



SYNOVA  
RENEWABLE TECHNOLOGY

BUILDING A PURE WORLD

**IAE Bioenergy  
Workshop on “Waste Gasification”  
November 2019**

# Our Ambition: To solve the unsolvable

\*\* *Disposition of Urban Waste, per World Bank 2018*

**5.5M\*\* Tons/Day**

*With current solutions, majority of waste is “wasted” at great expense*

**Typical in developed nations**

**Typical in developing nations**



**Landfills**

**Recycling,  
Compost**

**Incinerators**

**Open Dumps**

**Ocean**

**Uncollected**

## Synova Potential

- ✓ Generate \$70 - \$350 of value per ton of household waste
- ✓ Save \$50 - \$150 of cost/ton of disposing household waste
- ✓ Avert 0.5 – 4.0 tons of CO2e per ton of waste



# Our innovation: Cost-effective chemical recycling of waste & plastics

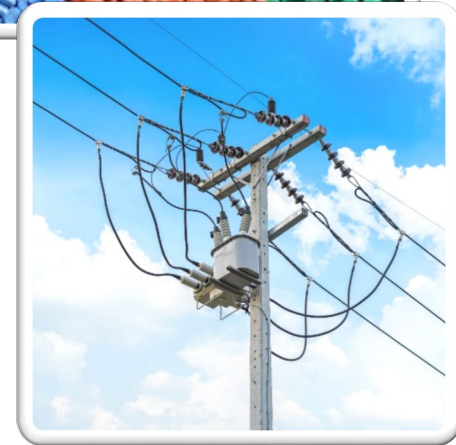
***Renewable, Sustainable, Circular***



Waste  
Plastic  
Biomass



RNG  
Chemicals  
Liquids  
Power



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RENEWABLE TECHNOLOGY

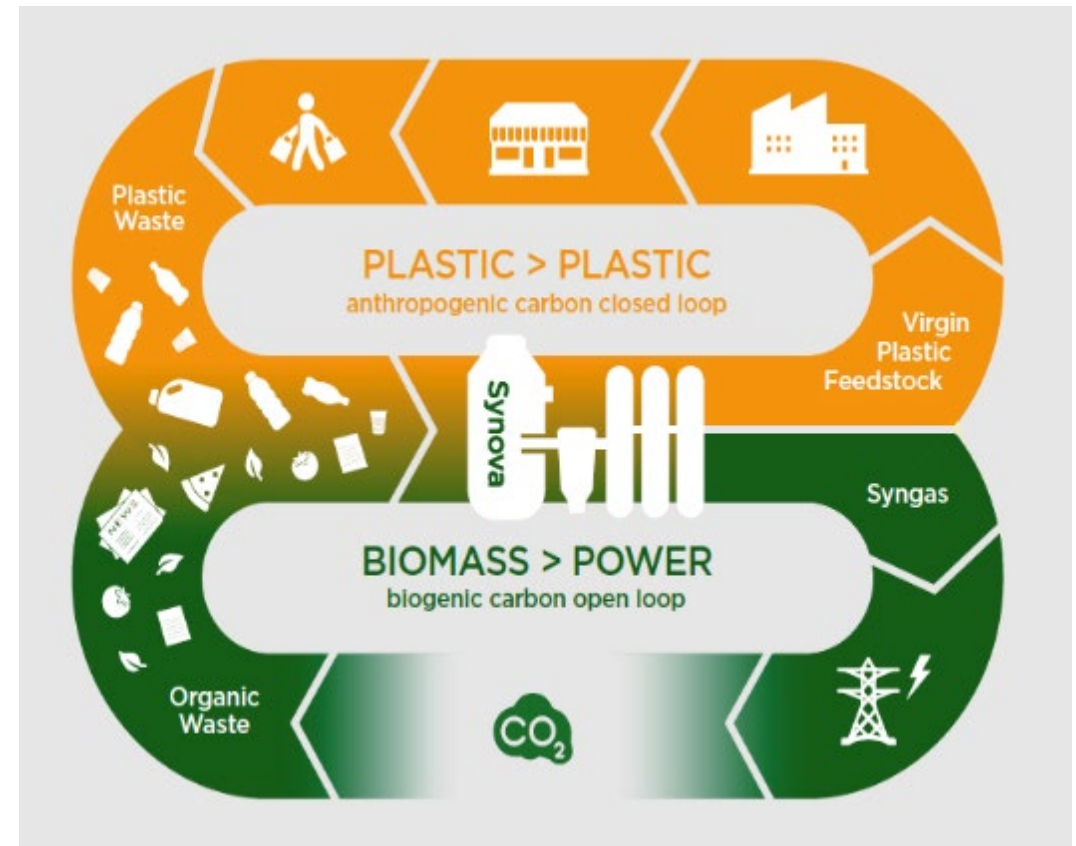
# Plastic Waste

## *Cost-effective to harvest vs synthesize*

- **MSW** has 40%-50% carbon from plastic today
- Chemical recycling uniquely preserves molecules vs previous alternatives
  - Chemicals like BTX can be isolated
  - Virgin plastic feedstocks can be harvested
- Capital efficient path to a “circular economy”

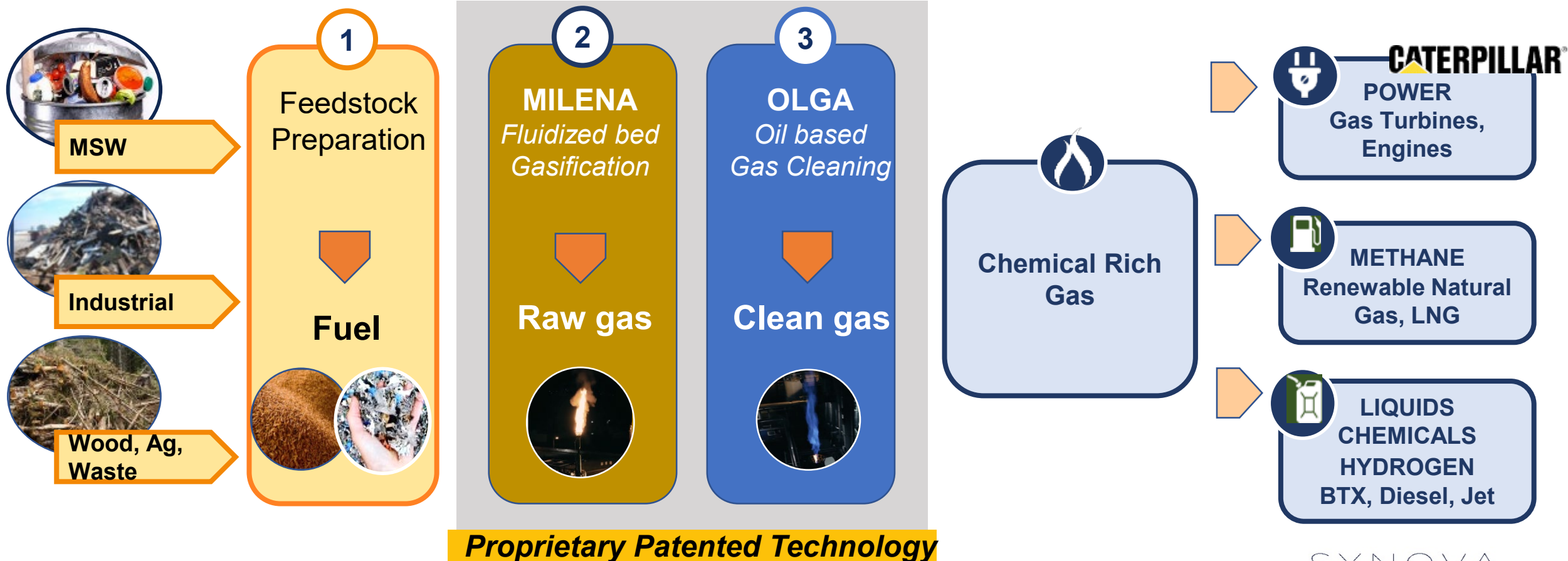
*“If global waste were converted to chemicals, it would be equivalent to 30% - 40% of all petrochemical / plastics production”*

## Plastics Closed Loop

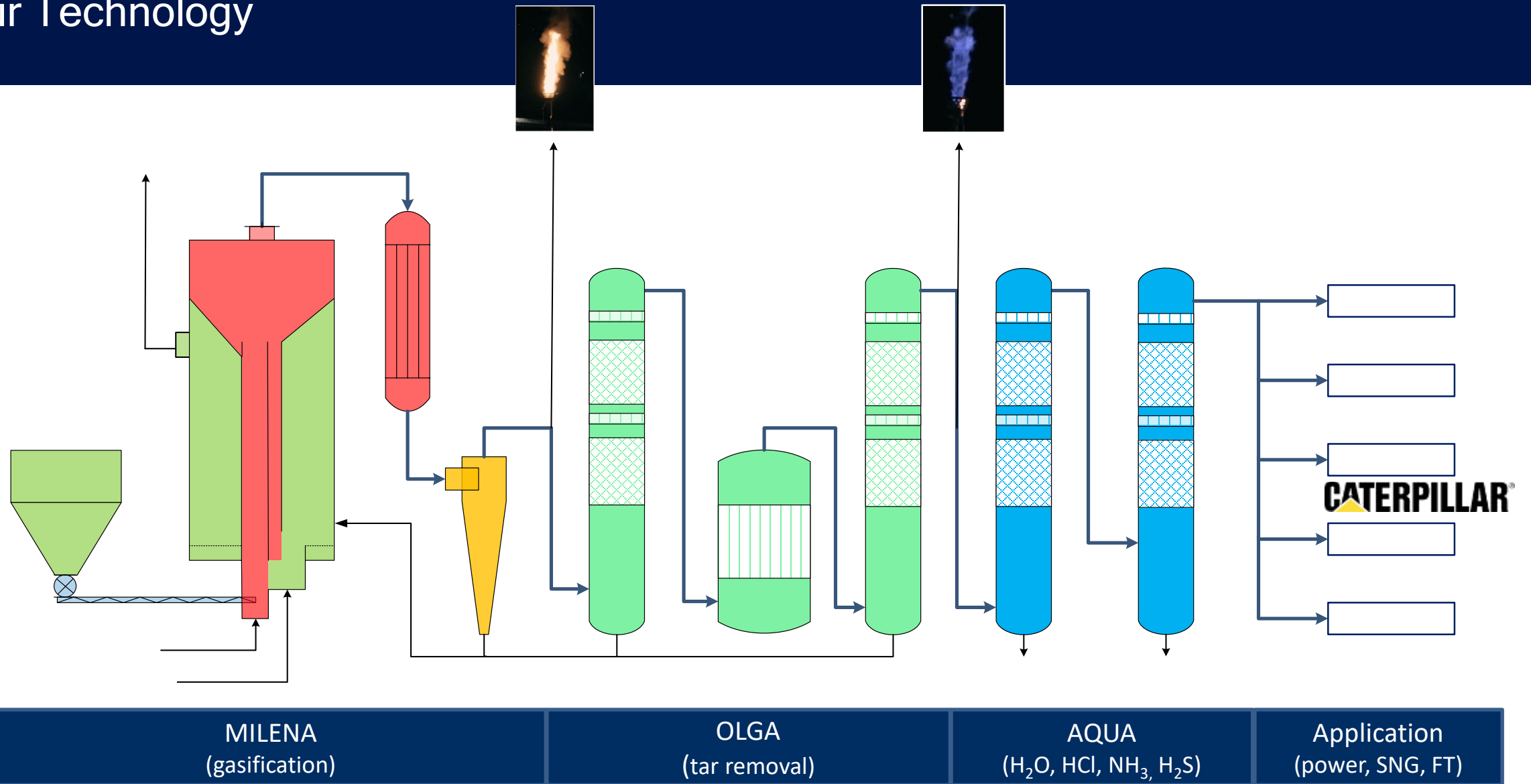


# Our innovation: Cost-effective chemical recycling of waste & plastics

*Unique “rich” gas, high efficiency, proven technologies*



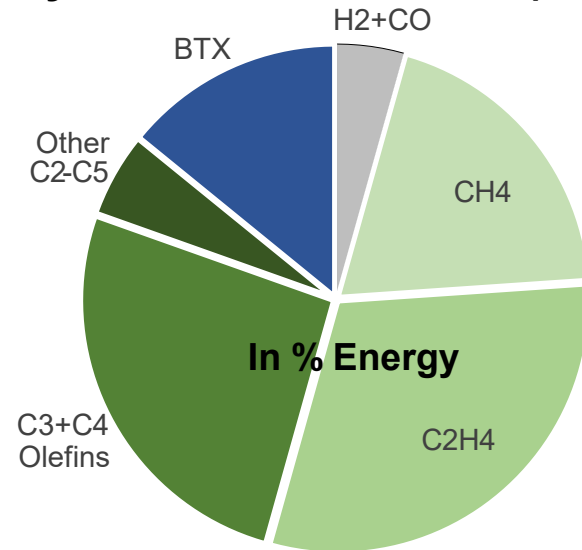
# Our Technology



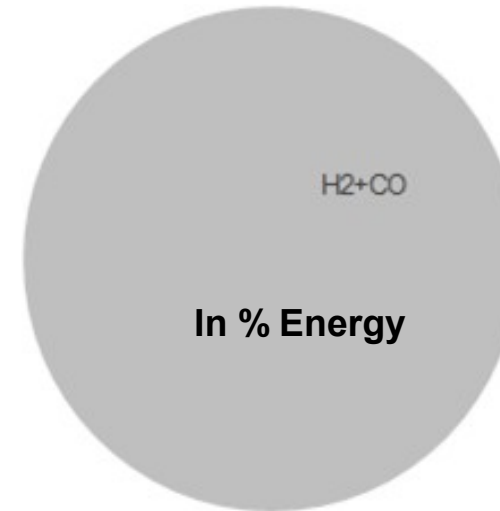


# Synova Syngas Suitable for many downstream processes

## Synova's Product Gas (from RDF)



## SYNGAS from Standard Gasification



### Synova Gas

- Output of low-temperature process
- Rich in olefins and aromatics
- Chemicals instantly generated
- Low energy penalties to harvest

### Syngas from Alternatives

- Output of high-temperature cracking
- Essentially only H<sub>2</sub> and CO
- Chemicals possible only via catalytic process
- High energy penalties for synthesis

# RNG at high efficiency and output

- Process proven at
- ~70% energy efficiency



Feedstock	Gasifier Inlet	SNG @grid injection
woody biomass	1090 kg/hr	255 kg/hr
	NA	12,75 Am <sup>3</sup> /hr (314 Nm <sup>3</sup> /hr)
	4,0 MW <sub>th</sub>	2,8 MW
waste	1331 kg/hr	327 kg/hr
	4,9 MW <sub>th</sub>	3,6 MW
	NA	16,26 Am <sup>3</sup> /hr (400 Nm <sup>3</sup> /hr)





Testing

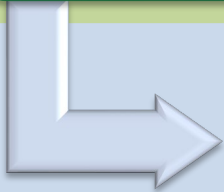
- 80kW lab facilities tested on biomass & waste
- 1,2MW Pilot Plant tested on Biomass & Waste
- 4 MW Demonstration Plant on Biomass



RNG

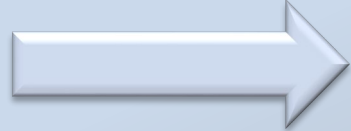
BTX

Liquid Fuels



SMM Development

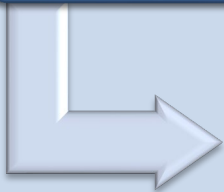
- Standard Modular MILENA
- 6 MWth waste to electricity
- 1<sup>st</sup> commercial plant



RNG

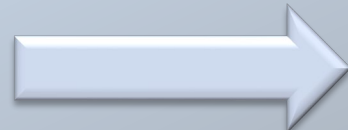
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Liquid Fuels



M30 Development

- 30 MWth



RNG

BTX



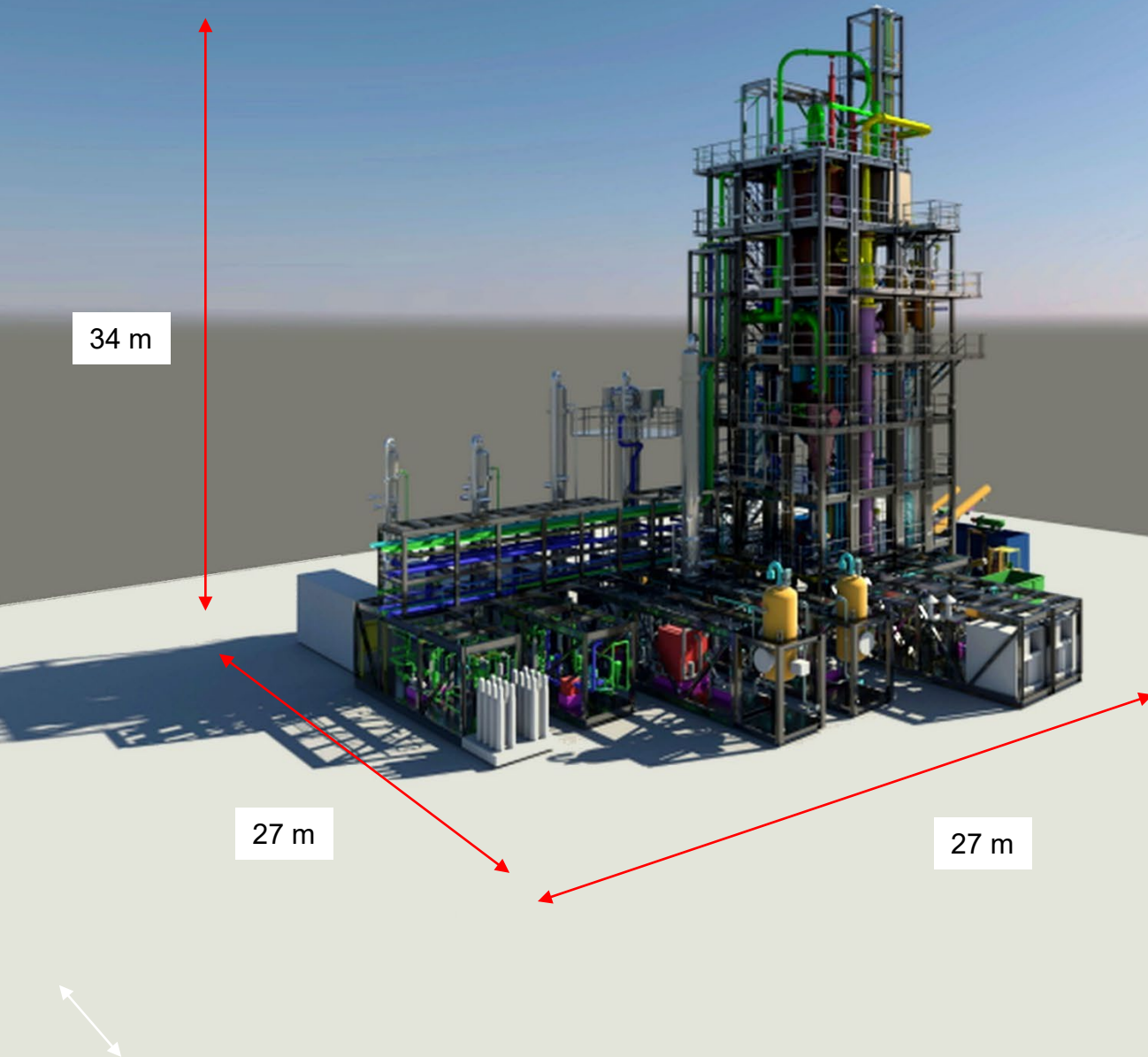
M74 Development

- Larger Scale Plants



RNG

# Our Solution - Standard Modular MILENA



- 1.2 MW<sub>e</sub> of net power
- 30 tpd of Refuse Derived Fuel (RDF) or biomass
- Made of pre-assembled, factory tested modules, to minimize field work and reduce cycle time
- Ships in 50 x 40' containers or equivalent (including crane and assembly equipment)



- Minimizes delivery cycle
- Maximizes opportunity to drive down costs
- Offers fastest path to many showrooms

Thank you!!

SYNOVA  
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Scheldeweg 10  
3144 ES Maassluis | The Netherlands  
Tel: +31 10 599 1240

[WWW.SYNOVAPOWER.COM](http://WWW.SYNOVAPOWER.COM)