

A photograph of an industrial biorefinery at night. The facility is illuminated by warm orange lights, contrasting with the deep blue twilight sky. A prominent white sign with the Energkem logo and name is visible on a structure in the upper left. The image shows a complex network of pipes, metal frameworks, and storage tanks. In the bottom right corner, there is a dark green square containing a white right-pointing chevron.

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# Energkem biorefineries: setting a new global standard in biofuels, chemicals and waste management



# Enerkem at a glance

- Biofuels and renewable chemicals from non-recyclable household garbage
- Proprietary clean technology developed in-house
- Private company founded in 2000; 200 employees
- First full-scale commercial biorefinery beginning operations in Edmonton
  - Pilot and demonstration facilities in Québec
- Developing similar facilities in North America and abroad
  - MOUs in China and EU



# Bringing the model to reality

## Rigorous path to commercialization

UNIVERSITY OF  
SHERBROOKE  
PILOT



SHERBROOKE



WESTBURY FACILITY



MODULAR COMMERCIAL BIOREFINERIES



Laboratory

Pilot

Syngas  
Demo

Methanol  
Demo

Ethanol  
Demo

Full-scale commercial  
production







World's first commercial  
MSW-to-biofuels and  
chemicals facility

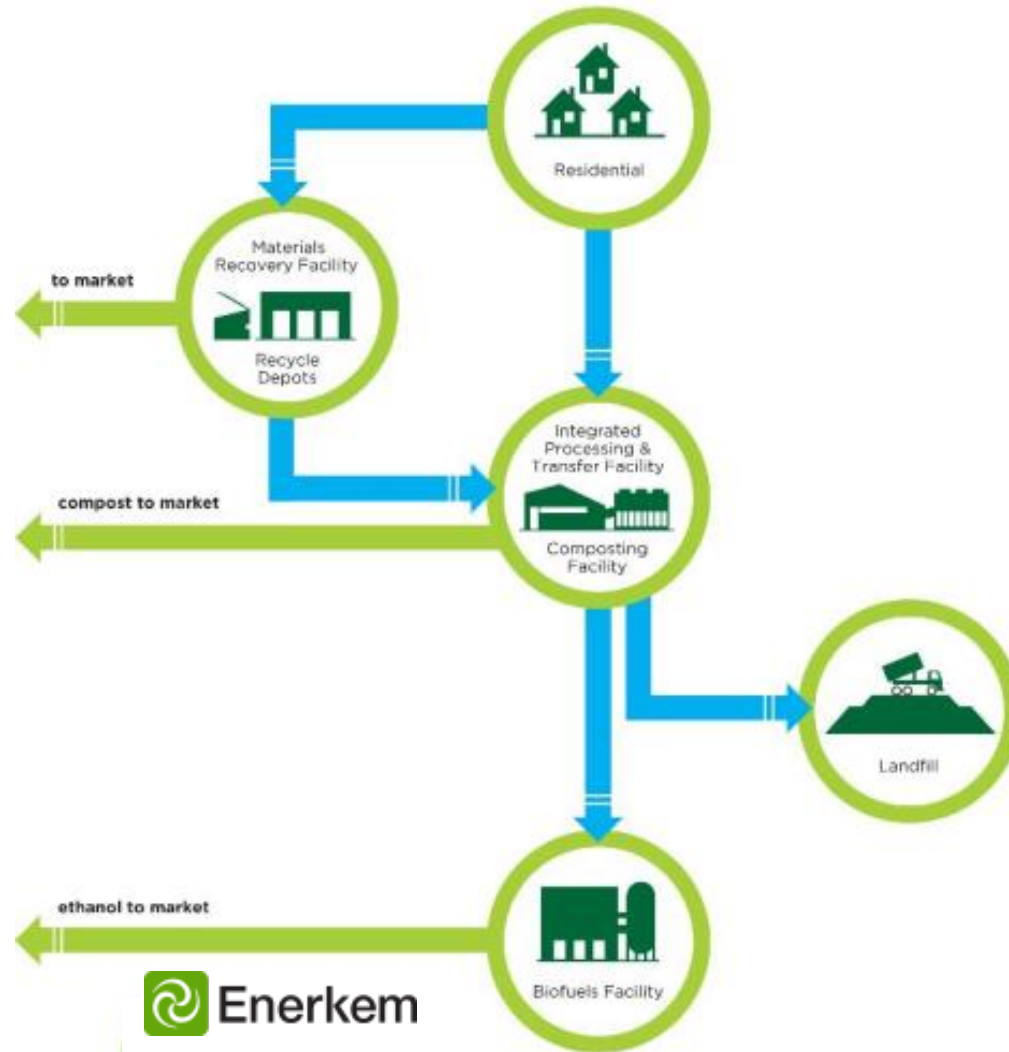
## ENERKEM ALBERTA BIOFUELS

Capacity: 38 million litres per year  
(i.e. 1 X standard Enerkem system)

Feedstock: 25-year agreement with City of Edmonton  
for 100,000 dry tonnes of MSW per year

Products: Biomethanol, cellulosic ethanol

# Part of an integrated waste management system



## Edmonton

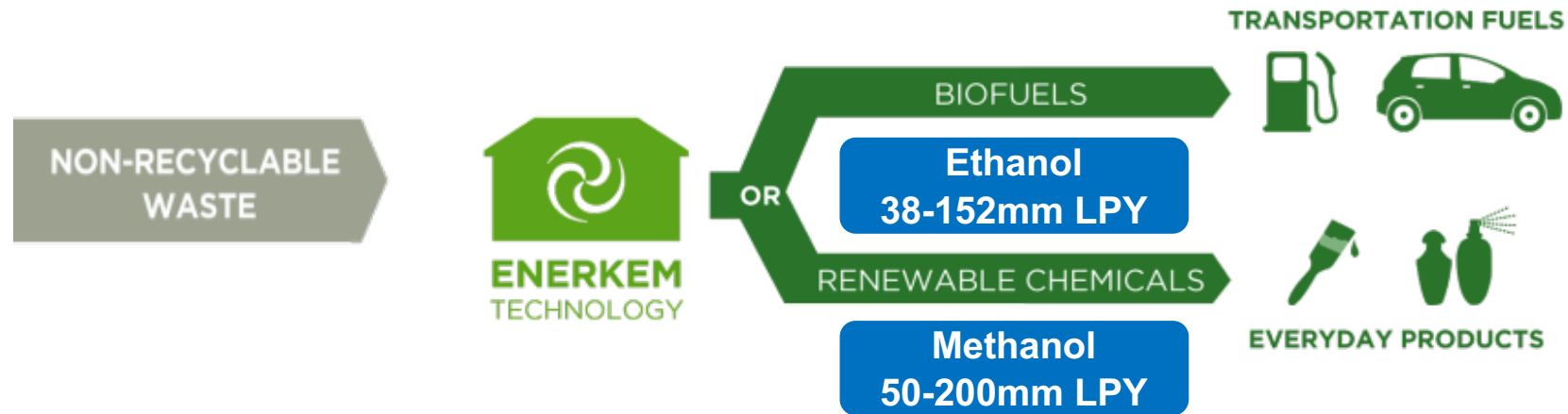
Recycled	⇒	20%
Composted	⇒	40%
Biofuels	⇒	30%
Landfill	⇒	10%



**Waste diversion = 90%**



# Cost-competitive and sustainable solution



## Municipality:

- Supplies between 100,000 to 400,000 tons of MSW per year (as available)
- Long-term contract
- Pays tipping fee – attractive compared to status quo
- Suggests sites

## Enerkem:

- Technology provider and joint venture partner in \$100 - \$225M project
- Converts RDF into biofuels and renewable chemicals up to 4x scale of Edmonton
- Works with the waste and municipal partners to optimize MSW sorting into commodities and for site selection
- Manages business risks incl. sale of final product
- Creates high-quality jobs
- Generates \$C65 M/year in net economic benefits in the region (for 1 X standard Enerkem system of 100,000 tons / year)

# Large market potential

## MSW IN THE EU



**329 MILLION**  
METRIC TONS OF MSW  
GENERATED PER YEAR

**102 MILLION**  
METRIC TONS OF MSW  
SUITABLE FOR ENERKEM'S  
TECHNOLOGY PLATFORM

THE POTENTIAL:  
**42.9 BILLION**  
LITRES<sup>3</sup> USING  
ENERKEM'S TARGET YIELD<sup>1</sup>

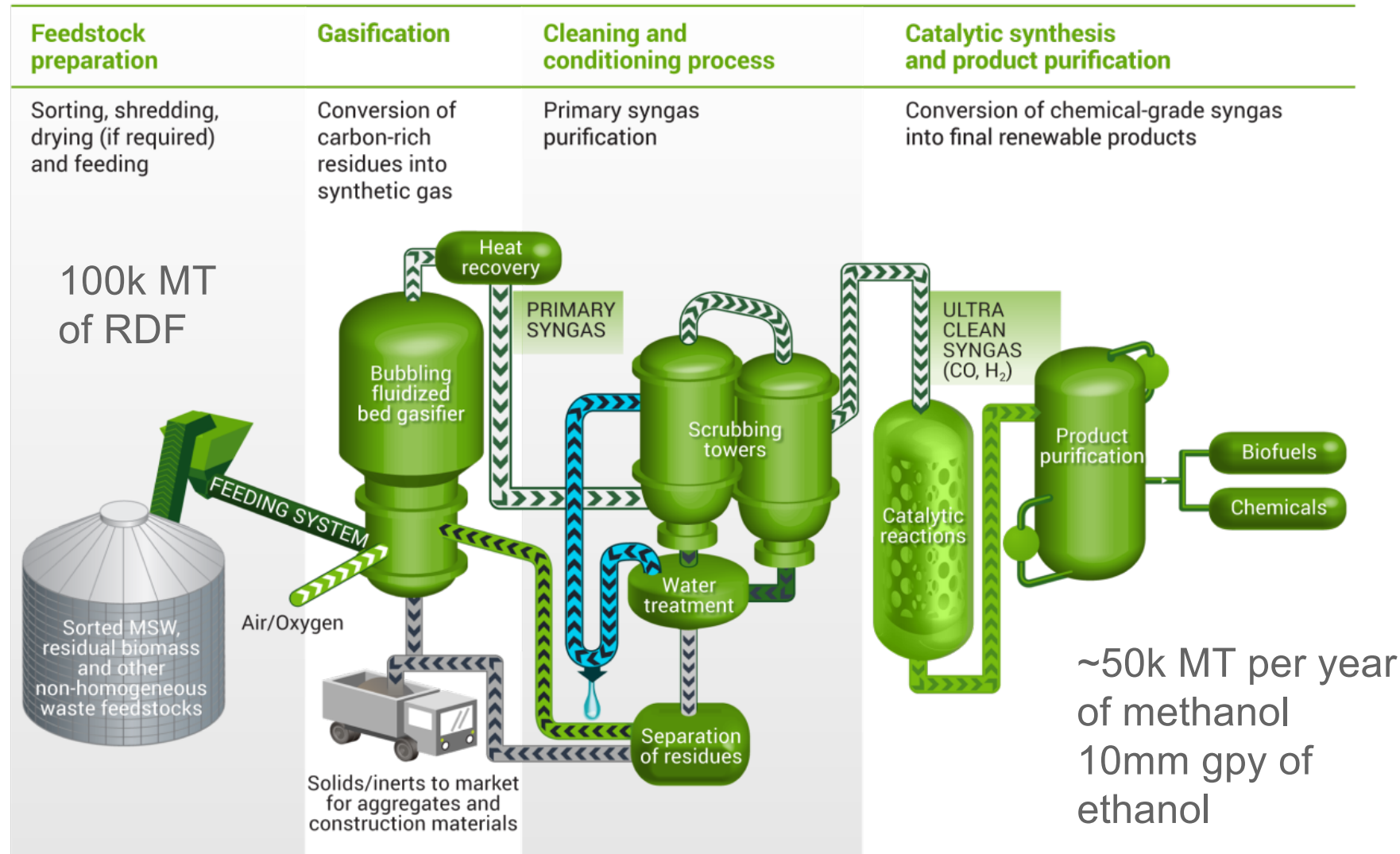
<sup>1</sup> 420 litres of cellulosic ethanol per metric ton

<sup>2</sup> Tonnage based on a weighted average

<sup>3</sup> Litres of biofuels

Source: World Bank, 2012

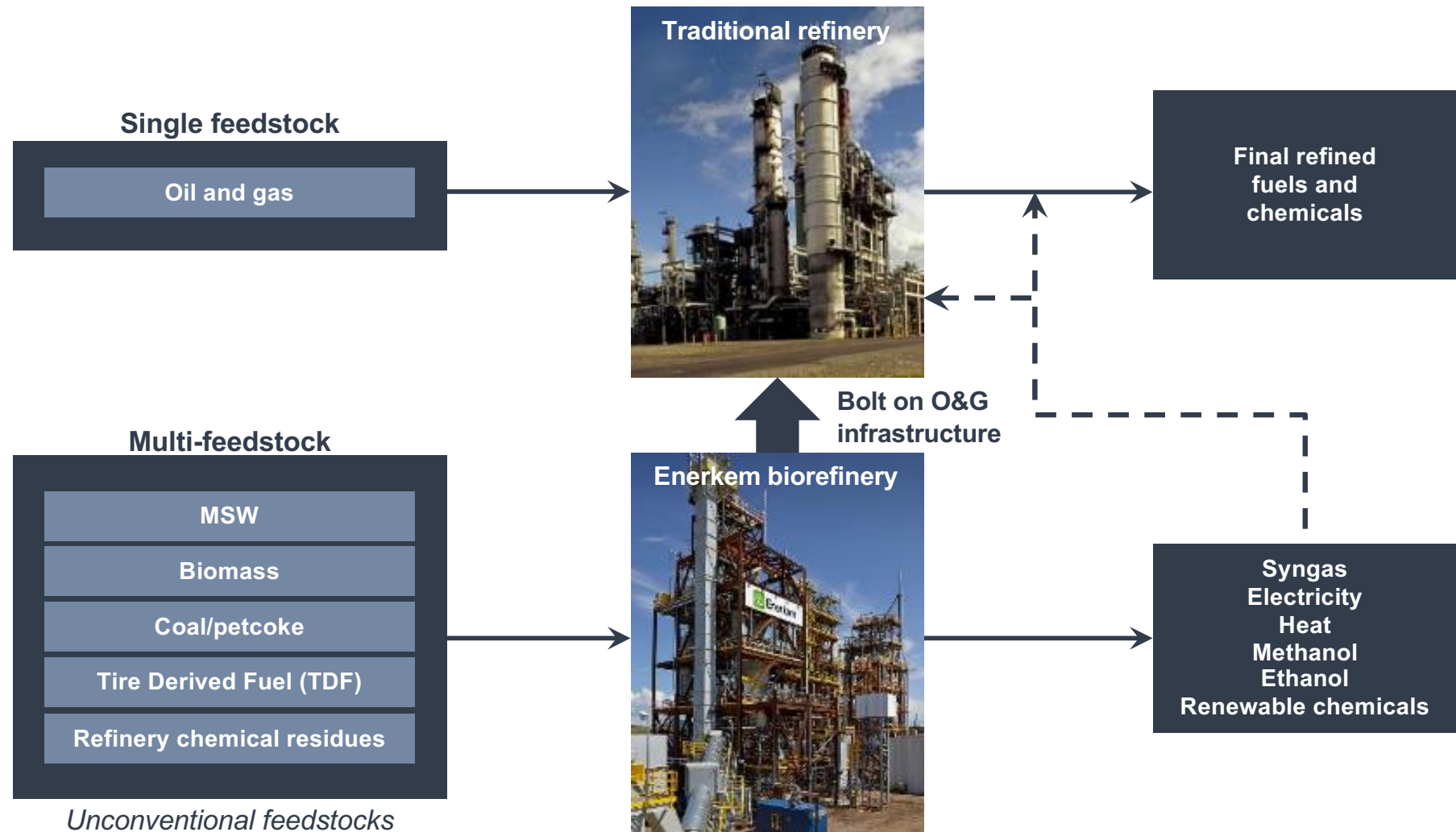
# An efficient “carbon-recycling” process



\* Municipal solid waste



# Bolt-on to existing oil and gas infrastructure







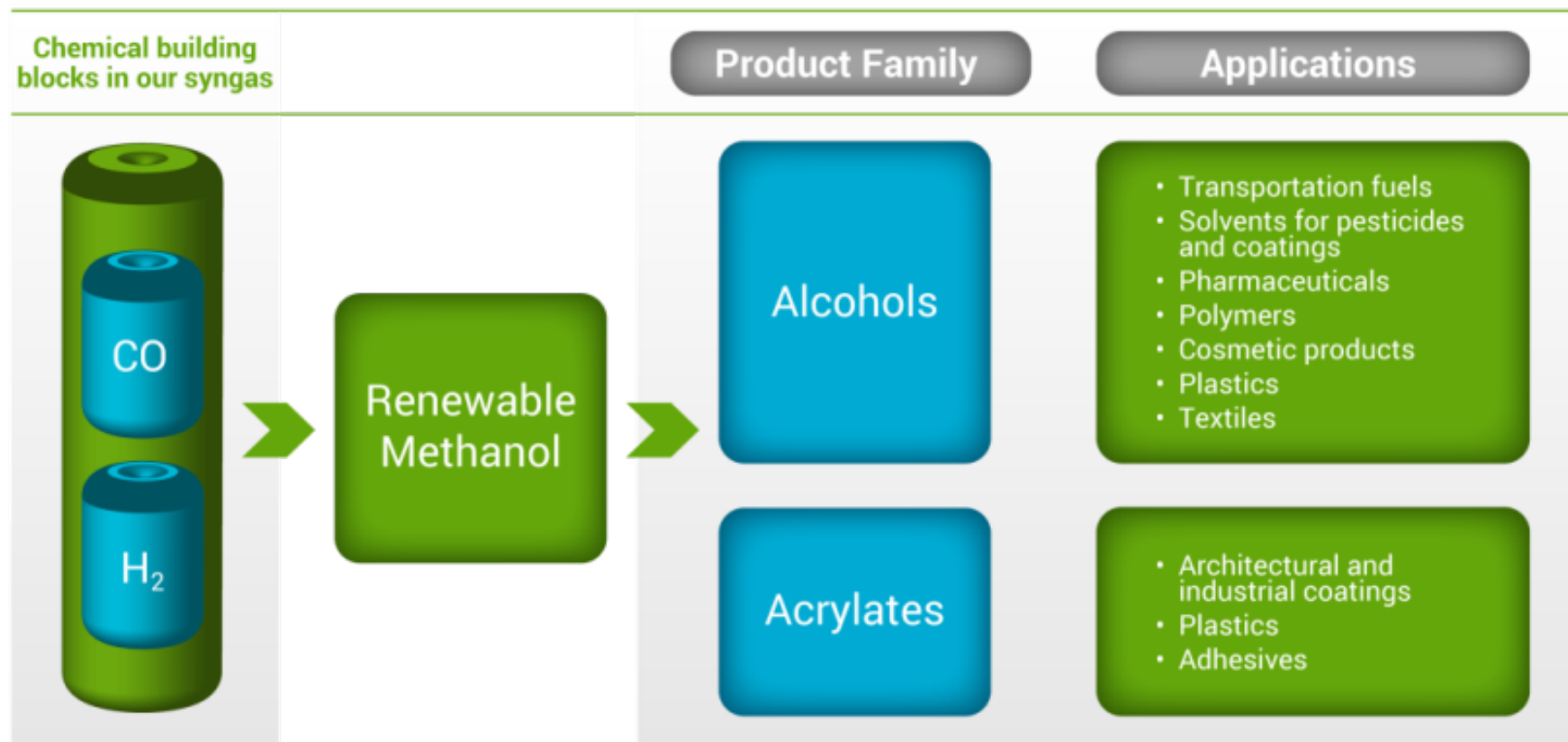
## Modular manufacturing approach enables global expansion

43 pre-fabricated modules in a standard  
Enerkem methanol facility:

- 15 core IP modules
- 28 structural modules



# Renewable chemicals for everyday products



# Waste as a feedstock for the chemical industry

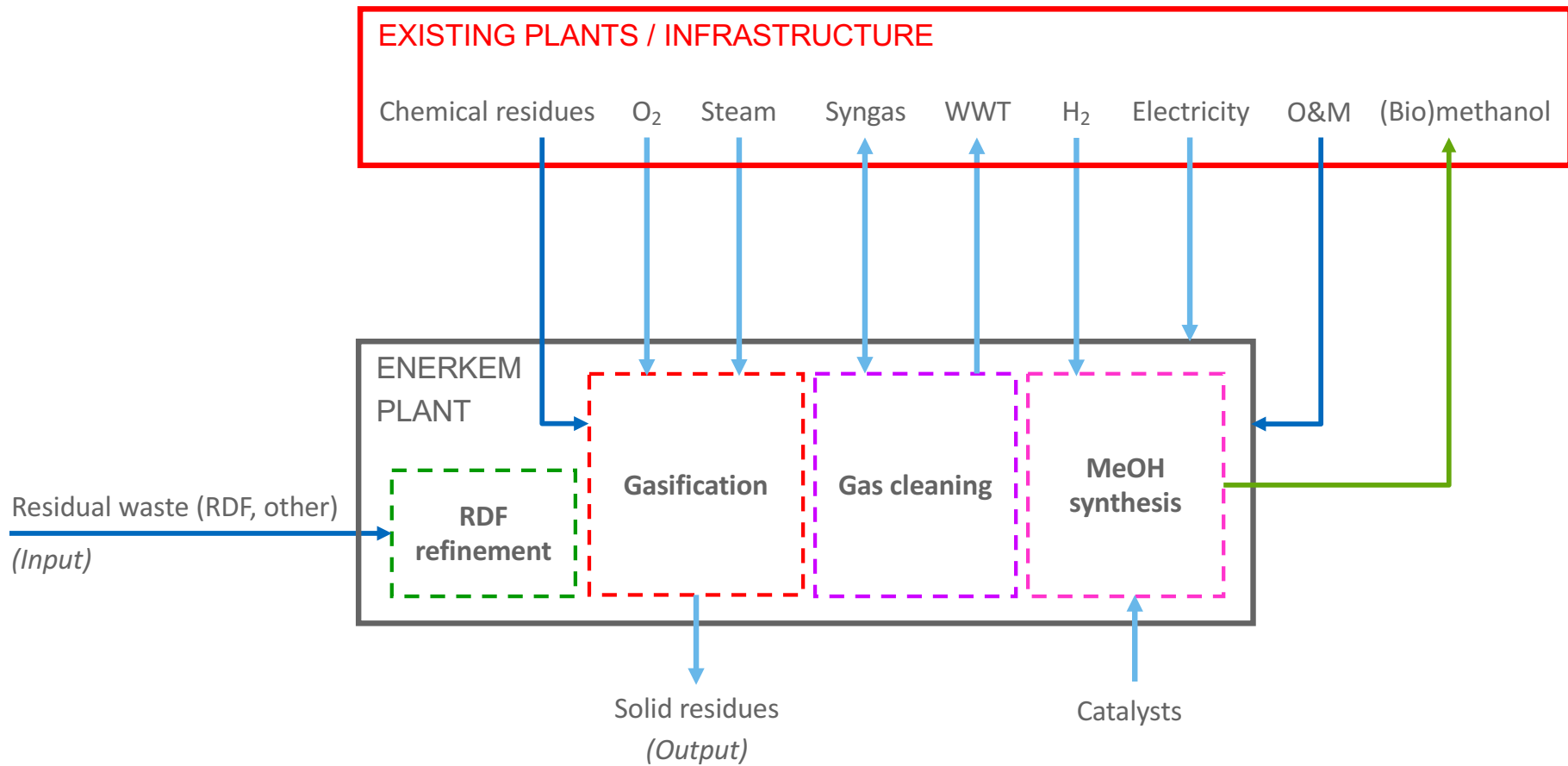
## Public-private partnership in the Netherlands






# Integrated design

## Maximise synergies, minimise costs





**Next facility: VANERCO**

**First advanced biofuels facility in Canada to be co-located with a conventional biofuels production facility**

Capacity: c.50,000 tonnes per annum  
(1 standard Enerkem system → possibility to add more systems)

Feedstock: Non-recyclable/non-compostable urban waste  
(industrial, commercial, institutional, construction, etc.)





Thank you

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