PROJECT PROPOSAL for the 7FP call

BIOENERGY PRODUCTION IN RURAL AREAS

ENRIQUE CORREAL
9th September 2011

Production and utilization of energy from biomass in European marginal rural areas

Hochschule für Forstwirtschaft
University of Applied Forest Sciences
Rottenburg

NOVagri med
Innovations agricoles en territoires méditerranéens

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project CALLS:

Seventh Framework Programme (FP7)

med
L'Europe en Méditerranée
Europe in the Mediterranean

NOVagri med
Innovations agricoles en territoires méditerranéens

ENPI CBCMED
CROSS-BORDER COOPERATION IN THE MEDITERRANEAN

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

SUDOE
Interreg IV B

arimnet

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TOPICS AND POSIBILITIES WITHIN THE CALLS

Topic: agro energetic districts (Novagrimed)
Axis 4 – objective 1: promotion of a polycentric and integrated development of the Med space

Topic: waste treatment and recycling
Justification: environmental sustainability at the basin level; use of renewable energy sources
Budget: EU contribution 90%; co-financing 10%

Topic activity 1. agriculture
KBBE.2012.1.2-01: Development of new improved logistics for lignocellulosic biomass harvest, storage and transport
Topic activity 3. biotechnology
KBBE.2012.3.1-02: Multipurpose crops for industrial bioproducts and biomass (4F future crops for food, feed, fiber and fuel)

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7FP call : KBBE

European Knowledge Based Bio-Economy (KBBE):

- **THEME 2 *AGRICULTURE***
- Activity 2.1: Sustainable production and management of biological resources
- Area 2.1.2 Increased sustainability of agriculture production systems
- **KBBE.2012.1.2-01: Development of new or improved logistics for lignocellulosic biomass harvest, storage and transport**
- **Call: FP7-KBBE-2012-6. The topic aims at the development of new or improved logistics for harvesting, transport and storage for each of the following main raw material types:**
  - **(1) agricultural residues (e.g. cereal straws, harvested weeds…)**
  - **(2) forestry residues (e.g. low value forestry wastes)**
  - **(3) BIOMASS FROM ENERGY CROPS**

(up to one project in each raw material type; 3,5M euro; 25% for SMEs; deadline 15 November 2011; collaborative project –targeted to SMEs-)

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Tentative project title:

PRODUCTION AND UTILIZATION OF ENERGY FROM LIGNOCELLULOSIC BIOMASS IN EUROPEAN MARGINAL RURAL AREAS:

ENERGY CROPS ADAPTED TO DRY-COLD ENVIRONMENTS

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LIGNOCELLULOSIC BIOMASS

- **WOOD from native species (trees, shrubs)**
- **STRAW from cereals (wheat, barley, corn)**
- **MSW (municipal solid waste)**

ENERGY CROPS:

- HERBACEOUS lignocellulosic plants
  - *Miscanthus*, switchgrass, reed canary grass, sweet sorghum
- WOODY lignocellulosic plants (trees & shrubs)
  - poplar, willow, eucalyptus, paulownias

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Project WORK PACKAGES (WP)

WP1: **COORDINATION**

WP2: **BIOMASS FEEDSTOCK** production and quality: energy crop species adapted to dry-cold environments

WP3: **HANDLING and MECHANIZATION of BIOMASS** : requirements for the establishment, harvest, handling, storage and transport of biomass crops

WP4: **SYSTEM ANALYSIS of ENERGY CROPS**: environmental and socio-economic impact on marginal rural areas

WP5: **AGROENERGY DISTRICTS**: establishing agroenergy chains at industrial scale

WP6: **DISSEMINATION**

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WP2: BIOMASS FEEDSTOCK

BIOMASS PRODUCTION:

ENERGY CROP SPECIES adapted to dry-cold environments:

- definition of **plant/crop ideotypes** for partner's environments
- **arable land** use strategies for energy crops: **scenarios** where species could be cultivated
- develop new crops through **plant breeding** with optimised characteristics/plant traits; **use of local** species **biodiversity**
- yield stability and crop resilience in erratic climate scenarios; **field trials with farmers and biomass companies**

BIOMASS QUALITY in relation to best available conversion technologies and uses

- establishment of quality **parameters and standard methodologies**
- thermo-chemical **performance of different feedstocks**

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WP3: HANDLING and MECHANIZATION of BIOMASS

MACHINERY for biomass crops:

- **establishment, harvest, and on-site pre-treatment** (size reduction, densification, blending)
- **develop and adapt specific machinery** for the raw material used and to optimise **storage and transport** of biomass to processing plants

LOGISTICS for relevant geographies

- GIS for **biomass availability, transport and cost**
- analyse **supply and demand**

MONITORING biomass

- traceability of biomass **feedstock quality** and properties
- **grids for** local and regional **biomass trading**

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WP4: SYSTEM ANALYSIS of energy crops in marginal rural areas

ENVIRONMENTAL impact of energy crops:

- evaluate **synergies** of bioenergy and environmental management; develop **indicators** and methodology

  - **biodiversity** (fauna and flora associated to biomass crops)
  - **soil** conservation and soil fertility (against soil abandonment)
  - **water** use efficiency (traditional crops v energy crops)

- **energy balance** (GHG analysis; C stock of the soil)

SOCIAL-ECONOMIC impact on rural development:

- costs and benefits compared with traditional crops
- improving the energy access of rural communities

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WP5: AGROENERGY DISTRICTS: establishing agroenergy chains

- Establishment of **agroenergy chains** through **regional pilot projects**:
  - **biomass power plants** to produce **electricity**
  - **biomass boilers for heating** and cooling
- Strategies to provide **homogeneous feedstock for large-scale applications**:
  - cost-efficient, high quality and high energy content feedstocks from various biomass sources (e.g. via pretreatment, blending, compacting etc.)
  - improvement of logistics -machinery, methods of collection, transport and storage- and their associated processes to supply biomass plants
- Develop **reliable and sustainable agro-to-energy chains** that open up the feedstock potentials, certification issues, and prevention of excessive disturbances in agricultural commodity markets

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Potential research PARTNERS and stakeholders from the agro-sector

LEADER/COORDINATION

COUNTRIES: SPAIN, ….

RESEARCH:

R+D+I: **IMIDA, ARGEM, …..**

STAKEHOLDERS:

SMEs (25%): **Ecoenergías Vega del Segura (DALKIA), …..**

agrarian organizations: **COAG**, **LEADER, …..**

education institutions: **IES-Moratalla, ….**

DEADLINE: 15 November 2011

JUSTIFICATION/EXPECTED IMPACT

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WHAT DO WE EXPECT FROM THE PROJECT:

- develop energy crops adapted to dry-cold EU environments **to produce local biomass at low cost in a sustainable way**

- provide answers as to whether promising energy crops can be allocated to specific European rural areas and their biomass **quality/yield optimised at every step of the energy chain up to the factory gate**

- **improve the link between agriculture activities and the environment**, reducing environmental footprints

- **improve social welfare and job opportunities in rural areas**; introduce more resilient and diverse agricultural production systems

- energy crops could provide **supplementary feedstock to make better energy use of biomass residues** (agriculture, forestry, industry and urban organic waste)

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Mediterranean context

The Mediterranean region is considered one of the regions of the world most threatened by climate change, which could worsen stresses that are already high (e.g., drought, extreme climatic events frecuency)

It is one of the hotspots of the global biodiversity, with a remarkable richness in cultivated and wild species

In most Mediterranean countries, water is a scarce resource and its availabiliy decreases

Soil erosion and loss of soil fertility are major problems

There is a loss of jobs in the rural sector and insufficient adaptation to new economic demands

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The European Strategic Energy Technology Plan

SET-Plan

Towards a low-carbon future

The European Industrial BIOENERGY Initiative

- a set of activities on **biomass resources for bioenergy** leading to improved **cooperation between stakeholders** and **developing the feedstock market**.
- longer-term **research and demonstration** concerning emerging and innovative **bioenergy value chains** that will be commercially available beyond 2020.

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European Biofuels
TECHNOLOGY PLATFORM

BIOMASS FEEDSTOCKS – EXPECTATIONS FROM INDUSTRY

R&D needs: biomass availability and supply

16th April 2010 Workshop Common view on biomass feedstock availability www.biofuelstp.eu

R&D recommendations

- Develop a common view on sustainable biomass availability across different sectors, shared with all relevant stakeholders.
- Develop cost supply curves for existing and new feedstocks and given timeframes, regions and demand types. Define obstacles to mobilisation.
- Develop new plant varieties (crop/tree breeding and physiology); improve cultivation and management practices (propagation, cultivation systems, etc) to optimise water, energy and other inputs and increase productivity.
- Optimise associated equipment to minimise logistics chain costs and to meet conversion requirements (integrated harvesting, collection and transport solutions for fibre/bio-materials and energy).
- Develop large-scale logistics for new feedstocks or underutilised resources, optimise along the supply chain.
- Competition in biomass use. Research should focus on defining the methods and criteria to assess what types of biomass can contribute to a sustainable biofuels market without directly competing with other uses (particularly food).
- Use of wastes and residues – maximising efficiency of closed-loop cycles and biorefining.

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BIOENERGY: BIOMASS CROPS

Plant-derived bioenergy currently supplies less than 1% of Europe's requirements, but is expected to develop dramatically in the coming decades

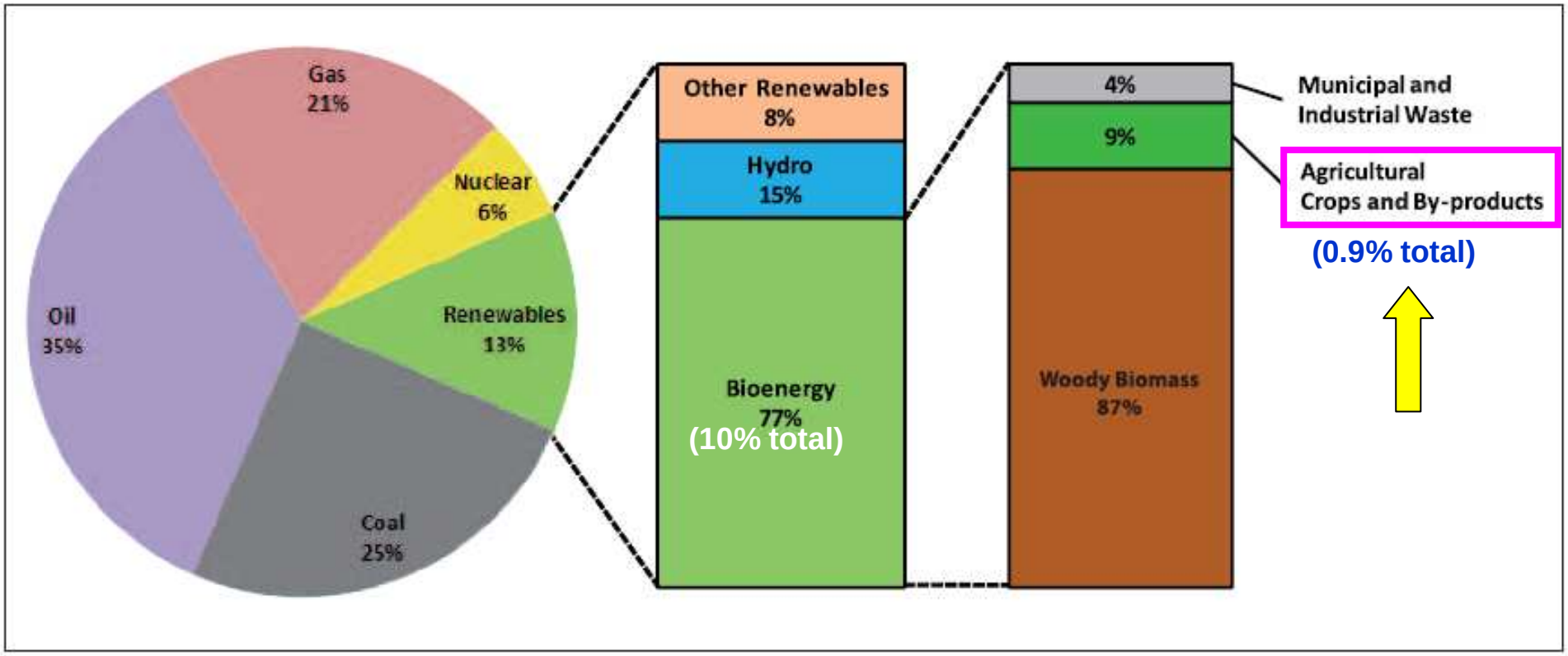

Figure 3. Share of bioenergy in the global primary energy supply. For further information, see IEA Bioenergy, 2009a.

demand for biomass is expected to roughly double in the upcoming 10 years in Europe (AEBIOM)

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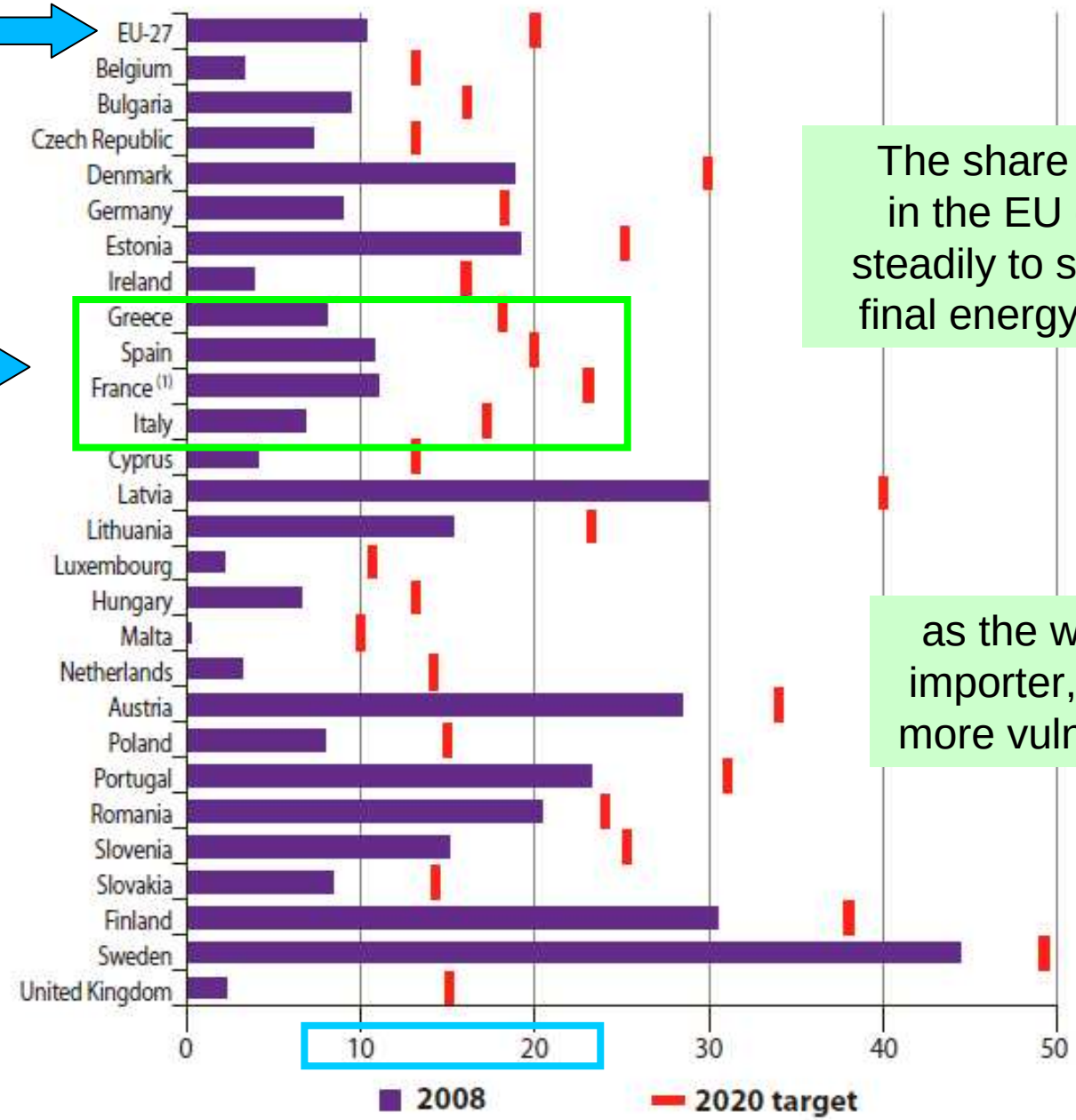
Figure 1.6.1: Share of renewable energy in gross final energy consumption and target for 2020 (%)



(1) "France métropolitaine", excluding the four overseas departments (French Guyana, Guadeloupe, Martinique and Réunion).

Source: Eurostat (Europe 2020 indicators — online data code: t2020_31)

The share of renewable energy in the EU energy mix has risen steadily to some 10% of the gross final energy consumption in 2008

as the world's largest energy importer, the EU is likely to be more vulnerable to supply risks

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Expectation of biomass supply in 2020 – 2030 – 2050

(source : expert view of RHC platform, biomass panel).

Renewable Heating & Cooling
European Technology Platform

		2007		2020		2030		2050	
		Surface (Mha)	Biomass (Mtoe)	Surface (Mha)	Biomass (Mtoe)	Surface (Mha)	Biomass (Mtoe)	Surface (Mha)	Biomass (Mtoe)
Agriculture	Energy crops	5.2	10	20	43	25	75	30	129
	By-products		4		20		30		30
	Other						5		15
Forestry	Residues		18		40		55		55
	Industry by-products		54		65		65		66
Waste			10		32		40		35
Imports			2		20		30		40
Total		5.2	98	20	220	25	300	30	370

Mtoe: Million Tons of Oil Equivalent

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LIGNOCELLULOSIC BIOMASS for HEAT and/or POWER

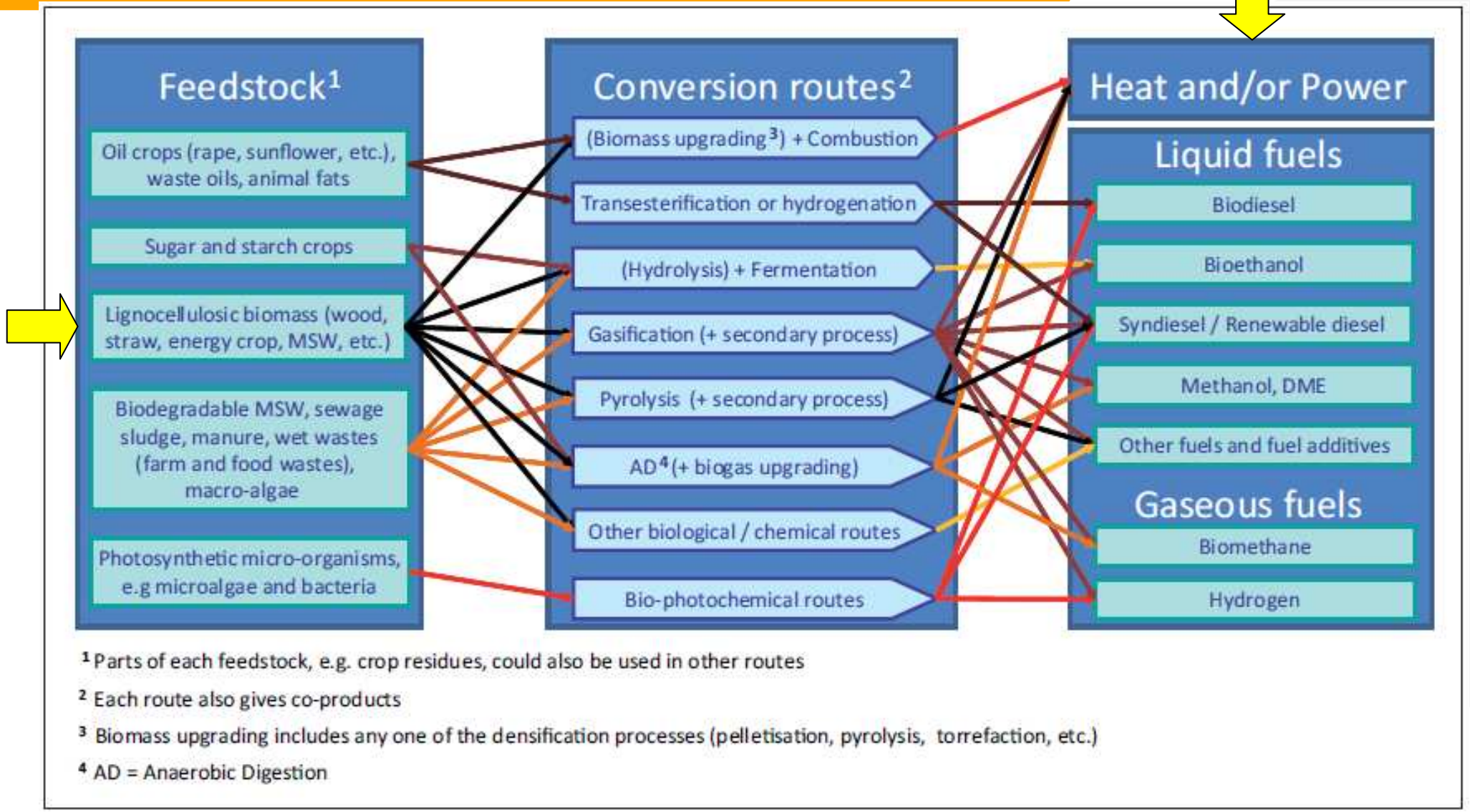

Figure 3: Schematic view of the wide variety of bioenergy routes. Source: E4tech, 2009.

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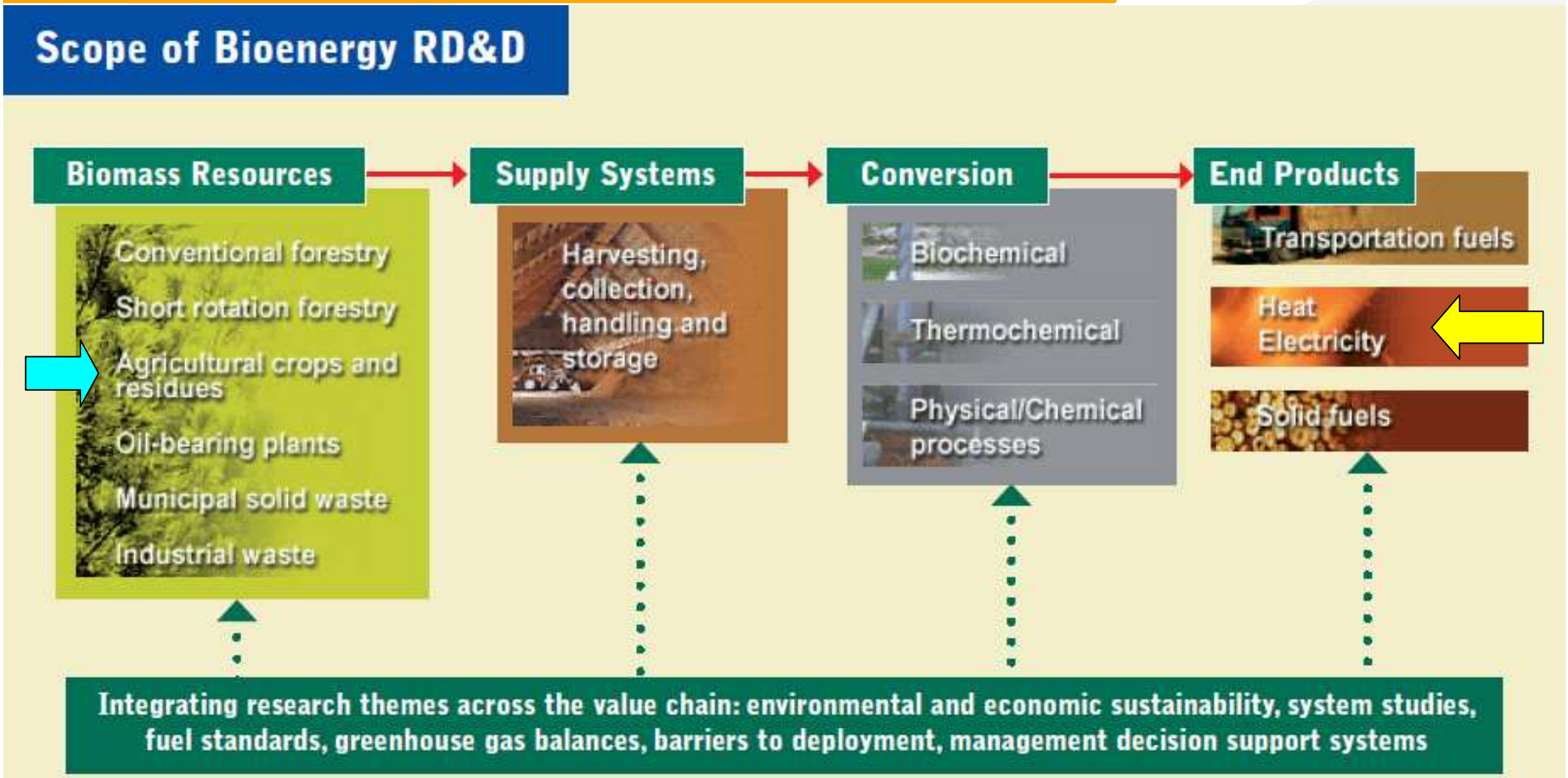
AGRICULTURAL CROPS FOR HEAT AND ELECTRICITY



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BIOMASS
BIOENERGY
ENERGY CROPS

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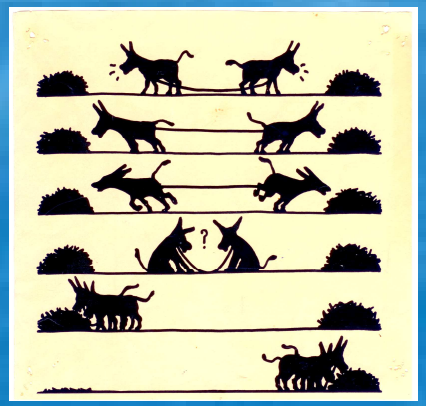

"Do what you can with what you have where you are"
Theodore Roosevelt

THANKS FOR YOUR ATTENTION