SECOND GENERATION BIOFUELS

PERSEO PROJECT

Bioethanol from daily Municipal Solid Waste

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Good yields in Combustion Engines

Clean Combustion

Good miscibility with other fuels i.e. petrol

Bioethanol

Versatility

Usage possibilities in Otto engines: usuals, FFVs, ethanol exclusives, and e-Diesel engines

Free from Special Hydrocarbons Taxes

Favour the implantation of the logistics and technology

Liquid Biofuels

Solid and Gaseous fuels

Storage facilities, compatible with current infrastructures, logistics…

Biomass: CO_2 drain

Decrease of Greenhouse Gases emissions

Bioethanol

One of the most value-added products that can be obtained from **celulloses** and **lignocelluloses**

Wide Feedstock spectrum

Forestry remains, Agricultural wastes, Municipal Solid Wastes

WASTES

Renewable Resource

Every liter petrol extracted, every liter petrol *exhausted*

"Producción de Etanol a partir de Residuos Sólidos domÉsticos Orgánicos"

Ethanol production from organic fraction of MSWs

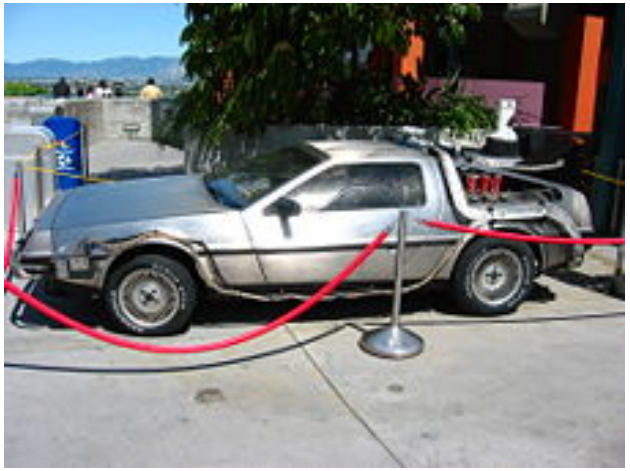
PERSEO Project

L´Alcúdia, Valencia

Environmental Problem: rubbish, wastes

***Increasing generation*, established by the rate of world increasing population**

M.S.W.s



- **Not affected by any feedstock market**
- **Stable feed along the year**
- **Well established collection system within a 50 – 70km operational range**

BIOETHANOL FROM WASTES: Sustainable Waste Valorization System and Energy Production

Productor / Manager Biofuels

Consolidation of the technology: ***Biorrefinery*** Manager

MSWs Management Plants

Solution to waste accumulations, and landfill elimination

Admision of new feedstock / WASTES with lignocellulosic component

Autocthonous Bioehtanol Production

- **Change of the Energetic model**
- **Local distribution network**

Semi-industrial Second Generation Bioethanol Plant:

- **Intermediate lab-to-industrial size tests.**
- **Engineering and Process problems Detection and Solving.**

Versatile Experimental Plant:

- **Processing of different types of lignocellulosic materials.**
- **Allows semi-industrial bioethanol process optimization for every feedstock.**

PERSEO Process

Organic Matter in MWS

Collaboration with:
Novozymes
Fermentis

Enzymes Yeasts

Pretreatment → **Thermochemical Treatment** → Simultaneous Saccharification and Fermentation (SSF) → Distillation → Dehydration → **99.5% Bioethanol**

Distillation → S/L Separation Unit → **Water** → Simultaneous Saccharification and Fermentation (SSF)

S/L Separation Unit → **Lignin** → **Cogeneration**

PERSEO Project:

Goal:

Produce **LIGNOCELULLOSIC BIOETHANOL** at **35 cent. EURO per LITER.**

- **Feedstock cost: 0 € / l bioethanol**
- Additives, Enzymes and Yeast costs: 0.1 € / l bioethanol
- Instalation fixed costs and amortization: 0.2 € / l bioethanol.
- Utilities and labour: 0.05 € / l bioethanol

Data based on:

- Real Plant of 500 Ton Organic Fraction from MSW per day.
- Daily production: 16.000 liters ethanol.
- Investment on instalation fix assets: 12-15 Mill. Euro.
- TIR: 10 years.

PERSEO Project:

PERSEO current results:

160 liters bioethanol per dry feedstock tonne.

Currently we are working to reach 220 liters ethanol/Ton of dry feedstock**.**

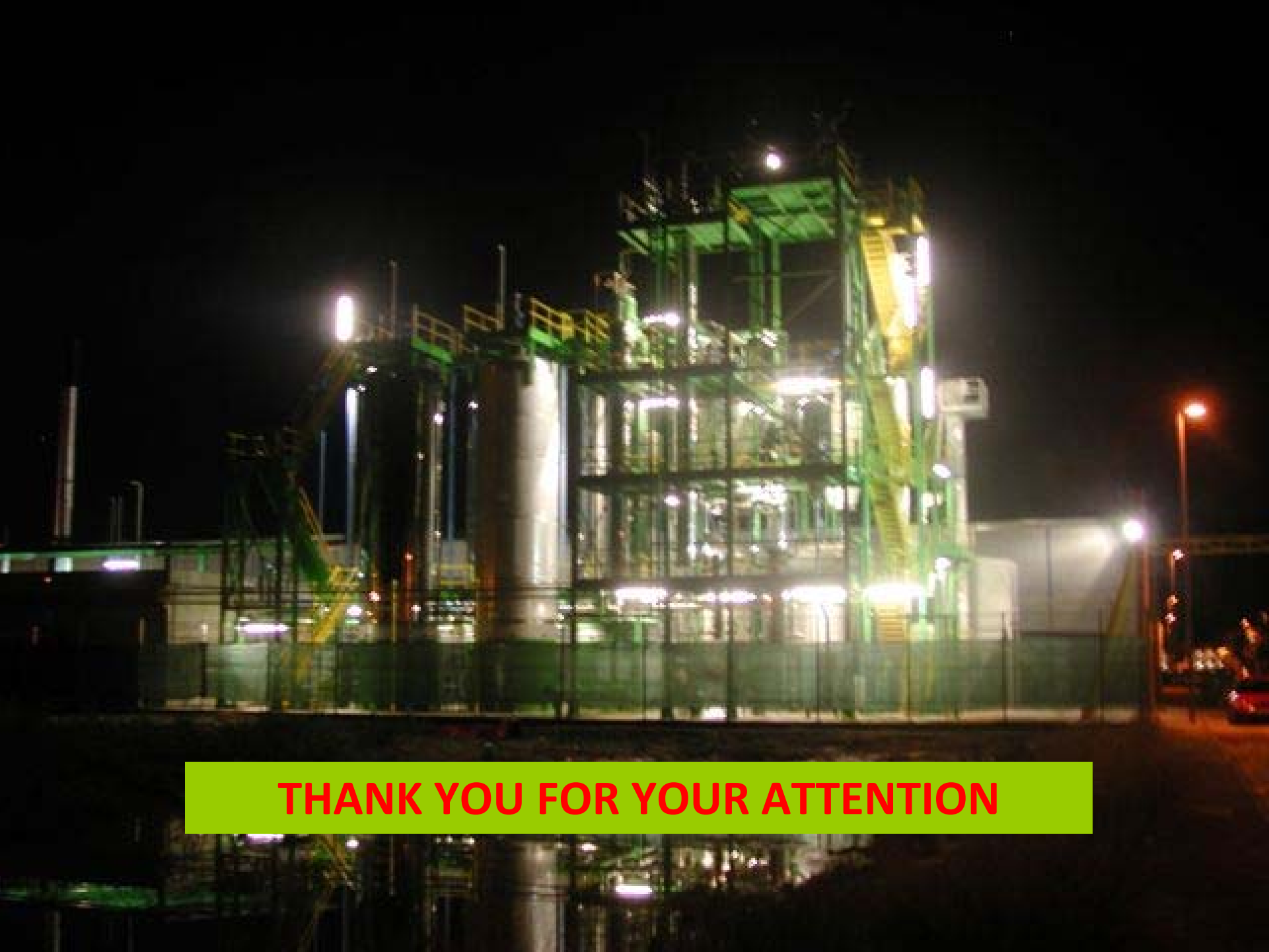
Comparative results with First Generation Bioethanol:

- First Generation bioethanol obtained from cereals, vary between 300 – 350 liters / Ton
- First Generation bioethanol feedstock cost (corn, wheat, barley, etc.): 220 – 300 € / Ton feedstock.

Costs comparison between Petrol 95 and PERSEO Bioethanol

	Production, logistics and distribution costs, (€ / lt)	Retail Price (€ / lt)
Petrol 95	0,547*	1,093*
PERSEO Bioethanol	0,473	0,549

* CNE (Spanish National Comission for Energy) Published Prices for 1st quarter 2008


THANK YOU FOR YOUR ATTENTION