Energy 2050 – Vienna
Issues for European Energy R&D: Options, priorities, policies, organisation

Dr Heather Greer

NRL Ireland

Advisory Group on Energy, FP6/7/Euratom

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Advisory Group on Energy (AGE)

- Covers FP and Euratom
- Nominated by Commission, appointed by Commissioner for Research
- Non-representative of MSs, but…
- Representative voice of energy RTD actors
- Independent advice
- Influence? None other than what the AGE creates

AGE – FP6 & 7 periods

FP6

- **“Within-field” assessment of R&D priorities**
- **European Research Area (ERA) in energy**
- **Strategic technology/R&D priorities to address a set of critical challenges: Short – Long Term**

FP7

- **Opinions on annual Work Programmes**
- **Strategic focus on long term sustainable energy system for Europe – driven by *European Strategic Energy Plan***
- **Closer dialogue with Commission?**

Members from Austria

FP6

- ***Prof Gerhard Faninger***
  Institut für interdisziplinäre Forschung und Fortbildung

FP7

- ***Dr Josef Spitzer***
  Joanneum Research

This presentation….

1. EU/EC level: recent developments
2. Views on priority R&D fields for short, medium and long terms
3. Organisation and funding issues: a new paradigm for EU energy research?
4. Some closing personal comments

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Recent EU developments - policies

- **Common policy approach to energy:**
  - **Security of supply**
  - **Shared approach to taxation**
  - **Competitiveness an issue of increasing concern, but…**
  - **Little advance on future energy technology for a *sustainable*, competitive Europe, *but…***

- **The visibility of energy technology issues is now rapidly increasing**

Raising the visibility

- **Action Plan on Energy Efficiency (19/10/2006) – 20% BY 2020**
- **Strategic European Energy Review (SEER) – for adoption 10 January ’07**
- **Strategic Energy Technology Plan (’07)**
- **Renewable Energy Road Map**

- **Common *external* energy policy**

The EC: …Urgency… Scale…

- **"Europe must act urgently: it takes many years to bring innovation on stream in the energy sector" (Green Paper - March 06)**
- **"A common approach, articulated with a common voice, will enable Europe to lead the search for energy solutions" (Barroso, May 06)**
- **"…The EU will need to reduce its CO2 emissions by at least 50% over the next decades…. we are beginning to realise the magnitude and the urgency of this problem" (Piebalgs, May 06)**

Yet….

1. **EU-25: In 2000, the second highest CO_2 emitter in the world from FF (16.0% of global)**

2. **"On present trends", by 2030, the EU will be:**
   - **90% dependent on imports for oil**
   - **80% dependent on imports for Nat Gas**

   (*EC: Green Paper on EE)*

3. **Likely range of EU GHG emissions to 2025: -1% to +39% above 2000** *(Pew Center Dec 04)*

Yet…. *(Contd)*

4. **Significant risk of global shortfalls in oil production from early 2010s**
5. **Technology developments will place upward pressure on electricity demand**
6. **Ageing European energy system:**

   ***€1,000 billion investment needed by 2025*, much of it to meet baseload**
7. **And key energy technologies aren't yet ready, and significant market share takes decades**

Is energy R&D *really* important in EU?

FP	Energy budget as % of total FP budget
1	66%
2	50%
3	23%
4	22%
5	18%
6	11.6%
7	7.25% (of Cooperation budget)

Is energy R&D *really* important in EU?

EU level:

- **FP6 Thematic Progr Energy: €424 M/y**
- **FP7 Thematic Progr Energy: €341 M/y**

Member State level:

- **Though it may now be steadying out, *EU (EU-15) Government energy R&D expenditures have been in decline since 1982 (adjusted to 2000 prices)***

Europe stirs…

- **In fact, the Commission has been pushing the agenda *hard* since FP5…**
- **And recent events are driving a common overall energy policy approach…**
- **A *few* MSs are driving their energy/GHG agenda**
- **Still an absence of *strategy* at EU level….. 2007**

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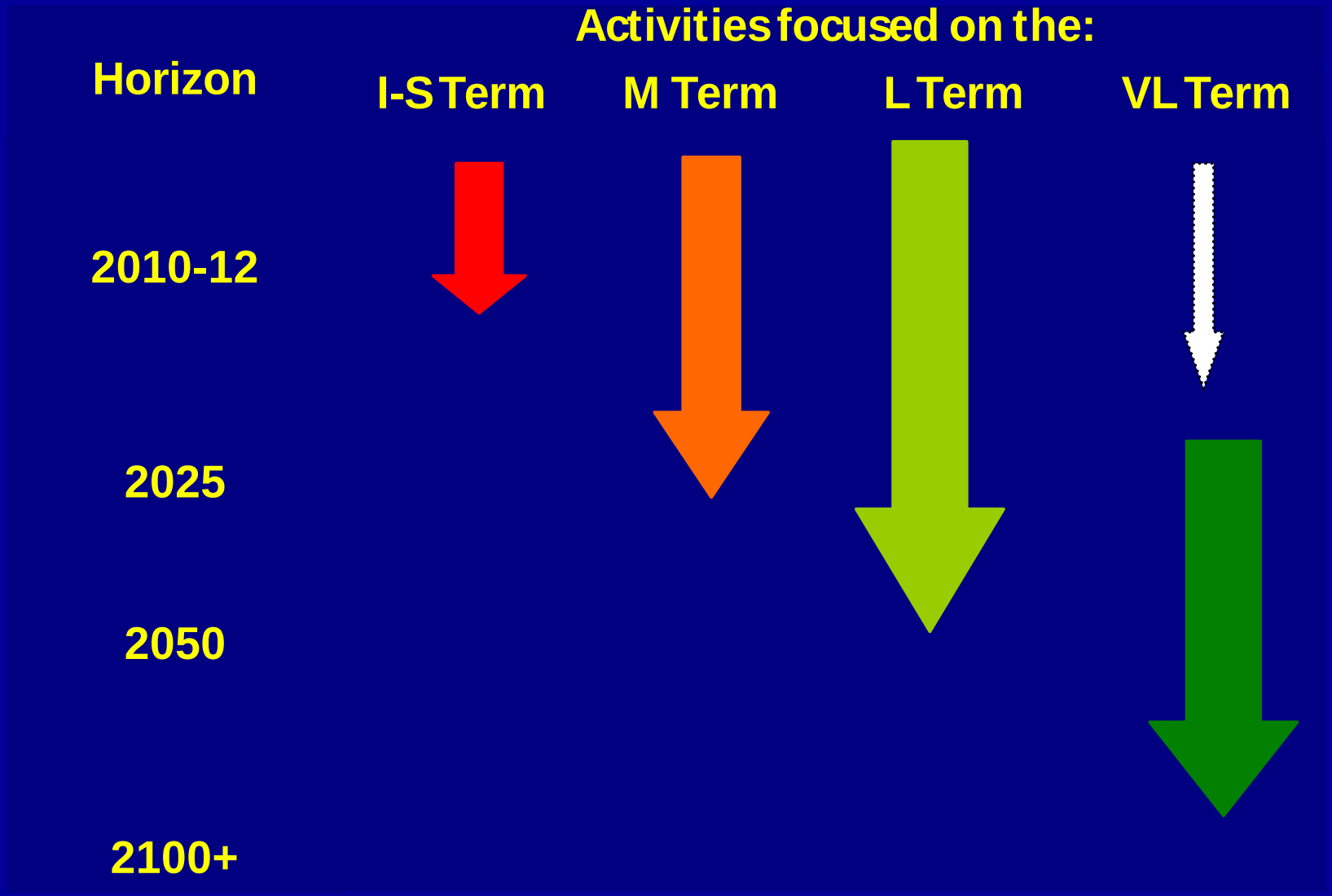
Initial comments (FP7)

- **Portfolio approach of FP7 seems inevitable and probably appropriate**
- **Proposed Work Programme for FP is (fairly) comprehensive… and it covers (almost) all AGE concerns**
- **Funds allocation likely to be stretched…**
- **Strategic element remains largely *ad hoc***

Prioritising – strategic issues

- **Required: a long term vision and quantitative/qualitative objectives for a "sustainable energy system"**

  ["Abundant, clean, affordable, long-term viability"]
- **Identifiable 'pathways to sustainability'**
- **Long term primary energy availability**
- **Transition technologies?**
- ***Parallel*** **focus: immediate-short, medium, long, and very long term horizons**



And focusing on all these ‘terms’ is costly

Overall European strategic energy R&D focus in the

Immediate Term

- Energy efficiency a key competitive advantage in all markets (stimulate 'virtuous R&D circle')
- Radical efficiency breakthroughs
- Established RE technologies fully cost competitive
- Demand reduction
- Societal action:
  - Incr. understanding
  - Commitment

Short-Mid Term

- 'Sustainability' a key competitive advantage in all markets
- Most efficient available technologies deployed in all sectors
- Develop required energy system infrastructures
- Accelerate development of "+ Gen." technologies
- World-class R&D infrastructures
- World-class CoEs
- Build competence/ capacity

Long Term

- Long term sustainability a pre-requisite in all markets
- Accelerated R&D focused on proof of concept and pilot
- Focus on technologies capable of contributing sizeable proportions of EU Final Energy Consumption

FP7: The elephant not in the room

Fission reactor research:

- **Nuclear power *will* be in the mix, like it or not**
- **Offers pathway to sustainable energy if**
  - **Fuel utilisation is increased greatly**
  - **New fuel cycles reduce quantity/ toxicity of waste products**
  - **Waste disposal/recycling are addressed**

Generation IV needs public funds

- **Recent modelling (SAPIENTA) shows Gen. IV is especially sensitive to R&D funding:**
  - **Zero-support scenario: G.IV costs in 2050 double and G.IV fails in the market**
  - **High-support scenario: G.IV gains 50% more share than in the Reference Scenario**

Conversion technologies: heat/power

- **Renewables, ‘clean coal’ and nuclear will fight it out in the market – *BUT:***
- **The ZEP’s aim is a commercial product by 2020 – penetration may be slow**
- **Nuclear build capacity is severely constrained and needs time**
- **And EU-level fission reactor research is (about) zero, and we need new designs**
- **Competitive renewables penetration *must* be achieved by 2020/25**

RE R&D priorities – overview *(1)*

- **Wind energy: cost reduction & scale; reliability & remote applications; predictability**
- **Solar low-temp: efficiency & cost reduction; applications (industry; desalination)**
- **Solar high-temp: extensive, including capital/operating cost reduction, materials/components, demonstration/ applications**

RE R&D priorities – overview *(2)*

- **Solar PV: Strategic Research Agenda; breakthrough R&D needed to achieve mass-producible low-cost film**
- **Biomass: All stages of supply chain; operating cost reduction; efficiency (gasification); demo/scale-up**
- **Biofuel: Gen 1: cost reduction/supply chain; Gen 2: lignocellusosic feedstock & syngas to liquid; biorefinery devt.**
- **Ocean energy: Prove potential**

Energy for transport

- A new old reality: “hydrocarbons will dominate transport for decades” – so emphasis on:
  - Shared policy instruments focused on CO2 reduction
  - Accelerate high-efficiency ICEs; hybrid drives
  - Mode-switchng
- H2/FC? Still heavy R&D investment…
- Electric vehicles and vehicle-scale electricity storage?

Transport energy – R&D priorities

- Integrated policy & extensive R&D to maximise indigenous BTL feedstock supply
- Maximise BTL penetration
- Accelerate 2nd Generation biofuels/fuel from waste streams/integrated biorefineries
- Speculative R&D needed on biofuel production – enzymes, photofermentation…
- H2/FC will be driven by TP agenda
- It would be a pity if small-scale electricity storage were ignored…

End use efficiency

- **Potential is massive, but requires massive multi-stranded policy support to stimulate ongoing R&D**
- ***All* sectors**
- **FP7 inclusion of industrial process R&D for step-change efficiency improvement is necessary and welcome**
- ***EU-level research should: focus on large-potential topics; breakthroughs; competitiveness; supporting policy***

Carbon Capture & Storage

- Extensive short and long term research programme still needed
- Environmental, regulatory, legal issues to be resolved
- Public acceptability may turn out to be a hidden trip-wire
- What is the long term role for CCS?
- Is CCS our latest comforting bedtime story?

Societal (and cultural) issues

- Political ‘short term-ism’ leads at best to public confusion; at worst, to complacency
- Issues include:
  - Understanding & informed opinions
  - Understanding that abundant, clean, affordable energy must have ‘costs’
  - Commitment to ‘clean’ choices & lines of behaviour
  - Lifestyle and values
  - Cooperative & collaborative approaches
- R&D needs; FP7 emphasis welcome

FP6 AGE & FP7/Euratom WP

- **Close correspondence between AGE unanimous recommendations and proposed FP7 WP**

- ***BUT:***

  - AGE wanted a four-fold budget increase

  - AGE believe a major EU initiative (JTI, MS participation, risk-reduction) on fission reactor, fuel cycles, waste reduction/recycling not only makes sense, but will be essential

  - AGE believes rapid progress towards more JTIs is needed (though costly…)

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Organisation & Funding (Overview)

- **Energy technology R&D has a particular need for ERA principles**
- **Pooled MS/EU funding and risk-reduction will be needed in a *number* of fields of energy R&D (ERA-NETs can help substantially)**
- **Better organisation of crosscutting R&D funding *must* happen in FP7**
- **We need world-leading energy R&D infrastructures and Centres of Excellence**

Is progress sufficient?

- **Strong progress since 2000**
- **European Commission have driven the agenda, *but***
- **Engagement by most Member States lacks conviction and urgency**
- **Requires strong top-down approach *as well as* bottom-up**
- ***Still* a gross absence of strategy at EU and most MS levels – even an absence of data!**

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Some (mostly) personal comments

- **Who is *really* aware of the "magnitude and urgency" of the problems we face**
- **Without strong MS political commitment, we will fail. We may anyway**
- **We simply cannot afford *not* to pursue all options (particularly not one as potentially important as fission)**
- **Changing the way we do energy R&D in Europe is as important as the R&D itself**
- **But it will require strong top-down coordination!**

Finally…

- ***"Our problems today result from a lack of commitment to energy R&D in the past. We cannot now afford to repeat this mistake. There is no time to spare."***

European Commission, "Transition to a Sustainable Energy System for Europe: The R&D Perspective", Summary report by the Advisory Group on Energy, 2006

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