

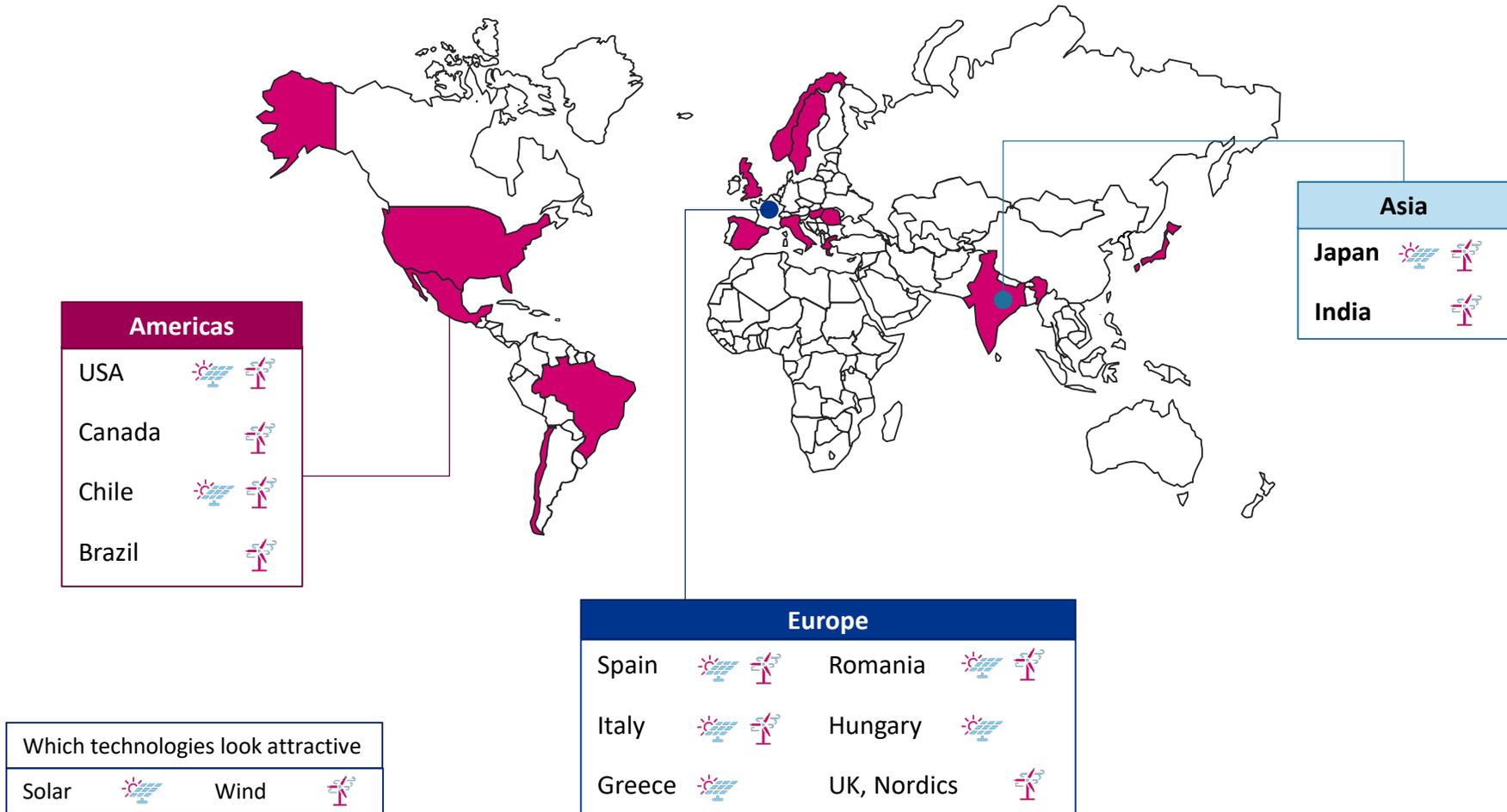
Where to invest in energy in 2020 - opening remarks and themes

Second annual breakfast seminar hosted by Norton Rose Fulbright

Tuesday January 21st, 2020

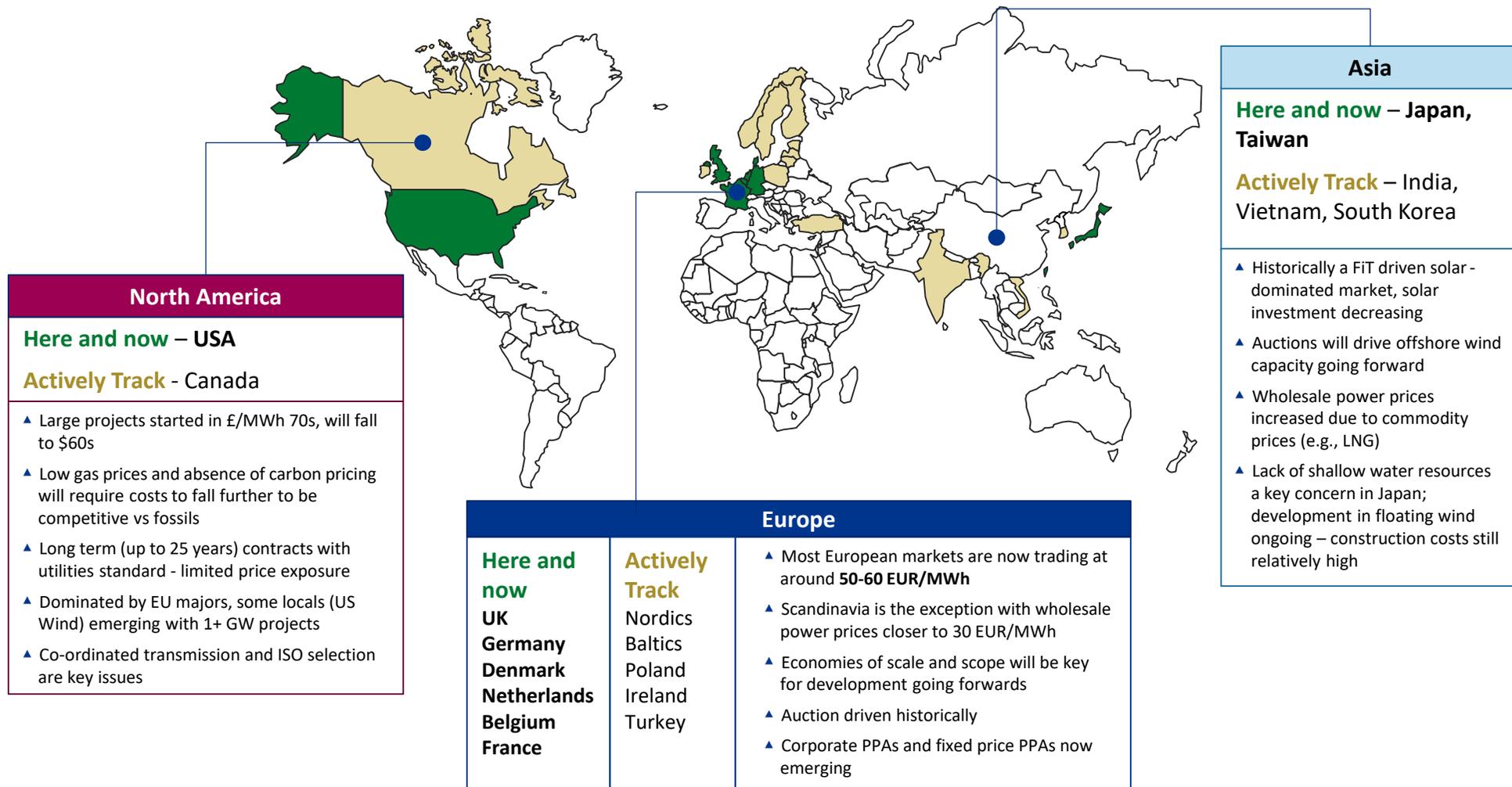
1. “Hot” markets for onshore wind and solar in 2020

Some picks for new entry markets (development entry) across a range of routes to market (auctions, corporate PPAs, PPAs)



2. Where to invest in offshore wind in 2020

USA, Western Europe, Japan and Taiwan will provide the most attractive opportunities in 2020



3. Green hydrogen & EVS as a bridge to renewables build?

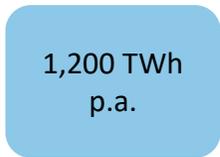


Renewables can provide a critical foundation to the rapidly-emerging green hydrogen fuel and electric vehicle markets, given the scale of generation required and the time it takes to take projects from development to operation

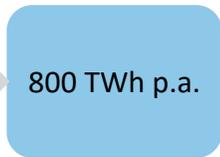
Scale will be key...

Hydrogen

Global demand for Hydrogen in transport, projected for 2030

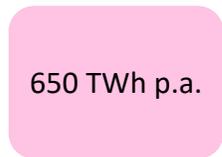


Power required to produce Hydrogen from electrolysis

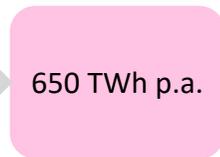


Electric Vehicles

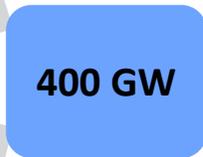
Global demand for electricity in transport, projected for 2030



Power required



Equivalent renewable power capacity required by 2030



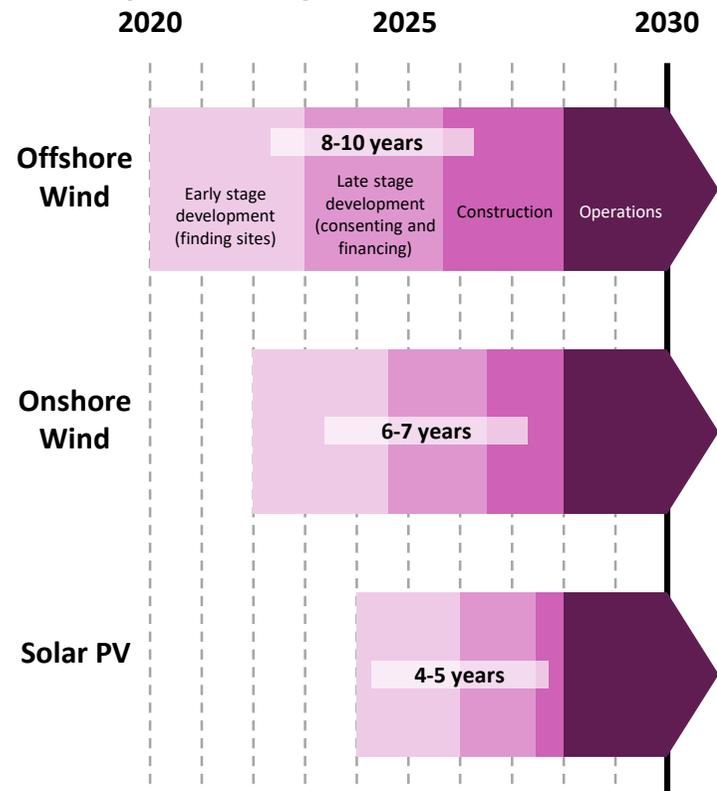
- 150 GW offshore wind, 200 GW onshore wind, 50 GW solar PV
- c.\$500bn total capex
- Across 10-15 markets

Source: Baringa analysis using BP Energy Outlook 2019 as source

Source: Baringa analysis; assumes 50% of Hydrogen is produced by electrolysis, at 75% average efficiency

Source: Baringa analysis; assumes mix of onshore wind, solar PV & offshore wind at blended load factor of c.41%

...and now is the time to move given development lifecycles

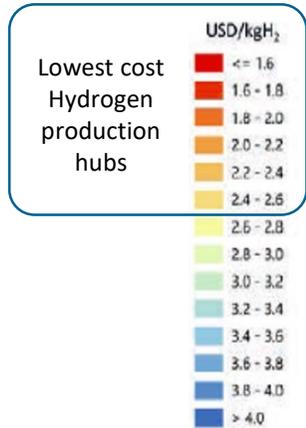
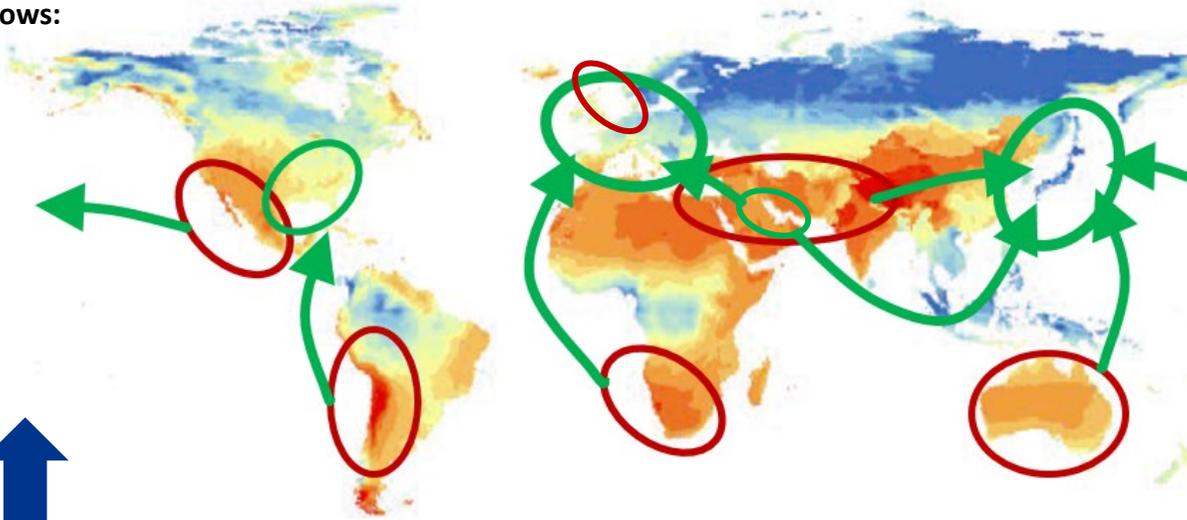


3. Long term hydrogen trade build on existing LNG routes

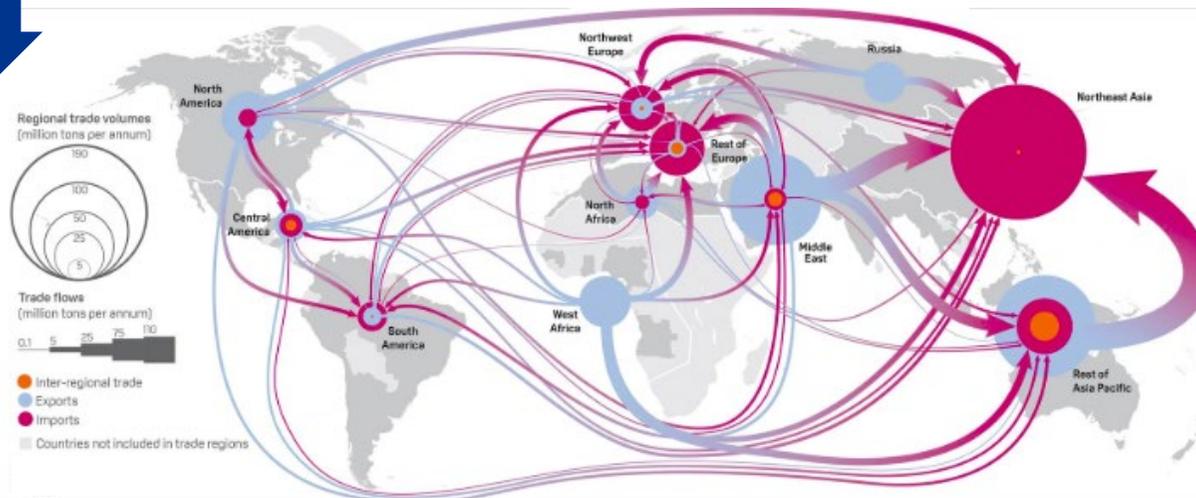
Future trade in hydrogen may become global and analogous to large-scale LNG trade today, with demand hubs largely the same and supply hubs shifting towards high renewables markets, utilising common infrastructure offering new downstream markets complementary to downstream gas

Future Hydrogen trade flows:

- Hydrogen supply hub
- Hydrogen demand hub
- Hydrogen trade flow



Analogous to today's LNG trade flows:



Likely early hydrogen projects will be local production and local consumption. For example, to supply large customers (e.g. for heat and power).

Sources:
 Hydrogen: IEA Future of Hydrogen
 LNG: S&P Global Platts
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