Science and policy interface:

Linking EU research and policies for better urban air quality monitoring

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AirMonTech Workshop
Air Pollution Monitoring Technologies for Urban Areas

Barcelona, 25-26 April 2012

OVERVIEW

- Air pollution in Europe - State and outlook

- Relevant EU research with AQ policy relevance

  - e.g. AirMonTech

- Science policy interface interaction

  - Research findings from EU research

  - Review of the EU Air Quality policies

- Perspectives in the context of HORIZON 2020

The European environment – state and outlook 2010

Air pollution - Key messages

- ✓ Europe has significantly cut emissions of the main air pollutants in recent decades, greatly reducing exposure to substances such as sulphur dioxide and lead.

- ✓ Despite reductions, certain air pollutants, especially particulate matter (PM), ozone (O3), nitrogen dioxide (NO2) and some organic compounds, still pose a threat to human health.

- ✓ In the EEA-32 countries, the area of sensitive ecosystems exposed to excess acidification from air pollution fell by about 80 % from 1990–2010.

- ✓ The EU's long-term objective of not exceeding the so-called critical atmospheric pollutant loads, which ecosystems can tolerate, has not been met. Still too many ecosystems affected by an excess input of atmospheric nitrogen.

Air pollution - Key messages (continued)

- ✓ Exposure to ground-level ozone concentrations above critical health levels is associated with more than 20 000 premature deaths in the EU-25 annually.

- ✓ European air pollutant concentrations still frequently exceed limit values set by the EU Air Quality Directives. Many Member States have either not complied, or will not comply by the required target dates, with legally-binding air quality limits set for the protection of human health.

- ✓ Further international cooperation to mitigate inter-continental flows of air pollution will help nations meet their own goals and objectives for protecting public health and environmental quality.

EU environmental research: three axes for a research strategy

- EU 2020 strategy

- Resource efficiency roadmap

- Eco-innovation action plan

- Environmental legislation

  - 6th EAP

  - Air Quality Framework Dir.

  - National Emission Ceilings

  - Dir. On ambient air quality and cleaner air for Europe

  - 4th Daughter Directive

  - …

European Commission

SEVENTH FRAMEWORK PROGRAMME

EU policies

**Climate change
Natural hazards
Environment and health
Environmental technologies
Natural resources management
(Water, air, soil, biodiversty,
forests, marine resources, etc.)
Observing and
forecasting systems
…**

European competitiveness on the global markets

ERA, S & T excellence

FP7 example: SME-targeted Eco-innovation Call 2011

Research and development of **novel eco-efficient environmental technologies (including monitoring)** whose direct or indirect use can substantially contribute to the **reduction of materials and resource use, energy consumption, polluting emissions**.
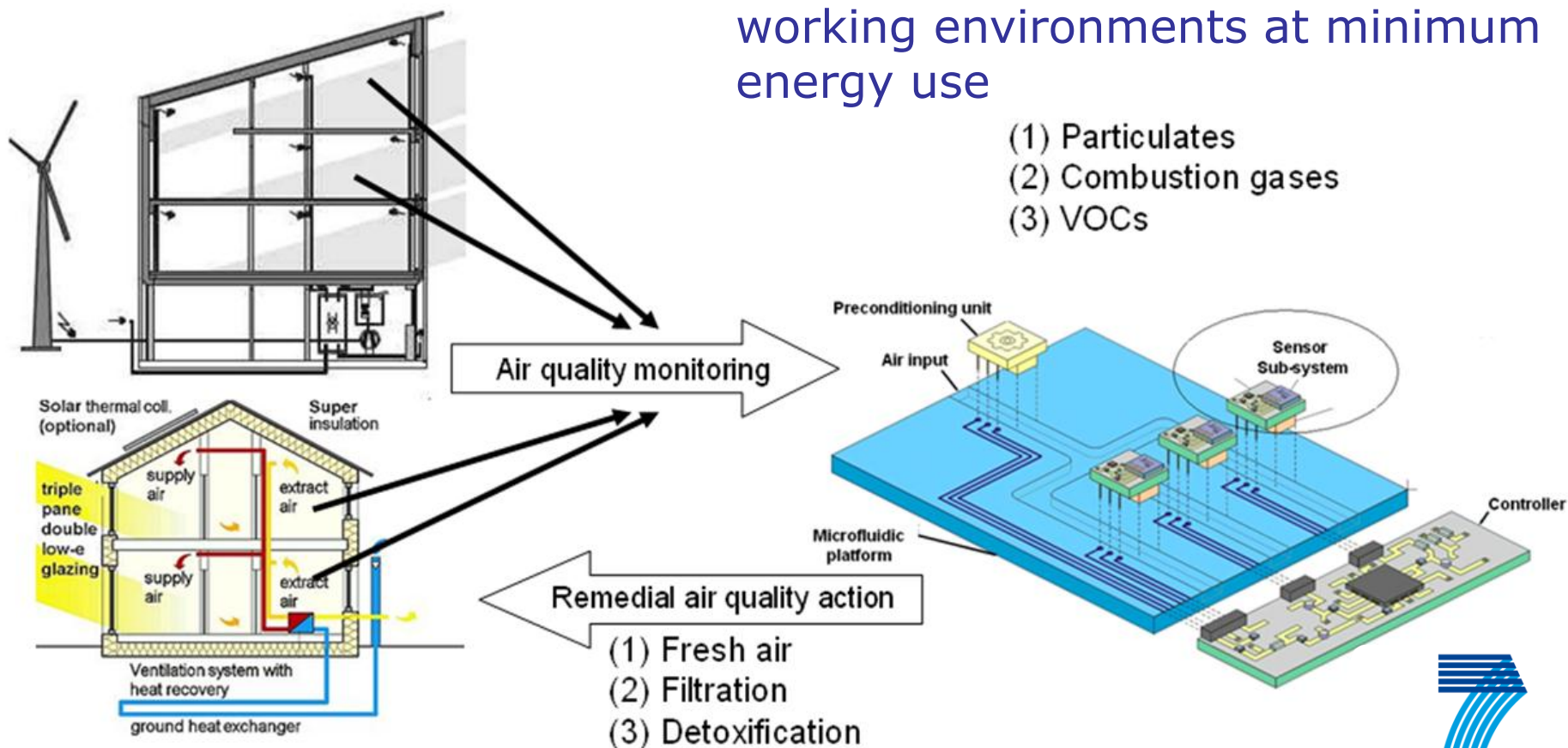
Research and development of **system solutions**

Multiple actors & innovations
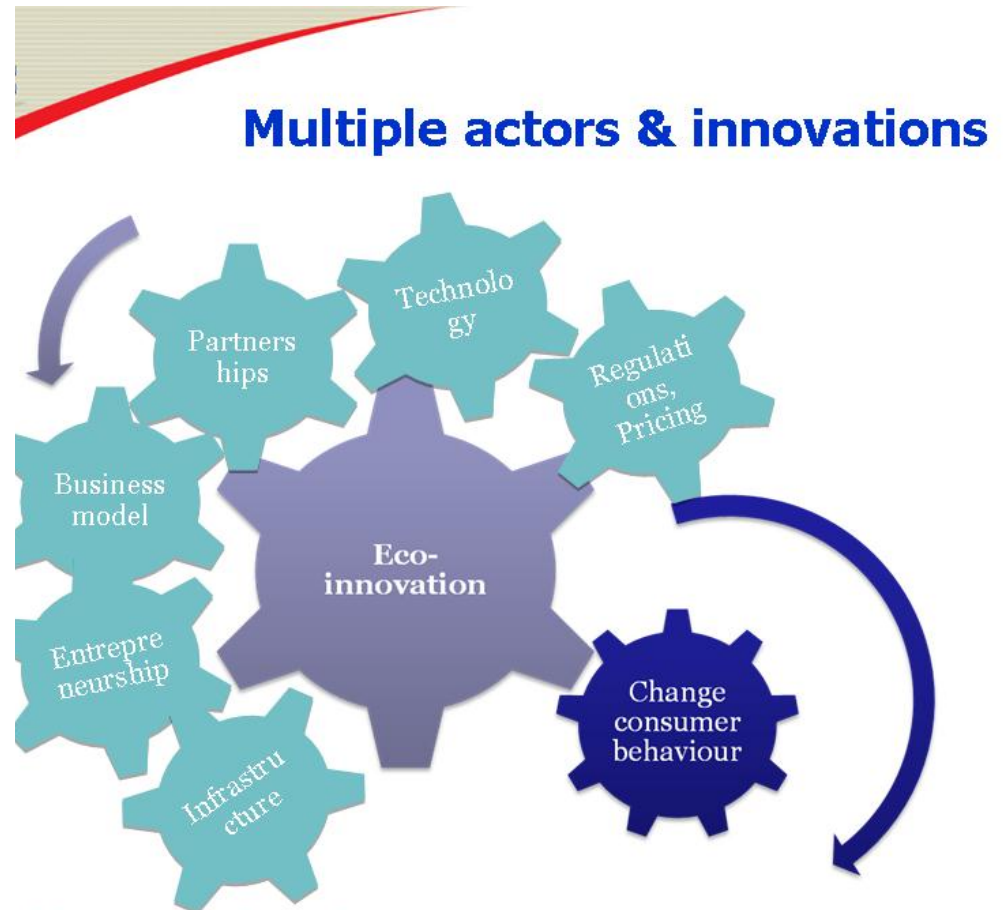
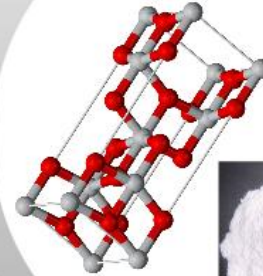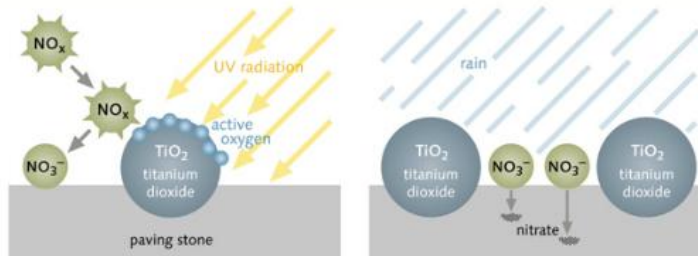Source: Tomoo Machiba - Senior Policy Analyst, OECD OECD

INTASENSE project

Advanced air-quality monitoring of key pollutants linked to HVAC systems supports improved living & working environments at minimum energy use

(1) Particulates
(2) Combustion gases
(3) VOCs

Air quality monitoring

Remedial air quality action

(1) Fresh air
(2) Filtration
(3) Detoxification

Solar thermal coll. (optional)

Super insulation

triple pane double low-e glazing

supply air

extract air

supply air

extract air

Ventilation system with heat recovery

ground heat exchanger

Preconditioning unit

Air input

Sensor Sub-system

Microfluidic platform

Controller

Photocatalysis applied to cementitious materials

Photocatalytic concrete

Light2Cat project

Horizontal and vertical applications

FP7 Example: Call 2010 for technologies and automated monitoring of air pollution in cities

- To **review the state-of the-art** and assess opportunities and limitations of **recent and new** generations of in-situ technologies for urban air pollution monitoring

- Particular focus on **automatic analysers for the continuous routine monitoring** of harmful substances, especially particulate matters and emerging pollutants, also using proxy indicators

- Equipment evaluation and selection, operation, maintenance and calibration, data quality, protocols, and processing … as well as aspects of cost efficiency and equivalence to reference monitoring methods.

- Delivery of a **technological research roadmap and consolidated recommendations** for the development or implementation of Community environmental legislation

- Involvement of the **researchers and technology providers** together with the **stakeholders involved in routine monitoring** of urban air pollution

- **Links** to relevant national and international **programmes and networks**

AirMonTech project

- Data base of air pollution monitoring technologies and performances

- Based on a review of recent technologies (approval tests, standard operating procedures, equivallence testing)

- Based on a review of novel promising technologies for automated monitoring or regulated and non-regulated air pollutants

- Recommendations for enhanced harmonisation and standardisation, adoption of new monitoring devices/strategies, new health relevant metrics

-> Leading to harmonised air pollution monitoring in Europe

-> Leading to improved implementation of EU environmental policies and strategies on ambient air quality and cleaner air for Europe

Wider list of 20+ FP6/FP7 projects
with a strong component on Air Quality

- **FP6: Eucaari, Nitroeurope, Heimtsa, Intarese**

- **FP7: Accent-Plus, CityZen, Megapoli, Pegasos, Eclipse, Eclaire, AirMonTech, Actris, Escape, Hereplus, Transphorm, Hitea, Officair, Purge, Urgenche, Atopica...**
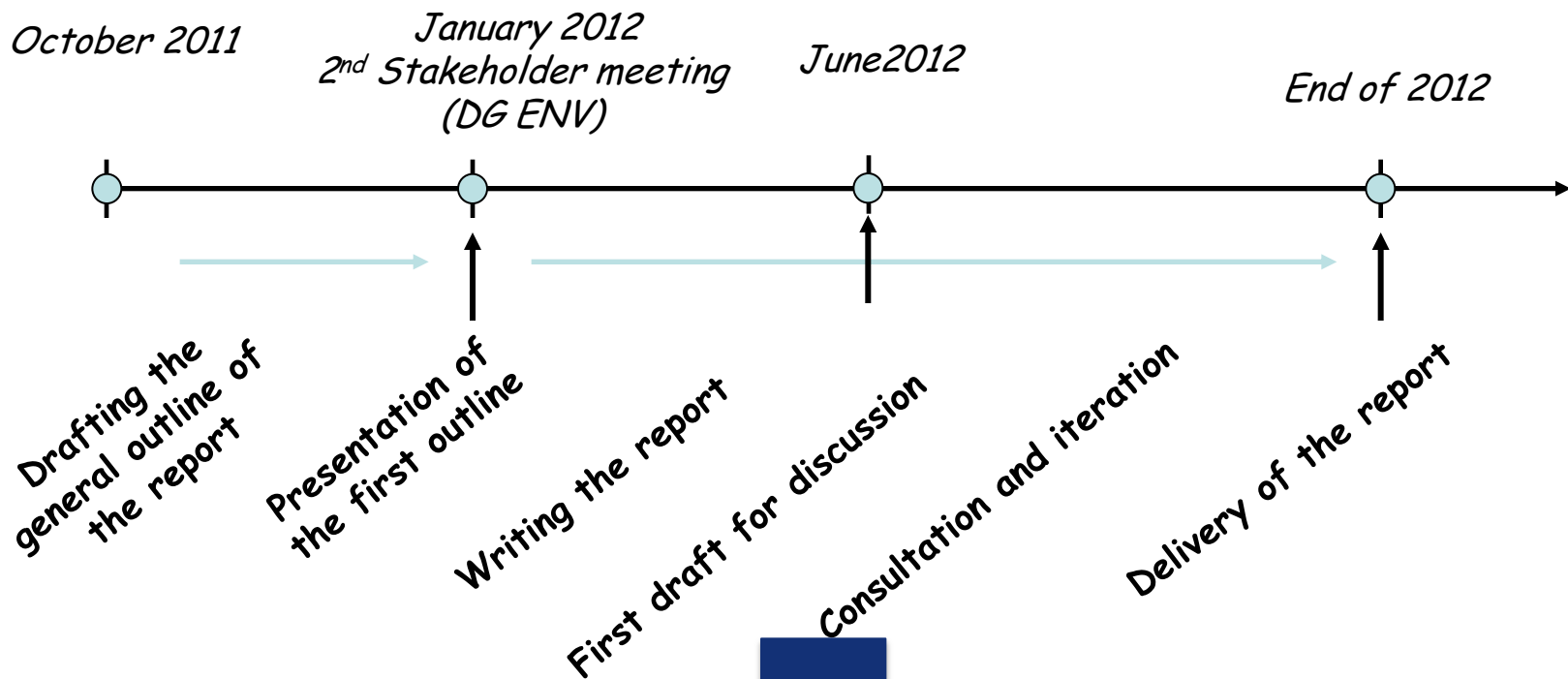
- 400+ research teams, all over Europe!
- atmospheric composition
- aerosols, clouds and trace gases
- diseases in changing climate/air quality
- emission hot spots, megacities
- Emission abatement strategies of climate forcers
- Exposure-response relationships and thresholds
- health risk maps related to O3 and PM
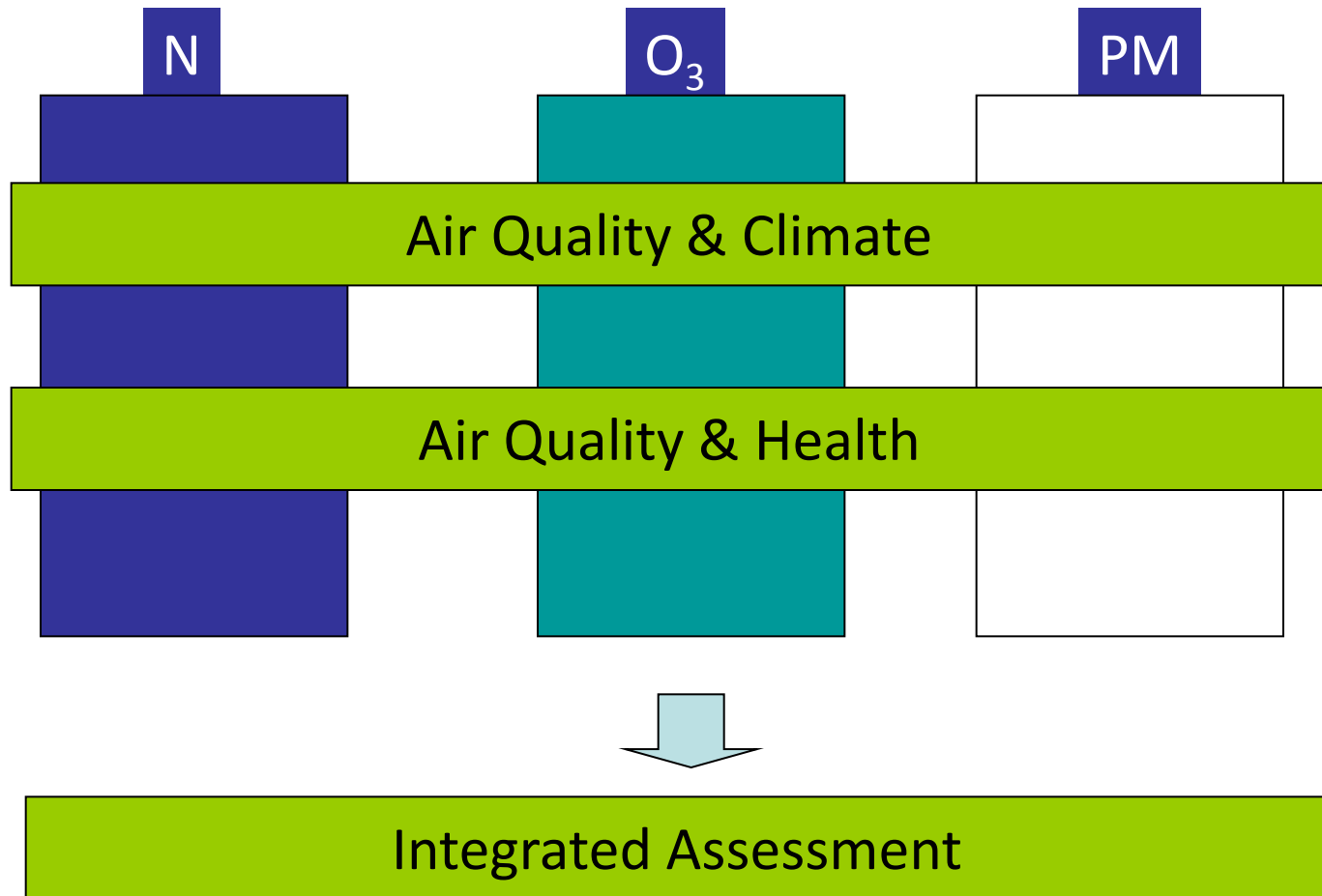- Indoor air exposures and health effects
- Total Budget: +/- 150 M €, EU contribution: > 100 M €

Collection of air policy related research outputs

EC-funded projects in the field of air quality, climate change and health aspects included, have been asked to provide science-based evidences relevant for the review process.
Latest scientific findings relevant to the EU Air Quality policy will be gathered into a single report to be finalised by the end of 2012.

October 2011

January 2012
2nd Stakeholder meeting
(DG ENV)

June 2012

End of 2012

Drafting the general outline of the report

Presentation of the first outline

Writing the report

First draft for discussion

Consultation and iteration

Delivery of the report

Lead Authors

Nitrogen	Mark Sutton	CEH Edinburgh
Particulate matter	Sandro Fuzzi	CNR Bologna
Ozone	Paul Monks	Univ Leicester
AQ and climate	Guy Brasseur	Climate Service Cr
AQ and health	Bert Brunekreef	Univ Utrecht
Integrated Assess.	Rainer Friedrich	Univ Stuttgart

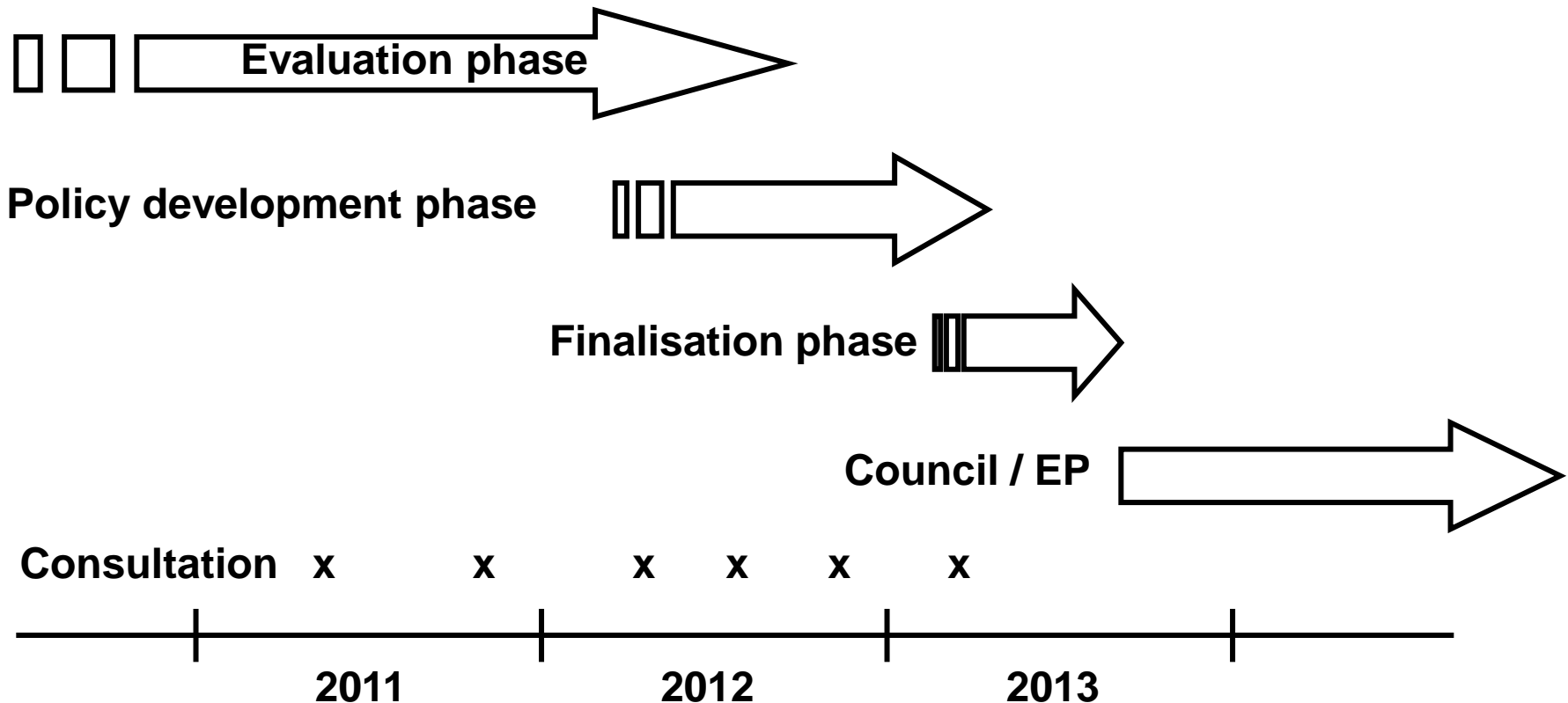# EU Air policy implementation and review

AIM:

"a robust EU Clean Air package, updating existing policies and directives including the National Emission Ceilings Directive **according to latest science**, and outlining further cost-effective measures to move much closer to the related 6EAP's objective:

to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment."

Review of the EU Air Quality Policies - Mandate

✓ **Review of 2005 Thematic Strategy on Air Pollution (COM (2005)446)**

  ✓ Cfr also 6EAP assessment

✓ **Article 32 of Ambient Air Quality Directive (2008/50/EC)**

  ✓ Standards for PM2.5 (legally binding national exposure reduction obligations) and, as appropriate, update standards for other pollutants

  ✓ Taking into account latest WHO information, air quality situation and reduction potential, revision of NEC directive, progress in implementation, …

✓ **Article 8 of Air Quality 4th Daughter Directive (2004/107/EC)**

  ✓ Standards for heavy metals (As, Cd, Hg, Ni) and PAHs

  ✓ Taking into account trends, effects, exposure, measurement, measures, …

✓ **Article 10 of National Emissions Ceilings Directive (2001/81/EC)**

✓ **College Debate 18/1/2011 (PV (2011) 1944) (SEC (2011) 342)**

✓ **Commission Work Programme 2013 (COM(2010) 623 final)**

✓ **Resource Efficiency Roadmap 2011 (COM(2011)571)**

Review of the EU Air Quality Policies - Timetable

Evaluation phase

Policy development phase

Finalisation phase

Council / EP

Consultation   x   x   x   x   x   x

2011   2012   2013

Review of the EU Air Quality Policies
Some key Issues Emerging from Consultations

- ✓ **PM: demand for simplification and focus (limit values redundancy)**
- ✓ **NO2: challenging health justification & playing the need to trade-off**
- ✓ **Ozone metrics (duration and gravity of exceedance)**
- ✓ **Target versus limit values, limit values versus exposure reduction**
- ✓ **New standards/deletion of standards**
- ✓ **Measures (costs, transboundary aspects, sensitive populations,…)**
- ✓ **Monitoring siting (representativeness) and density (nber of stations per zone)**
- ✓ **Modelling (mandatory?, uncertainty, input quality, output resolution…)**
- ✓ **Public information (complex parameters, AQ indices…)**
- ✓ **Role of indoor air quality in relation to ambient air quality**
- ✓ **Additional focus on ecosystem protection**
- ✓ **Stimulating eco-innovation, link to resource efficiency**
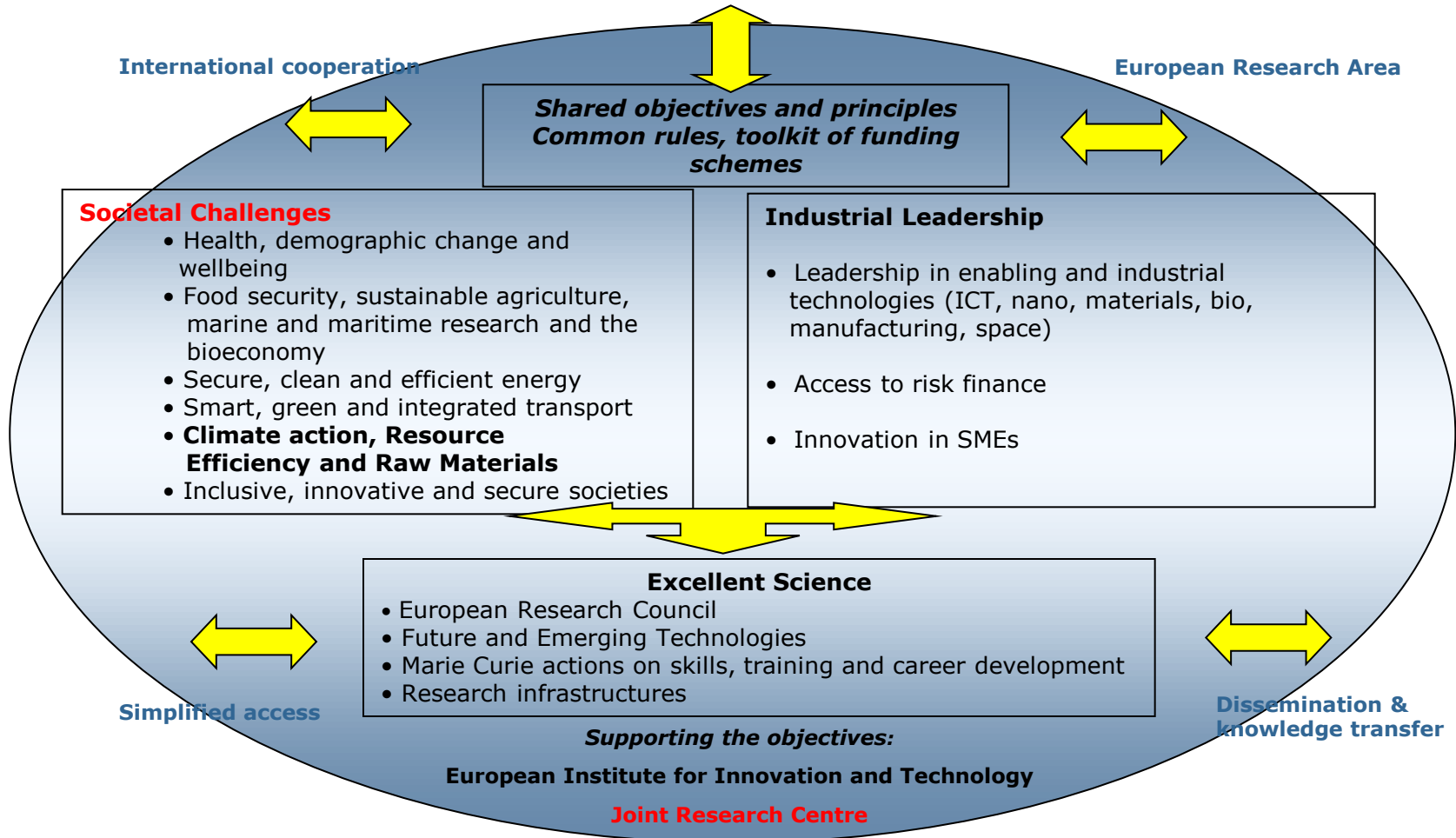
Priority 3. Societal challenges

Why:

- Concerns of citizens and society/EU policy objectives (climate, environment, energy, transport etc) cannot be achieved without innovation

- Breakthrough solutions come from multi-disciplinary collaborations, including social sciences & humanities

- Promising solutions need to be tested, demonstrated and scaled up

HORIZON 2020 – Specific programme

**Main references to 'air quality'***:*

- Challenge 3 – ENERGY
  3.1.3 Foster European smart cities and communities
  -> Reduced energy consumption, energy and air quality,
    ICT for a low Carbon society

- Challenge 4 – TRANSPORT
  4.1 Resource efficient transport and mobility in urban areas
  -> New mobility concepts to reduce air pollution and noise

- Challenge 5 – CLIMATE CHANGE, RESOURCE EFFICIENCY AND RAW MATERIAL
  5.2 Sustainably managing natural resources and ecosystems
  -> Air as a natural resource, air quality and ecosystem services
  -> Eco-innovation

- Non-nuclear direct actions of the JRC in support of challenge 5
  Air quality thematic models as part of an intergrated modelling framework
  for sustainable assessment
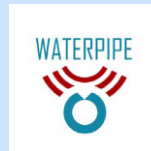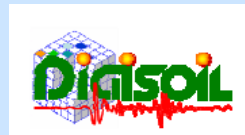
Thank you
for your attention

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Monitoring technologies - Examples of ongoing EU research
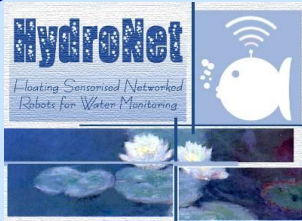
Marine/coastal monitoring
- **Floating sensorised robots**
- **PP automated devices**

Soil contamination mapping
- **Geophysical sensors (geoelectric, seismic, magnetic, SPI, GPR/EMI)**
- **Geochemical techniques**
- **Biosensors**

Water monitoring
- **Water pipelines and buried infrastructures**
- **Aquifer monitoring**
- **Drinking water quality**

Air monitoring
- **Automated analysers for monitoring urban air**
- **Indoor air quality**