The international developer's perspective of Vietnam

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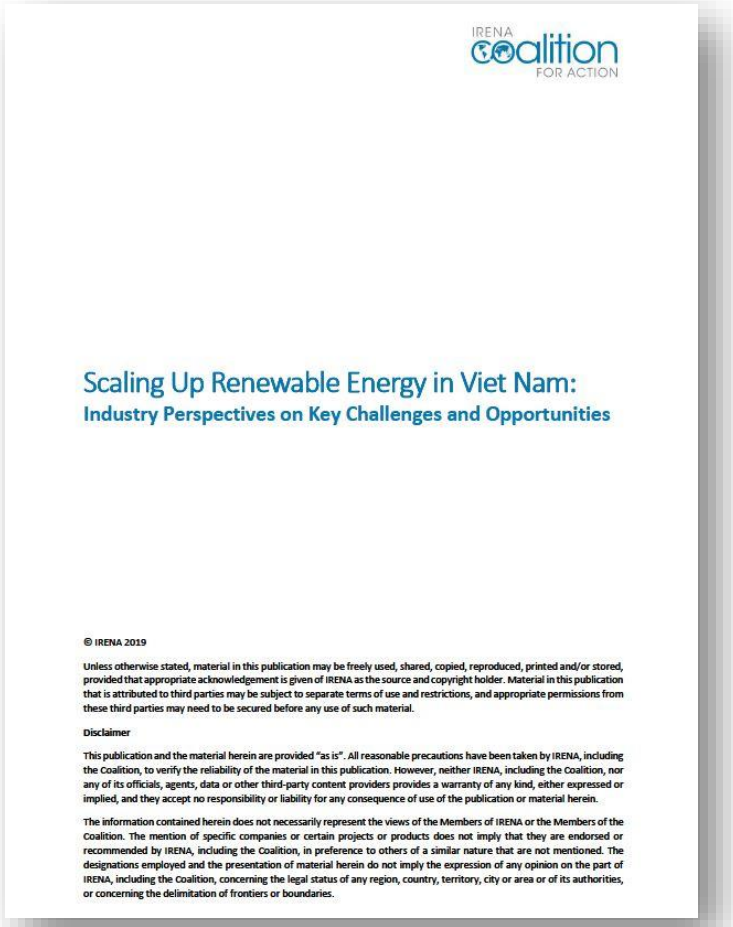
A WORLD ELECTRIFIED BY RENEWABLE ENERGY

- Mainstream Renewable Power Limited ("Mainstream") is **a leading global international developer** of large utility-scale renewable energy projects
- Since 2008, Mainstream has grown significantly to be a leader in the development of renewables:

- **1,650MW** of Offshore Assets sold were also awarded **Contracts for Difference**
- Based in **Dublin, Ireland**, Mainstream was founded by Dr. Eddie O'Connor following the successful sale of Airtricity in 2008 for c. **€1.8bn**. Airtricity was founded in 1997 as an Irish generation capacity developer
- Mainstream brings together **one of the most experienced management teams in the industry led by CEO, Andy Kinsella**
- Mainstream is a renewable energy leader in growth markets such as **Chile, South Africa, Vietnam, Egypt, the Philippines Ghana and Senegal**
- Mainstream has **strong global relationships** with leading banks, export credit agencies, equipment manufacturers, project developers and renewable energy investors

Renewable energy in Vietnam



IRENA Coalition FOR ACTION

Scaling Up Renewable Energy in Viet Nam:
Industry Perspectives on Key Challenges and Opportunities

MAINSTREAM RENEWABLE POWER

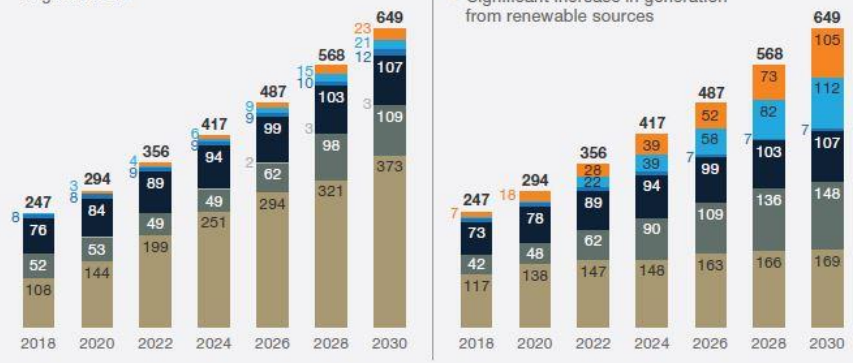
- Growing demand for electricity
- Significant wind and solar resources (in addition to legacy hydro)
- Coal investment stalling
  - Stranded asset risk
- Growing support from government for renewable energy
  - PPA
  - Insufficient local banking liquidity
  - Unclear medium term policy framework

Cleaner, cheaper and more secure

Exhibit 2 Vietnam's Renewables-Led Pathway meets electricity demand differently.

Generation mix, terrawatt-hours[1]

Batteries · Coal · Gas · Hydro dam · Hydro river · Other[2] · Pumped storage · Solar · Wind



[1]Figures may not sum, because of rounding. Forecast assumes additional generation requirements resulting from transmission and distribution losses.
[2]Includes bioenergy and oil.
[3]Renewables-Led Pathway has higher total generation than Current Plan because of greater use of batteries, which introduces a round-trip efficiency loss.
Source: Decision Number 428 on Revised National Power Development Plan, 2016; McKinsey analysis

McKinsey&Company

Exhibit 4 The Renewables-Led Pathway is a more compelling vision for Vietnam's energy future.

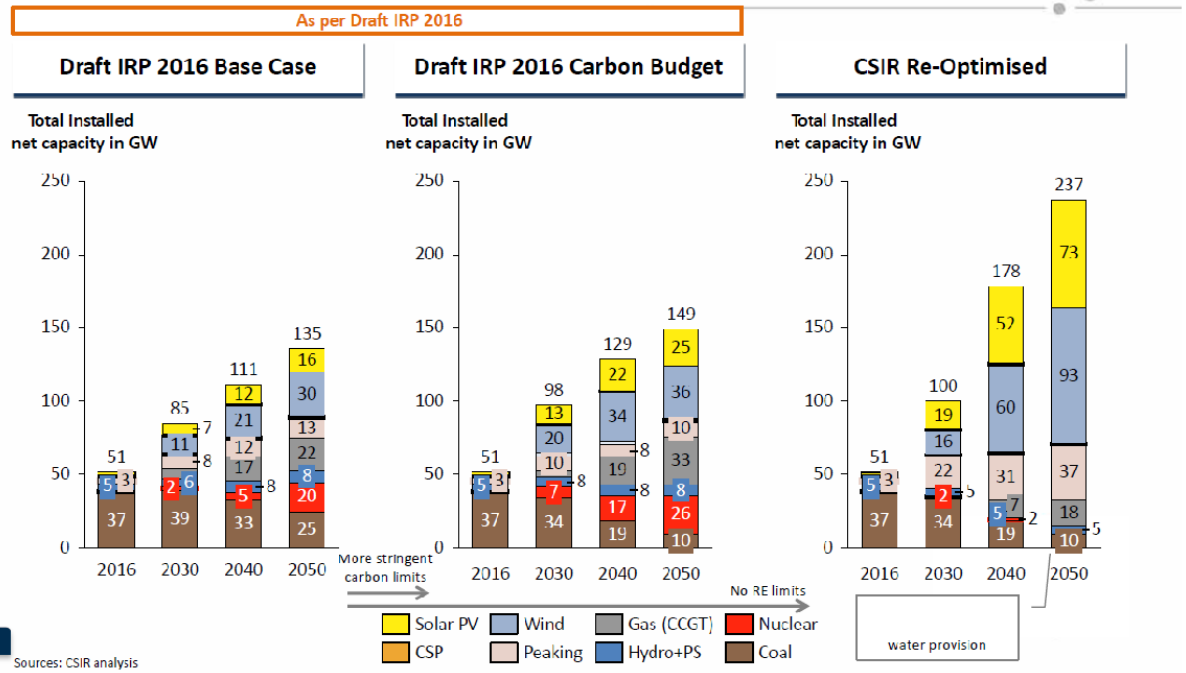
Key results of dispatch modeling[1]

	Current Plan	Renewables-Led Pathway	Highlights
Cleaner Total emissions (2017–30), CO_2 equivalent	3.5 gigatons	2.4 gigatons	• Renewables-Led Pathway reduces key emissions: —1.1 gigatons (32%) reduction in greenhouse-gas emissions —0.58 megatons (33%) reduction in particulate emissions
More secure Total fuel imports (2017–30), MMBtu[2]	18 billion	7 billion	• Renewables-Led Pathway limits imported fuels: —440 million fewer tons of imported coal (~70% reduction) • Creates additional 465,000 jobs
Cheaper Total costs[3] (2017–30)	$230 billion	$207 billion	• Renewables-Led Pathway is 10% cheaper ($23 billion) vs Current Plan: —$5 billion increase in levelized capital expenditures —$24 billion reduction in fuel costs —$2 billion increase in operations and maintenance —$6 billion reduction in interest payments

[1]Model run over 2017–40 assumes no increase in power demand beyond 2030 in order to compare with Current Plan, while optimizing capacity for this period.
[2]One million British thermal units.
[3]Adjusted for terminal value of assets by end of 2030 or end of 2040 depending on run, assuming sinking fund depreciation; in 2015 dollars (includes capital costs, fixed and variable operations and maintenance, fuel costs, implied fuel subsidies, and interest payments).

Similar stories elsewhere

In the CSIR Re-Optimised case, 100 GW of wind & 60 GW of PV by 2050



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Sources: CSIR analysis

CSIR Re-Optimised case without renewables limits is R90 billion/yr cheaper than both IRP 2016 Base Case & IRP 2016 Carbon Budget case

Preliminary Year 2050

Draft IRP 2016 Base Case	Draft IRP 2016 Carbon Budget	CSIR Re-Optimised
27%	33%	80%
R580 billion/yr	R580 billion/yr	R490 billion/yr
200 Mt/yr	100 Mt/yr	70 Mt/yr
40 bn l/yr	16 bn l/yr	11 bn l/yr

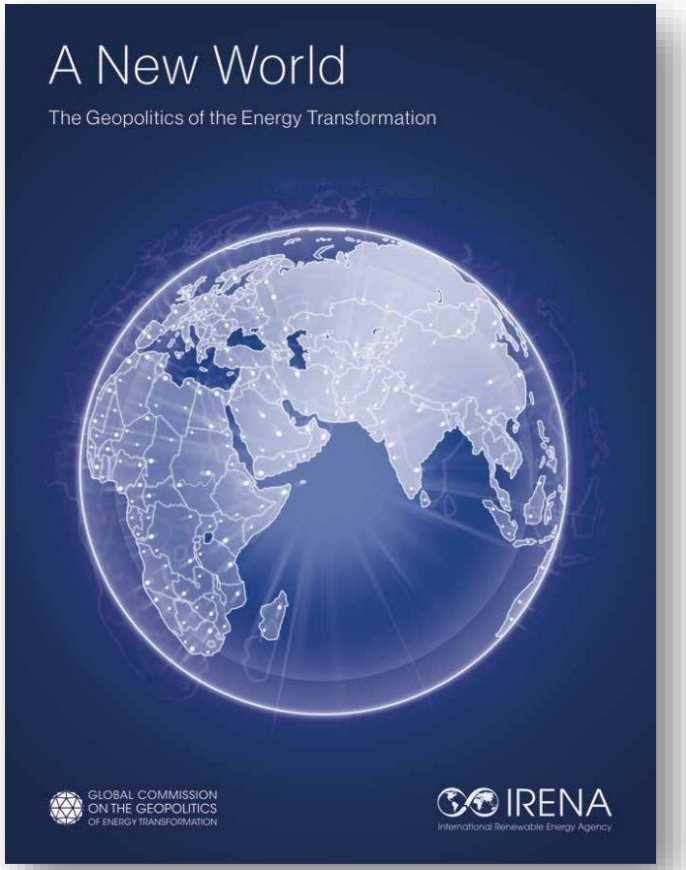
49

Sources: CSIR analysis

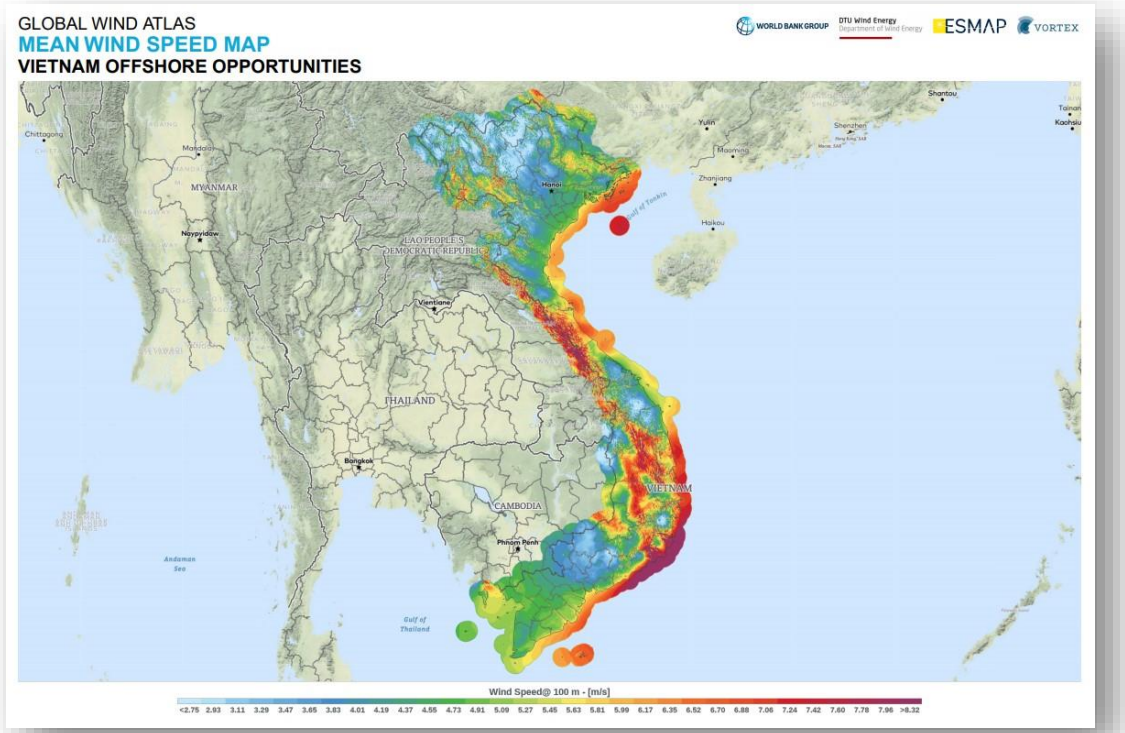
Vietnam can be the leader across ASEAN

> Energy geopolitics is changing
  - New Renewable Energy States are emerging
  - Energy independence and energy security

> Vietnam enjoys regional resource leadership
  - Supply chain development – manufacturing for domestic and global markets
  - Construction and operational expertise
  - A global energy – and climate - leader



Vietnam's offshore resource



> The offshore wind opportunity

> Good: -

- Best in region
- 64GW potential
- Benign seabed

> Not so good: -

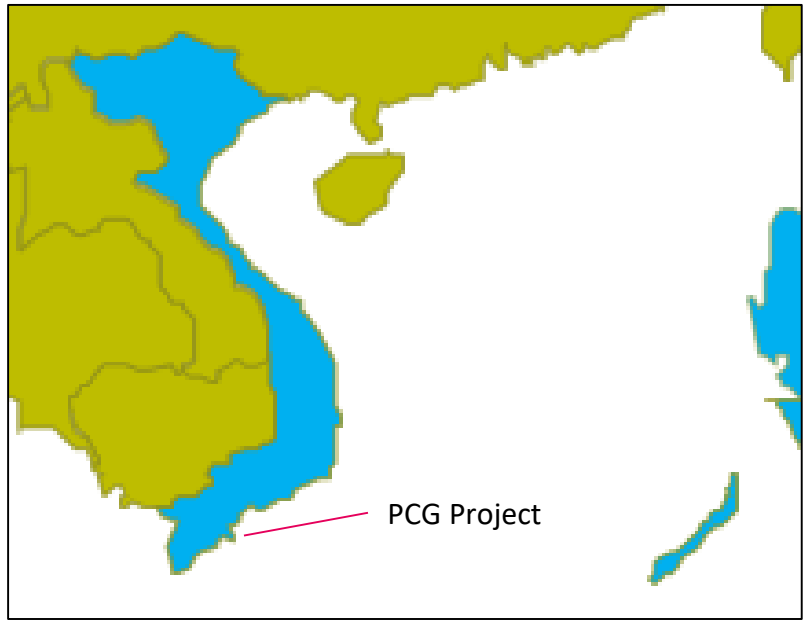
- Infrastructure
- Grid
- Supply chain

Vietnam – Phu Cuong offshore windfarm

800MW PCG Project

- Mainstream has entered a JV Agreement with the Phu Cuong Group ("PCG") to develop a **800MW offshore project in Vietnam**.
- The project consists of two land concessions but is structured to be developed in two phases as set out in the table below:

	MWs	Expected FC Date	Expected COD Date
Phase 1	400	2020	Q4 2021
Phase 2	400	2021+	Q2 2023+



- Negotiations on a 20 year PPA with EVN, the national utility are ongoing with the Vietnamese Ministry of Industry and Trade ("MOIT") to secure a bespoke and bankable PPA for the project
- Application submitted for the project to be included in the national Power Development Plan ("PDP"): currently with MOIT

Conclusion

- Vietnam – considerable wind and solar resources
- Vietnam - opportunity to become regional hub for supply chain and construction and O&M services
- Vietnam – opportunity for regional leadership in corporate offtake
- Vietnam – next step – clarity on medium-term energy policy and offtake framework
- GWEC – next step – ASEAN taskforce and local market support in Vietnam

Thank you

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