

8 December 2009 / COP-15 Side Event

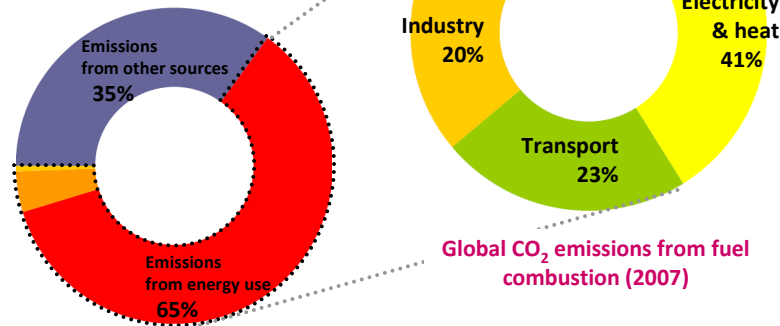


Scales of Ambition

The Energy Challenge

Global Energy Use

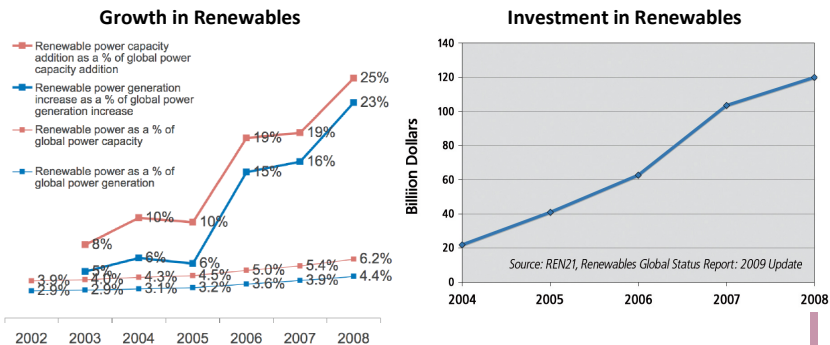
- Energy use contributes **65%** of all manmade greenhouse gas emissions.



Statistics from IEA CO₂ Emissions from Fuel Combustion (2009); US EPA Global Mitigation of Non-CO₂ GHGs (2006)

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Alternative energy share is growing



- Alternative energy share is growing as a share of power capacity and power generated.
- Investment has been increasing, even in the midst of an economic downturn.

UNEP/SEFI/NEF Global Trends in Sustainable Energy Investment (2009); REN21 Renewables Global Status Report (2009 Update)

Alternative energy share is growing

- 2008 saw milestones in global alternative energy capacity. We reached **280GW** of renewables and **860GW** of large hydropower.

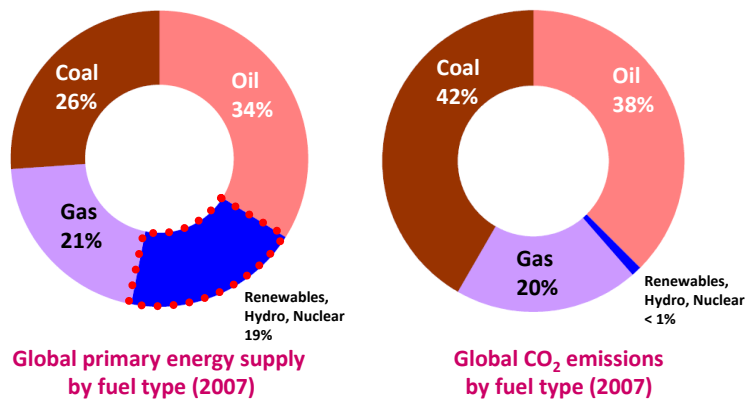
Table R4. Renewable Electric Power Capacity, Existing as of 2008 (estimated)

Technology	World Total	Developing Countries	EU-27	China	United States	Germany	Spain	India	Japan
Gigawatts									
Wind power	121	24	65	12.2	25.2	23.9	16.8	9.6	1.9
Small hydropower	85	65	12	60	3.0	1.7	1.8	2.0	3.5
Biomass power	52	25	15	3.6	8.0	3.0	0.4	1.5	>0.1
Solar photovoltaic-grid	13	>0.1	9.5	>0.1	0.7	5.4	3.3	~0	2.0
Geothermal power	10	4.8	0.8	~0	3.0	0	0	0	0.5
Solar thermal power-CSP	0.5	0	0.1	0	0.4	0	0.1	0	0
Ocean (tidal) power	0.3	0	0.3	0	0	0	0	0	0
Total renewable power capacity (excluding large hydro)	280	119	96	76	40	34	22	13	8
For comparison:									
Large hydropower	860								
Total electric power capacity	4,700								

REN21 Renewables Global Status Report (2009 Update)

But fossil fuels still dominate

- Fossil fuels still account for > 80% of the world's primary energy supply and generation capacity (4,700GW).



Statistics from IEA CO₂ Emissions from Fuel Combustion (2009)

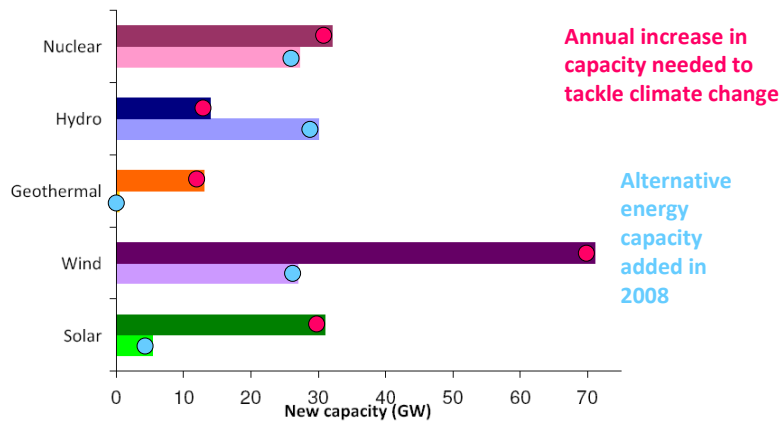
Stark realities for the energy sector

- To avoid $\sim 2^{\circ}\text{C}$ increase in average global temperature we will need to install, somewhere in the world:
 - 55 fossil-fuelled power plants with CCS
 - 32 nuclear plants
 - 17,500 large wind turbines
 - 215 million square metres of solar panels
 - 1/5th Canada's hydropower capacity
 - 130 geothermal units... ..

**every year between 2010 and 2050,
and at ever-increasing efficiency**

Statistics from IEA Energy Technology Perspectives (2008)

Game of catch up



- Progress falls short of the change needed
 - Absolute capacity still low
 - Rate of change slow

Statistics from IEA (2009), UNEP/NEF/SEFI (2009), IAEA (2008)

The scale of the challenge is immense

- Where should we begin?
- Where are the best opportunities and the low-hanging fruit?
- How can change be shared amongst countries?

Background to this study

- Singapore has spent most of its short history pondering resource scarcity
 - Scarce in all natural resources, including water & land; relatively small population
 - Country with 2nd highest population density in the world
- Coping with climate change is a deep concern for all, and small island states have particular vulnerabilities
- Climate change can only aggravate scarcity – in every decision taken there will be painful tradeoffs

We welcome suggestions for
further work and collaboration.

Please contact

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End of Part 1
**Scientific study
on world's
alternative
potential
follows**