



CORSO:

**TECNICO SUPERIORE PER L'AMBIENTE,
L'ENERGIA E LA SICUREZZA**

**INTRODUZIONE allo SVILUPPO
SOSTENIBILE:
ENERGIA da PROCESSI BIOLOGICI**

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Isola del Liri 19 gennaio 2010



World energy consumption



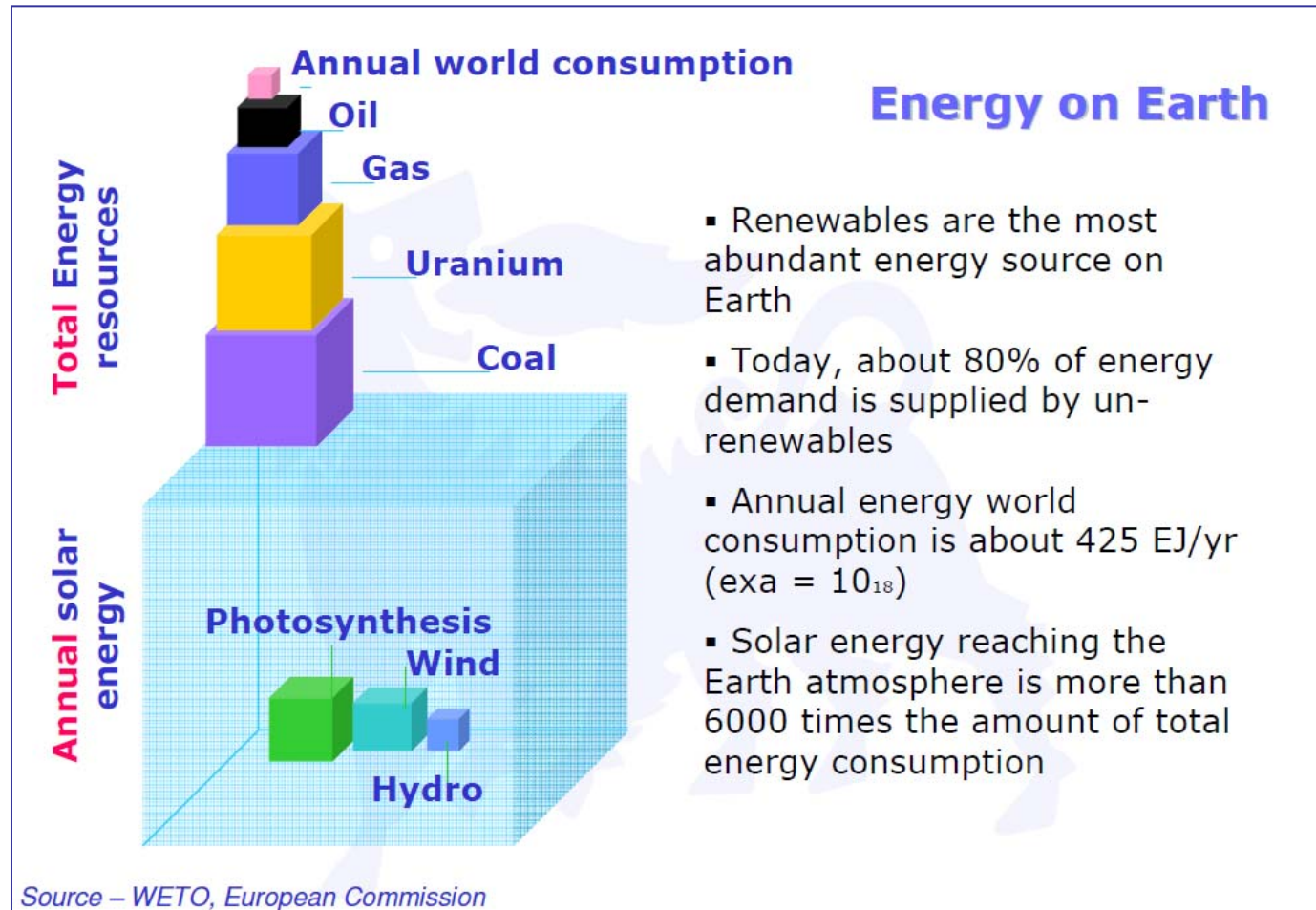
Global growth trend (yearly median value, 2000 – 2020):

Energy demand – 1,8%

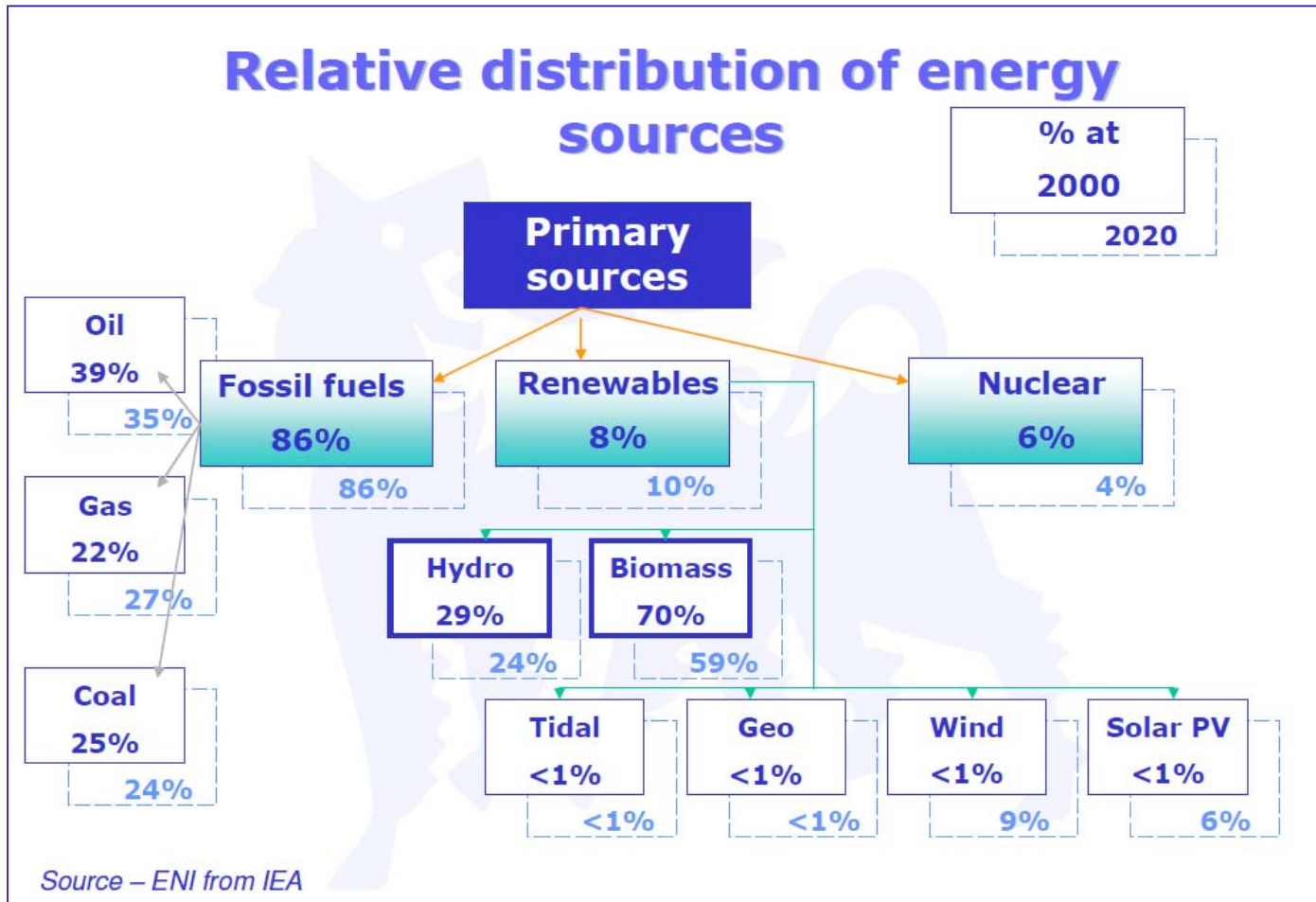
Population growth – 1,0%

Source – WETO, European Commission

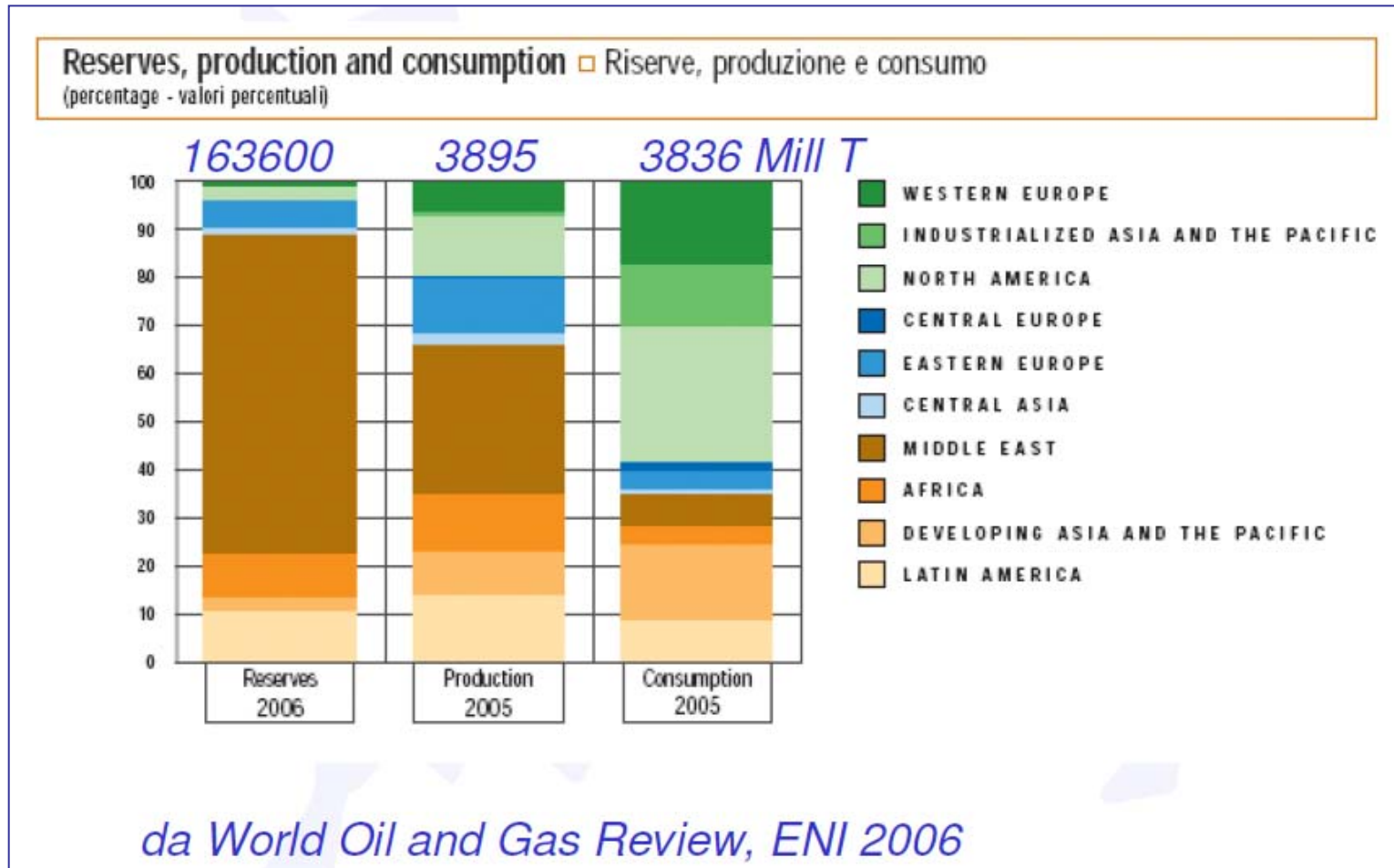
FONTI DISPONIBILI E CONSUMI MONDIALI



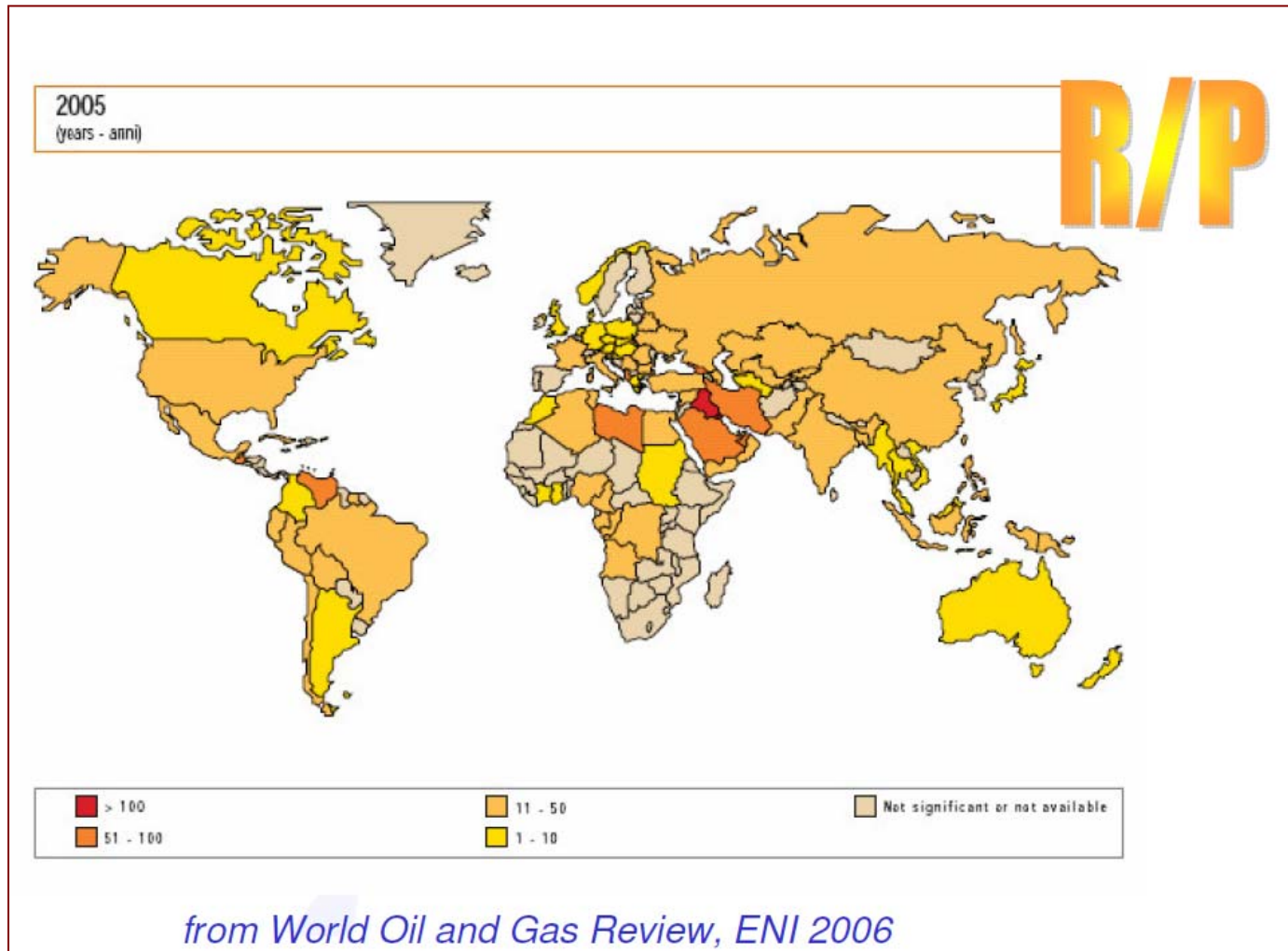
TECNOLOGIE E PRODUZIONE



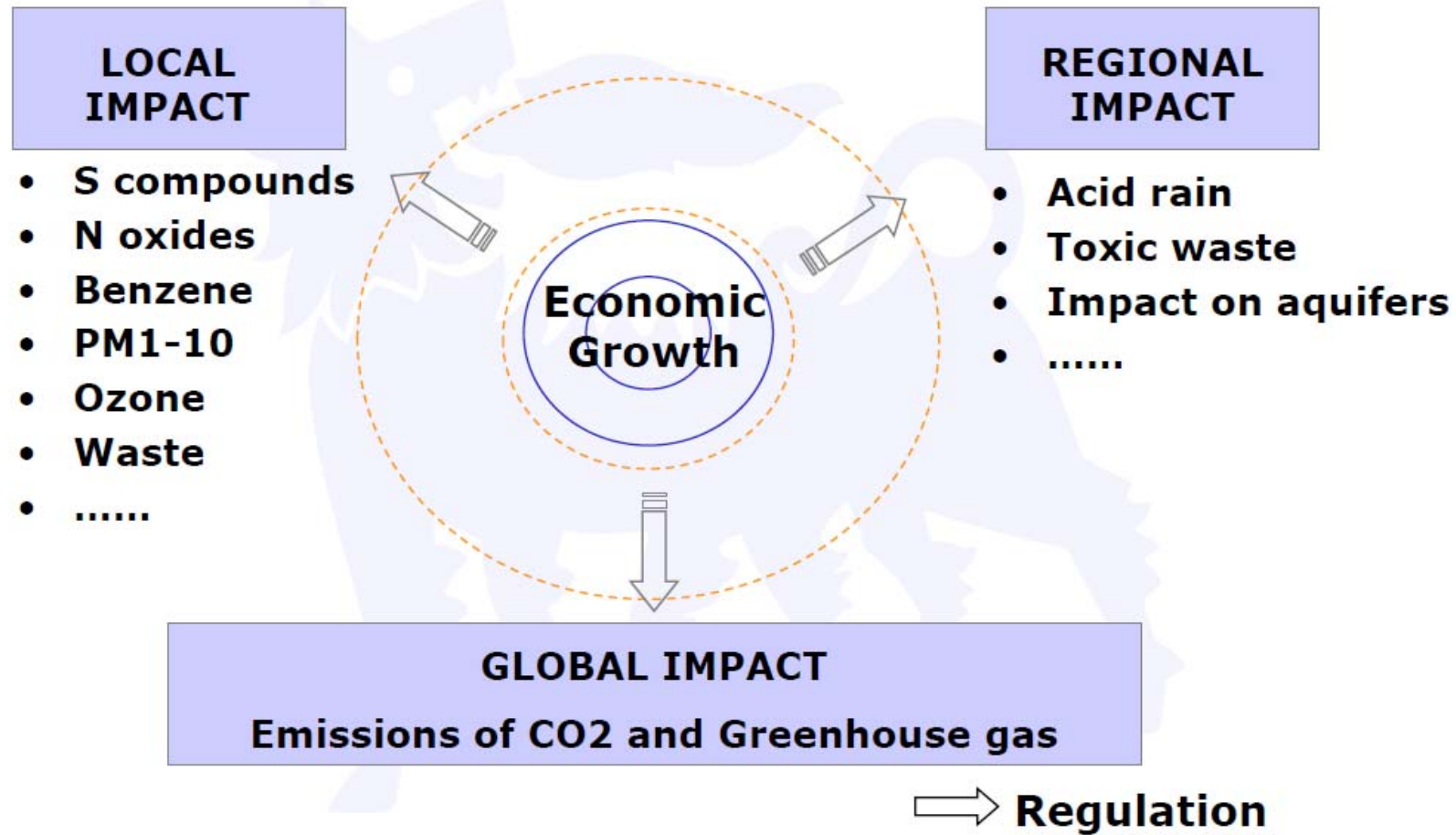
PICCO DEL PETROLIO



PICCO DEL PETROLIO: STIME



Energy and environment



The European directives on biofuels

Direttiva europea 2003/30/CE

2 % before 31 december 2005

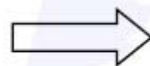
5.75 % before 2010

Decreto Legge 81/ 11 marzo 2006

1% before july 2006

5% before end of 2010

Biofuels



Biodiesel
Bioethanol – ETBE
BioHydrogen
Biomethane
HC from biomass

BIOMASS ACTION PLAN UE

The European proposals on biofuels

TREN commission



3.07 Approvazione da parte del Consiglio del documento programmatico con un obiettivo del 10% E al 2020

5.12.07 proposal for new Directive

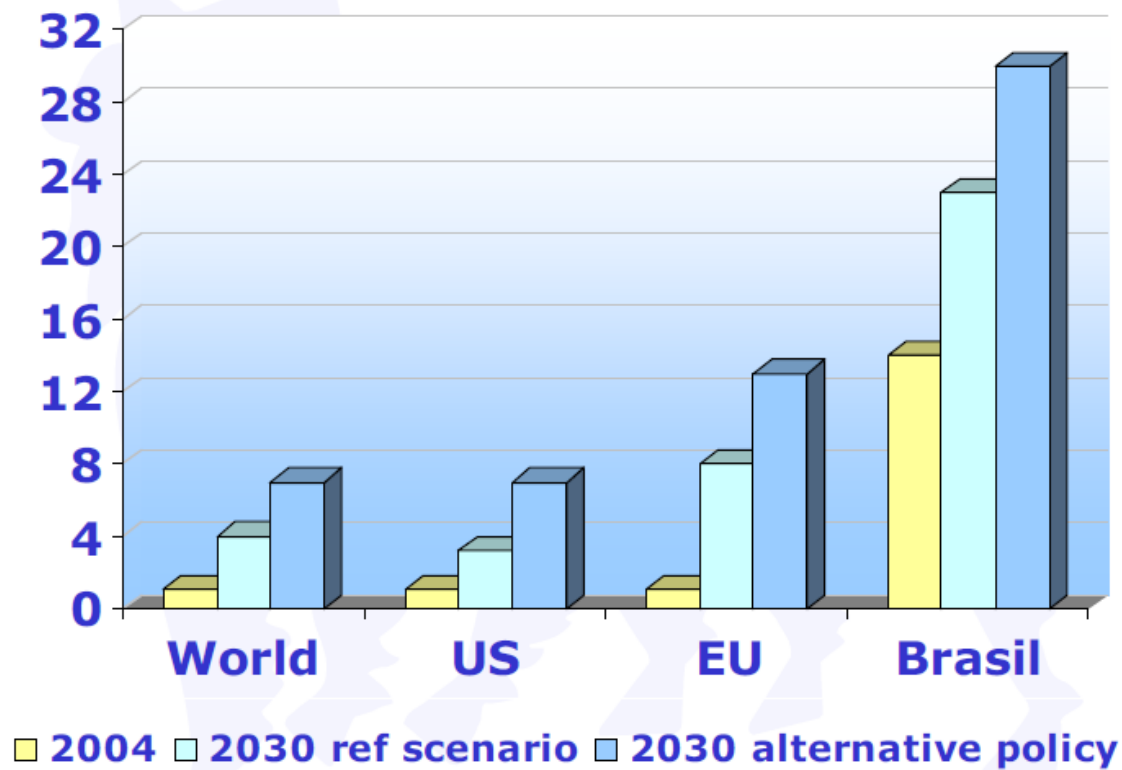
ENVI commission



31.1.07 Riduzione delle emissioni di gas serra GHG del 10% su tutto il ciclo di vita dei carburanti (WTW) entro il 2020

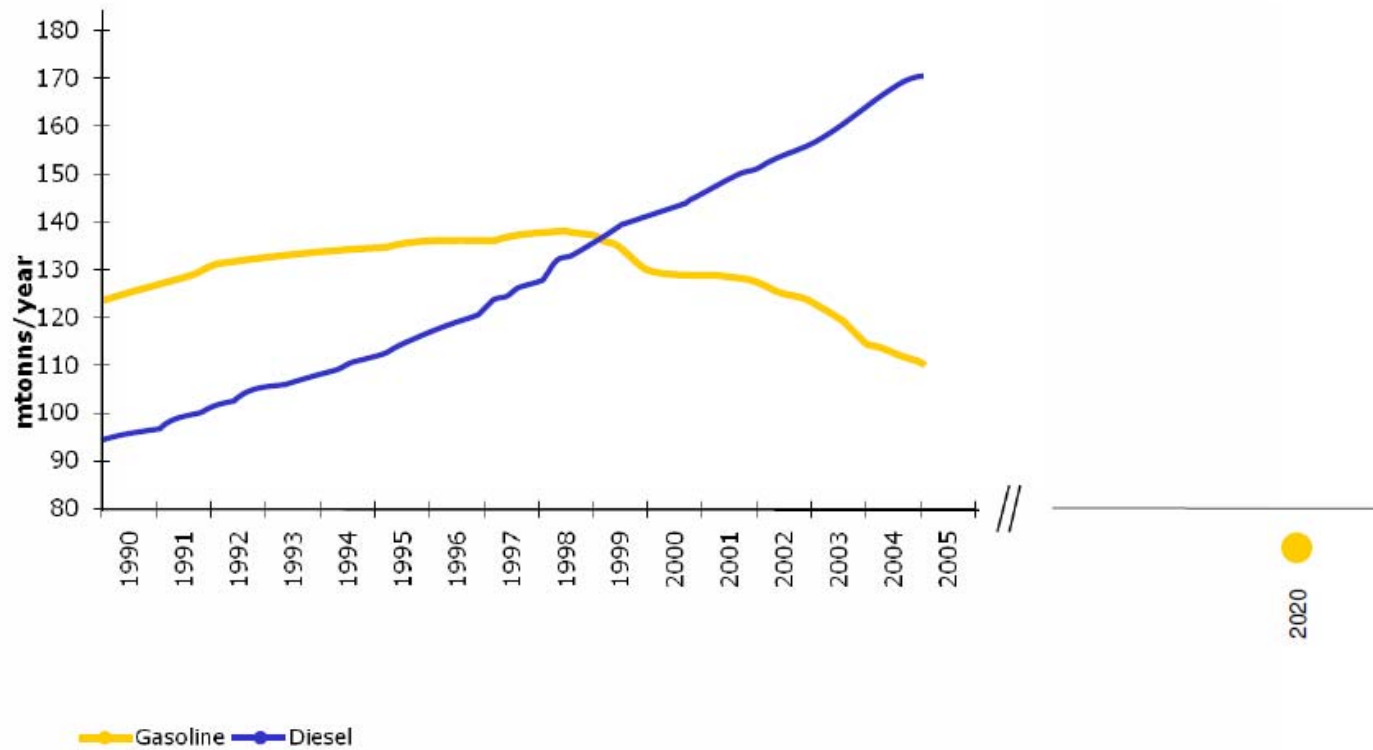
Suggested measures in the Action Plan aim to increase biomass use from current 69 Mtep to about **150 millions tons of corresponding oil with no intensive farming enhancement or important cut of pro food crops.**

Share of Biofuels in road transport fuel consumption



Source – from IEA 2006 World Energy Outlook

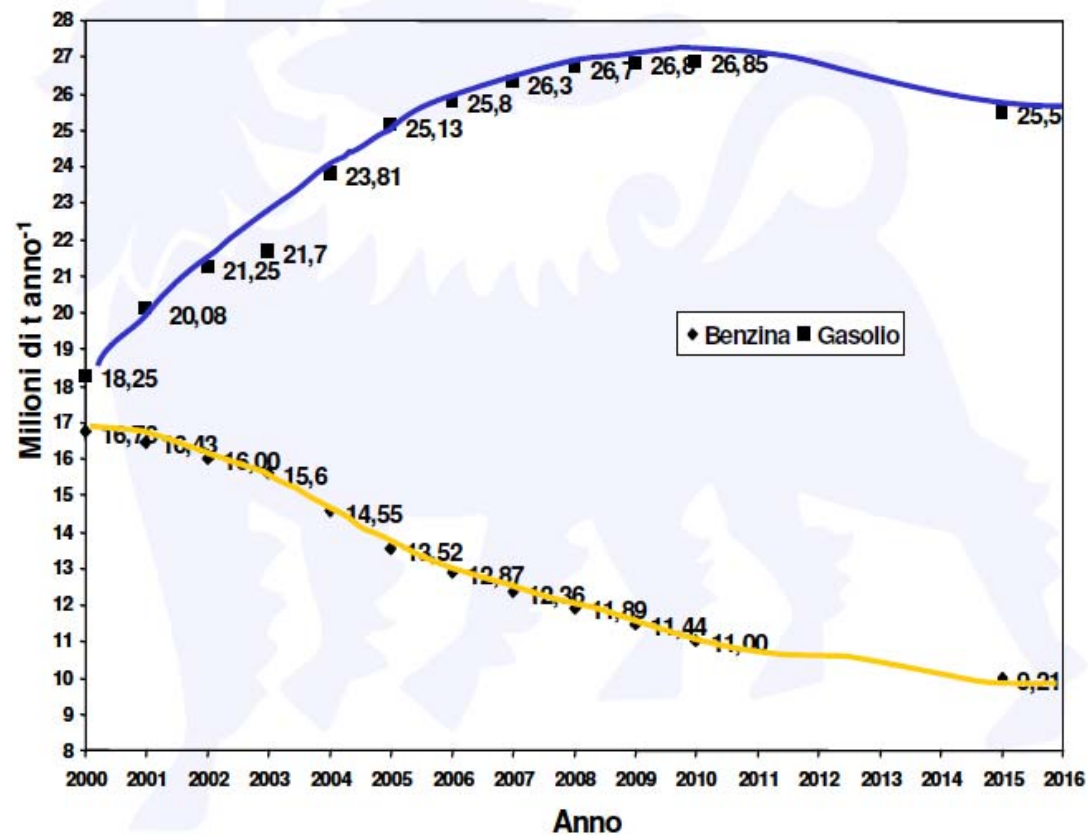
Diesel and gasoline demand forecast in EU



Source: Eurostat

Source: Concawe

Diesel and gasoline demand forecast in Italy



source UP

Bioproducts and technologies

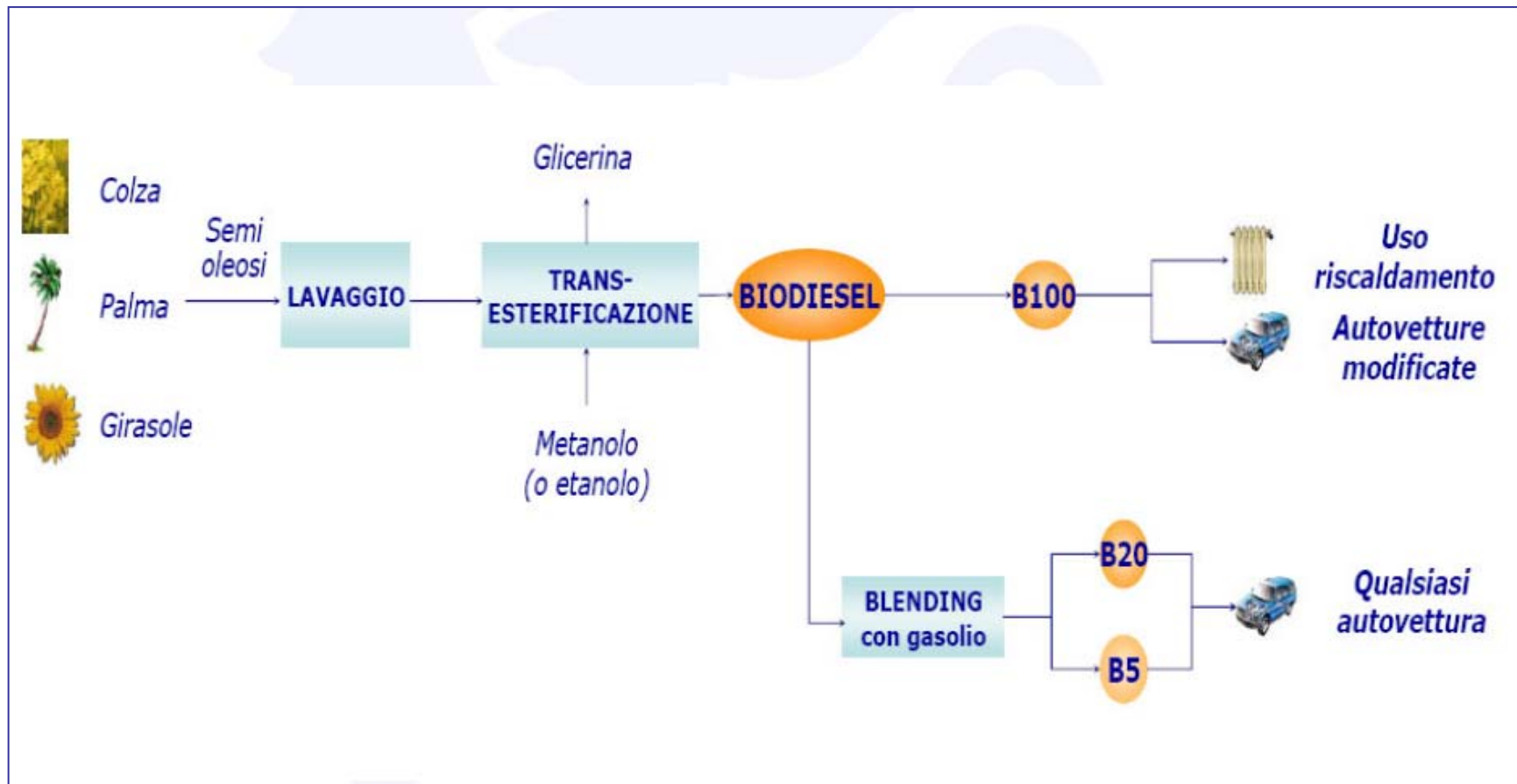
- FAME, FAEE Transesterification
- Biodiesel from oil Catalysis
- Biodiesel from biomass Catalysis FT

- Alcohols, additives (ETBE) Fermentation
- BioMethane Fermentation
- Biohydrogen Fermentation

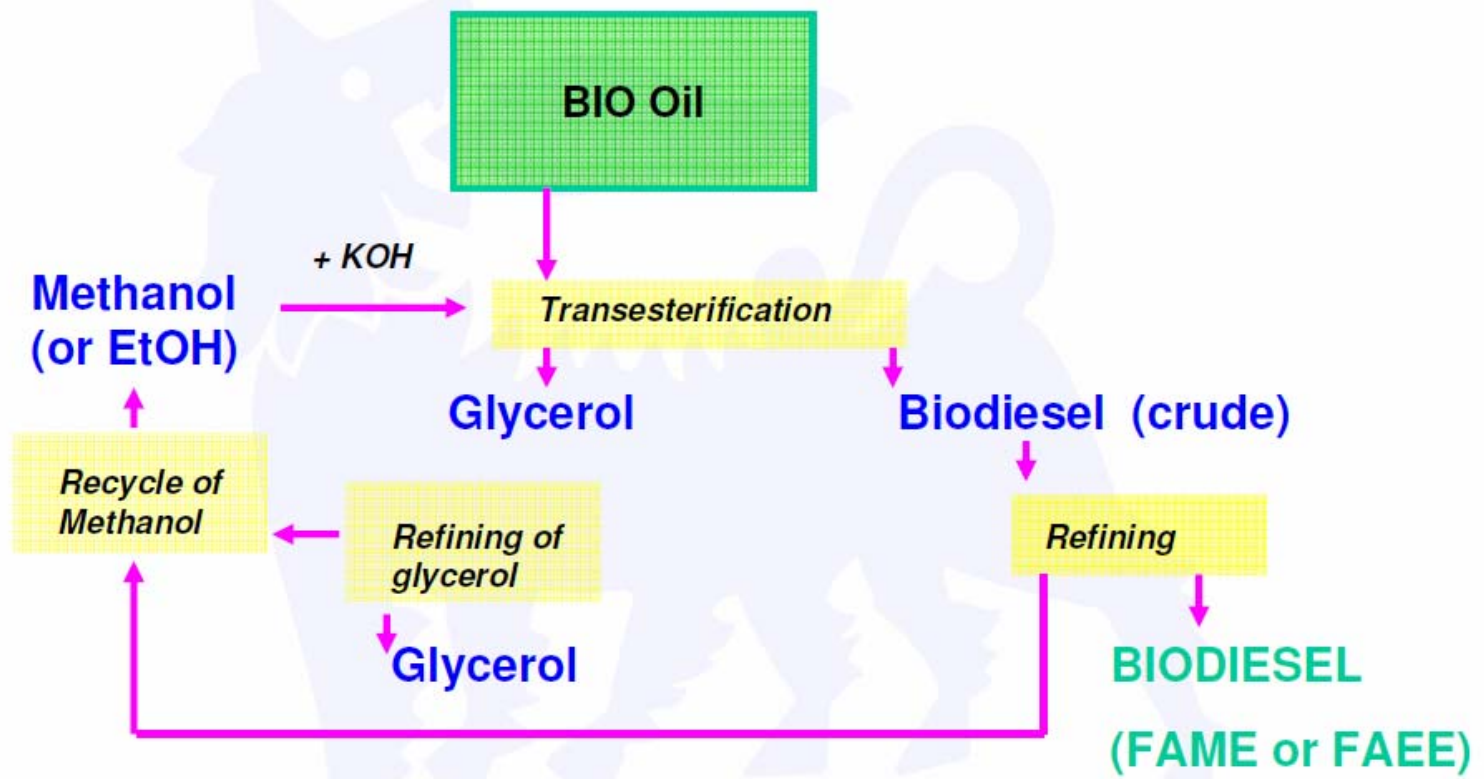
- Other products from syngas Gassification catalysis

→ Need to satisfy product specifics for use as fuel

PRODUZIONE DI BIO-DIESEL



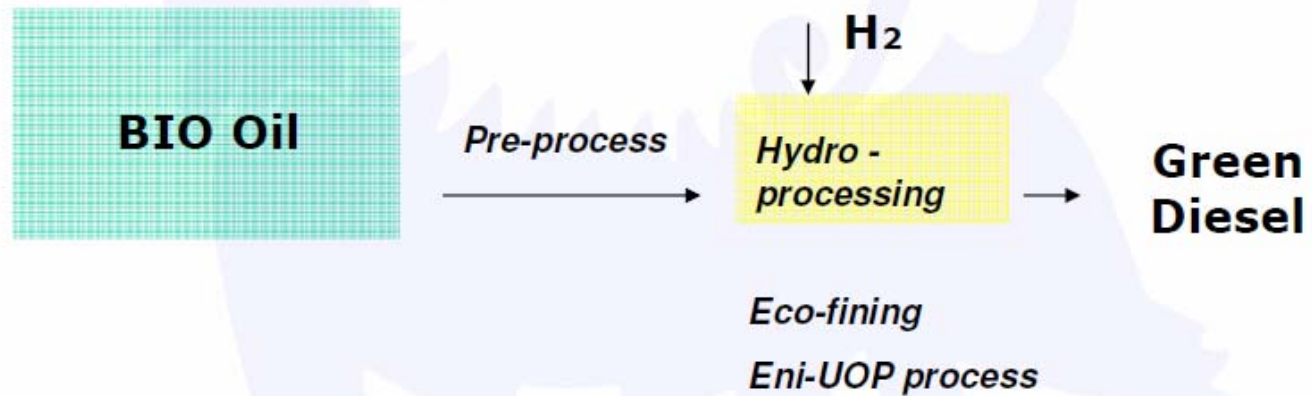
Biodiesel from oil - 1



Byproducts – Glycerol 10%

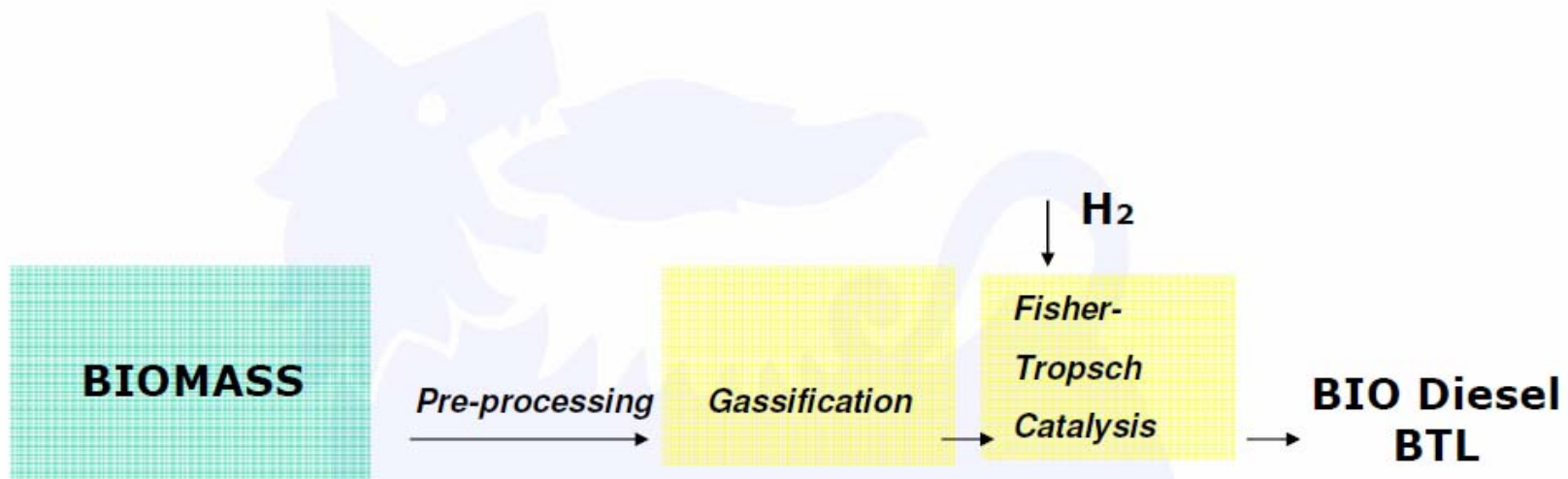
Technology available

Biodiesel from oil - 2



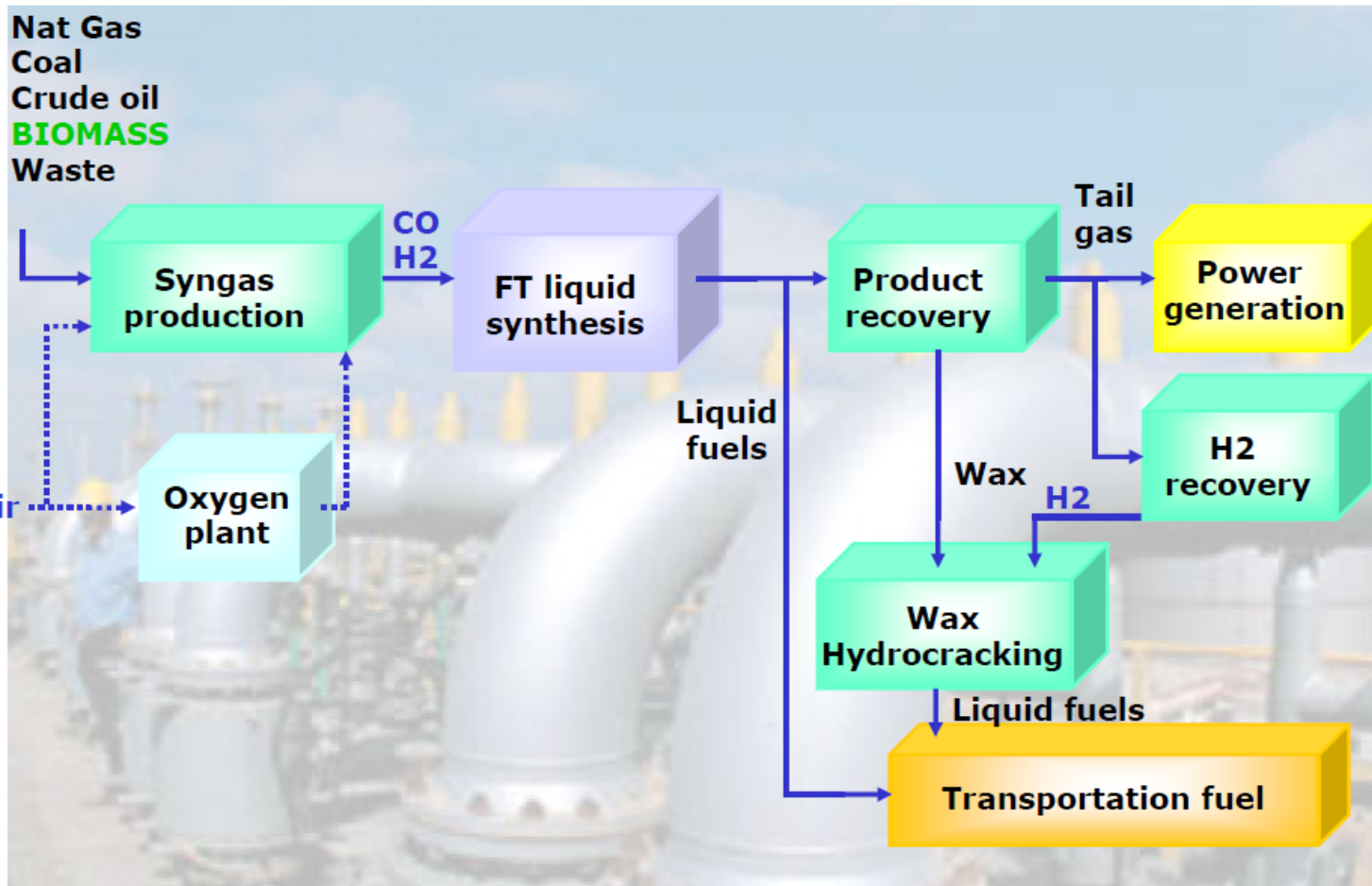
Technology in late R&D stage

Biodiesel from biomass



Technology in R&D stage

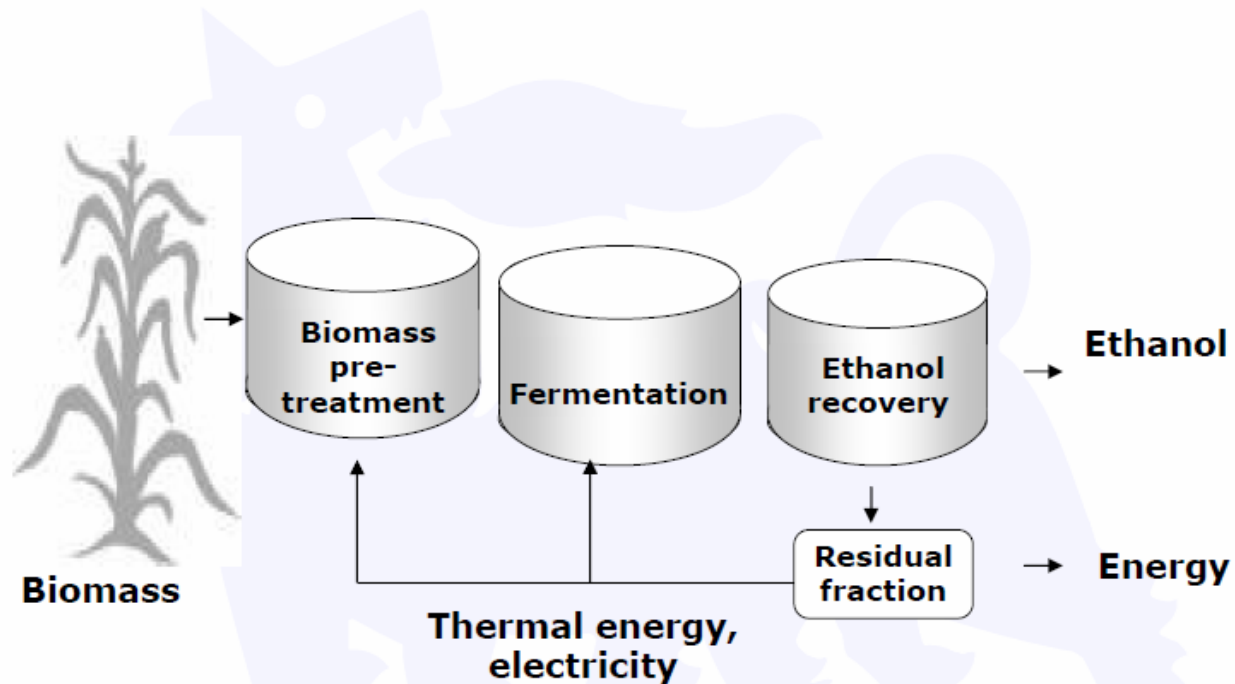
Fischer-Tropsch technology



ETANOLO DA FERMENTAZIONE



Ethanol from fermentation



**Byproducts – Non fermentable residual fraction
Technology in R&D stage/pilot (from lignocellulose)**

Biofuels seconda generazione



**Biomassa
(oleaginose)**

Olii veg.

*Hydro
processing*

**Diesel da
oli vegetali**

BIOMASSA.

Gassificazione

FT

BTL



**Biomassa
(lignocellulosa)**

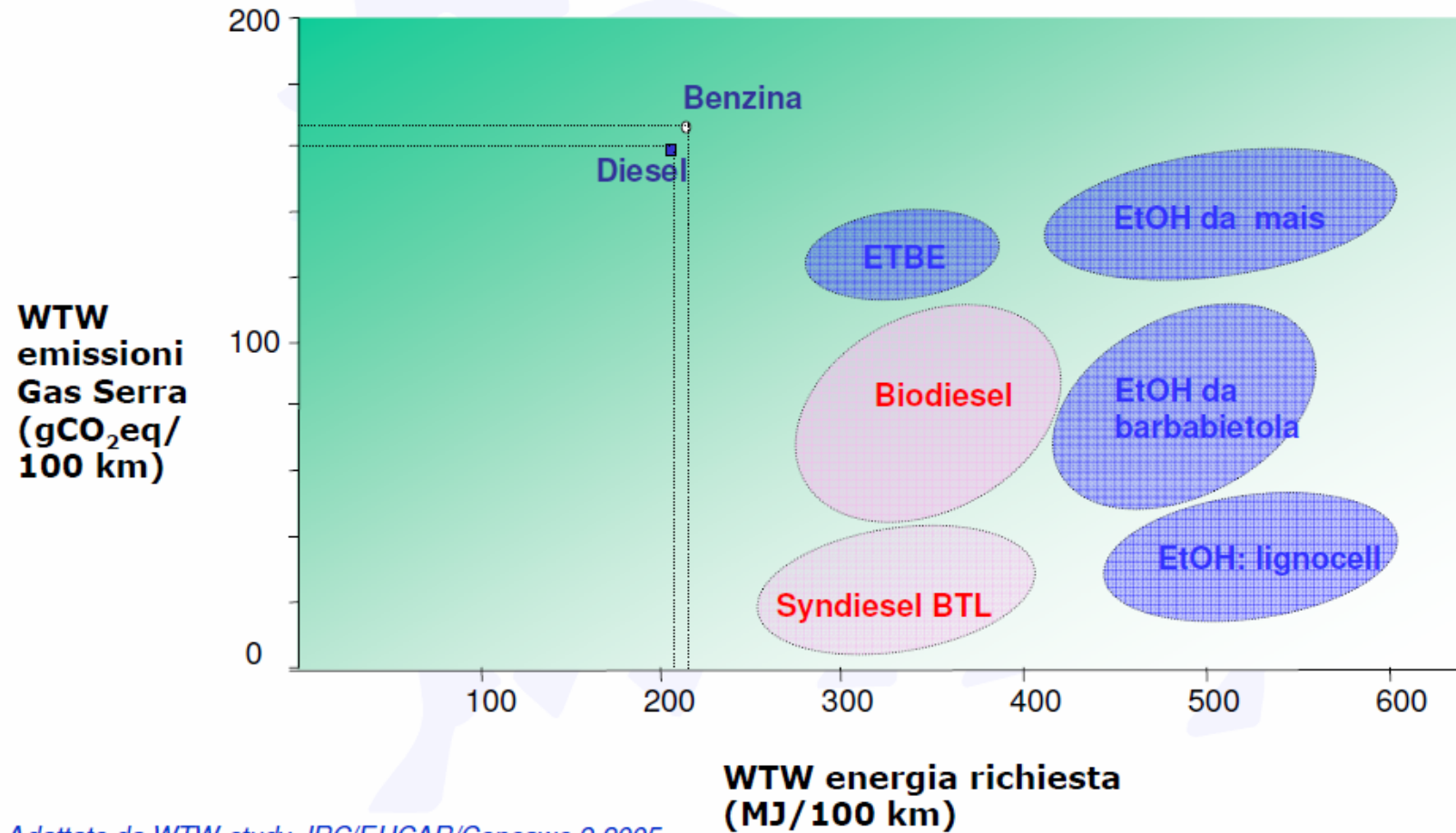
Idrolisi

Fermentazione

*Recupero
alcoli*

**Etanolo
Butanolo**

Confronto biofuels LCA



Adattato da WTW study JRC/EUCAR/Concawe 9.2005

WTW: ciclo di vita dei carburanti

OPPORTUNITA' DALLE BIOTECNOLOGIE PER ENERGIA

- New plants new biomasses as feedstock
- Better strains for industrial use for bio-alcohols
- New processes for bio-alcohols and bio-oils
- Improved enzymes for biomass treatment pre-fermentation
- Syngas fermentation

**GRAZIE PER
L'ATTENZIONE**