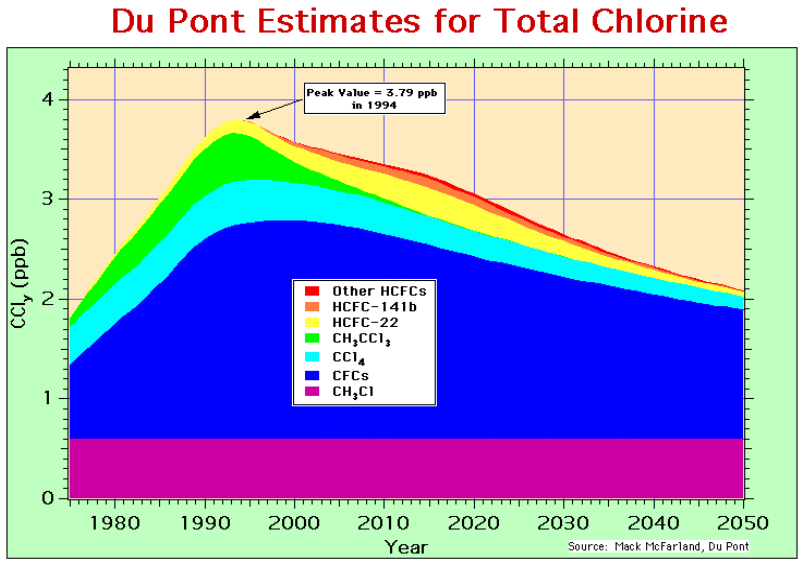
Technology Policy

CFCs and the ZEV mandate



International Conference on Technology Policy & Innovation, Lodz, July 2005

Karel Mulder

January 7, 2010

TPM, T&DO

Delft University of Technology

Why do Governments Intervene?

Always limited appropriation

Total benefits always larger than investors benefits

Why do Governments Intervene?

Undesired results of free market

- Pollution
- Privacy
- Threats to the individual (prisoners dilemmas)
- Inequity (medicine, etc.)

Prisoner's dilemma

		Prisoner B: Stays silent	Prisoner B: Confesses
Prisoner A	Stays silent	1 year for A 1 year for B	10 years for A No jail for B
	Confesses	No jail for A 10 years for B	5 years for A 5 years for B

Examples: Not driving during SMOG alarms, Buying environmentally sound products, Driving your child to school

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Why do Governments Intervene?

- Structure of sector
  (R&D needs minimum scale, cf. agriculture)


FOKKE & SUKKE
GAAN ER METEEN WAT AAN DOEN
DE VERVUILING OVERSCHRIJDT ALLE NORMEN!
WAAR IS DE LUL DIE DE NORMEN HEEFT VASTGESTELD?!!
RGVT
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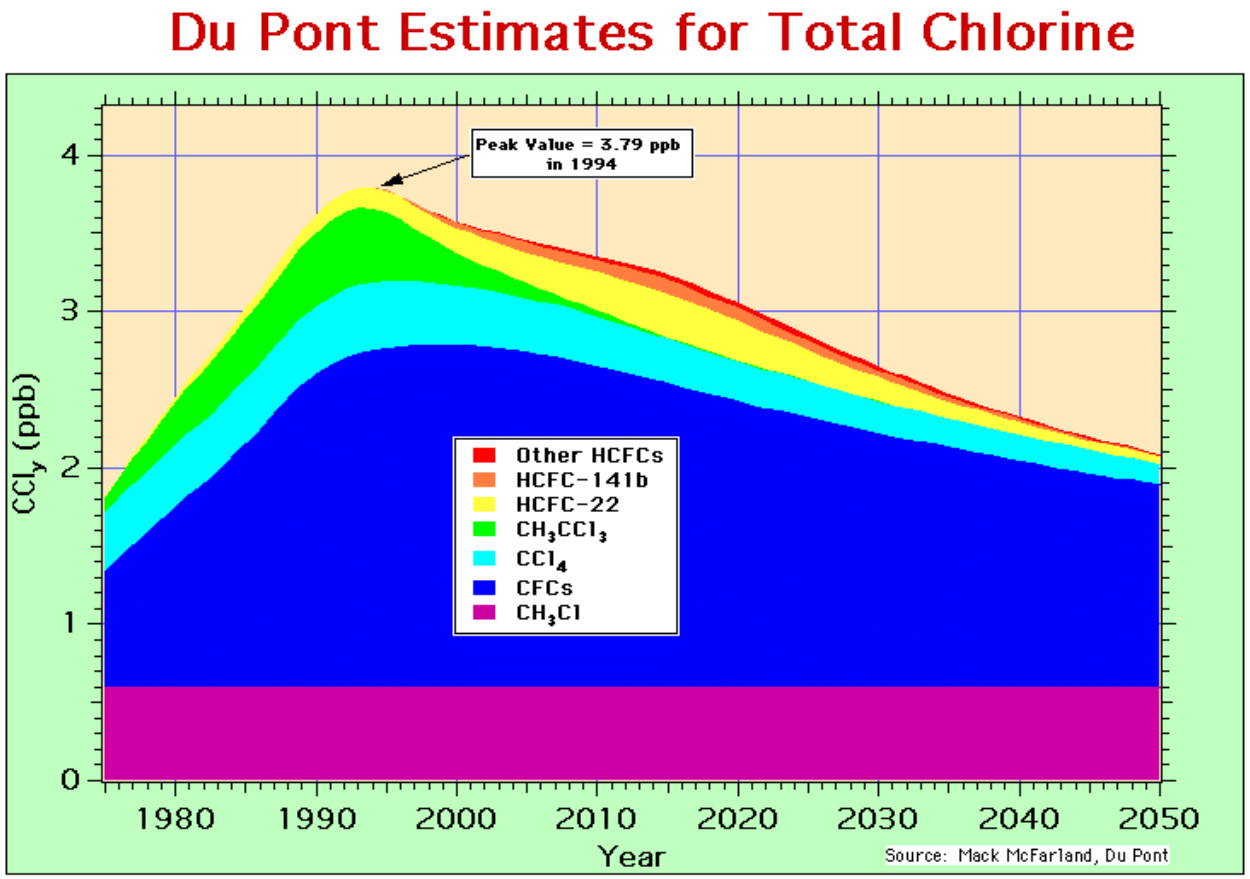
Example Ozone/cfc game



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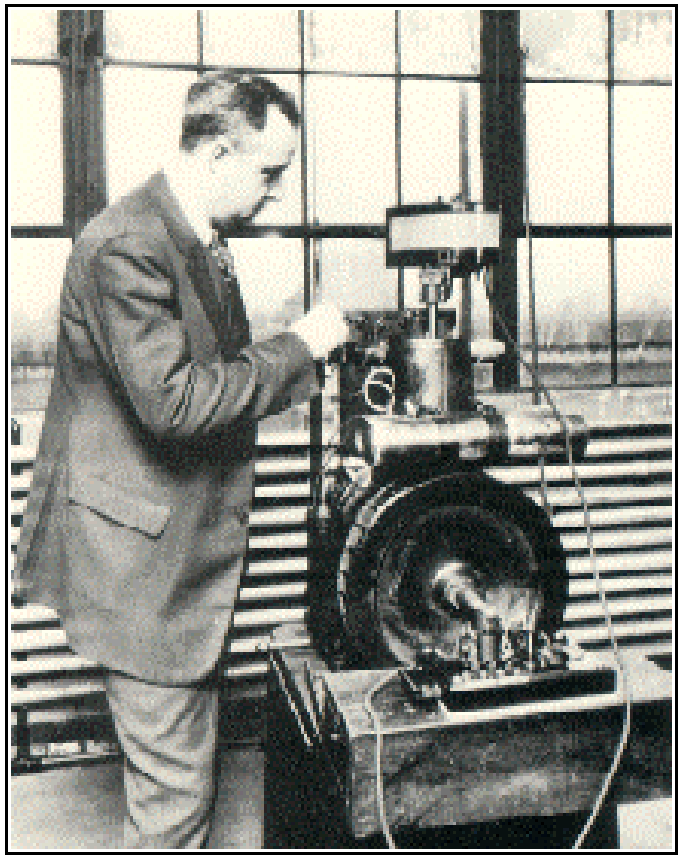
Chloro-Fluoro-Carbons

1928 Synthesis by Thomas Midgley
1930 Refrigerant
1932 Airconditioners
1949 spray can
1961 Gaseous insulators & Foams
~1965 degreaser micro-electronics



Thomas Midgley Jr.

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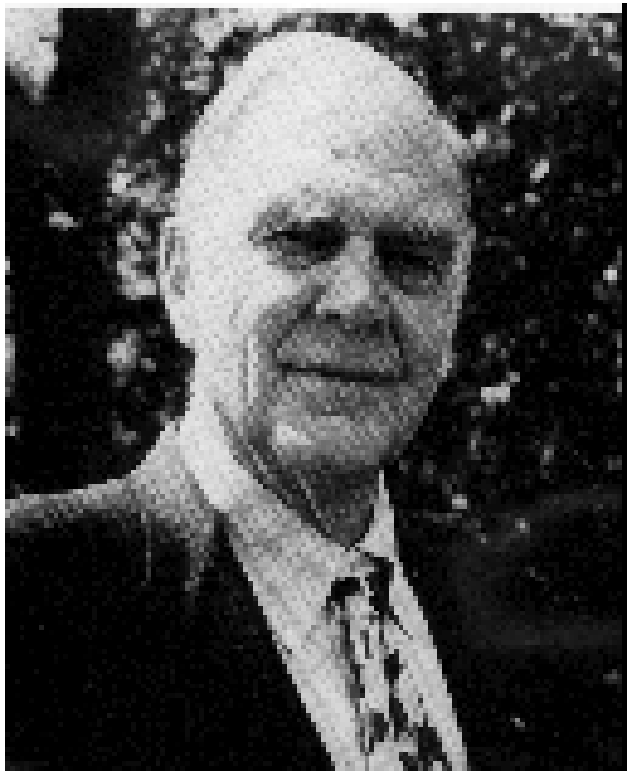
1970 Lovelock traces CFC's in wind at Western Ireland
1974 F. Sherwood Rowland (UC-Irvine), Mario Molina



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Reactions to Rowland / Molina paper

World wide media attention

Market demand for spray cans diminishes (25 %)
EPA could take drastic measures

1978: USA, Canada, Norway and Sweden prohibit non-essential use spray cans

Innovation in Spray cans

CO_2, air
Di-methyl-ether and Propane/Butane unsafe
not in kind: different packaging

CFCs disappeared from spray cans in the 80s

Reluctance

1981 EPA: relation CFC-ozone layer *'highly controversial'*

Models predicted less harm to ozone layer

No empirical confirmation of ozone destruction

Less media attention

Industry does not react

CFC market still grows

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Policy Development

1974-’85 Precautionary Principle?

May 1985 Discovery ‘hole’

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1987: The Montreal Protocol

1999 Reduction by 50%

Flexibility

UNEP: Technical Options Committees

Diffusion of expertise by reports, symposia etc.

1987-90 Further proof regarding role CFCs in Antarctic Ozone hole
London/Copenhagen protocol: phase out in 1995, 3rd world in 2005

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Technological Innovation due to the Montreal Protocol

Refrigerators

- pressure Greenpeace, public: Foron Greenfreeze: propane/butane

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Micro Electronics

CFCs to degrease printed circuit boards

1988 Industry: *“There is no alternative”*

Industry Cooperative for Ozone Layer Protection
R&D Exchange

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Innovation in Micro-electronics

No clean

Water and dryer

Ford saved $18 million annually by not using CFCs but needed change teams to convince its own engineers

'What I liked was that it wasn't the autocratic "I'm the government and if you guys don't play ball" approach'

(Jay Baker, Ford Motor company)

The most successful innovations were produced in strongly interactive environments (ICOLP, Greenpeace/Foron)

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Conclusion

CFC replacement has been more successful than could initially be expected

Reagan/Bush sr. anti-regulation policy blessing in disguise?

International obligations increased the credibility of government measures

Paralyzing legal actions were absent