Results of the JRC-AAAS Trans-Atlantic Workshop

The Challenge of feeding Scientific Advice into Policy-Making

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Robust Science for Policy-Making

Scientific session:

Evidence-based policy versus policy-biased evidence: EU/US perspectives

Saturday, 3rd July, 2010 – 15.45 to 17.00
Lingotto, Room 5

AAAS

JRC @ ESOF2010
EUROPEAN COMMISSION
EUROSCIENCE OPEN FORUM

Facts on scientific support to policy-making

- Importance of *scientific advice* to policy-making is *growing*
- Independence of science from *political influence* is sometimes blurred
- Industry and other core interest groups have *natural vested interests* and a key role to play
- Public perceptions and misperceptions often *reflect media coverage* and can be a *deciding factor* for policy-makers

Structure of this presentation

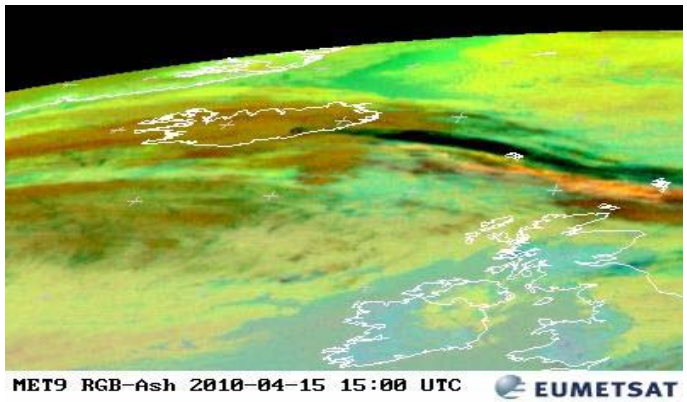
- Setting the case-study scene
- What went right or wrong and why?
- Lessons learned and recommendations for the future

Case-studies under the microscope today

- **Nuclear Waste Management**

- **Biofuel Production for Transport**

- **Volcanic Ash Response**



Case Study 1: Nuclear waste

Basic Facts:

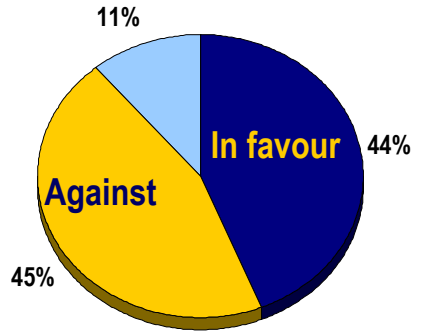
- 31% of electricity in the EU is generated by nuclear power (145 reactors in 15 Member States, 8 under construction)
- Reactor life-extension requests made in France, Sweden, Finland and Hungary
- Phasing out planned in Belgium, Germany, Spain
- Nuclear is a safe, cheap, free-carbon source of energy
- Low volume of high-level waste: EU yearly production = 280 m3 of vitrified waste and 3,600 tonnes of spent fuel

Legacy of waste - and the public opinion:

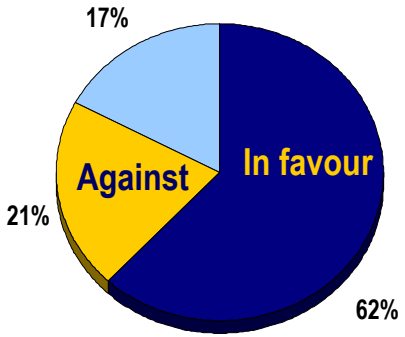
- Chernobyl paralysed decision-making for decades
- Safety design and performance have significantly improved
- Fossil-fuel chain is the most accident prone today
- Nuclear increasingly seen as an attractive option again
- Public opinion is shifting: 62% pro nuclear if waste issue is solved

Waste Eurobarometer 2008

Current Opinion about nuclear

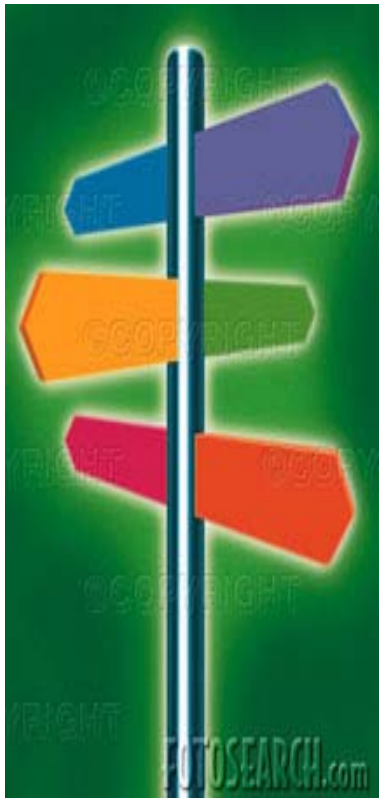


If waste issue was solved



Why nuclear energy?

- Competitiveness → nuclear energy makes economic sense
- Carbon-free energy option → good for climate
- Health & safety → nuclear fission reactors have a proven safety record
- Nuclear waste management → despite public perceptions, *solutions* do exist while further developments are under way
- Security & non proliferation → nuclear energy is a dual use technology but the public are often unaware that *civilian* is not the same as *military* use



From Public Perception to Industrial Reality

The Case of Sweden

- 12 operating reactors at 3 sites
- 50% of electricity production
- 2002 – 2007: controversial feasibility study of 2 candidate sites for deep geological waste disposal

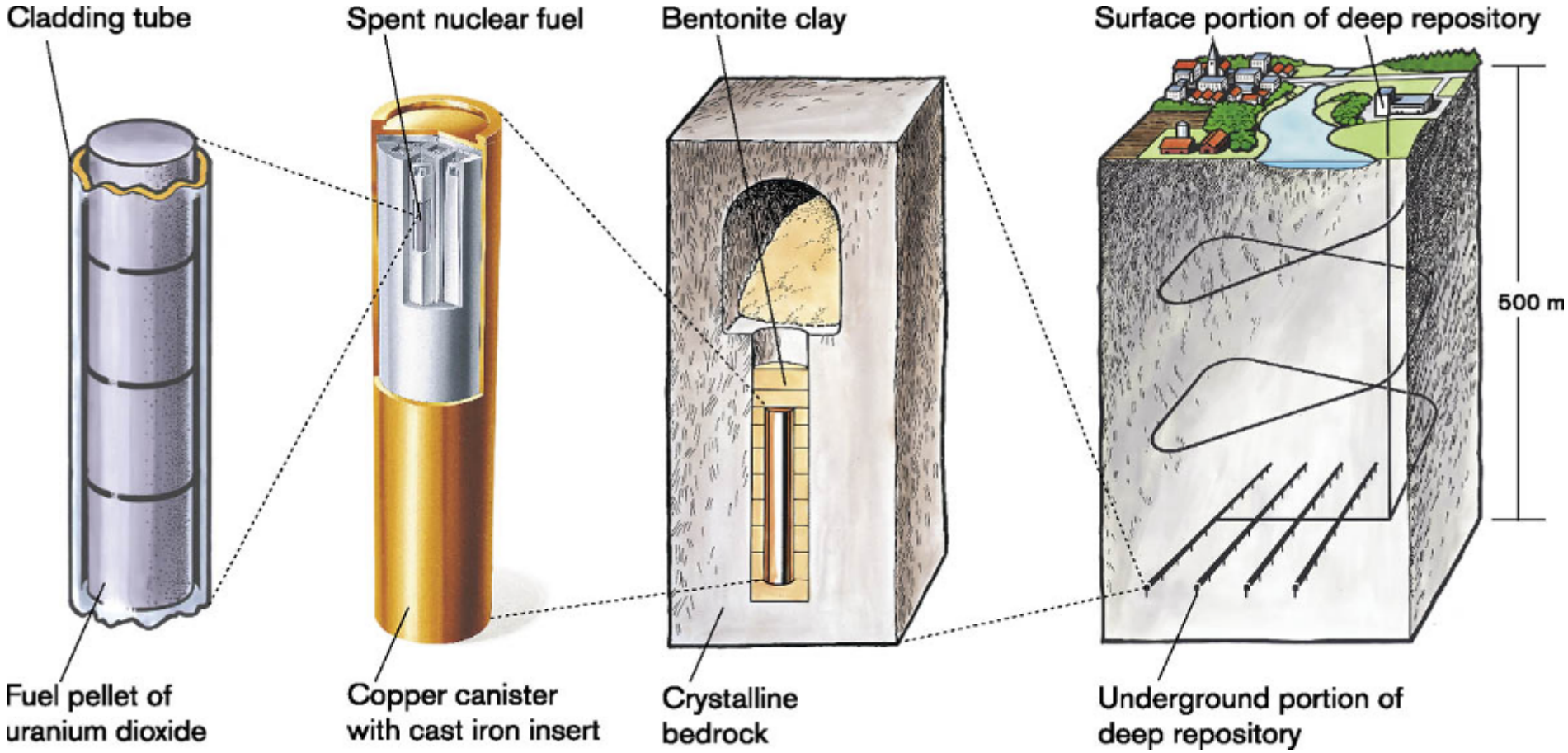
What was different?

- Strong emphasis on socio-economic studies, interaction with stakeholders, openness and transparency, accurate communications
- Strong local support for the final repository after intense national competition

The public understood the safety argument

Containment Period

Isolation Phase



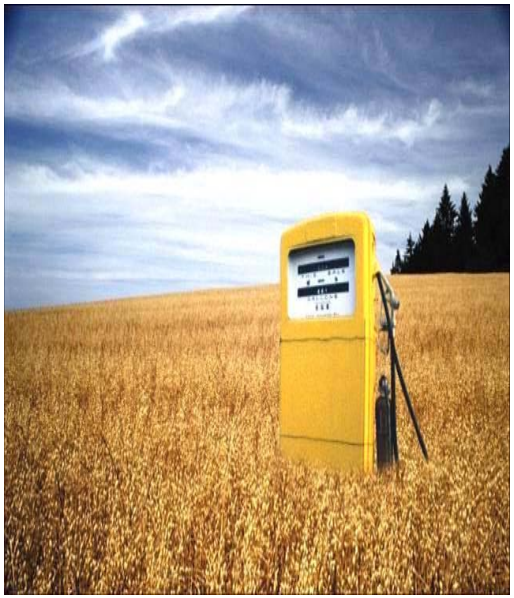
Nuclear waste: Lessons Learned

- Lack of communication with the public has been the key mistake in the past
- Harrisburg, Cernobyl etc. (and improper communication of these accidents) have further complicated a rational dialogue
- Globalisation, climate change, increased energy demand, security of supply etc. have changed the stakes
- Nuclear industry can demonstrate move from R&D to the industrialisation of safer solutions
- Public confidence is being developed through real engagement which, in turn, impacts on more informed policy-making

Case Study 2: Biofuels

Intense Debate over the last 3 years:

- Security of Supply
- Climate Policy Goals
- EU Biofuels Target: 10% by 2020, from previously 5.75% by 2010
- Impact on Food Prices



Questions we must ask and answer:

Why is there disagreement between different groups?
Do we have sufficient scientific evidence?
Do Biofuels meet sustainability requirements?
What is the role of 3rd Countries?

Why Conflicts/Disagreements ?

Different interests:

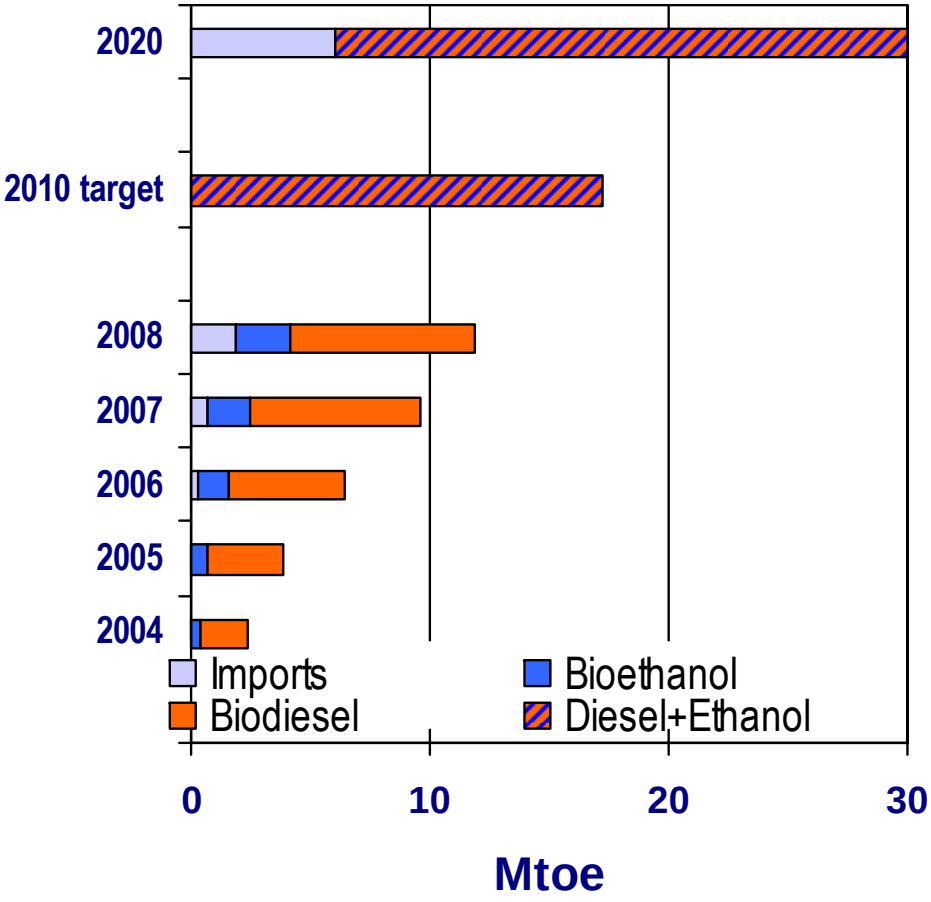
Agro-economic sector
– has strong economic interests

Energy Industries
– Oil vs. competition from Biofuels

Environmental Groups
– Mono-culture, pesticides, GMO crops, deforestation …

3rd Countries and Export Perspective
– South America, South-East Asia

10% Biofuels
= 30 Mtoe in the EU by 2020?



Source: EuroStat

The main scientific uncertainties are in …

… predicting the competitiveness of Biofuels

- The future oil price, against which Biofuels compete (today 1 ltr fuel **costs** 10c€; Biofuels 60c€)
- Amount of future subsidies on agriculture, which influence the fraction of agriculture dedicated to biofuels

… calculating the overall Greenhouse Gas (GHG) emissions

- Part of the increasing biofuel production will be achieved by crop yield increase, and the amount of fertilizer which will be used is not sufficiently well known. N_2O emissions from fertilizers have a high global warming impact (1 kg N_2O corresponds to 296 kg CO_2), thus their increase could outweigh any savings in the replacement of oil.
- How much of crop yield increase can be otherwise achieved by ecological agriculture, and where, and on what soil.

The main scientific uncertainties are in …

… whether biofuels are sustainable from a climate change mitigation perspective:

- How much of Indirect Land Use Change (ILUC) one has to consider, when agricultural land will be changed from food to energy production, with subsequent displacement of food production to low-yield or carbon-intensive land…

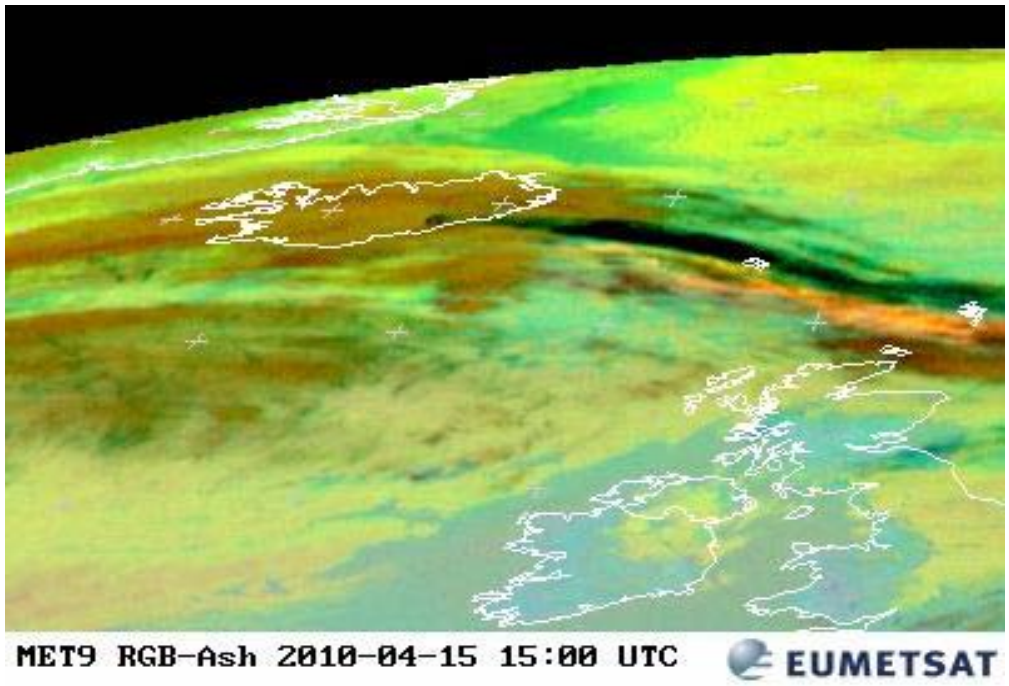
  ILUC related GHG emissions are difficult to calculate as there are different approaches for allocating additional land, uncertainties in N_2O emissions, soil emissions etc. Present uncertainties amount to ± 50%!).

- Depending on the quality of land used for the displaced food production, GHG emissions for Biofuels can vary significantly when these ILUC effects are taken into account…
- Quantifying other impacts on soil degradation, water use, biodiversity etc...

Biofuels: Lessons Learned

- Early interaction between the scientific community and policy makers has helped to sensibilise politics (and the wider public) for unexpected side effects of biofuel policies.
- In particular, it is now widely accepted that, in order to be sustainable, energy-related agriculture must not emit more GHG than fossil fuel which emits 85 gCO_2/MJ (e.g. through avoidance of carbon-rich soils for biofuel production).
- Scientific uncertainties are still too high, thus more research is needed, e.g.:
  - **The assessment of the amount of GHG emissions caused by fertilizers needs more reliable data on the potential and consequences of crop-yield increase.**
  - **The role of reforestation with fast growing trees has not yet been sufficiently quantified. The estimates are too wide ranging.**
  - **The competition with other Bio-energy sectors (Biogas, Pellets, Biofuel for electricity..) needs to be understood and quantified.**
  - **A geographical, global reference "cadastre" of Biofuel production and impact is required.**
- Thanks to the close interaction with science, policy makers are willing to fund biofuel research and to adapt policies in the light of scientific evidence.

Case Study 3: Volcanic Ash



- Ejyafjallajökull caused biggest aviation disruption since 9/11
- 14-21 April: zero tolerance strategy
- 75% of airspace closed
- No EU competence
- Little scientific evidence
- Major public impacts

Questions we must ask:

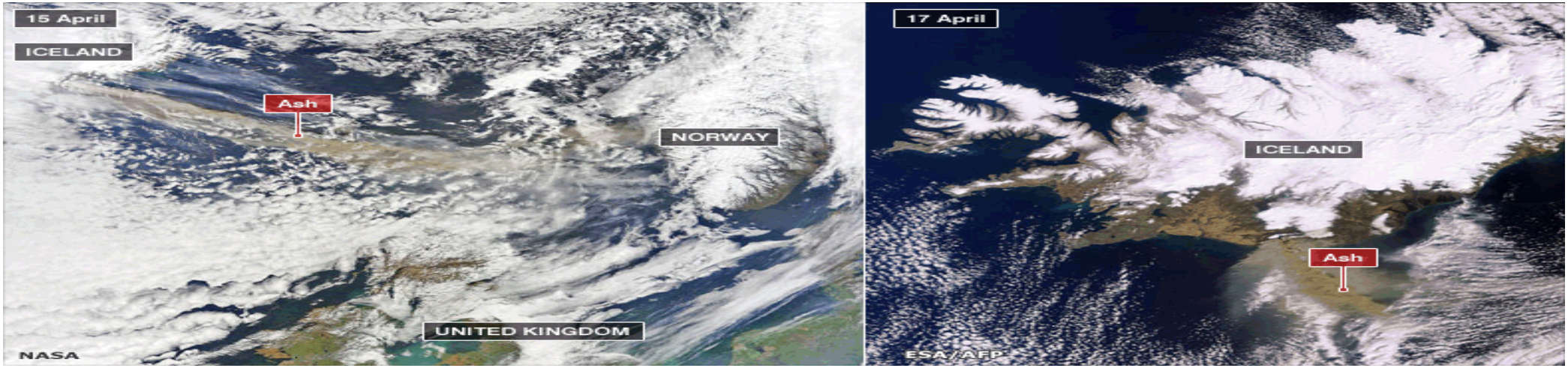
- What to do when there are no EU-wide standards?
- Why are the supporting sciences fragmented?
- Can we prioritise greater foresight and risk assessment?

Decision-making in absence of scientific evidence

How much volcanic ash can an aircraft safely fly through?

- Little evidence/testing on how different jet engines cope with different ash concentrations
- Threshold set too low = serious implications for aviation and the wider economy
- Threshold set too high = serious implications for air safety
- Before April 2010 = 2 mg/m^3 limit (UK), May 2010 increased to 4 mg/m^3
- International Civil Aviation Organisation = Not permitted at all to fly through ash

Wanted: Hard facts in a crisis



- Thousands of tonnes of mineral ash into the air - forced higher by steam plumes created as ice melted. Mostly very fine particles which formed an ash cloud, rising 6-10km (20,000-35,000 feet) into the atmosphere
- The fine, abrasive particles can erode metal, clog fuel and cooling systems and melt to form glassy deposits. Instruments, windows, lights, wings can also be affected
- First Scottish airspace closed, then the entire UK, then most of Northern Europe. A second eruption impacted Spain and the Mediterranean region
- Test flights allowed aviation authorities to identify safe thresholds and most flights were given the all clear to resume on 21 April. Sporadic disruptions continued thereafter.

Volcanic Ash: Lessons Learned

- Risk assessment for this scenario was apparently not available beforehand
- Scientific evidence was not easily at hand, partly because of the multitude of scientific disciplines involved: volcanology, atmospheric science, remote sensing, material sciences, engineering, economics….
- In the absence of scientific evidence, policy makers had no choice than to follow the precautionary principle
- Science needs to step up its efforts:
  - Characterising the volcanic ash plume: need for more research on physico-chemical and radiometric properties of volcanic ash and how to assess such properties in case of crisis
  - Modelling of ash cloud movement: Different models give different messages and are not well adapted to an active source
  - Validating assessments: airborne and ground measurements were not coordinated; capacity to “deploy” was limited; no EU-wide approach
  - Addressing the question of critical level of ash concentration: empirical evidence only, industry sources difficult to assess

What these case studies demonstrate

- Government decisions are ultimately political and science is just one element under consideration.
- The scientific community needs to be more proactive in contributing to policy-making.
- The policy-making community needs to be more receptive to scientific evidence and engage more in public dialogue about it.
- The public plays a critical role in determining what positions policy-makers will take or support, thus communication is essential.
- The response from the scientific community must be timely and tailored to the needs – and be understandable for laymen.
- Appropriate indicators, horizon scanning and acceptable risk assessments are crucial to an effective science and policy relationship

Launched at ESOF: New JRC Strategy 2010 – 2020

Joint Research Centre: *Robust Science for Policy-Making*
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To find out more: www.jrc.ec.europa.eu

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