

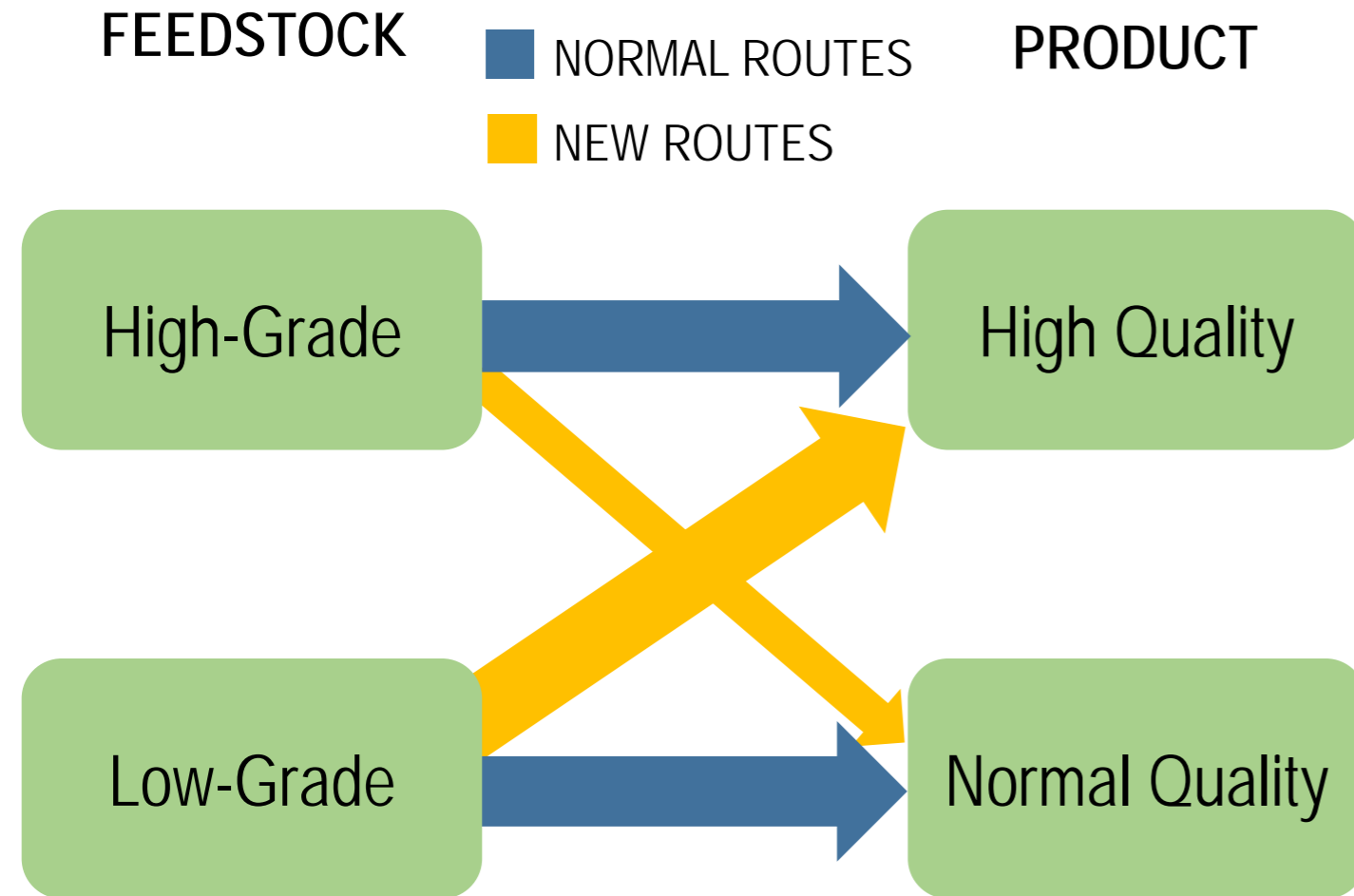
**INCREASING FLEXIBILITY OF FEEDSTOCK USE IN
BIOREFINERIES VIA MODELLING:
PRODUCING A TARGETED SET OF OLEOCHEMICALS FROM DIFFERENT QUALITY
GRADES TALLOW**

EUROPEAN OLEOCHEMICAL INDUSTRY FACES A CHALLENGE

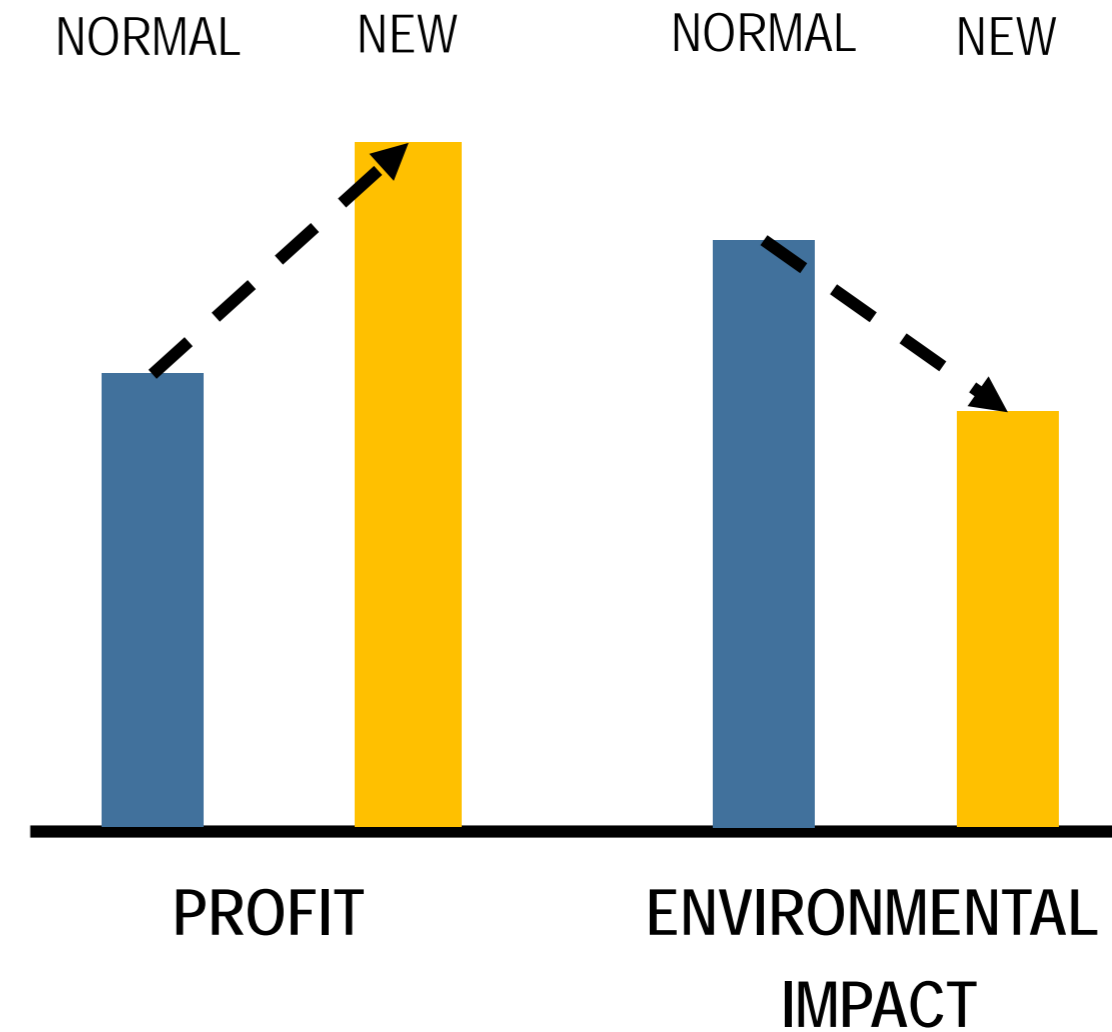


GENERAL GOAL OF MODELLING FATTY ACID PRODUCTION

INCREASE FLEXIBILITY OF FEEDSTOCK USE

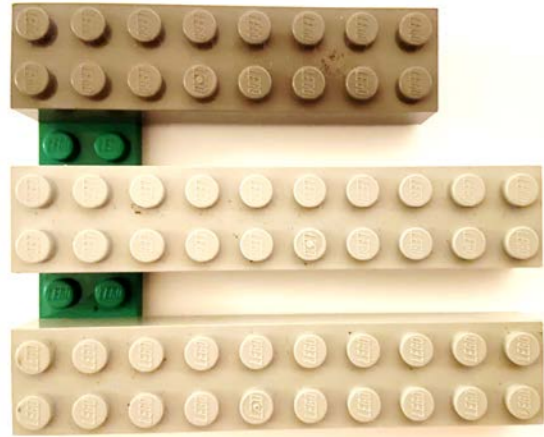
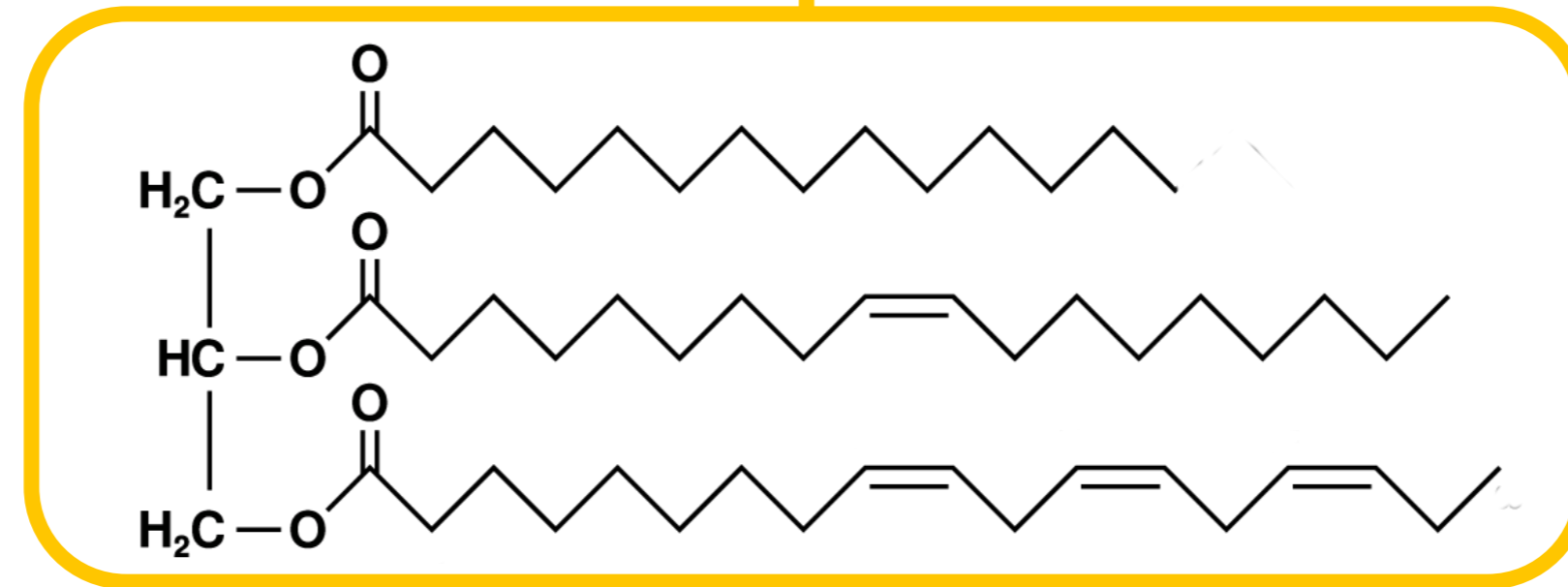


IMPROVE ECONOMIC & ENVIRONMENTAL PERFORMANCE

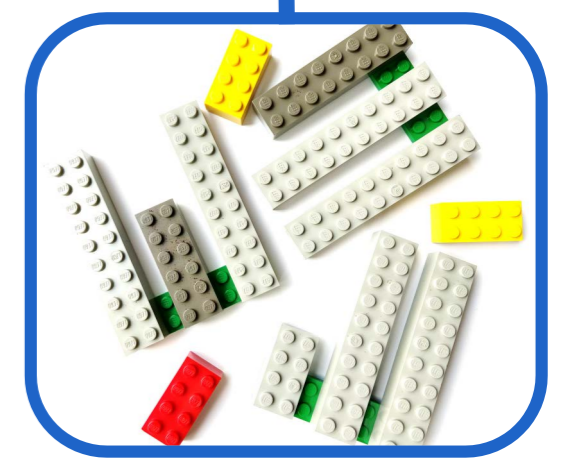


THE COMPLEX COMPOSITION OF TALLOW

TRIGLYCERIDES

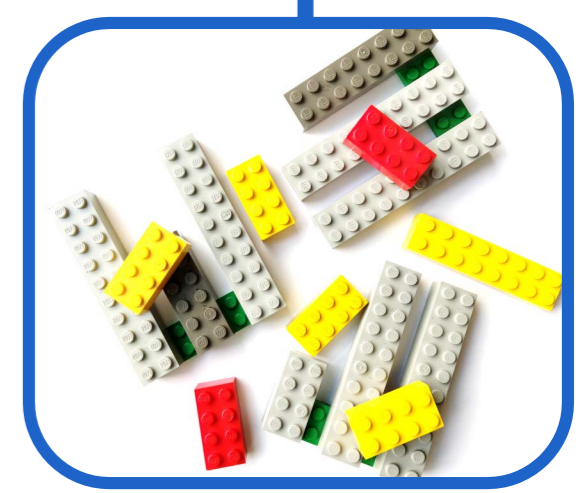


HIGH-GRADE TALLOW

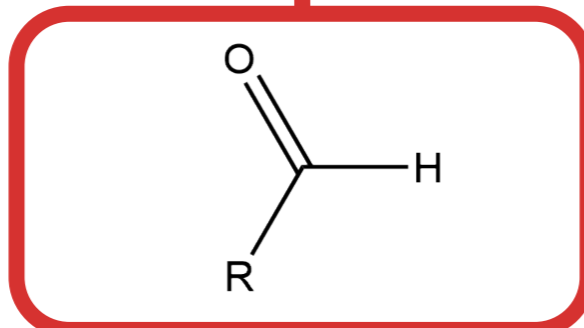


Price Difference
€40-€100 /ton

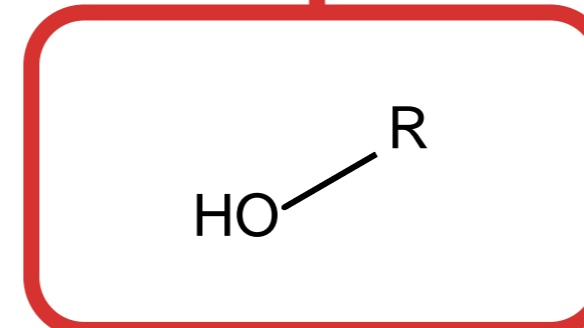
LOW-GRADE TALLOW



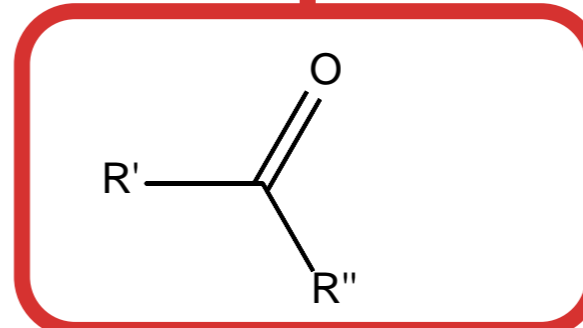
ALDEHYDES



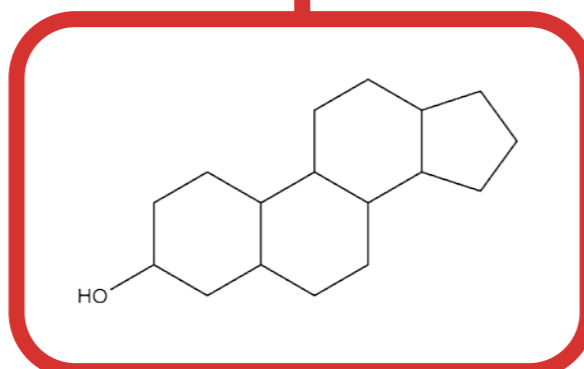
ALCOHOLS



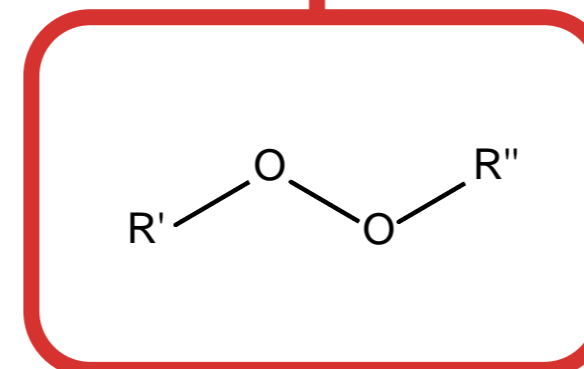
KETONES



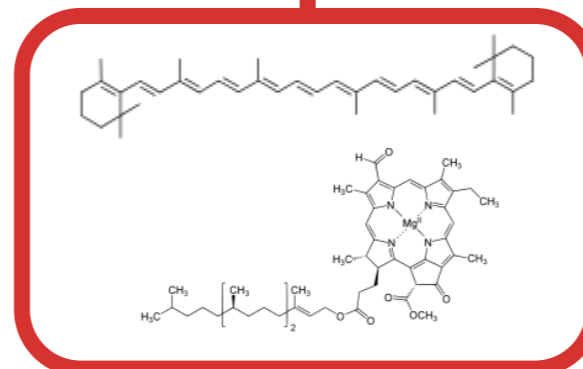
STEROLS



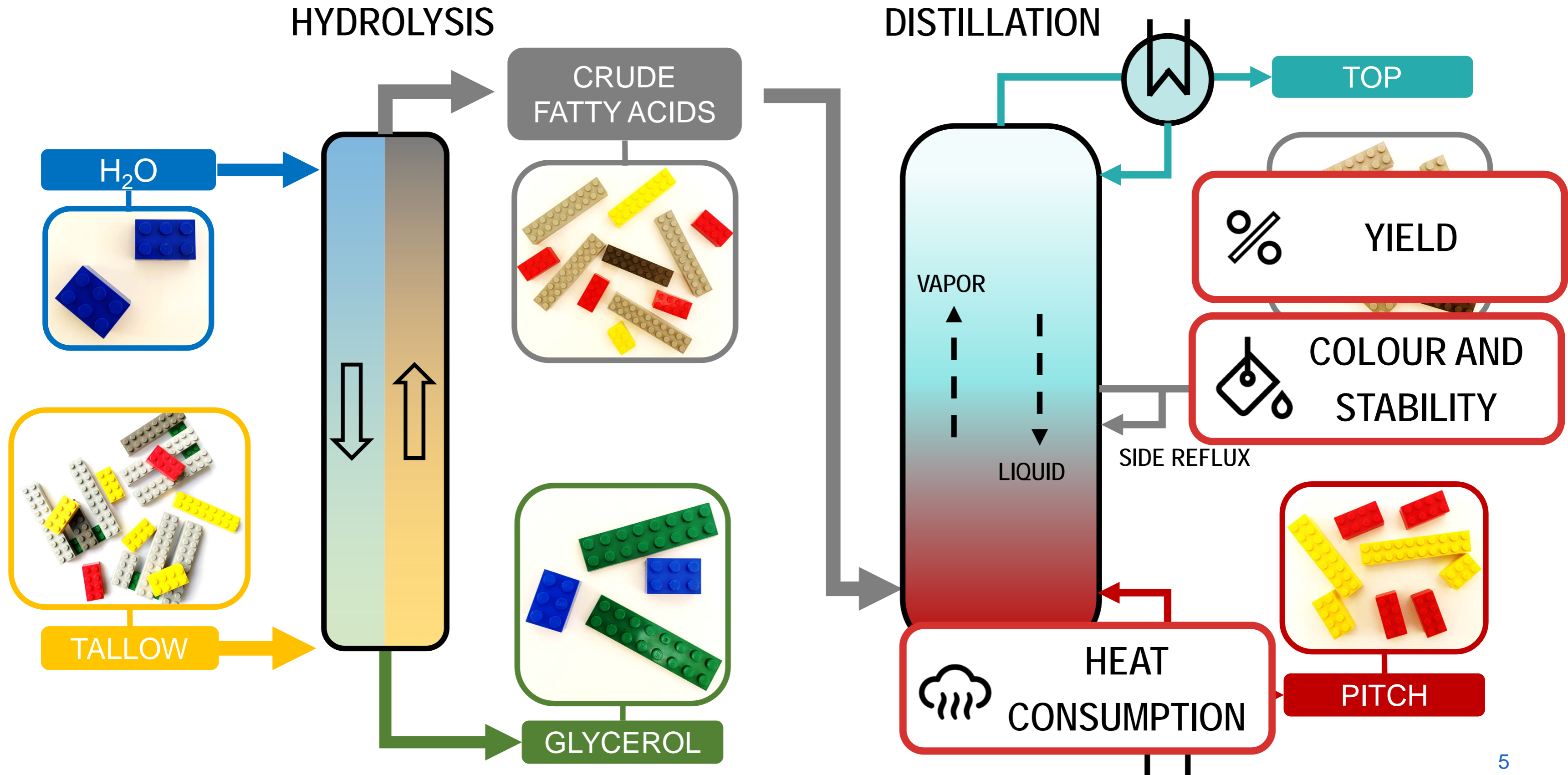
PEROXIDES



& MANY MORE



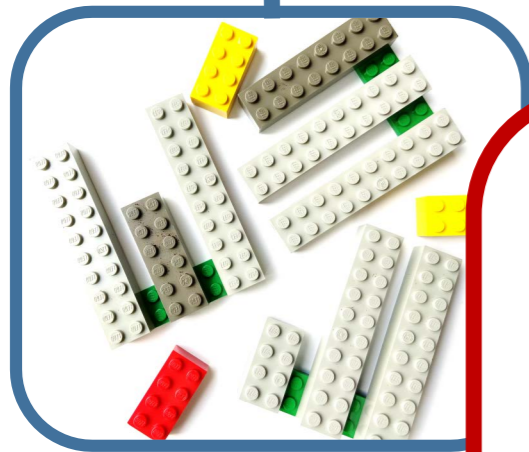
CASE: PRODUCING HIGH QUALITY FATTY ACID MIXTURES FROM TALLOW



CAN WE PRODUCE HIGH QUALITY FATTY ACIDS FROM LOWER-GRADE TALLOW?

■ NORMAL ROUTE
■ NEW ROUTE

HIGH-GRADE TALLOW



LOW-GRADE TALLOW



Price Difference
€40-€100 /ton

HYDROLYSIS

DISTILLATION



Determine economic and environmental performance of producing High Quality-Fatty Acids from

- High-Grade Tallow
- Low-Grade Tallow
- Mixed Tallow (0 → 100 %)



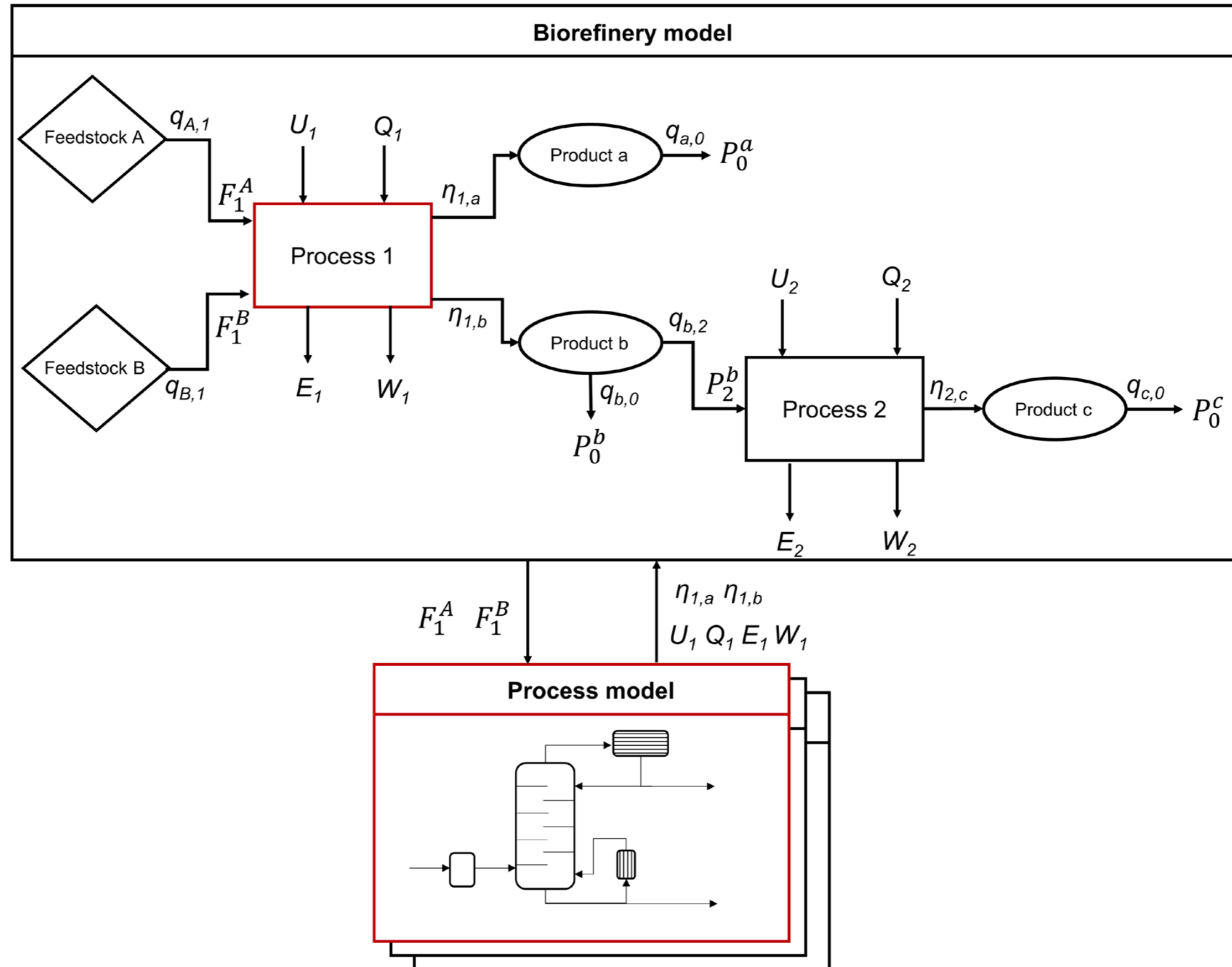
TOP

HIGH QUALITY FATTY ACIDS

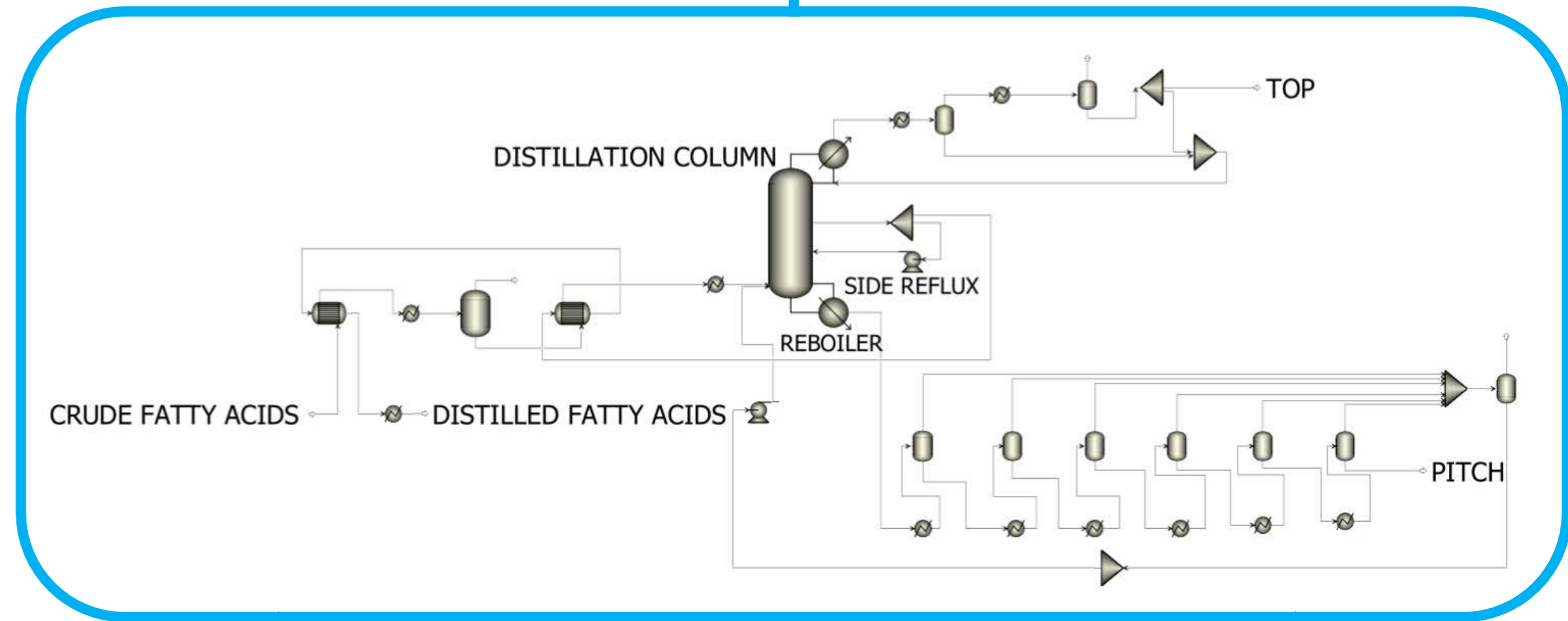
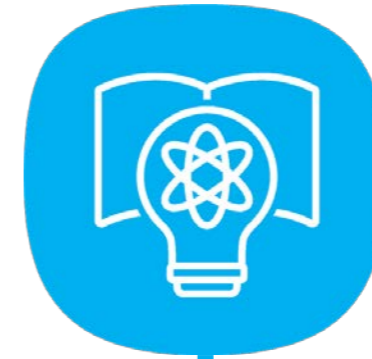


PITCH

INVESTIGATION VIA MODEL-BASED APPROACH



MECHANISTIC MODELLING OF FATTY ACID DISTILLATION IN A PROCESS SIMULATOR

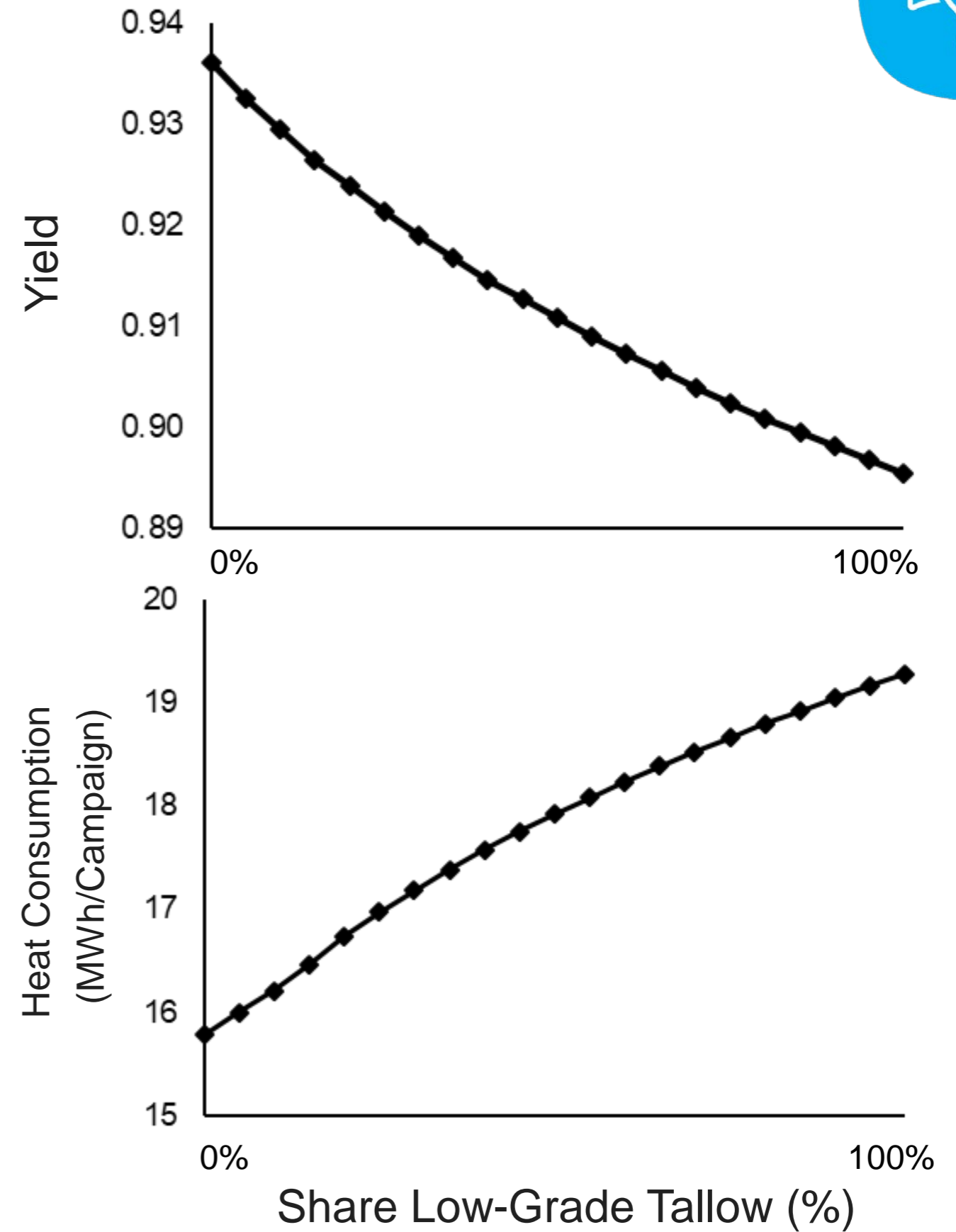
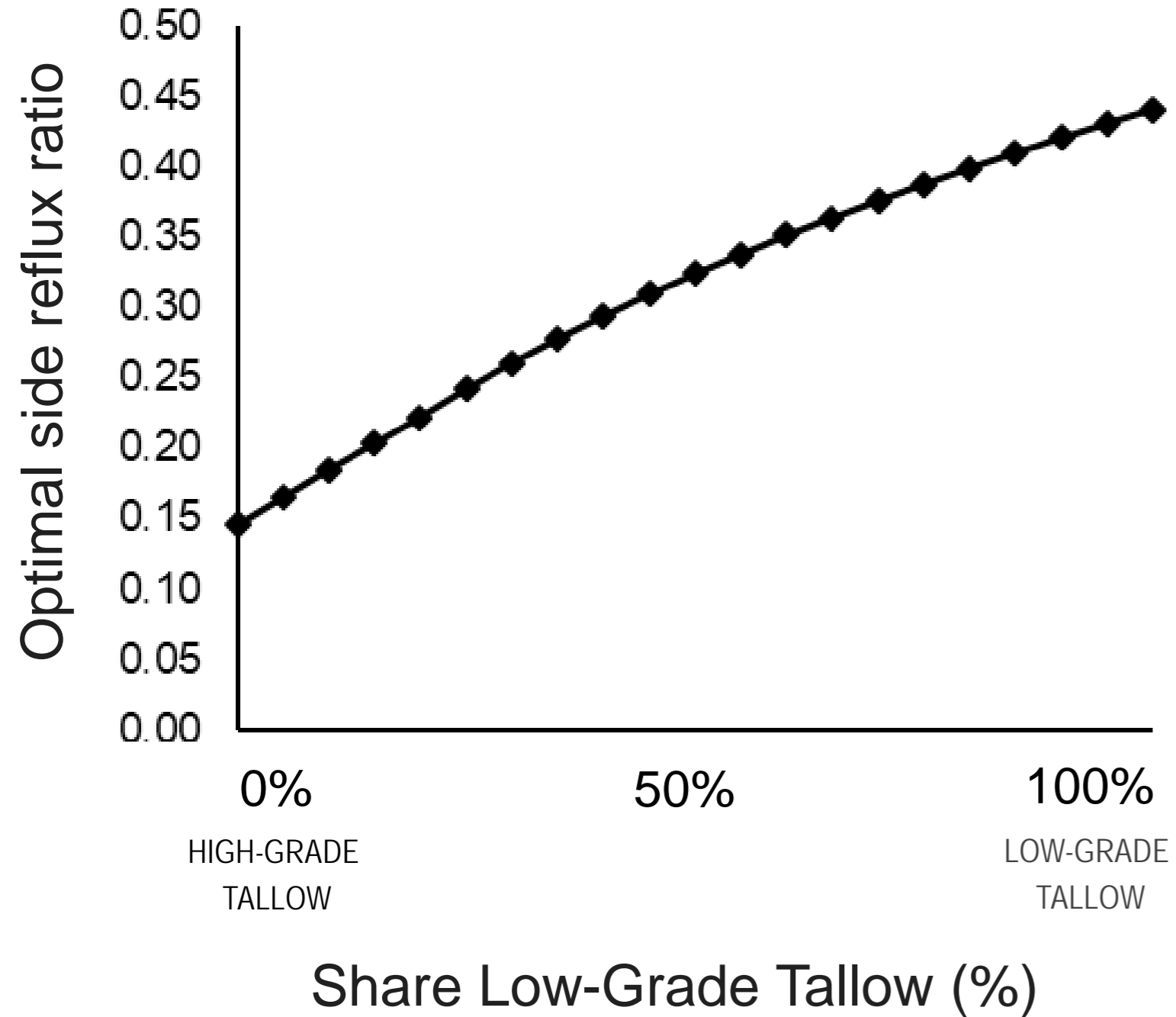
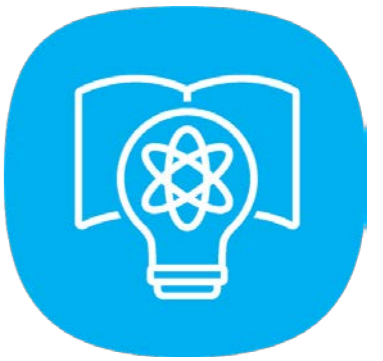


MODELS OF UNIT OPERATIONS

PHYSICAL PROPERTIES

PROPERTY METHODS

PROCESS MODEL IS USED TO DETERMINE OPTIMAL REFLUX RATIO



ECONOMIC AND ENVIRONMENTAL EVALUATION

ECONOMIC EVALUATION



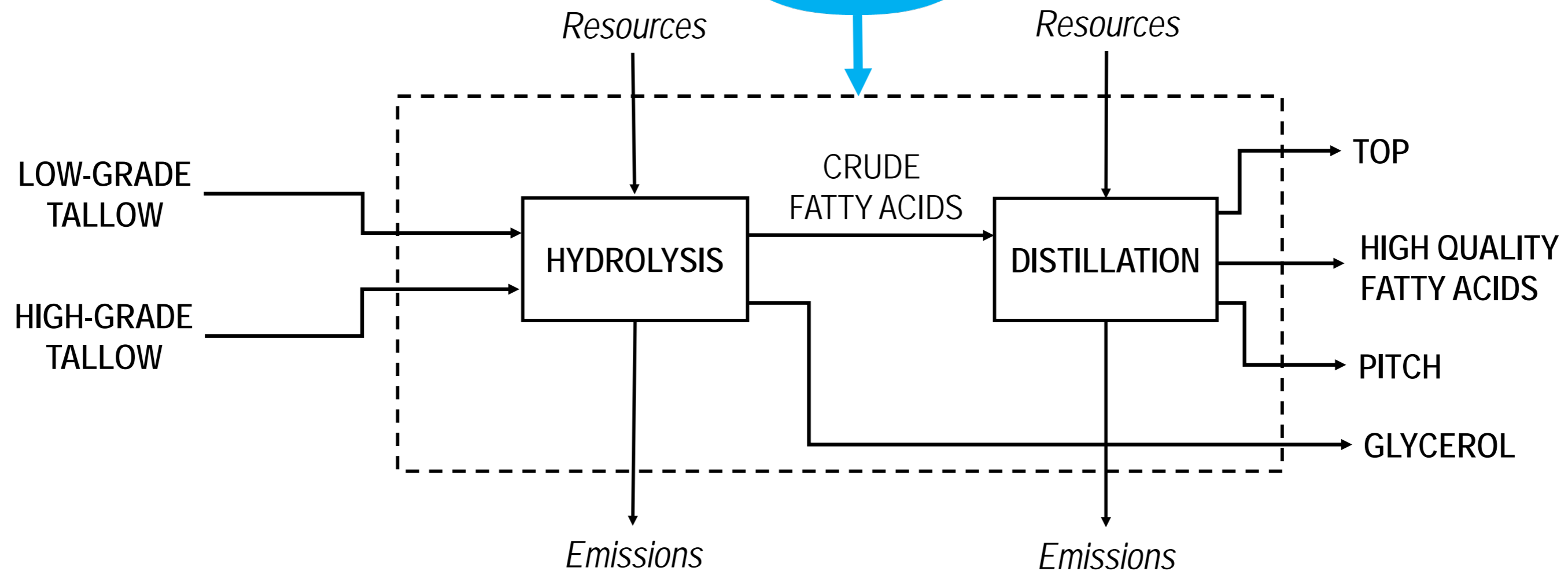
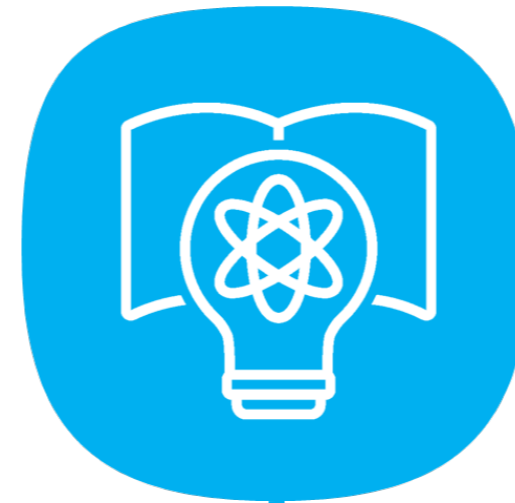
Gross Hourly Profit

$$= \frac{\text{Revenue} - \text{Costs}}{\text{Production Time}}$$

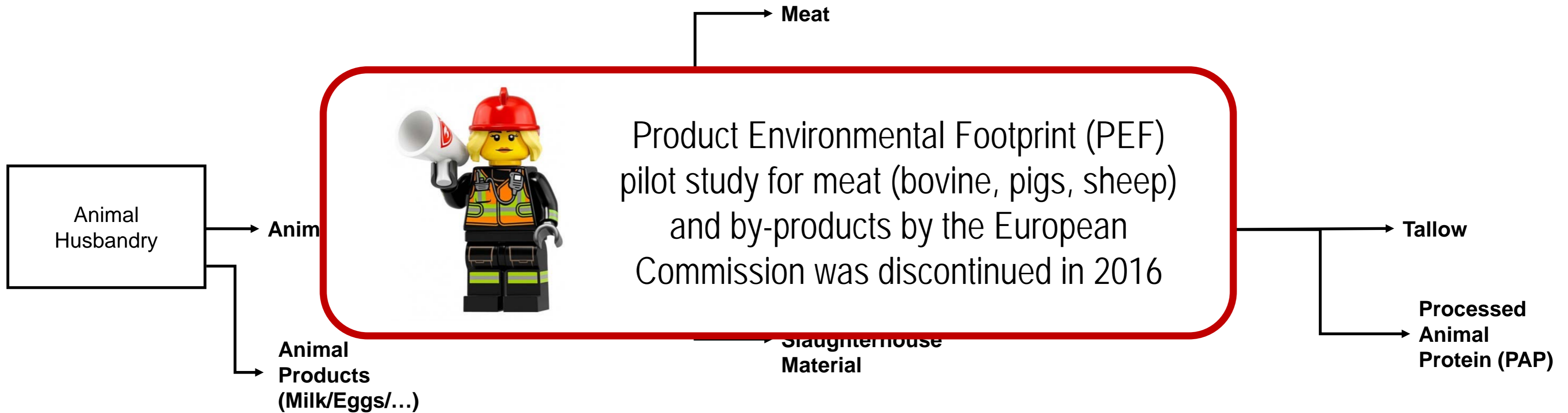
ENVIRONMENTAL EVALUATION



Global Warming Potential



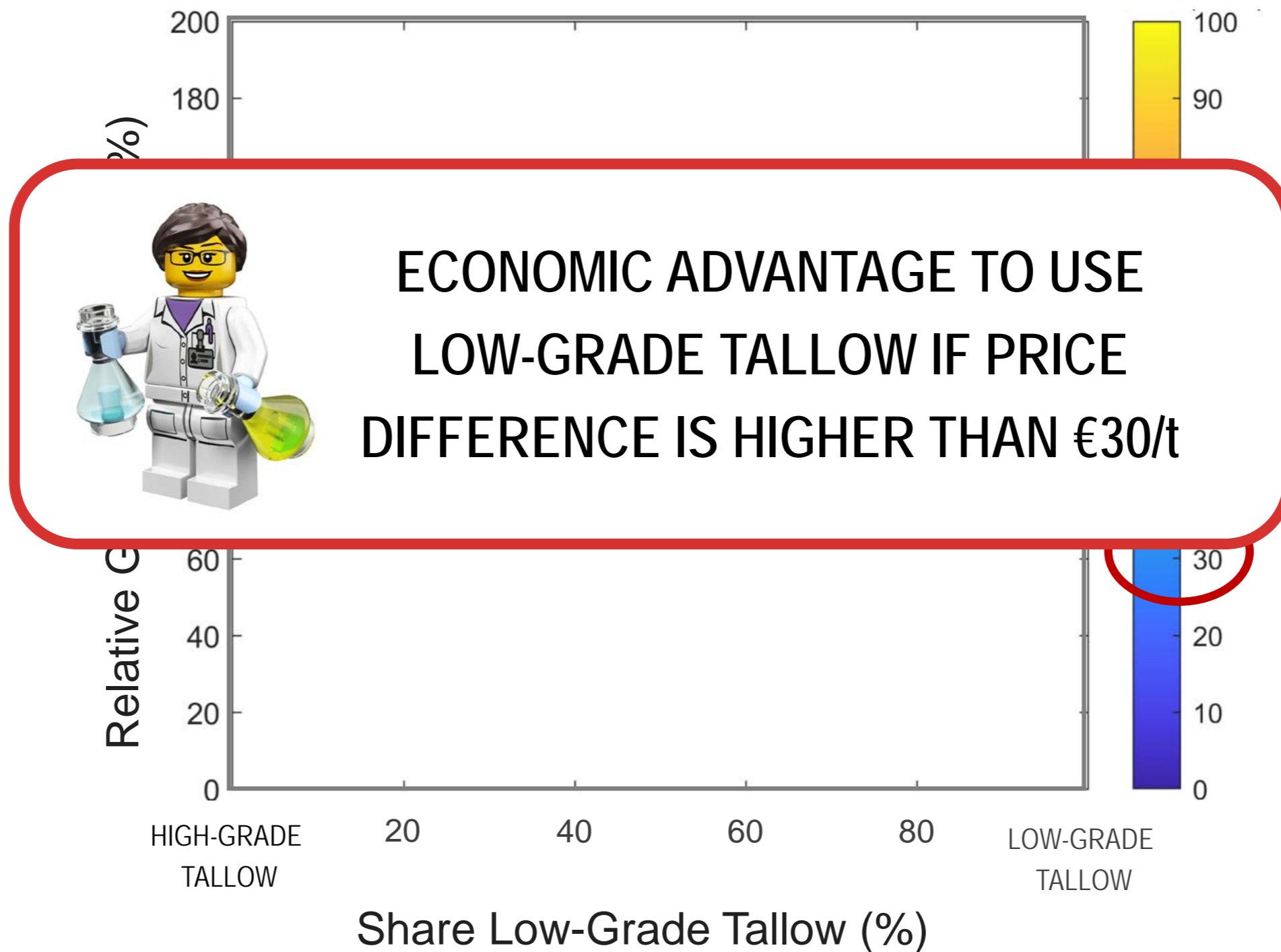
LIFE CYCLE ASSESSMENT OF TALLOW PRODUCTION



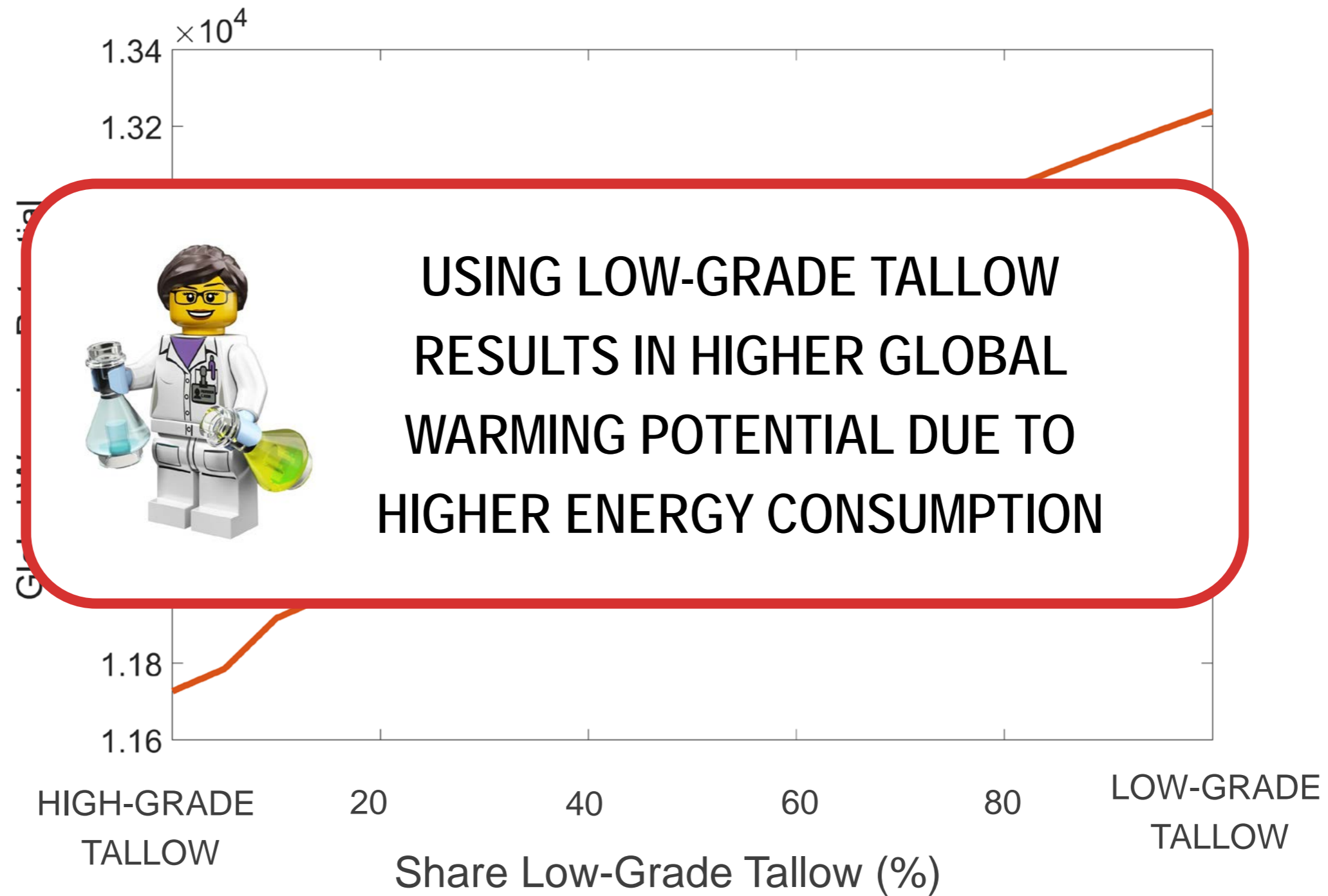
ECONOMIC EVALUATION OF PRODUCING HIGH QUALITY FATTY ACIDS FROM DIFFERENT QUALITY GRADES TALLOW



Price Difference (€/ton) =
Price HG Tallow – Price LG Tallow



ENVIRONMENTAL EVALUATION OF PRODUCING HIGH QUALITY FATTY ACIDS FROM DIFFERENT QUALITY GRADES TALLOW



CONCLUSIONS



Economic advantage to use low-grade tallow if price difference is higher than €30/t



Integration of mechanistic modelling and sustainability assessment helps increase feedstock flexibility

OUTLOOK



Include other oleochemical processes
and feedstocks



Integrated life cycle sustainability assessment,
including impact of the feedstock

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Thanks!

