European Biomass Industry Association

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(EUBIA)

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“Future Bio-Economy is focussed on a sustainable efficient production of biomasses for the sectorial Bioenergy & Biochemicals Markets”.

Biomass represents an attractive resource because of many reasons:

1) Large Potential:

Year forecast	World potential	Utilisation targets in the EU
2020	2 Billion TOE/y	175 Milion TOE/y
2030	4,2 Billion TOE/y	225 Million TOE/y
2050	10,4 Billion TOE/y	360 Million TOE/y

2) Capacity of penetration of numeros sectoral energy and chemical markets with a progerssive substitution of many of the 73,000 products now derived from Oil, Nat Gas and Coal.

3) Large impact on new jobs creation: 1 job / 100 -500 ton biomass.

PROBLEMS & LIMITS of BIOMASS RESOURCE

I. **Insufficient economic-environmental sustainability for many production-conversion-utilisation systems.**

II. **Competition for the use of land. (Food/Energy/Chemicals).**

Current area used for food	**1,3 Billion ha**
Estimated area used for biomass	**~ 1 Billion ha**

III. **Large amount of water needed for the production (300-1000 kg/kg biomass) and for conversion / utilisation.**

IV. **Limited photosinthetic efficiency (1-4%).**

V. **Respect of biodiversity.**

BIOMASS NEW TECHNOLOGIES: Solutions to Overcome the Present difficulties

I) A wide range of more efficient and environmental friendly technologies & integrated systems (i.e. biorefinery) will be available.

II) Biology research progress, by OGM and MAS (marked assisted selection) methods to improve the production of biomass with an accurate development of seeds (i.e. new Monsanto ‘s corn seeds need 30% less of water!).

III) The progress expected in the sector of genetic enginering and in particular in the “synthetic biology” could increase the photosynthetic efficiency up to 30%. The potential of biomass resources could become huge.

IV) Respect of biodiversity is facilitated by the progress of genetic enginering.

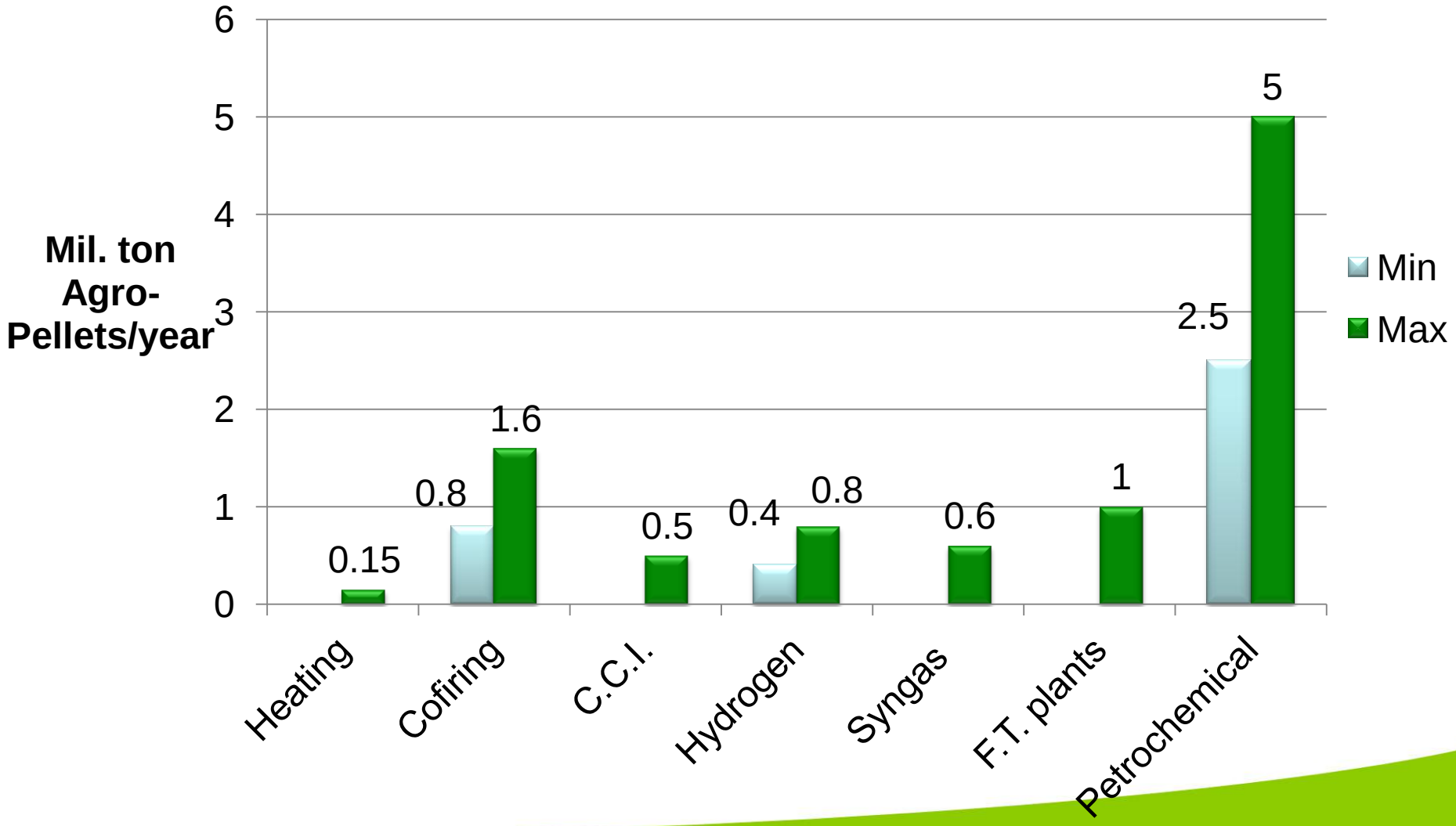
V) The impact due a drastic reduction of the cost of genetic engineering process (i.e. the genom sequencing cost had been reduced 1000 times during the last 20 years and it is expected to be reduced 1000 times more from now to 2030: at about 12 $!)

SIGNIFICATIVE COMMERCIAL BIOENERGY ACTIVITIES AT WORLD LEVEL

Bioethanol:	**90 million/year**
Biodiesel:	**35 million m^3/y vegetable oil**
Bioelectricity:	**400 TWhe /year (Total: 20,000 TWhe/y)**
Heating with pellets:	**15 million ton/y**
Biogas production:	**8,3 million TOE/y**
Charcoal (iron production):	**30 million m^3/y**

The total of this energy utilization represents only the 1.5% of the total world primary energy consumption

AVERAGE BIOMASS SUPPLY VOLUME FOR TYPICAL LARGE SCALE ACTIVITIES

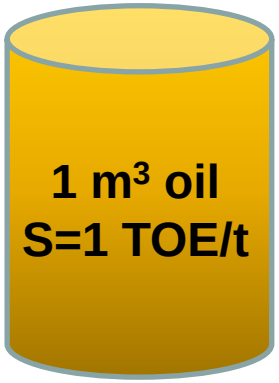


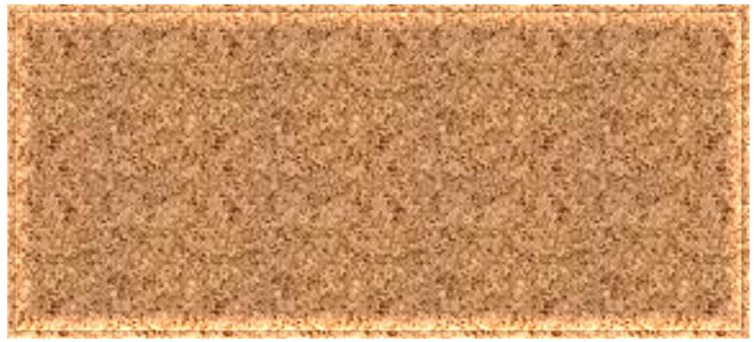
BIOMASS COFIRING (DRAX POWER PLANT, UK)

ADVANTAGES OF AGRO-PELLETS

(LOW MOISTURE, HIGH DENSITY)

Volume equivalent to 1 ton of oil (m^3)





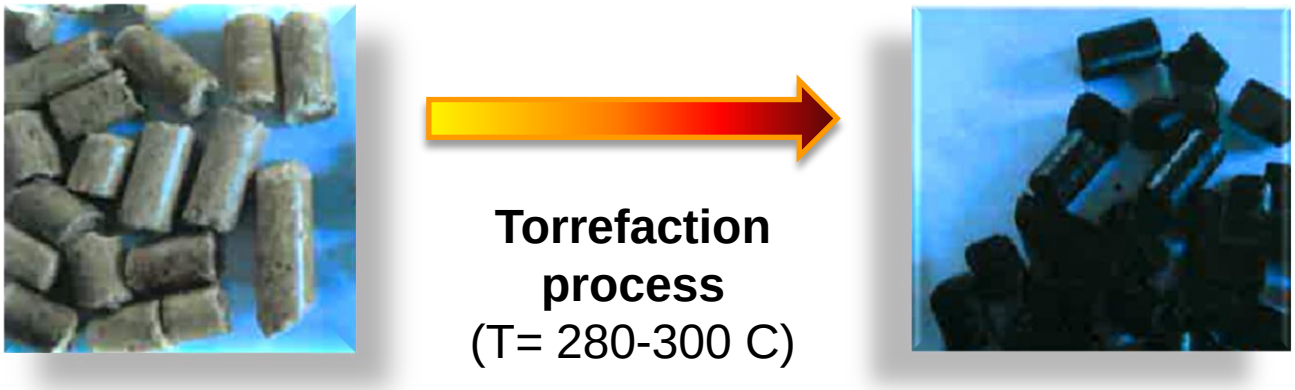
17,5 m^3 dry chips(10% moisture): S=0,122 TOE /m^3

3,8 m^3 Agro-pellets: S=0,285 TOE/m^3

18 m^3 straw bales: S=0,062 TOE/m^3

TORREFIED AGRO-PELLETS

Even if Agro-pellets is already a valuable refined biomass commodity, in the next future, **Torrefied Biomass pellets** could represent the **refined biomass commodity** for all sectorial bioenergy and biochemical markets.



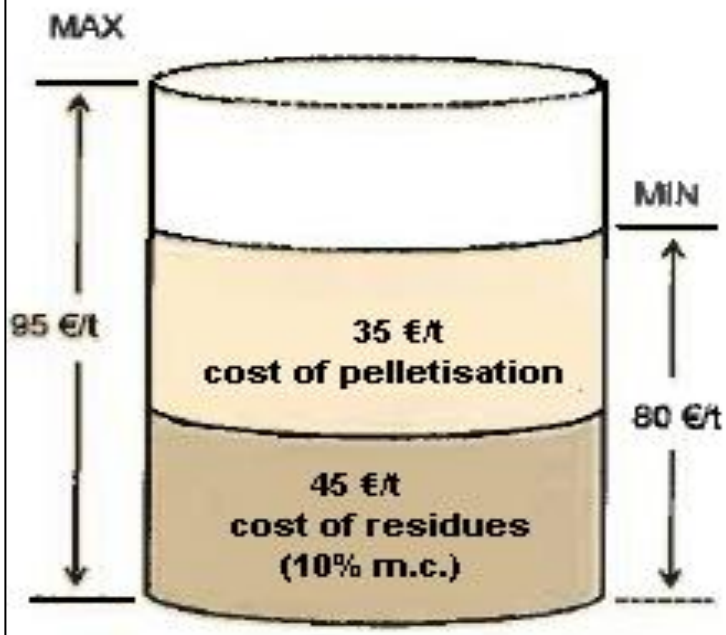
The torrefied agro-pellets is a 2° stage refined product with valuable properties:

- ✓Omogenization of processed biomass resource.
- ✓Higher energy density per m^3 (+20%)
- ✓Higher energy content (+15%)
- ✓Less pollution (low tars, Cl).

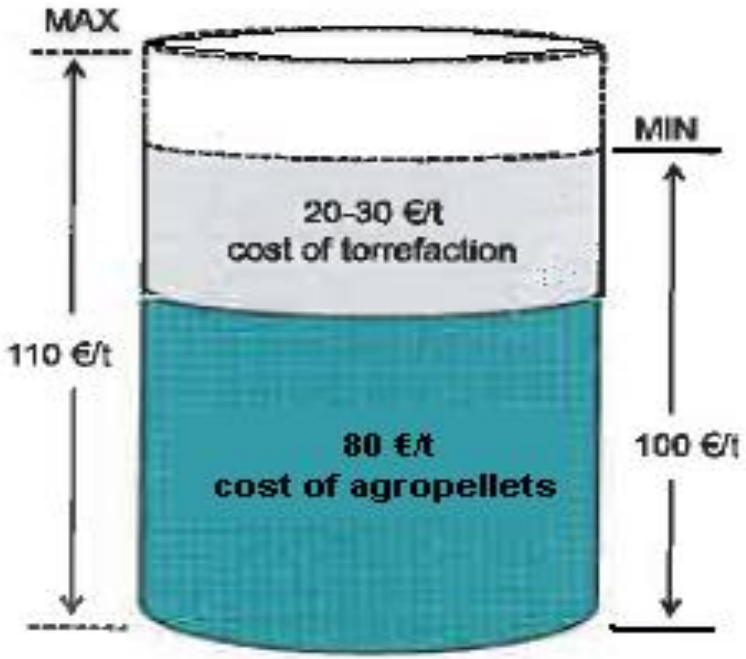
“Why torrefied Agro pellets are such a promising commodity?”

- This commodity can penetrate all sectoral energy and chemichal markets
- Resonable investment and processing costs
- Reduction of transport and handling costs due to:
  - High energy density facilitates transport logistic and storage.
  - Higroscopicity allows outside long-term storage, without loosing its characteristics.
- More efficient utilisation/conversion.
- Promoting large scale biomass trading among continents.
- Impact on the infrastructures for the biomass supply

PRODUCTION COST OF REFINED BIOMASS

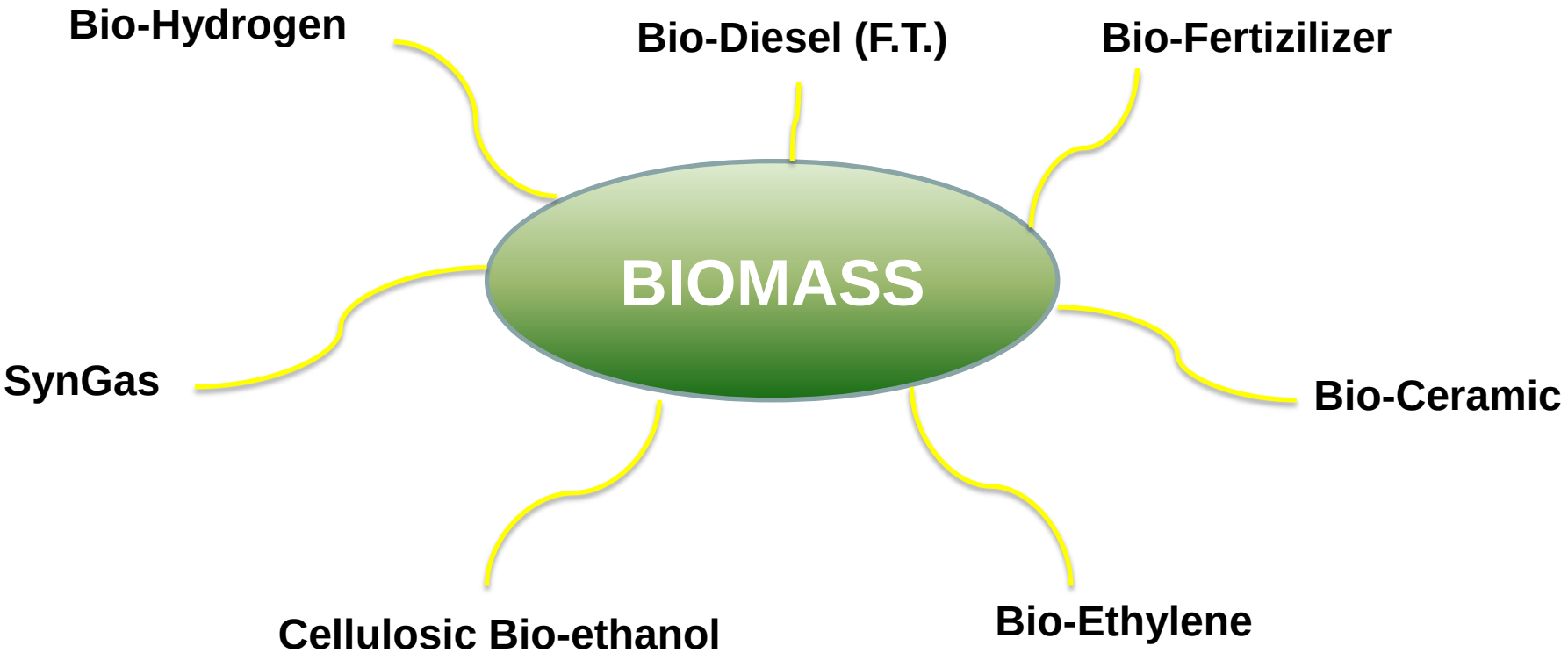


PRODUCTION COST
OF AGROPELLETS
0.41 TOE/t
0.30 TOE/m³

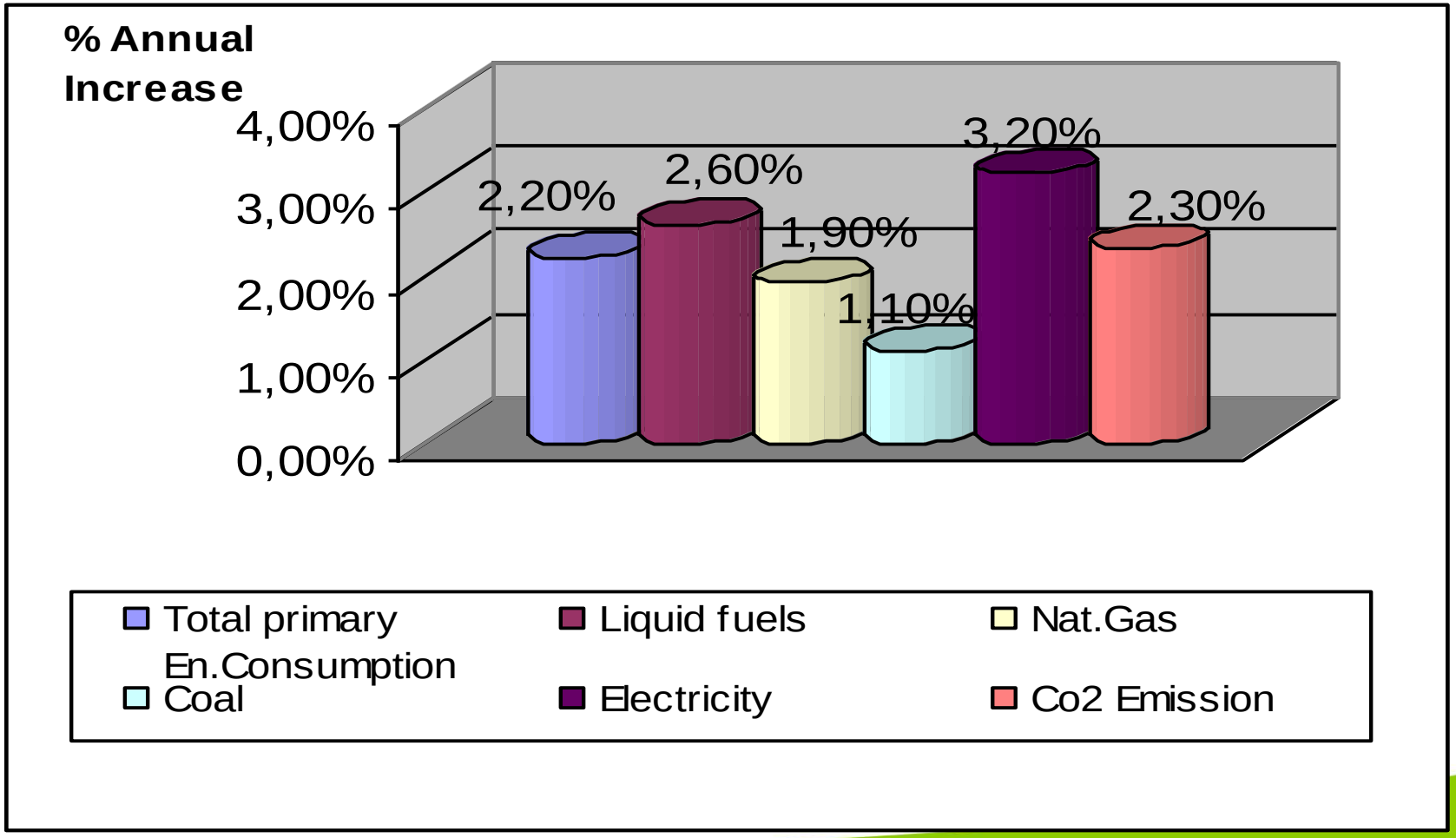


PRODUCTION COST
OF TORREFIED AGROPELLETS
0.52 TOE/t
0.34 TOE/m³

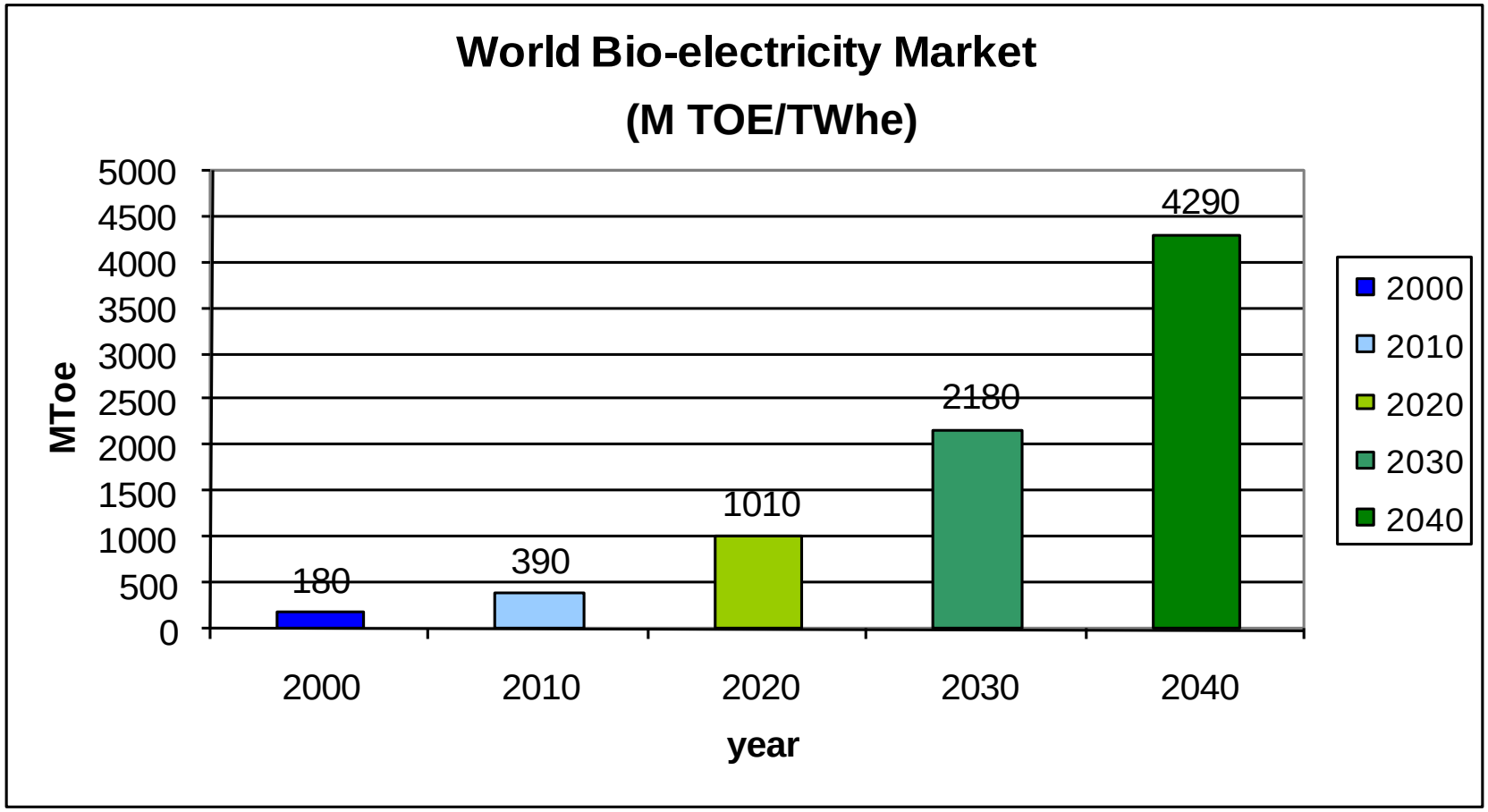
BIOENERGY ACTIVITIES BASED ON ADVANCED TECHNOLOGIES



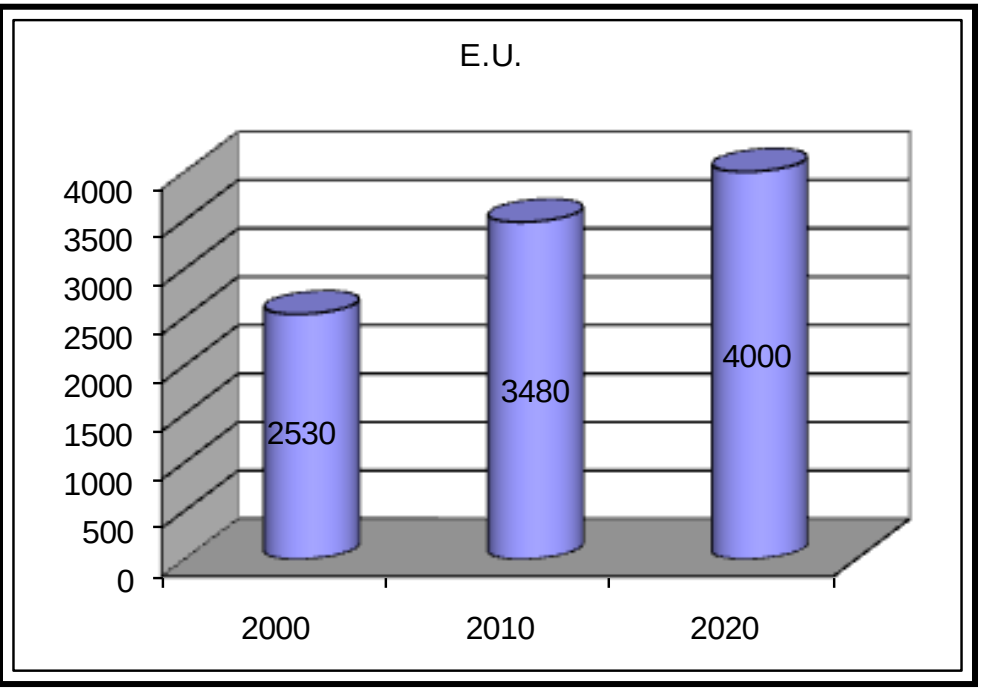
ESTIMATED INCREASE OF WORLD ENERGY CONSUMPTION (2005-2030)

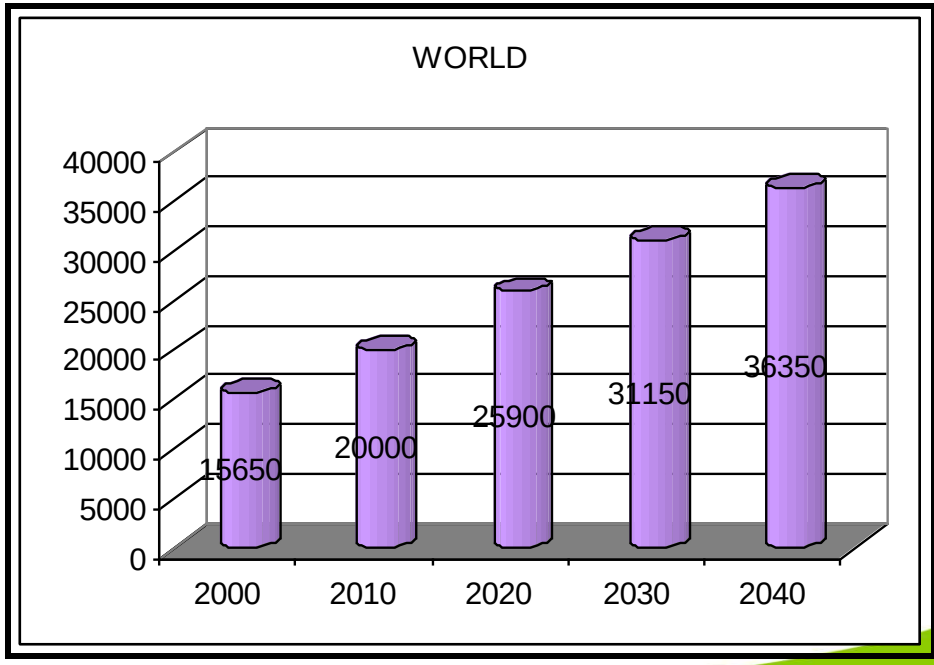


SECTORIAL MARKETS FORECAST



ELECTRICITY MARKET FORECAST (TWhe/year)

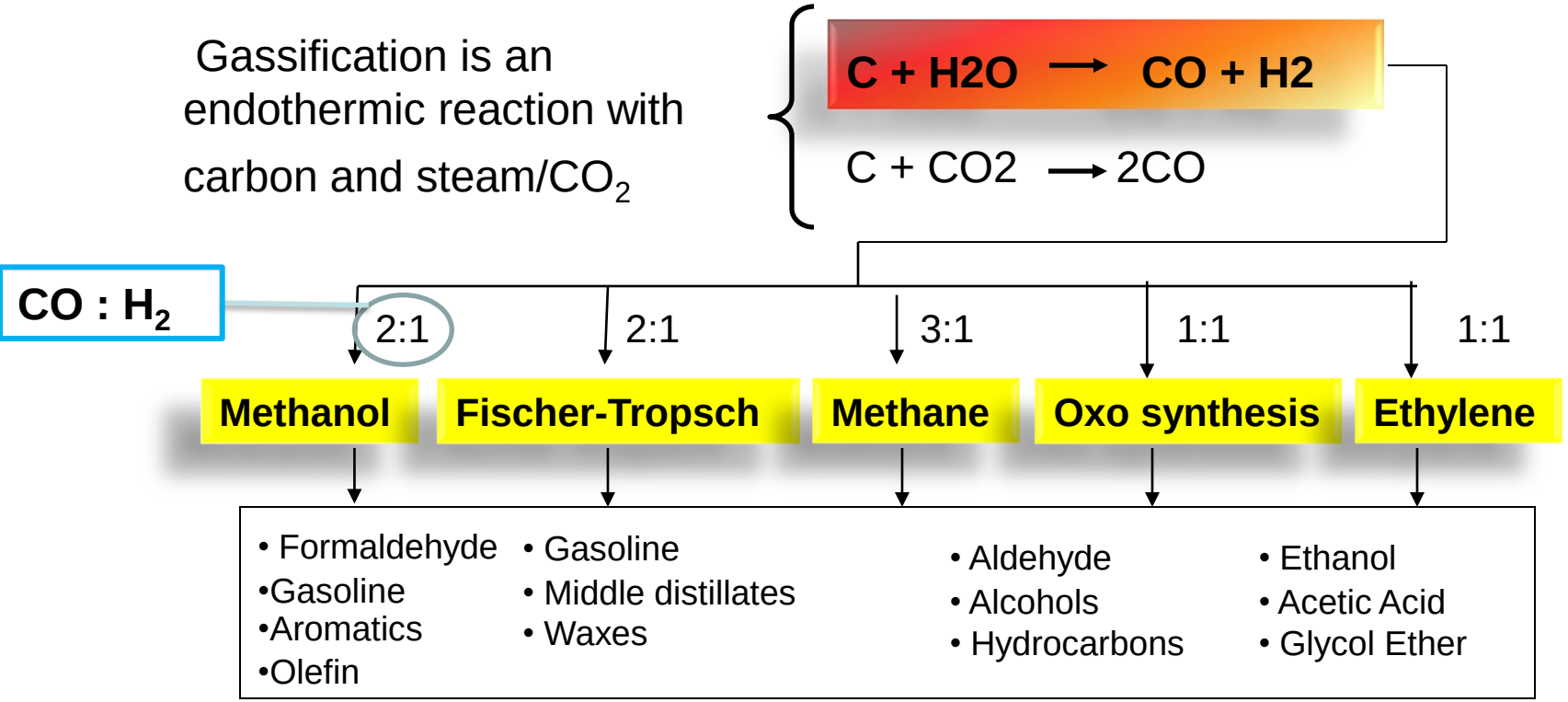




Source : Energy in Europe to 2020/ E.C.

BIOMASS GASSIFICATION PROCESS:

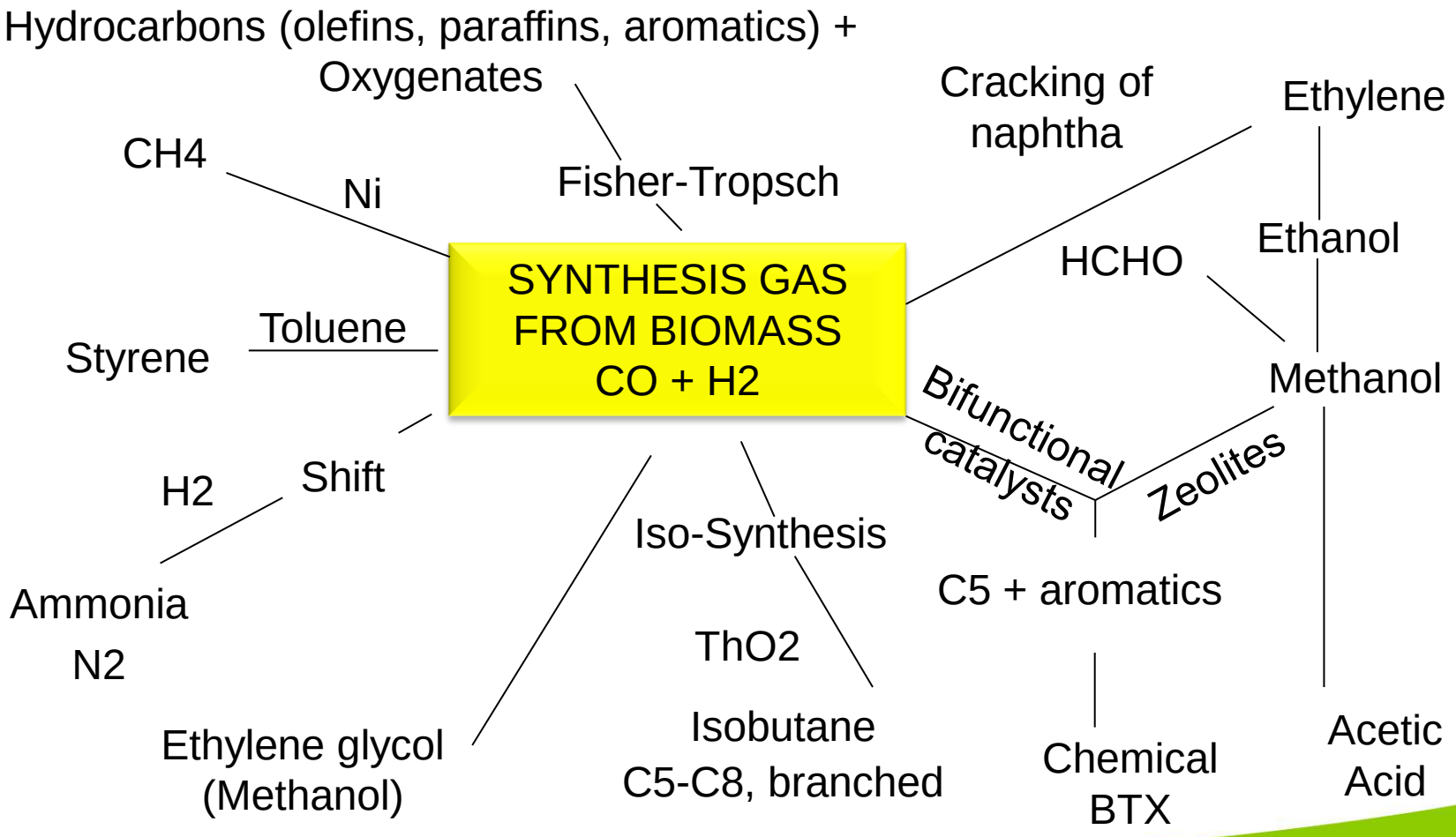
Gassification is an endothermic reaction with carbon and steam/CO_2



Unfortunately synthesis-gas from wood contains **tars** (mixture of hydrocarbon compounds) and traces of HCl,HF,NH3 and alkaline metals; their concentration depends on nature of biomass and type of reactor.

Tar gas-cleaning cannot yet be considered a solved problem !

MAIN BIO-CHEMICALS FROM SYNTHESIS GAS (Source : wender, i.)



HISTORIC DATA ON ALTERNATIVE FUELS IN EUROPE

European Consumption 1937 (t/year)					
Country	Bioethanol	Synthetic Fuels	Total alternative fuels	Total Transport Fuels Consumption	Total Alternat. / Total consump.
UK	16.000	376.000	392.000	4.840.000	8,1%
France	153.000	94.500	247.000	2.827.000	8,8%
Germany	210.000	1.230.000	1.440.000	2.640.000	54,5%
Sweden	15.247	500	15.747	503.000	3,1%
Italy	37.000	-	37.000	483.500	7,7%
Europe (17 countries)	510.322	1.796.300	2.306.622	13.014.700	17,7%

Average subsidies : ~ 1.8 Li/l

Thank you for your attention!

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