

**Business & Climate Change Conference
Australia & New Zealand**

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Vice President, Power & Environmental Policies,
Asia & Oceania
August 2011



Three main activities



**Rail Transport
Infrastructure**



**Power
Transmission**



**Power
Generation**

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Global energy context ALSTOM

Asia is part of the solution to key global energy issues

- **Climate Change**
 - High energy consumption
 - High carbon content of energy use
 - Large total CO₂ emissions
 - Large population, low per capita CO₂
 - Consumption to double by 2030
- **Energy Security:** Rapid increase in oil and gas imports
- **Rapid economic growth, urbanization, and improving quality of life** while shifting to less energy- and carbon-intensive economy, cities, and lifestyle

Country	Income Level	Population (billions)	CO ₂ Emissions (t/ha)
Australia	High-income	0.20	25
Canada	High-income	0.30	20
United States	High-income	0.30	18
Switzerland	High-income	0.75	15
Russian Federation	High-income	1.40	12
Germany	High-income	0.80	10
Japan	High-income	1.25	10
United Kingdom	High-income	0.60	10
Italy	High-income	0.60	10
Ukraine	Middle-income	0.45	10
Indonesia	Middle-income	1.90	10
South Africa	Middle-income	0.45	10
France	High-income	0.65	10
Iran, Islamic Rep. of	Middle-income	0.70	10
Mexico	Middle-income	1.10	10
Turkey	Middle-income	0.70	10
Thailand	Middle-income	0.65	10
China	Middle-income	1.30	10
Pero	Middle-income	0.30	10
Myanmar	Middle-income	0.55	10
Iraq, Columbia	Middle-income	0.30	10
Egypt, Arab Rep. of	Middle-income	0.70	10
Algeria	Middle-income	0.30	10
Nigeria	Middle-income	0.15	10
Philippines	Middle-income	0.90	10
Uganda	Middle-income	0.25	10
Bhane	Middle-income	0.15	10
Vietnam	Middle-income	0.75	10
Pakistan	Middle-income	1.40	10
Ethiopia	Low-income	0.10	10
Senegal	Low-income	0.10	10
Bangladesh	Low-income	0.15	10
Sudan	Low-income	0.10	10
Chad, Kenya, Niger, Rwanda	Low-income	0.10	10
India	Middle-income	1.10	10

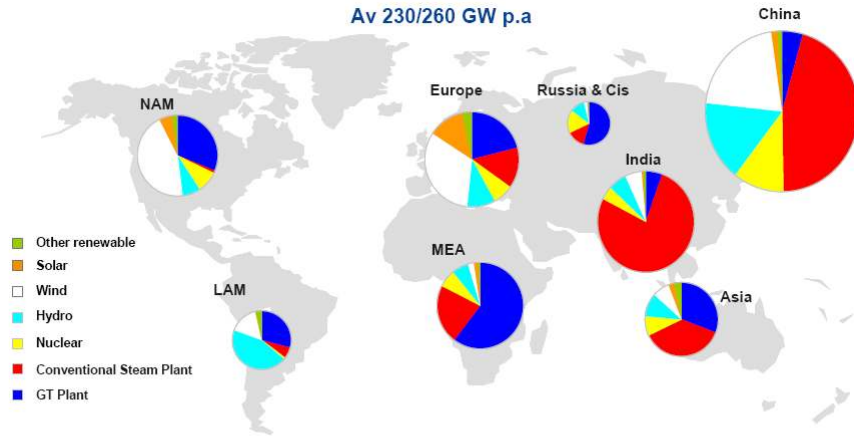
World Bank Group

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New power plant market forecast over next 5 years



Av 230/260 GW p.a

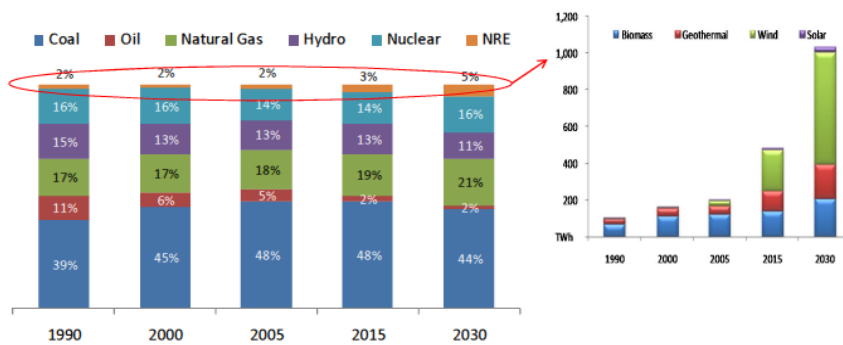


Source: ALSTOM MACA 2010

- ✓ Biggest demand in emerging countries
- ✓ Growing share of CO2-free all across the globe.

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Renewable energy in APEC economies: Electricity Generation



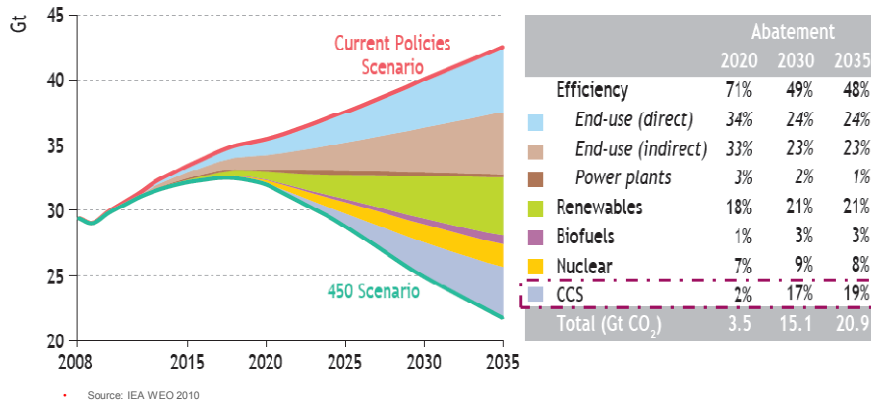
- The share of NRE in electricity generation fuel mix is projected to increase from 2% in 2005 to reach 5% by 2030.
- Wind and geothermal are the main contributors for the increase of NRE's share in the fuel mix.

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CCS is needed



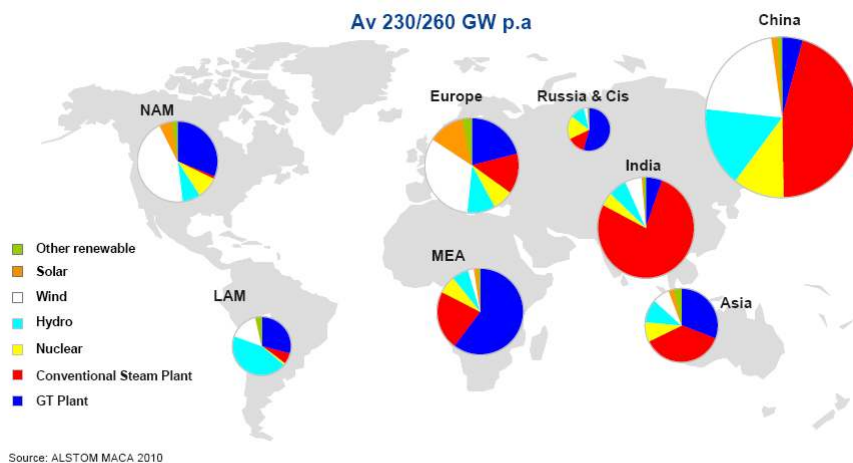
World energy-related CO₂ emission savings by policy measure in the IEA WEO 2010 450 Scenario



CCS provides for 20% of global emissions reductions

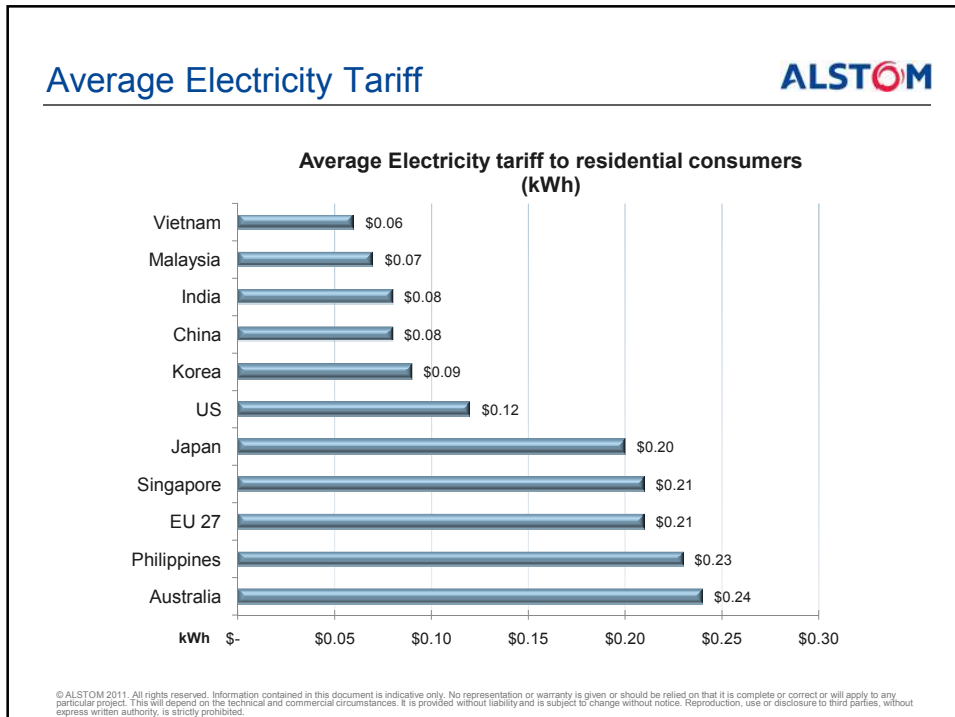
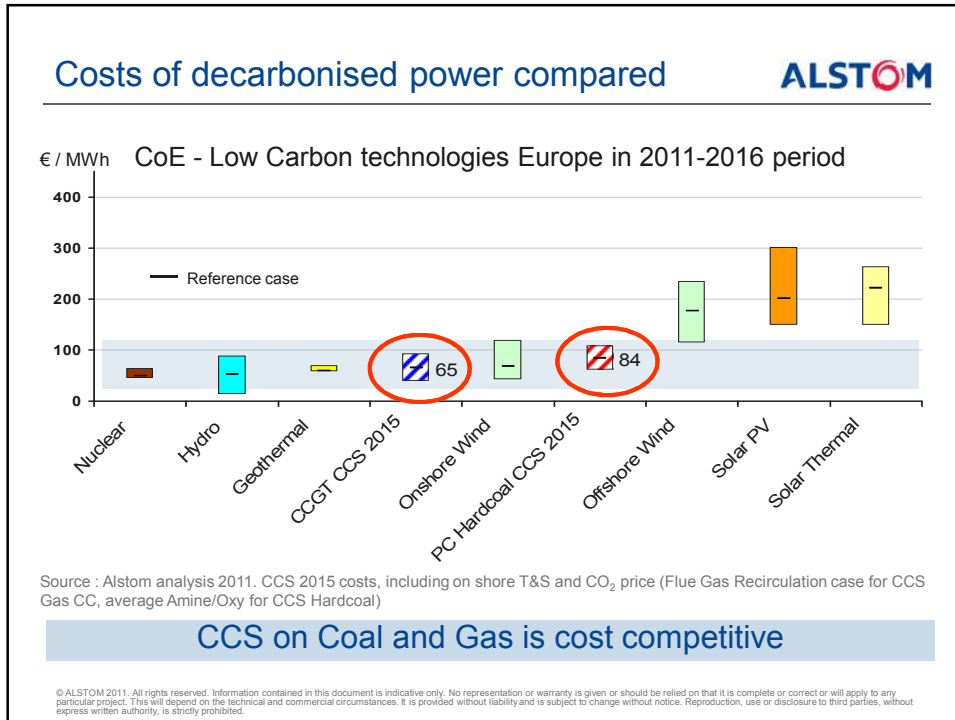
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New power plant market forecast over next 5 years



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China: Facts and Figures

	CHINA	AUSTRALIA
Population	1.34B	22.5M
Total GhG contribution	19.13%	1.47%
GhG emissions per capita	4.9t CO ₂ /capita	19t CO ₂ /capita
Emissions intensity/\$GDP	2.50kg CO ₂ /\$US '00 (PPP - 0.60kg)	0.77kg CO ₂ /\$US'00 (PPP - 0.59 kg)
Fossil fuel in electricity mix	81%	94%
Electricity demand growth	Annual increase 6 - 8%	12.10% ('10 - '19)

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China

Environmental targets & Renewable incentives

Market	Political Targets	Clean Energy Mechanism	Issue/Comment
Wind	90GW by 2015 (<i>offshore 5GW</i>), 150GW by 2020(<i>offshore 30GW</i>)	The on-grid price of offshore wind: RMB 0.978/kWh; Onshore wind: RMB 0.51/kWh to 0.61kWh with regional differences. Mongolia has a Feed in Tariff for wind, guaranteed for 10 years.	<ul style="list-style-type: none"> The regulated on-grid price can prevent wind farms from over competition. Grid connection has been widely reported as one of the key bottlenecks facing Chinese wind farms (<i>only 75% connected in 2010</i>). The quota system may force grid companies to upgrade their network and grant better renewable grid access.
Solar PV	5GW by 2015, 20GW by 2020 No split between PV and CSP	No central register, no central incentive scheme, but one-off compensation agreements between SOE module makers and utilities. Government provided huge loans to their top PV manufacturers.	<ul style="list-style-type: none"> Compared with CSP, PV is in a better situation due to its earlier development, mature technologies and lower tariffs. PV should represent ~80% of solar market
Solar CSP	No targets. Pilot 2 GW project currently developed in a US-Sino cooperation. 3GW projects under planning, in preliminary stage.	China has not yet implemented FIT for CSP. 1st public bidding (50MW trough) launched October 2010 with a lower-than-expected winning bidding price of RMB 0.9399/kWh. Mongolia: Feed in Tariff for Solar-10 years guarantee-US\$0.15-0.3/kWh.	<ul style="list-style-type: none"> China is smoggy and water is scarce. Sunniest places far from consumers and in dry regions. Hard to make profit on low price of the 1st public bidding. Before Chinese players master the CSP technology, the government is less likely to promote CSP aggressively.
Biomass	NDRC increasing focus on Biomass. 30GW by 2020.	FIT. NDRC will set a national tariff at CNY0.75/kWh or € 0.08.	
CO ₂	Carbon-intensity reduction target of 40-45 % by 2020 from 2005 levels. Carbon intensity to be reduced by 16-17% from 2011 to 2015.	Emission trading system and carbon tax approaches likely to be operating by 2015	<ul style="list-style-type: none"> The target is ambitious. In 2020, China's GDP could double - so emissions in 2020 have to be roughly at today's levels.

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China's energy transformation

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- 12th Five-Year Plan 2010-2015 has very clear targets on energy. Aim is transformation
- Reduce carbon intensity by 17%
- Reduce energy intensity by 16%
- Increase non-fossil fuels use to 11.4%
- Increase nuclear from 10GW to 40GW
- Increase wind from 42GW to 70 GW
- Increase solar to 5GW (may increase to 10GW)
- Remember: PRC GDP is still less than US\$5000 pp



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China's energy transformation

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- Coal still major energy source for PRC
- China is now world largest producer of wind turbines and also has world's largest installed wind capacity
- China also plan to increase its high-speed rail from 5000km to 35,000 km
- Pew Charitable Trust estimates that China has invested \$54.5 billion or 27.5% of G-20 investment in clean energy



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India

Environmental targets & Renewable incentives



India

Market	Political Targets	Clean Energy Mechanism	Issue/Comment
Wind	Wind target: 38.5 GW by 2022. Potential for wind power capacity in India is ~50 GW according to Centre for Wind Energy Technology.	Feed-in tariffs (FIT), Renewable Energy Certificates (RECs), plus Generation Based Incentive (GBI) of INR 0.5/kWh (over and above FIT) for IFPs (in lieu of accelerated depreciation); So far, 21 of 29 states have set RPOs; 10 of 29 states have preferential tariffs for wind. Average FIT projects are getting: Rs 3.5/kWh	<ul style="list-style-type: none"> Major hurdles in wind power development include delay in land allocation and getting forest clearances for new projects. Grid constraints. Offshore: Govt has launched a study to assess potential
Solar PV	'National Solar Mission': 20 GW of installed capacity by 2022 (50% PV and 50% CSP). Under Solar Mission \approx300MW of utility-scale (>5MW) projects to be approved in 2011 with increasing localization requirement.	FIT: The tariffs for fiscal year 2010-11 have been set as INR17.9 (0.28) / kWh for solar PV. Given that a large number of entities applied, the government expects these tariffs to be adjusted. Generally, a fragmented incentive scheme. For off-grid decentralized solar applications the government provides incentives like subsidies, low interest loans and generation based incentives.	<ul style="list-style-type: none"> The market is still in its infancy, so it is hard to ramp to the 2GW a year it would need to meet that target from the very low level of installation it is at now. Problems with T&D and domestic content requirements.
Solar CSP	'National Solar Mission': 20 GW of installed capacity by 2022 (50% PV and 50% CSP). Projects shall be commissioned within 28 months of the date of signing PPA.	FIT: The tariffs for fiscal year 2010-11 have been set as INR15.3 (0.24) / kWh for solar CSP. Given that a large number of entities applied, the average bid for the Phase 1 (470MW) is INR11.48/kWh.	<ul style="list-style-type: none"> Gujarat and Rajasthan key areas for large-scale projects. Haze and water scarcity, high cost of capital and limited industrial experience in CSP are the key challenges.
CO ₂	Carbon intensity improvement: 24 % cut by 2020 compared with 2005 levels. 37% improvement by 2030.	Renewable Energy Certificate (REC): Similar to carbon credit mechanisms - enabling states with shortfall in renewables to meet government renewables purchase obligations (RPO) by buying RECs from other states.	<ul style="list-style-type: none"> Like China, India focuses on carbon intensity

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East Asia

Environmental targets & Renewable incentives

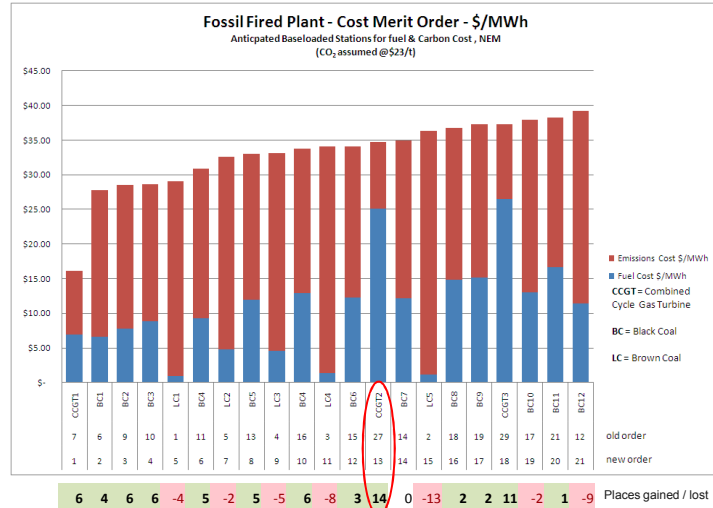


East Asia

Market	Political Targets	Clean Energy Mechanism	Issue/Comment
Wind	Renewable targets/RPS in some markets	<ul style="list-style-type: none"> Vary across regions (FIT, tax incentives, ETS) Financial support from multilateral institutions 	<ul style="list-style-type: none"> Grid constraints; land constraints for onshore development Offshore: South Korea, Taiwan plans in place to stimulate market development
Solar PV	Japan set a target of 28 GW PV installed base by 2020 .	S. Korea: FIT for solar PV up to \$0.36/kWh. Japan: FIT : ¥50/kWh (\$0.57 / kWh).	<ul style="list-style-type: none"> Japan and South Korea most advanced markets
Solar CSP	No official CSP targets	limited	Less relevant for CSP due to poor direct solar radiation
Geothermal	Indonesia: 5% geothermal (2025).	FIT & Tax incentives	
Biomass	Indonesia: Biomass target, but not specified.	Indonesia and Thailand: FIT & Tax incentives	<ul style="list-style-type: none"> Small biomass potential in Indonesia and Thailand.
CO ₂	Singapore: 16% down from projected 2020 BAU levels. Indonesia: GHG emissions down: 26% from BAU. Korea: 30% from BAU by 2020. (4% below 2005). Japan: Down 25% below 1990 levels if international framework is established.	Japan is considering an ETS from 2014. South Korea has legislated emissions trading from 2015.	<ul style="list-style-type: none"> Trading schemes likely in Korea and Japan in the future

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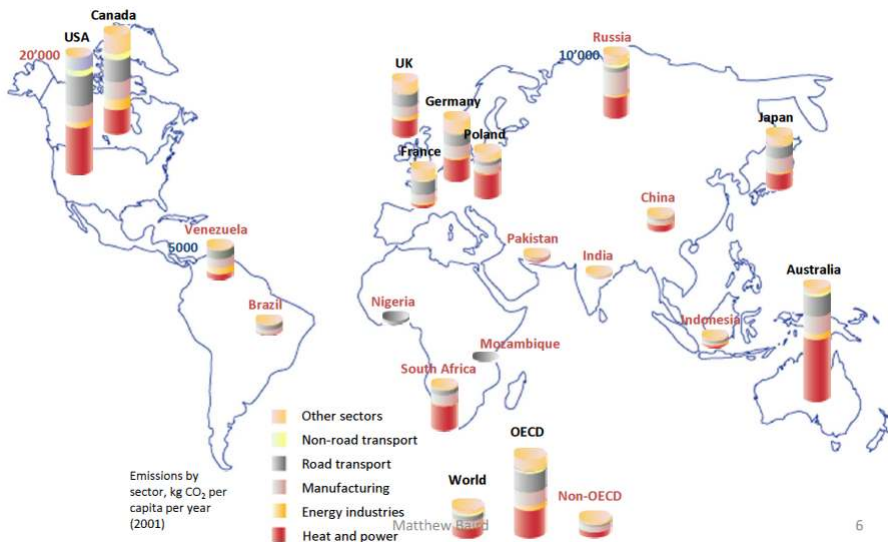
Australia: Anticipated cost merit order with CO2 price



In a carbon constrained world, efficiency is king

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Energy use, development and CO₂



60% of Carbon emitted in 2030 will come from today's installed base

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What conclusions can we draw?

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- The idea that Australia is moving ahead of others **is a myth**
- The view that Asian countries don't care about swamping the world with emissions **is incorrect**
- Developing Asia **will drive the climate change issue** even more than the US or Europe
- Industrial and competitive advantage is a **big driver**

Other nations need to recognise this reality and redefine domestic policies accordingly

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