
NEU-CO2 Paris Workshop

7th-9th November 2001

Roger Matthews, BP

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- BP, Chemicals stream – European Olefins Business Unit
- Chairman of European Ethylene Producers Committee – working committee within CEFIC
- Leader of Lower Olefins Shadow Group for input to LVOC BREF
- Member of TWG on LVOC BREF, industry lead for Chapter 7 (Lower Olefins Illustrative Process)

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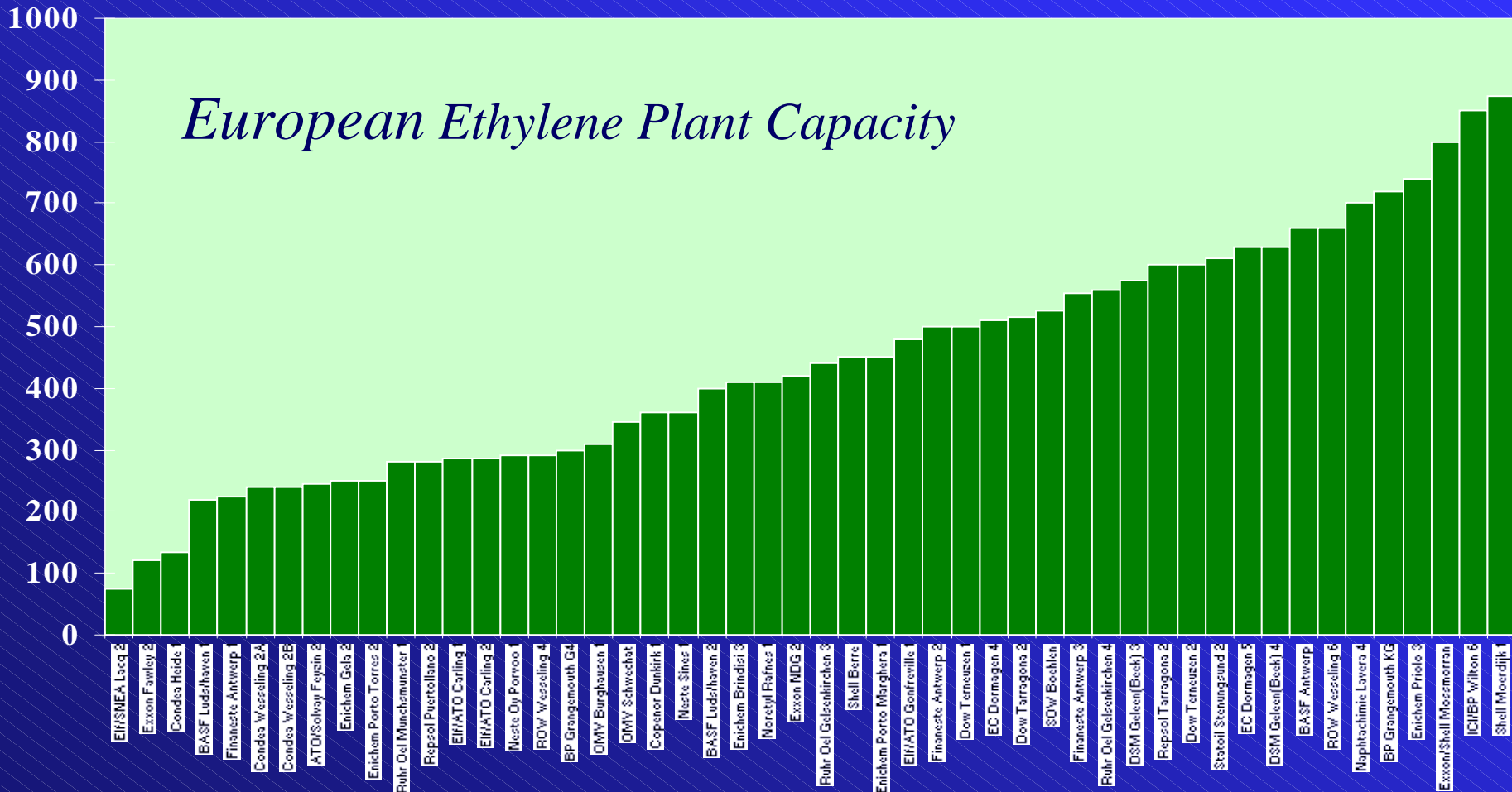
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Lower Olefins - some facts and figures

- ❑ Worldwide capacity 100.5 million tonnes per year, from 240 plants
- ❑ Western Europe 21.8 mt per year, 51 plants
- ❑ In Europe, capacities range from 15 kt per year to 900 plus metric tonnes per year
- ❑ Average European cracker 25 years old – only 4 built in last decade

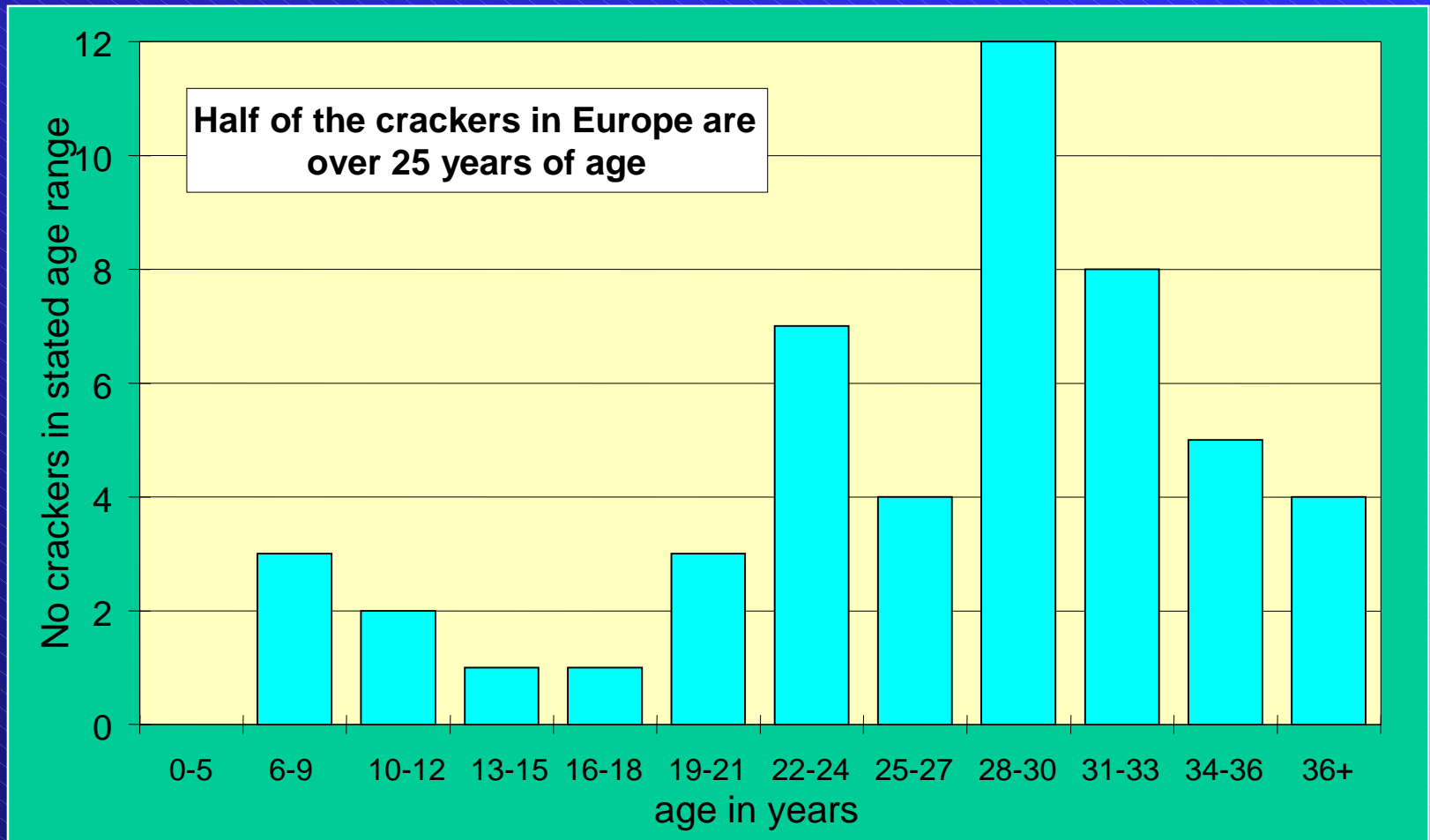
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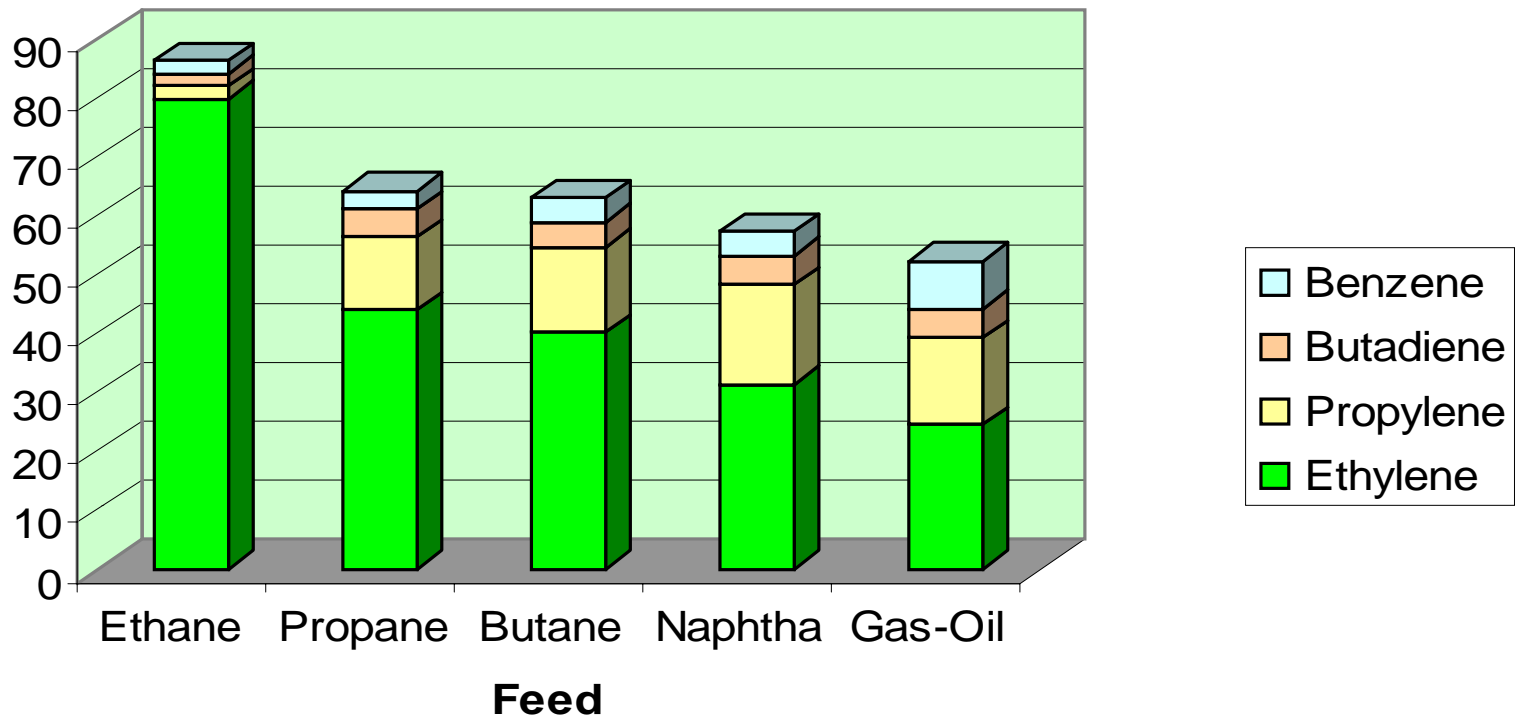
Which feedstock ?

- Ethane, LPG (propane, butane), naphtha, gas oil
- Selection based on availability, location, desired products and most importantly price
- Most European crackers are naphtha fed, with some LPG flexibility. A few gas crackers
- Gas crackers cheaper to build – fewer high value co-products

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Product Profiles



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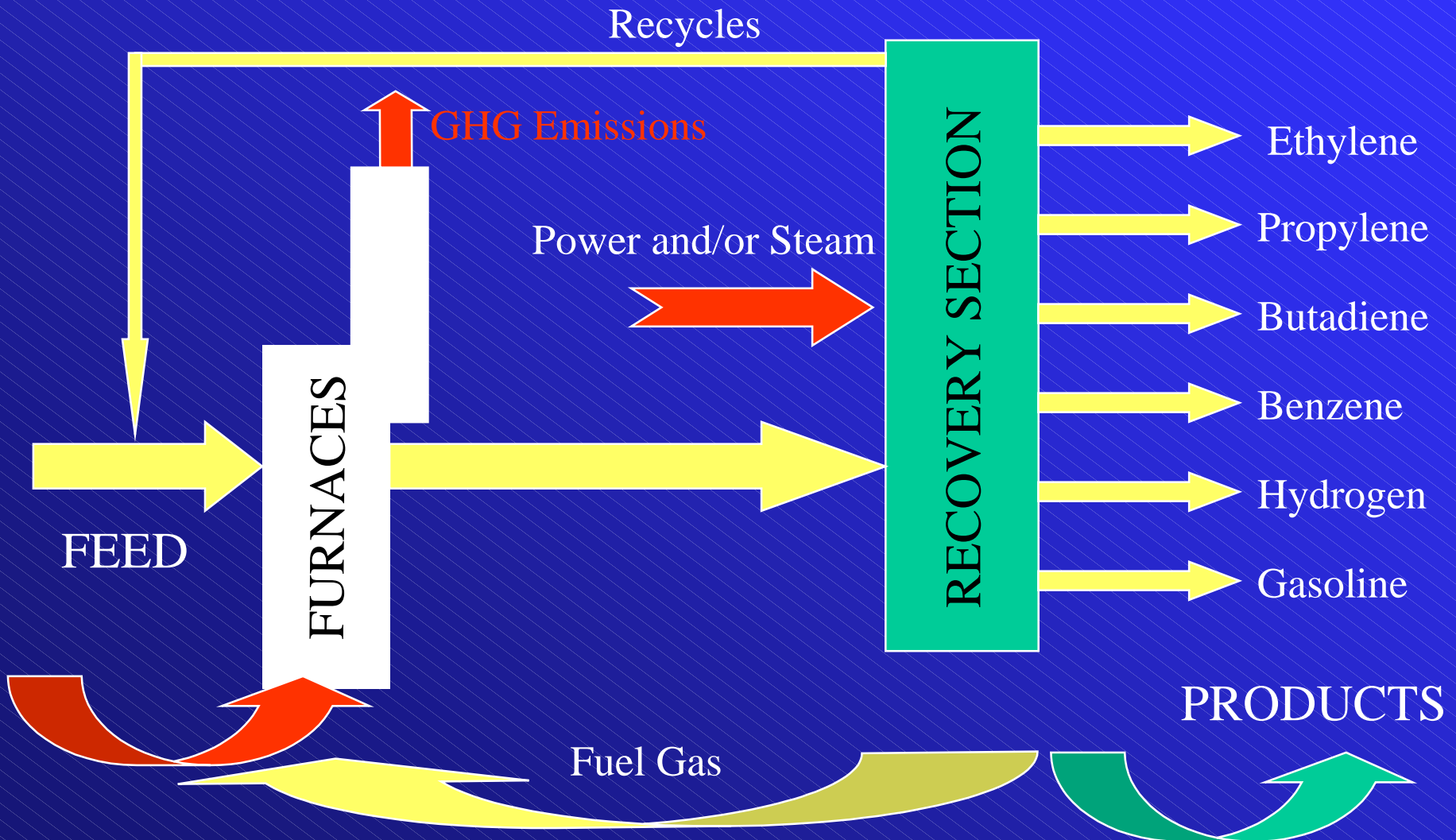
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Typical core plant area
for 700 kta unit
(10-12 hectares)

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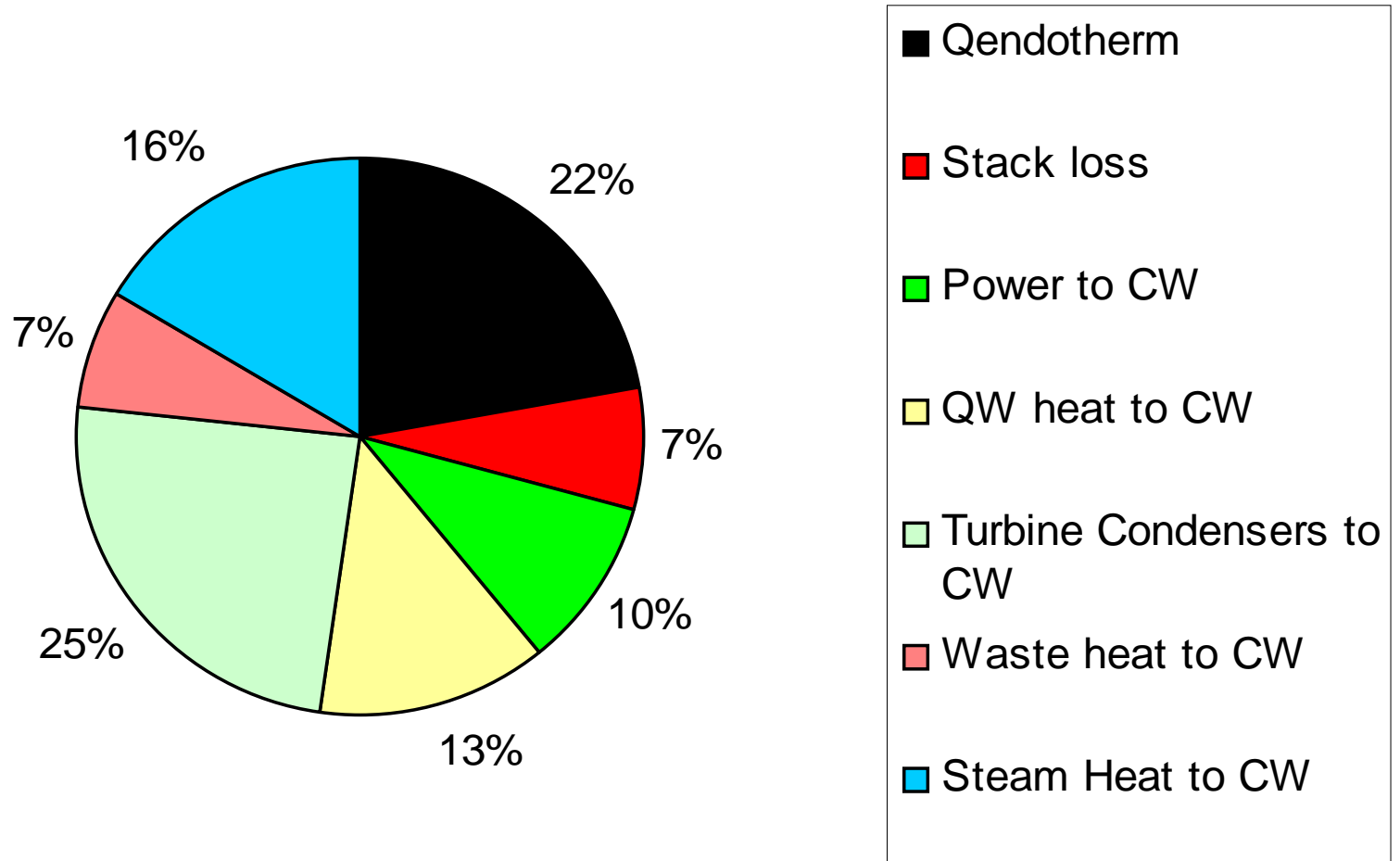
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- Energy is recovered from the furnaces by raising high pressure steam. In turn, this is used to drive turbines and provide a source of heat for fractionation processes
- Although cracking furnaces are nearly always fuelled using recycled residue gas, additional steam may be required to meet the overall demand of the Recovery Section. This can be generated in auxiliary boilers, using a range of fuels, or supplied from a CHP or central co-gen facility.
- For ethane crackers, there is insufficient residue gas,

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Issues associated with energy & emission data collection

□ Defining the plant boundaries :

- Integrated site – recovery streams, product purity
- Butadiene recovery
- Gasoline treatment and benzene recovery
- Energy centre

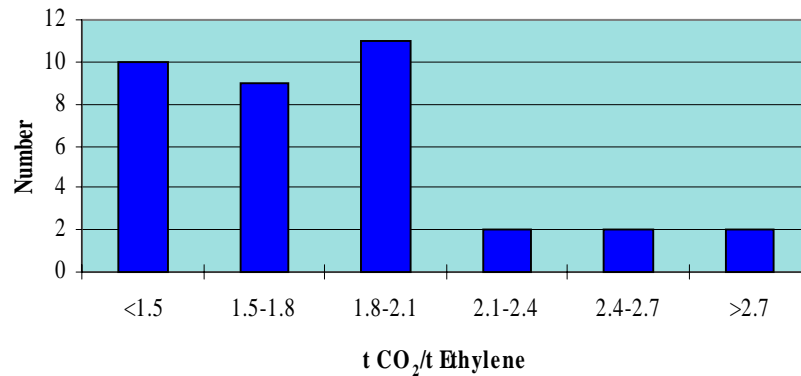
□ Reporting protocol

- Energy conversion (fuel/steam/power)
- Reporting period
- Relative to what ? (ethylene, E + P, HVC's)

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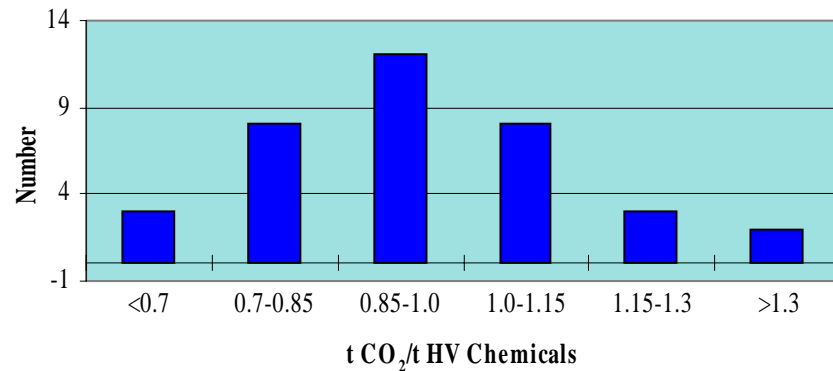
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Emissions of Crackers
Overview (t CO₂/t Ethylene)



CO₂ per tonne of ??

Emissions of Crackers
Overview (t CO₂/t HV Chemicals)



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- Energy represents 60% of the cash cost of conversion – so has always been a very important consideration in plant design/operation
- Modern plants have highly integrated energy recovery systems, employing heat-pumps, gas turbines/CHP facilities
- Older plants have often been retrofitted with modern high-selectivity furnaces

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Where is the industry going ?

- Much research into catalytic cracking, low energy recovery systems, dehydrogenation routes to olefins and more recently methane to olefins technology. No breakthrough yet
- Marginal investment cases in Europe – most new build now in ME and China. Environmental pressure in Europe may accelerate move.
- Change will be very slow