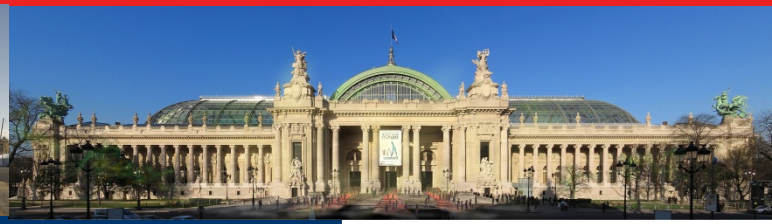
26th World Gas Conference

1 – 5 June 2015, Paris, France



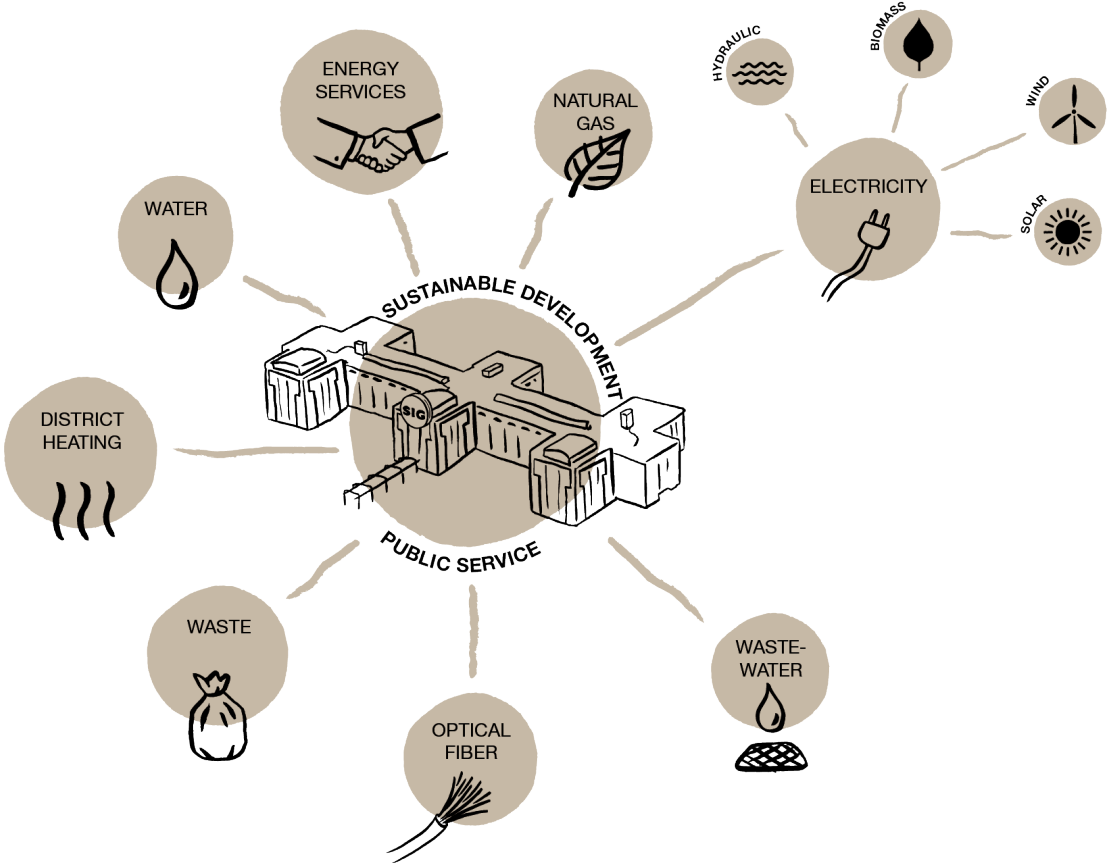
WOC 5.4 : Technology and economic aspects for power to gas and upgrading of biogas to natural gas quality

GENEVA BIOGAS PURIFICATION PLANT

Caroline MAZZOLENI - *Gas Networks Manager*
Service Industriels de Genève, Switzerland

IGU
WGCPARIS2015
WORLD GAS CONFERENCE

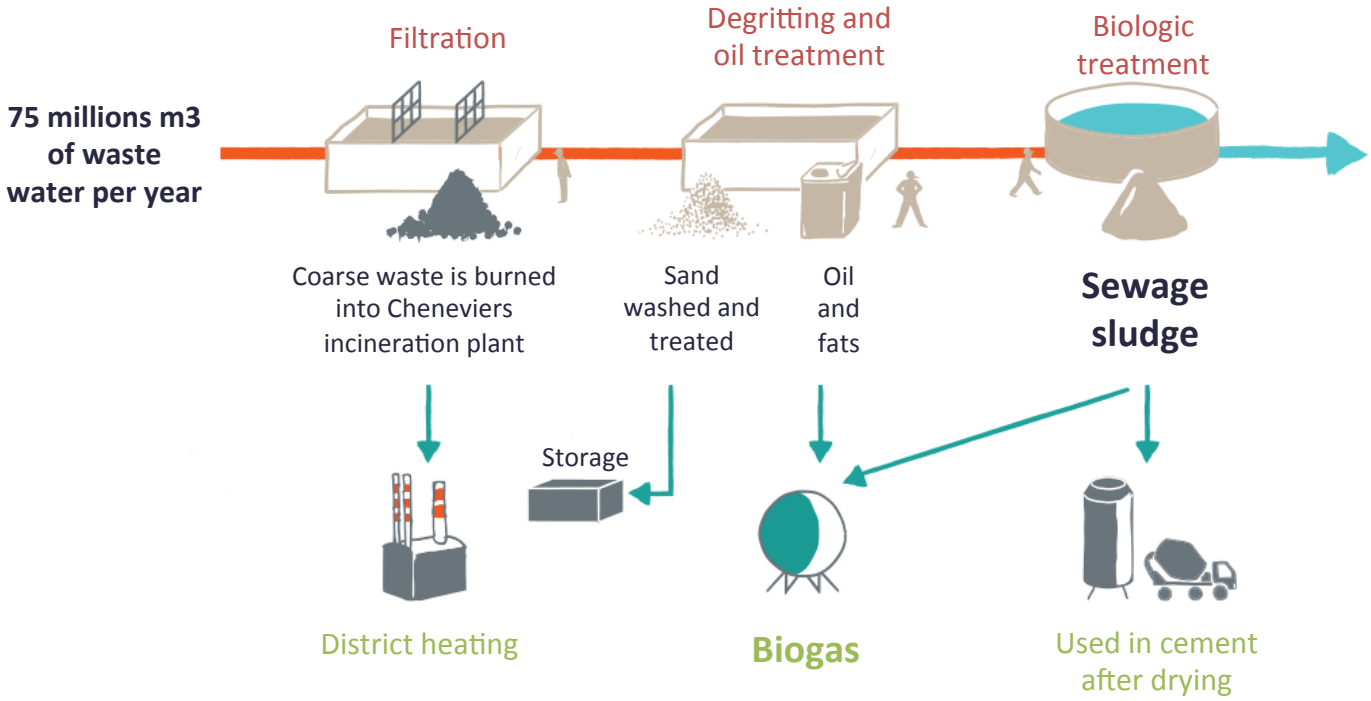
SIG - Areas of expertise



Biomethane Production - Legal frame

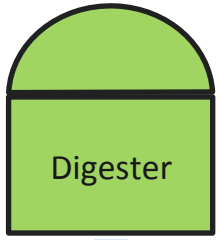
- In Switzerland, the production of biogas is regulated by the Swiss Gas and Water Industry Association (SGWA)
- Untreated biogas can be valorised directly into :
  - Heat (combustion in a boiler)
  - Electricity (turbine)
  - Heat and electricity (Cogeneration)
- Biogas can be also injected in the natural gas network. Depending on the biogas quality ($\Leftrightarrow \%CH_4$) the injection could be :
  - Unlimited : biogas quality is comparable to an H type gas (>96% CH_4)
  - Limited : the gas quality (natural gas+ biogas) at the first consumer should respect Swiss quality standard (H type gas). CH_4 content in biogas must be higher than 50%.
- Gas injected in cars must contain minimum 10% of biogas

SIG wastewater treatment - Operating Principle



95% of the waste are valorised electricity, heat or biogas

Geneva sewage treatment plant – Biogas production



8 millions m³ of Biogas

Biomethane Plant
829 000 m³

Heating Step Buildings
2.5 millions m³

Drying sludge system
4 millions m³

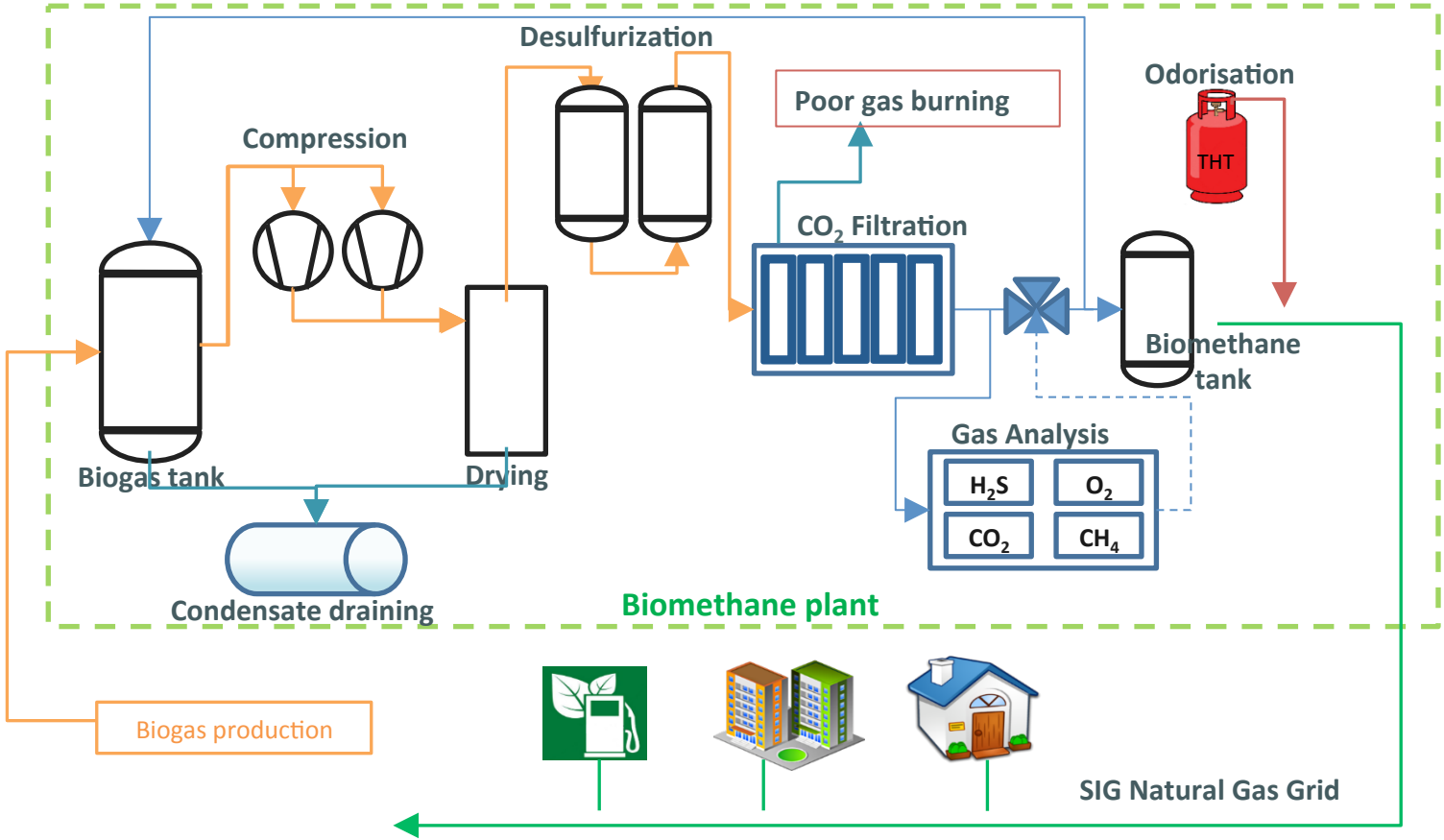
Biogas flare
~~1.5 millions m³~~
675 000 m³

Biomethane plant – Planning

- Engineering : 2010 – 2012
- Plant construction : March 2012- March 2013
  - Project Ownership : SIG - Geneva
  - Project management : Acrona Systems
  - Investment : 5.5 millions CHF
  - Return on Investment : 15 years
- Tuning phase : March – December 2013
- Nominal operating : since January 2014
- Biomethane production :
  - Nominal capacity : 350Nm^3/h of biogas ⇨220 Nm^3/h of biomethane
  - Maximum annual production : 16.7 GWh ⇔ Energy consumptions of 2500 apartments with BBC European Standards

ACRONA SYSTEMS

Biomethane plant – Operating principle

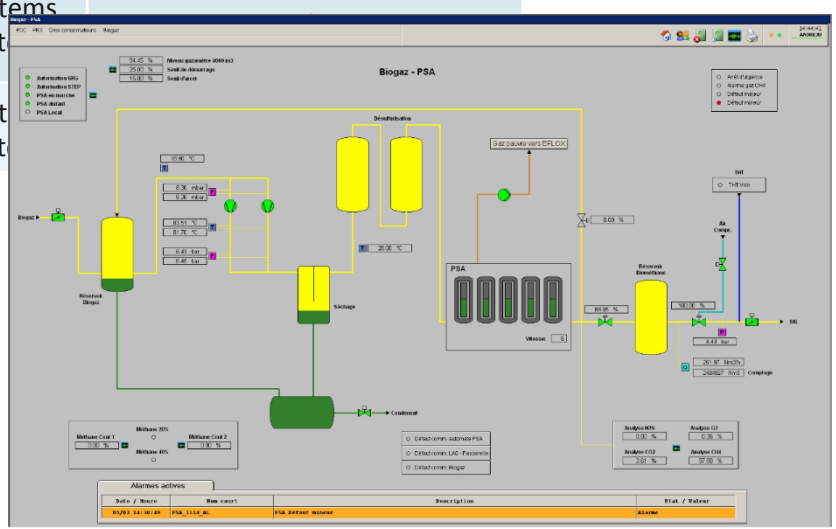


Biomethane plant – Monitoring and Maintenance

- Monitoring and Maintenance :

Periodicity	Responsible	Actions
One week	SIG	Visual Check Consultation of the logbook
3 month	Acrona Systems (constructor)	Installation control
4000h of exploitation	Acrona Systems (construct	Preventive maintenance on the
8000h of exploitation	Acrona Syst (construct	

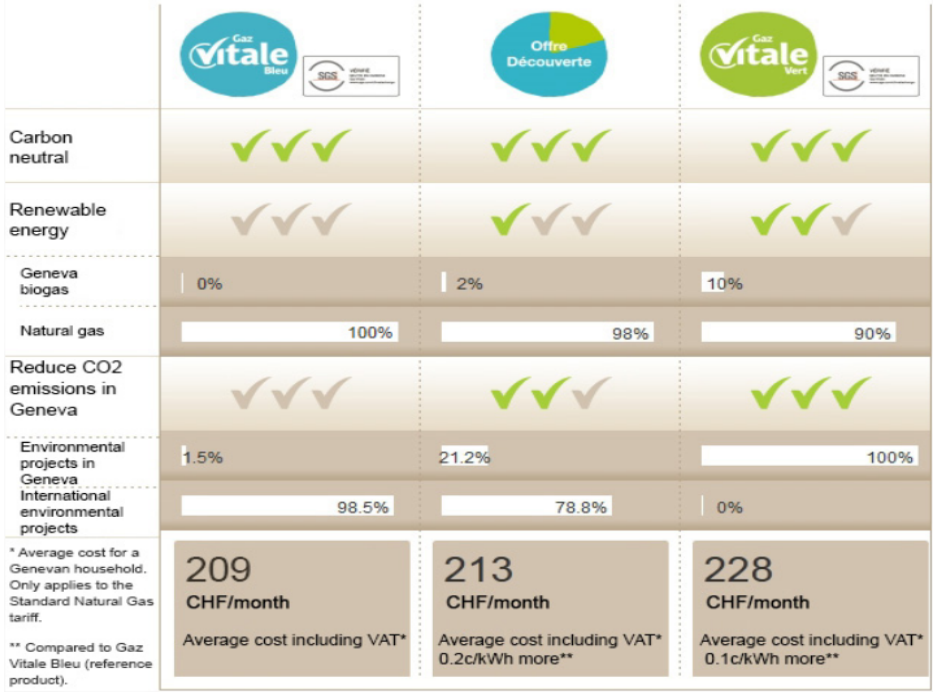
- In case of an urgent alarm, a message is automatically send to the SIG duty person by our supervision system.



SIG Marketing – Gaz Vitale

- “SIG Gaz Vitale” offer is an innovative solution to promote the development of natural gas and biogas in Geneva. This offer propose a natural gas neutral in CO2 (environmental project funding).

- “SIG Gaz Vitale” :



SIG Marketing – Key figures

- Geneva population : 480’000
- SIG gas customers : 40’000

	Gaz Vitale Bleu	Gaz Vitale Découverte	Gaz Vitale Vert
Customers	37000	1800	1200
Market share	88%	11 %	1%

- Biomethane sale forecast (GWh) :

2013	2014	2015	2016	2017	2018	2019
4.7	8.5	12.3	12.7	13.7	14.7	15.7

- Geneva production is sufficient to meet the demand until 2017.
- After 2017, new sources of production will be necessary

Questions


Biomethane plant


PSA Room


EFLOX room


Cold Sources
Biomethane tank