Thorium Energy: A Personal Passion

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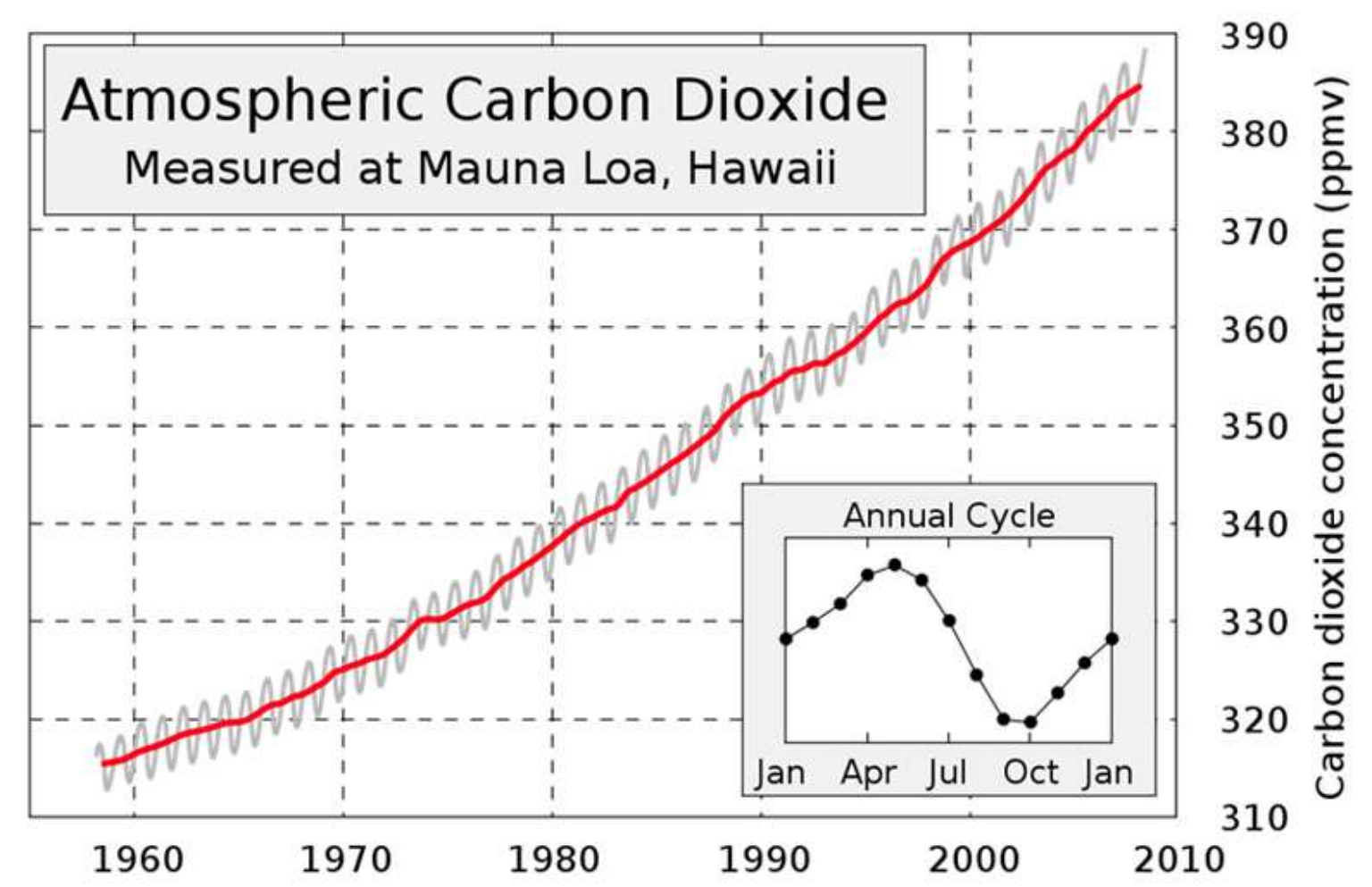
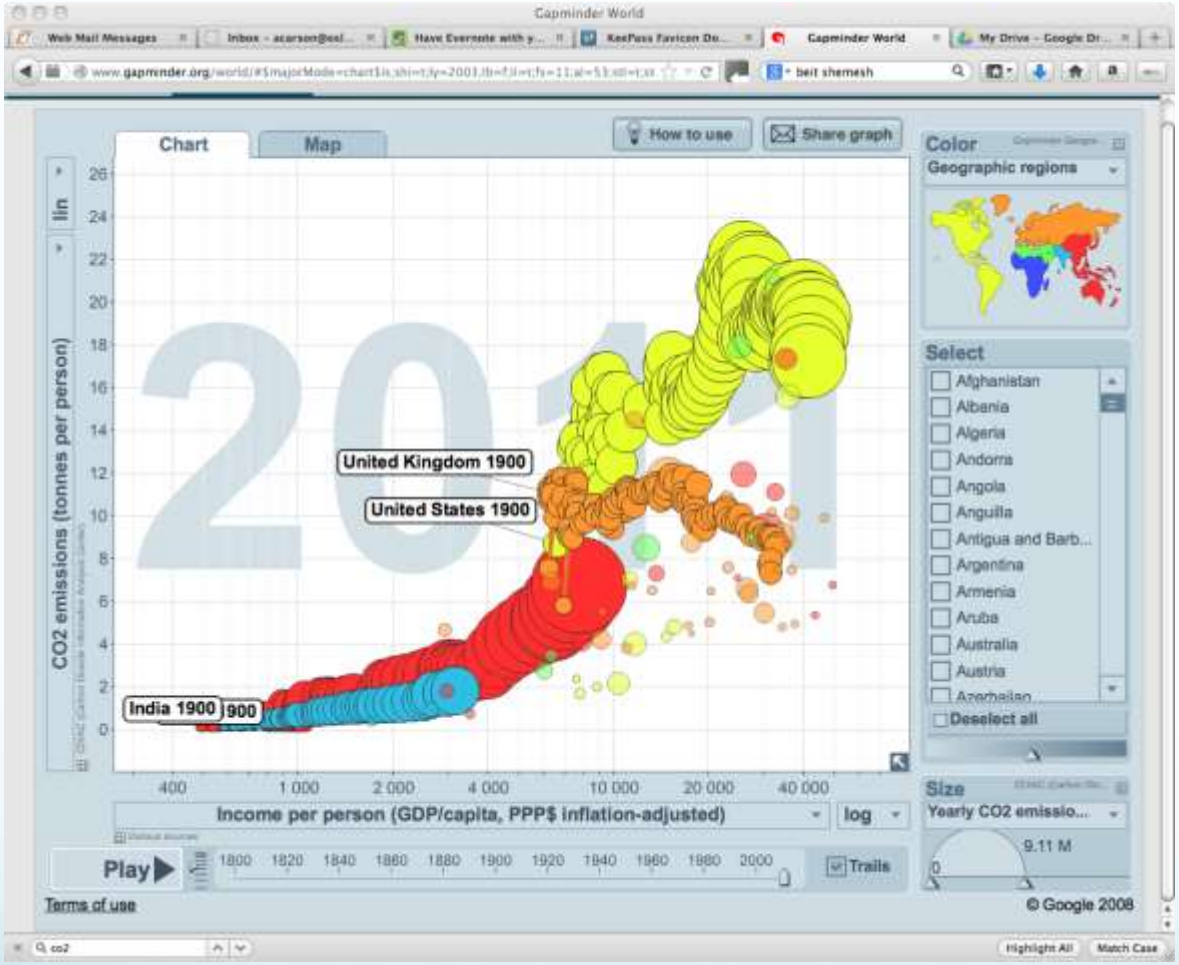
The Keeling Curve



CO_2 emissions are the problem.

At the dawn of the 20th century, carbon footprints were fairly small individually and collectively.

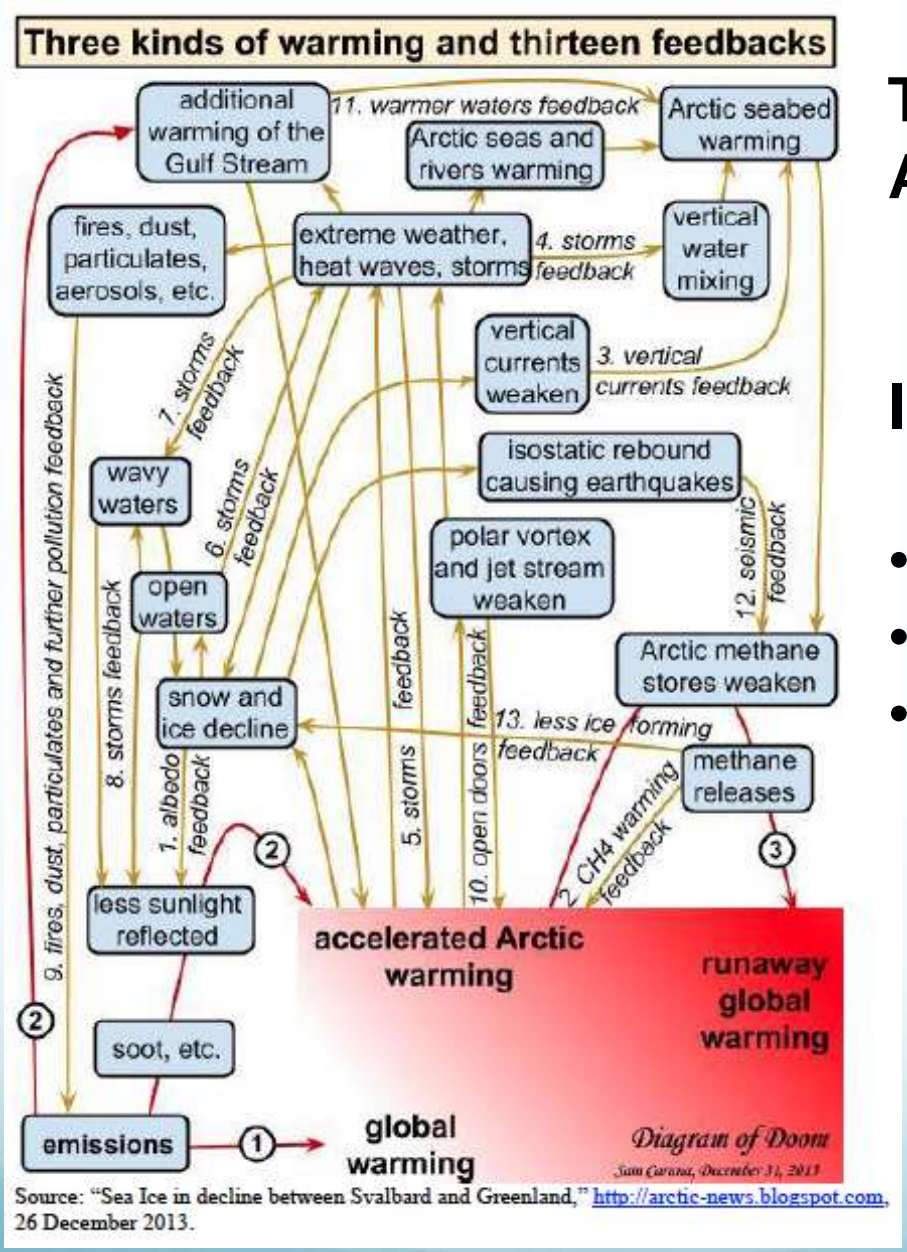
Source: http://www.gapminder.org/world/#$majorMode=chart…, April 10, 2014.



The 20th century has created the vast majority of industrial CO_2.

Hence the sharp rise in atmospheric CO_2.

Source: http://www.gapminder.org/world/#$majorMode=chart…, April 10, 2014.



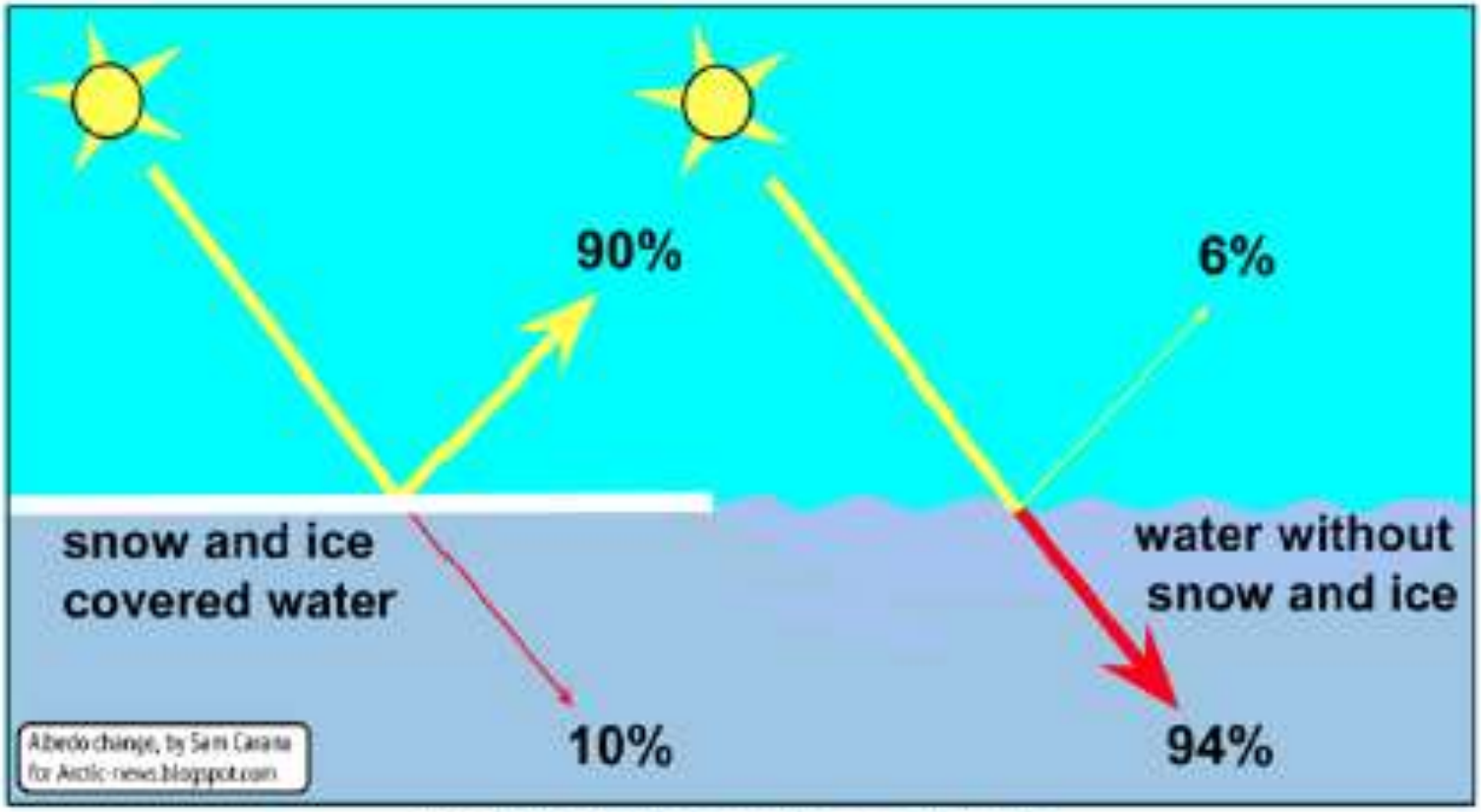
Source: "Sea Ice in decline between Svalbard and Greenland," http://arctic-news.blogspot.com, 26 December 2013.

Three kinds of warming And thirteen feedbacks

In short, it's chaos:

- Non-linear,
- Dynamic and
- Unpredictable.

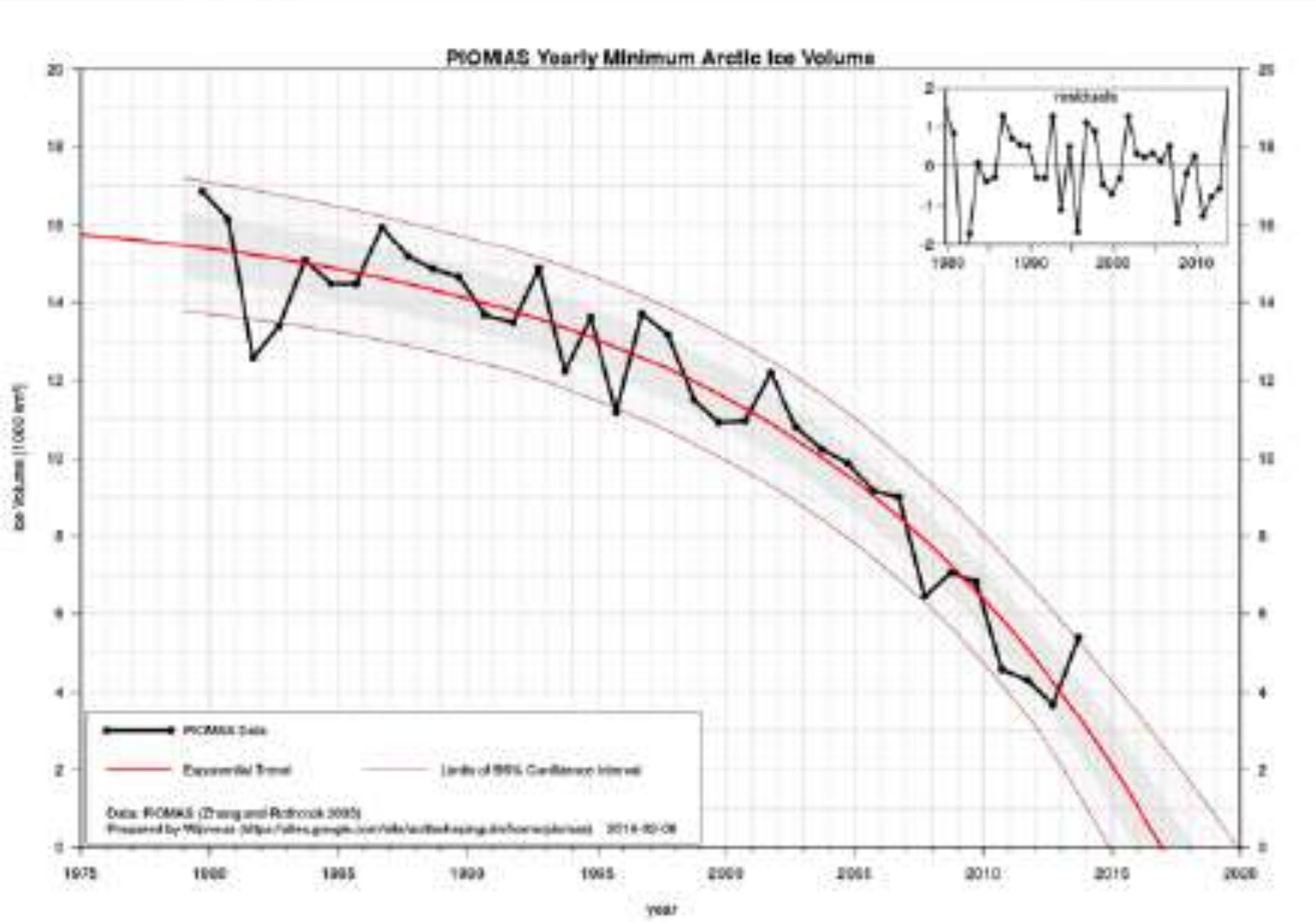
Ice Loss Feedback Loop



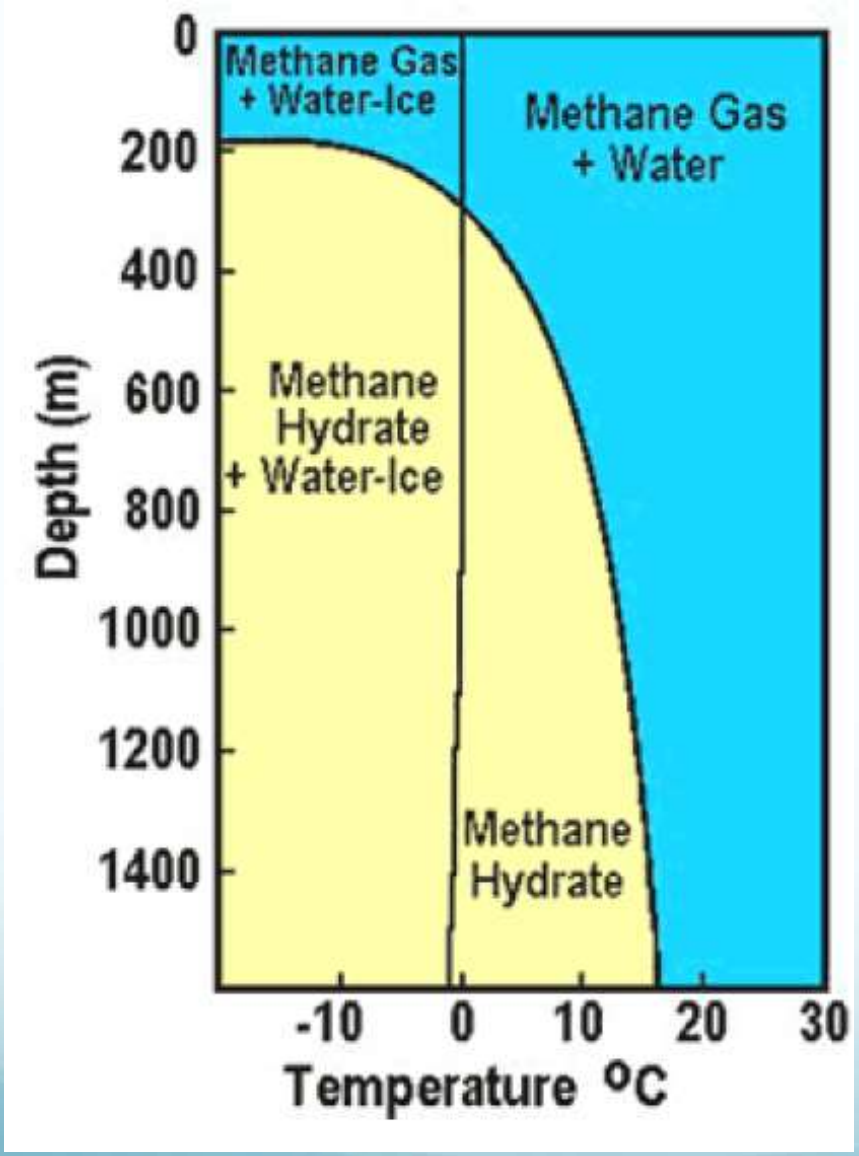
From: Arctic Warming due to Snow and Ice Demise

Source: "Where We Are: A climate system summary", http://arctic-news.blogspot.com, 3 October 2014.

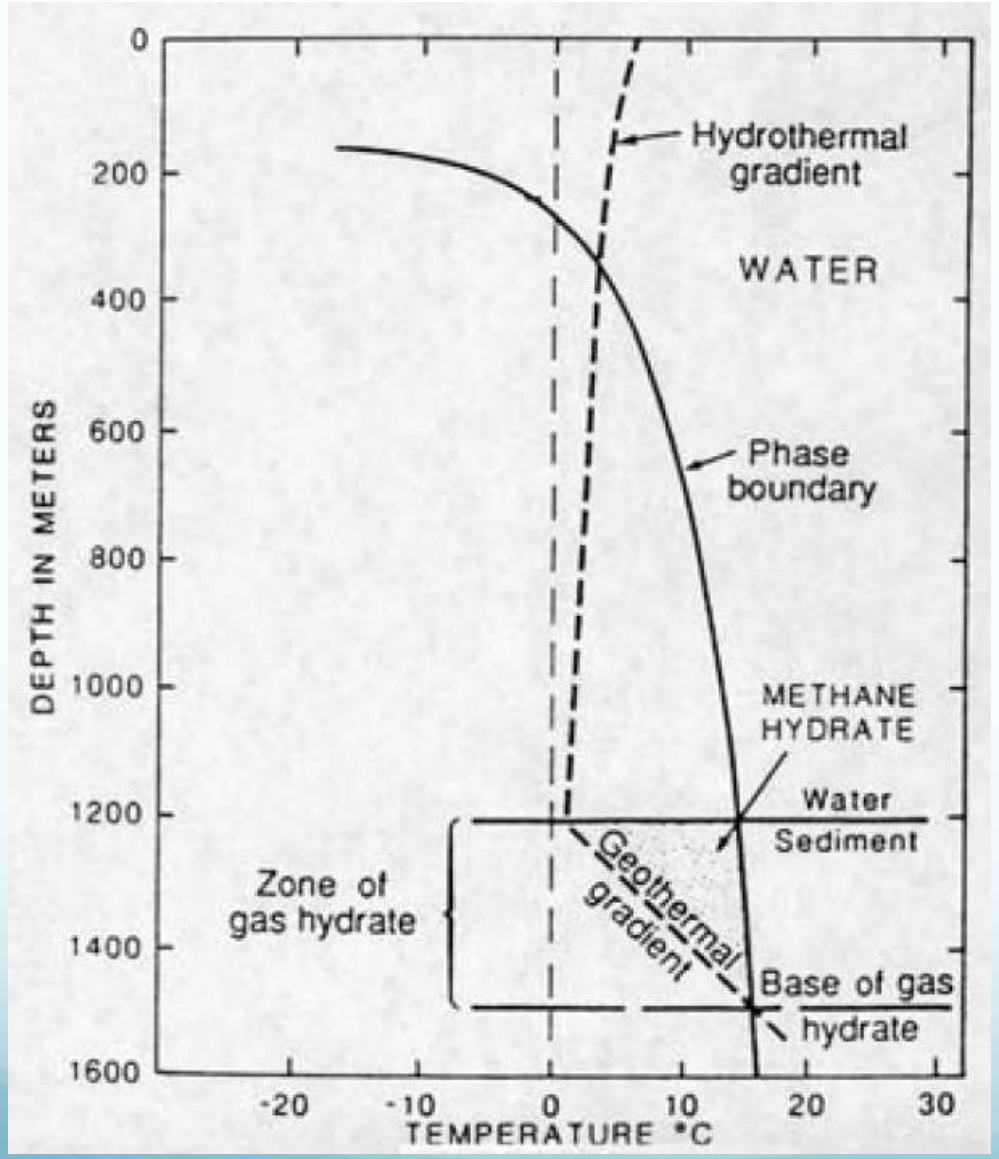
Polar Ice Observatory detects exponential lost of Minimum Arctic Ice Volume



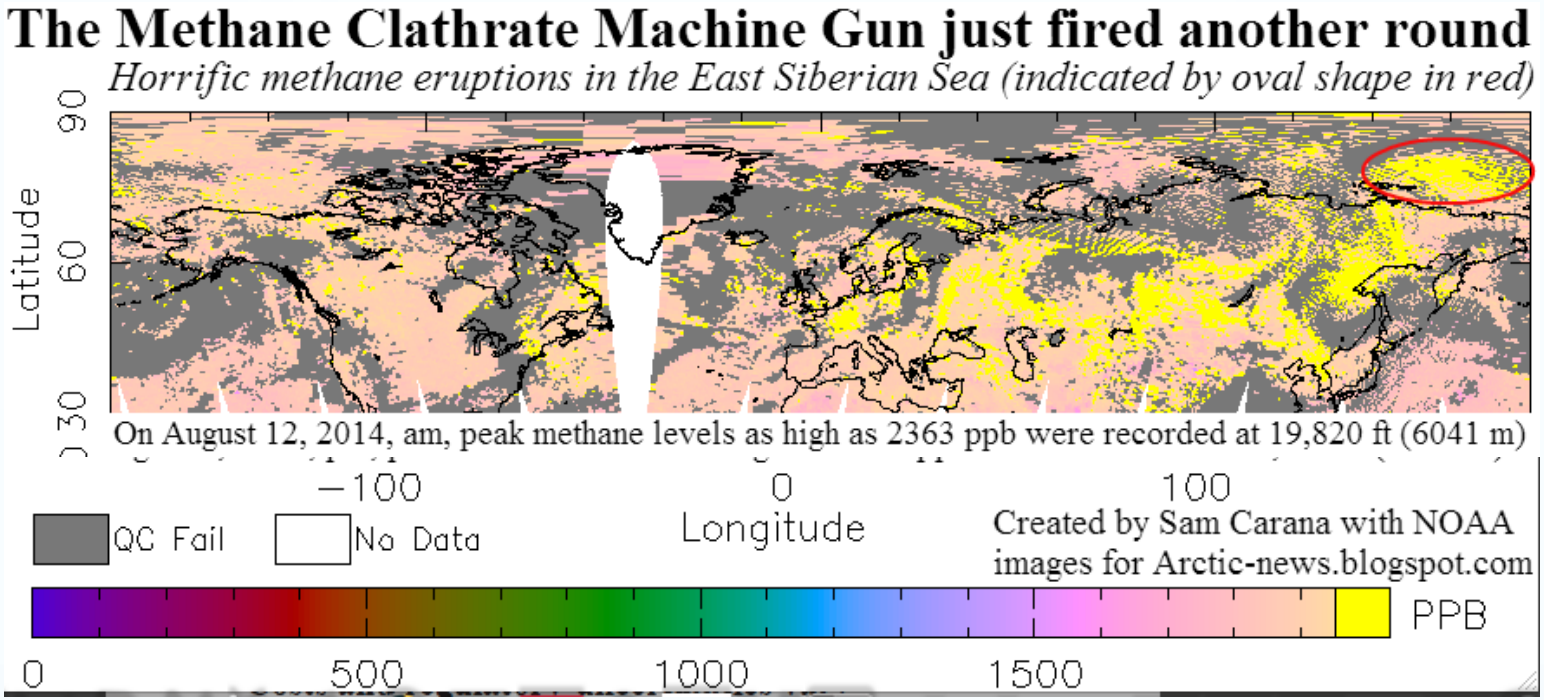
Source: "Arctic Sea Ice Steep Decline Continues," http://arctic-news.blogspot.com, 9 June 2014.



Simple Methane Hydrate Phase Diagram



Full Methane Hydrate Phase Diagram



Arctic specialists worry about CH_4 eruptions in East Siberian Sea

Some eruptions are explosive.

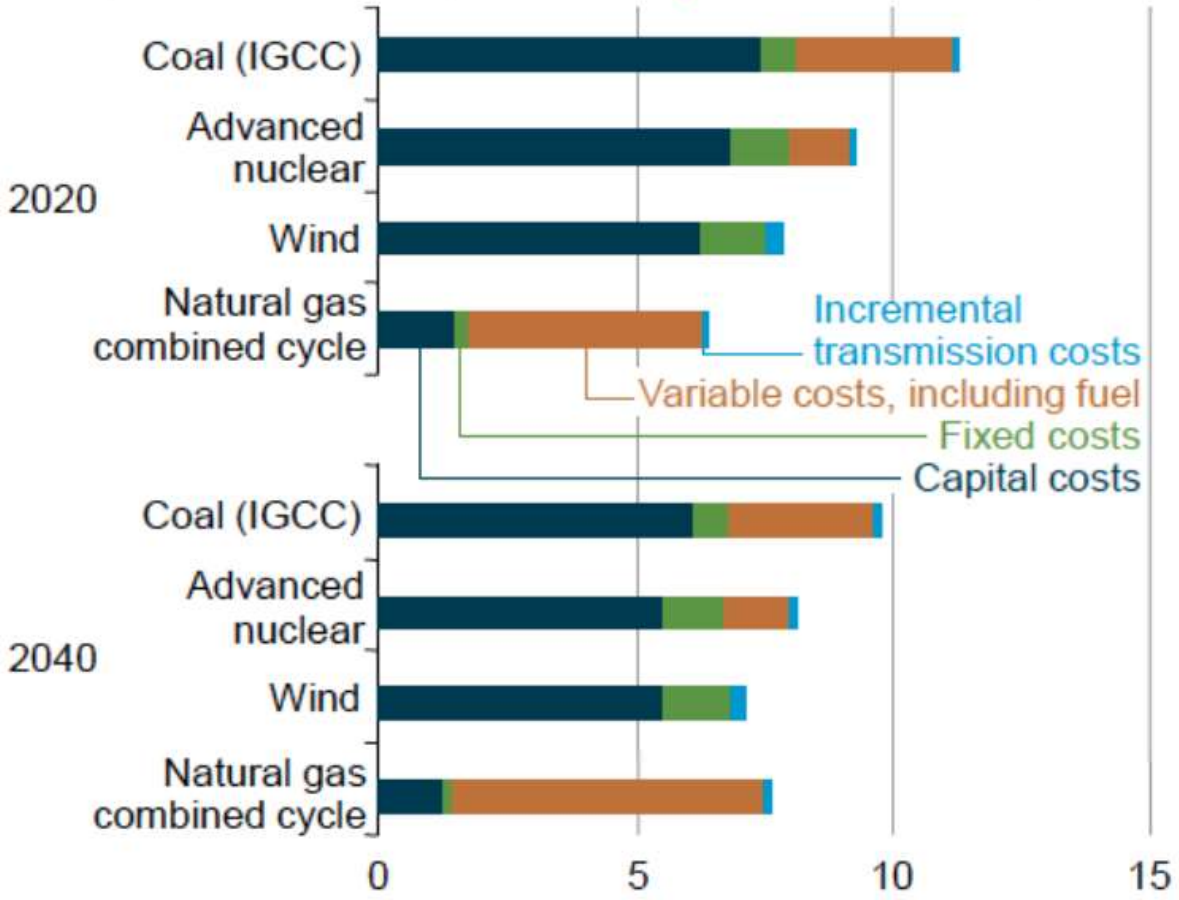
Recent methane crater in Siberia

- **About 80 meters in diameter**
- **60-100 meters deep**

Methane releases may trigger runaway global warming.

Source: http://www.realclimate.org/index.php/archives/2014/08/how-much-methane-came-out-of-that-hole-in-siberia/

Figure MT-34. Average levelized electricity costs for new power plants, excluding subsidies, in the Reference case, 2020 and 2040 (2012 cents per kilowatthour)



Source: Annual Energy Outlook 2014, DOE/EIA-0383(2014), April 2014

Where does Thorium Energy fit into the cost structure of new generating capacity technologies?

It should have lower Capital costs than Advanced nuclear.

The Telegraph

Technology revolution in nuclear power could slash costs below coal

By Ambrose Evans-Pritchard
9:23PM BST 24 Sep 2014

A report by UBS said the latest reactors will be obsolete by within 10 to 20 years, yet Britain is locking in prices until 2060

Scientists have already designed better reactors based on molten salt technology that promise to slash costs by half or more Photo: Getty Images

Source: http://www.telegraph.co.uk/finance/newsbysector/energy/11120003/Technology-revolution-in-nuclear-power-could-slash-costs-below-coal.html

The Alvin Weinberg Foundation in London is tracking seven proposals across the world for molten salt reactors (MSRs) rather than relying on solid uranium fuel.

Unlike conventional reactors, these operate at atmospheric pressure. They do not need vast reinforced domes. There is no risk of blowing off the top.

The Telegraph

Technology revolution in nuclear power could slash costs below coal

Nuclear nations face regulatory issues changing to Thorium

The UK's "principles-based" philosophy of regulation means that a sudden pivot in technology of this kind could be approved very fast, in contrast to the America's "rules-based" system.

"I would never even think of doing it in the US."

Ian Scott,
Alvin Weinberg Foundation

ChEnected AIChE™ Where chemical engineers mix it up.

April 11th, 2014

China Doubles Down on New Thorium Reactor

By Kent Harrington | Comments (0)

As the smoggy skies over China's northern industrial cities thicken into soupy murkiness, life spans plummet and citizens are getting testy. Over a billion sullen people would frighten any politician, elected or not. Ratcheting up a response, concerned leaders just pushed to develop a revolutionary thorium nuclear reactor in only 10 years, elevating a long=term research program to an urgent Manhattan Project. Although it's a symbolic gesture at this point, as an attempt to cut down China's destructive reliance on coal, it plays to the country's reputation as the global infrastructure king after building the Three Gorges Dam and nation-wide high speed rail.

Pollution chokes China's northern industrial cities.

Leaders set 10 year goal for Thorium nuclear reactor.

http://chenected.aiche.org/energy/china-doubles-down-on-new-thorium-reactor/

World Class Thorium Center in India

9 June, 2014

India’s President Pranab Mukherjee addressed the joint session of the Lok Sabha at the Central Hall of Parliament in New Delhi today. He announced a series of programmes on a variety of issues facing the country, of which **power for all by 2022 was one**.

He emphasized India's five Ts: Traditions, Talents, Tourism, Trade and Technology and said the following:

My government recognises the central role of Science and Technology in raising the quality of life. It will encourage and incentivise private sector investments, both domestic and foreign, in science and technology and in high-end research aimed at nurturing innovation. My government will build world class research centres in the fields of nanotechnology, material sciences, **thorium technology***, brain research, stem cells.*

The challenges of global climate change and growing demand for clean energy

converge with the opportunities of Thorium energy.

Thank you