportunity: Complementary wind zones across climatic regions balancing variability; eg UK & Iceland.



- Concept: Offshore Wind Beyond Borders: Interconnecting offshore wind farms from different climatic zones to enhance overall system reliability and capacity factor.
- Main Cost Drivers: Converter stations + subsea cable installation.

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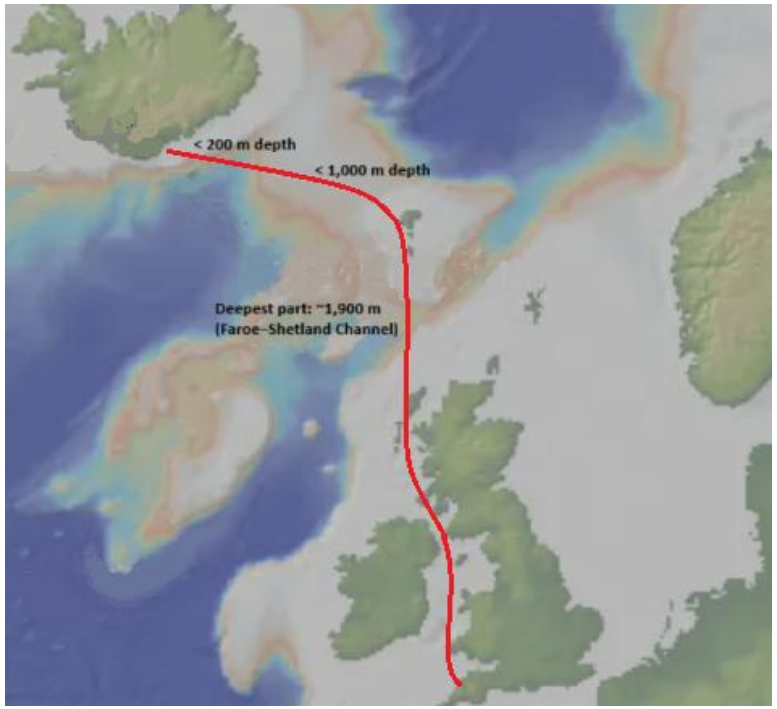
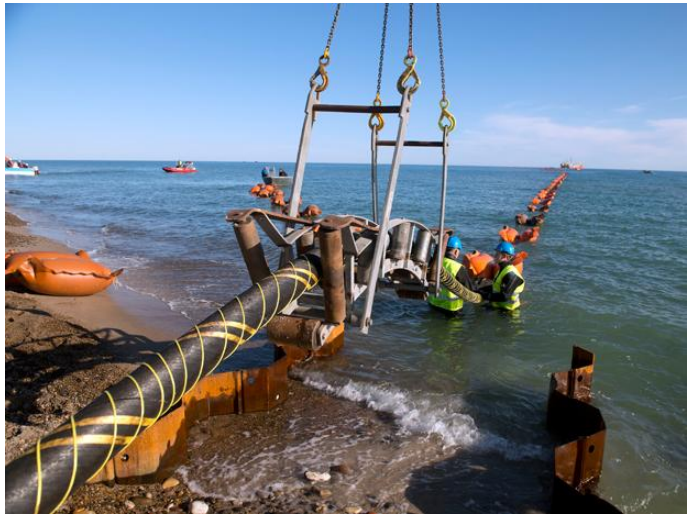
Offshore Wind Beyond Borders

Enabling Technology and Benefits

- Enabler: Advances in long-distance HVDC transmission (525 kV class) enable efficient cross-border renewable integration.
- Distance: ~1,500 km link (IceWind project concept).
- Depths: ~ 500-800 meters (via Faroe Islands).
- Power Losses: ~ 3% per 1,000 km.



Source: folk.universitetetiioslo.co



Source: The Independent Icelandic and Northern Energy Portal

- ✓ Higher system reliability
- ✓ More Renewable availability.
- ✓ Higher Combined Capacity Factor: ~ 55% - 60.5%

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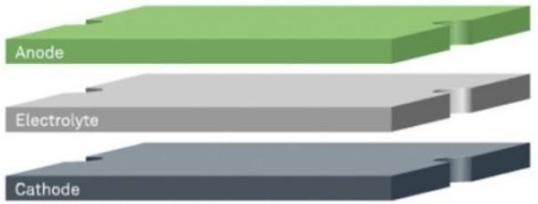
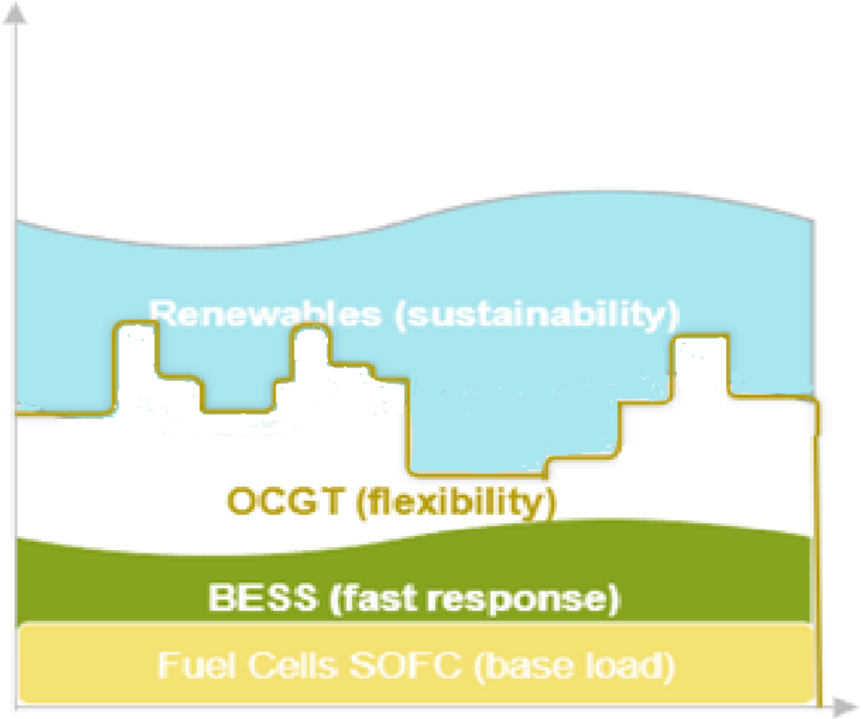
Fuel Cell Technology: Base Load off-Grid Power

➢ SOFC Fuel Cells Role in power generation mix

- Base load operation
- Grid independence
- 20% carbon reduction and higher efficiency compared to OCGT
- Cons: Warm-up time: ~12–14 hours to reach full operational state.

- $CH4+2O2 \rightarrow CO2+2H2O$





➢ Hybrid configuration advantage

- Combined system improves system efficiency, response and endurance.

➢ Market momentum

- Growing commercial projects in the US and Europe.

Battery Energy Storage Evolution

- Drivers of BESS growth:
  - Larger-scale manufacturing & commercialization in the last decade
  - Falling material and system costs
  - Improved technology and reliability

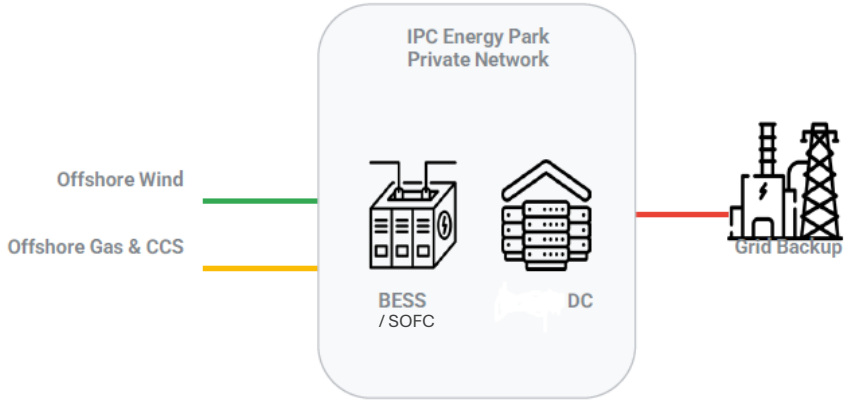
- Transformational capabilities:
  - Sub-second response times and fast frequency response
  - Grid-forming and black-start capability
  - Competing directly with gas and diesel engines for fast start and resilience

@GE Vernova and its Affiliates

Comparative Technology Analysis	Start-up / Response Time	Response Characteristics	Operational Notes
OCGT	5-10 min to full load	50 MW per min	Peaking power and back-up, but not instantaneous response
Gas Engine (recip)	30 sec – 2 min	Moderate ramping speed	Distributed generation & backup
Diesel Engine	5-30 sec	Quick start for standby use	Emergency backup, but not continues balancing
BESS	400 milliseconds	Instantaneous power injection; can follow load or frequency within milliseconds	Fast frequency response Grid stabilising Load following Black start

IPC Perspective on BESS

- Hybrid & Co-Location Concept:
  - Shared grid connection and substation
  - Optimised capex & opex
  - Higher transmission asset utilisation: from ~45% to up to 75%
- Enhancing renewable value:
  - Smooths intermittent generation and load peaks
  - Enables stable, carbon-free power for data cenres & critical users



- Other Integration potential:
  - Battery + Gas Turbine: fast, flexible backup
  - Battery + Fuel Cell: lower-emission resilience
- Flagship project example – Icewind Hinkley Point
  - Iceland–UK non-standard one-way interconnector project:
  - Incorporates battery storage to balance variable wind and grid curtailment
  - Uses stored energy during high-demand or high-price periods

Closing: From Vision to Implementation

- What's exciting is that all this technology exists today.
- The challenge isn't technical feasibility. It's bringing the right mindset, partnerships, and forward-thinking customers together to implement it.
- Data centres, for example, are already embracing decentralised, hybrid power systems, combining reliability, flexibility, and sustainability in ways traditional grids can't match.
- At IPC, we're bridging proven power generation expertise with cutting-edge, hybrid technologies to deliver resilient, low-carbon systems at scale.
- We're eager to collaborate with partners who share this vision and want to make next-generation power a reality.

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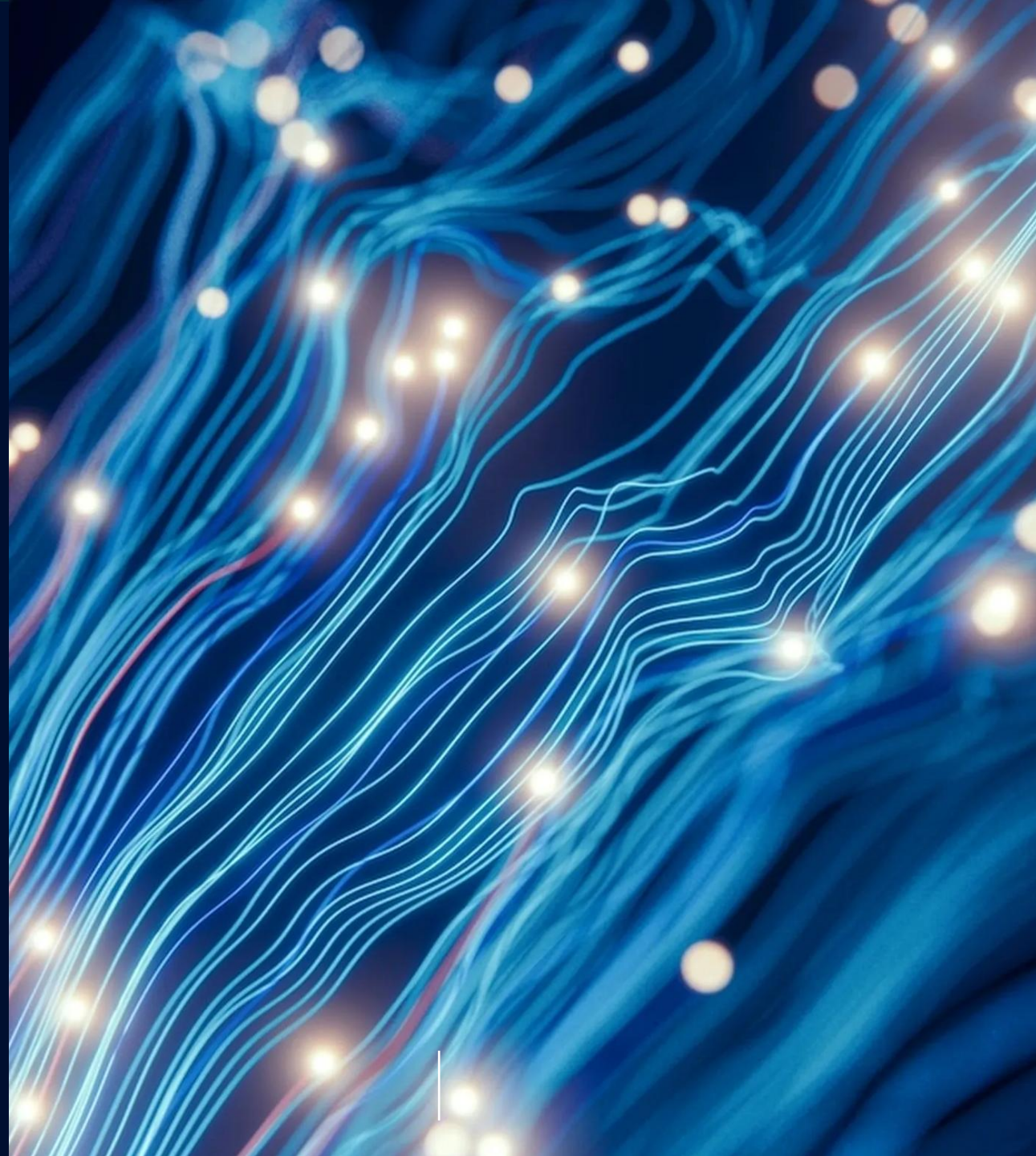
THANK YOU



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