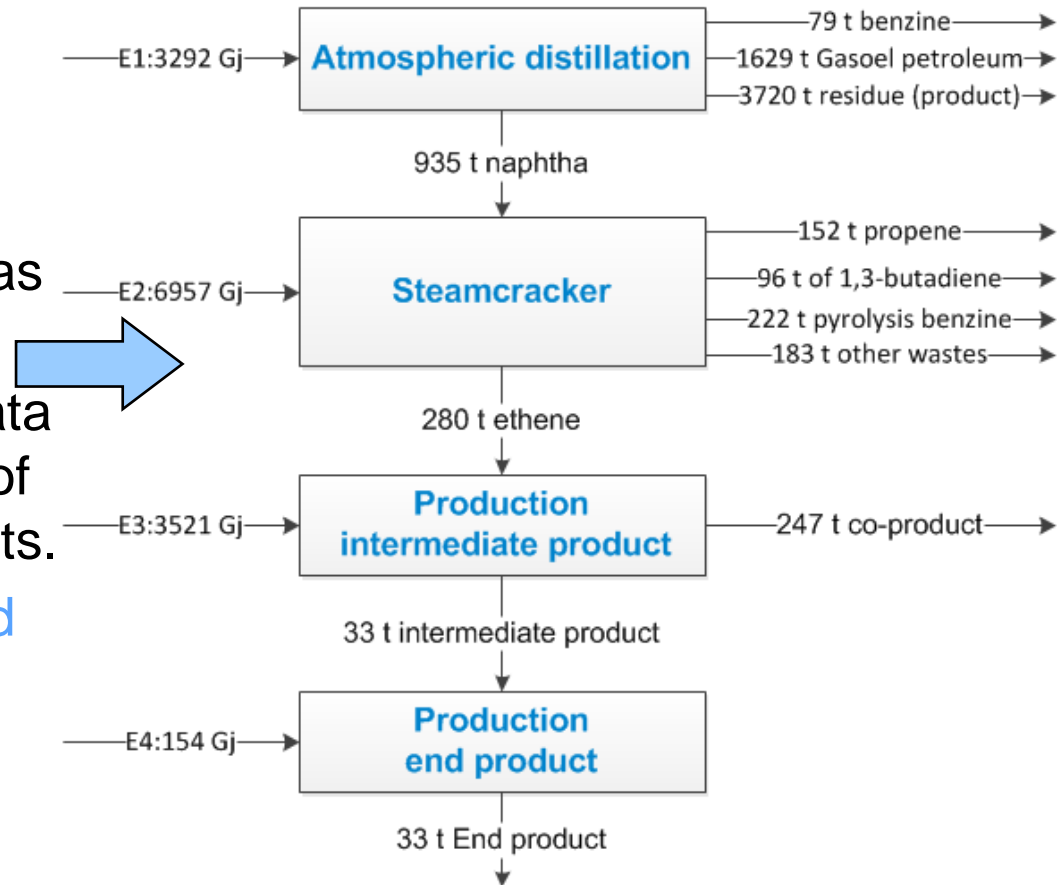


# Example: Allocation by mass

- A product is made from petroleum.
- The process chain is shown as a flow chart.
- For each process step are data on energy consumption and of the mass accruing co-products.
- Calculate the energy required for the final product, MJ / kg.



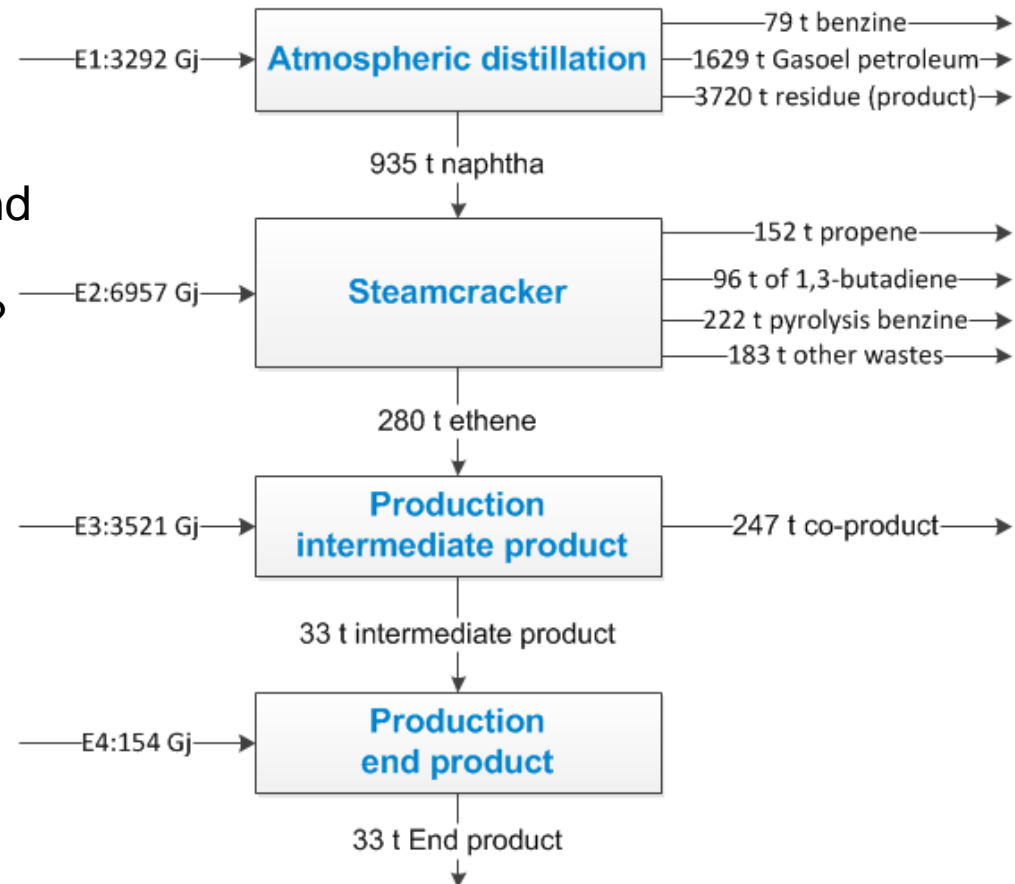
# Example: Allocation by mass (I)

Derivation:

Production end product:

- No allocation → 154 GJ are completely attributed to the 33 t end product

Production intermediate product:???



# Example: Allocation by mass (I)

Derivation:

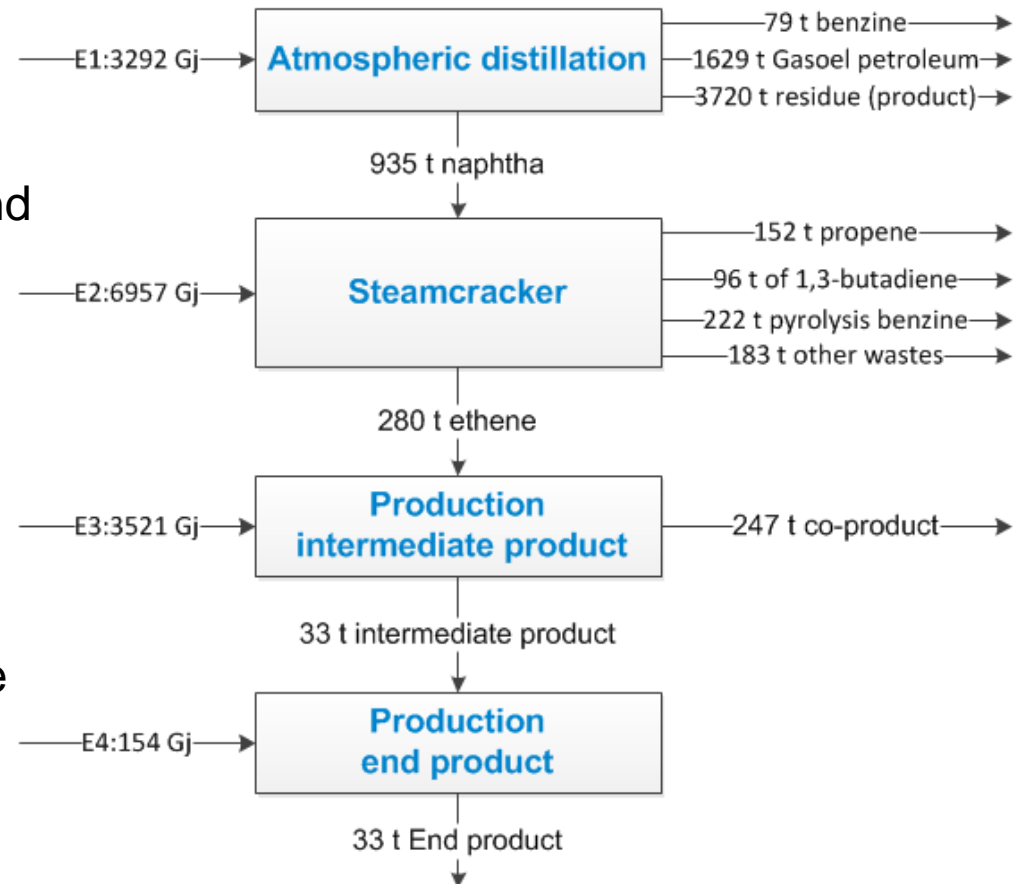
Production end product:

- No allocation → 154 GJ are completely attributed to the 33 t end product

Production intermediate product:

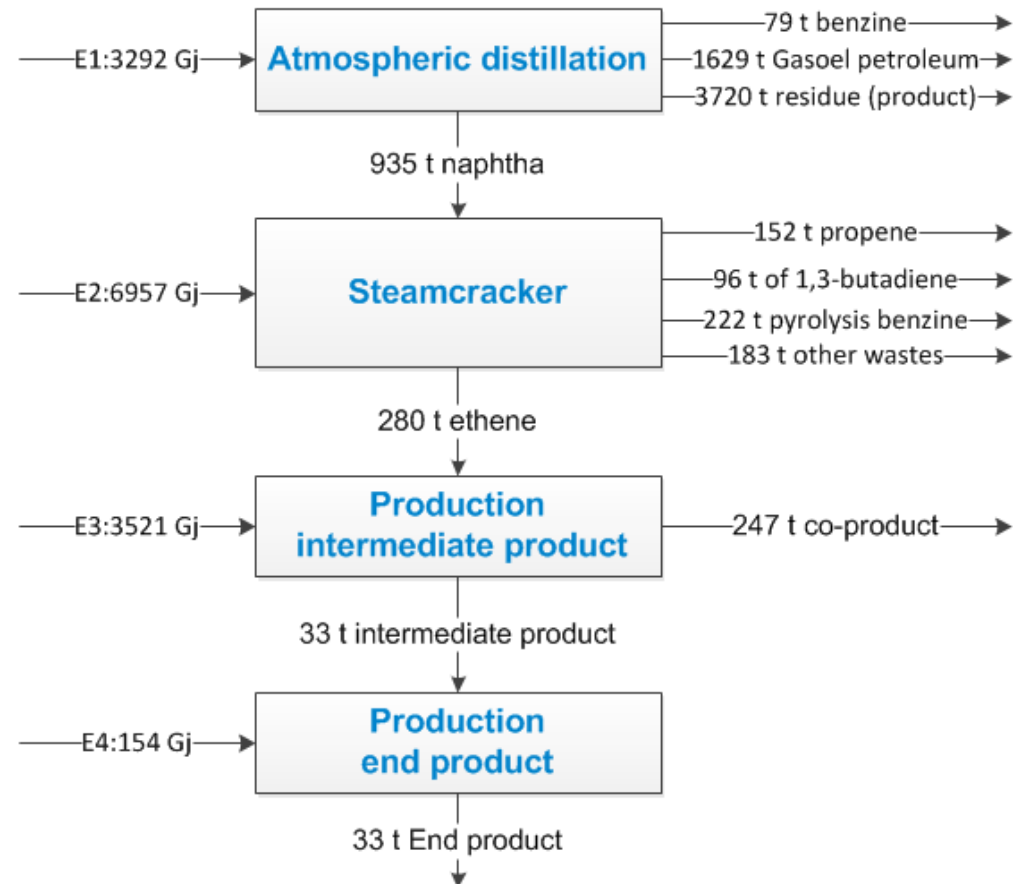
Simple allocation by mass:

- 3106 GJ are attributed to the 247 t co-product (88,2 %)
- 415 GJ to the 33 t intermediate product (11,8%)
- If no burdens would attribute to the co-product, it would get out unencumbered from the process.



# Example: Allocation by mass (III)

Derivation:  
Steamcracker???

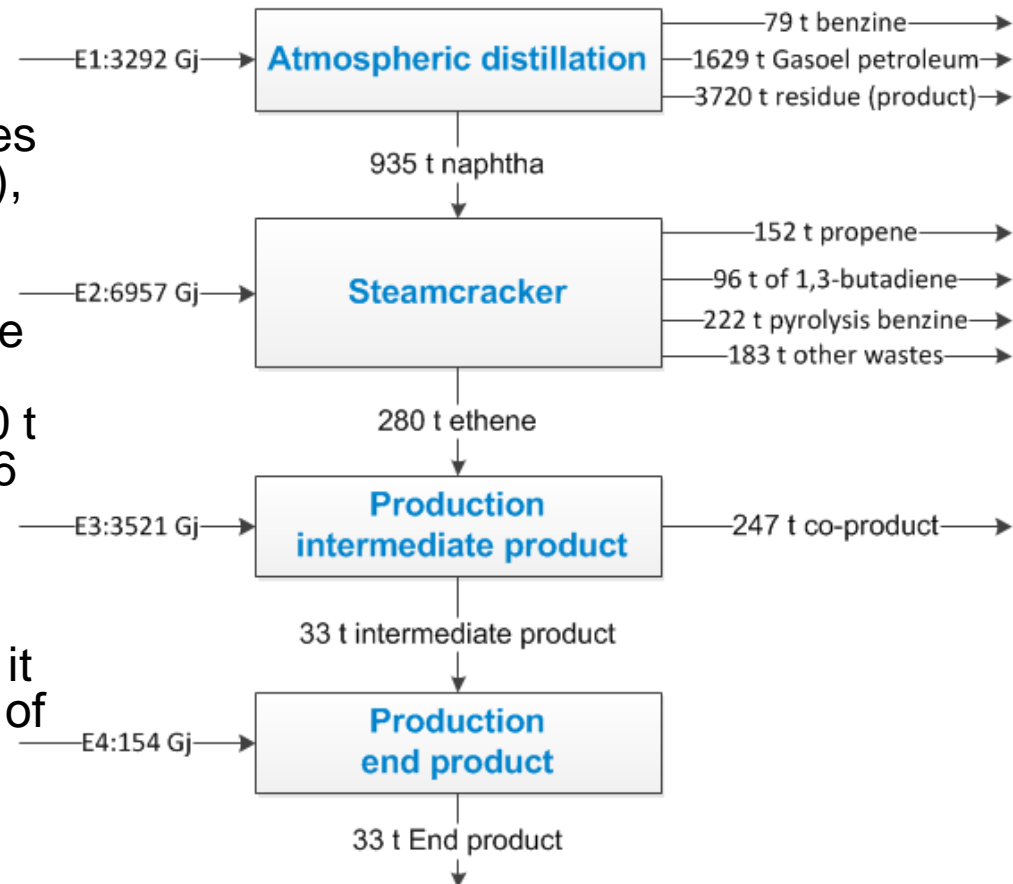


# Example: Allocation by mass (III)

Derivation:

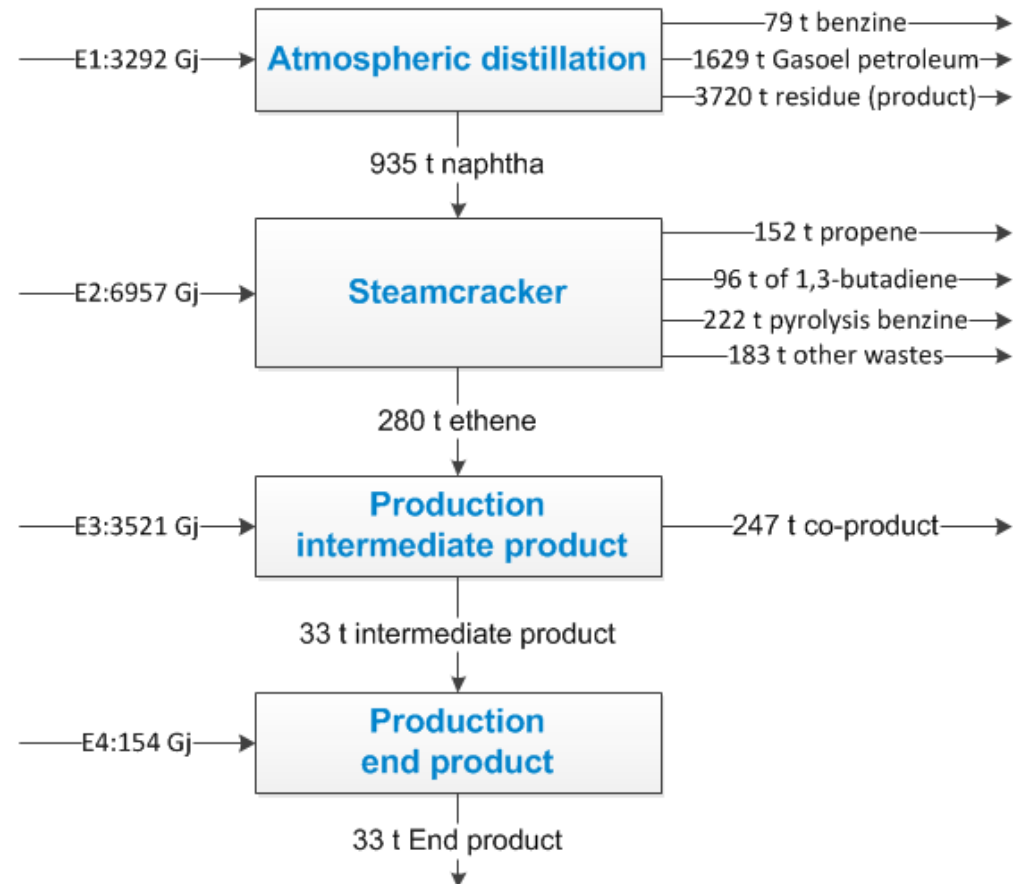
## Steamcracker:

- From the 280 t steamcracker comes out ethene (37.2% of the products), which is further processed in the 'intermediate production'.
- From the burdens, which are, in the allocation by mass of the steamcracker, attributed to the 280 t ethene (2590 GJ), only 11.8% (306 GJ) are added to the intermediate product,
- With the rest (88,2 %) must be charged the co-product, otherwise it wouldn't have to bear any burden of the pre-production.



# Example: Allocation by mass (III)

Derivation:  
Atmospheric distillation(AD) ??

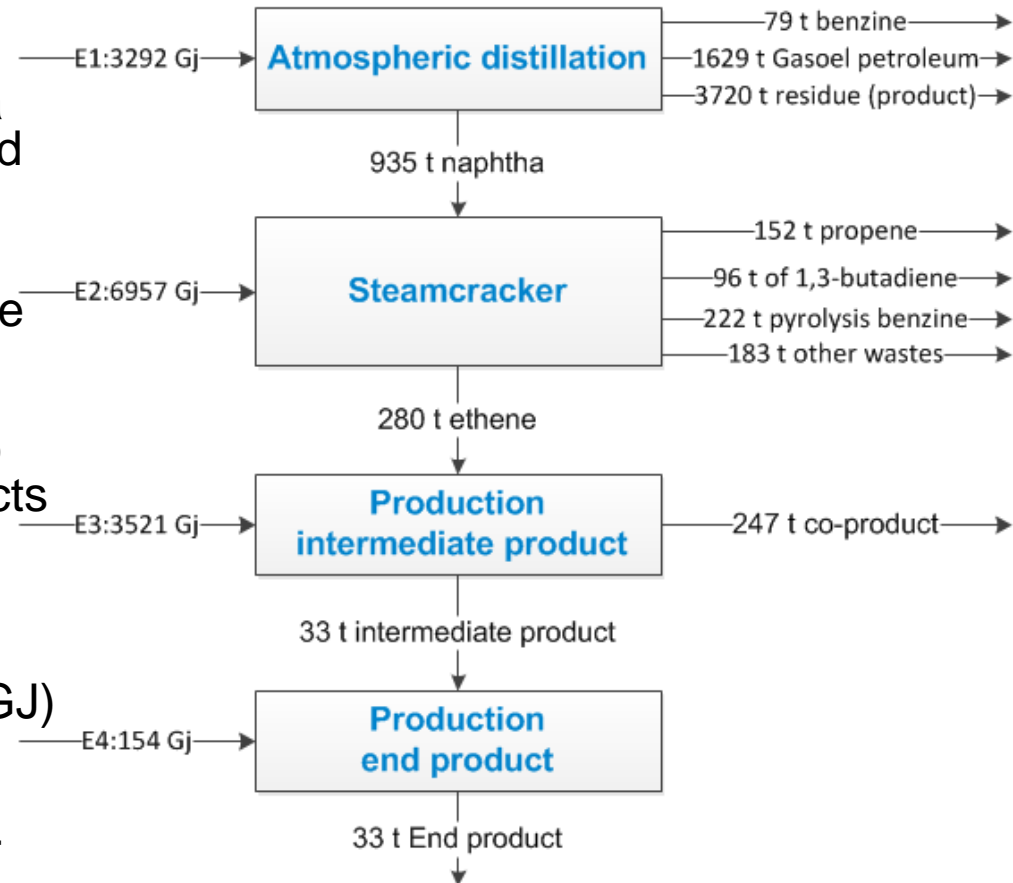


# Example: Allocation by mass (III)

Derivation:

## Atmospheric distillation(AD)

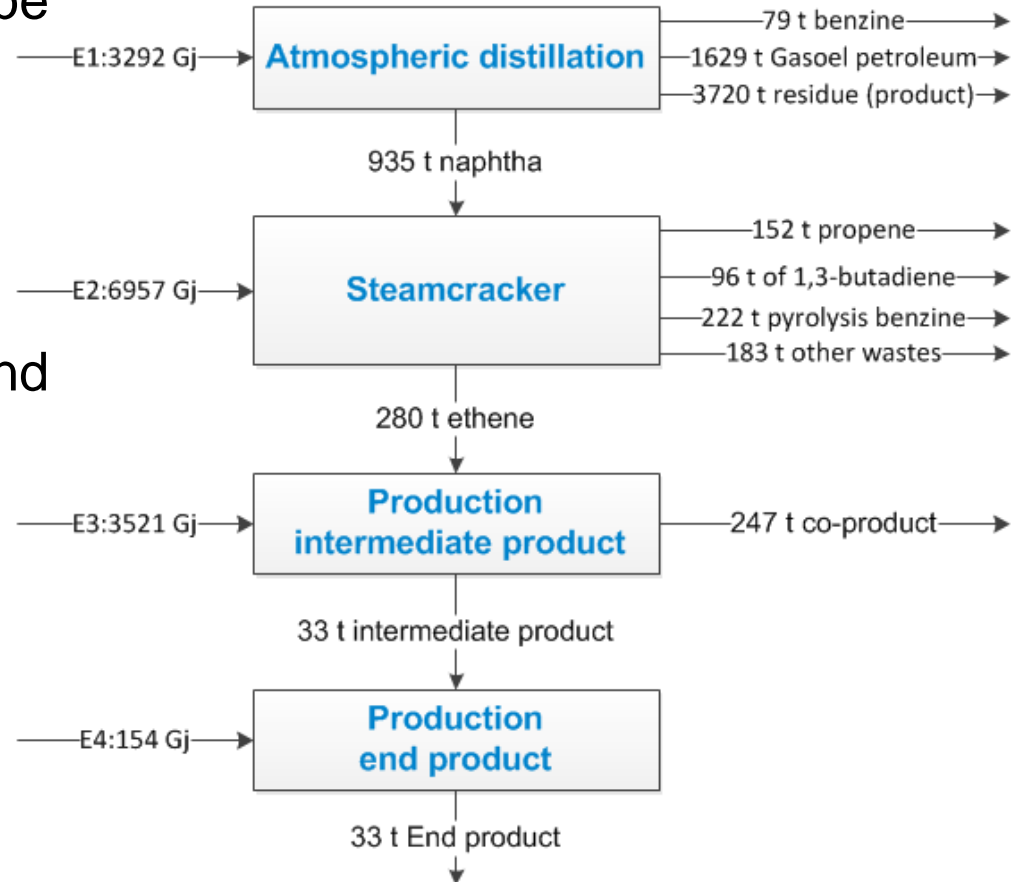
- From 935 t AD comes out naphtha (14.7%), which is further processed in the steam cracker.
- From the burdens, which are, in the allocation by mass of the AD, attributed to the naphtha (484 GJ), only 37,2 % (180 GJ) are added to the ethene, otherwise other products of the the steamcracker would be unencumbered realting to the AD.
- Of these 180 GJ, only 11.8% (21 GJ) are added to the intermediate product, and the rest (159 GJ) is attributed to the burdens of the co-product.



# Example: Allocation by mass (III)

Hence, following burdens have to be added for 33 t end product??

This corresponds to ??? MJ / kg end product





# Example: Allocation by mass (III)

Hence, following burdens have to be added for 33 t end product:

- 154 GJ (production end product)
- + 415 GJ intermediate product
- + 306 GJ (Steamcracker)
- + 21 GJ (atmospheric distillation)

-----  
896 GJ (sum)

This corresponds to 27 MJ / kg end product

