



biogasmax

A D R I V I N G F O R C E

Perspective for a European standard on biomethane: a proposal from Biogasmax

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A European standard on biomethane?

1. A proposal from Biogasmax : context and method
2. Why a EU standard on biomethane?
3. Will of a common regulation – the work that has already been done
4. Technical parameters specifying the biomethane quality: the issues raised
5. Conditions for success in perspective of a market expansion of biomethane



Biogasmax proposal : context and method

- Biogasmax was asked by the EC to set up a proposal of an **EU technical specification on biomethane** (Final conference in Göteborg)
- Task coordinated by Lille Métropole Communauté Urbaine (LMCU): Paul Huguen
- Contributors:
 - Biogasmax partners: Arthur Wellinger (Nova Energie, Switzerland), Michael Beil (Fraunhofer, Germany), François Cagnon (GDF Suez, France), Paul Huguen, Pierre Hirtzberger, Gildas Le Saux (LMCU)
 - Christian Couturier (Solagro, France)
- Purpose:
 - provide the EC (and especially the CEN) with knowledge and a cross analysis of upgraded biogas used in the Biogasmax project
 - draw recommendations for the establishment of a European Standard on biomethane.



A European standard on biomethane: why ?

A standard (also called « technical specification ») :

- Defines a quality of gas (biomethane in our case)
 - **Thresholds on parameters and compounds of gas... (e.g. calorific value, water content, hydrogen sulphide content...)**
 - **expressed in units**
- Leads to specific tuning of equipments (upgrading unit, compressors...) and vehicles in order to reach the “specification”
- Leads to specific measurement tools used by the operator to monitor the requested quality of the “parameters”



Biomethane quality in France : national gas grid operator technical specification

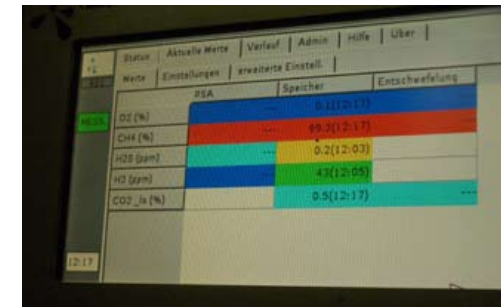
P.C.S. (kWh/Nm ³) Gaz B	9,5 à 10,5 kWh/Nm ³ à 0°C
Teneur en CH ₄ (% molaire)	–
Densité	Comprise entre 0.555 et 0.7
Point de rosée eau	T < 5°C à la pression maximale de service du réseau
Point de rosée « hydrocarbures »	T < -2°C de 1 à 70 bar
Teneur en NH ₃ (mg/Nm ³)	Teneur < 3 mg/Nm ³
Composés soufres et mercaptans	Teneur < 5 mg/Nm ³
Composés sulfurés H ₂ S (mg/Nm ³)	Teneur < 5 mg/Nm ³
Gaz carbonique (% molaire)	Teneur CO ₂ < à 2.5% molaire
Monoxyde de carbone (% molaire)	Teneur CO < 2% molaire
Hydrogène (% molaire)	Teneur H ₂ < 6% molaire
Oxygène (% molaire)	Teneur O ₂ < 0,01% molaire
Teneur Cl	Teneur < 1 mg/Nm ³
Teneur F	Teneur < 10 mg/Nm ³
Impuretés	Teneur Hg < 1 µg/Nm ³ Teneur goudrons et poussières < 5 mg/Nm ³
Teneur en tétrahydrothrophène (produit odorisant THT)	Comprise entre 15 et 40 mg/Nm ³



A European standard on biomethane: why ?

A diversity of standards applied in Europe :

- Today, each biomethane plant needs to be adapted to a technical specification (called “SPEC”) applying locally/regionally/nationally
- many SPECS are applied in countries



Werte	Einheiten	aktuelle Einstell.	Speicher	Entschwefelung
O2 (%)		0.11(0.17)		
CH4 (%)		99.81(99.83)		
H2S (ppm)		0.2(1.2-0.3)		
H2 (ppm)		4.3(1.2-0.5)		
CO2,ls (%)		0.5(1.2-1.7)		

=> this diversity of standards inhibits biogas expansion throughout Europe



A diversity of standards in Europe

■ Technical specifications on biomethane and natural gas

	SWEDEN	SWITZERLAND	FRANCE	
Parameter		Requirement		Unit
Methane (CH ₄)	> 96% volume	≥ 96 %		% (V/v)
Dew point at max. pressure of injection point	-9°C at 200 bar (32 mg/m ³)	- 8	T < 5°C at service pressure of the grid	°C
Mist, dust		technically free		(-)
Odourisation	13 mg/m ³	According guidelines (SVGW G11)	15 < THT < 40 mg/Nm ³	(-)
Heating value (H _{u,n})	12,15	10.6 – 13.1	9.5 to 10.5 kWh/Nm ³ à 0°C	kWh/Nm ³
Upper Wobbe index (W _{u,n})	> 12.4	13.3 – 15.7 local deviation accepted (+0.7/-1.4)	8.10	kWh/Nm ³
Relative density		0.55 – 0.7	0.555 < d < 0.7	(-)
Oxygen (O ₂)	< 1% volume	≤ 0.5	< 0.01% mol.	% (v/v)
Carbon dioxide (CO ₂)	< 4% volume (CO ₂ + O ₂ + N ₂)	≤ 6	< à 2.5% mol.	% (v/v)



A European standard on biomethane: why ?

The issue:

- How to meet

- ... on the one hand, the need for biomethane expansion in Europe as part of opening gas market?
- ... on the other hand, the requirements for safety of equipments and people ?

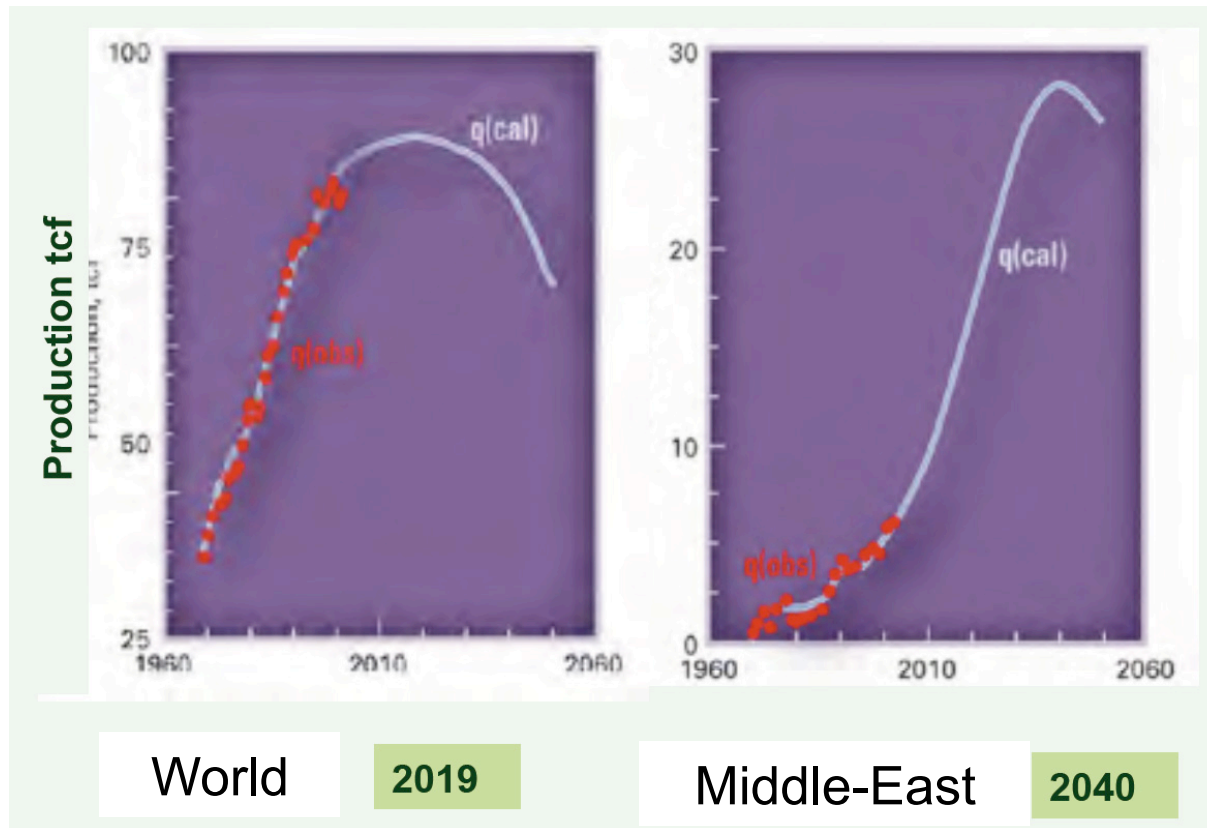
Biogasmax proposal clearly shows that a European standard on biomethane

- may be a way of sustaining new biomethane projects...
- ... if the common standard is flexible and take into account current European experiences



Aims of a European standard on biomethane

- Be prepared to fossil sources depletion and to Peak Gas



Source : « Multicyclic Hubbert model shows global conventional gas output peaking in 2019 », Oil & Gas journal On-line , Imam, Startzman, Barrufet, 2004



- A common European standard on gas should lead:
 - To allow similar tuning for upgrading units and analyses
 - To reduce the measurement needs, investment costs – economy of scale / reduce costs of analyses
 - to simplify authorizations procedures and measure requirements
 - to ensure a stability of gas quality

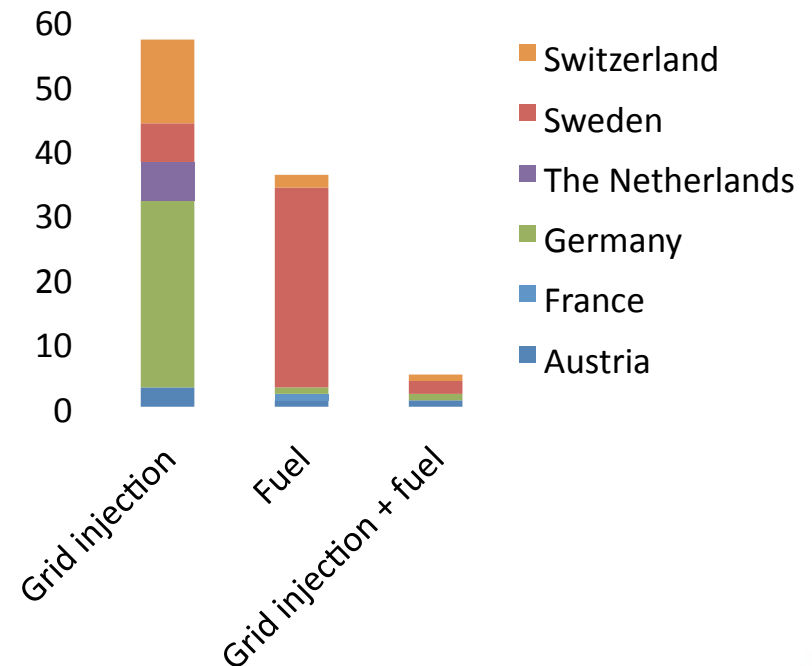
Goals :

- Ensuring a greater economic feasibility of projects
- Establishing better conditions for biomethane expansion



A review of current practices in Europe

- Different **biogas sources**: biowaste, energy crops, manure, sewage sludge, landfill
- 6 countries, with some specificities:
 - **Switzerland**:
 - limited **volumes** injected into the transport grid: cleaned raw biogas (> 50% CH₄)
 - Unlimited for upgraded biogas (>96% CH₄)
 - **Sweden**: essentially fuel (absence of natural gas grid except Göteborg)
 - **The Netherlands**: grid injection of biomethane from landfill
 - **Germany**: almost only grid injection
 - **France**: grid injection very soon (Lille)
 - **Austria**: a few plants



The current regulations on biomethane

- Each country developed a dedicated regulation on biomethane:
 - Switzerland: Directive SSIGE G13
 - Sweden: Standard SS155468
 - The Netherlands: Proposition for Dutch gas suppliers
 - Germany: Standards DVGW G260 and G262
 - France: National guidance n°2004-555 (2004) and technical specifications (2006)
 - Austria: Directive OVGW G31 and G33
- Disparities of parameters, values and units of measurement
- French and Dutch regulations are **the strictest** (with nevertheless some possible flexibilities). So far, sewage sludge substrates are excluded for grid injection in France.
- German, Swedish and Swiss ones are less stringent



Reports and proposals already made

(In the field of natural gas and/or biogas)

➤ By Organizations or Consortiums of gas suppliers-transporters:

EASEE-gas > Harmonization of **natural gas** quality parameters

MARCOGAZ,
KIWA > **Comparison** of current standards on biogas in Europe

AFG
(French
association of
gas suppliers) > French technical specification for grid injection in natural
gas **distribution** network



Reports and proposals already made

(In the field of natural gas and/or biogas)

➤ By National central agencies or other European Consortiums:

AFSSET
French National
Health Agency

- > has demonstrated no additional microbiologic risks of biomethane compared to natural gas
Biomethane from sewage sludge excluded from this first health assessment (in progress)

BINGO and
BONGO
projects:

- > WGs focused on injection of biogases in gas transportation network



A European standard on biomethane: how?

CEN
European
Committee for
Standardization

- > mandated by EC to set up biomethane quality requirements for 1/ grid injection 2/ use as a fuel

➤ A future EU standard on biomethane has to **harmonize** specifications with **one technical “Specification”** (or “Guidelines” according to the nature and the extent of the harmonization !)



- **The current proposals (e.g. EASEE-gas) are dedicated on natural gas and not on biomethane**
 - **Due to** cross-border trades, natural gas requirements are stringent
 - These thresholds are not relevant to biomethane :

Issues regarding harmonization

- **The example of the EASEE-gas proposal : Oxygen content (0,01%)**
 - is **not technically** reachable with upgrading technologies
 - is based on **empirical data** (one deep gas storage in Europe) and not on other investigations

Parameter	Unit	Min	max	Implementation date
Wobbe index	kWh/Nm ³	13.60	15.81	10.01.2010
Relative density	-	0.555	0.700	10.01.2010
Total sulfur	mgS/Nm ³	-	30	10.01.2006
H ₂ S + COS	mgS/Nm ³	-	5	10.01.2006
RSH	mgS/Nm ³	-	6	10.01.2006
O ₂	% mol.	-	0.01	10.01.2010
CO ₂	% mol.	-	2.5	10.01.2006
Water dew point	°C at 70 bar	-	-8	10.01.2006
Hydrocarbon dew point	°C at 1-70 bar	-	-2	10.01.2006

Source: EASEE-gas CBP 2005-001-02 "harmonization of natural gas quality"



Issues regarding harmonization

When examining current surveys and assessment on gas quality, following issues are raised:

- Some parameters are “crucial” to assess the quality : all gases (biomethane, natural gas...) need to be monitored according these parameters

- Some parameters are “uncertain”
 - Monitoring some is not justified, when biomethane is produced from specific feedstock (biomethane).
 - e.g. the monitoring of Mercury in biomethane from households biowaste



Parameters defining biogas quality: > state of the art and a Biogasmax analysis

➤ **Crucial parameters:**

- Almost all regulated by current national standards
- Contents and values vary, depending on regions (Low and High gases) or on countries

➤ **Uncertain parameters: (very fine requirements)**

- Only taken into account in France and in The Netherlands
- Relevance of quantification has to be shown or to be based on studies

➤ **To be defined into a EU standard:**

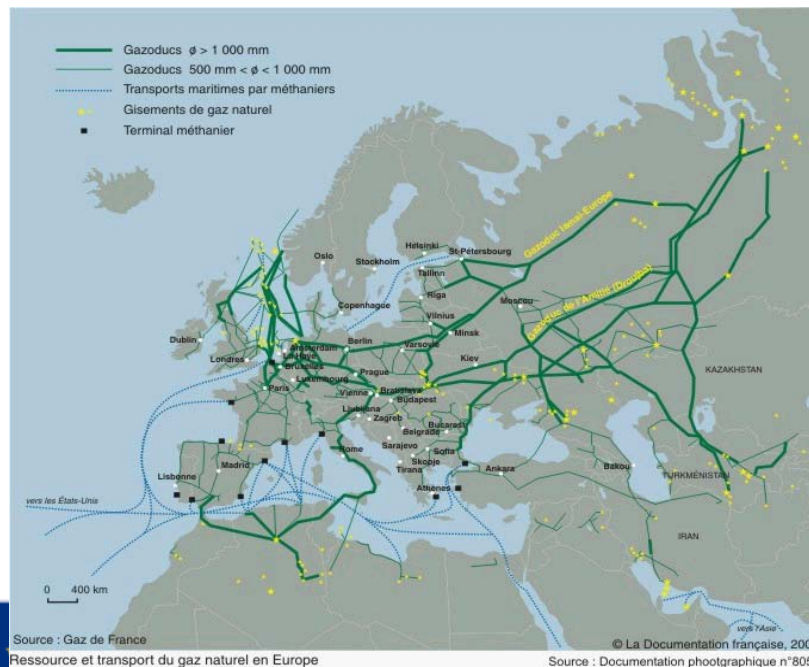
- Thresholds and guidelines
- Units
- Periodicity of measurement

	Crucial parameter	Uncertain parameter
Methane	X	
Heating value	X	
Relative density	X	
Wobbe index	X	
CO ₂	X	
O ₂	X	
H ₂	X	
H ₂ S	X	
Mercaptans (RSH)	X	
THT	X	
Total sulfur	X	
Water dew point	X	
NH ₃		?
CO		?
Siloxans (as Si)		?
Mercury (Hg)		?
F,Cl		?
Dust		?
HCl,HCN		?
BTX, PAH		?

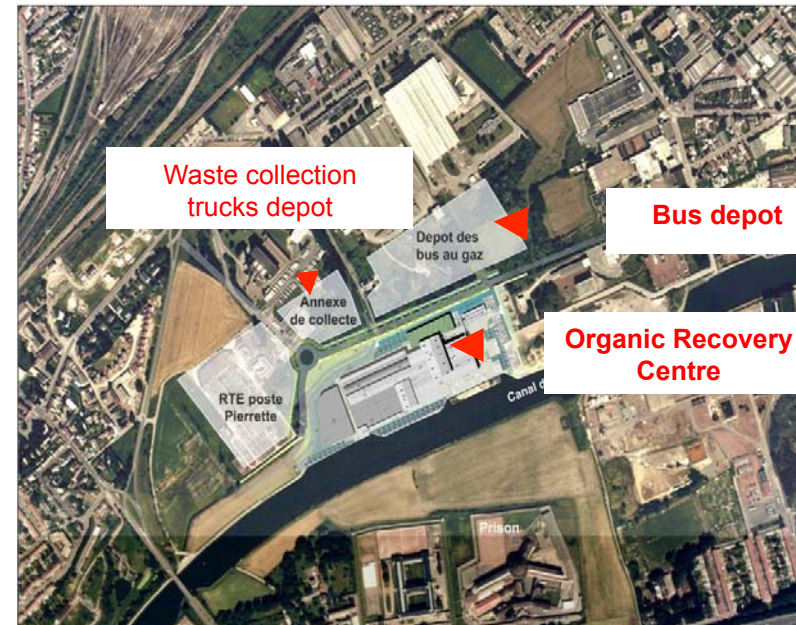
Quality requirements: there is a great difference between Natural Gas and Biomethane



Various origins, transport on long distances, deep storage



local production, local uses:
few storage and transport needed, substrates known



■ Quality requirements: there is a great difference between Natural Gas and Biomethane



Various origins, transport on long distances, deep storage



local production, local uses: few storage and transport needed, substrates known



Quality requirements are different => SPEC need to be different

- A common standard on biomethane will have to ensure a flexibility
- with, as a basis, the current SPECs applied in injector countries



Conclusions

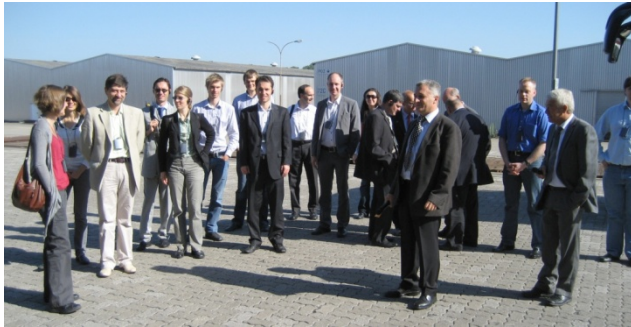
- A European standard on biomethane would take into account:
 - Experiences of injector countries (>20 years)
 - Current SPEC on biomethane of injector countries: O₂ content
 - less stringent French and Dutch SPEC on biogas quality: Hg, Cl, F ?

- Conditions of a EU standard on biomethane :
 - Need for meeting a wide range of biomethane actors' interests (natural gas operators' interests but also biogas producers's)
 - Flexibility – biogas is a local renewable energy and quality differs: A EU standard needs to be flexible, in the aim to sustain biogas expansion !
 - Important not to limit biomethane expansion by imposing stringent SPEC to injectors country

- Studies to be carried out:
 - Simplify measurement (e.g. correlation of removal of couples H₂S/mercaptans - H₂O/H₂S)
 - Delete some unnecessary measurements: certification of upgrading units for the removal of certain components (NH₃, Cl, F, siloxans ?, Hg ?) in case of specific substrates (biowaste)
 - carrying out further surveys and monitoring on biomethane use (to examine impacts on engines, grids...)



Thank you for your attention



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The screenshot shows the biogasmax website with a navigation menu at the top (Home, News, Events, Publications, Downloads, Contact) and a sidebar on the left with categories like 'PARTNERS INTERVIEW', 'THE PROJECT', 'STRATEGY & STAGES', 'BIOGAS LIFECYCLE', 'EVALUATION', 'KNOWLEDGE TRANSFER', 'BIOGAS TECHNIQUES IMPROVEMENT', 'SUBSCRIBE TO THE NEWSLETTER', 'DOWNLOADS', 'LINKS', and 'CONTACT'. The main content area features several news items:

- European Biomethane Fuel Conference 7-9 September 2009 Göteborg - SWEDEN**: Participants from 30 different nations registered for the forthcoming EBFC. Come and join them!
- Sweden: proposal of national goal for biogas**: Biogas can play an important role in the transition to decrease the emission of greenhouse gases from the transport sector in the Swedish regions (SME and Västra Götaland) there is a high potential and good conditions for production, distribution and end-use of biogas.
- European Biogas Association (EBA) makes proposals to European Commission**: The European Biogas Association (EBA), based in Brussels, aims to promote sustainable biogas production and use in Europe.
- Biogasmax partners on videoclips**: Let's discover some Biogasmax partners on www.biogasmax.eu: in a series of 8 first minute videos, they provide key information on the issues dealing with the "biomethane field": from organic wastes treatment to biomethane use.

Technical reports, videos, training sessions, agenda of events, newsletters...

> visit

www.biogasmax.eu