

Proposed Standard Regarding Biomethane in Chile

(Draft in review process)

June 2010

General Background

- **Coordinating Entity:**

- The work of preparing National Standards in Chile is carried out through INN (Chilean National Institute of Standards) through technical committees.
- I.N.N. is a member of ISO and the Pan American Standards Commission.
- Biomethane standard: Technical Committee of non-petroleum fuels.
- Each member body interested in a subject for which a technical committee has been established has the right to be represented in that committee.

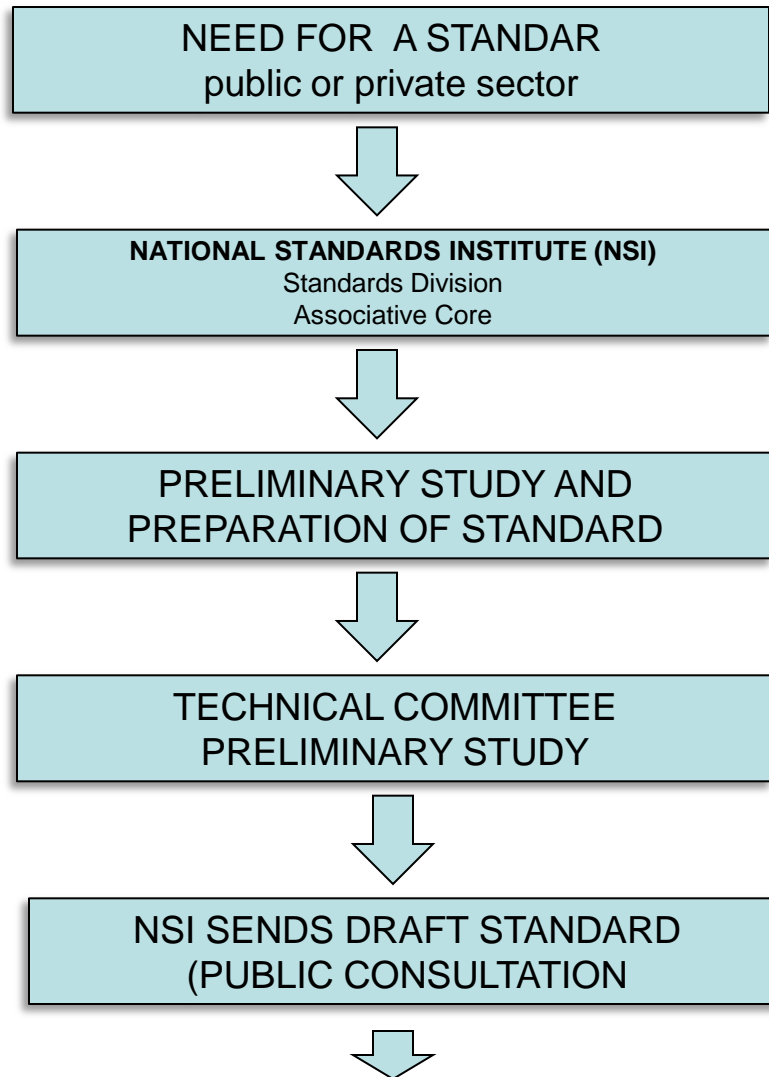
Why create a standard of biomethane in Chile?

(Survey CNE/GTZ September 2007)

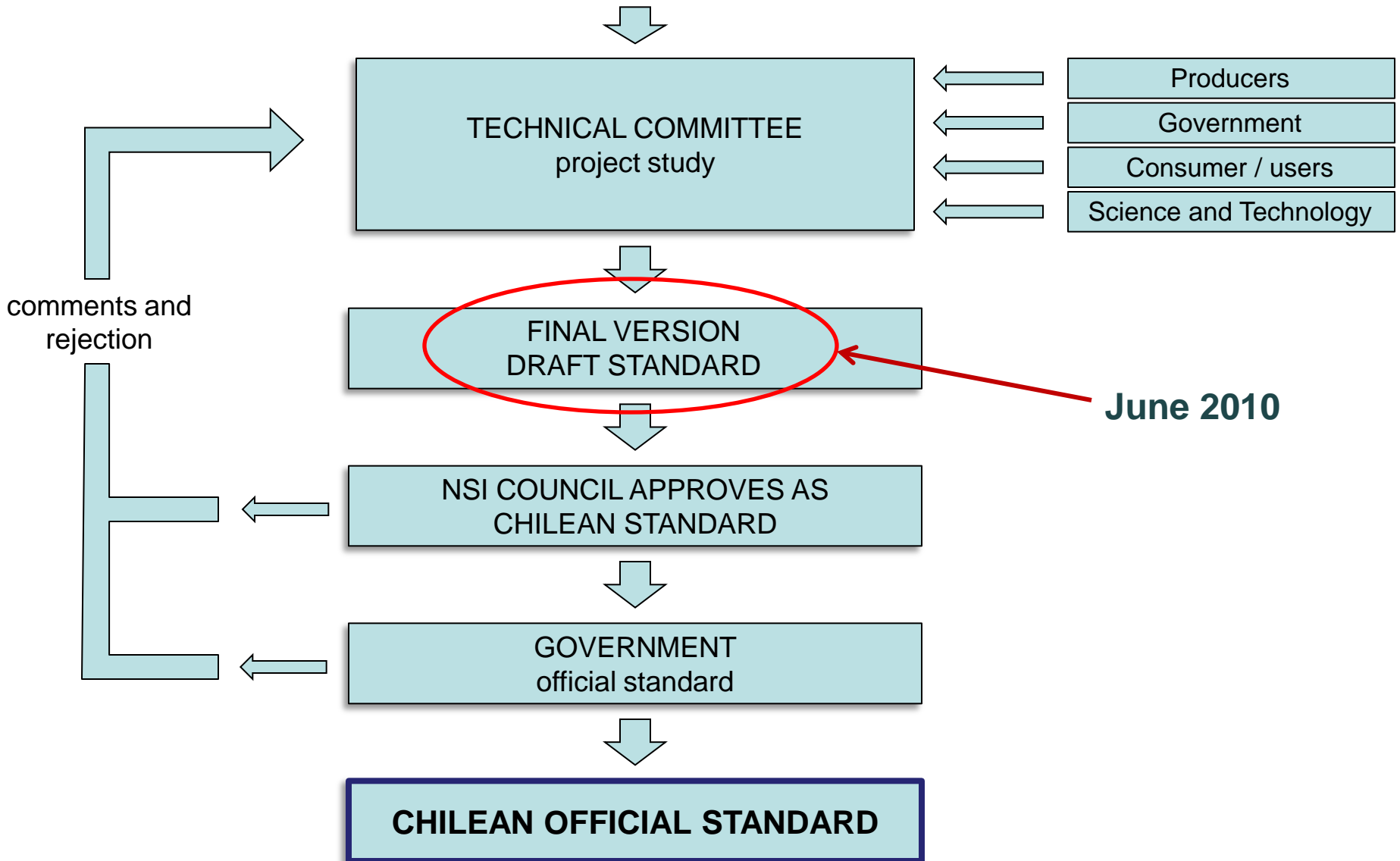
Fuente	Biogás [Mm ³ /año]	Metano [Mm ³ /año]
Plantas de Tratamiento de Aguas	137.369	82.421
Rellenos Sanitarios c/captación de biogás	115.551	57.775 *
Rellenos Sanitarios s/captación de biogás	53.671	26.835
RILES	47.838	28.706
Pre-tratamiento aguas residuales urbanas	80.652	50.811
Biomasa de principales cultivos de temporada	387.791	240.430
Biomasa de residuos de poda y desmalezados municipales	425.488	297.842
Biomasa de desechos industria vitivinícola	27.561	17.088
Biomasa de residuos sólidos industria cervecera	8.752	5.533
Biomasa de industria de Lácteos	3.580	2.148
Biomasa de industria conservera de frutas y verduras	65.163	39.098
Biomasa bebidas de infusión	2.412	4.387
Biomasa residuos de matadero	29.775	19.353
Biomasa residuos industrias aceites y grasas	132.190	82.533
Biomasa a partir de estiércol (avícola, vacunos y porcinos)	1.027.453	607.872
Total	2.515.471	1.562.832 **

(**) Promedio: 4, 3 [MMm³/día]

The study process of a standard



The study process of a standard



Biomethane Standard: Collaboration of many sectors



Universidad de
Concepción



Metrogas



GNL Mejillones



Universidad de
Chile



National Standards
Institute (NSI)



CESMEC



National Automotive
Association



Sical Engineers



National Energy
Commission

Standard of Biomethane NCH 3213

(Draft in review process)

Scope:

- To establish biomethane specifications to be met in the residential, commercial, industrial and transportation segments.
- The main aspects covered are the technical and quality requirements for delivery of such gases into gas networks.
- Interchangeability of biomethane with natural gas distributed in the grid
- The standard takes as reference the Environmental Protection Agency CARB California Air Resources Board, Chapter 5, and also other international information that might be relevant for this purpose.

Definitions

- **Biogas:**

- Is produced during anaerobic digestion of organic substrates, such as manure, sewage sludge, organic fractions of household, industry waste, energy crops and landfills etc.


- Consists mainly of methane and carbon dioxide, and it can be utilized in combined heat and power plants, as a substitute for natural gas or as a vehicle fuel.

Composition of Biogas and landfill gas.

		Biogas from AD	Landfill gas
Compounds	Methane (vol-%)	60 - 70	35 - 65
	Other hydro carbons (vol-%)	0	0
	Hydrogen (vol-%)	0	0 - 3
	Carbon dioxide (vol-%)	30 - 40	15 - 50
	Nitrogen (vol-%)	app 0.2	5 - 40
	Oxygen (vol-%)	0	0 - 5
	Hydrogen sulphide (ppm)	0 - 4000	0 - 100
	Ammonia (ppm)	app 100	app 5
	Lower heating value (kWh/Nm ³)	6.5	4.4

Definitions

Biomethane:

- The energy content of biogas is in direct proportion to the methane concentration, and by removing carbon dioxide in the upgrading process the energy content of the gas is increased  **biomethane.**
- Depending on the end use, different biogas treatment steps are necessary:
 - **Ammonia** is usually separated when the gas is dried or when it is upgraded. High concentrations of ammonia are often limited by manufacturers of gas engines. Normally up to 100 [mg/m³] ammonia can be accepted.
 - **Siloxanes:** can be removed by cooling the gas by adsorption on activated carbon.

Biomethane Specifications⁽¹⁾

(Draft in review process)

Property	Unit of measure	Value	Test method
Methane	% mol	88% (min)	ASTM D 1945
Ethane	% mol	6% (max)	ASTM D 1945
Propane and higher hydrocarbons	% mol	3,0% (max)	ASTM D 1945
Hexane and hydrocarbons	% mol	0,2% (max)	ASTM D 1945
Hydrogen	% mol	0,1% (max)	ASTM D 2650
Carbon monoxide	% mol	0,1% (max)	ASTM D 1945
Oxygen	% mol	1,0% (max)	ASTM D 1945
Inert gases (2)	% mol	1,5 to 4,5	ASTM D 1945
Total sulfur	mg/m3	35 max (3)	ASTM D 5504
	mg/m3	65 max (4)	ASTM D 5504

(1) Extracted from CARB California Environmental Protection Agency-Air Resources Board; Chapter 5: Standard for Motor Vehicle Fuels

(2) Amount of carbon dioxide and nitrogen

(3) Before the addition of odorants

(4) After the addition of odorants

(5) Alternatively it can use the method ASTM D 4468, in case of arbitration must use ASTM D 5504 method

This standard is neither exhaustive, categorical nor definitive, because it is still a document in review process.

Physical Chemical Properties

(Draft in review process)

Property	Unit of measure	Value	Test method
Higher Heating Value	kJ/m ³ (kcal/m ³)	41.170 (9.839) max	NCh 2380
	kJ/m ³ (kcal/m ³)	36.300 (8.605) min	
Wobbe index	kJ/m ³ (kcal/m ³)	52.720 (12.600) max	NCh 2380
	kJ/m ³ (kcal/m ³)	47.280 (11.300) min	
Relative density		Report	NCh 2380
Dew Point HC	°C	-4 max a 5.500 kPa abs. (55 bar)	ASTM D 1142

Biomethane Specifications

(Draft in review process)

- **Particulate matter:** Should not contain solid particles larger than 5 micrometers. Maximum concentration 22, 5 [mg/m³]. Free of lubricating oils and gums.
- **Injection temperature:** Should be below 50 degrees Celsius.
- **Odorant:** In atmospheric conditions must have a characteristic unpleasant smell (detectable when the biomethane reaches 20% of its lower explosive limit)

Thanks!

Any questions

Claudia Cerda: claudia.cerda@inn.cl
Gerardo Muñoz: gmunoz@metrogas.cl