

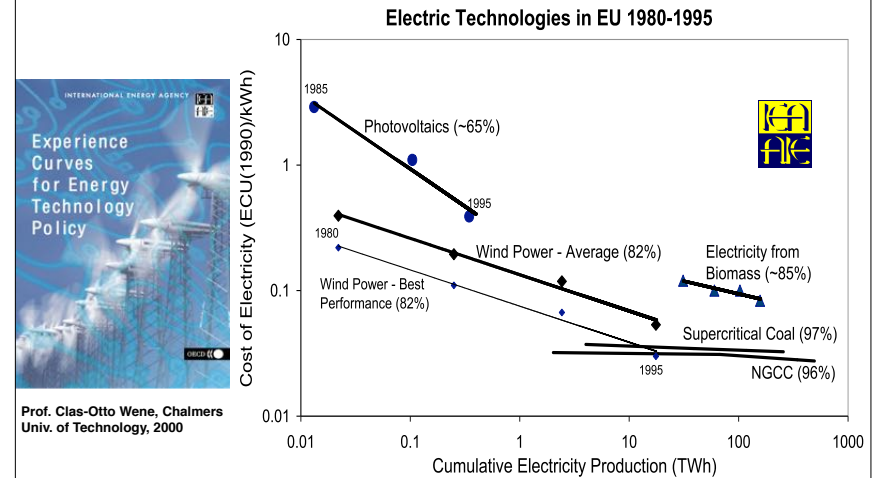
# From German *Energiewende* to Global Energy Transition: Costs Matters!

## Helsinki 2015-03-30

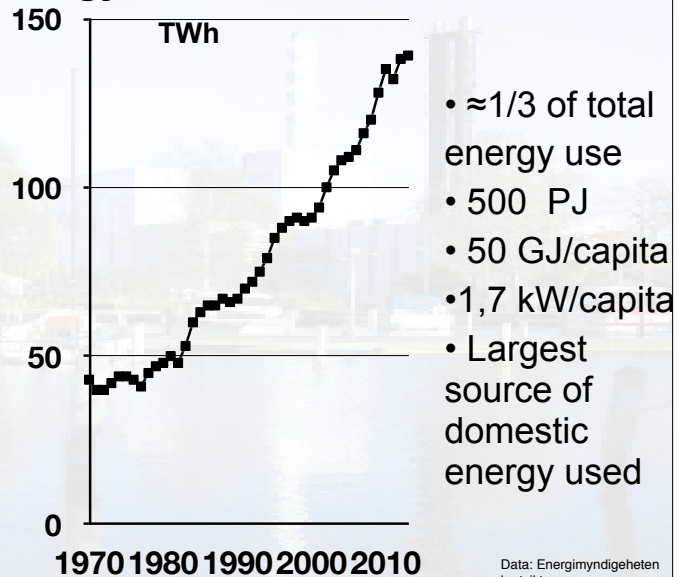
*Tomas Kåberger*

Professor of Industrial Energy Policy at Chalmers University of Technology  
 visiting fellow/academy/professor at IAS TU München/IIIEE Lund Univ. / Zhejiang University  
 Executive board chair Japan Renewable Energy Foundation

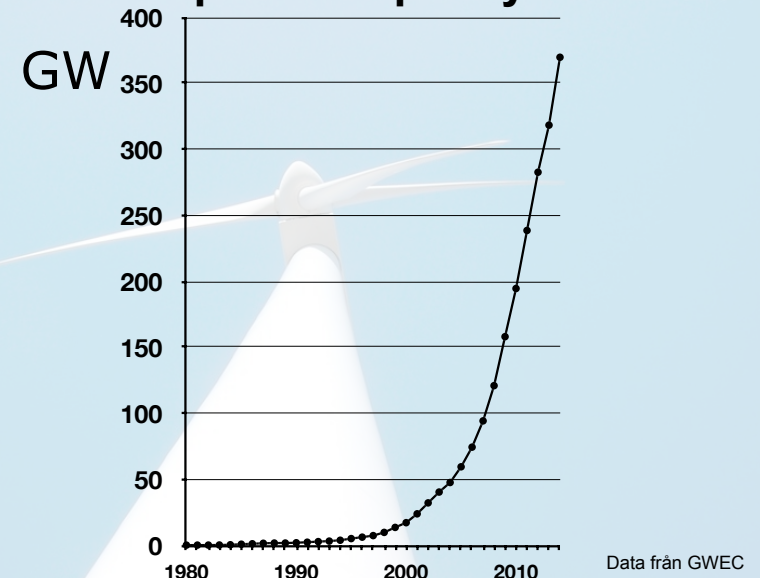
## Industrial learning by experience

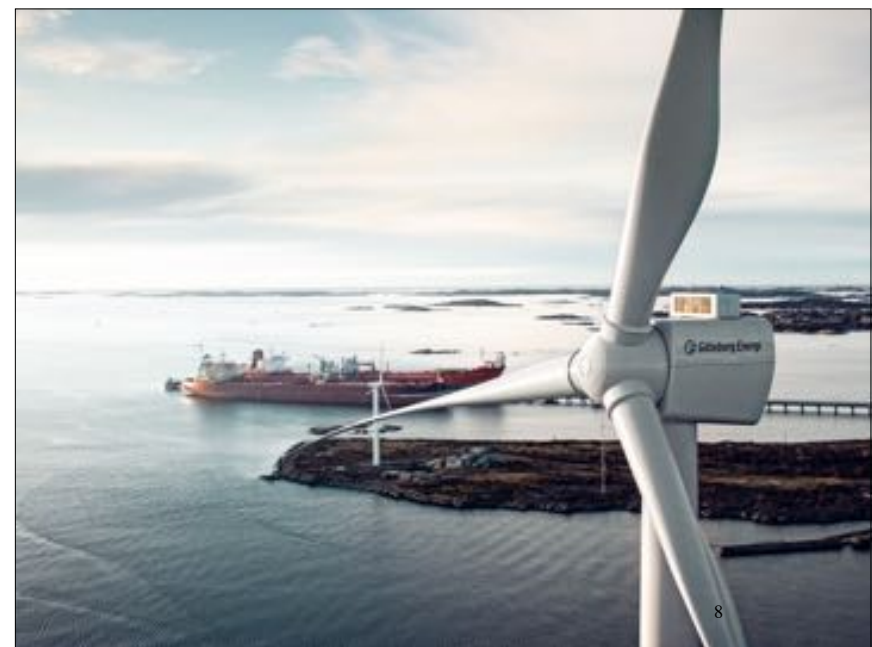
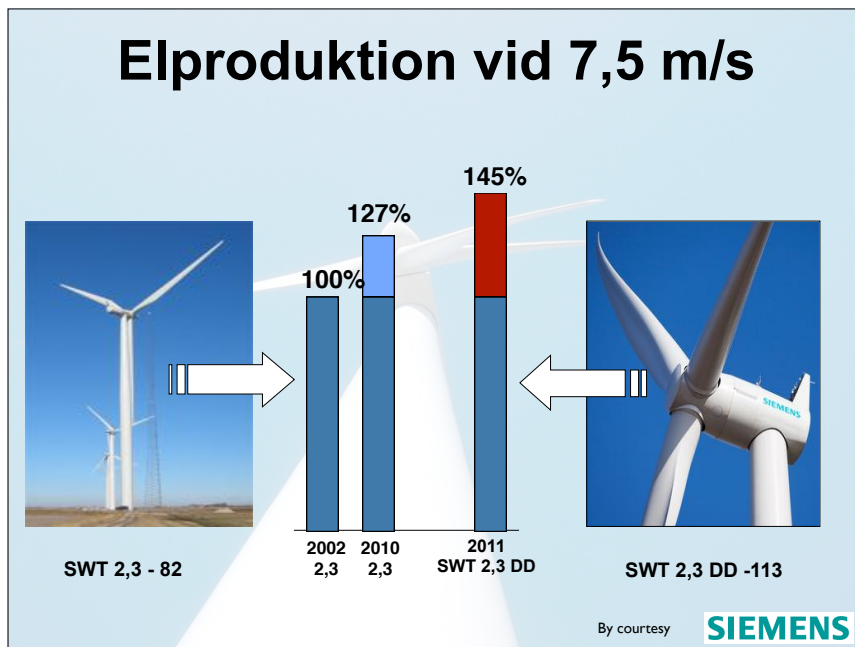
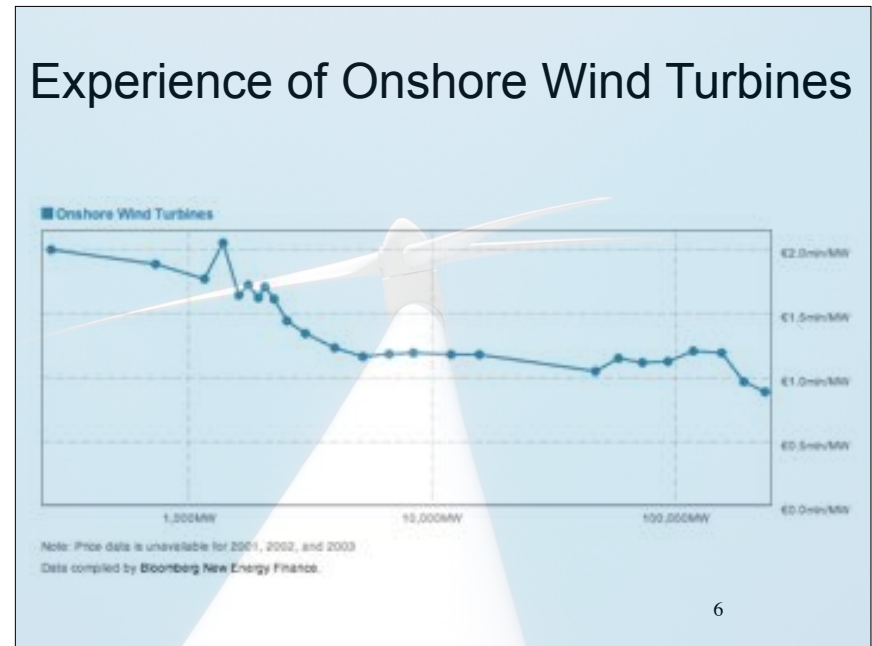
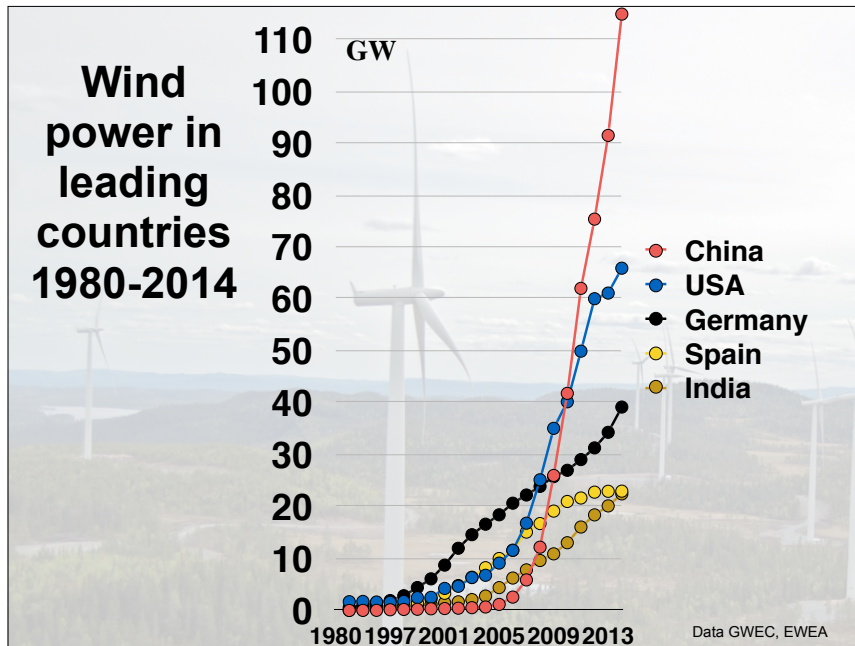


## Bioenergy use in Sweden 1970-2013



## Global Wind power capacity 1980-2014





# Snowtown II: Wind Power At A

e360 digest

29 JUL 2014: DANISH WIND POWER TO BE HALF THE PRICE OF COAL AND NATURAL GAS BY 2016

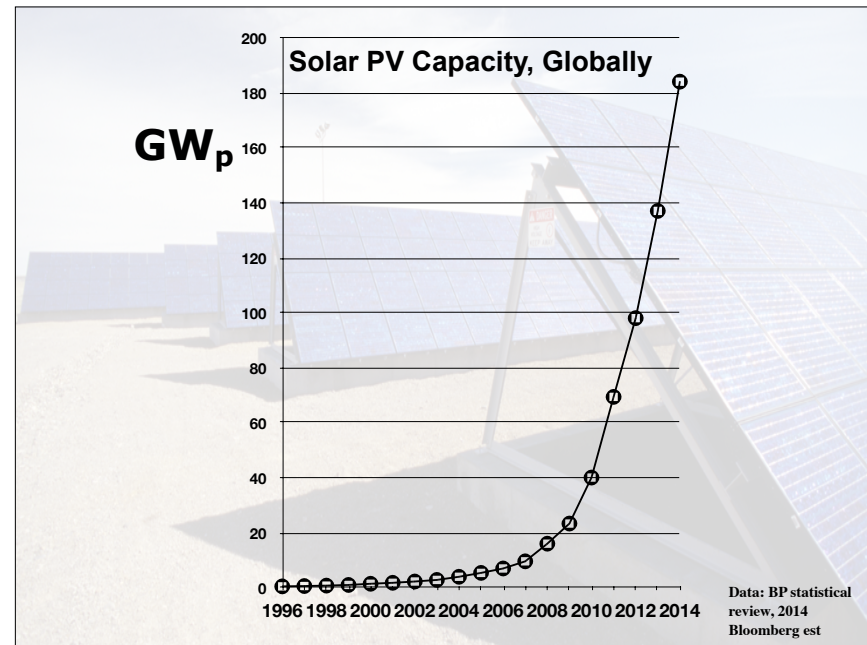
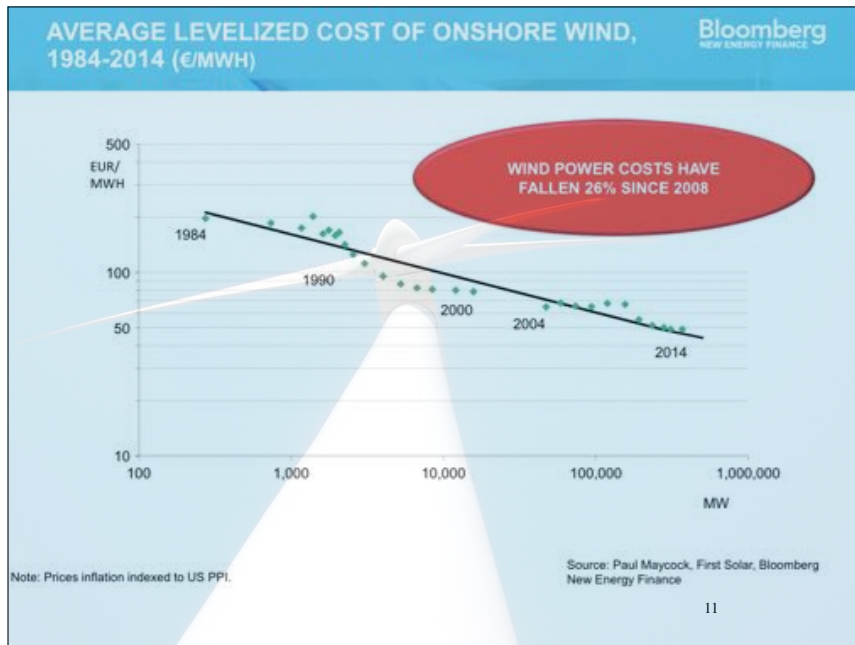
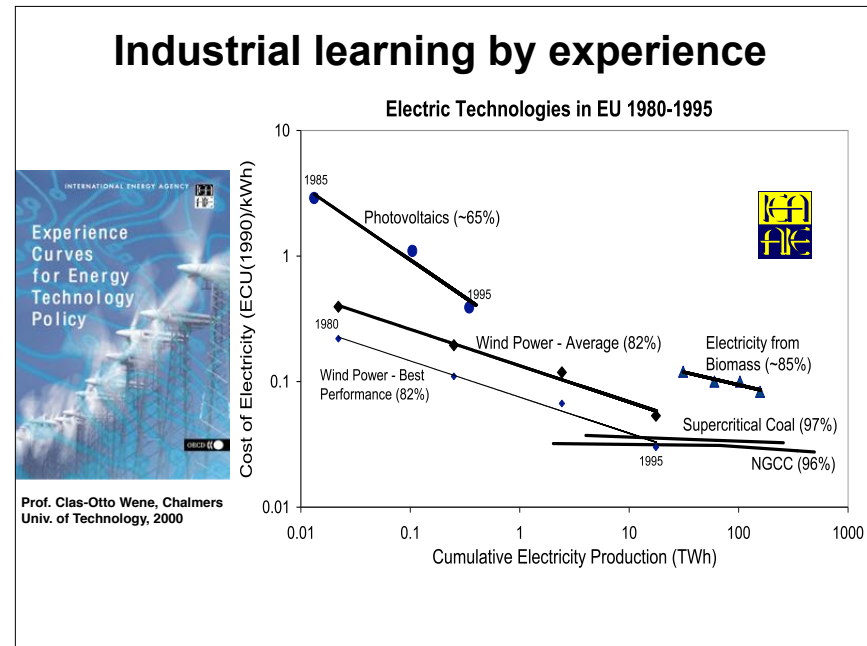
Wind power has overtaken all other energy sources as the cheapest form of electricity in Denmark, with a cost roughly half that of coal and natural gas projected by 2016, according to an analysis by the Danish Energy Association (DEA). Home to major turbine manufacturers Vestas and Siemens, the country has been investing steadily in wind power since the 1970s and seems to be reaping the benefits of those investments now, analysts say. Electricity from two new onshore wind power facilities set to begin operating in 2016 will cost around 5 euro cents per kilowatt-hour, according to DEA calculations. Wind power would remain the cheapest energy option even if interest rates on wind power projects were to increase by 10 percent, the report found. The Danish government aims to meet 50 percent of the country's total electricity needs with wind power by 2020, and another 20 percent with other renewable sources. By 2050, the government aims to produce all electricity from renewable sources.

*Wh*

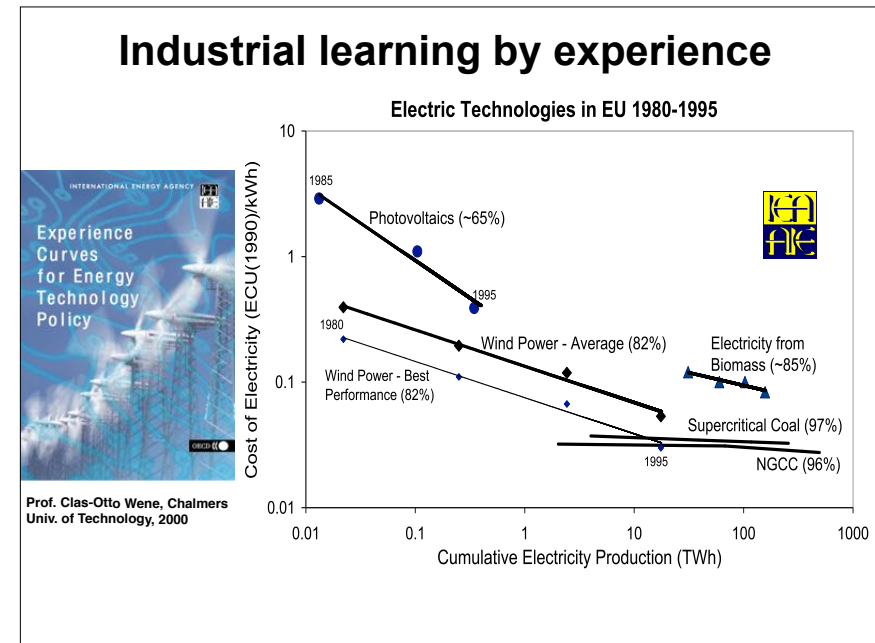
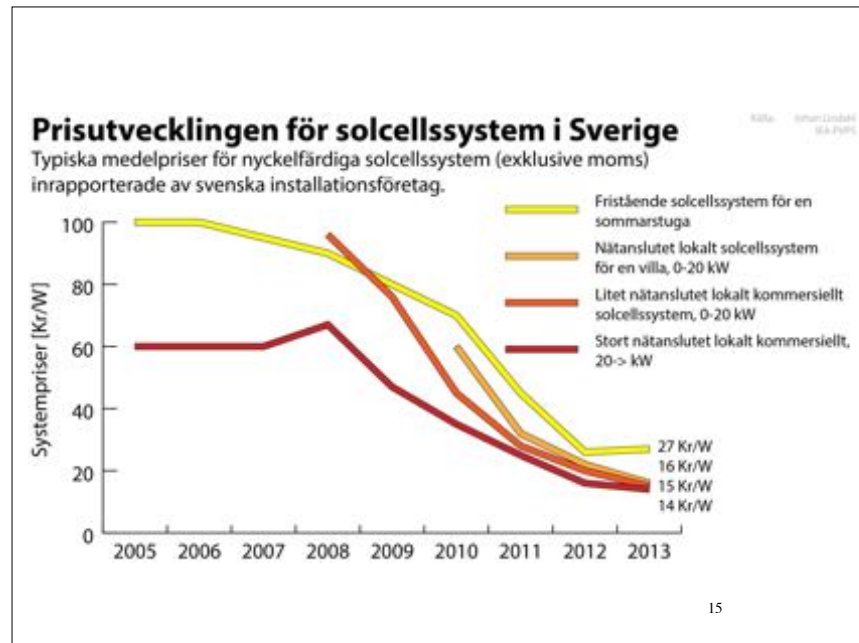
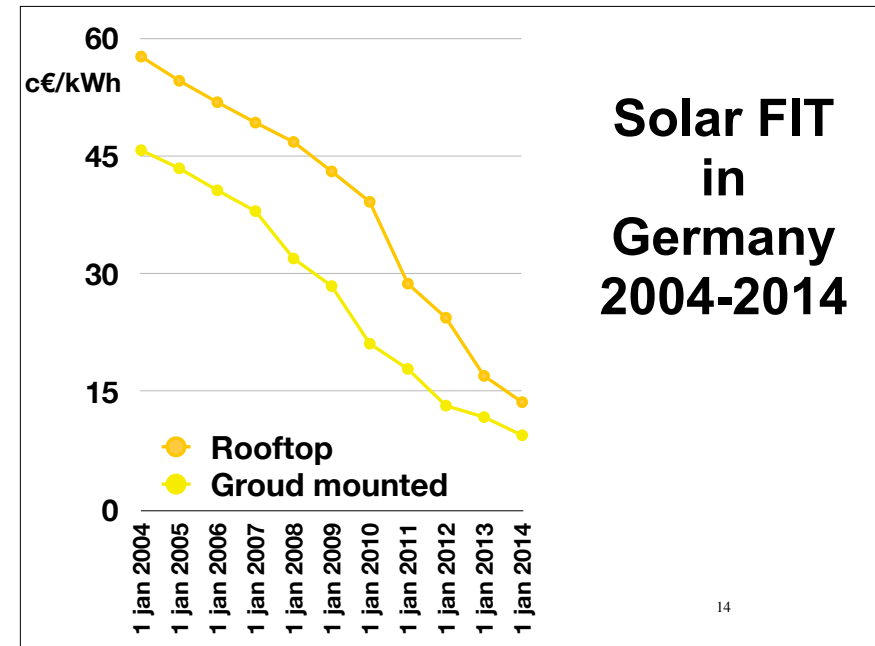
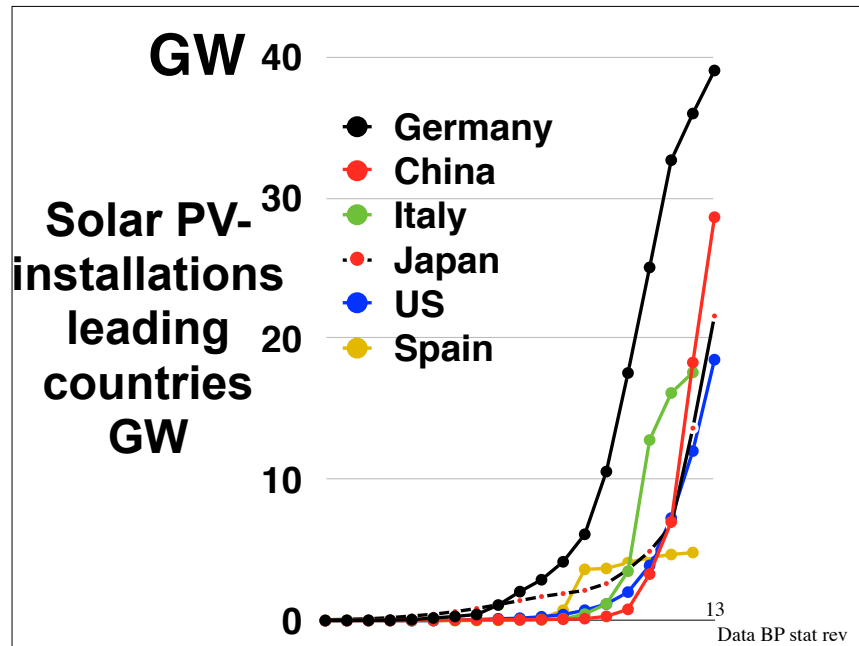
http://www.ens.dk/sites/ens.dk/files/info/ta/kort/fremskrivninger-analyser-modeller/notat\_-\_2014\_07\_01\_elproduktionsomkostninger\_for\_10\_udvalgte\_teknologi

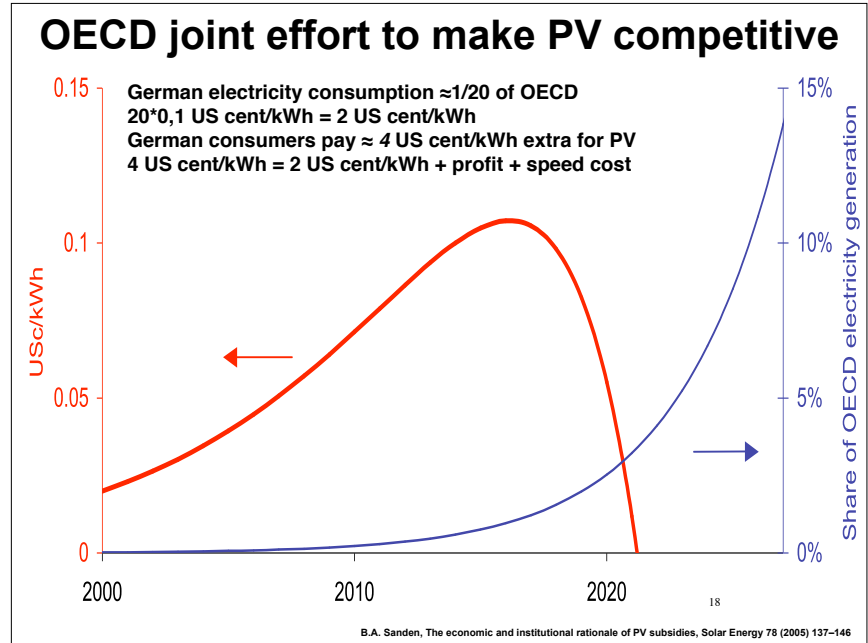
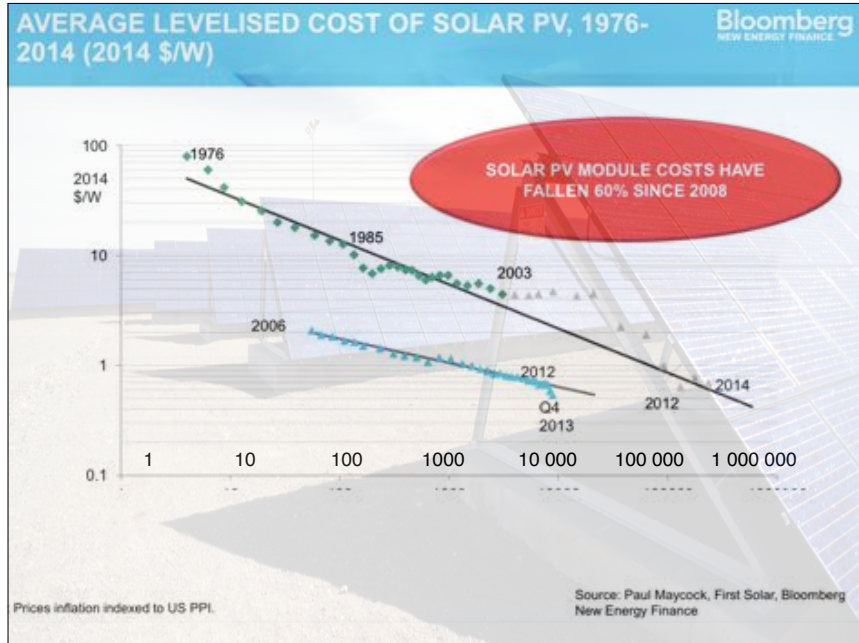
second largest wind farm and South Australia's largest. One very exciting thing about this wind farm sequel is it looks set to provide some of

making sure the turbines are in good hands on our wind turbines. Image Credit: Siemens







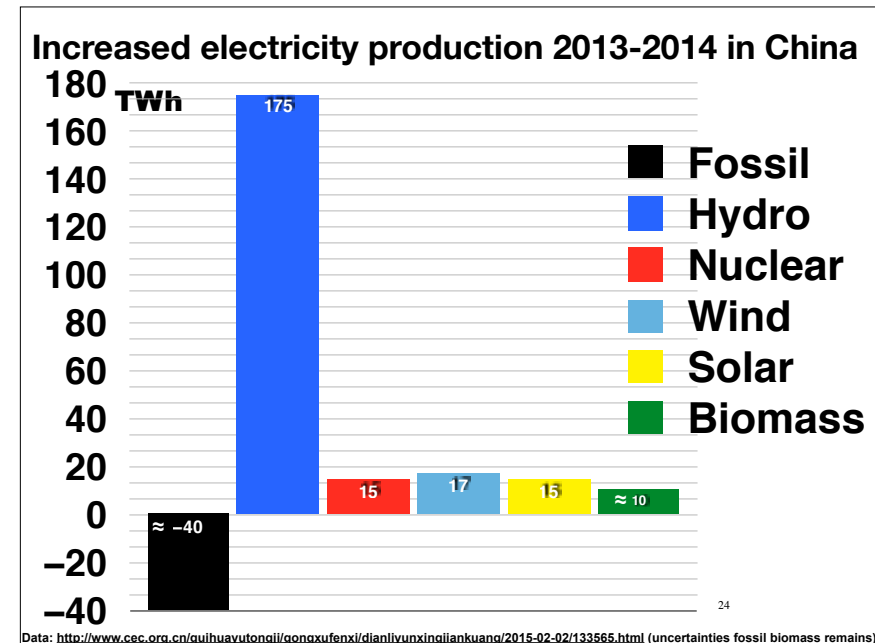




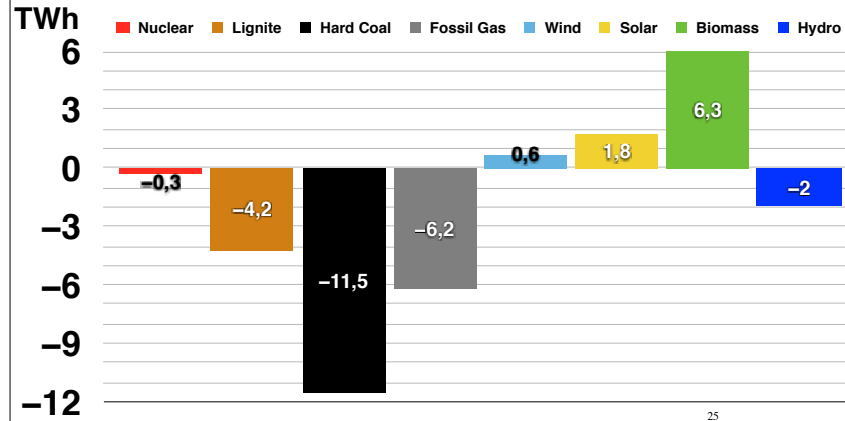


Negative network effects will transform the economics and operations of our infrastructure within 1,000 days. Are you prepared to benefit from the massive value creation that will come with game-changing shifts in energy and other industries? In this comprehensively researched economic analysis, noted consultant Michael Rogol shows how to rapidly build small and midsize companies into hundred-million-dollar enterprises within a thousand days. If you do not adjust to market conditions, you put your business at substantial risk including possible annihilation. The clock is ticking.

*The book was published 13 December 2011. A thousand days had passed on September 8th 2014.*

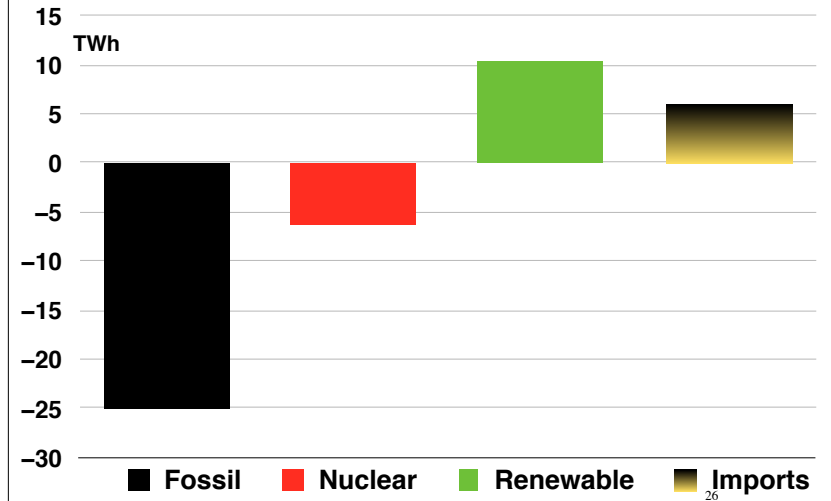


### German change electricity generation 2013-2014



<http://www.ise.fraunhofer.de/de/downloads/pdf-files/data-nivc/-stromproduktion-aus-solar-und-windenergie-2014.pdf>

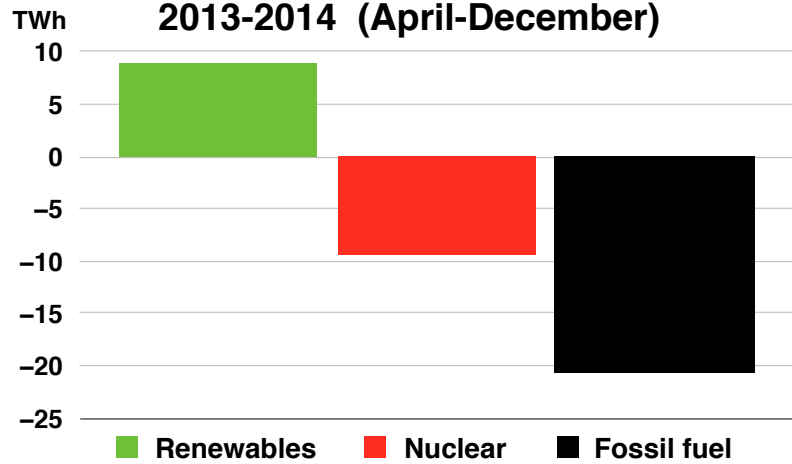
### UK electricity generation 2014-2013



[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415997/electricity.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415997/electricity.pdf)

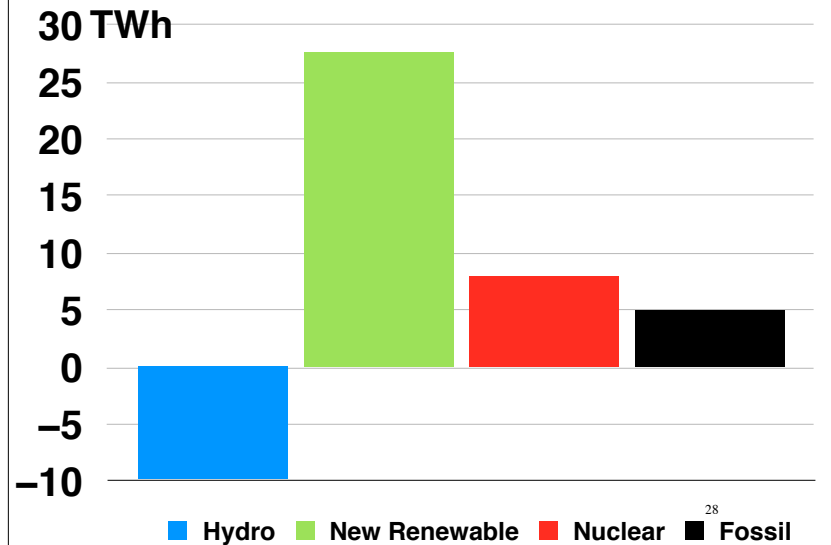


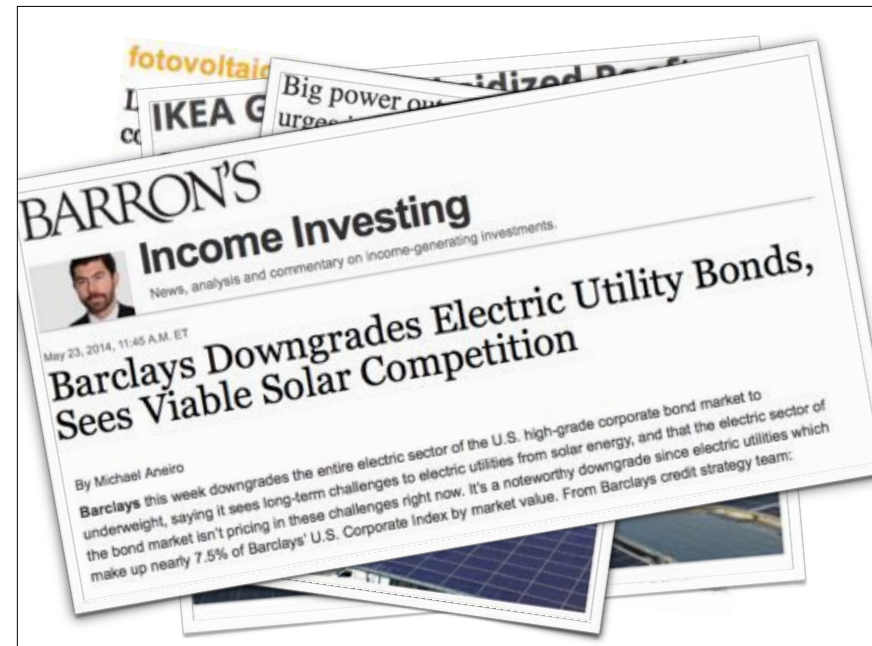
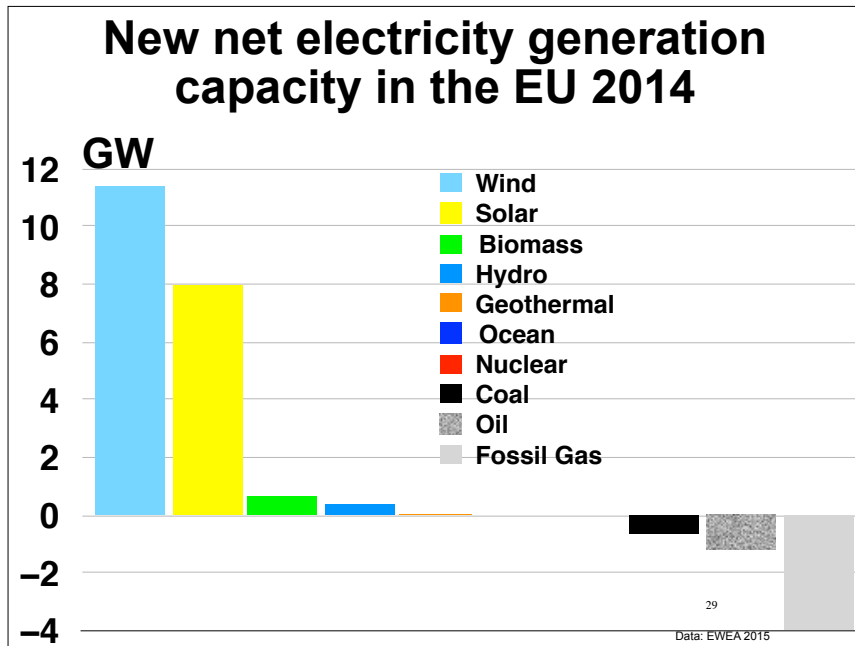
### Change in Japan's Electricity Generation 2013-2014 (April-December)



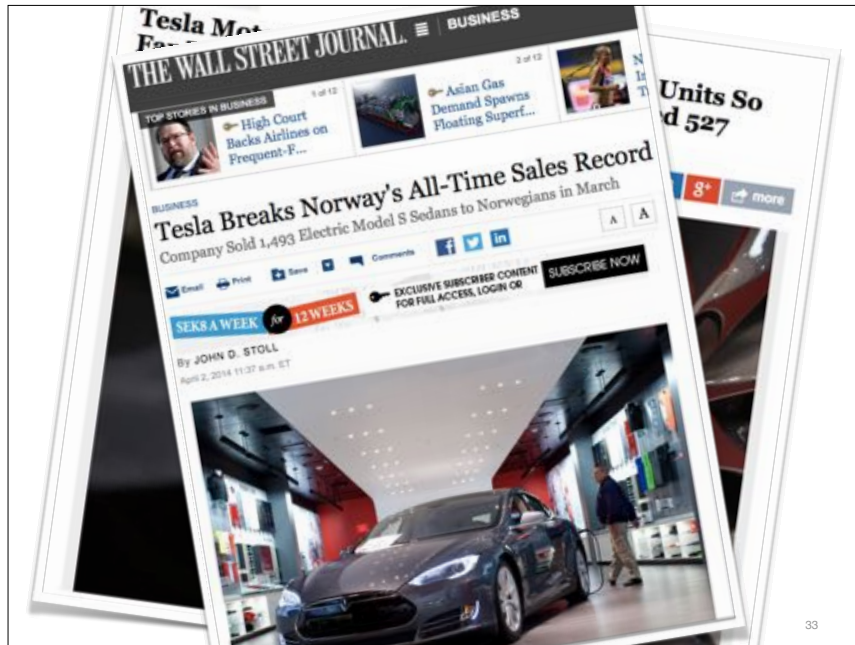
Data: METI Electricity Research Statistics

### Change in US electricity generation 2013 to 2014

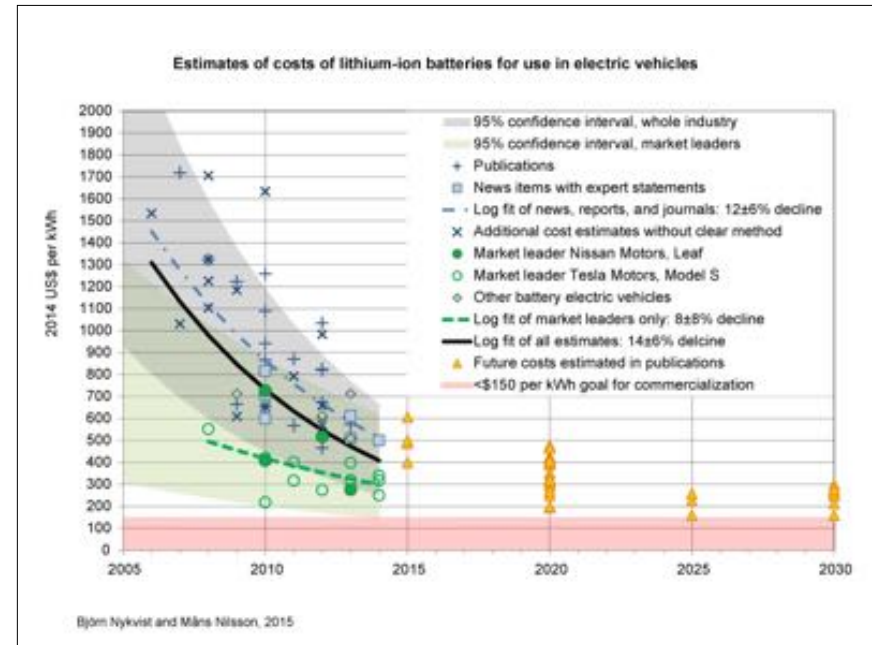








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### Citibank: Utilities are dinosaurs waiting to die

By Jesse Berst  
Published October 10, 2013  
Tags: Corporate Strategy, Energy & Utilities, More...  
[Email](#) | [Print](#) | [Single Page View](#)

Today's electric power utilities could lose half their addressable market to energy efficiency, solar and storage, and other distributed generation, according to "Energy Darwinism – the evolution of the energy industry," a new report (PDF) from the investment banking arm of Citibank.

"Consumers face economically viable choices and alternatives in the coming years which were not foreseen five years ago," the analysts write.

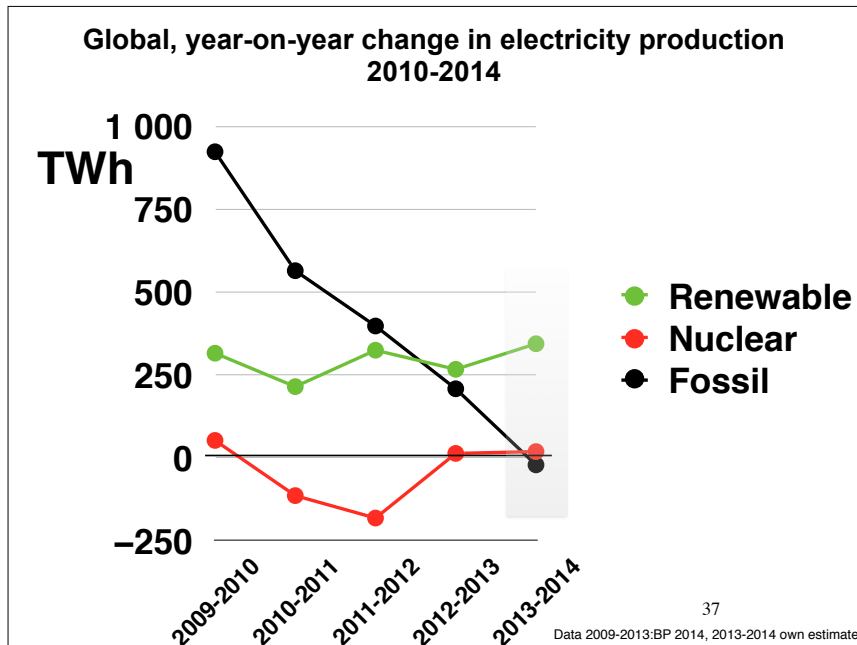
According to REneweconomy, the price fall of solar panels has exceeded all expectations, resulting in cost parity being achieved in certain areas much more quickly.

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## Disruptive innovations

The Innovator's Dilemma  
When New Technologies Cause Great Firms to Fail  
CLAYTON M. CHRISTENSEN

- Solar and wind power are too expensive...
- Intermittent power is not sufficient...
- Solar and wind do not fit our business model...



International Energy Agency  
Working together to ensure reliable, affordable and clean energy

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### Global energy-related emissions of carbon dioxide stalled in 2014

IEA data point to emissions decoupling from economic growth for the first time in 40 years

13 March 2015

Data from the International Energy Agency (IEA) indicate that global emissions of carbon dioxide from the energy sector stalled in 2014, marking the first time in 40 years in which there was a halt or reduction in emissions of the greenhouse gas that was not tied to an economic downturn.

"This gives me even more hope that humankind will be able to work together to combat climate change, the most important threat facing us today," said IEA Chief Economist Fatih Birol, recently named to take over from Maria van der Hoeven as the next IEA Executive Director.

Global emissions of carbon dioxide stood at 32.3 billion tonnes in 2014, unchanged from the preceding year. The preliminary IEA data suggest that efforts to mitigate climate change may be having a more pronounced effect on emissions than had previously been thought.

RECENT  
Global energy carbon dioxide  
IEA releases March  
Explore the with IEA Em  
IEA Chief Executive  
Prime Minister  
IEA releases February

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