


# MAYEKAWA for BIOGAS

**MAYEKAWA**  
**MYCOM**





# What is Biogas?

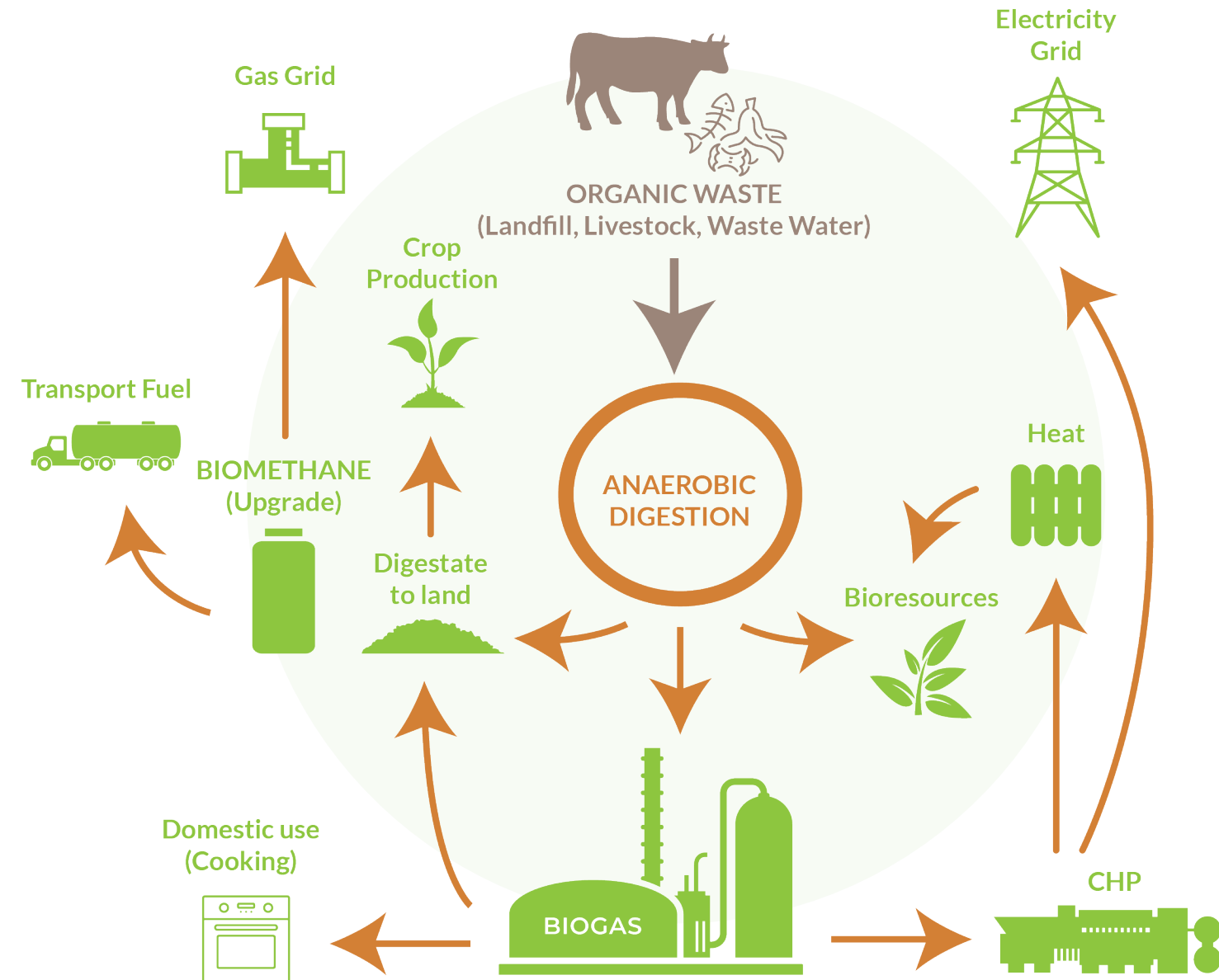


Biogas is naturally produced from the decomposition of organic waste. When organic matter, such as food scraps, animal waste, wastewater and sewage, break down in an anaerobic environment (an environment absent of oxygen), they release a blend of gases, primarily methane and carbon dioxide.

<https://www.homebiogas.com/what-is-biogas-a-beginners-guide/>



# What is Biogas?



**Biogas is a renewable resource.**

Biogas can be cleaned and upgraded to natural gas standards, to biomethane. Removed CO<sub>2</sub> while upgrading can be used as a natural source of energy as well.

# Methane Emissions

Accounting for **about 20 % of global emissions**, methane is the second-most-prevalent greenhouse gas after CO<sub>2</sub>, which makes up more than 70%.

Cutting methane emissions is a **cost-effective and relatively quick way** to limit global temperature rise, could provide one quick win in the fight against climate change.

## Methane Emissions by Industry

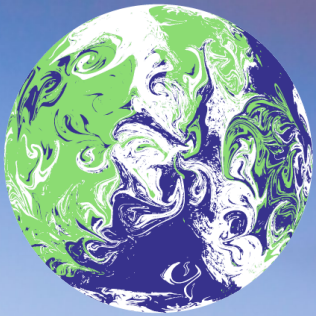
Agriculture – 40%

Fossil fuels – 35%

Waste (BIOGAS) – 20%

# Methane Emissions & Global Pledge

More than one hundred countries signed the EU and U.S. led Global Methane Pledge and agreed to collectively slash methane emissions by 30 percent by 2030 at UN's Glasgow Climate Change Conference (COP26) in 2021.



UN CLIMATE  
CHANGE  
CONFERENCE  
UK 2021

IN PARTNERSHIP WITH ITALY



# Methane Emissions

**Tax incentives** for projects that involve Renewable energy production, Biogas, and Energy investment have been pushed **in UE**.

Agricultural Environmental Stewardship

Renewable Electricity Production Tax Credit

Business Energy Investment Tax Credit

In some markets **Carbon Offset Credits** may be earned by reducing GHG emissions, such as the **CH<sub>4</sub> recovered from biogas system**. Besides serving as an additional revenue source, carbon offset credits can also provide incentives for outside parties to provide project funding for biogas systems.

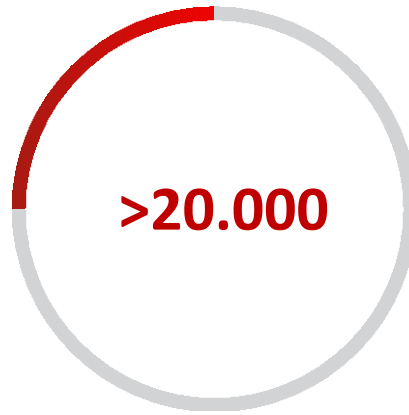
# Biogas Operators in UE

**Tax incentives** for projects that involve Renewable energy production, Biogas, and Energy investment have been pushed **at EU**.

These incentives will encourage the Biogas operators in Europe to invest in the system to reduce CH<sub>4</sub> emissions.



**Landfill** operations



**Digesters at Livestock**  
**operations**



**Wastewater**  
**Treatment Stations**  
employing anaerobic  
digestion

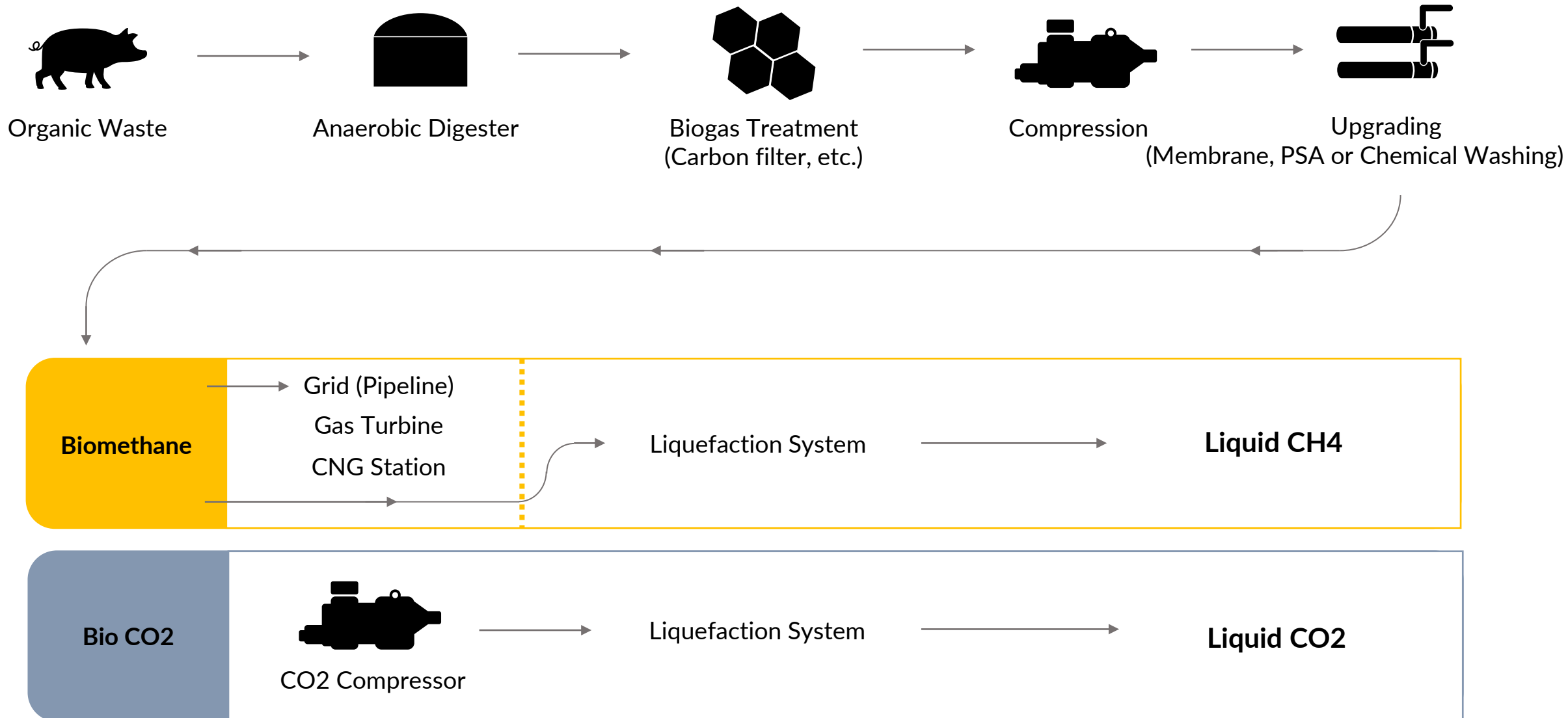


# BIOGAS to Renewable Energy: Biogas **UPGRADING**

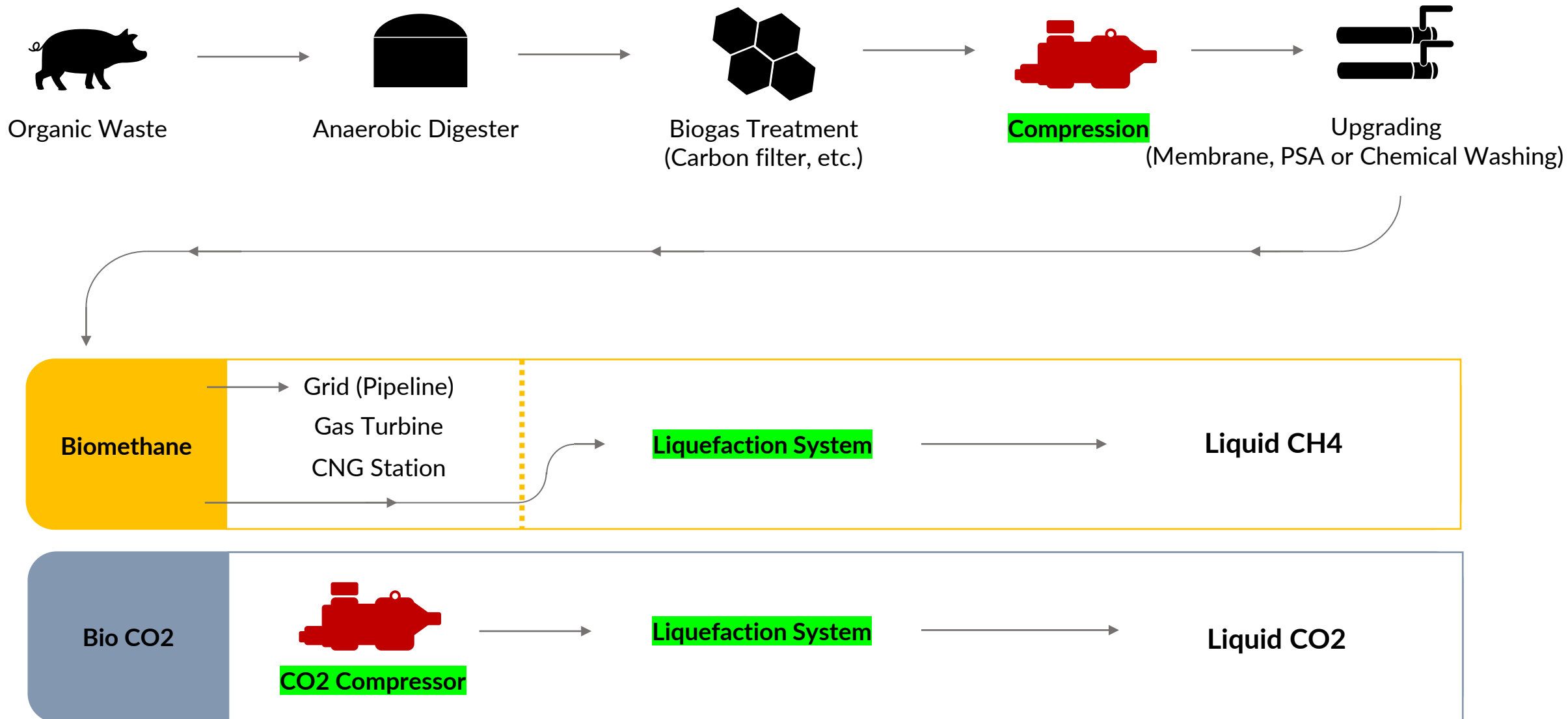




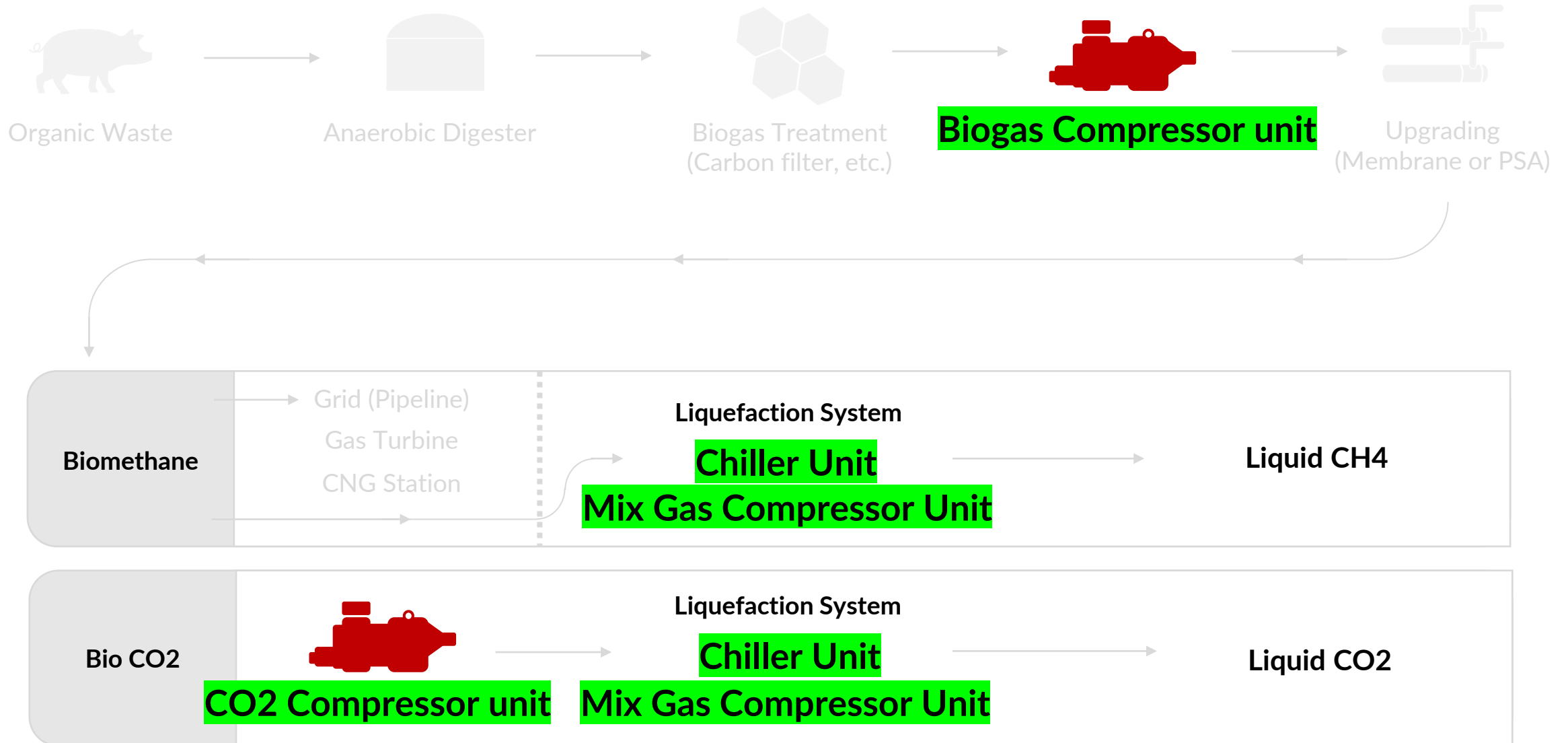
# Biogas Treatment Process



# Biogas Treatment Process & MAYEKAWA PRODUCTS



# Biogas Treatment Process & MAYEKAWA PRODUCTS





# Biogas Treatment Process & **MAYEKAWA PRODUCTS**

## Biogas Compressor

To increase pressure of Biogas before feeding to the membrane, PSA or Chemical Washing system to extract CH<sub>4</sub> and CO<sub>2</sub> from Biogas.

## CO<sub>2</sub> Compressor Unit

## Mix Gas Compressor Unit

## Chiller Unit

For liquefaction process of CH<sub>4</sub> and CO<sub>2</sub>.



# Biogas Treatment Process & **MAYEKAWA PRODUCTS**

Biogas Compressor unit



Chiller Unit



CO2 Compressor Unit



Mix Gas Comp. Unit





# Mayekawa ADVANTAGE in Biogas





# Biogas Compressor Unit



**G3225SSC-LBL**  
**MYCOM 2 Stage Compound Compressor**

**Application**  
Landfill gas feed gas compressor

# Biogas Compressor Unit : Example Specifications

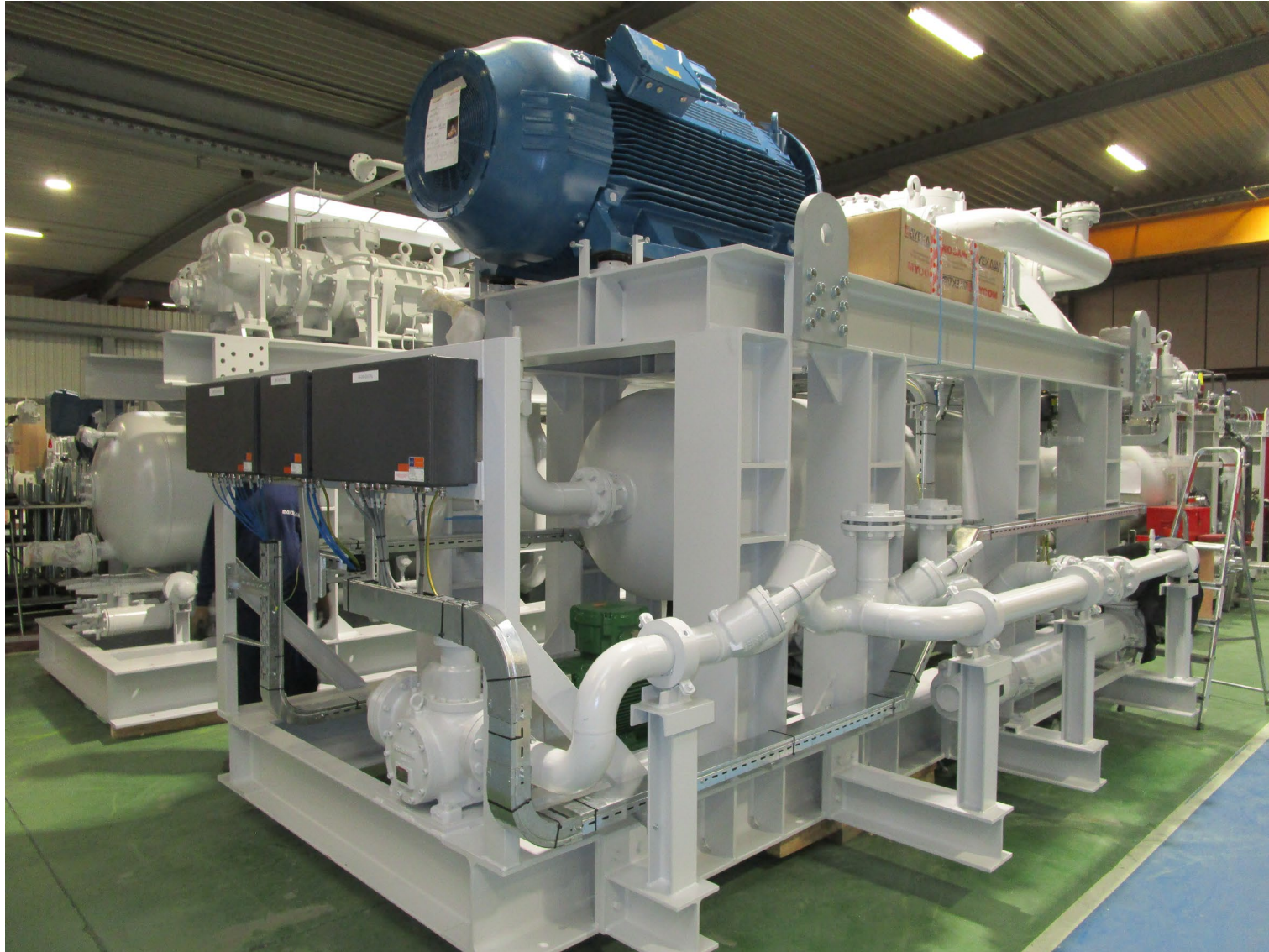
Compressor	Oil flooded compound compressor
Model	G3225SSC-LBL, 2 stage compound compressor
Capacity	4.012,5 Nm <sup>3</sup> /hr
Suction & Discharge	Suction 1,49 Bar A – Discharge 15,85 Bar A
Speed	3.550 RPM
Absorbed Power	607 kW
Area Classification	Class 1 Div.2
Oil Carry Over	0,1 ppmwt

**EXAMPLE : G3225SSC-LBL**  
**MYCOM 2 Stage Compound Compressor**

**Application**  
 Landfill gas feed gas compressor



# Biogas Compressor Unit



**G3225MSC-LBL**  
**MYCOM 2 Stage Compound Compressor**

**Application**  
Landfill gas feed gas compressor



# Biogas Compressor Unit : Example Specifications

Compressor	Oil flooded compound compressor
Model	G3225MSC-LBL, 2 stage compound compressor
Capacity	3.830 Nm <sup>3</sup> /hr
Suction & Discharge	Suction 0,2 Bar G – Discharge 17 Bar G
Speed	2.950 RPM
Absorbed Power	572 kW
Area Classification	Class 1 Div.2
Oil Carry Over	15 ppmwt

**EXAMPLE : G3225MSC-LBL**  
**MYCOM 2 Stage Compound Compressor**

**Application**  
 Landfill gas feed gas compressor

# CO2 Compressor Unit



**G3225LLC-LBM**  
**MYCOM 2 Stage Compound Compressor**

**Application**  
CO2 Liquefaction

# CO2 Compressor Unit : Example Specifications

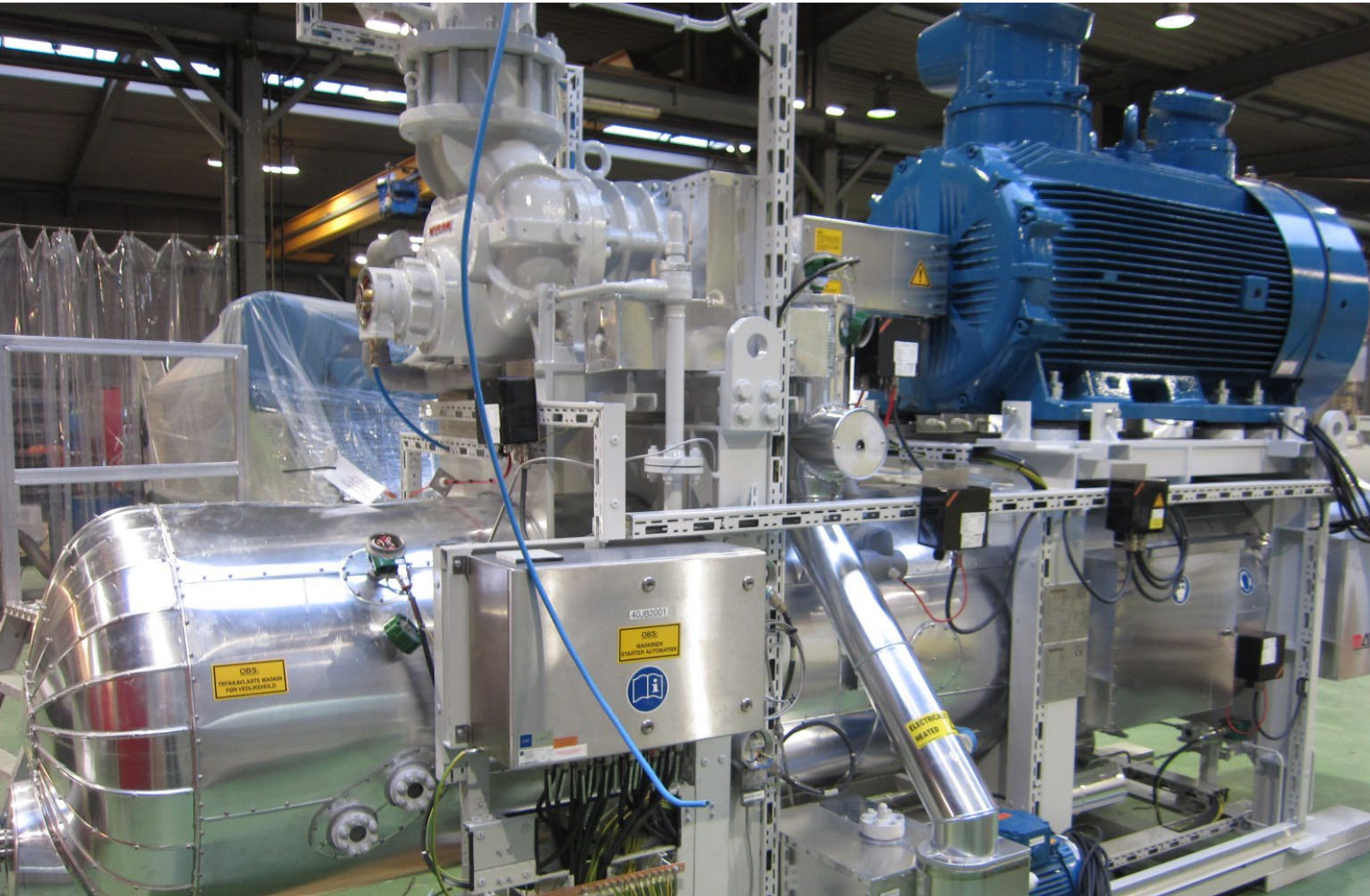
Compressor	Oil flooded compound compressor
Model	G3225LLC-LBM, 2 stage compound compressor
Capacity	10.721 kg/hr
Suction & Discharge	Suction train 12" 9.721,4 kg/hr, Discharge 6" 10.721 kg/hr
Speed	3.550 RPM
Absorbed Power	725 kW
Area Classification	Non-Hazardous
Oil Carry Over	15 ppmwt

**EXAMPLE : G3225LLC-LBM**  
**MYCOM 2 Stage Compound Compressor**

**Application**  
 CO2 Liquefaction



# Mix Gas Compressor Unit



## G250VMD

MYCOM Single Stage Compressor

### Gas Composition

N2	Nitrogen	9,0 %
C1	Methane	35,0 %
C2	Ethane	35,0 %
C3	Propane	13,5 %
C4	i-Butane	8,5 %

# Mix Gas Compressor Unit : Example Specifications

Compressor	Oil flooded single stage compressor
Model	G250VMD, single stage compressor
Capacity	8.004 kg/h
Suction & Discharge	Suction 2,49 Bar A – Discharge 18,6 Bar A
Speed	3.600 RPM
Absorbed Power	558,4 kW
Area Classification	Hazardous area zone 2
Oil Carry Over	5 ppmwt

**EXAMPLE : G250VMD**  
**MYCOM Single Stage Compressor**

**Application**  
Mixed Refrigerant Compressor



# Chiller Unit



**N220**

**MYCOM Single Stage Compressor**

**Application**

**Pre-cooling package - Chiller**

# Pre-Cooling Chiller Unit: Example Specifications

Compressor	Oil flooded single stage compressor
Model	N220, single stage compressor
Capacity	447,4 kW
Evaporating & Condensing	$T_e = -17 \text{ degC} - T_c = 38 \text{ degC}$
Speed	3.150 RPM
Absorbed Power	161,3 kW
Area Classification	Safe Area
Oil Carry Over	15 ppmwt

## EXAMPLE : N220

MYCOM Single Stage Compressor

### Application

Pre-cooling package - Chiller



# Mayekawa Advantage in BIOGAS

- ✓ ATEX & PED certificate for UE and NFPA 70 NEC for U.S. available for screw compressor and chillers
- ✓ Extensive experience for hydrocarbon gas handling and liquefaction
- ✓ Flexible design according to operating conditions (HYSYS simulation)
- ✓ Global service network



# Mayekawa Advantage in BIOGAS with COMPOUND COMPRESSOR

- ✓ ATEX, PED, NFPA 70 NEC certificate available for screw compressor and chillers
  - ✓ Extensive experience for hydrocarbon gas handling and liquefaction
  - ✓ Flexible design according to operating conditions (HYSYS simulation)
  - ✓ Global service network
- ✓ Compression ratios in the range of 15:1, leading to absorbed power reduction
  - ✓ One single motor for a double stage compressor
  - ✓ Control via slide valve, VFD or a combination of both
  - ✓ Possibility to offer combined solutions for RNG + CO<sub>2</sub> + MIX REFRIGERANT

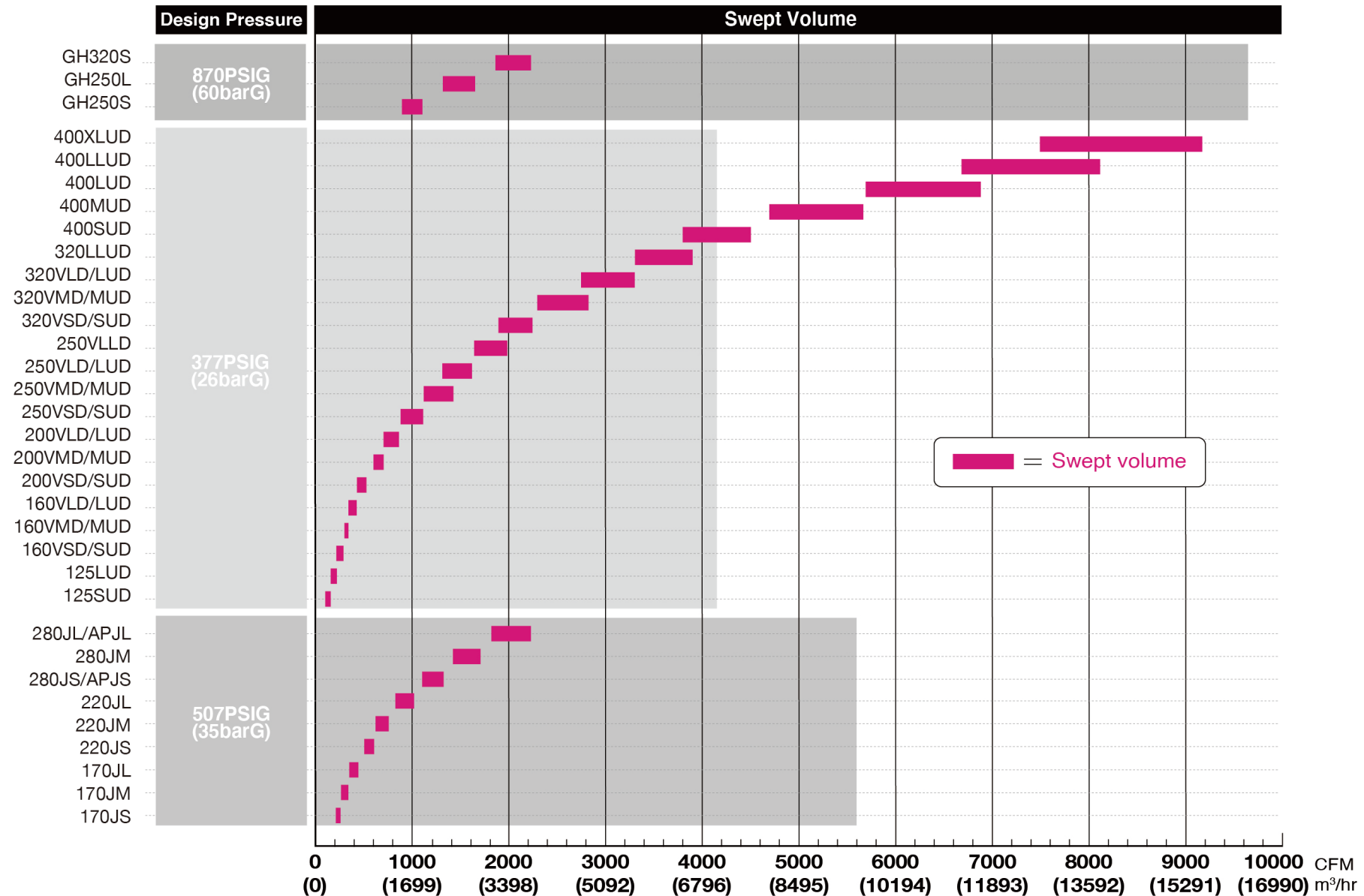


# BIOGAS Compressor Range Performances

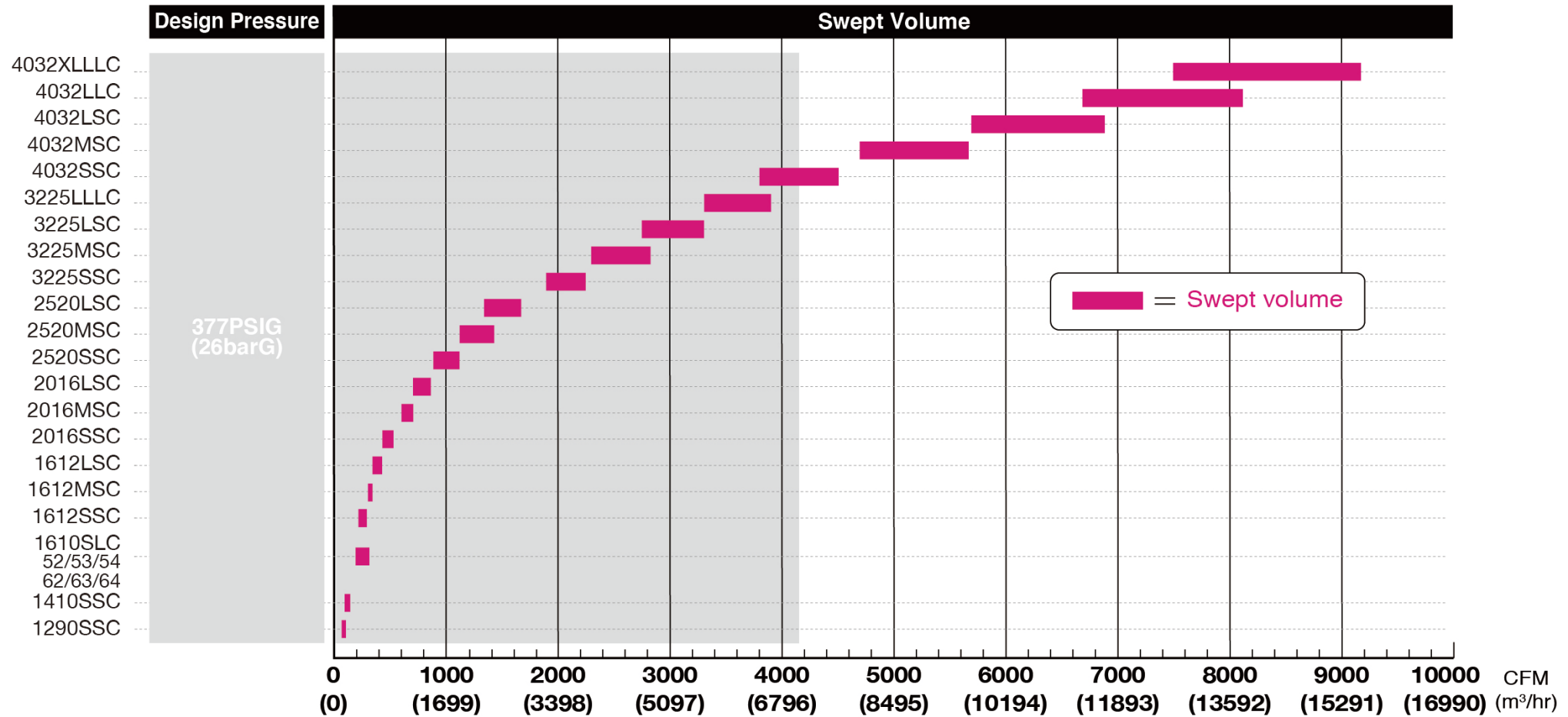




# Single Stage Compressors



# Compound Compressors



# BIOGAS Product & Project References





# Mayekawa Biogas Project References

Project	Gas	Model	Services	Qty	Capacity	Motor (kW)
Biogas Liquefaction	NH3 Mix gas	220JS, 250 VMD	Chiller unit Compressor Unit	1 1		
Biogas Upgrading	NH3 CO2 Biogas	200M 2016LLC 3225MSC	Refrigeration packages	1 1 1	239kW 2200kg/hr 4700kg/hr	185kW 250kW 650kW
Biogas Plant	Biogas	3225MSC	Compressor unit	1	3831 Nm <sup>3</sup> /hr	650kW
Biogas Plant	Biogas	3225MSC	Compressor unit	1	3831 Nm <sup>3</sup> /hr	650kW
Biogas Plant	Biogas	3225MSC	Compressor unit	1	3831 Nm <sup>3</sup> /hr	650kW
CO2 Recovery	NH3 CO2	200M 2016LLC	Compressor unit	1 1	240kW 220kg/hr	185kW 250kW
Biogas Liquefaction	NH3 Mix gas	220JS-V 250VMD	Chiller unit Compressor unit	1 1		
Biogas Liquefaction	NH3 Mix gas	220JS-V 250VMD	Chiller unit Compressor unit	1 1		
Biogas Upgrading	Biogas CO2	3225MSC 2520SSC	Compressor unit	3 2	3830Nm <sup>3</sup> /hr 3300kg/hr	650kW 330kW
Biogas Plant	Biogas	250LL	Compressor unit	2	3143 Nm <sup>3</sup> /hr	560kW

# Mayekawa Biogas Project References

Project	Gas	Model	Services	Qty	Capacity	Motor (kW)
Biogas Upgrading	NH3 CO2 Biogas	200 M 2016 LLC 3225 MSC	Ref. Package	1	250 kW	185 kW
			Compressor Unit	1	2.200 kg/hr	250 kW
			Compressor Unit	1	4.700 kg/hr	650 kW
Biogas Plant	Biogas	3225 MSC	Compressor Unit	1	3.831 Nm3/hr	650 kW
Biogas Plant	Biogas	3225 MSC	Compressor Unit	2	3.831 Nm3/hr	650 kW
Biogas Upgrading	NH3 CO2 Biogas	200 M 2016 LLC 3225 MSC	Ref. Package	1	239 kW	185 kW
			Compressor Unit	1	2200 kg/hr	250 kW
			Compressor Unit	1	4700 kg/hr	650 kW
Biogas Upgrading	Biogas CO2	3225 MSC 2520 SSC	Compressor Unit	3	3830 Nm3/hr	650 kW
			Compressor Unit	2	3300 kg/h	350 kW
Biogas Plant	Biogas	250 LL	Compressor Unit	2	3300 Nm3/hr	560 kW
Biogas Plant	Biogas	3225 SSC	Compressor Unit	1	3.564,1 Nm3/hr	671 kW