Cooperation Europe – Latin America

Results from the BioTop project

and the need to cooperate for sustainable biofuel production

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WIP – Renewable Energies, Munich, Germany

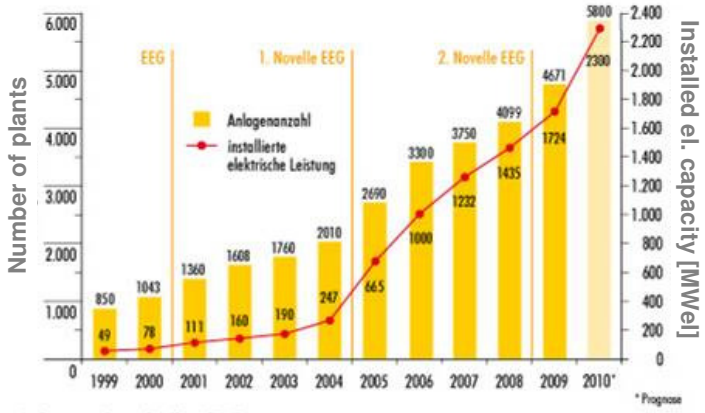
Mexican Bioenergy Network
Annual Meeting

Cuernavaca, Mexico, 26 October 2010

Content

1. Example of Policies: Biogas in Germany

The Power of Policies
Example: Biogas plants in Germany



Quellen: FNR nach DBFZ (2010), FvB (2010)

Typical biogas plant in Germany

- Average Size (2009): 500 kWel
- Average Size (2010): 430 kWel
- Biogas use: electricity
- Feedstock: mainly corn silage, but also manure, waste, etc.

Typical biogas plant in Germany

Learning effect: Reasons why German biogas plants struggled in 2007/2008

OUT:
wasted heat

OUT:
electricity EEG

IN:
only corn silage;

High corn prices
in 2007/08

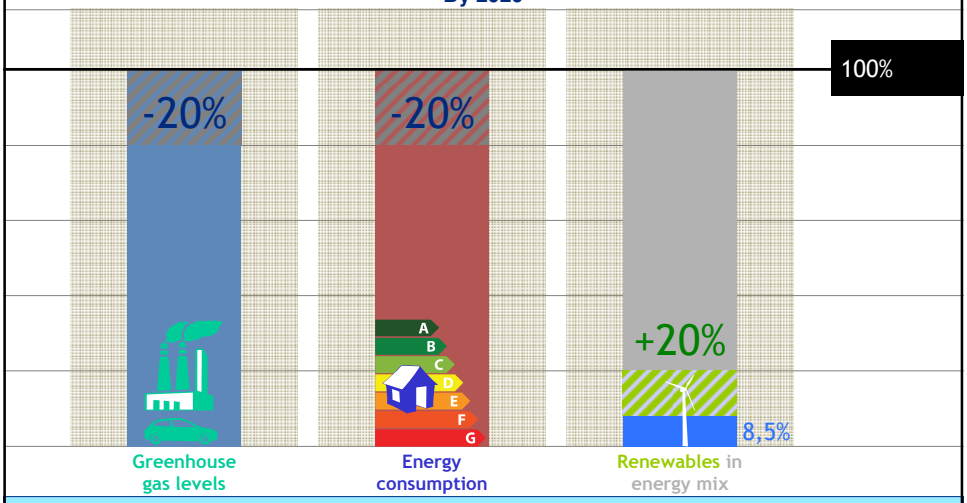
2. EU Policies on Biofuels

Biofuel Policy Development of the European Union

- **2001**: In the "**Communication on alternative fuels fro road transport**" the European Commission identifies i.a. biofuels as potential future transport fuel
- **2003**: The EU adopts the **Biofuels Directive** (2003/30 EC). Targets: 2% in 2005; 5.75% in 2010
- **2003**: **Energy taxation Directive** (2003/96 EC) allows de-taxation of biofuels
- **2005**: EC presents "**Biomass Action Plan**"
- **2006**: EC presents "**An EU strategy for biofuels**" prepares the revision of the Biofuels Directive 2003/30 EC
- **2007**: EC presents "**Road Map for Renewable Energy in Europe**"

The 20-20-20 EU policy

By 2020



RED Directive (2009/28/EC) "on the promotion of the use of energy from renewable sources"

- Scope: Common framework for the promotion of energy from renewable sources

- Mandatory national targets
- 20% overall target for renewable energy in 2020
- **10% target for renewable energy in transport in 2020**
  - Biofuels 1st generation
  - Biofuels 2nd generation **counts double**
  - Renewable electricity / hydrogen
    - Renewable electricity in cars: bonus of 2.5

- Measures to achieve these targets:
  - Support schemes
  - Measures of co-operation

Sustainability of biofuels in the RED

- Single EU scheme
  - Applies to both EU production and imports
  - Member States cannot set additional criteria

- Apply to single consignments of biofuels

- Have to be met in order to:
  - Count toward the targets (10% and the '20%')
  - Count toward obligations (put on suppliers)
  - Be eligible for financial support (for their consumption)

Mandatory sustainability criteria

- GHG saving of at least 35%
  - 50% from 2017
  - 60% for new installations from 2018
  - default values and calculation method for actual values included
- No raw material from converted land with:
  - high biodiversity value
    - Primary forest, protected areas, biodiverse grassland
  - high carbon stock
    - Forests, peatland, wetlands
- Chain of custody must respect mass balance methodology

Who is responsible for compliance?

- Not prohibited to produce or sell unsustainable biofuels in EU
- Economic operator benefiting from support or under blending obligation typically under requirement to provide evidence
- Without such evidence Member State may not give support / allow to count towards quota

EU Technology Roadmap (SET-Plan)

- **Strategic Energy Technology Plan (SET-Plan):**
  „In short, we must make low-carbon technologies affordable and competitive – a market choice. This is the core idea behind the SET-Plan“
- **Objective Sector Bioenergy:**
  „To ensure at least 14% bioenergy in the EU energy mix by 2020, and at the same time to guarantee GHG emission savings of 60% for bio-fuels and bio-liquids under the sustainability criteria of the new RES directive.“
- The cost of this bioenergy initiative is estimated at €9 billion over ten years.

http://ec.europa.eu/energy/technology/set_plan/set_plan_en.htm

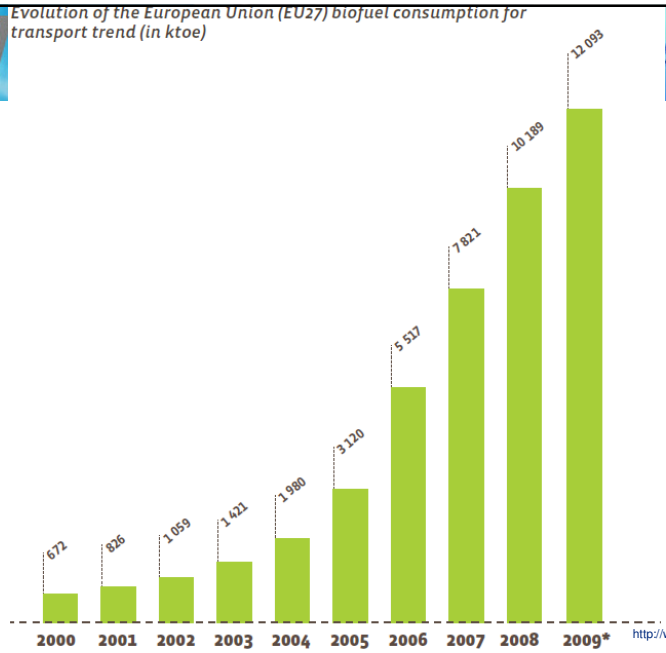
The EU Biofuel Policy has also impacts on Latin American countries

- Sustainability/markets if LA exports biofuels to EU
- Common Research and Technical Development of new technologies
- Knowledge transfer from EU to LA
- Knowledge transfer from LA to EU

→ Therefore projects like BioTop are supported

3. European Biofuel Markets

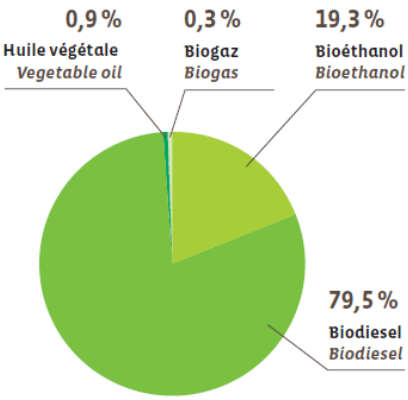
Evolution of the European Union (EU27) biofuel consumption for transport trend (in ktoe)



http://www.eurobserv-er.org/pdf/baro198.pdf

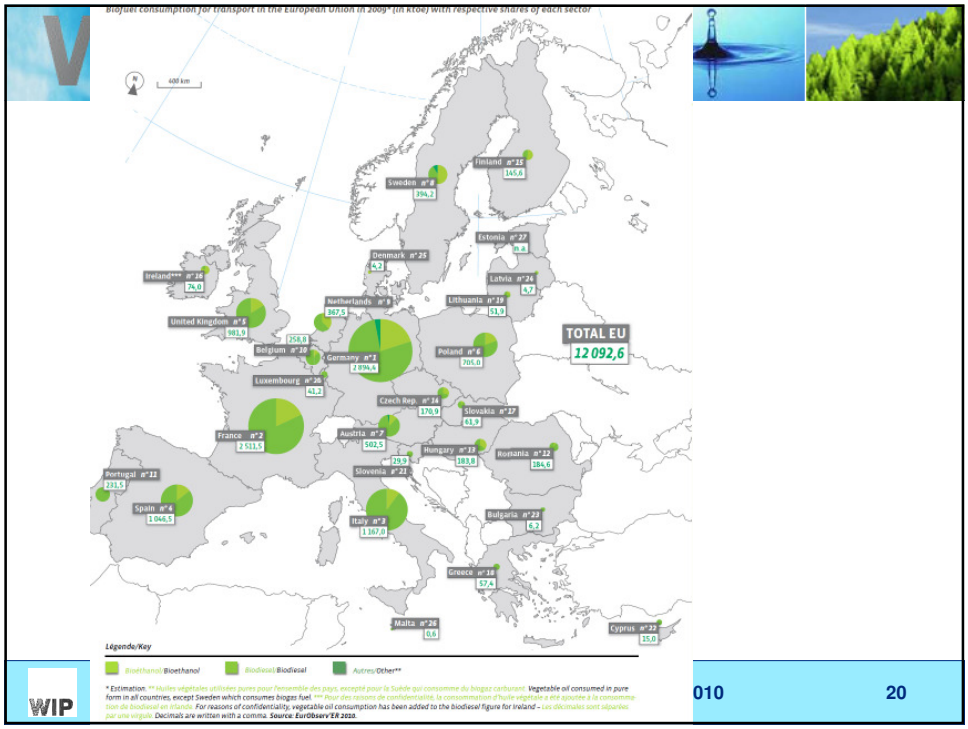
** Estimations. – **Sources: EurObserv'ER (année 2008 et 2009) et Eurostat (2000-2007)./EurObserv'ER (for years 2008 and 2009) and Eurostat (2000-2007).***

Breakdown of total EU 2009 biofuel consumption for transport by biofuel type and energy content*



* Estimations. – *Les décimales sont séparées par une virgule.* Decimals are written with a comma. **Source: EurObserv'ER 2010.**

http://www.eurobserv-er.org/pdf/baro198.pdf



4. Overview on the BioTop Project

BioTop
Biofuels
RTD-cooperation
Latin America - Europe

„Biofuels Assessment on Technical Opportunities and Research Needs for Latin America“

Duration: **March 2008 August 2010**

BioTop was supported by the European Commission in the 7th Framework Programme

BioTop Objectives

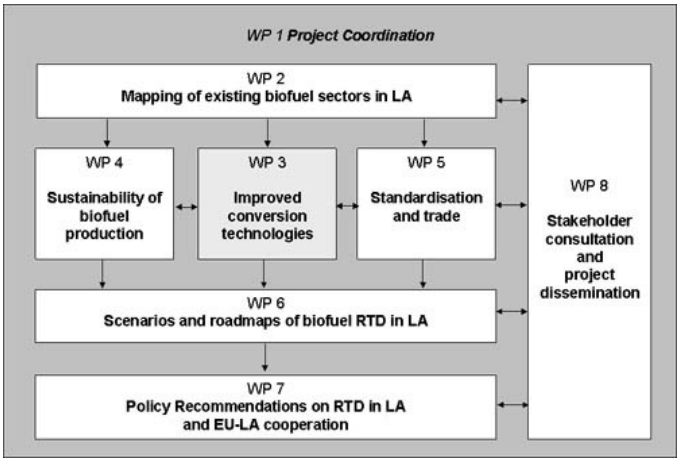
BioTop identified Biofuel technical opportunities and research needs for LA and supported specific RTD cooperation activities between LA and the EU

- Overview of the existing **biofuel sectors in LA**
- Identification of **RTD priorities**, needs and opportunities
- **Collaboration** between European and Latin American stakeholders
- **Harmonization** of EU and LA research agendas
- Knowledge and technology transfer
- **Recommendations** on RTD priorities and biofuel policies

BioTop – Consortium

- **WIP – Renewable Energies** (coordinator), Germany
- **Technical University of Denmark**
- **University of Graz**, Austria
- **BTG Biomass Technology Group**, The Netherlands
- **Centro de Investigaciones Energéticas, Medioambientales y Technólogias**, Spain
- **Argentine Renewable Energies Chamber**
- **FUSP/CENBIO**, Brazil
- **Universidad Catolica de Valparaiso**, Chile
- **Universidad Nacional Autonoma de Mexico**
- **Fundación Bariloche**, Argentina

BioTop Activities



BioTop Events

Study Tours:
- Choren, Lignocellulose Production, Germany
- Biodiesel Plant, Soy Production, Argentina
- Biogas Plant, Wastewater Treatment Plant, Chile
- Abengoa / CIEMAT Research Facilities, Spain

Workshops:
- Sept. 2008 on Sustainability in Brazil
- March 2009 on Conversion Technologies in Argentina
- Sept. 2009 on Biofuels, Trade, Standards in Chile

Final Conference
- 13-14 July 2010 in Brussels

BioTop – Reports & Publications

- Assessment of research opportunities and needs of biofuel standard development and harmonisation in Latin America, 2009
- State of the art in biogas. Short country profiles for Argentina, Brazil, Chile and Mexico, 2009
- Application of Sustainability Tools for Biofuels in Latin America, 2009
- Intercultural Aspects of Bioethanol and Biodiesel Sustainability in Latin America, 2009
- Biofuel policies and legislation in Latin America, 2009
- Full-scale integrated biorefineries, 2009
- Improved Biodiesel and Pure Plant Oil Production Technologies: Technical Opportunities and Research Needs, 2009
- Overview of existing biomass conversion technologies in Latin America, 2009
- Biofuels standardization in the European Union and Latin America, 2009
- Overview of sustainability assessment tools for biomass production in Latin America, 2009
- Production of biomethane and its use for transport applications, 2009
- Overview of biofuel markets and biofuel applications in Latin America, 2009
- Initiatives and recent developments in EU Member States and at EU level towards the implementation of sustainability criteria for biofuels, 2009
- Gender aspects in Biofuels research in Latin America, 2009
- Improved Bioethanol Production Technologies, 2009
- Biomass-to-Liquid Production in Latin America: Technical Opportunities and Research Needs, 2009
- Feedstock Production in Latin America, 2009
- Sustainable Biofuels in Latin America, 2008
- Nachhaltigkeit von Biokraftstoffen im internationalen Kontext, 2008
- Biofuels Assessment on Technical Opportunities and Research Needs for Latin America, 2008

→All documents are available at www.top-biofuel.org

5. Sustainability of Biofuels

Cooperation on biofuel sustainability

Objective: Guarantee SUSTAINABLE biofuels

"International Latin American – European Cooperation Workshop on Sustainability in Biofuel Production" in São Paulo, Brazil on 25 – 26 September 2008

Based on the contributions of the workshop participants, the following fields of activity for joint EU-LA research on biofuel sustainability issues have been identified:

1.) Sustainability criteria and certification schemes
2.) Intercultural and intercontinental perspectives of sustainable biofuels
3.) Mapping and zoning
4.) Direct and indirect land use change
5.) Greenhouse gas emissions
6.) Food, feed and biofuels
7.) Poverty and land tenure
8.) Genetically modified organisms
9.) Agricultural best practices
10.) Economies of biofuels
11.) Improved conversion technologies
12.) Holistic transport approaches

Global Assessment of Biomass and Bioproduct Impacts on Socio-economics and Sustainability (Global-Bio-Pact)

- Supported in the 7th Framework Programme of the European Commission
- Coordinator: WIP Renewable Energies
- Duration: 3 years
- Start: February 2010




Global-Bio-Pact Concept

Development and harmonisation of sustainability schemes for biofuels and bioproducts to prevent negative socio-economic impacts

Case Studies

- **Argentina**: Soy production and conversion
- **Indonesia**: Palm oil production and conversion
- **Tanzania** / **Mali**: Jatropha cultivation
- **Costa Rica** / **Brazil**: Bioethanol production from sugarcane
- **EU** / **N-America**: 2nd generation Biofuels

6. Improved Conversion Technologies

Cooperation on improved conversion technologies

BtL, Lignocellulose-Ethanol, Biomethane
2nd Generation Biodiesel, Biorefineries

BioTop reports on Research Needs

- **"Improved Bioethanol Conversion Technologies"**
  by Mercedes Ballesteros, Paloma Manzanares (2009)
- **"Improved Biodiesel and Pure Plant Oil Production Technologies: Technical Opportunities and Research Needs"**
  by Sigurd Schober, Martin Mittelbach (2009)
- **"Biomass-to-Liquid Production in Latin America: Technical Opportunities and Research Needs"**
  by Dominik Rutz, Wolfgang Hiegl, Rainer Janssen (2009)
- **"Full-scale Integrated Biorefineries"**
  by Gustavo Nadal, Víctor Bravo, Francisco Lallana (2009)
- **"Production of biomethane and its use for transport applications"**
  by Patrick Reumerman, John Vos (2009)

Proposals for selected future research activities

Report "Research Needs for Biofuel Conversion Technologies and Co-operation Opportunities between Europe and Latin America"
by S. Schober et al.


Biofuels Assessment on Technical Opportunities and Research Needs for Latin America
BioTop Project No: FP7-213320

BioTop

Research Needs for Biofuel Conversion Technologies and Co-operation Opportunities between Europe and Latin America

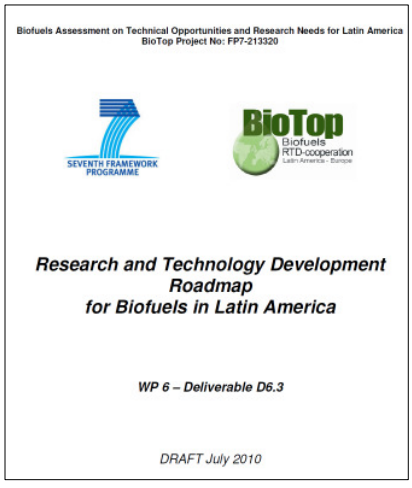
Deliverable 3.2 and 3.3

February 2010

Example:

4.6 Support RTD for conversion of waste feedstocks

The use of current residues and by-products as feedstocks (e.g. black liquor, sawdust, raw glycerine, vinasse, lignin) shall be a core research activity. These residues represent a huge disposal problem and pollution hazard in whole LA, thus their use as feedstock would have the double advantage of reducing waste streams and creating added value. RTD should aim at transforming these specific materials into valuable outputs, not only energy. Research is being carried out in Argentina, Colombia and Brazil on vinasse and glycerine treatment, e.g. anaerobic digestion of vinasse. Research needs to involve laboratory research and its application at demo and pilot scale for cost reduction.


Biofuels Assessment on Technical Opportunities and Research Needs for Latin America
BioTop Project No: FP7-213320

SEVENTH FRAMEWORK PROGRAMME

BioTop Biofuels RTD-cooperation Latin America - Europe

Research and Technology Development Roadmap for Biofuels in Latin America

WP 6 – Deliverable D6.3

DRAFT July 2010

Roadmap Objectives

- Illustration of short-, medium- and long-term developments and research gaps in order to support the sustainable production of biofuels in Latin America
- Identification of priority areas for (public and private) RTD efforts
- Development of:
  - 6 roadmaps for conversion technologies
  - 5 country-specific roadmaps for Argentina, Brazil, Chile, Mexico, and Colombia

RTD Technology Roadmaps

- Focus on biofuels for road transport
- RTD topics divided into high and medium priority topics
- Timeframe includes short-term (0-5 years), medium-term (6-10 years), and long-term (11-20 years) RTD topics
- Roadmaps target biofuels development in Latin America and highlight cooperation opportunities between LA and EU

Legend for the technology roadmaps

High priority topic

Medium priority topic

Topics in ***bold italics*** present good opportunities for EU-LA cooperation

RTD Technology Roadmap – Biodiesel and PPO

Conversion process (cont.)	2010 - 2015	2016 - 2020	2020 - 2030
C-13 Optimum production scale at different framework conditions			
C-14 Basic quality control measures at the production site			
C-15 Glycerol purification and utilization			
Biofuel use			
C-16 Harmonisation of FAME specifications			
C-17 Development of FAEE standard			
C-18 Optimisation of engines for biodiesel use (long-term engine tests)			
Sustainability			
C-19 LCA for biodiesel from new and existing feedstock types			
C-20 Investigation of socio-economic impacts			
C-21 Practices to reduce GHG emissions for soy and palm FAME			

RTD Technology Roadmap – 1st gen bioethanol Selected topics

Feedstock production

- Agricultural practices for soil improvement and protection (low or no tillage methods)
- General research on the potential of new feedstock types

Conversion process

- Value-added use of vinasse (e.g. anaerobic digestion)
- Value-added use of bagasse (e.g. co-generation with high pressure boilers or as 2nd generation feedstock)

Sustainability

- Social impacts of mechanical sugarcane harvesting
- Effects of bioethanol production on direct and indirect land use change

RTD Technology Roadmap – 2nd gen bioethanol
Selected topics

Feedstock production

- Suitable feedstock resources for 2nd generation bioethanol

Pre-treatment

- Suitable pre-treatment processes for subsequent hydrolysis and fermentation

Conversion process

- Mechanisms of enzymes and specific catalytic activities (basic research)
- Optimised and cost-effective enzyme cocktails
- Enzymatic hydrolysis of cellulose and hemicellulose
- Measures to reduce costs

Sustainability

- Full LCA for 2nd generation bioethanol

RTD Technology Roadmap – Biomethane
Selected topics

Feedstock production

- Investigation of opportunities and drawbacks of dedicated energy crops in LA for AD

Feedstock logistics

- Waste collection systems in LA for the organic fraction of MSW

Conversion process

- Anaerobic digestion (microbiological processes) of different feedstock types in LA climates

Sustainability

- Potential of biomethane production in combination with other biofuel processes (e.g. use of vinasse and glycerol)

RTD Technology Roadmap – BtL Fuels
Selected topics

Feedstock logistics

- Efficient feedstock collection and logistics

Pre-treatment

- Pre-treatment for pyrolysis and direct gasification

Conversion process

- Synthetic gas cleaning

Sustainability

- Social impacts in LA on small-scale (1st generation) biofuels producers
- GHG emissions of the whole chain

RTD Technology Roadmap – Biorefineries
Selected topics

Feedstock logistics

- Logistics of different feedstock types for biorefineries

Conversion process

- Assessment of potential biorefinery concepts in LA
- Integrated processes for bio-plastics, materials and bio-chemicals
- Integrated processes for combined biofuel production in one biorefinery (e.g. bioethanol – biomethane)
- Cost reduction of different biorefinery concepts

Sustainability

- LCA of different biorefinery concepts

RTD Country Roadmaps

- **Focus on biofuels for road transport**
- **Roadmaps show end-products of different conversion routes**
- **Research, demonstration and commercialisation phases**
- **Timeframe includes short-term (0-5 years), medium-term (6-10 years), and long-term (11-20 years) RTD topics**

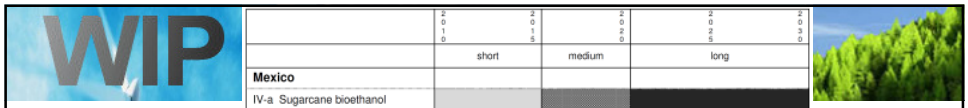
Legend for the country-specific roadmaps

Research phase

Demonstration phase

Commercialisation phase

* After an initial phase of basic research (research phase), decision shall be taken whether this technology will be further developed



Biofuel RTD Roadmap - Mexico

	2010–2015	2015–2020	2020–2025	2025–2030
	short	medium	long	
Mexico				
IV-a Sugarcane bioethanol				
IV-b Sweet sorghum bioethanol		*		
IV-c Cassava bioethanol		*		
IV-d Bioethanol from other sugar/starch plants		*		
IV-e 2nd generation bioethanol				
IV-f Soy biodiesel				
IV-g Palm oil biodiesel				
IV-h Jatropha biodiesel		*		
IV-i Animal fat biodiesel				
IV-j Algae biodiesel			*	
IV-k PPO (different sources)		*		
IV-l Sewage sludge biomethane		*		
IV-m Household waste biomethane		*		
IV-n Agricultural and industry waste biomethane				
IV-o Biomethane from dedicated energy crops				
IV-p BtL fuels				
IV-q Sugar-ethanol bioretineries with high pressure boilers				
IV-r Biorefineries for different biofuels (bioethanol, biomethane, biodiesel)				
IV-s Biorefineries for bio-chemicals and high value bio-products				

Research phase

Demonstration phase

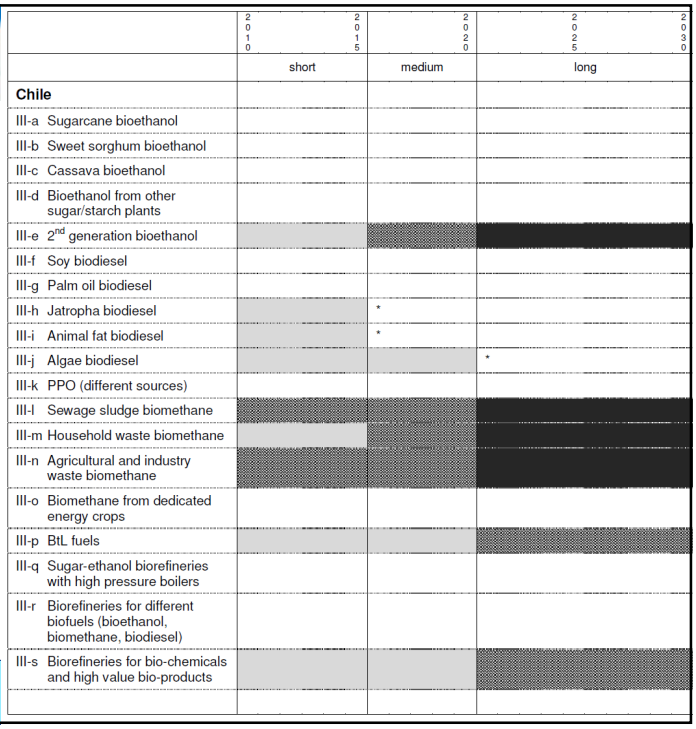
Commercialisation phase

* After an initial phase of basic research (research phase), decision shall be taken whether this technology will be further developed

Biofuel RTD Roadmap - Chile

Characteristics

- No biofuels production/ consumption
- Limited land availability
- Focus on 2nd gen biofuels

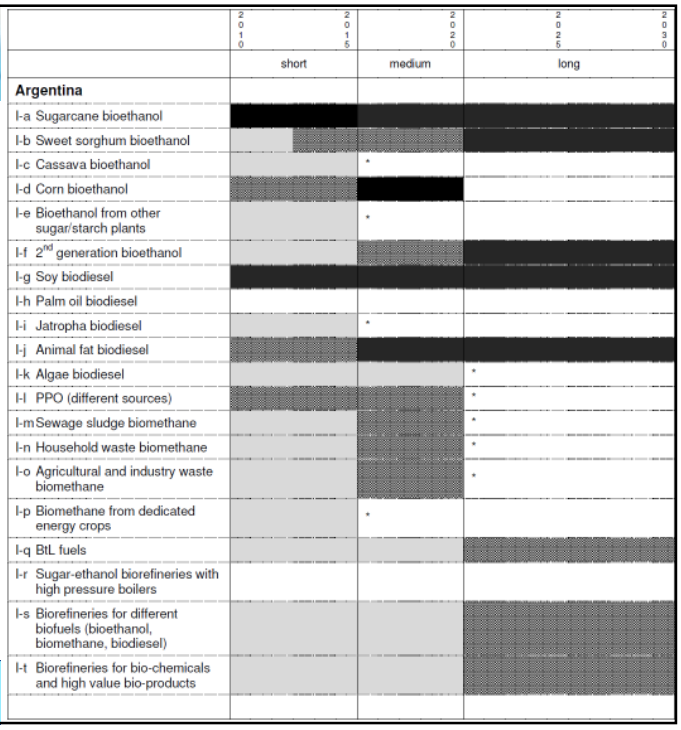


WIP www.wip-munich.de

Biofuel RTD Roadmap - Argentina

Characteristics

- Developed agri-business sector (largest soy exporter)
- Development of domestic market (B5, E5)
- Increasing interest in alternative feedstock



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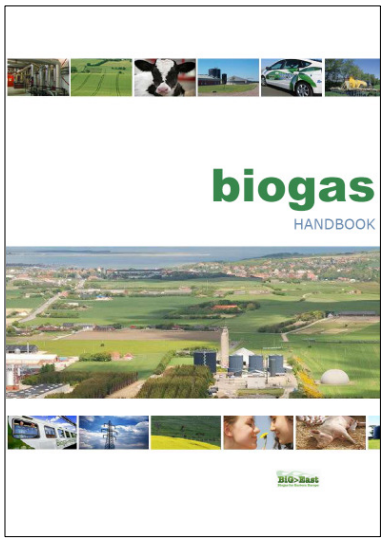
7. Conclusion

Conclusion

- As long as biofuels are not competitive to fossil fuels, policies are needed to support biofuels
- EU-LA Cooperation has the potential to create large benefits on both sides
- EU Biofuel policy will have increasingly impact on LA (support of research, biofuel exports, sustainability)
- Research on conversion technologies is still necessary for both, 1st and 2nd Generation Biofuels.
- Feedstock is one of the most important research and policy topics due to sustainability aspects (dLUC, iLUC,k biodiversity, socio-economic impacts, etc.)

BiG>East Biogas Handbook

Available (free download) at:
www.big-east.eu



More Information:
Website & Interactive LA Biofuels Map

www.top-biofuel.org

Muchas Gracias!!

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