Developing sustainable biofuels: challenges and technological options for european actors

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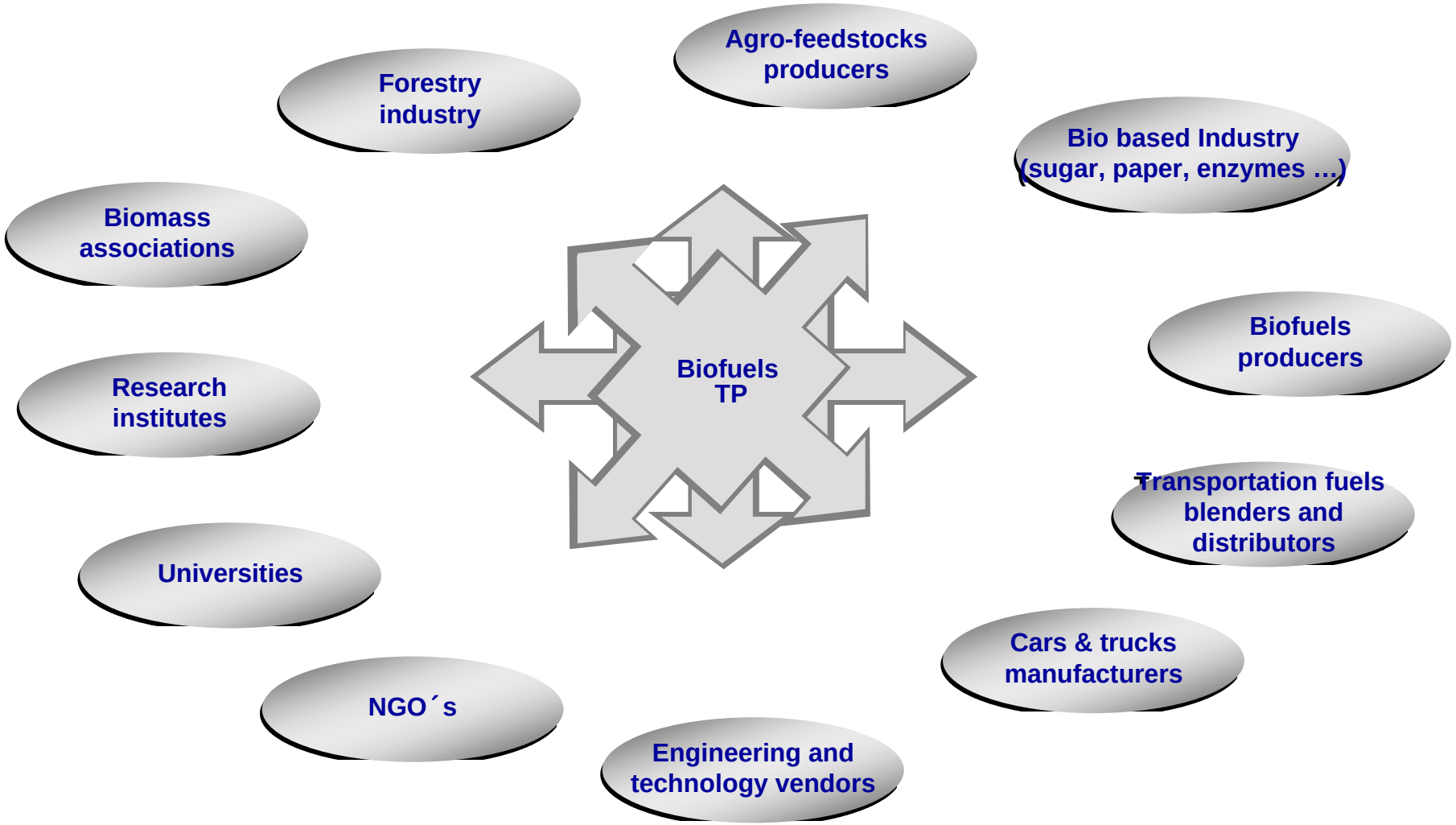
OUTLINE

- Introduction to the European Biofuels Technology Platform
- Strategic Research Agenda & Strategy Deployment Document (SRA/SDD)
- SET Plan and the European Industrial Initiative on Bio-Energy: opportunity for SRA implementation
- Developing sustainable biofuels: facts & challenges
- The value chain approach
- Conclusion: R&D priorities and more …

Biofuels TP: Stakeholders



Biofuels TP: Mission Statement

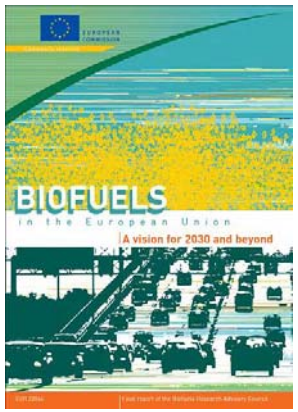
The Mission of the European Biofuels Technology Platform is to contribute to the development of:

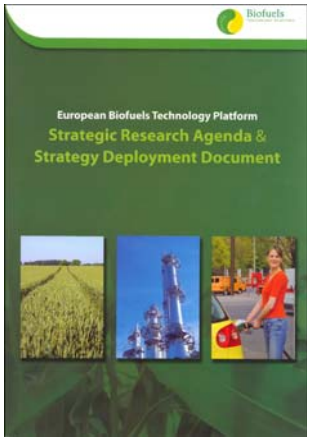
- **cost-competitive world-class biofuels technologies,**

- a **healthy biofuels industry** supplying **sustainable biofuels** in the European Union,

→ ***through a process of guidance, prioritisation and promotion of research, development and demonstration.***

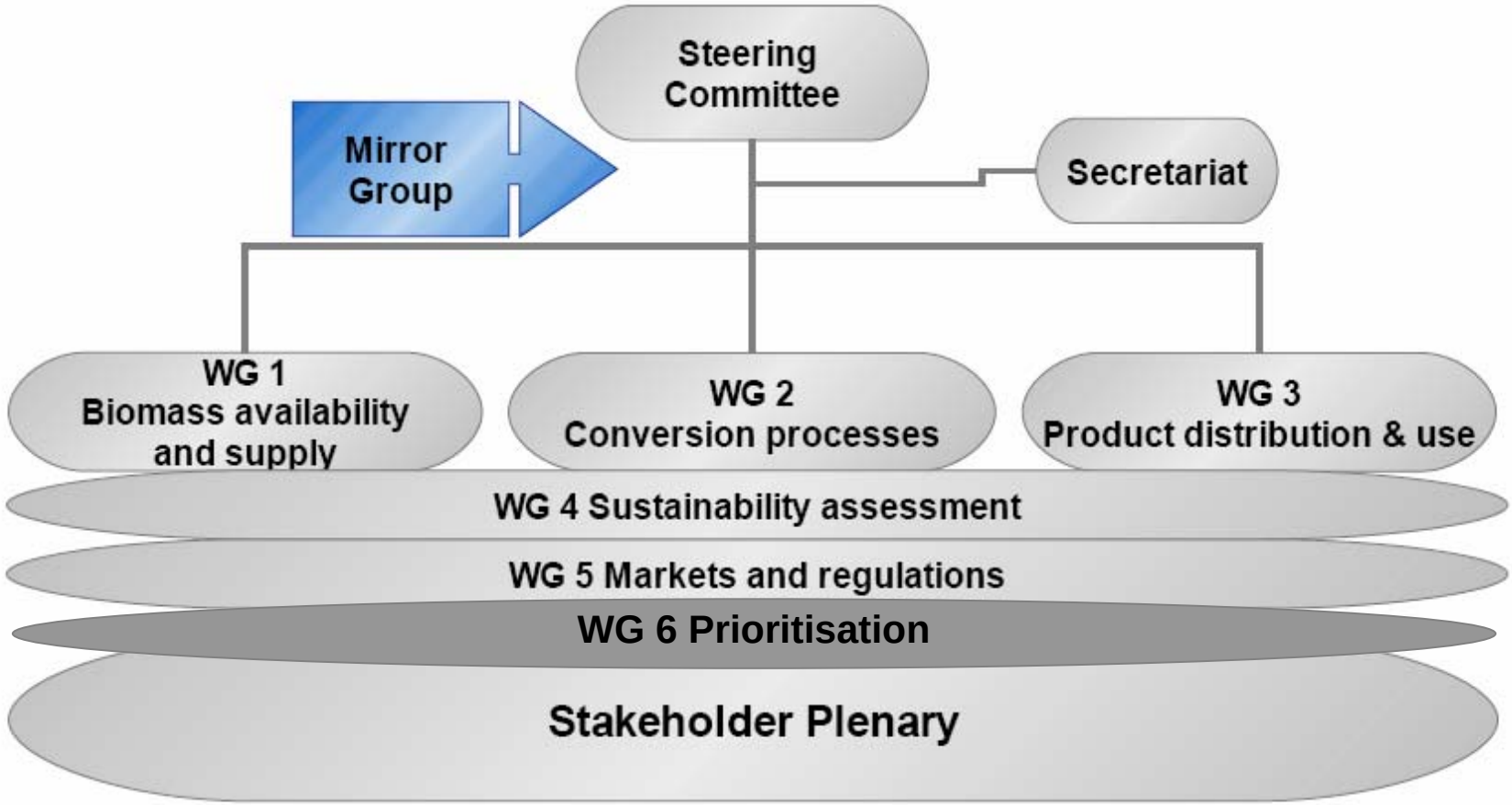
Vision Report June 2006 → **Strategic Research Agenda & Strategy Deployment Document January 2008** → **Facilitate Implementation**





Biofuels TP: Organisation

Biofuels Technology Platform






SRA/SDD


Biofuels
Technology Platform
European Biofuels Technology Platform
Strategic Research Agenda &
Strategy Deployment Document

SRA: Main conclusions

Three main areas of technology development are critical to ensure successful development of sustainable biofuels in the European Union:

- **FEEDSTOCKS**
  - managing competition for land resources (food & fodder vs. bioenergy) and for different biomass applications (transportation fuels, heat, electricity, industrial raw materials).
  - Increasing yield per hectare and developing efficient supply logistics both for dedicated crops and residues.
- **CONVERSION TECHNOLOGY**
  - developing energy efficient and reliable biomass-to-fuel conversion processes with feedstock flexibility and high quality products.
- **LOGISTICS & END-USE TECHNOLOGIES**
  - optimisation of fuel-engine environmental and energetic performance ensuring compatibility with existing and future infrastructure and vehicles.

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SDD: Recommendations for biofuels deployment

- A ***coherent, long term and harmonised political and open market framework*** to secure confidence of investors in capital-intensive innovative technologies.
- ***Joint public/private financing*** for ***R&D and Demonstration*** of new biofuels production routes and end-use applications.
- ***Biofuels quality standards based on sound science*** while not creating unnecessary barriers for biofuels deployment.
- ***A simple, coherent and global certification system*** to ensure environmental, economic and social sustainability of biofuels production chains.
- ***Social awareness and acceptance*** gained by open communication on benefits as well as on potential limitations of biofuels.

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SRA/SDD: Conclusions

The winning options (combination of land, feedstock, conversion processes and end products) will be those best addressing strategic and sustainability targets:

- High level of GHG reduction with sound management of other key environmental issues (biodiversity, water use, local emissions…)
- Security and diversification of energy supply for road transport
- Economic competitiveness and social acceptance

Strategic Energy Technology (SET) Plan:

Focus on the

Industrial Initiatives

European Strategic Technology Plan (SET-plan)

COM(2007)723 of 22 November 2007

- Joint Strategic Planning – new governance – align technology development with energy policy goals
- Effective implementation:
  - » European Industrial Initiatives: strategic technology alliances
  - » Strengthening European energy research capacities – European Energy Research Alliance
  - » Trans-European Energy Networks and Systems of the Future – transition planning
- Increase resources, both financial and human. Follow-up Communication in 2008.
- Reinforce international cooperation

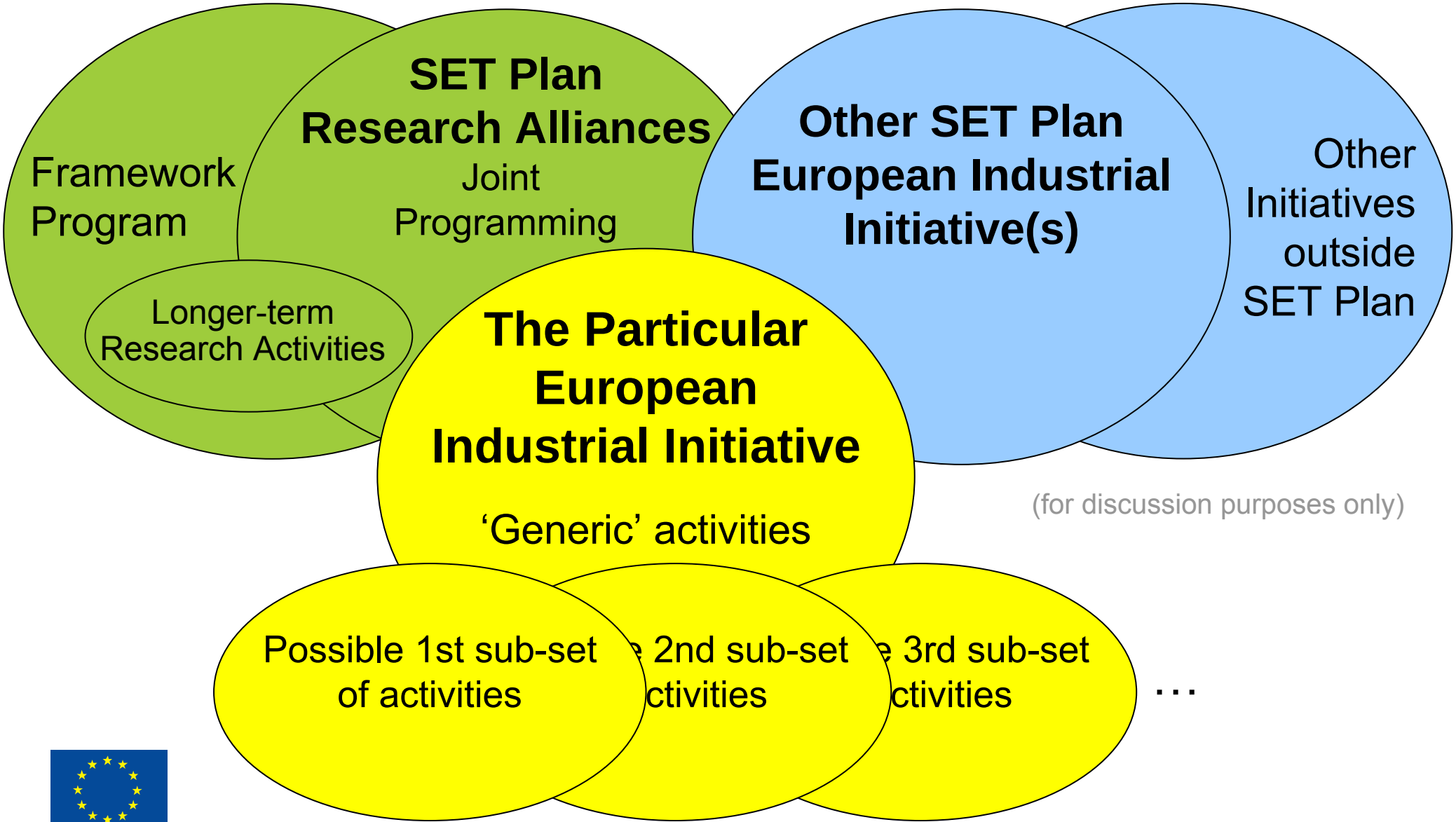
Proposed priority initiatives

- Solar Europe (PV and CSP)
- European Wind
- Bio-Energy Europe
- European CO_2 capture, transport & storage
- European electricity grid
- Sustainable nuclear fission (gen-IV)

Basic features of European Industrial Initiative

- Led by industry
- Contribute to political goals (energy & climate change)
- Accelerate deployment of technology: deliver progress beyond business-as-usual
- Leverage on European scale capability and added value
- Foster public–private partnership: Share risk & Pool public and private financing
- Define & realise clear targets (quantified objective)

Context of industrial initiative



(for discussion purposes only)

EUROPEAN COMMISSION

Biofuels Technology Platform

SET Plan & European Industrial Initiatives (EII)

As part of the Strategic Energy Technology Plan (SET–Plan)*, the European Industrial Initiative on Bio-Energy will focus on ***advanced biofuels*** in the context of an ***overall strategy for bio-energy***

- **Scope: bio-energies and bio-energy carriers** (solid, liquid, gaseous fuels, heat, electricity) includes biorefining/industrial integration.

- **Goal:** accelerate the development and industrial deployment of technologies and markets enabling the EU to meet its ambitious goals for biofuels and bio-energy in a sustainable way.

- **Key features:**

  - Industry lead
  - Leverage on European scale capability and added value to overcome national limitations
  - Sustainability essential in its three dimensions (economic, environmental, social)

* reference: COM (2007)723, 22.11.07

.... facts & challenges

Feedstocks

- **Facts:**
  - fragmented, highly heterogeneous → no single feedstock likely to dominate in the ”European basket of biomass feedstocks”
  - competition for land and/or feedstock use
  - limited European potential on a per capita basis
- **Challenges:**
  - realistic appreciation of sustainable biomass supply on a local/regional basis across Europe
  - to enhance feedstock availability, lower the production cost and improve sustainability

.... facts & challenges

Processing technologies

- **Facts:**
  - different types of feedstocks, different integration opportunities and policy priorities → need for a “tool box” of processing technologies.
  - Except for lipids, intrinsic low energy density of biomass → overall lower energy and carbon efficiency compared to fossil alternatives
- **Challenges:**
  - Developing technologies and pathways able to cope with variable quantities and qualities of biomass feedstocks
  - Achieving energy and cost efficiency on a reliable basis

.... facts & challenges

End markets for biofuels

- **Facts:**
  - large and increasing distillate markets for transportation (road, air, marine)
  - biofuels costs: even at high crude oil price, biofuels need monetisation of GHG and/or security of supply benefits
- **Challenges:**
  - need to secure adequate logistics, to be competitive with its alternatives, sustainable and in full compliance with European standards and regulations.

.... facts & challenges

Regulatory framework

- **Facts:**
  - the economics of biofuels value chains in Europe are still dependent on the regulatory framework.
  - Unsettled political framework lacking coherence across Member States and policy areas: the objectives of climate, energy security environmental and agricultural policies are not always convergent and coherent in relation to bioenergy and biofuels issues.
- **Challenges:**
  - Developing advanced processing technologies requesting high investment costs in an environment with uncertain feedstock availability & price and unpredictable regulatory framework whose impact on the economics of bioenergy is of first order.

From development challenges to technical priority

- Feedstocks & regulatory framework are critical challenges.

- Selecting technologies only on technical criteria is not an option. Local context consideration is critical.

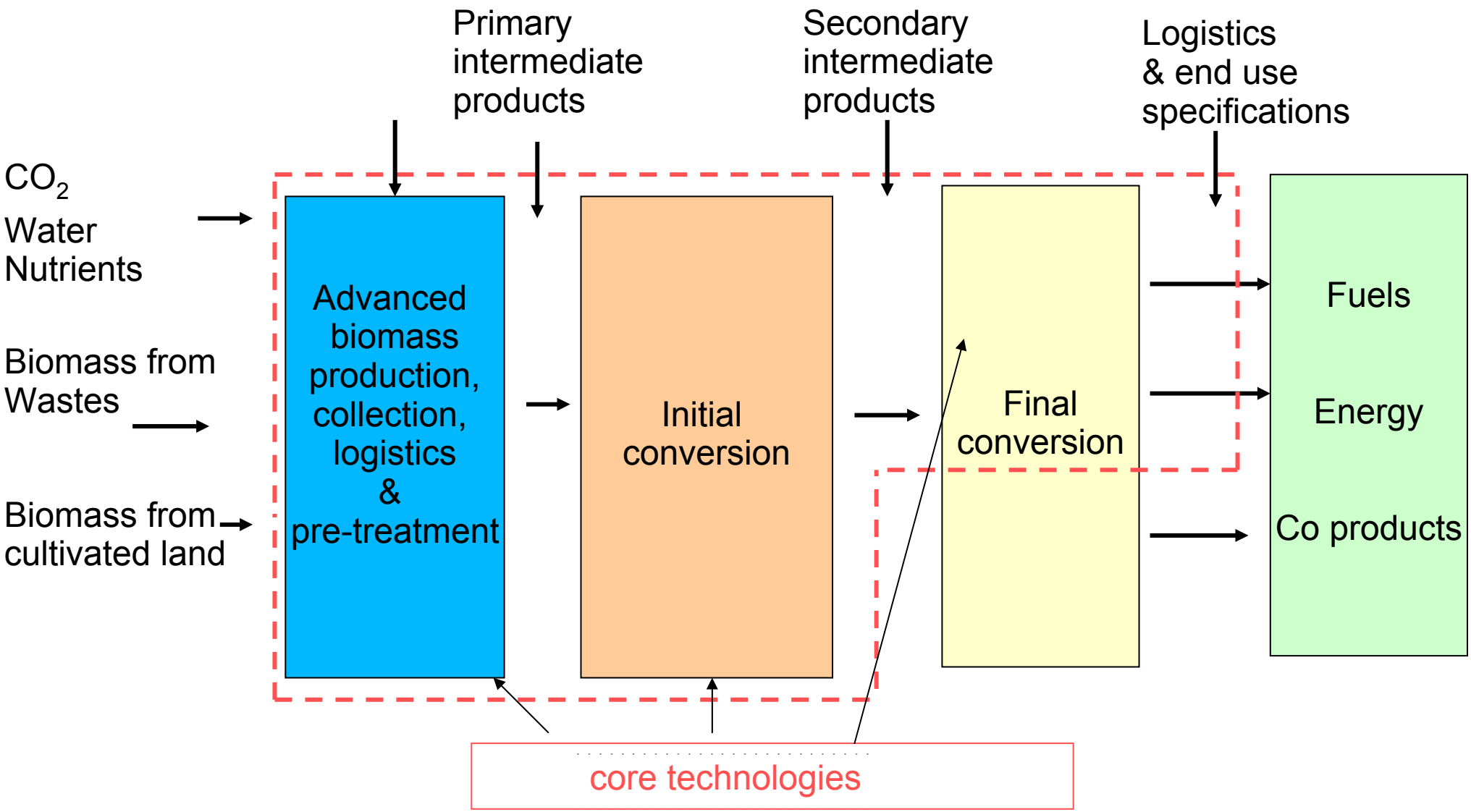
→ **Need for a pragmatic approach integrated over the whole value chain to identify critical technologies and the underlying research needs.**

The value chain approach

Current European biofuels value chains are unlikely to develop at a scale allowing to meet EU 2020 biofuels ambitions. Innovative advanced biofuels value chains will be needed.

- Identify most relevant innovative value chains: those suitable for supplying a significant share of the road transportation market, in a sustainable way.
- For each of these value chains:
  - appraise feasibility of sustainable and competitive supply of relevant feedstocks
  - identify the critical technologies: those having a major impact on overall energy and/or carbon efficiency, capex, opex and reliability
  - appraise the status of the critical technologies within context of proposed value chain: 1 (laboratory), 2 (pilot), 3 (demonstration), 4(industrially demonstrated and commercially available)
  - list the core technologies: those critical technologies which are specific to bio-feedstocks and/or bioenergy value chains.

The value chain approach



The value chain approach

Preliminary identification of advanced biofuels and bioenergy value chains of relevance to EII-B

- **20 value chains of potential relevance have been suggested by EBTP SC members.**
- **From this initial list 6 distinct « generic value chains » were short-listed:**
  - Ligno-cellulosic alcohols (ligno cellulose to alcohols via biological processes)
  - Ligno-cellulosic synfuels (ligno cellulose to synfuels via gasification)
  - Micro-organism based production of biofuels via lipids (algae, bacteria …)
  - Sugar & starch chemically converted into HC:s
  - Pyrolysis based bioenergy carriers (ligno cellulose to solid, liquid and/or slurry bioenergy carriers via pyrolysis)
  - Ligno cellulose to SNG (ligno cellulose to methane via gasification)
- **Further analysis of their potential, the maturity of the core technologies and the underlying technical challenges is ongoing …**

Conclusion

Conclusion: R&D priorities and more …

- ***The European ambitious goals for climate and energy policy is calling for step change innovation in bioenergy/biofuels value chains.***
- ***The SET-plan proposed European Industrial Initiative on Bio-Energy (EII-B) is aiming at delivering such dramatic progress.***
- ***Preliminary identification of value chains of potential relevance to EII-B is under way within EBTP: 6 generic value chains have been identified.***
- ***The need for further development and demonstration of critical and core technologies is beeing analysed.***
- ***Industrial leadership backed by strong support from EU and Member States will be essential to manage the risks and secure financing.***
- ***Contributions from all key stakeholders of the biofuels/bioenergy value chains will be needed: biomass supply, industrial deployment, research and technology development, sustainability assessment.***

European Biofuels Technology Platform

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