

Demand & Supply

of Renewable Energy in Asia

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Thank you IEE Japan

Pleasure to be in Kyoto again

Wish to thank IEE, Japan, especially
Kenichi Matsui for the invitation to speak

Demand, Supply & Fukushima

What are the fundamentals in Asia?

- ◆ Demand
 - Robust growth projected especially in developing economies
 - Key variables: Economic & population growth
 - Key point: Demand **can** be influenced by govt. policy
- ◆ Supply
 - Determined by availability, logistics & relative prices
 - Key point: Supply mix **can** be influenced by govt. policy
- ◆ Fukushima
 - Business as usual for some, back to drawing board for others
- ◆ Let's examine the basics

Demand

What are the fundamentals in Asia?

◆ Key variables

- Economic growth derives energy demand
 - Relationship is not 1-to-1 or pre-ordained
 - Gradual shift toward electricity
- Population & growth in income significant drivers
 - Number of households, buildings, cars, appliances, etc. matters
 - Per capita consumption & living standards

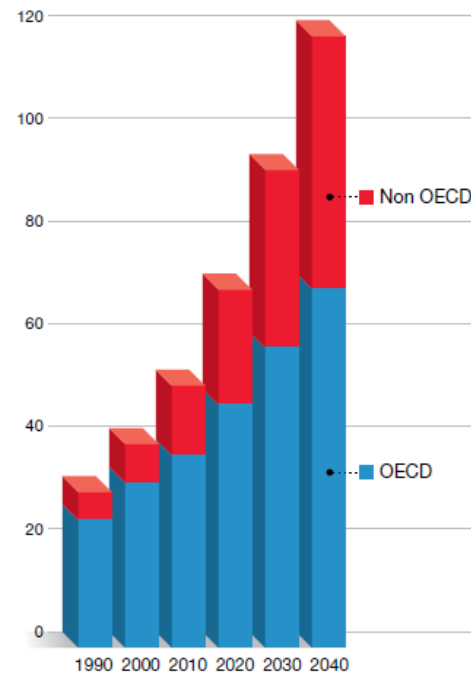
◆ Policy matters

- Govt. can shape/influence demand growth
 - #1: Energy efficiency reduces demand
 - #2: People want “cold beer & hot shower,” not energy per se

BAU: Robust Growth outside OECD

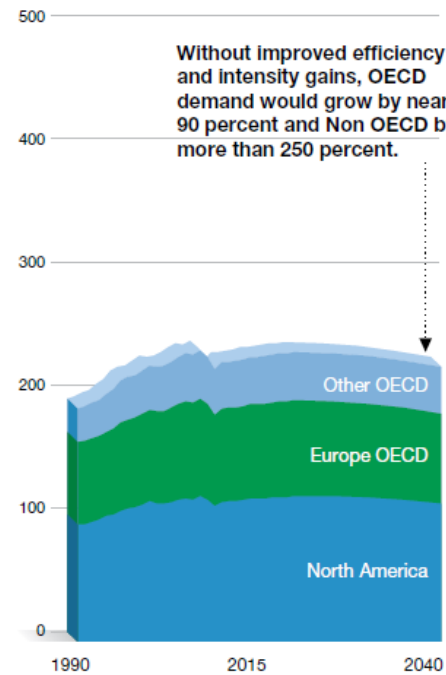
Global GDP by region

Trillions of 2005 dollars



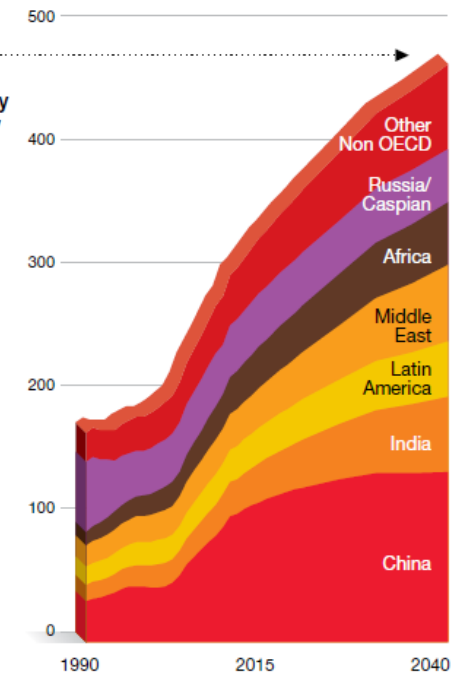
OECD energy demand

Quadrillion BTUs



Non OECD energy demand

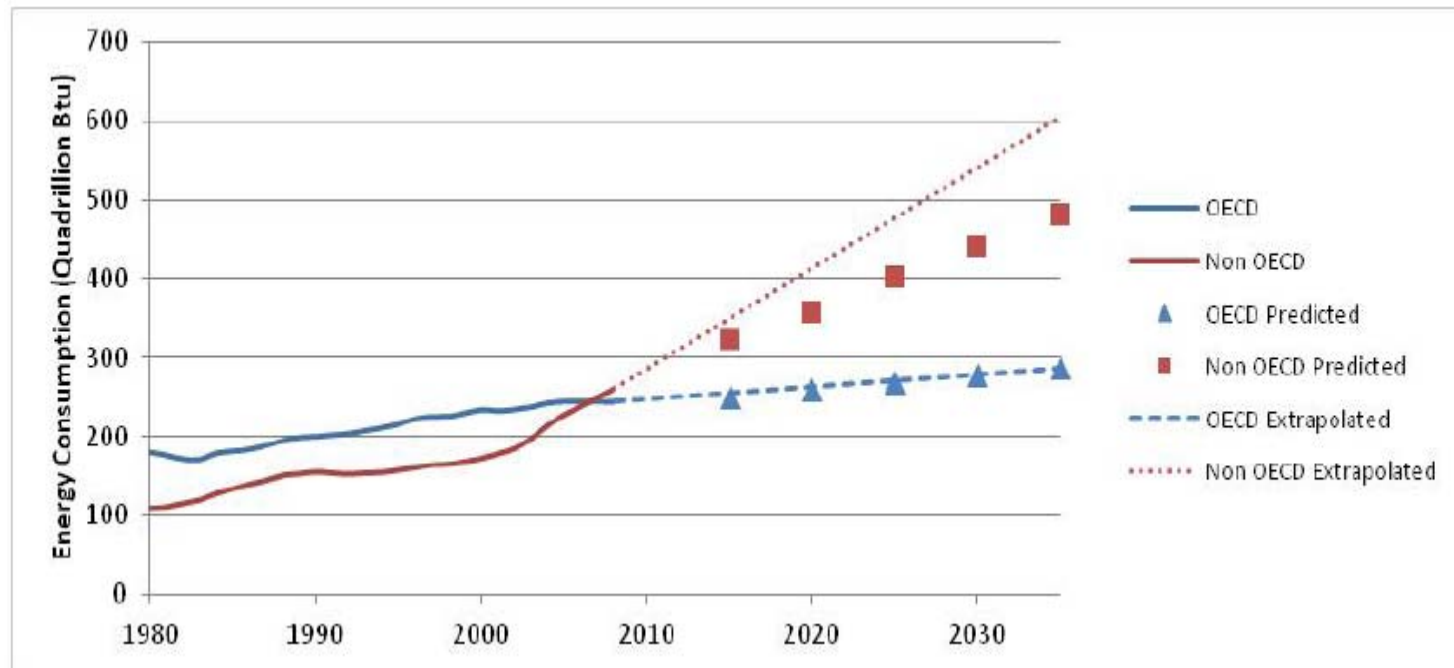
Quadrillion BTUs



Source: 2012 The Outlook for Energy: A View to 2040, ExxonMobil, Dec 2011

Different growth paths

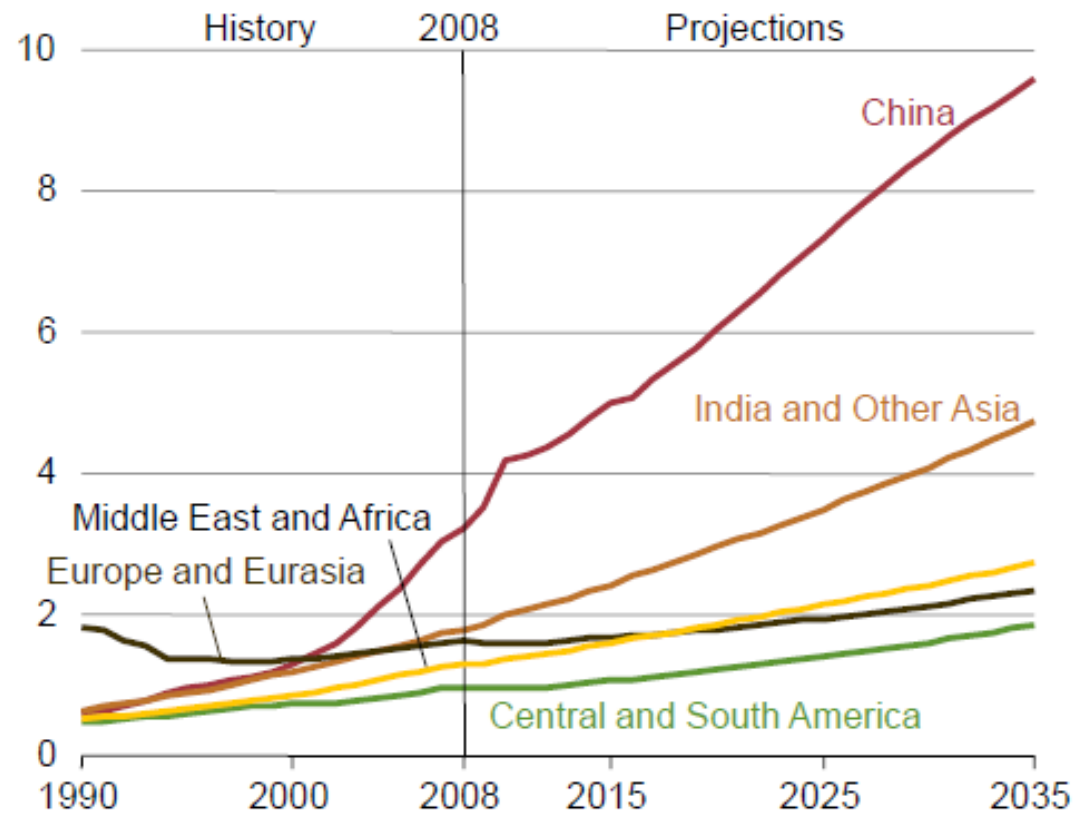
Non-OECD growth can be modified



Source:

High growth regions

Electricity demand growth projections, in trillion kWhrs

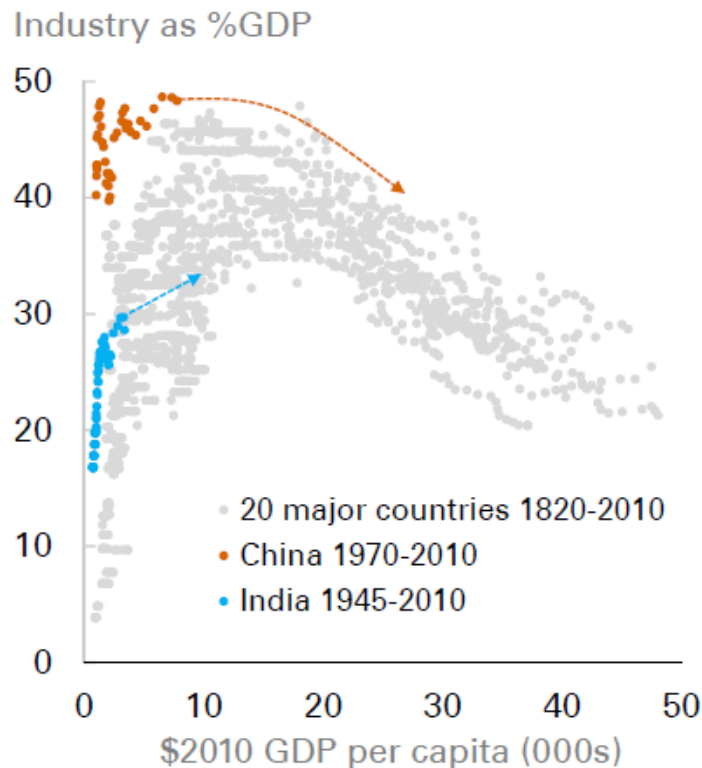


Source; EIA, International Energy Outlook 2011, Sept 2011

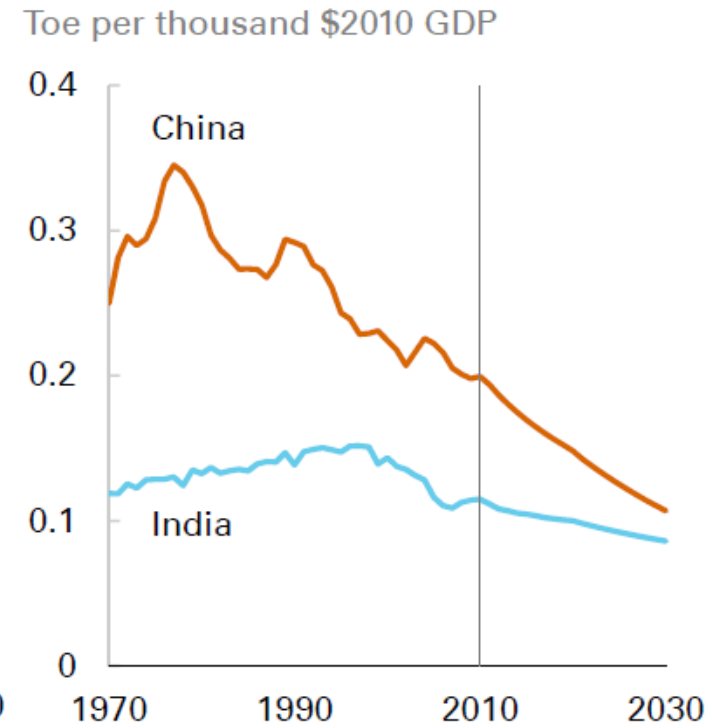
How can we influence the trends?

Countries follow certain patterns as their economies mature

Historical industrialisation



Energy intensity



Source: BP Energy Outlook 2030



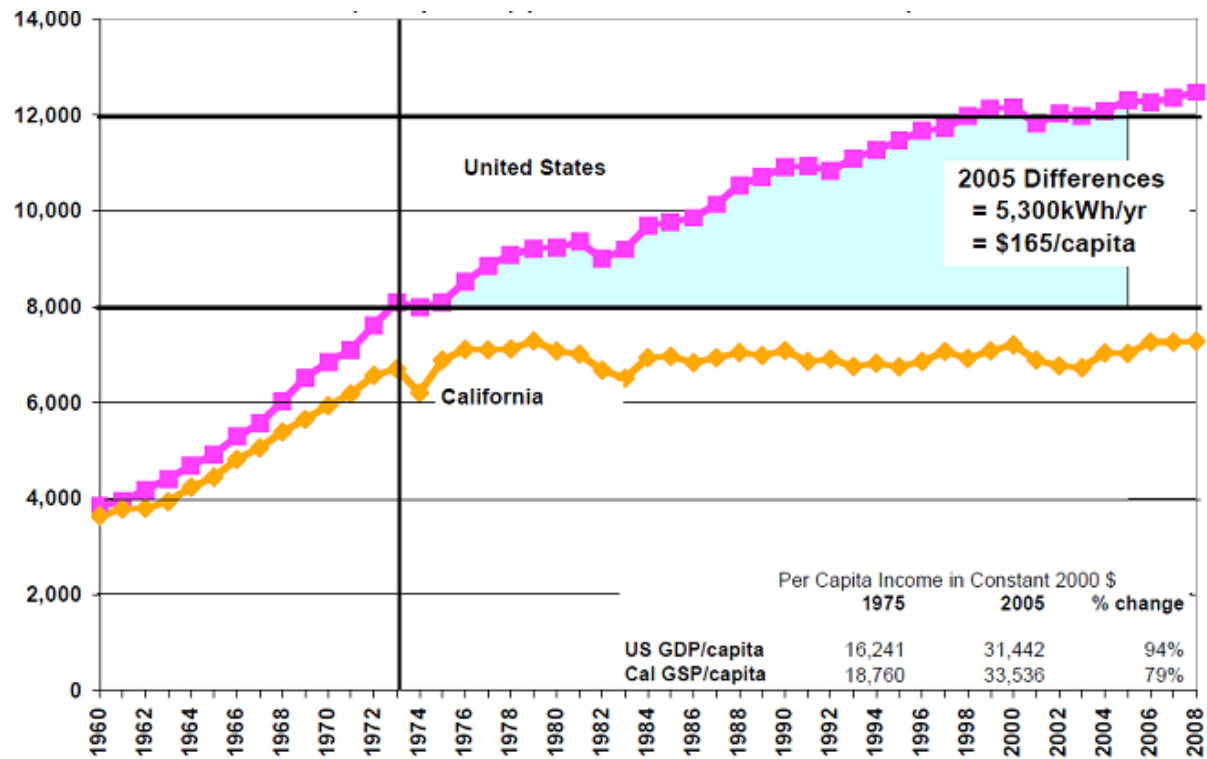
Influencing demand

Future demand growth is not pre-ordained

- ◆ Govt. policy & prices can influence demand
 - Energy efficiency matters
 - California has maintained flat per capita electricity consumption
 - Standards can make a difference
 - The poor can ill-afford cheap appliances, lights, buildings
 - Prices matter
 - Energy price subsidies are counter-productive

California keeps it flat

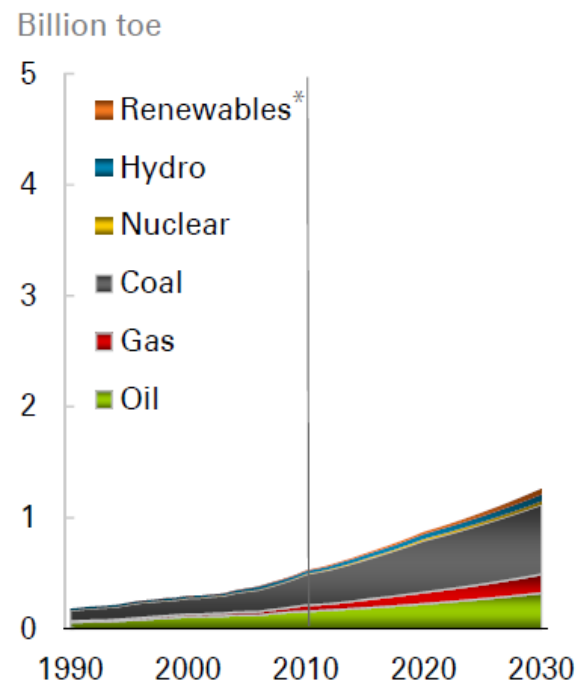
Per capita electricity consumption



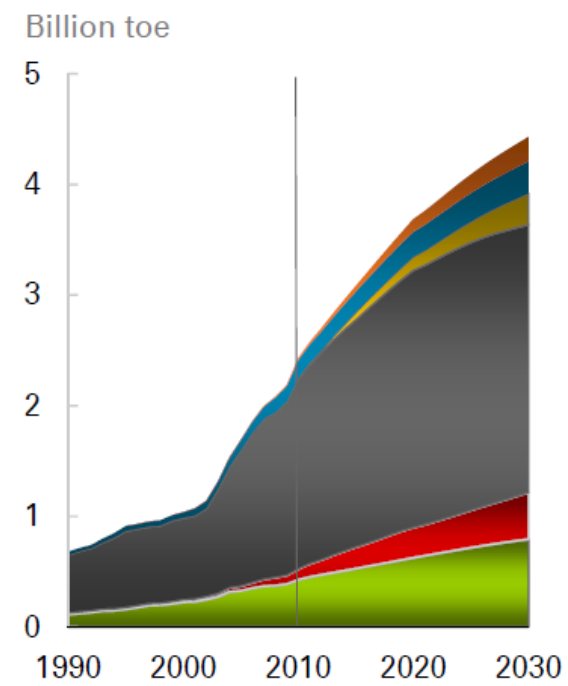
Source: A. Faruqi, Brattle Group, Aug 2010

Chindia

India



China



*Includes biofuels

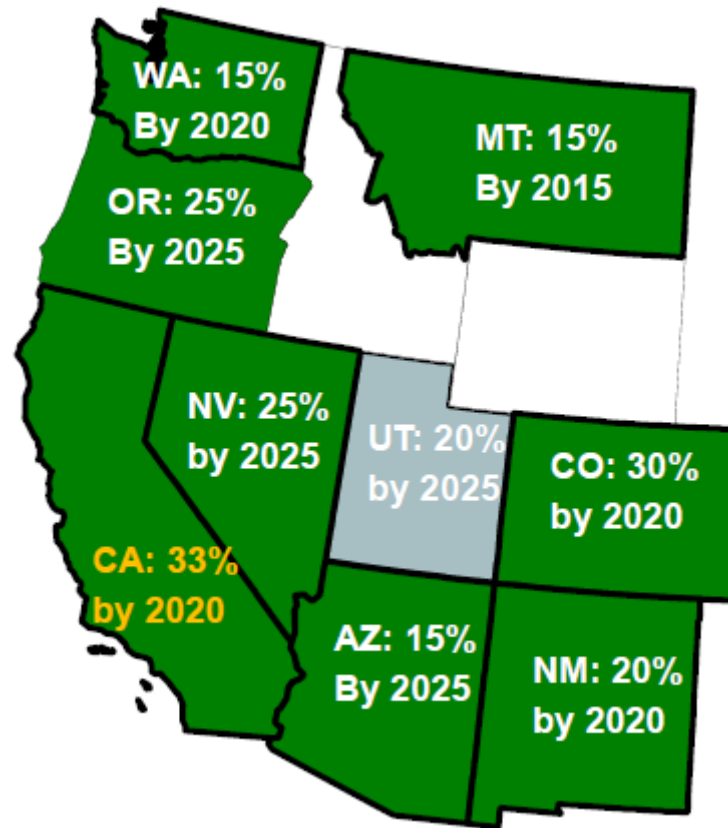
Source: BP Energy Outlook 2030

Influencing Supply

Policy matters

- ◆ Govt. policy can influence energy supplies
 - Examples abound
 - Promoting/subsidizing renewables
 - ◆ Renewable portfolio standards (RPS) popular in US
 - ◆ Feed-in-tariffs (FITs) popular in EU
 - ◆ Production tax credits (PTC) popular in US
 - Employment/export policies
 - ◆ PV and wind manufacturing subsidies/loan guarantees
 - Carbon policies/pricing
 - ◆ Climate laws such as in California
 - ◆ Carbon taxes such as in EU, Australia
 - Energy security

US RPS mandates in West



Source: Black & Veatch



China matters

Few examples why

- ◆ Global renewable index: On top
- ◆ Installed wind capacity: on top
- ◆ PV manufacturing: On top
- ◆ Hydro: On top
- ◆ Exports: On top

Global Renewable Index

China on top, India is #4

Rank ¹	Country	All renewables	Wind index	Onshore wind	Offshore wind	Solar index	Solar PV	Solar CSP	Biomass/ other	Geo-thermal	Infra-structure ²
1	(1) China	70	76	78	70	61	66	47	58	51	75
2	(2) USA ³	66	66	69	55	72	71	74	61	67	61
3	(3) Germany	65	69	65	78	51	70	0	65	57	70
4	(4) India	63	63	71	42	64	69	53	59	45	66
5	(5) Italy	58	59	62	51	58	63	42	53	62	59
6	(5) UK	57	64	60	78	34	48	0	57	36	65
7	(7) France	55	58	59	55	48	55	29	57	33	55
8	(8) Canada	53	60	65	46	32	45	0	49	35	63
9	(9) Spain	51	50	54	39	58	56	63	46	30	47
10	(11) Brazil	50	53	57	40	42	46	32	51	23	49

Source: Renewable energy country attractiveness indices, Nov 2011, Ernst & Young

Installed Wind Capacity

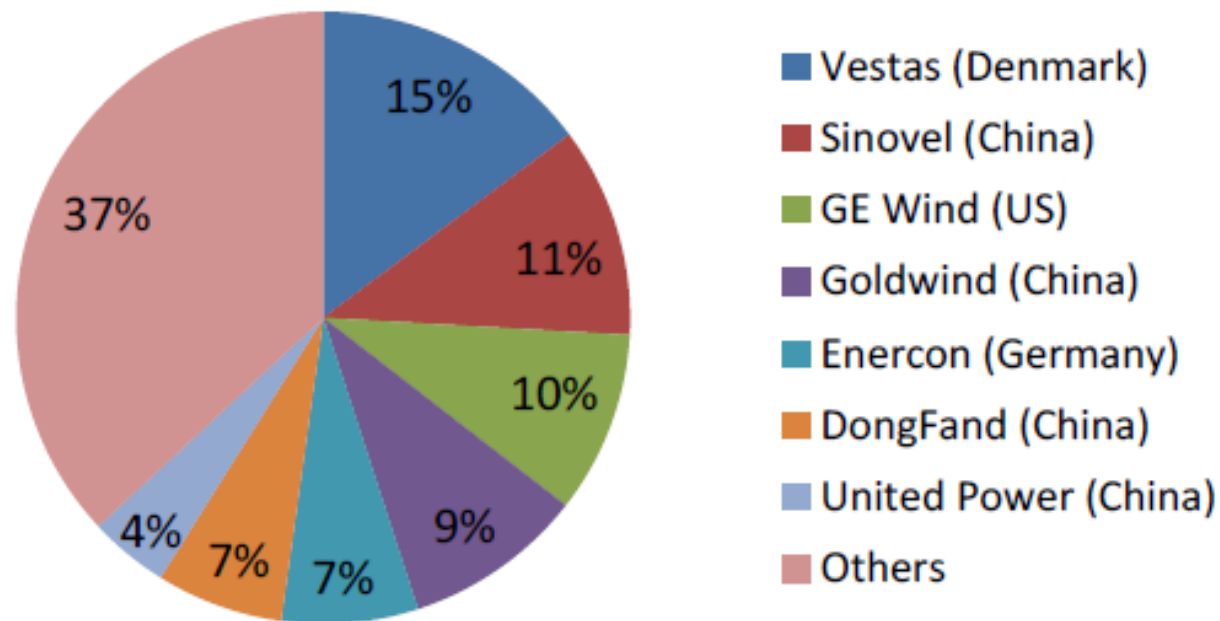
China has surpassed US, India is #5

Annual Capacity (2010, MW)		Cumulative Capacity (end of 2010, MW)	
China	18,928	China	44,781
U.S.	5,113	U.S.	40,267
India	2,139	Germany	27,364
Germany	1,551	Spain	20,300
U.K.	1,522	India	12,966
Spain	1,516	France	5,961
France	1,186	U.K.	5,862
Italy	948	Italy	5,793
Canada	690	Canada	4,011
Sweden	604	Portugal	3,837
<i>Rest of World</i>	5,205	<i>Rest of World</i>	28,371
TOTAL	39,402	TOTAL	199,513

Source: 2010 Wind Technologies Market Report, Ryan Wiser and Mark Bolinger, Lawrence Berkeley National Laboratory, June 2011

Growing market share

Five years ago China not on the list, what about 5 years hence?



Source: Financial Times, 29 Aug 2011 based on BTM-Consult



Questions?

- ◆ Thank you



Few take away points

- ◆ Bifurcated future
 - OECD vs. ROW
- ◆ Policy matters
 - Can influence demand
 - Can influence supply mix
- ◆ Renewables likely to grow
 - Fast enough to make a difference?

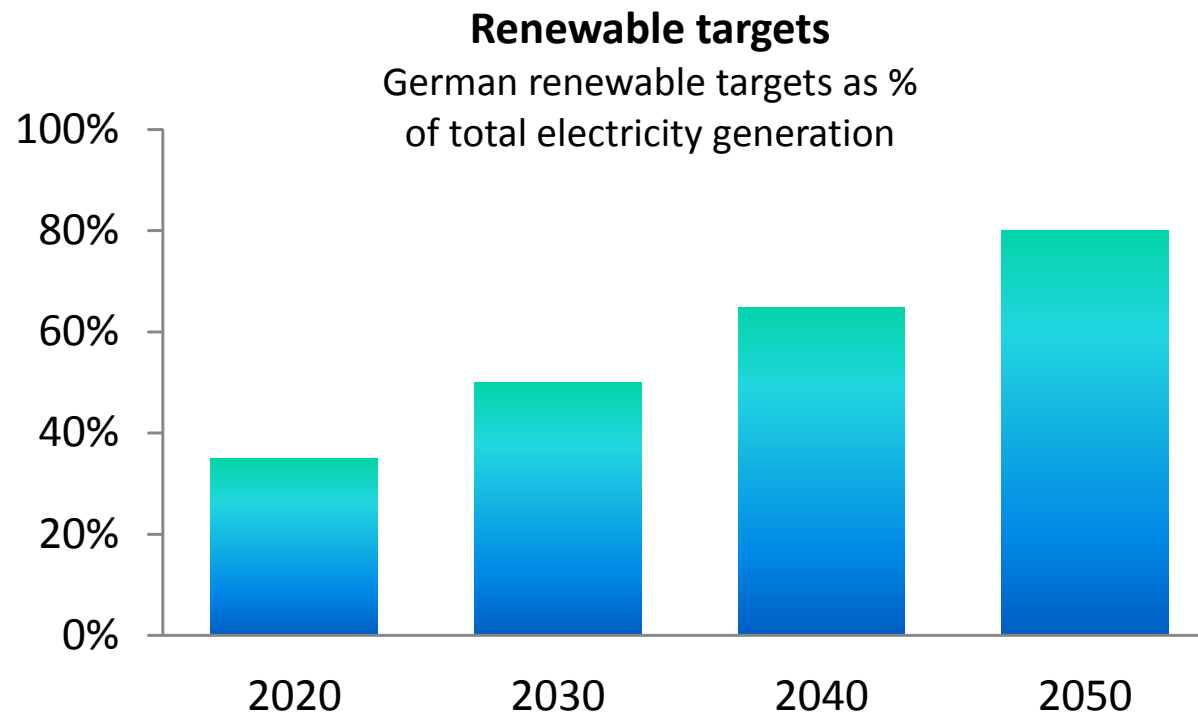
Fukushima

What are the fundamentals in Asia?

- ◆ Japan
 - Official nuclear policy divorced from reality?
- ◆ South Korea
 - Reassessment of official policy at “highest” level
- ◆ China, India, Russia
 - Reassessment, then back to normal
- ◆ Other
 - More hesitation, more risky for anyone to start nukes
 - Vietnam, Malaysia, UAE, etc.

80% by 2050!

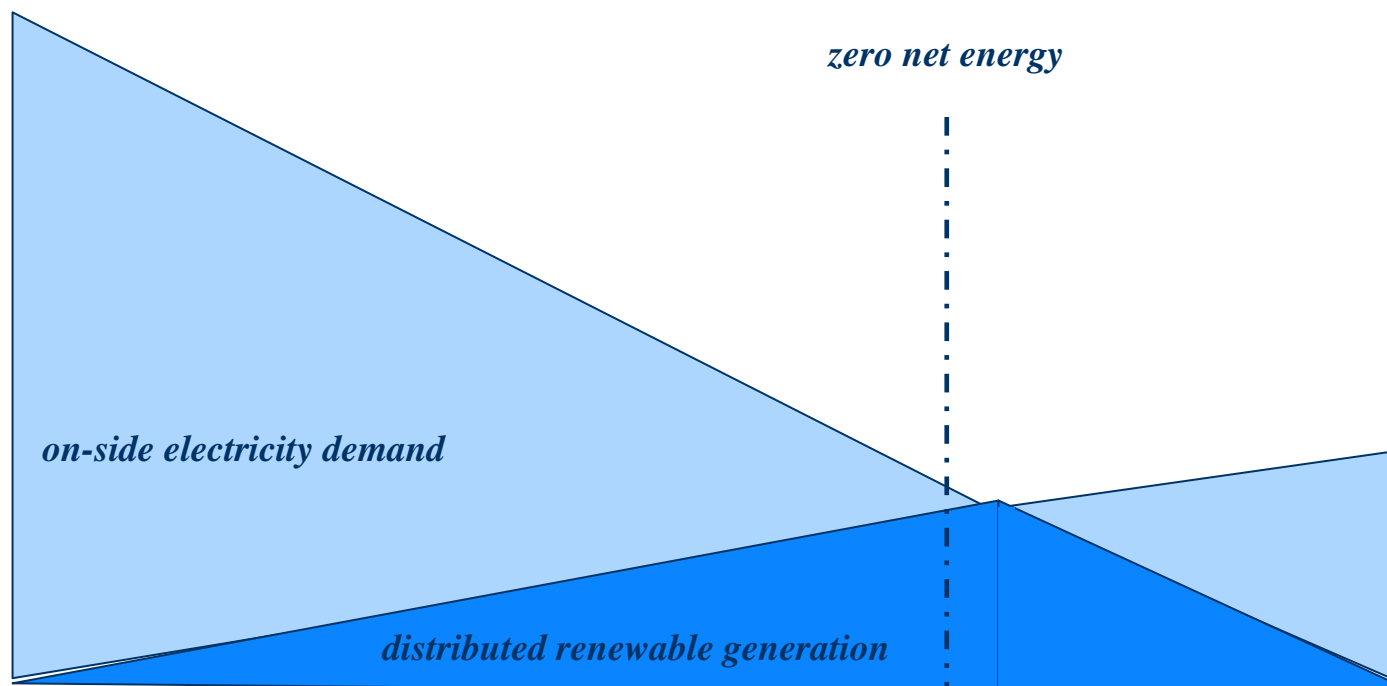
German target post Fukushima



Source: German Govt. proposals

Zero Net Energy

Would it apply to developing countries?



Distributed generation

California Gov. envisions 12 GW of DG

Residential Retrofit



New Production Homes



Commercial & Public

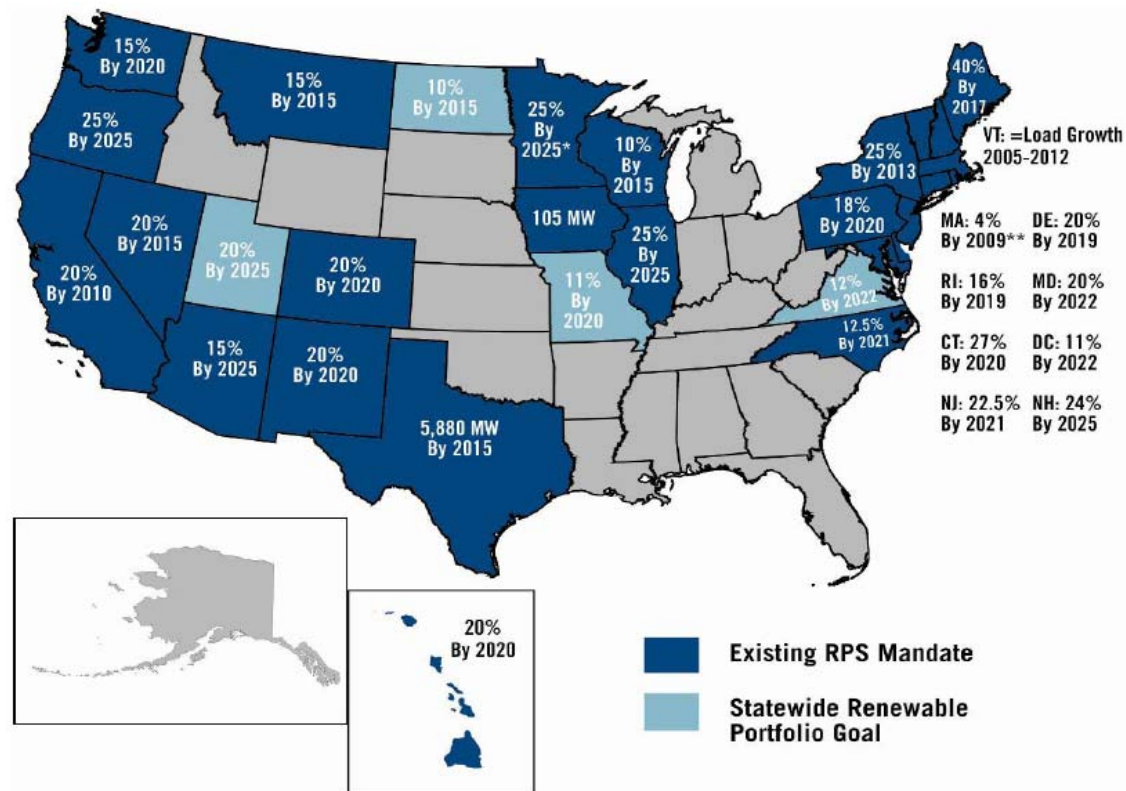


Power Plants



Renewable portfolio standards

US states with mandatory targets



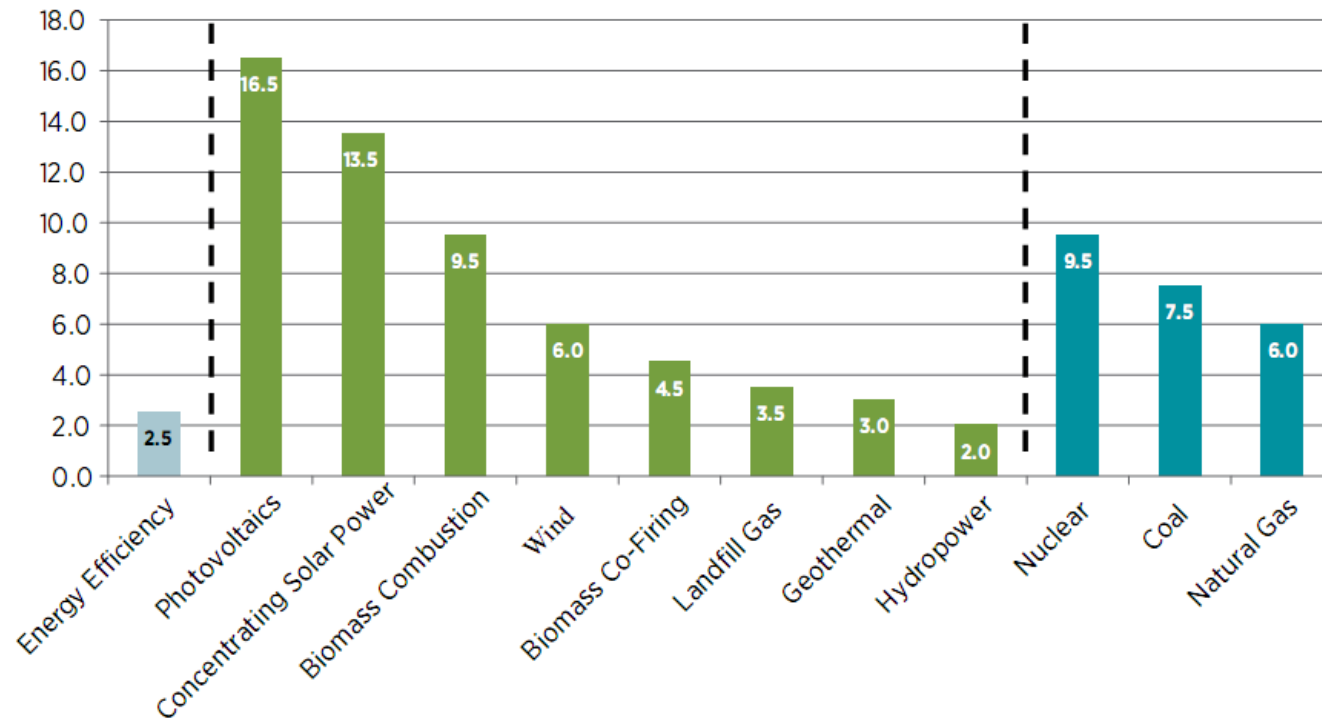
* Florida now has a 20% RPS by 2020 not reflected in the map. There may be other states as well that have adopted mandates since the map was published
 Source: Edison Electric Institute, 8 Apr 08

3. Renewable integration

SunPower claims it can install 1 MW per day



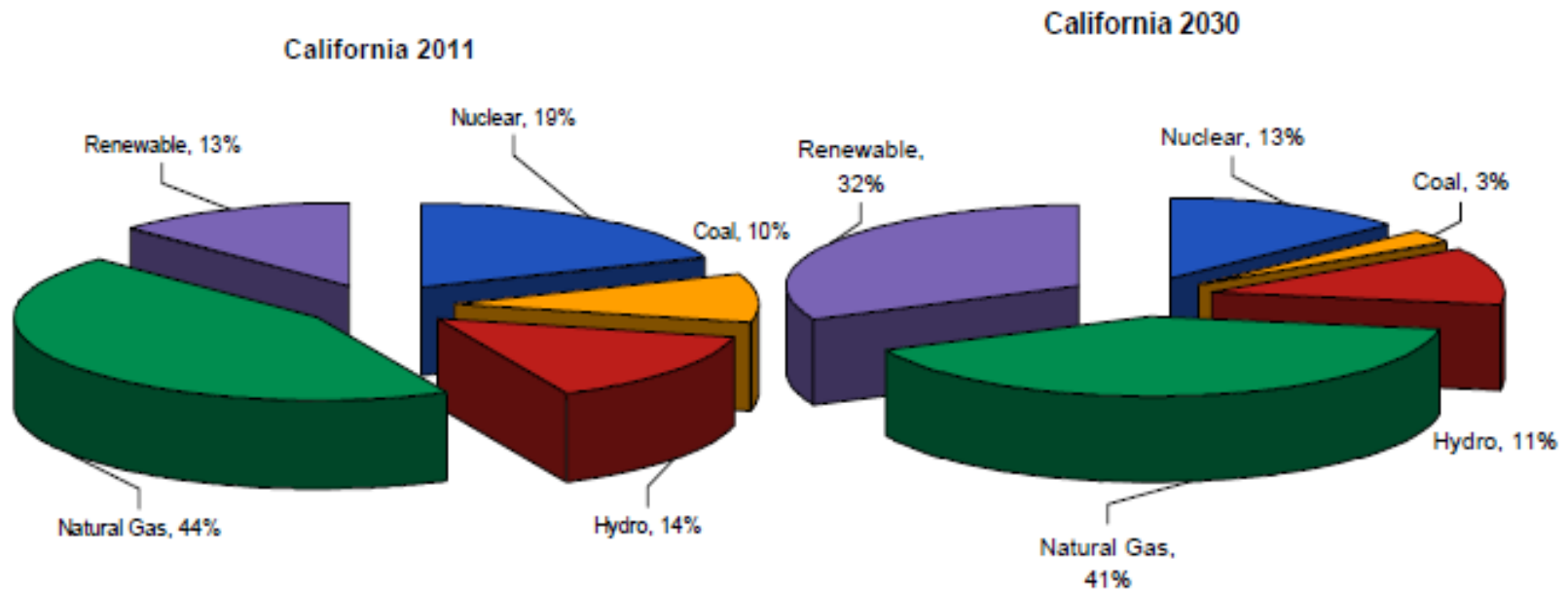
5. The cheapest kWh is the one you don't use



* Includes current federal & state level incentives, natural gas price is assumed at \$4.50/MMBTU
Source: US Renewable Energy Quarterly Report, ACORE, Oct 2010

California going low-carbon

Don't count on nuclear, CCS, cap-&-trade, or market signals



Source: Black & Veatch