

# The Low Carbon Fuel Standard

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## Scientists fear ice caps melting faster than predicted

**Paul Brown in Ilulissat**  
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[Guardian Unlimited](#)

The Greenland ice cap is melting so quickly that it is triggering earthquakes as pieces of ice several cubic kilometres in size break off. Scientists monitoring events this summer say the acceleration could be catastrophic in terms of sea-level rise and make predictions this February by the Intergovernmental Panel on Climate Change far too low.

The glacier at Ilulissat, which supposedly spawned the iceberg that sank the Titanic, is now flowing three times faster into the sea than it was 10 years ago.

Robert Correll, chairman of the Arctic Climate Impact Assessment, said in Ilulissat today: "We have seen a massive acceleration of the speed with which these glaciers are moving into the sea. The ice is moving at two metres an hour on a front 5km [3 miles] long and 1,500 metres deep. That means that this one glacier puts enough fresh water into the sea in one year to provide drinking water for a city the size of London for a year." Prof Correll is visiting Greenland as part of a symposium of religious, scientific, and political leaders to look at the problems of the island, which has an ice cap 3km thick containing enough water to raise worldwide sea levels by seven metres.

Prof Correll, director of the global change programme at the Heinz Centre in Washington, said the estimates of sea level rise in the IPCC report were conservative and based on data two years old. The predicted rise this century was 20cm to 60cm, but it would be at the upper end of this range at least, he said, and some believed it could be two metres. This would be catastrophic for European coastlines.

He had flown over the Ilulissat glacier and "seen gigantic holes in it through which swirling masses of melt water were falling. I first looked at this glacier in the 1960s and there were no holes. These so-called moulins, 10 to 15 metres across, have opened up all over the place. There are hundreds of them."

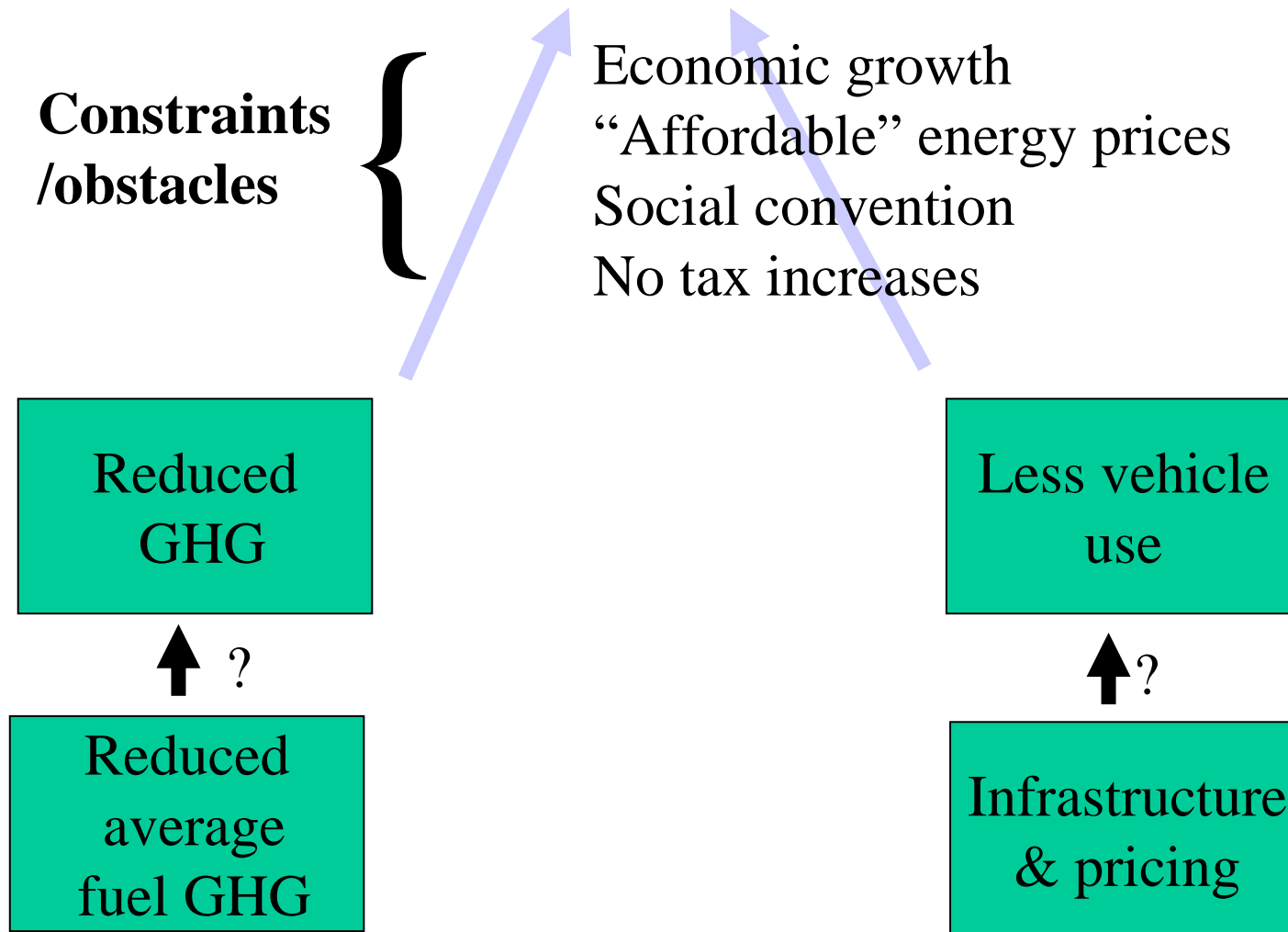
He said ice-penetrating radar showed that this melt water was pouring through to the bottom of the glacier creating a lake 500 metres deep which was causing the glacier "to float on land. These melt-water rivers are lubricating the glacier, like applying oil to a surface and causing it to slide into the sea. It is causing a massive acceleration which could be catastrophic."

The glacier is now moving at 15km a year into the sea although in surges it moves even faster. He measured one surge at 5km in 90 minutes - an extraordinary event.

Veli Kallio, a Finnish scientist, said the quakes were triggered because ice had broken away after being fused to the rock for hundreds of years. The quakes were not vast - on a magnitude of 1 to 3 - but had never happened before in north-west Greenland and showed the potential for the entire ice sheet to collapse.

Prof Correll said: "These earthquakes are not dangerous in themselves but the fact that they are happening shows that events are happening far faster than we ever anticipated."

# Slow/stabilize/reverse climate change



# LCFS has three overarching goals

- 1. Deploy near-term technologies to cut emissions soon**
- 2. Stimulate innovation & investment in new technologies needed to meet climate stabilization targets by mid-century**
- 3. Respect related objectives**
  - Economic growth
  - Air quality
  - Low energy costs
  - Diversity of energy sources
  - etc.

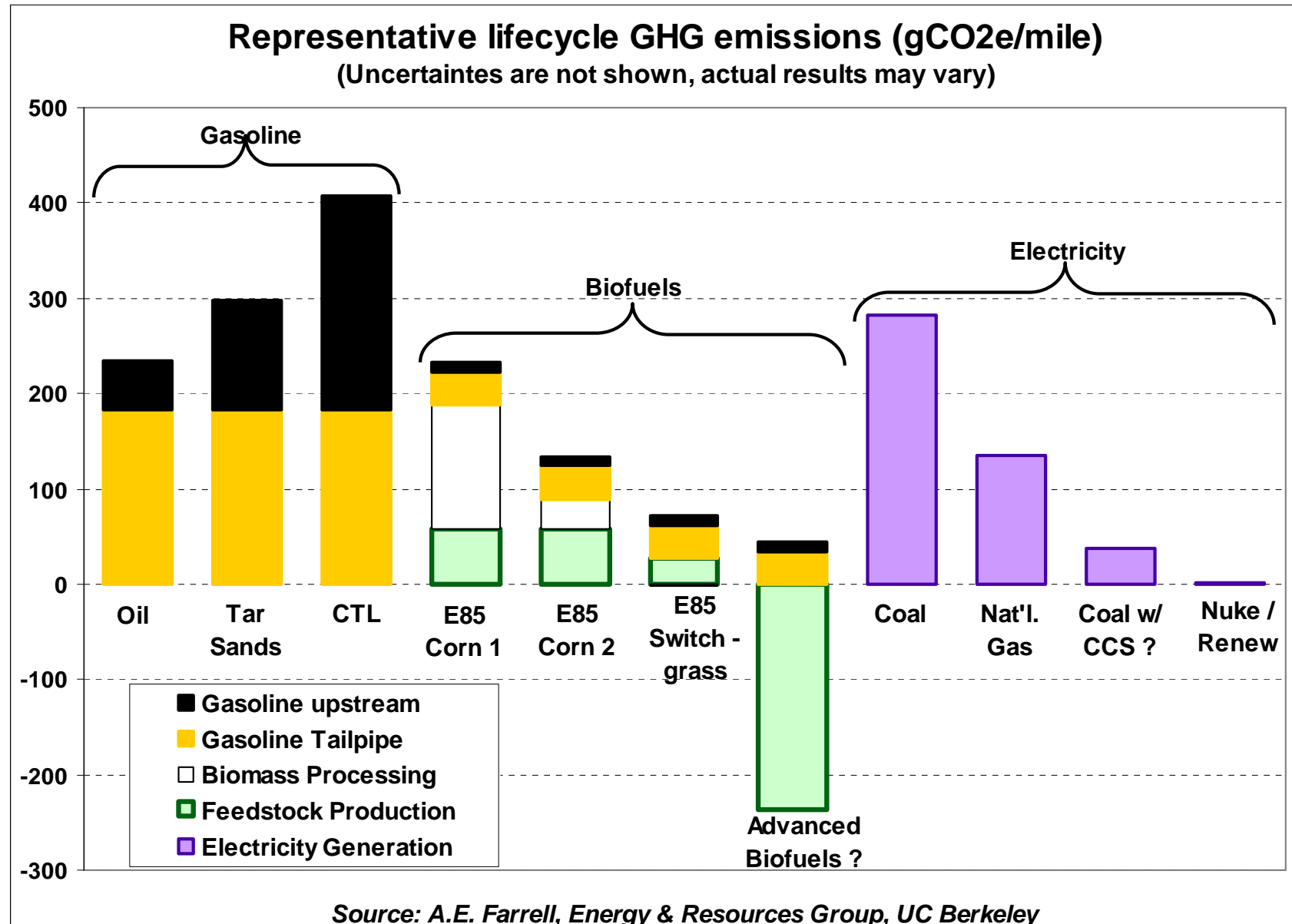
# Climate stabilization requires multiple policies

- **Multiple market imperfections in transportation create the need for complements to economy-wide policies**
  - Inadequate R&D; Market power; Network effects; Infrastructure; Social convention; High private discount rates
- **Technological innovation is needed in every sector, which economy-wide policies cannot achieve**
- **Price Implications of a \$25/ton CO<sub>2</sub> price**
  - Nuclear + renewable electricity \$0.01/MWh
  - Integrated gasification combined cycle with carbon capture and storage (IGCC+CCS) \$02.50/MWh
  - Natural gas combined cycle (NGCC) \$12.50/MWh
  - Pulverized coal (PC) \$20.00/MWh
  
  - Gasoline \$0.22/gallon
  - Corn ethanol \$0.11 to \$0.23/gallon

# LCFS basics

- **Carbon intensity must be measured on a lifecycle basis**
  - Average Fuel Carbon Intensity (AFCI) measured in gCO<sub>2</sub>e/MJ
  - Adjusted for inherent drivetrain efficiency: Gasoline = 1.0 by definition, Diesel = 0.78, Electricity = 0.20, H<sub>2</sub> = 0.47
  - AFCI must decline by at least 10% by 2010
- **Compliance by manufacturers or importers of fuels (mostly oil refiners)**
- **Performance standard (no 'picking winners')**
- **Additional to vehicle performance standards**
- **Overcompliance creates credits that can be traded or banked**
- **Similar to emerging European approach to biofuels**

# GHG emissions depend on how the fuel is made



# Default and opt-in approach

- **Fuel providers (oil refineries) meet a declining average carbon fuel intensity target**
- **Default: all fuel inputs are assigned a carbon intensity**
  - Fuel inputs must be categorized
  - Highest value in common use is the default value
  - Encourages opt-in and focuses management attention
- **Opt-in: suppliers with low carbon intensity are certified**
  - Requires protocol development and data collection
  - Certifiers are needed
- **Example of one set of defaults:**
  - Gasoline: conventional oil, heavy oil, tar sands, coal
  - Diesel: conventional oil, heavy oil, tar sands, coal
  - Ethanol: U.S. corn, Brazilian sugar, U.S. switchgrass



# Global perspective

- **California:** LCFS regulations to be in effect 2010
- **Federal regulations:** LCFS+CAFE rule final by Dec 2008
- **Federal bills:** Boxer, Feinstein, Obama, Inslee, Dingle-Boucher, etc.
- **European Union:** monitoring in 2009, reductions in 2011
- **United Kingdom:** Renewable Transportation Fuel Obligation (like a RFS) requires GHG monitoring in 2007
- **Germany:** Sustainability requirements for biofuels
- **Other states and provinces:** BC, WA, ON, OR, AZ, NM, MA, MN...

# Key issues and questions

- **Basis of competition**

  - Electricity**

  - Rate-of-return regulation

  - All emissions capped (?)

  - Local

  - “Ratepayer subsidies”

  - Oil**

  - Competitive

  - Intensity target

  - Global

  - “Capital at risk”

- **Including “upstream” emissions for oil production**

- **Rationalization (aka “leakage”)**

- **LCA methods and compliance tools**

  - Better data, transparency, better tools, land use change

- **Compliance schedule and time for innovation/investment**

- **Complementary regulations and government actions**

- **Availability of offsets, interactions with cap and trade**

- **Land use change**

# Thank You

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