

ENERGY POLICY PANEL SESSION

Is net zero possible without nuclear?

Chaired by Tim Yeo, Chairman, The New Nuclear Watch Institute

Kirsty Gogan

Co-founder and Executive Director, Energy for Humanity

Alan Raymant

Chief Executive of Bradwell B, CGN UK

Martin Wright

Chair, Renewable Energy Association

Dr Alan Whitehead MP

Shadow Minister for Green New Deal and Energy, BEIS

Ian McCarlie

Partner, Renewables & Clean Tech Sub Sector Lead, Pinsent Masons LLP



THE NEW NUCLEAR
WATCH INSTITUTE



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Kirsty Gogan

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**ENERGY FOR
HUMANITY**

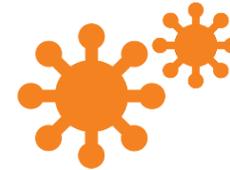
Is net zero possible without nuclear?

Alan Raymant
Chief Executive

Overview of CGN: A global clean energy company



27GW / **24** units
in operation



5.8GW / **5** units
under construction

CGN is the biggest nuclear power company in China and third largest global nuclear enterprise



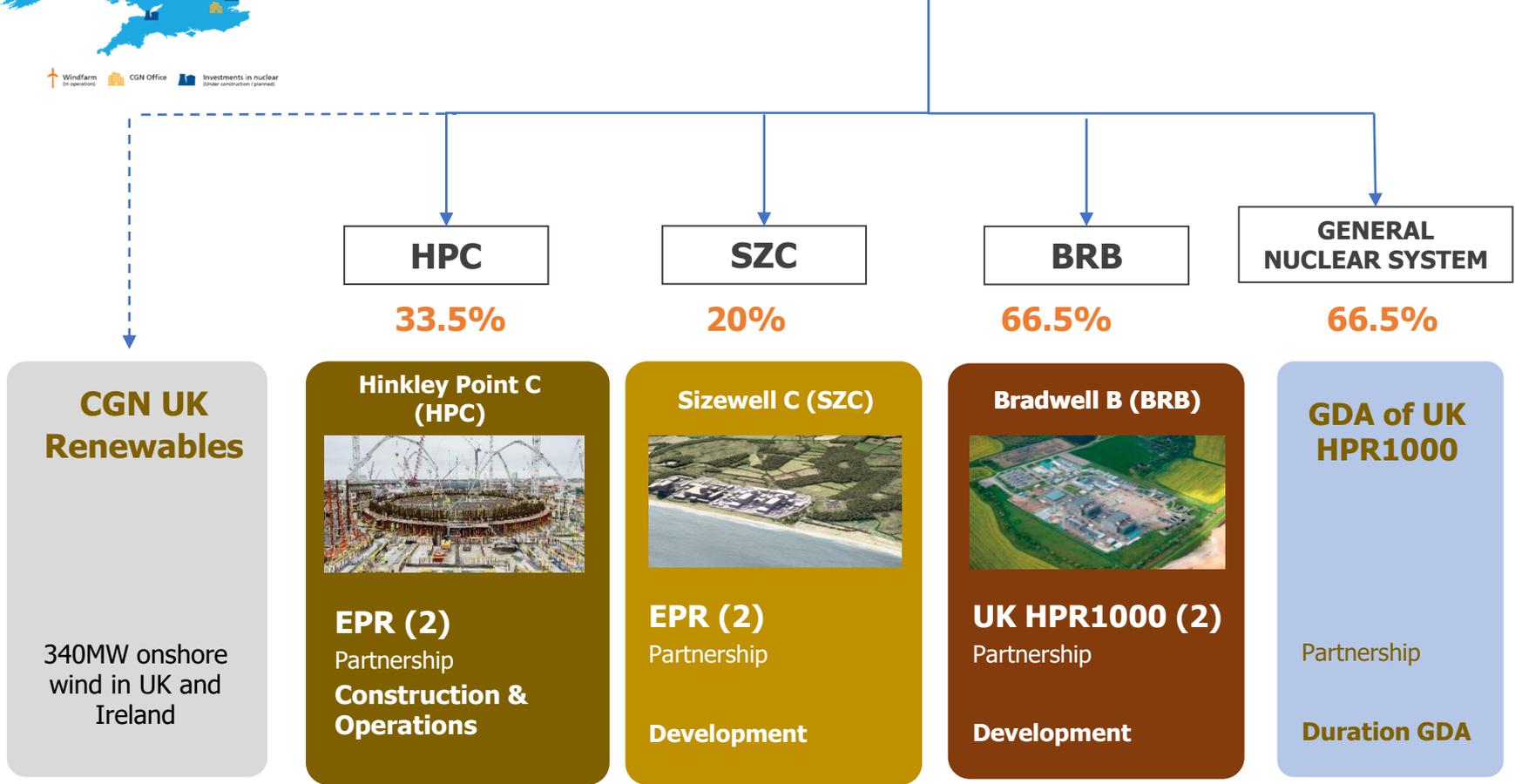
CGN also has more than 30GW of renewables in 15 countries

This means that CGN operates 58GW of clean energy in total, split equally between renewables & nuclear



CGN in the UK today

CGN UK (GENERAL NUCLEAR INTERNATIONAL)



2050 electricity system: variable and firm power

Committee on Climate Change

- By 2050 we will need significantly more electricity as heat and transport is electrified
- It will all have to be **zero or very low carbon**
- **Variable** renewables will make up 57% of the generating mix
- 38% will come from **firm** power: nuclear and gas + CCUS

Energy Systems Catapult

- Innovating to Net Zero report recommends large and small nuclear
 - Models range from 50% to 28% nuclear generation

Clear agreement that nuclear will make up around a quarter to a third of our generating capacity in 2050

Great Britain firm baseload needs
(GW, 2020-2050)

■ Firm Low-Carbon Gap

■ New Nuclear

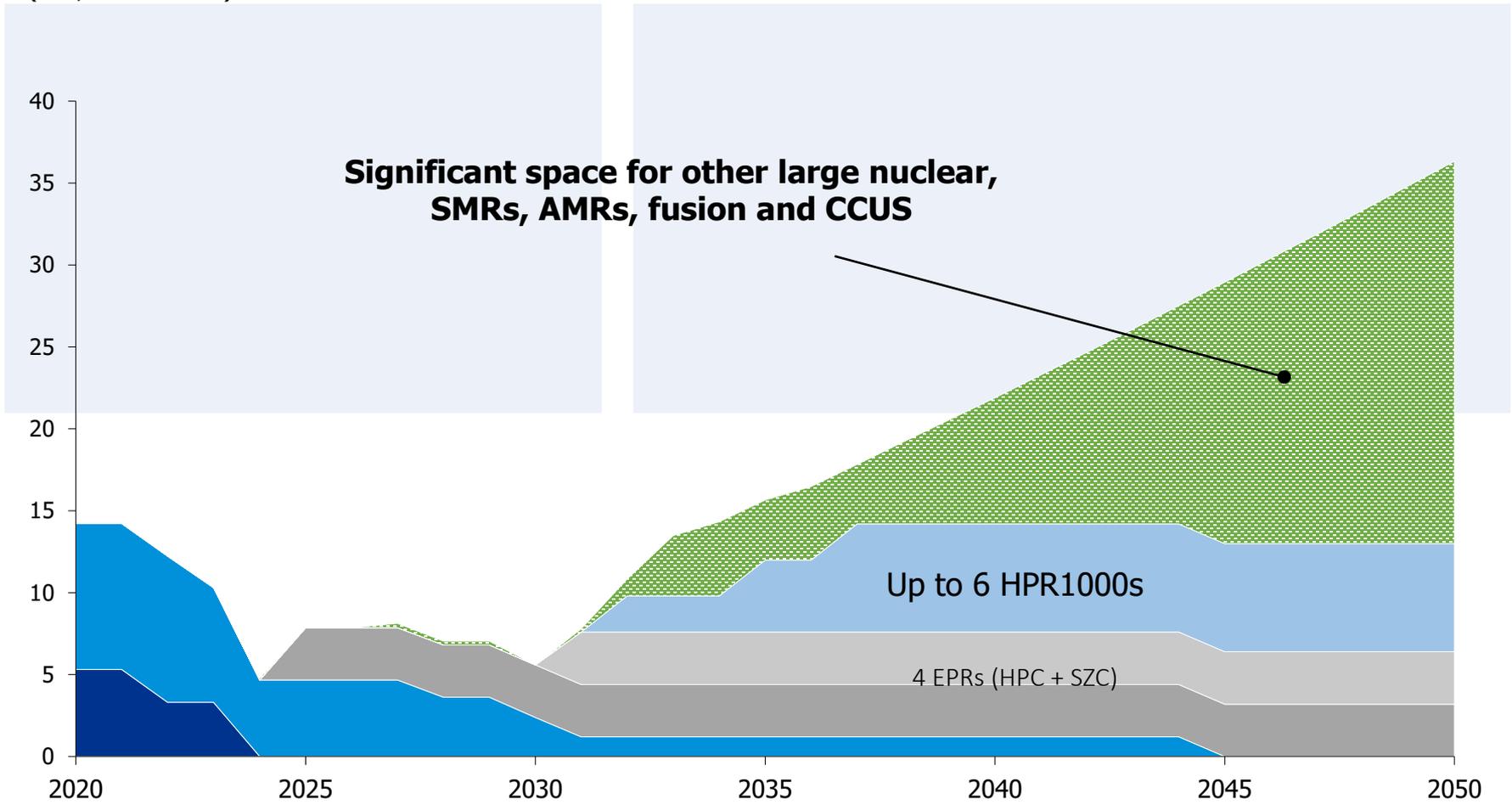
■ Retiring Nuclear

■ Coal

**Significant space for other large nuclear,
SMRs, AMRs, fusion and CCUS**

Up to 6 HPR1000s

4 EPRs (HPC + SZC)



Proving the acceptability of new nuclear

- The question is not whether large nuclear is needed; it is clear that it is. The question is whether it is acceptable to decision-makers and the public
- As developers we have to answer three key questions of acceptability:

- Can we build new nuclear?

Taishan -> Hinkley Point C -> the rest of the new build programme

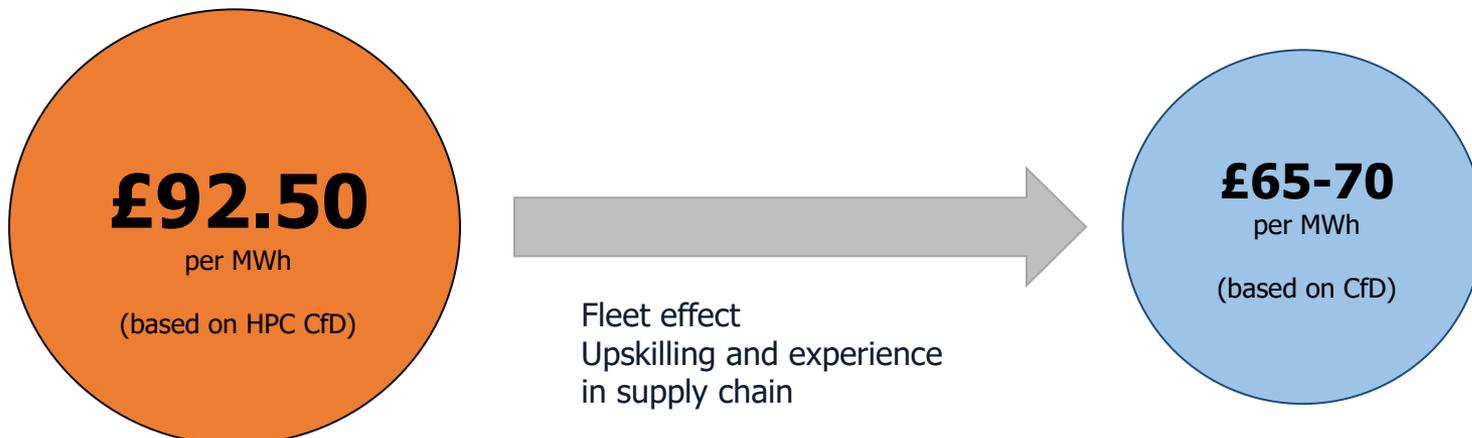
- Can we deliver benefits to the UK economy via the supply chain?

*UK supply chain is building up expertise and capability all the time
Distributed nature of the supply chain means nuclear can be a big
player in the levelling up agenda*

- Can we demonstrate that new nuclear is affordable?

Answering questions on cost

- Challenge from Government / National Infrastructure Commission / others is to ensure that nuclear is cost competitive with other low carbon technologies
- Yes, a truly comparable cost for offshore wind is not £40 per MWh because of intermittency and impact on the grid
- But the Nuclear Sector Deal envisaged a drop of 30% compared to Hinkley Point C and that is what we have to deliver
- Experience from China is that this is what a fleet development programme with a fully mobilised and engaged supply chain can deliver highly significant cost reductions



Bradwell B: powering 4 million UK homes of the future



HPR1000 reactor design:

- ✓ Going through GDA process;
- ✓ Recently entered Step 4 (the final step)
- ✓ Complete by early 2022

Bradwell B has just started DCO Stage 1 consultation (extended due to coronavirus)



It is projects like Bradwell B, as part of a system combining renewables and large and small nuclear, that is the only reliable and affordable way to achieve net zero by 2050

Thank you



Martin
Wright,
Chair,
REA

Renewable Energy in the UK Generation Mix



REA - Who We Are

We are the largest trade association for renewable energy and clean technologies. Our 500+ member organisations range from energy utilities & renewable energy developers working across multiple technologies and solutions through to innovative niche technology companies and consultants.

Our Sector Groups



Our various sector groups enable us to focus on sector-specific issues. Members can join our various groups concentrating on individual renewable technologies, energy market sectors, or cross-cutting issue forums.

Our Subsidiaries



The Wood Heat Association is the UK trade association for the modern biomass heating industry.



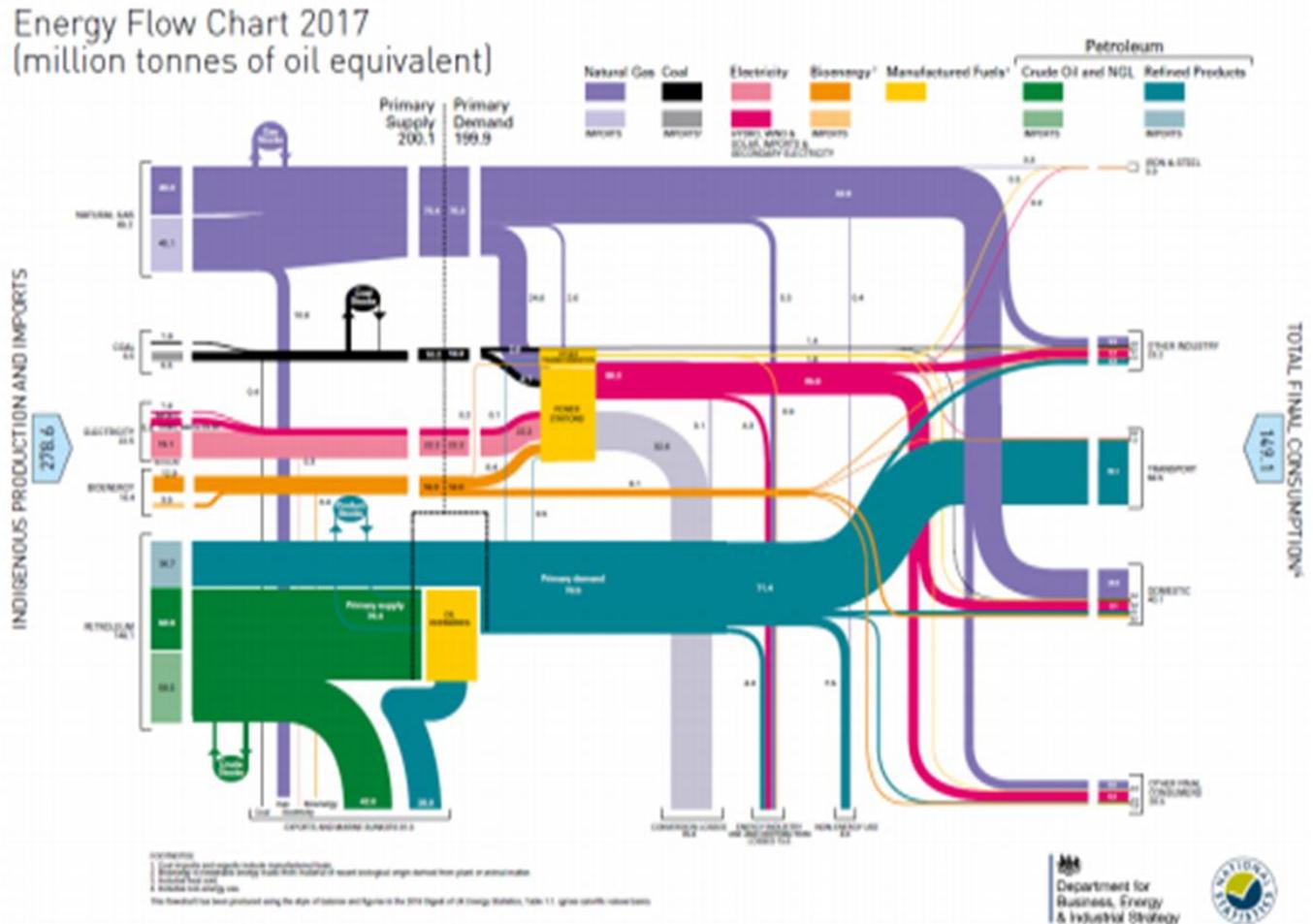
Renewable Energy Assurance Ltd carries out a range of certification and consumer protection activities all of which promote sustainable energy.



Energy Use Today

Much to be improved upon

Renewables and Clean Tech provide an opportunity to increase efficiencies across the sector



Renewable Energy & Clean Technologies

Efficient and cost-effective

Solar & Wind: no input feedstock costs, near zero marginal cost of production

Heat Pumps: efficient space heating method, at fraction of the carbon cost of natural gas

Fuelled renewables (Biomass, Anaerobic Digestion, Energy from Waste): Baseload profile, providing inertia to the grid

Related clean tech: 100 miles on an EV vehicle more efficiently than via petrol/diesel vehicles

Energy storage: provides opportunity to turn variable generation into rapidly-responding stable profiles

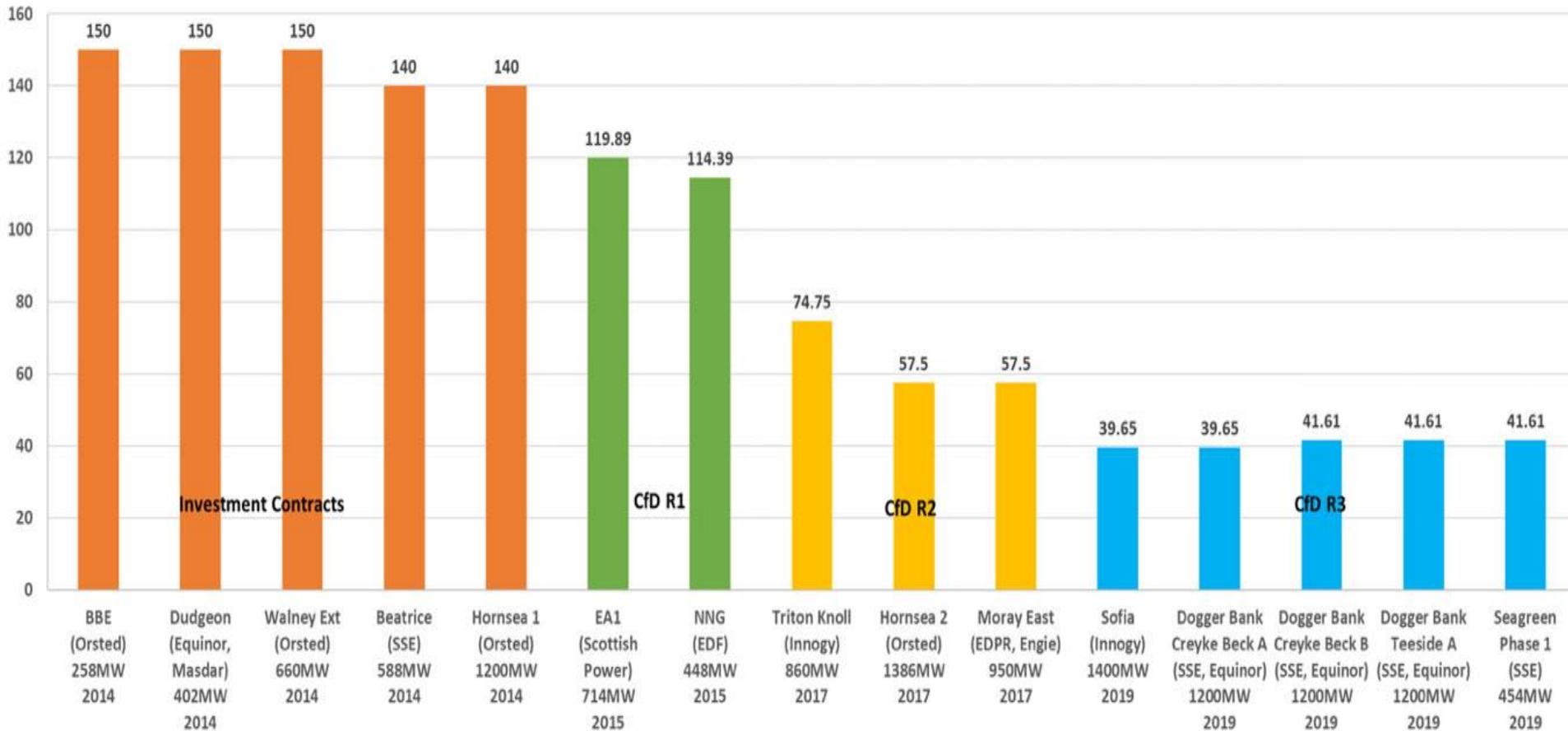
A whole new system of efficiencies and savings is possible with renewables and clean technologies...



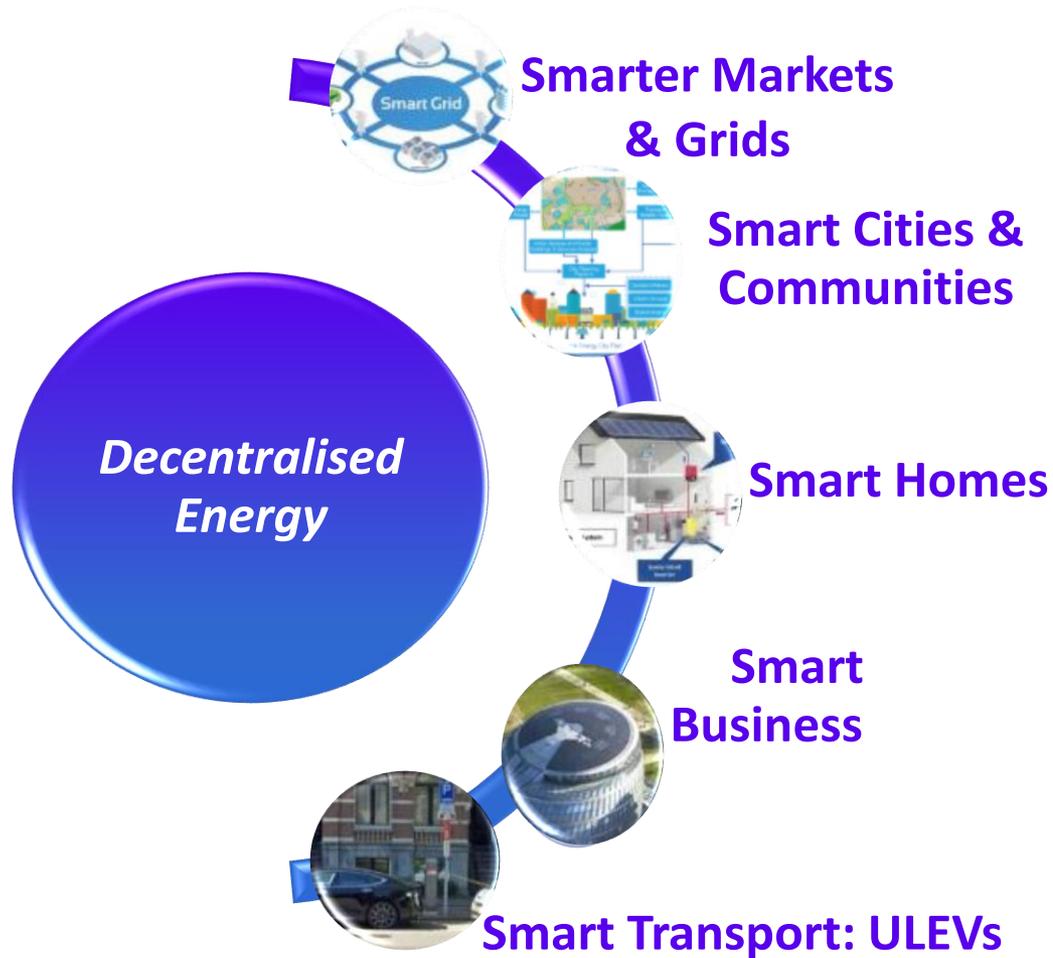
Reductions in UK Renewable Costs – Offshore Wind

UK Offshore Wind Strike Prices - GBP(2012, real)/MWh

Source: OWC



Moving towards a Smart Grid & Energy System



How renewables can provide stable generation

- Baseload, flexible generation profile
- Intelligent solution to energy trilemma
- Enables low carbon energy transition
- While Solar and Wind can work with the grid Storage unlocks the true potential of renewables
- Frequency regulation and voltage control
- Storage can provide an alternative to grid upgrades
- Storage compliments and enables Distributed Energy
- Other renewables such as biomass and Energy from Waste are naturally stable, baseload and can ramp up and down quickly



Renewable Energy & Nuclear: Our common target is to end use of **Fossil Fuels**

The IPCC & CCC are clear- Non-CCUS Fossil Fuel power and heat generation cannot continue beyond the 2030s

Lets get fossil fuels off the system - together

Renewables can provide stable, responsive generation

Based on infinite resources (eg wave and solar)

More effective waste management: Circular Economy

Combinations with smart, flexible technologies creating more efficiencies, new opportunities and business models for the future



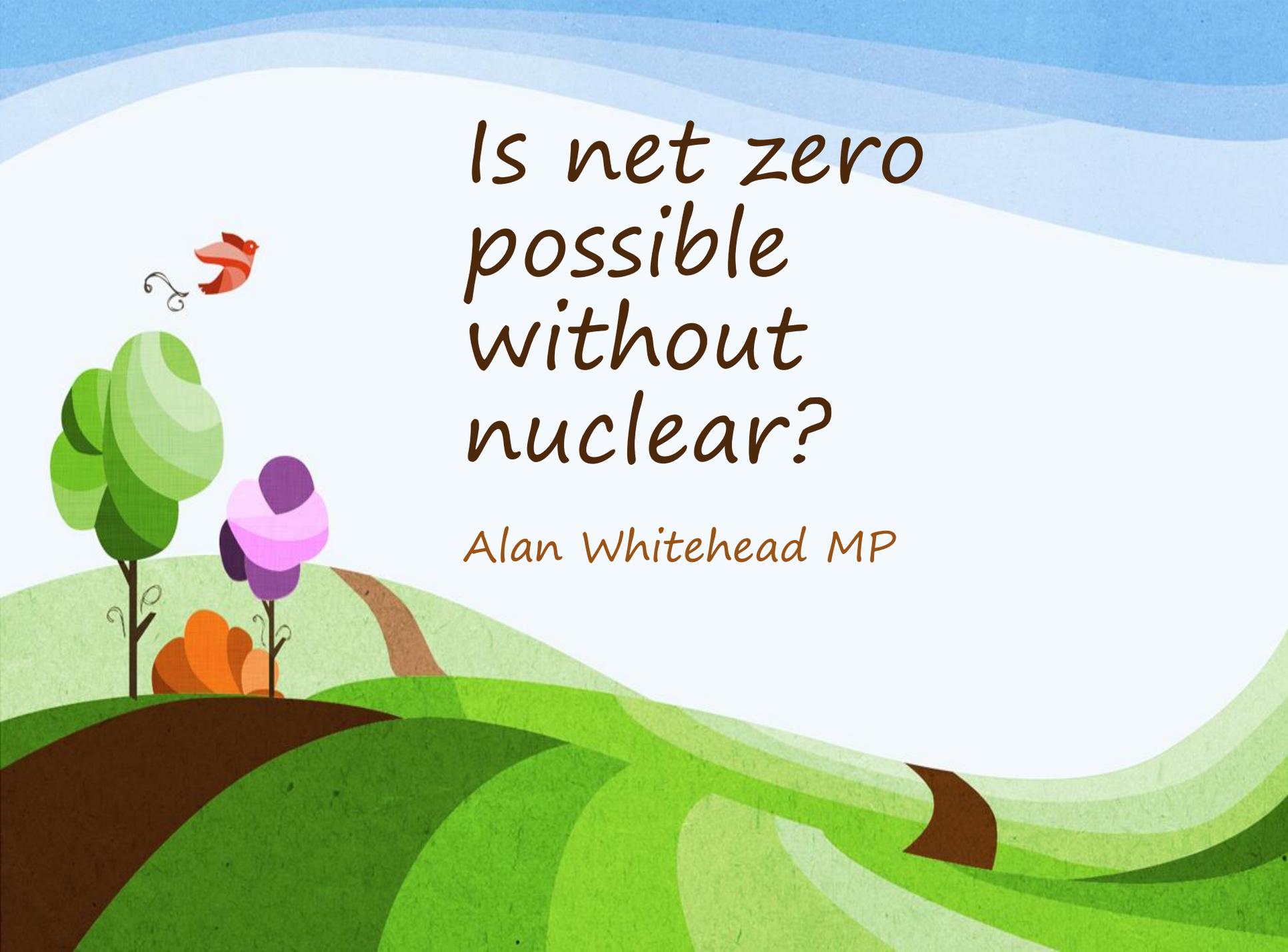
Thank You

Martin Wright

Chair, REA (The Association for Renewable Energy & Clean Technologies)

martin.wright@auroraventures.co.uk





*Is net zero
possible
without
nuclear?*

Alan Whitehead MP

Net Zero and nuclear

- Net Zero requires negative emission technologies and action to achieve the target, in addition to emissions reductions from various sectors. This is a necessary part of a net zero target, regardless of the emissions performance of the power sector.
- The big energy challenge in getting to net zero is heat. Requirement for very much larger generating capacity in UK comes partly from supplying electricity for low carbon vehicles, and partly from possible requirement for electrified heat provision. Low carbon heat could be supplied by other means (eg Hydrogen). Energy efficiency measures (eg home insulation) can also radically reduce heat and power demand.
- As far as power is concerned BEIS is projecting that to cover plants going out of commission or being uneconomic and need for new generating capacity in addition, about 93 gw of new power generation needs to be built.

Net Zero and nuclear

- The total new build projected is 93gw. Of this BEIs projects 12 gw would be new nuclear. But already these projections have been superseded: Offshore wind sector deal now projects 30gw from offshore wind alone by 2030 more than BEIS projected for all renewable new build by 2020. Interconnection looks also likely to surpass projected total of 15gw capacity by 2035.
- New methods of demand management are also maturing rapidly. BEIS projected 8gw of storage by 2035 – this total can now easily be surpassed: and demand management techniques through smart grid operation will substantially reduce need for new build.
- In short, assuming measures on efficiency, renewables development and smart management can be introduced, and necessary carbon negative technology (e.g. CCS afforestation) can be established, there would be no need to place 12 gw of nuclear power onto the system.

Net zero and nuclear.

- This conclusion may be strengthened by the inherent problems that nuclear has in developing this amount of capacity within such a timescale.
- Currently, one nuclear power station (Hinkley 2.3gw) in construction and one more planned to come on stream by end of 2020s (Sizewell C) Possibility of Bradwell..
- Projected power stations at Wylfa, Moorside and Oldbury all shelved or abandoned. EDF is now 'the only show in town'.
- Problems already with pricing nuclear power. Hinkley CFD means almost double current electricity price, whilst renewables come down in price substantially.

Net Zero and nuclear

- Currently floated mechanism for Sizewell C is RAB financing model, electricity would still come in above market price and public would have to stand cost of any delays etc.
- Only way forward for nuclear development looks to be some form of state assistance: i.e. state pays development cost plant run subsequently on tender basis.
- If this is to happen then state has a choice: does it put government money into more expensive nuclear with time and delivery issues or does it support renewables, efficiency etc at a possibly much lower cost and a more certain outcome for net zero?

Net Zero and nuclear

- *Final point: the more the power system (generation, transmission and distribution) takes renewables and smart systems on board, the less it requires the input of large inflexible generation such as that represented by Hinkley C. What it will need will be flexible support generation, and this is likely to continue to be incentivised.*
- *So...is there a role instead for small modular nuclear reactors? (which to date are not coming out as very small, or fully modular, and may well be as expensive in power output as larger plants).....*



Is net zero possible without nuclear?

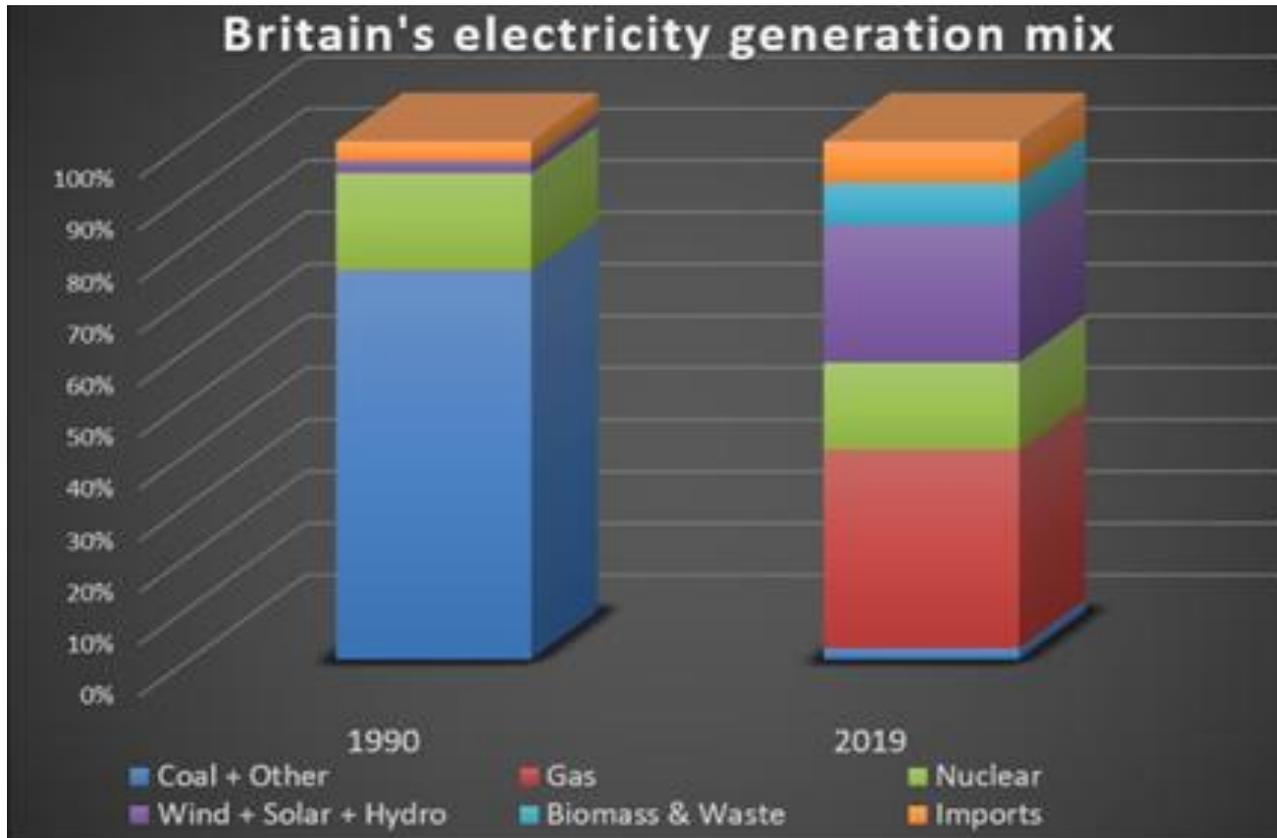
Ian McCarlie, Partner
Pinsent Masons

29 April 2020



Pinsent Masons

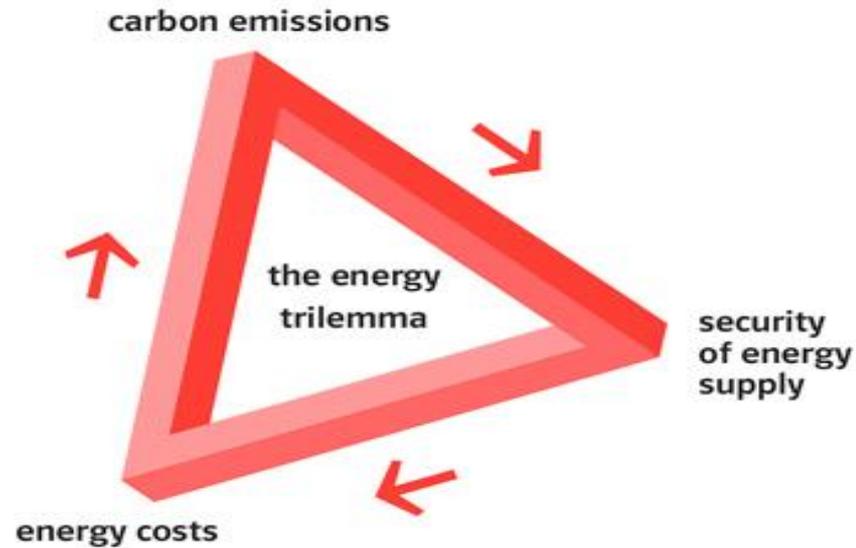
The Energy Mix



• *Source – Thomson Reuters



The Energy Trilemma

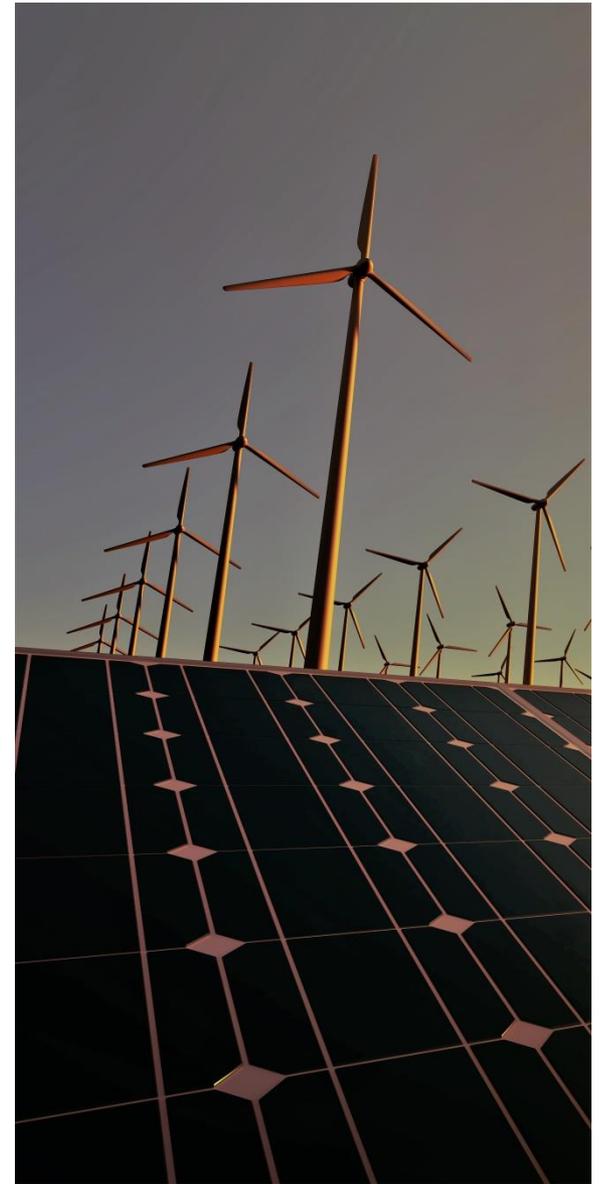


- The growth of renewables
 - A prominent seat at the table
 - Gaps to plug



The Energy Future

- Can Renewables and Nuclear co-exist?
 - Envious glances; or
 - More collaboration; or
 - Synergies?
- Conclusion



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