From MAC Summit in Brussels to SAE Symposium in Phoenix:

Regulation of Fluorinated Gases in Automotive Air Conditioning Systems in the European Union

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How long would you need to stop driving to compensate for the greenhouse effect, if a stone blew a hole in your MAC?

6 months

assuming you have a thrifty (≅ 30 mpg) car and drive about 8000 miles per annum (1300 x 750g / 162500 g/month)

Outline

- Problem due to mobile air conditioners (MACs)
- Main features of the proposal for an EC regulation on certain fluorinated gases, as far MACs are concerned
- Coverage of the Regulation
- Open issues
- Next steps

Measured regular leaks 53 g/year in the EU fleet (weighted average)

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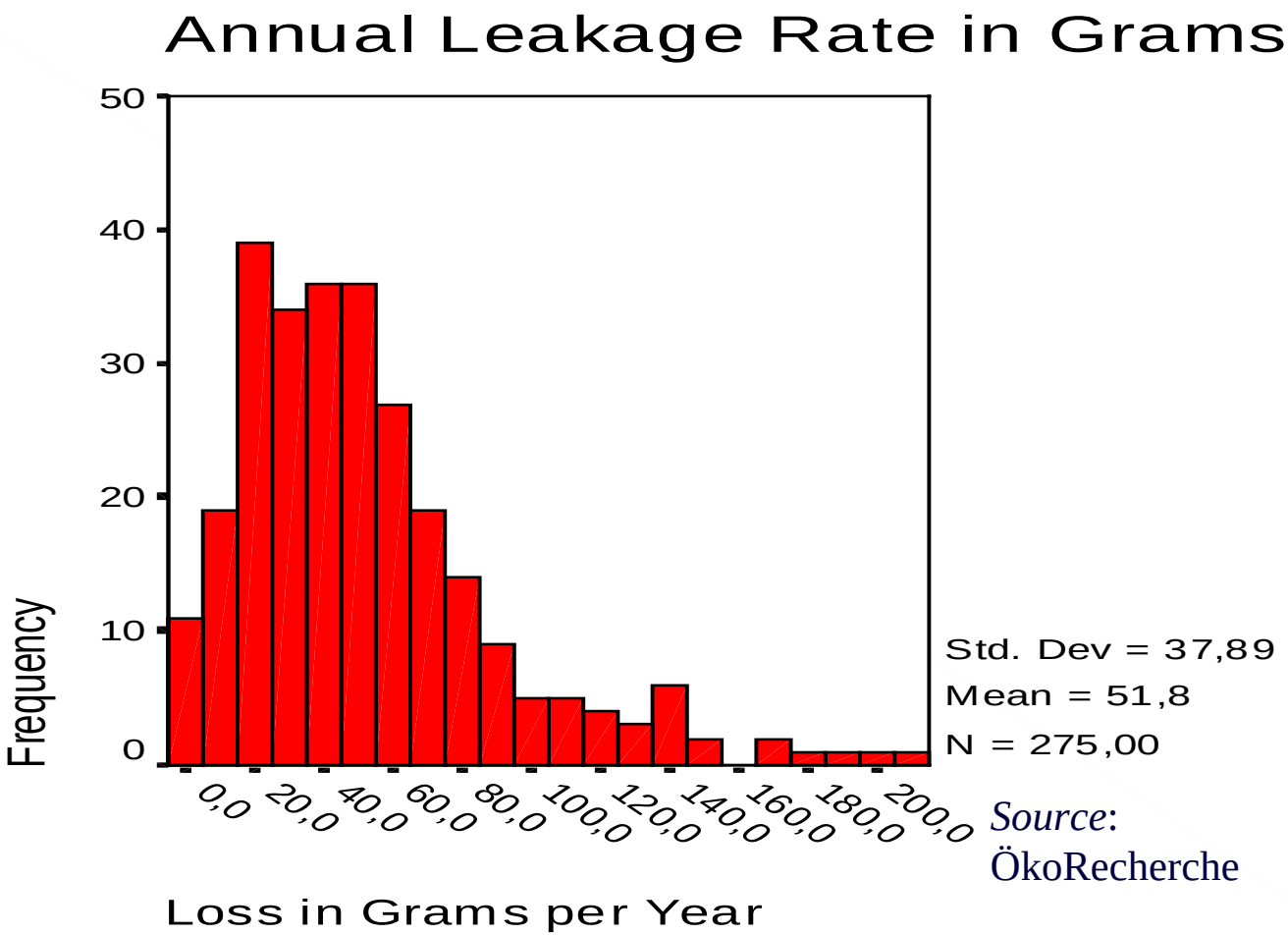

Source: ÖkoRecherche

“Controlled” leakage rates of different vehicle makes vary a lot

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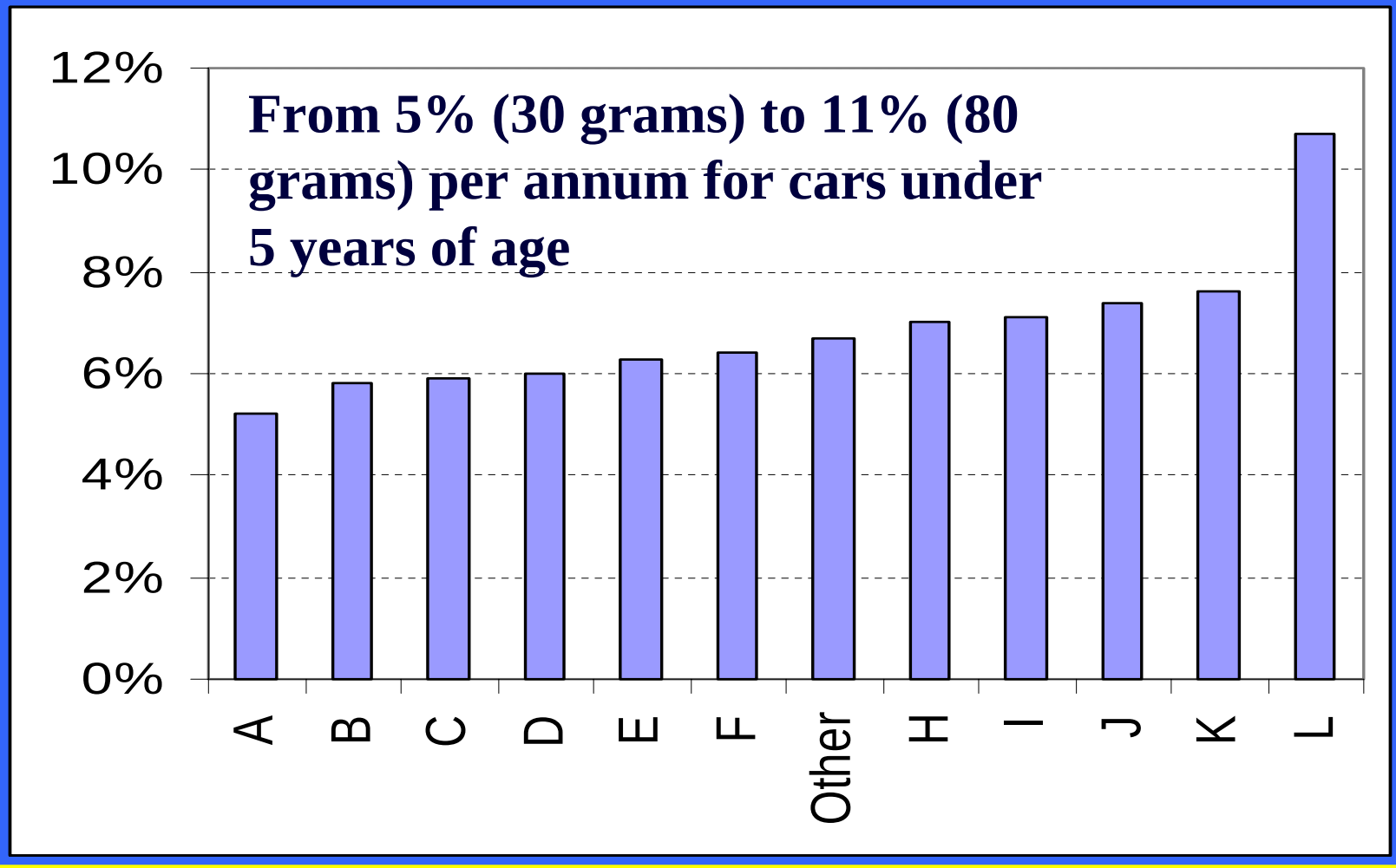

Problem: Lifetime leakage high (93-123 grams of R134a per year)

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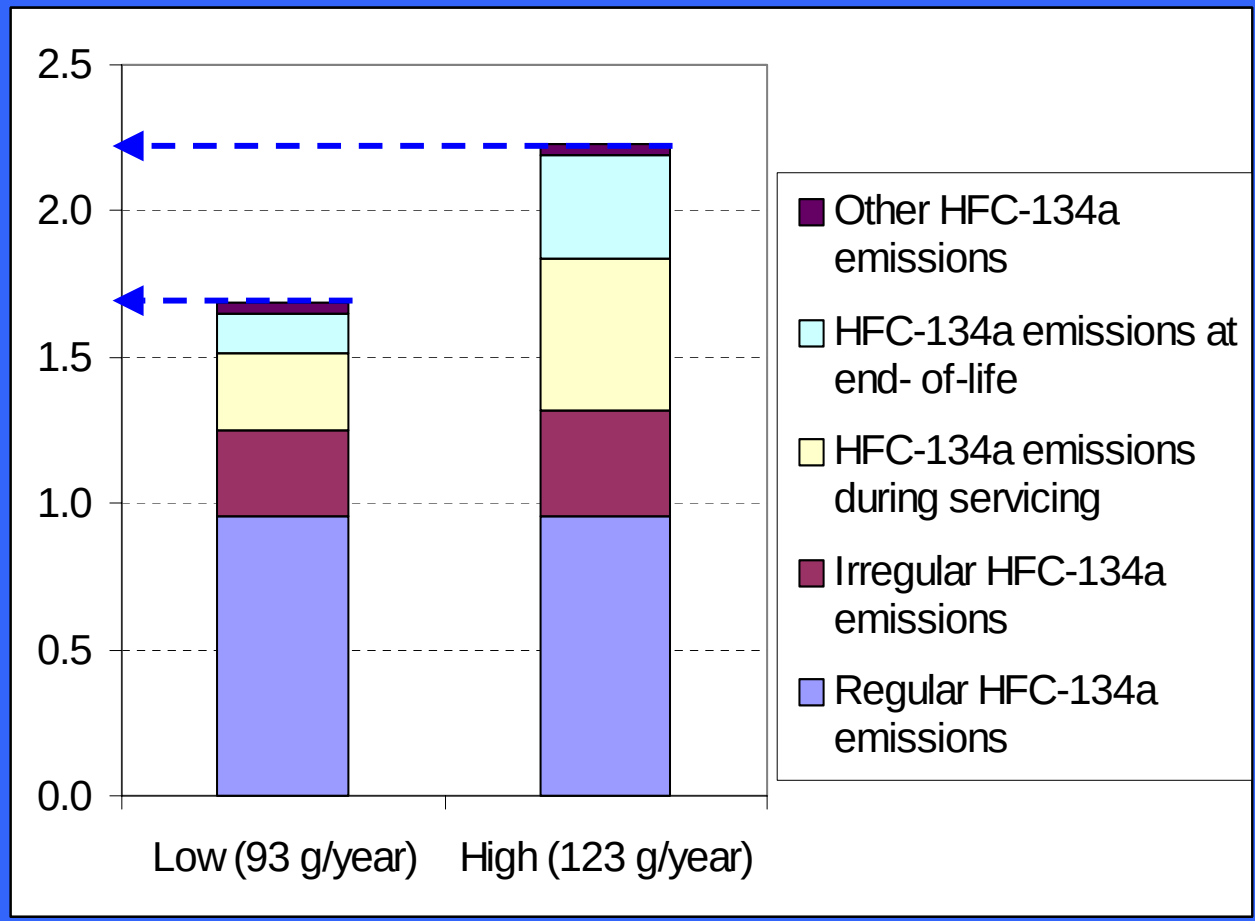
- **Direct lifetime emissions of R134a are from 1.7 to 2.4 t/CO2 eq per car**
- **And average fuel consumption increases by 4-8% (NREL)**



Source: European Commission. DG Environment

Political context

- **We request the European Commission to *"study and prepare measures in reduction of all greenhouse gas emissions from air conditioning in vehicles".***

  European Council, 10 October 2000

- **Earlier: Voluntary agreement with car manufacturers to reduce average CO2 emissions by 25% to 140 grams of CO2/km (about 40 mpg) by 2008**

The regulation in a nutshell

- From 1 January 2009 transferable quotas for new cars with R134a issued annually till 2013
- Remove bad apples from 1 January 2005: annual (regular) performance standard
  - 40 grams for single evaporator and 50 grams for dual evaporator systems
- Early action is rewarded
- R152a is allowed as it is OK from environmental point of view.
  - DG Environment is not responsible for road safety
- Also servicing is regulated
  - Mandatory recycling
  - Training and minimum qualifications required
  - Disposable cans banned

Features

- **Transferable quota needed for any MAC that contains a refrigerant with global warming potential over 150.**
  - **For the purpose of this Regulation, the GWP is set in the Kyoto Protocol (based on the second IPCC assessment report, which established the GWP for R152a at 140)**

Transferable quota

- In year *n*, car manufacturer applies for a quota for *n+1* as a percentage of sales in *n-1*
  - first year 80% then 60%, 40%, 20% and 0%
- Commission allocates all quotas with a predetermined rule
  - market operators have full certainty of the allocation rule
- In n+2 car manufacturer reports the balance and applies for a new quota
- All transfers need to be notified to the Commission, which will hold an electronic registry to keep track

Features cont.

- **Enhanced R134a counts for 50% of the quota**
  - **“Enhanced” has a design leakage rate (controlled leakage) of 20 grams of R134a (single evaporator) and 25 grams per annum**
  - **Generous, because lifetime emissions of enhanced systems are only 30-40% lower than R134a**
- **Early action:**
  - **For each R744 or R152a you get 1 extra quota**
  - **For each “enhanced” system you get half quota**

Coverage

- All passenger cars (M1) and light commercial trucks (N1, Class 1) placed on the market for the first time
- All car manufacturers and importers

- Pooling quotas allowed subject to competition laws (no cartels) for simplicity and to minimise bureaucracy
  - Commission expects that European manufacturer or importer (e.g. "GM Europe") applies and surrender quotas. Thus, the system would comprise only about 20 participants

Coverage, cont.

- *"De minimis"* rule for small series produces like in the EC directive on type approval
- Does not cover private persons
  - "old timers" and imports by natural persons allowed

- *New entrants* clause
  - If you did not place any cars on the market a year ago, quota is determined by the sales of the year when compliance is required
  - *Example*: If no cars were sold in 2007, quota for 2009 is based on 2009 sales. The quota is <u>not</u> transferable to others. Quota for 2010 is based on 2011 sales.

Example

- Each year a manufacturer sells 1 million cars (just to keep numbers simple)
- Get 800,000 quota in 2009
- In 2005-8 sell 400,000 cars with enhanced R134a MAC: get 200,000 extra quota in 2009
- In 2008, sell 100,000 cars with CO2 MACs: get 100,000 additional quota

Example cont.

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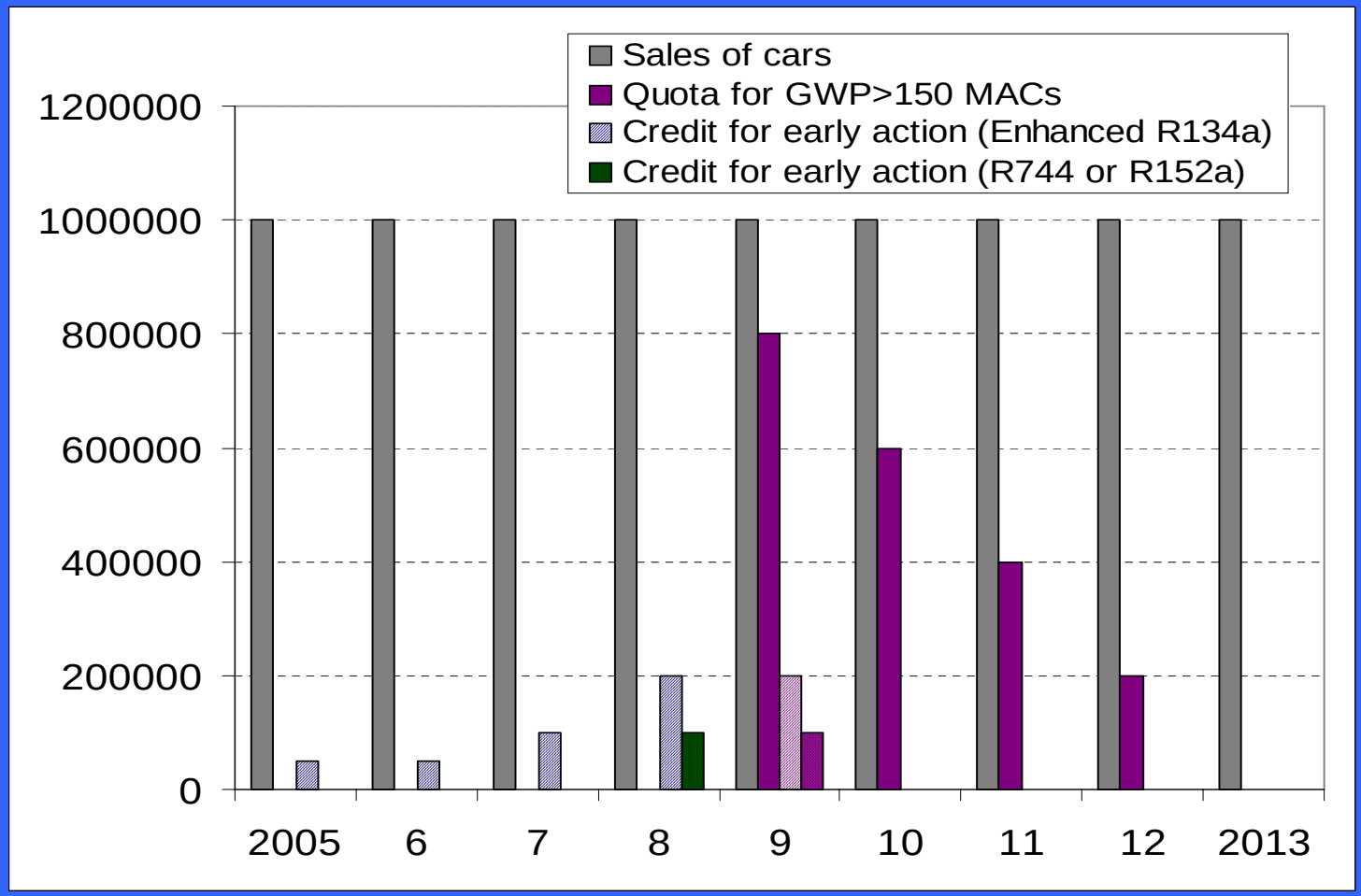

Penalties for non-compliance

- **As severe as in the adopted Directive on EU-wide greenhouse gas emission trading system:**
  - **For each tonne of CO2 for which you do not have an allowance, one tonne is deducted from the following years allowance and you pay a financial penalty of €100**
- **As lifetime emission of MAC is about 2 tCO2 equivalent Penalty for non-compliance is €200 per MAC.**
- **However, the scheme is transitory, the system is simplified to minimise bureaucracy**
  - **In the case of non-compliance, two will be deducted MACs from the following year´s quota. Penalties apply only after the transition is over. Thus, no need to set up a system to receive penalties unless this is really needed (i.e. you would not be able to buy quotas)**

Next steps: EC Regulation enters into force in 20 days

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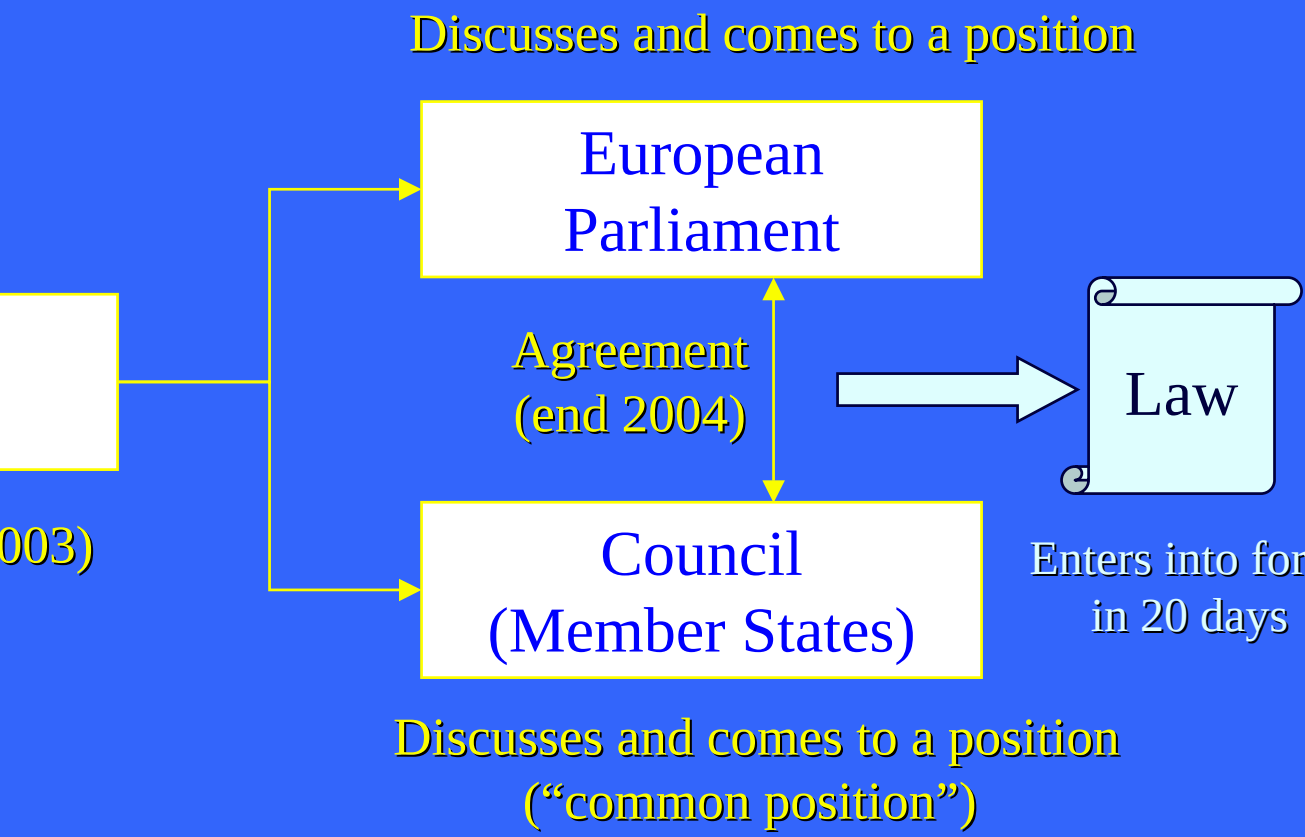

Open issues...

- Verification of performance standard and "enhanced" systems
  - Role of type approval authorities needs to be specified
- Support R&D for alternative refrigerants is in the pipeline: see calls for proposal of the 5th Framework Programme
- Air conditioning of trucks and buses will be looked into in 2004
- CO2 emissions due to additional fuel consumption need to be addressed
- MACs & global markets
  - Collaboration between US, Japan and the EU and developing countries important

Conclusions

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- **The days are numbered for R134a in the largest car market in the world**
  - car manufacturers and their suppliers have need to phase out R134a between 2009 and 2013
- **Regulator gazes only at target**
  - Full certainty on the quota system (no surprises)
  - Transferability of quotas leaves all economic decisions with the manufacturers
  - Pooling allows transaction costs to be minimised
- **Regulation allows flexibility for different strategies, e.g.**
  - Innovators can bring CO2, R152a or R290 early and earn quotas
  - All can buy time by taking the "enhanced" route, some can buy quotas
  - Depending on brand mix, a manufacturer could combine both
- **Penalties for non-compliance are in line with the adopted Directive on EU-wide trading with greenhouse gases**

Summary

- **The Commission appreciates collaboration with**
  - European, US, Japanese Korean car manufacturers,
  - their suppliers of systems and components,
  - SAE, MACS, ACEA, CLEPA, JAMA, KAMA and other industry organisations
  - US EPA and other regulators
  - NGOs

- **We trust that we have succeeded in combining the best of two worlds:**
  - Achieving the environmental goal of reducing greenhouse gas emissions from air conditioning in vehicles;
  - with a system that is market friendly, not technology prescriptive and which minimises costs

Thank you!