



# Environmental Issues

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International Fire & Cabin Safety Research Conference

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# Overview

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- Ozone Depletion
  - Montreal Protocol
  - EU ODS Regulations
  - ICAO Resolution
- Climate Change
  - Science
  - Policy – International, Europe, United States
  - Impact on Fire Protection

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# Montreal Protocol

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- Montreal Protocol on Substances that Deplete the Ozone Layer is generally considered to be the most successful environmental treaty
- Over 190 countries agreed to a production phase out of ODS that has been implemented with relatively few compliance issues
- If remaining MP provisions are implemented, the concentration of ODS in the atmosphere is expected to fall to pre-ozone hole levels found in the early 1980s by around 2050

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# Montreal Protocol

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- Phase out of halon production under the Montreal Protocol is complete worldwide
- Halon 1301 is still manufactured in Europe and China as feedstock for pesticide production
- Phase out of HCFC production for fire protection uses scheduled for 2020/2030
- Aviation currently developing a new halon alternative (BTP) that may have very small ODP
- HTOC has asked Parties for guidance on the viability of low-GWP, very low-ODP agents

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# EU ODS Regulations

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- European Union banned all non-critical uses of halons in 2003
- Critical uses are listed in the current Annex VI to Commission Regulation (EC) No. 1005/2009
- All current onboard uses of halons in aviation are included on the critical use list
- Annex VI was revised in August and now contains “cut-off dates” for use of halons in new equipment or facilities and “end dates” when all halons must be decommissioned

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# EU ODS Regulations

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- Dates for aviation critical uses (cut-off dates are for application for new Type Certificate):
  - Cargo compartment fixed systems - cut-off date is 2018, end date is 2040
  - Cabin/crew portables - 2014, 2025
  - Engine nacelles and APU - 2014, 2040
  - Lavatory (potty bottles) - 2011, 2020
  - Dry bays - 2011, 2040
  - Inerting of fuel tanks - 2011, 2040

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# ICAO Resolution

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- A new resolution on halon replacement was adopted at the 37<sup>th</sup> Session of the ICAO Assembly in September
- It replaces Resolution A36-12 adopted in 2007
- A36-12 was result of Montreal Protocol Decision XV/11 calling on TEAP to work with ICAO
- The new resolution was supported by the aviation industry (ICCAIA)

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# ICAO Resolution

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- *Agrees* with the urgency of the need to continue developing and implementing halon alternatives for civil aviation
- *Urges* States to intensify development of acceptable halon alternatives for fire extinguishing systems in cargo compartments and engine/APUs, and to continue work towards improving halon alternatives for hand-held fire extinguishers



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# ICAO Resolution

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- *Directs* the Council to establish a mandate for the replacement of halon:
  - in lavatory fire extinguishing systems used in aircraft produced after a specified date in the 2011 timeframe
  - in hand-held fire extinguishers used in aircraft produced after a specified date in the 2016 timeframe
  - in engine and auxiliary power unit fire extinguishing systems used in aircraft for which application for type certification will be submitted after a specified date in the 2014 timeframe

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# ICAO Resolution

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- *Directs* the Council to conduct regular reviews of the status of potential halon alternatives
- *Urges* States to verify the quality of halon and request certification documentation to a recognized international standard
- *Encourages* ICAO to continue collaboration with the IASFPWG and the UNEP HTOC
- *Urges* States to inform ICAO of halon reserves
  - Aviation halon use will continue for at least 30 years

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# ICAO Resolution

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- The ICAO Air Navigation Commission will consider proposed amendments to Annex 6 – Operation of Aircraft, and Annex 8 – Airworthiness of Aircraft, in order to implement the new resolution
- The ICAO Council must approve the changes to the Annexes by July 2011 in order to meet the dates mandated in the resolution

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# Climate Change - Science

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- Intergovernmental Panel on Climate Change (IPCC) produces international assessments on the science of climate change
- Reports are produced and reviewed by over 2,000 contributors
- Completed 4th assessment report in 2007
- “Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the increase in anthropogenic greenhouse gas concentrations”

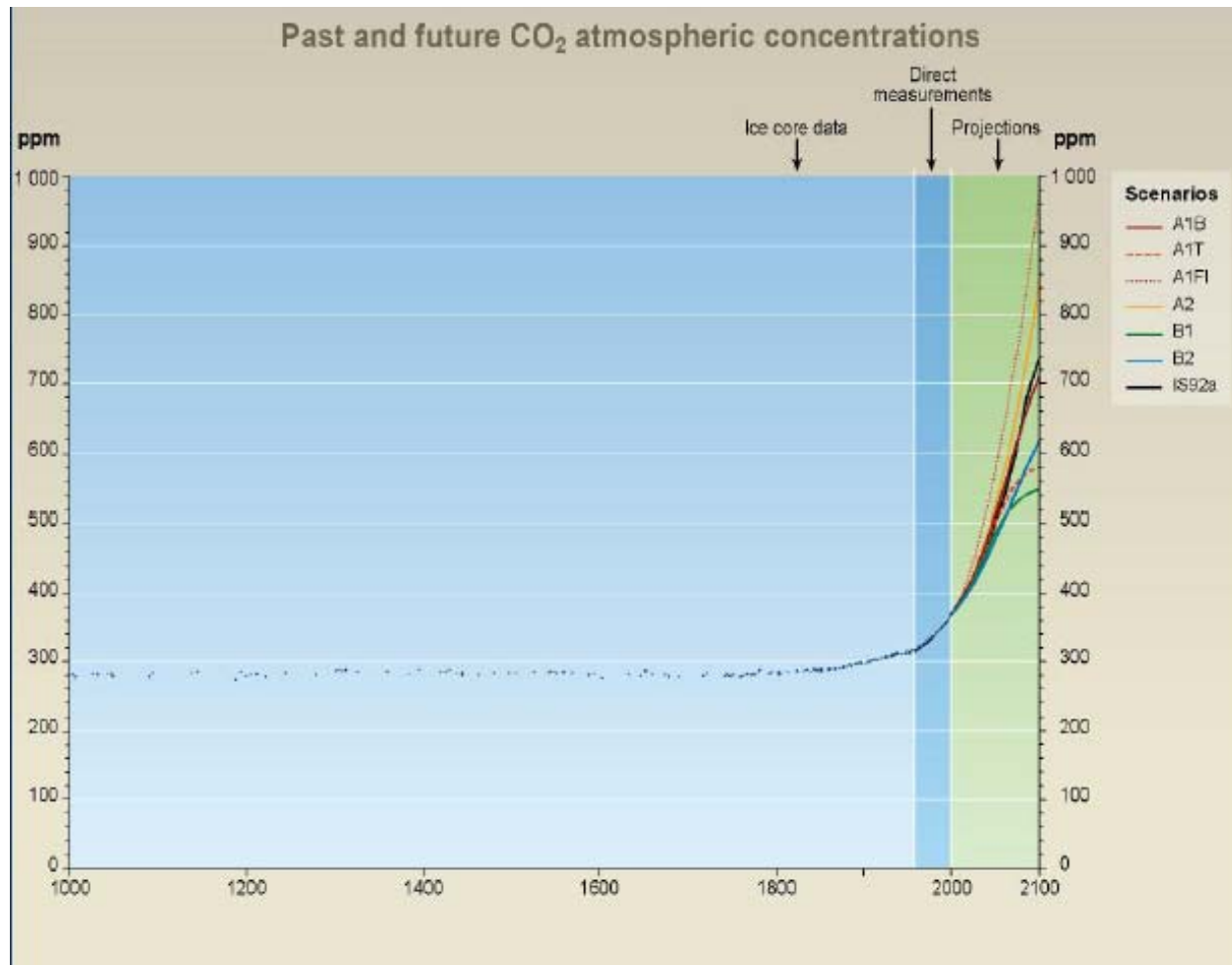
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# Climate Science

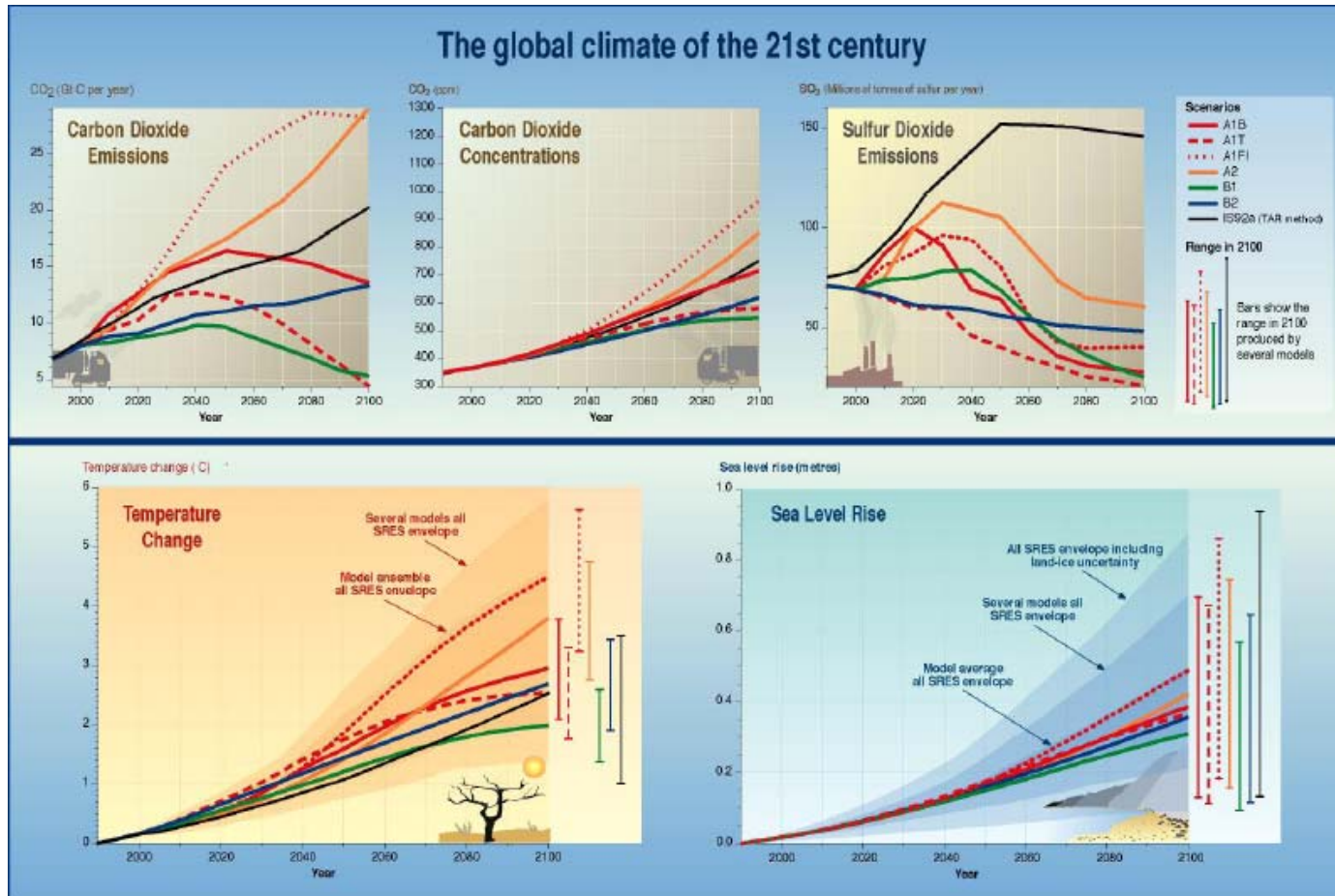
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- US National Academy of Sciences recently released three climate change reports requested by Congress that cover science, mitigation (limiting emissions), and adaptation
- Science report concludes that “climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems”
- Mitigation report concludes there is “urgent need for U.S. action to reduce greenhouse gas emissions”

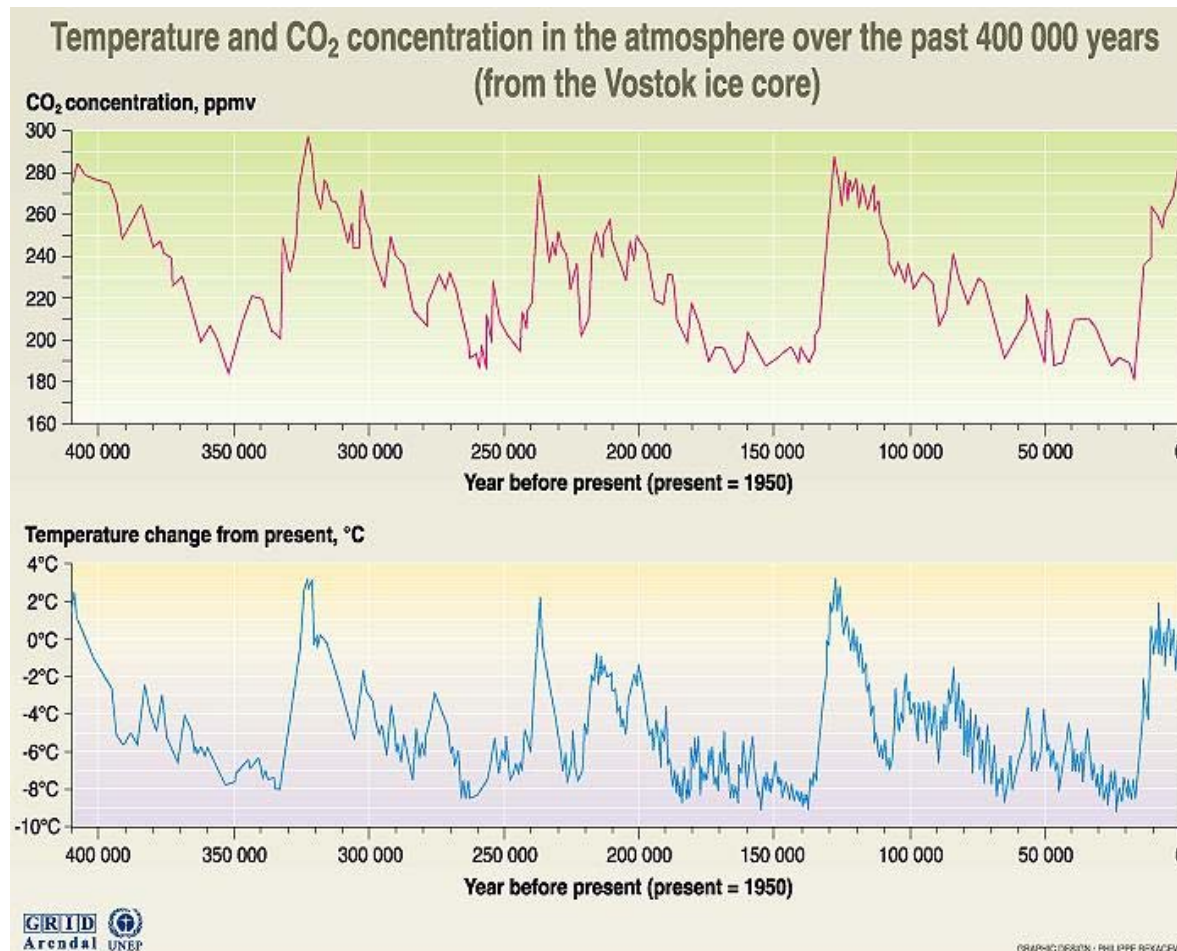
# Climate Science



# Climate Science



# Climate Science





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# Climate Science

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- Recent revelations from emails about IPCC scientists “hiding” contradicting data
- Errors in 2007 IPCC report related to Amazon rain forest endangerment, Netherlands/sea level, Himalayan glaciers
- Raised questions about climate science and about the methods of the IPCC
- Independent scientific reviews have concluded that IPCC findings are generally sound
- Impact on public opinion about the climate issue

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# Climate Science





# Climate Policy - International

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- Kyoto Protocol
  - Worldwide differentiated target of 5.2% reduction in GHG emissions from 1990 levels between 2008-2012
  - CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, **HFCs**, PFCs, SF<sub>6</sub>
  - EU (-8%), Japan (-6%), U.S. (-7%, at +16%)
  - No international policies and measures
  - Many countries not on schedule to meet emission reduction targets

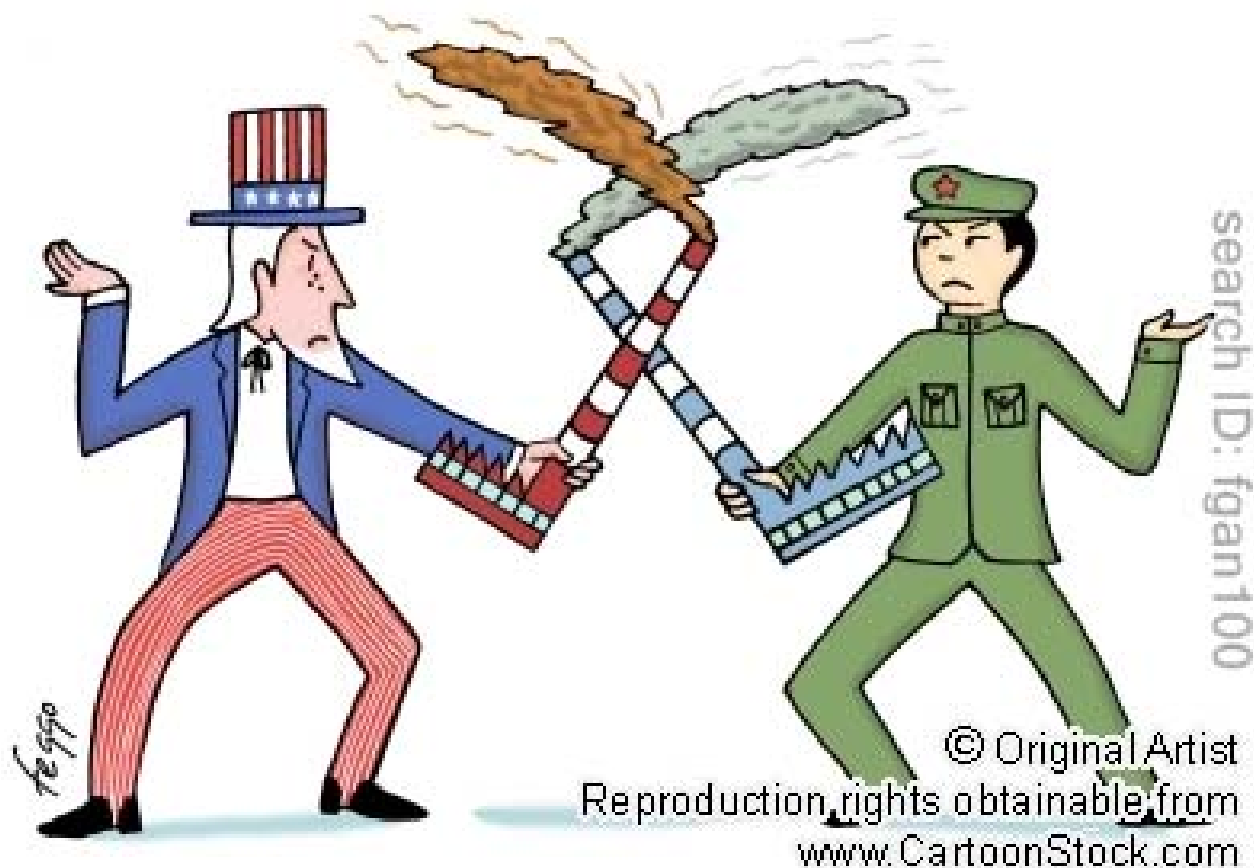
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# Climate Policy - International

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- Kyoto Protocol Status
  - Continued negotiations aimed at approval of legally binding treaty to replace Kyoto Protocol
  - Commitments from large developing countries like China and India key issue
  - Funding for developing countries key issue
  - Lack of action by US - damper on negotiations
  - No agreement on new treaty this year, future prospects seem dim

# Climate Policy - International



Uncle Sam and China argue about pollution

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# Climate Policy - International

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- Aviation

- GHG emissions from aviation are about 3.5% of global GHG emissions and grew about 65% from 1990-2005
- GHG emissions from aviation are not currently covered by Kyoto Protocol, instead are handled by ICAO
- Some countries have proposed including aviation emissions in any future international climate treaty

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# Climate Policy - International

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- Aviation – ICAO Resolution
  - A new resolution on GHG emissions from aviation was adopted at the 37<sup>th</sup> Session of the ICAO Assembly in October
  - Global target of 2% increase in fuel efficiency per year until 2050
  - Capping growth of aviation emissions in 2020
  - CO<sub>2</sub> standard for aircraft engines by 2013
  - Development of a framework for market-based measures



# Climate Policy - Europe

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- Main policy to address issue is EU emissions trading system (ETS) - covers only CO<sub>2</sub>
- Now in its second phase (2008-2012)
- Covers 10,500 facilities in 27 EU countries (oil, steel, cement, glass, and paper)
- Covered facilities have a cap on CO<sub>2</sub> emissions and can sell or purchase additional allowances
- Allowance price is currently about 15 euros a ton, down from 29 euros on July 1, 2008





# Climate Policy - Europe

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- CO<sub>2</sub> emissions from aviation are not currently included in the EU ETS
- Plan is to include aviation emissions from 2012
- Cover all airlines flying in/out of EU airports
- One allowance for every ton of CO<sub>2</sub> emitted
- EU claims that new ICAO agreement clears way for inclusion of aviation emissions in ETS
- Plan is opposed by US airline industry

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# Climate Policy - United States

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- Congress
  - Comprehensive climate legislation passed the House in June 2009
  - Similar bills were introduced in the Senate in 2009 and 2010 but were never voted on
  - Bills would create an economy-wide cap-and-trade program covering 85% of US GHGs
  - Targets are 17-20% below 2005 levels in 2020, 83% below 2005 levels in 2050

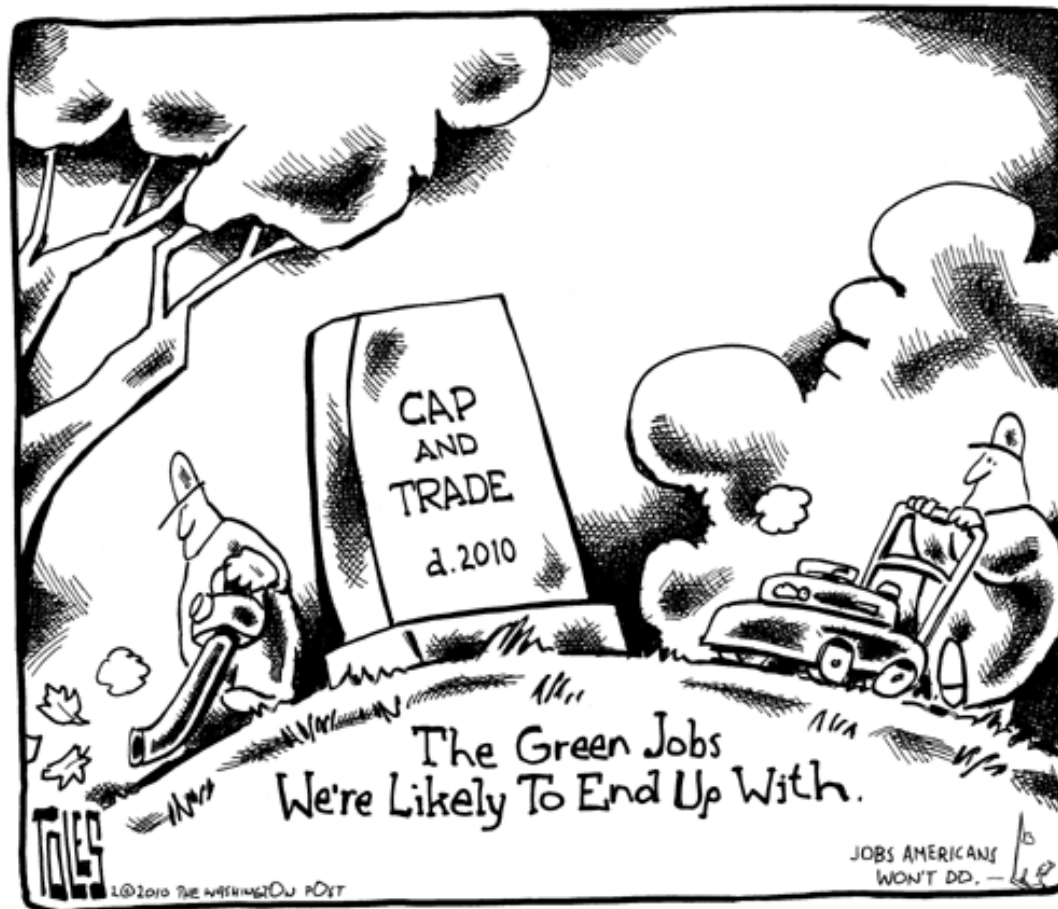
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# Climate Policy - United States

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- Congress
  - Bills did not cover aviation emissions directly, instead regulate transportation fuels at the point of production (refinery)
  - Further consideration of climate legislation by the Senate this year is extremely unlikely
  - If Republicans gain seats, unlikely Congress would address climate issue for next 2 years

# Climate Policy - United States



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# Impact on Fire Protection

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- High-GWP Gases in Fire Protection
  - HFC-227ea – 3,220 (GWP) ( $\text{CO}_2 = 1$ )
  - HFC-125 – 3,500
  - HFC-236fa – 9,810
  - HFC-23 – 14,800
- Low GWP Alternatives
  - Non-HFC Chemical Agents (Fluoroketone, HCFCs)
  - Inert Gases
  - $\text{CO}_2$  (non-occupied spaces)
  - Water Mist
  - Aerosols
  - Inert Gas/Water Vapor

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# Impact on Fire Protection

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- Montreal Protocol – HFC Proposals
  - Two amendments have been proposed that would add HFCs to Montreal Protocol and slowly phase down their production
  - Key elements:
    - List 20 specified HFCs as new Annex F to the Montreal Protocol
    - Use baseline for developed countries of 2004-2006 production and consumption of HCFCs and HFCs
    - Do not restrict the use of HFCs in fire protection

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# Impact on Fire Protection

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## ■ Montreal Protocol – HFC Proposals

### ■ Mauritius and Micronesia:

- 15% reduction in 2013
- 30% in 2016
- 45% in 2019
- 55% in 2022
- 70% in 2025
- 85% in 2028
- 90% in 2030

Developing countries: 6-year grace period (2019-2036)

### ■ United States, Canada and Mexico:

- 10% reduction in 2014
- 20% in 2017
- 30% in 2020
- 50% in 2025
- 70% in 2029
- 85% in 2033

Developing countries: begin in 2017, reach 85% level in 2043

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# Impact on Fire Protection

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- Montreal Protocol – HFC Proposals
  - Both proposals will be discussed at the Meeting of Parties in November
  - Similar proposals were rejected in 2009
  - Amendments may not be approved this year, but could be approved next year or soon after



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# Impact on Fire Protection

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- European Union F-Gas Regulation
  - Covers emissions of HFCs, PFCs, and SF<sub>6</sub>
  - Does not prohibit the use of HFCs for fire protection
  - Most applications requires reporting, recovery containment, leak inspection, labeling, training
  - Compliance with industry standards such as ISO should meet most requirements
  - Regulation is up for review in 2011

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# Impact on Fire Protection

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- US Congress – HFC Provisions
  - All recent US climate bills have contained provisions to regulate the production of HFCs
  - HFC provisions are generally supported by industry and environmental NGOs
  - Could be attached to other bills or introduced as stand alone legislation

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# Impact on Fire Protection

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- US Congress – HFC Provisions
  - HFCs would be regulated separately from other GHGs under Title VI of Clean Air Act
  - Slow phase down of production (GWP-weighted) starting with 0-10% cut in 2012-2014, ending with 85% cut in 2030-2040
  - Essential use, labeling, nonessential product, safe alternatives, and other provisions of Title VI would be extended to HFCs

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# Impact on Fire Protection

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- US Congress – HFC Provisions
  - Essential use provisions are provided for fire suppression and aviation
  - Allowances required to produce or import HFCs, or import products containing HFCs
  - \$1.00/MT first year = \$1.46/lb of HFC-227ea  
= \$4.46/lb of HFC-236fa
  - Offset credits for destruction of CFCs

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# Summary

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- Ozone Depletion
  - Phase out of CFC and halon production is complete worldwide
  - ICAO and EU have set dates for the replacement of halons in aviation
  - Aviation industry needs to ensure that it will have adequate supplies of halon to service the worldwide fleet of aircraft for the next 30 years

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# Summary

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- Climate Change
  - ICAO adopted a resolution focused on stabilizing GHG emissions from aviation
  - EU plans to add aviation CO<sub>2</sub> emissions to its emission trading system
  - Proposals have been made internationally and in US legislation to slowly phase down the overall production of HFCs

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# Summary

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- Stay tuned!

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