



refining & marketing

Venice Biorefinery Conversion Project

Distillation and Absorption 2018

Venice Refinery location



Eni Refineries



2000s

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Venice Refinery History



Why Venice Refinery Conversion?

1926



1947



1960s



1980s



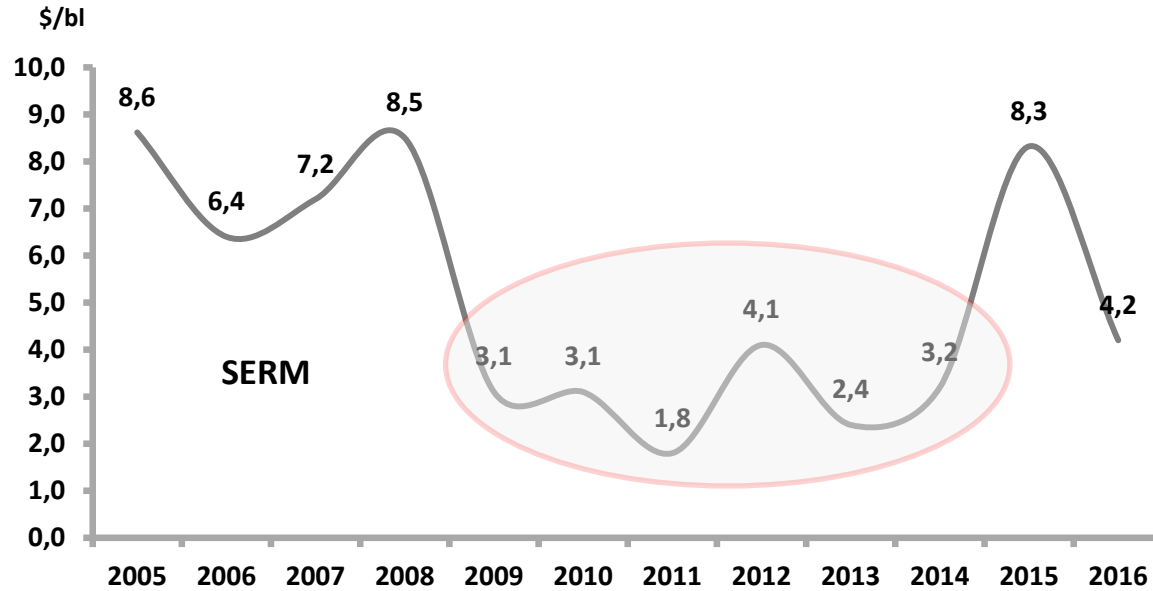
2000s



Refinery crisis in Europe and Eni strategy

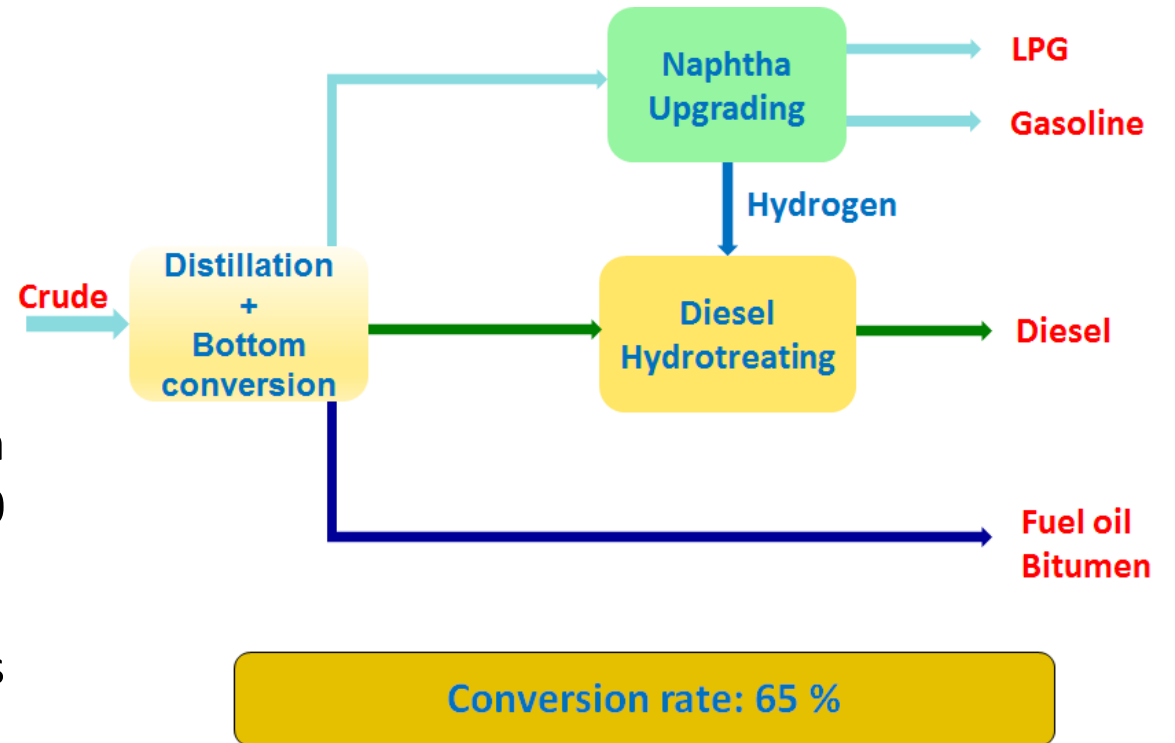


Refinery Margin



- Since 2009 in Europe (OCSE) the demand has been 650 Mton/y, while the production capacity is 720 Mton/y
- Refining overcapacity **contributed** to margins reduction and losses for refining activities.
- **21 refineries closed** in OCSE Europe (2 Mb/d, 110 Mton, -15%) and 7 refineries in not OCSE Europe.

Venice Refinery



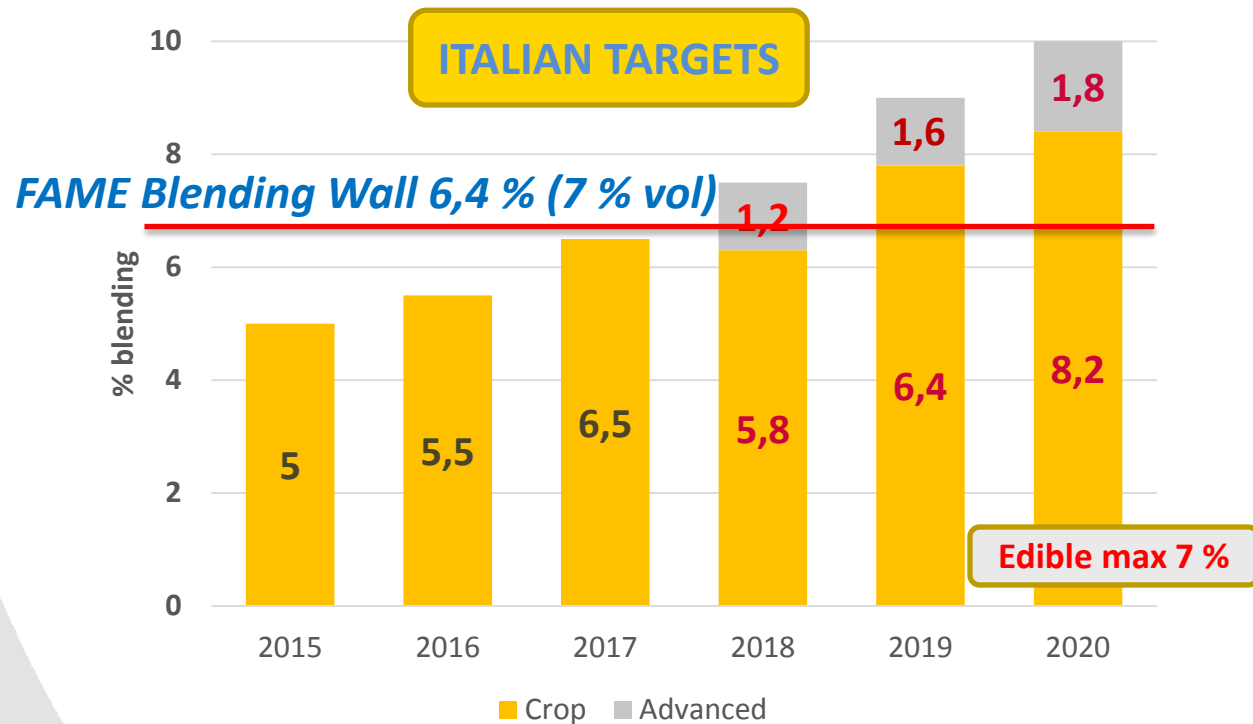
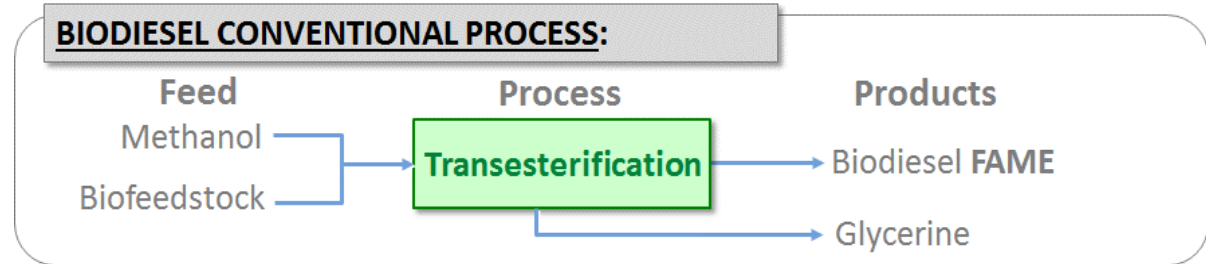
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European Directives for Biofuels



European environmental directives introduce biofuels blending obligation:

- ❑ RED 20/20/20
- ❑ ILUC Directive (1513/2015)

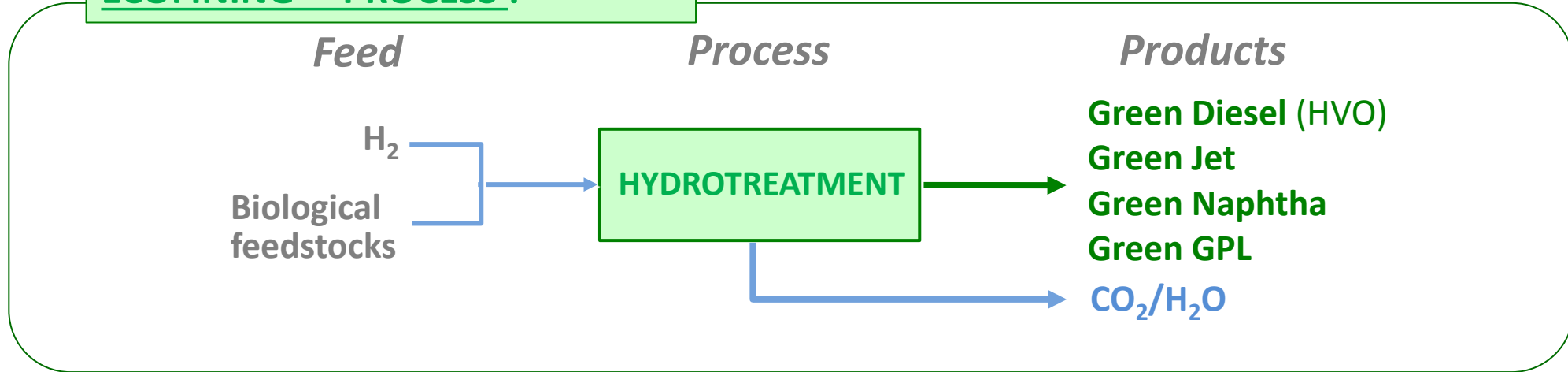


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ECOFINING™ technology

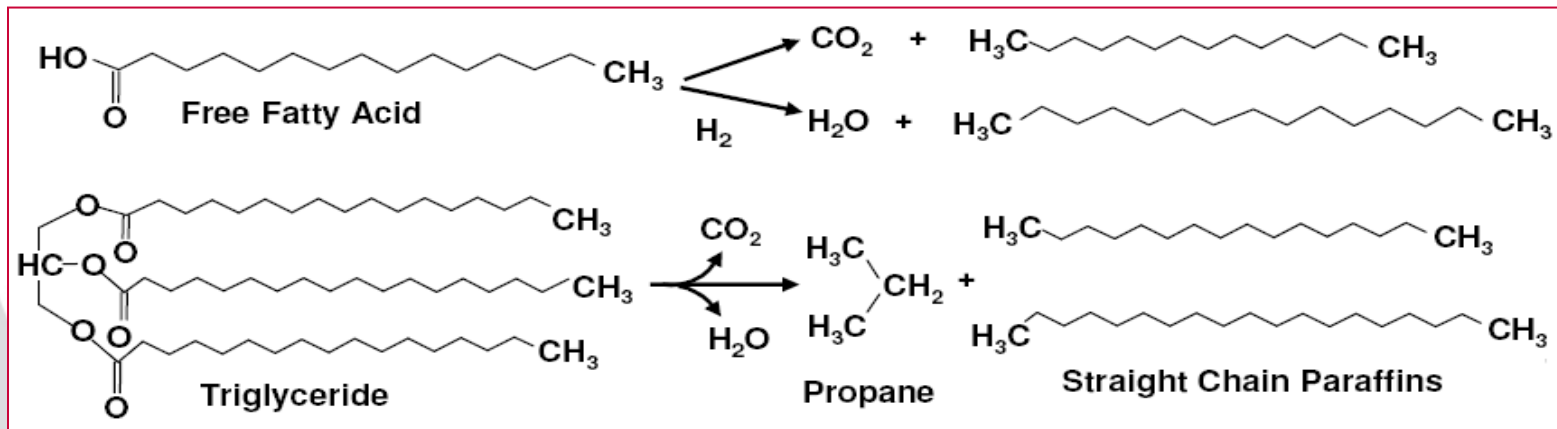


ECOFINING™ PROCESS :

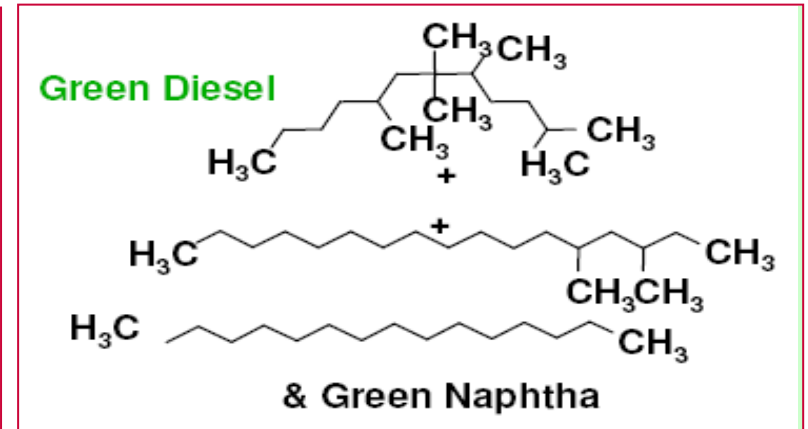


Ecofining reactions

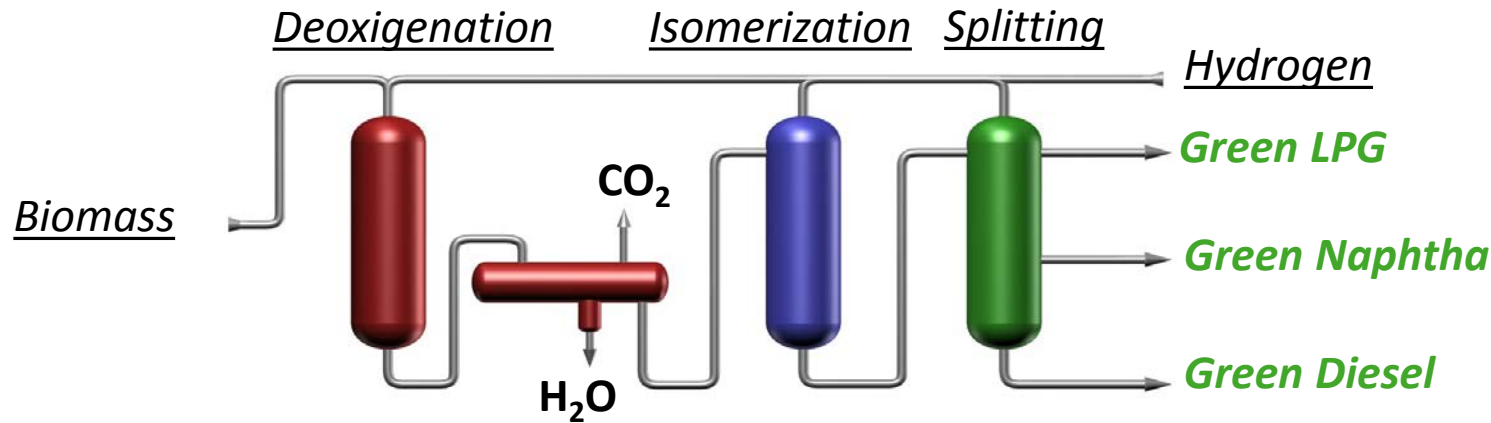
1st stage - Deoxygenation



2nd stage - Isomerization

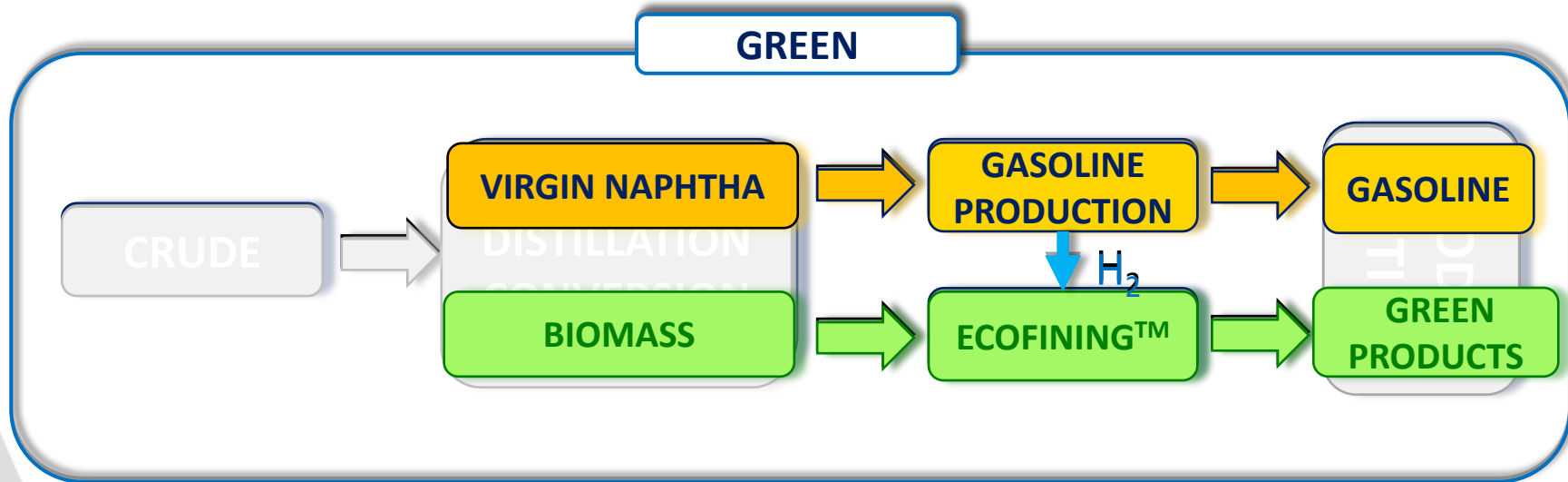


From traditional Refinery to Green Refinery



Emissions [t/year]

| Item | Traditional | Green I Step | Reduction |
|-----------------|-------------|--------------|-----------|
| SO ₂ | 2.275 | 270 | -88% |
| NO _x | 1.365 | 1.154 | -15% |
| Particulate | 137 | 44 | -68% |
| CO | 205 | 151 | -26% |



Water consumption [Mm3/year]

| Item | Traditional | Green I Step | Reduction |
|---------------|-------------|--------------|-----------|
| Process Water | 2,6 | 1,3 | -50% |
| Cooling Water | 56,8 | 28,4 | -50% |

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The quality of Green Diesel



| Properties | Fossil Diesel ULSD | Conventional Biodiesel (FAME) | ECOFINING™ Green Diesel |
|------------------------|--------------------|-------------------------------|-------------------------|
| BIO content | 0 | 100 | 100 |
| Oxygen, % | 0 | 11 | 0 |
| Specific gravity | 0.820 | 0.880 | 0.780 |
| Sulphur, ppm | <10 | <1 | <1 |
| Heating Value, MJ/kg | 43 | 38 | 44 |
| Cloud Point, °C | -5 | From -5 to +15 | Up to -20 |
| Distillation range, °C | 200 - 350 | 340 - 355 | 200 - 320 |
| Polyaromatics, %w | 11 | 0 | 0 |
| Nox emissions | Standard | + 10% | -10% |
| Cetane | 51 | 50-65 | 70-90 |
| Oxydation stability | Standard | Pour | Excellent |

European Biofuels Regulation - Evolution

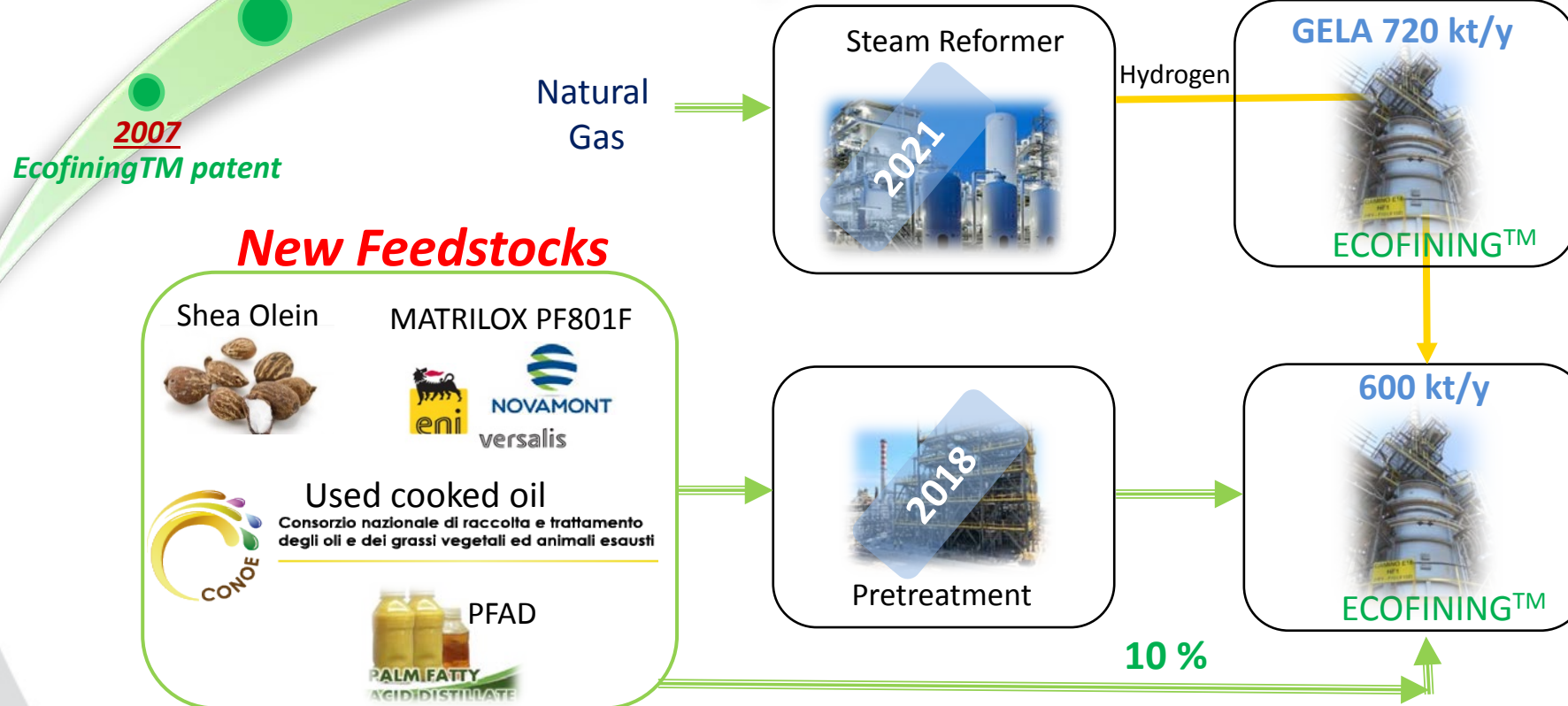


Under discussion the RED II for the next decades, with relevant changes in the regulatory framework.

HIGHLIGHTS:

- ❑ 27% renewable target up to 2030 at European level (including biofuel blending)
- ❑ increasing shares of advanced raw materials versus conventional and unconventional feedstock (UCO, tallow)

Green Refineries evolution



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Green Diesel: new opportunities



Biofuels in maritime transportation

Eni and the Italian Navy defined an agreement, within the frame of the Navy Green Fleet Project, to formulate and produce a new military ship bio-fuel by means of the Ecofining™ Technology.

Green Diesel application tested with high level of additivation (about 50%).



Biofuels in aviation

Green Diesel produced through the Ecofining™ process brilliantly overcomes the risk of crystallization at low temperatures

Eni is currently supplying biojet for an experimental test sponsored by MATTEM (*Italian environment Minister*), CNR (*National Research Center*), Enea (*energy and environment national agency*) and Aeronautica Militare (*Italian Air force*).



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Thank -you