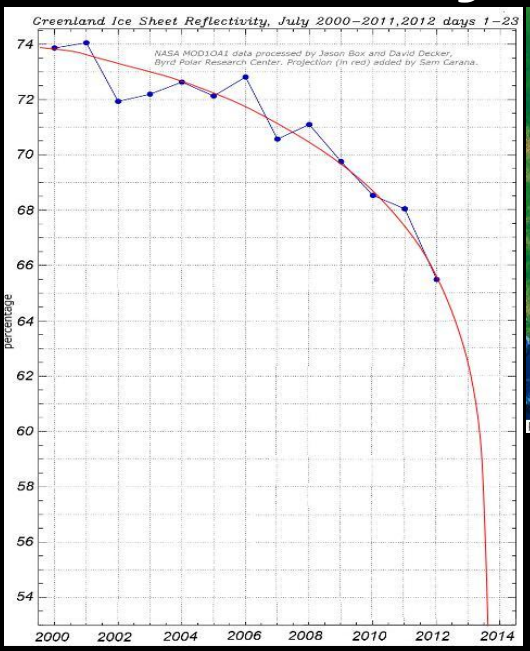
Why act now, and how?

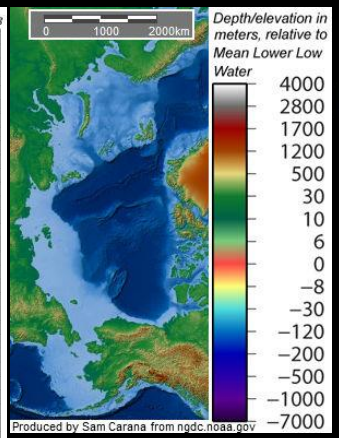
Sam Carana

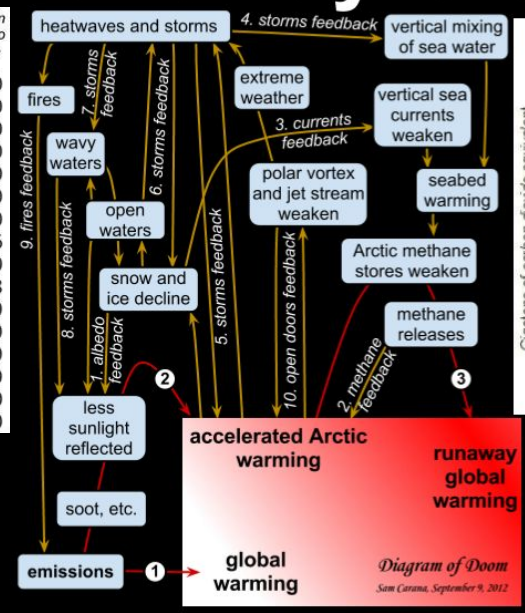
August 27, 2012

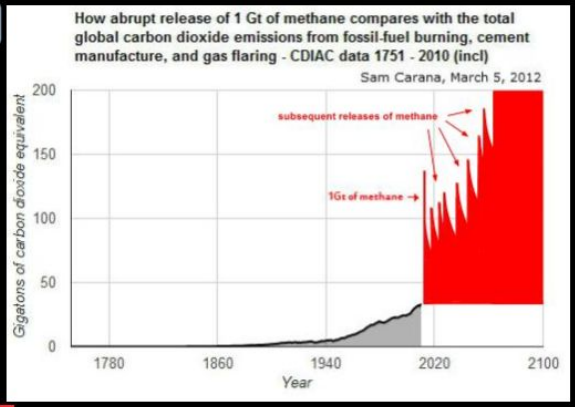
Why?

Runaway Global Warming





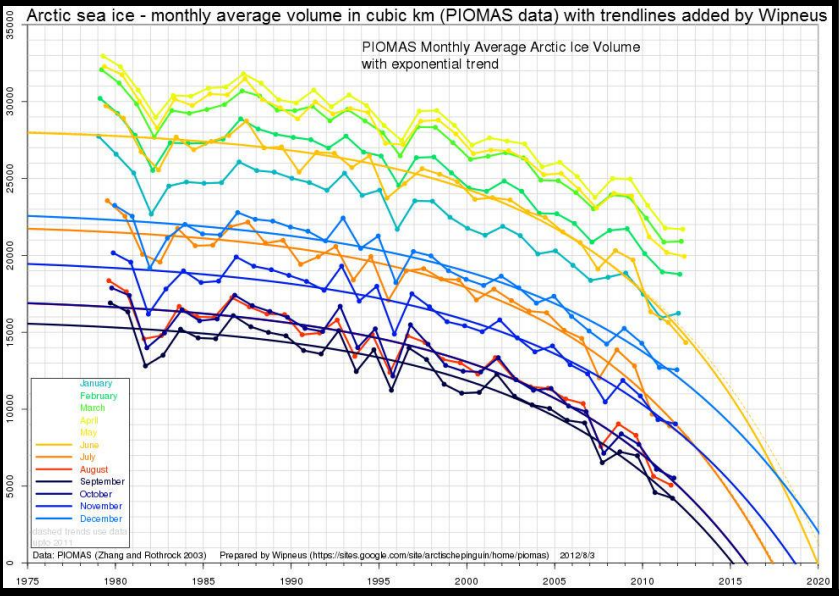


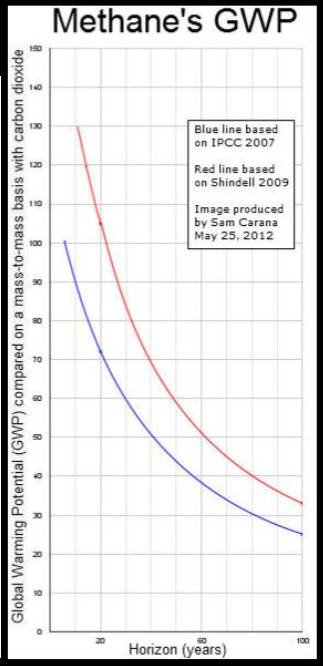


See final slide for references

As rising temperatures change the jet stream, further accelerating Arctic warming, the risk increases of large methane releases in the Arctic.

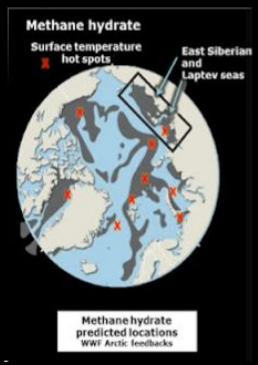
When methane is released in shallow waters, such as is the case in the East Siberian Sea and the Laptev Sea, much of it will rise to the surface without getting oxidized.

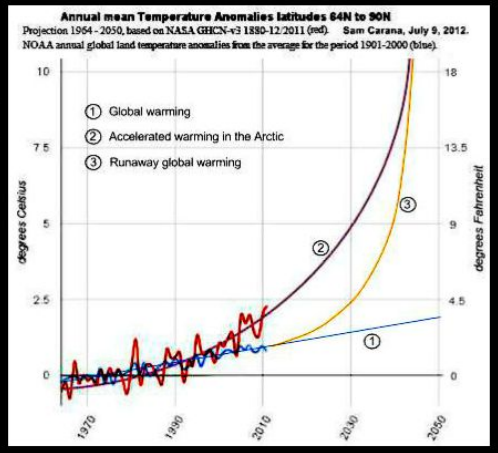




The squared area alone contains up to 1700 Gt of methane, of which 50Gt is ready for abrupt release at any time. Since it will take time for the methane to spread around the globe, such releases will have dramatic warming impact in the Arctic, where hydroxyl levels are also low.

Methane's high short-term global warming potential (GWP) makes that a 1Gt release of methane can dwarf fossil fuel-related CO2 emissions (33 Gt in 2010, CDIAC). Abrupt methane releases in the Arctic have a huge immediate local warming potential (LWP) and threaten to trigger further releases in a vicious cycle escalating into runaway global warming.





Comprehensive Plan of Action

Plan calling upon all nations to commit to effective action to comprehensively deal with climate change and the threat of large methane releases in the Arctic.

Part 1. Reducing oceanic and atmospheric CO2

Part 2. Reducing other pollutants and Arctic geo-engineering

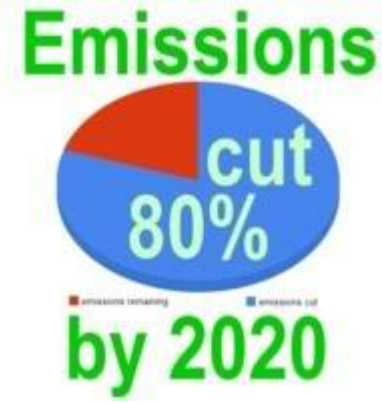
Part 3. Adaptation

1.1. Dramatic cuts in CO2 emissions

Most emissions are energy-related. Dramatic cuts in CO2 emissions can be achieved by electrifying transport and shifting to generation of energy by clean facilities such as solar panels and wind turbines.

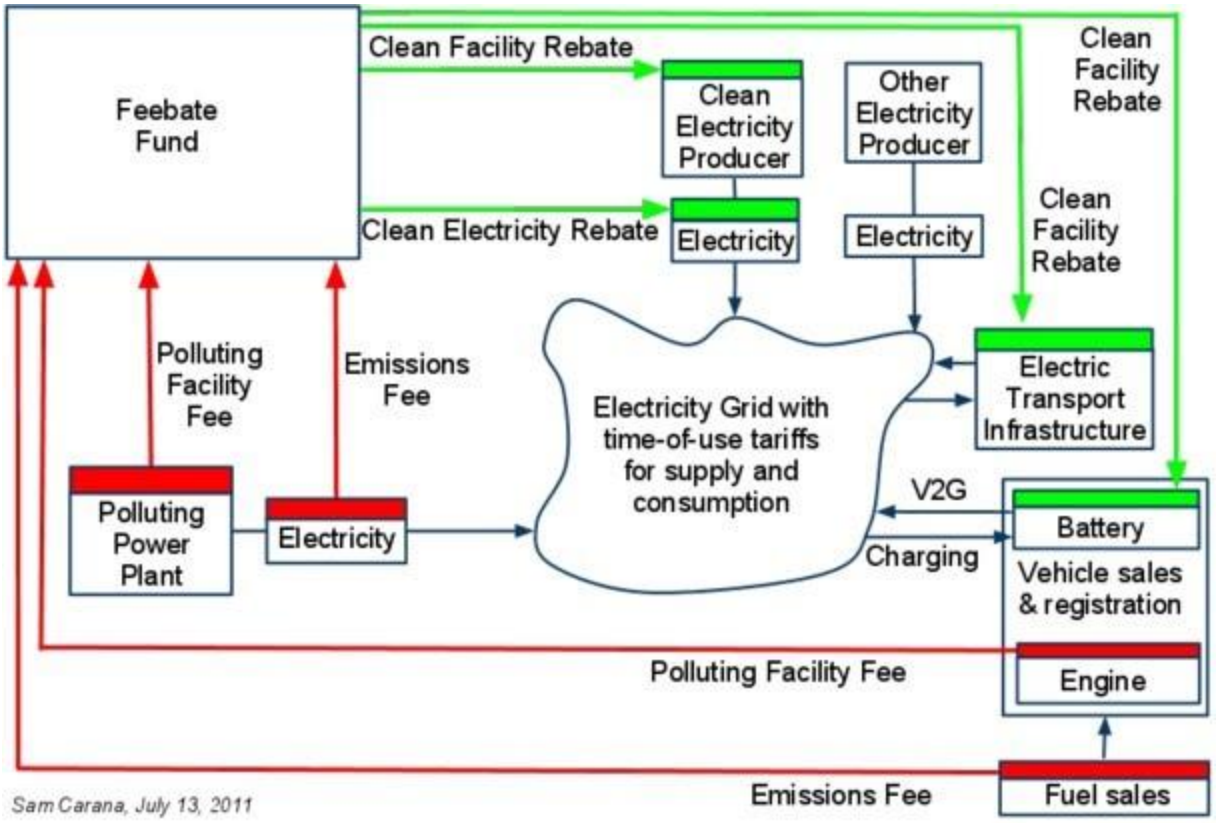
Each nation should aim to reduce their CO2 emissions by a minimum of 8% per year over the next ten years, based on their 2009 emissions, and by 80% by 2020.

Local feebates can most effectively achieve cuts in CO2 emissions; specifically recommended are energy feebates as pictured on the next slide.



Emissions cut 80% by 2020

Energy feebates



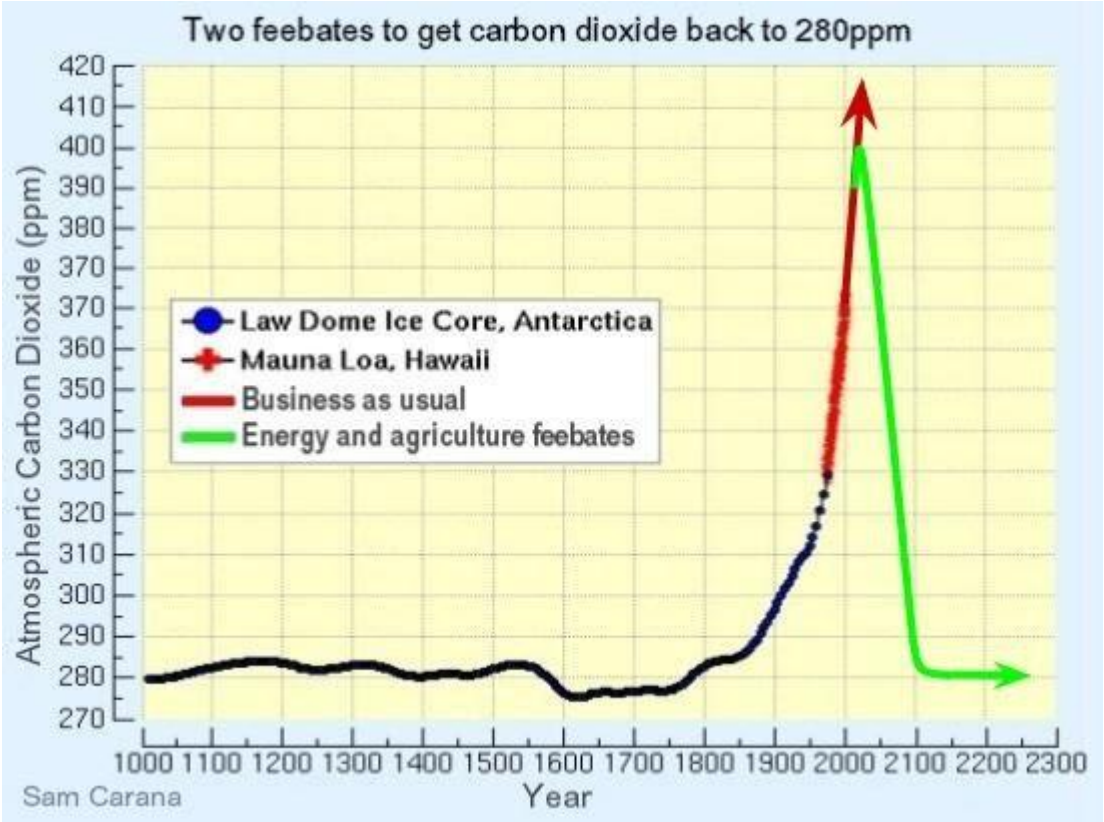
[The way back to 280ppm]

1.2. Carbon removal from the atmosphere and the oceans

Carbon is naturally removed from the atmosphere and the oceans by vegetation, so it makes sense to protect forests and encourage their growth, but this alone will not be enough.

Energy feebates can phase themselves out, completing the necessary shift to clean energy within a decade.

Carbon dioxide removal will need to continue for much longer, so funding will need to be raised from other sources, such as sales of livestock products, nitrogen fertilizers and Portland cement.



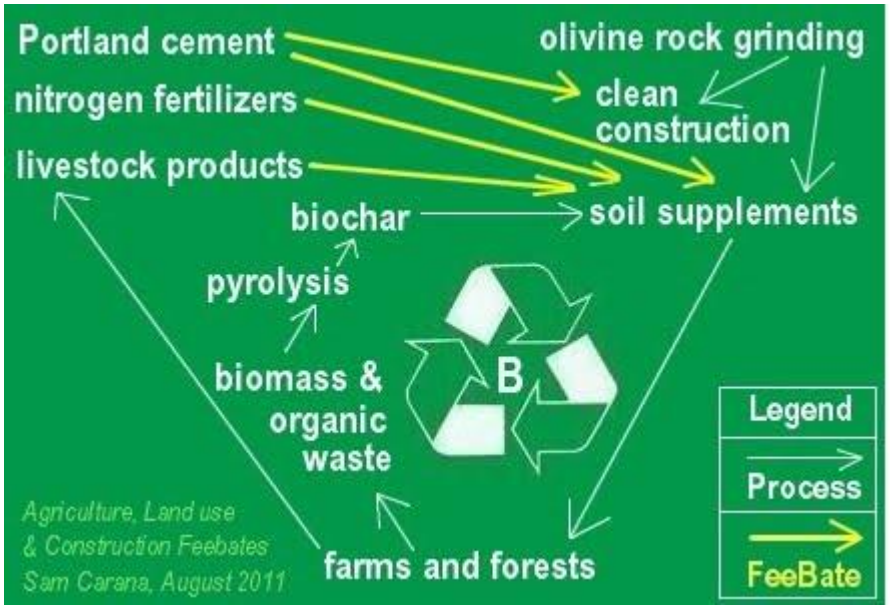
The way back to 280ppm

Agriculture, land use and construction feebates

There are ways to reduce ocean acidification, such as by adding lime to seawater. Carbon capture from ambient air and pyrolysis of surplus biomass with biochar burial are some of the most promising methods to further remove carbon from the atmosphere.

Biochar and olivine sand can also help with afforestation and prevent deforestation and land degradation.

Such feebates also work well together with energy feebates, e.g. funding of carbon air capture could be raised through fees on jet fuel.



The way back to 280ppm

2.1. Phasing out chemical gases with high GWP

Some gases are best phased out through international agreements. This would include gases such as HFC, PTC, SF6, halon, CFC and HCFC.

This can be achieved by protocols (such as a renewed Kyoto protocol, the Montreal Protocol, etc), implemented in national standards and regulations, e.g. regulations calling for deposits (refunded at collection) on products containing certain inorganic pollutants.

Read more at:
Green Refrigerators and Air Conditioners

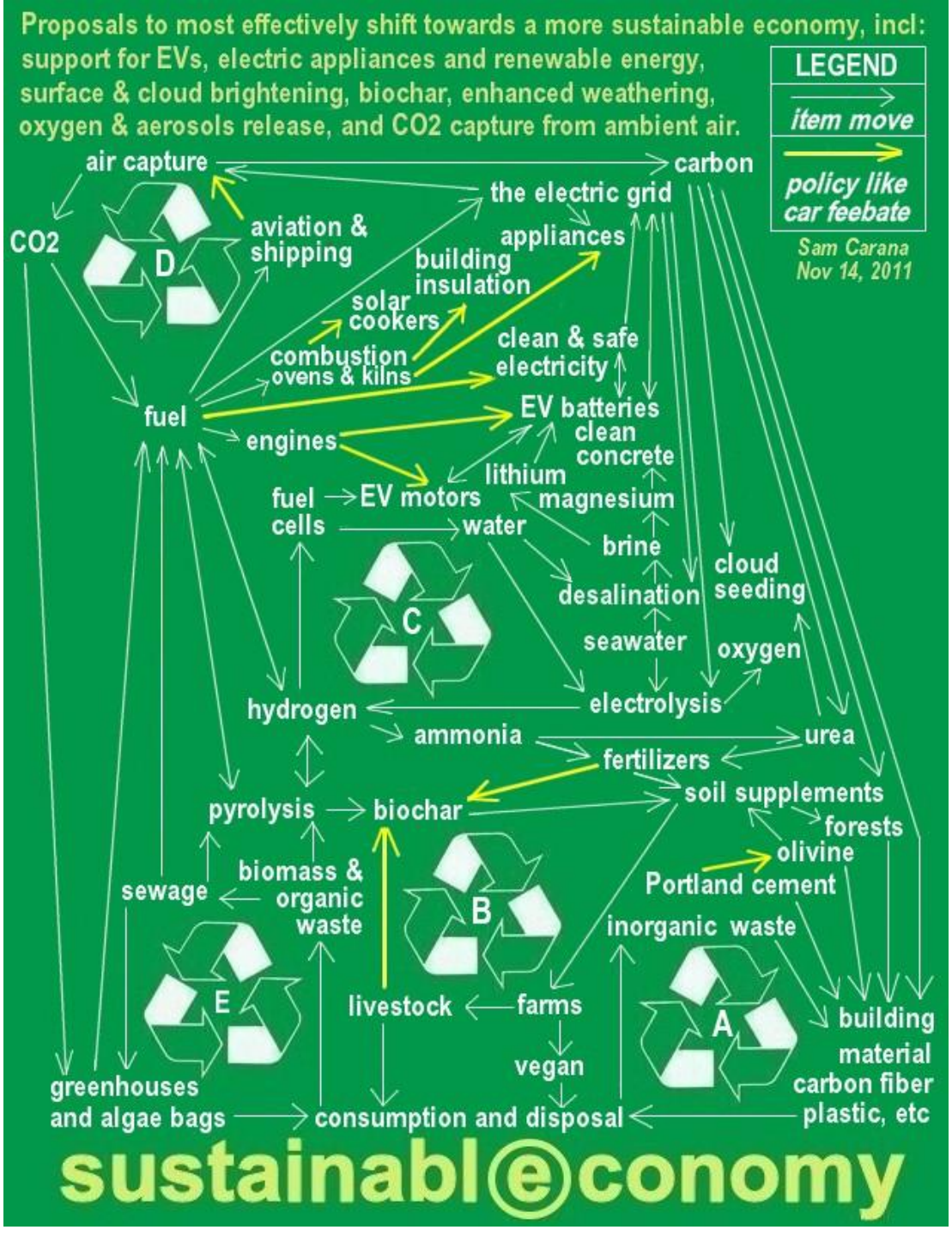
2.2. Reducing emissions of further pollutants

Reductions should also be achieved in emissions of methane, nitrogen oxide (NOx and particularly N2O) and aerosols.

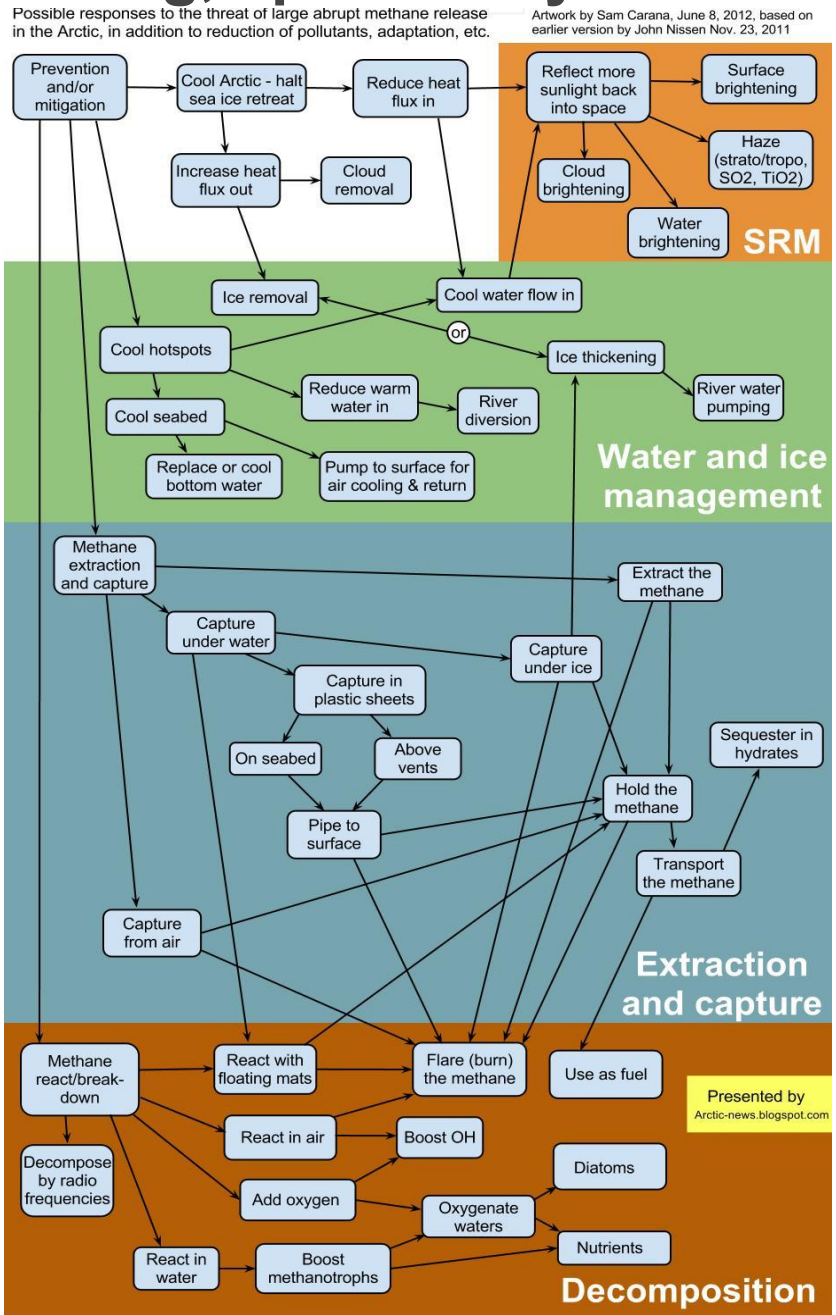
International agreements have been proposed to establish:

- a ban on commercial drilling in the Arctic
- a ban on direct flights over the Arctic
- a ban on agricultural waste disposal by open fires
- a ban on deforestation
- increased monitoring and reporting

Additionally, reductions in short-lived pollutants can be achieved by local feebates, as discussed before, and as pictured on the next slide.


Proposals to most effectively shift towards a more sustainable economy, incl:
support for EVs, electric appliances and renewable energy,
surface & cloud brightening, biochar, enhanced weathering,
oxygen & aerosols release, and CO2 capture from ambient air.
LEGEND
item move
policy like car feebate
Sam Carana
Nov 14, 2011
air capture
carbon
CO2
the electric grid
aviation & shipping
appliances
building insulation
solar cookers
combustion ovens & kilns
clean & safe electricity
fuel
EV batteries
engines
clean concrete
lithium
fuel cells
EV motors
magnesium
water
brine
cloud seeding
desalination
seawater
oxygen
electrolysis
hydrogen
ammonia
urea
fertilizers
soil supplements
pyrolysis
biochar
forests
olivine
Portland cement
sewage
biomass & organic waste
inorganic waste
livestock
farms
building material
carbon fiber
plastic, etc
vegan
greenhouses and algae bags
consumption and disposal
D
C
B
A
E
sustainabl@economy

2.3. Geoengineering, specifically aimed at the Arctic



3.1. Prepare for extreme weather events

Look at safety issues from the perspective of a changed world. It makes sense to prepare for hailstorms, heavy flooding, severe droughts, wildfires, etc., and to grow food that fits such weather patterns best.

Read more at:
Ten Dangers of Global Warming

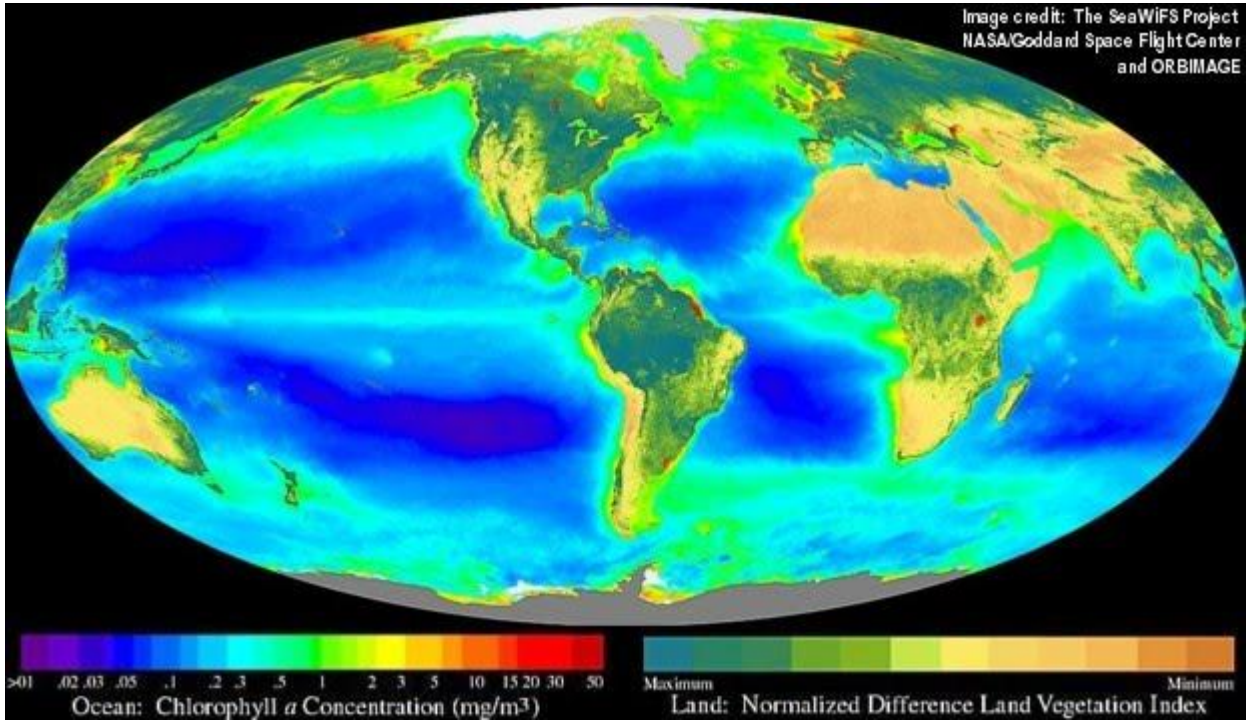
3.2. Preserve biodiversity

Protection of rain forests is well covered in the media. Biodiversity can be further preserved by means of seed banks, parks and wildlife corridors.

Urban Food Forest

3.3. Vegetate

Fresh water supply and food security require extensive planning, such as selection of best crop. Build facilities for desalination both for fresh water in cities and to irrigate and vegetate deserts and other areas with little vegetation.

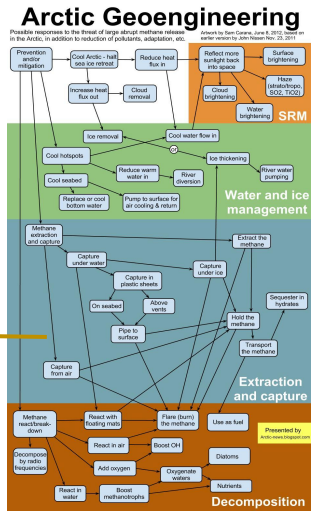


Read more at:
Biomass
Algae Bags
Large areas of open ocean starved of oxygen

References

The image with possible Arctic geo-engineering methods is based on:
How to cool the Arctic
http://arctic-news.blogspot.com.au/p/how-to-cool-arctic.html

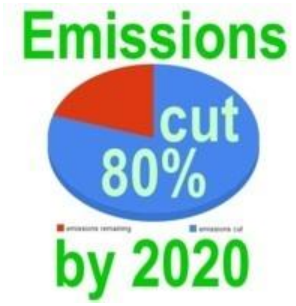
The image is part of a Comprehensive Plan of Action, as described at:
http://arctic-news.blogspot.com/p/comprehensive-plan-of-action.html

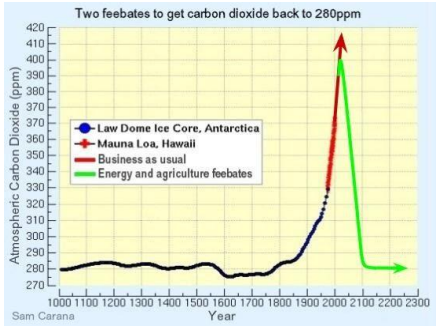


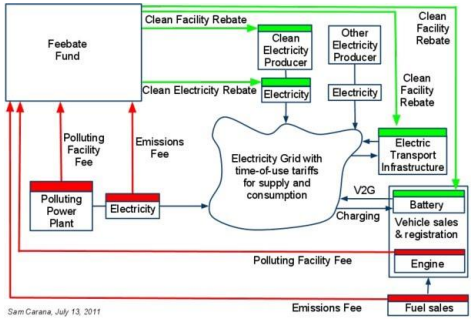
More on other images at:
http://arctic-news.blogspot.com/p/need-for-geo-engineering.html
http://geo-engineering.blogspot.com/2011/11/combining-policy-and-technology.html
http://geo-engineering.blogspot.com/2011/07/way-back-to-280-ppm.html

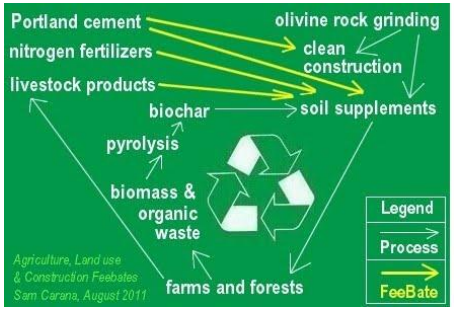
More on the Sustainable Economy at:
http://sustainable-economy.blogspot.com/2011/09/towards-sustainable-economy.html

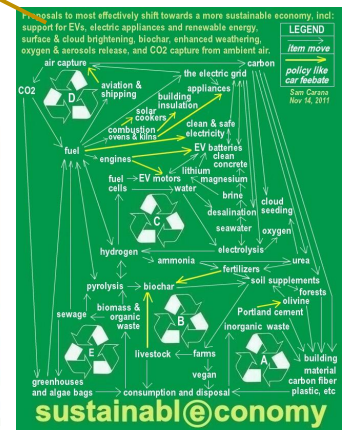
More on feebates at:
http://feebates.blogspot.com/p/feebates.html





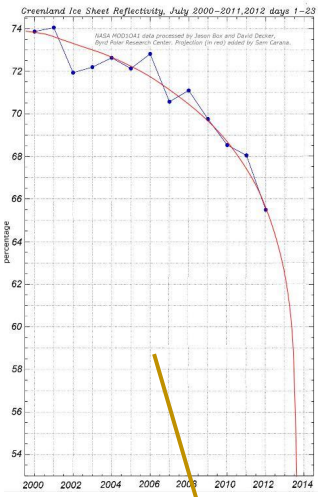




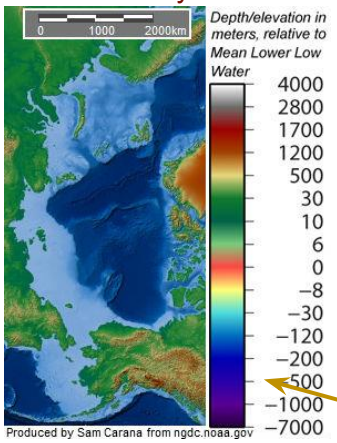


References on top slide

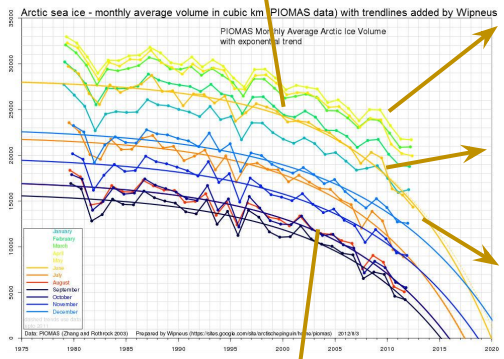
Prints can be ordered of the Runaway Global Warming poster below at Shutterfly (8 x 10 size works best).



Greenland is melting at incredible rate



The potential impact of large abrupt release of methane in the Arctic



Will Arctic sea ice collapse in 2014?

Arctic sea ice volume on track to reach zero around 2015

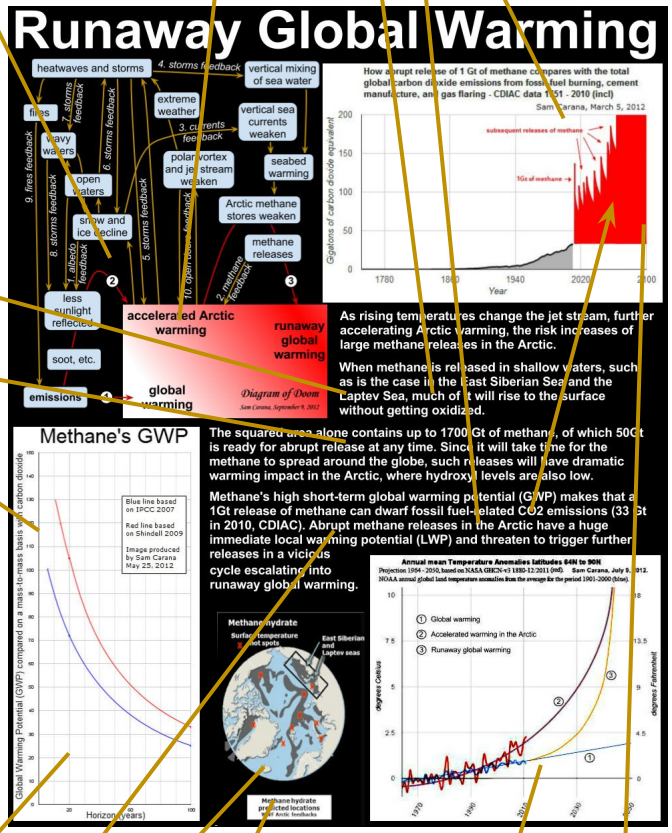
Arctic Sea Ice

Getting the picture

Arctic sea ice volume on track to reach zero around 2015

Diagram of Doom

How extreme will it get?



Methane's Global Warming Potential

How much time is there left to act?

Striking increase of methane in the Arctic