

ANNUAL IMPLEMENTATION WORKSHOP (AIW)

TRABAJAMOS
PARA PRODUCIR
**BARRILES
LIMPIOS**

Methane recovery Project in Ecopetrol:

Study cases

13th MAYO 2014



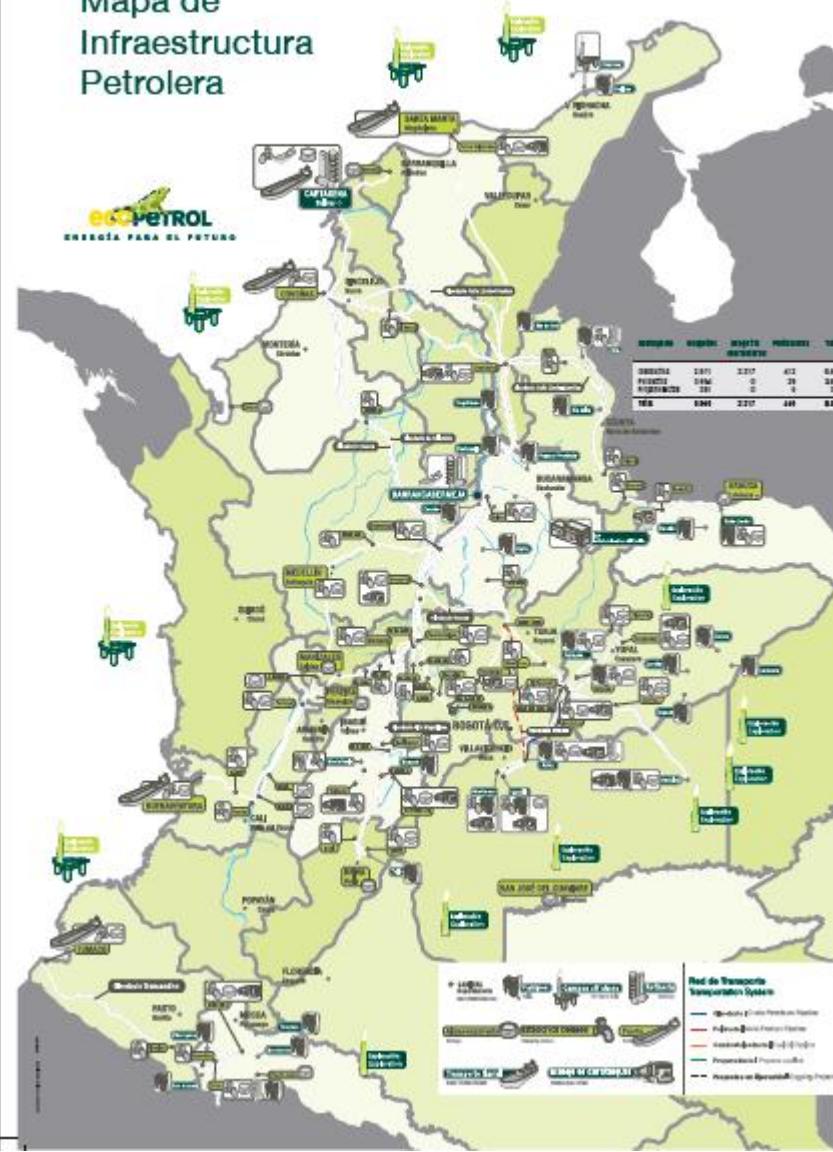
energía FUTURO COLOMBIA futuro eco
BIA FUTURO COLOMBIA futuro colombia energía
ergía ecopETROL energía Ecopetrol energía FUTURO COLOMBIA energía FI IT

ABOUT OUR COMPANY

ECOPETROL

Is the largest and primary petroleum company in [Colombia](#). As a result of its continuous growth, Ecopetrol belongs to the group of the 30 largest petroleum companies in the world, and it is one of the four principal petroleum companies in [Latin America](#).

Mapa de Infraestructura Petrolera



WHY DOES ECOPETROL WORK IN GHG REDUCTION?

STRATEGIC FRAMEWORK
2012-2020

Why?

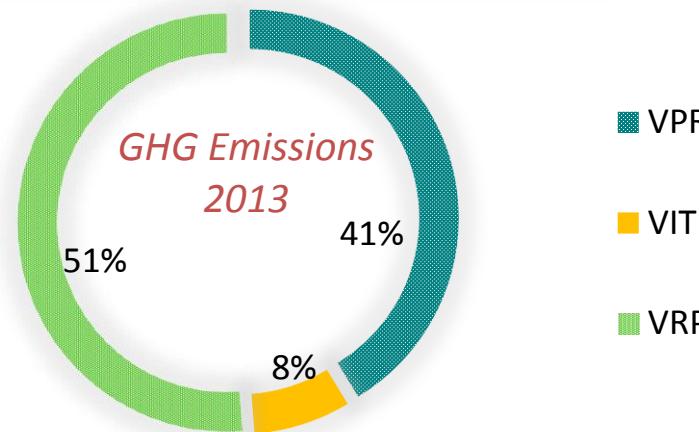
It supports the corporative strategic in the **Environmental management** aspect.

In Order to...

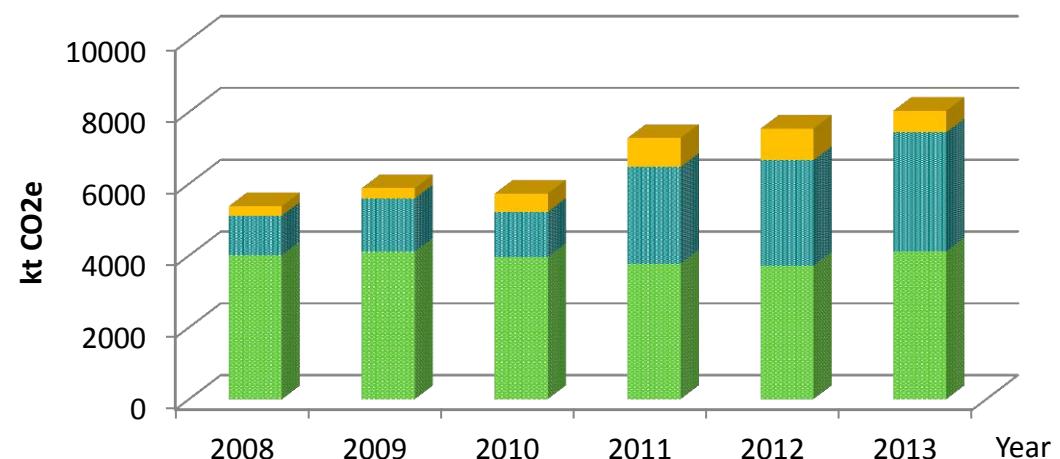
Identify and to generate reduction strategies, making itself in a essential element for the **sustainability** development in the company.



ECOPETROL GHG EMISSIONS RESULTS



GHG emissions in ECP 2008-2013



Source: Ecopetrol, Vicepresidencia de HSE y Sostenibilidad Operativa



REPORTS



MEMBER OF

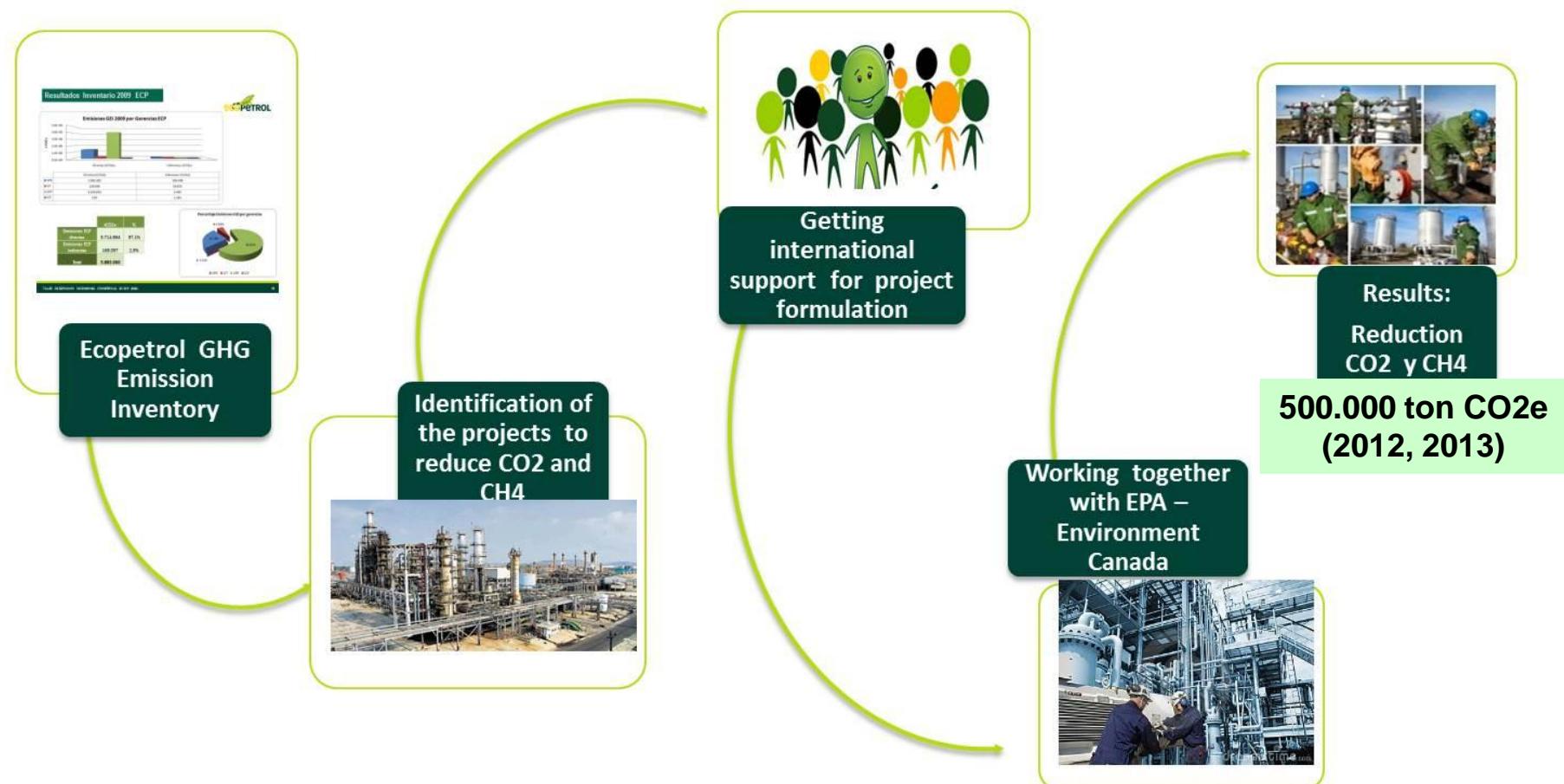
**Dow Jones
Sustainability Indices**

In Collaboration with RobecoSAM

**Reporte Integrado
de Gestión Sostenible
2013**



ECOPETROL GHG MANAGEMENT



WHAT HAS BEEN DONE?

JOINT WORK WITH EPA AND THE GMI PROGRAM



NaturalGas
EPA POLLUTION PREVENTER

Análisis preliminar del estudio de medición y oportunidades para la reducción de las emisiones de metano en las operaciones de SOM, SON y SOA

23 de octubre, 2013

Global Methane Initiative

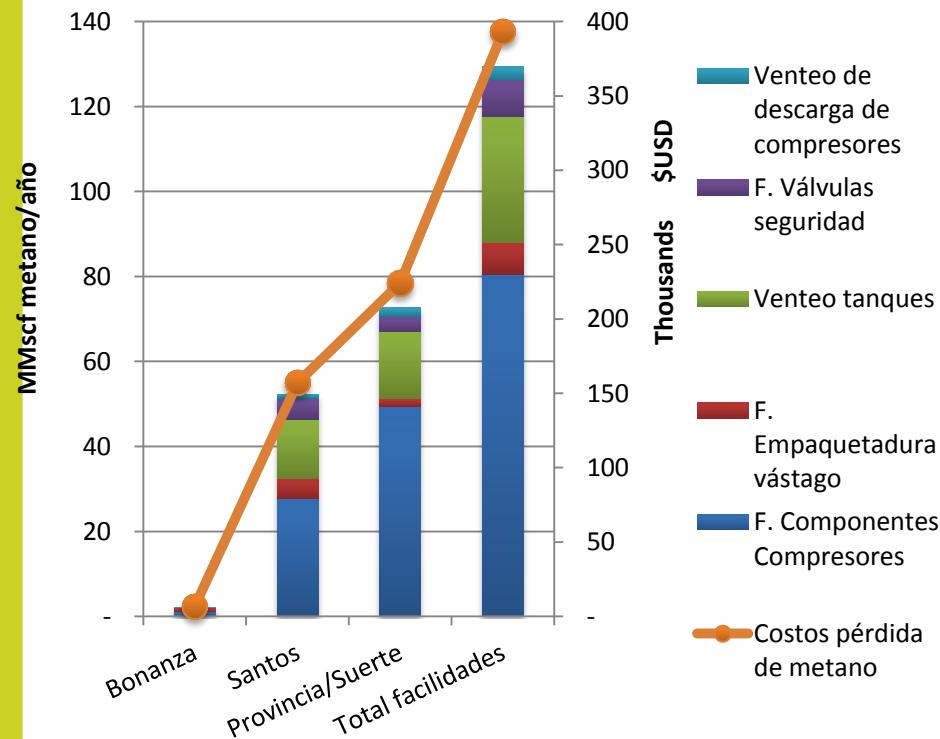
A presentation slide with a blue header and footer. The main content is in Spanish, discussing a preliminary study on methane emissions reduction in operations of SOM, SON, and SOA. It includes the date (October 23, 2013) and logos for NaturalGas (EPA POLLUTION PREVENTER) and the Global Methane Initiative.

SHARING EXPERIENCES

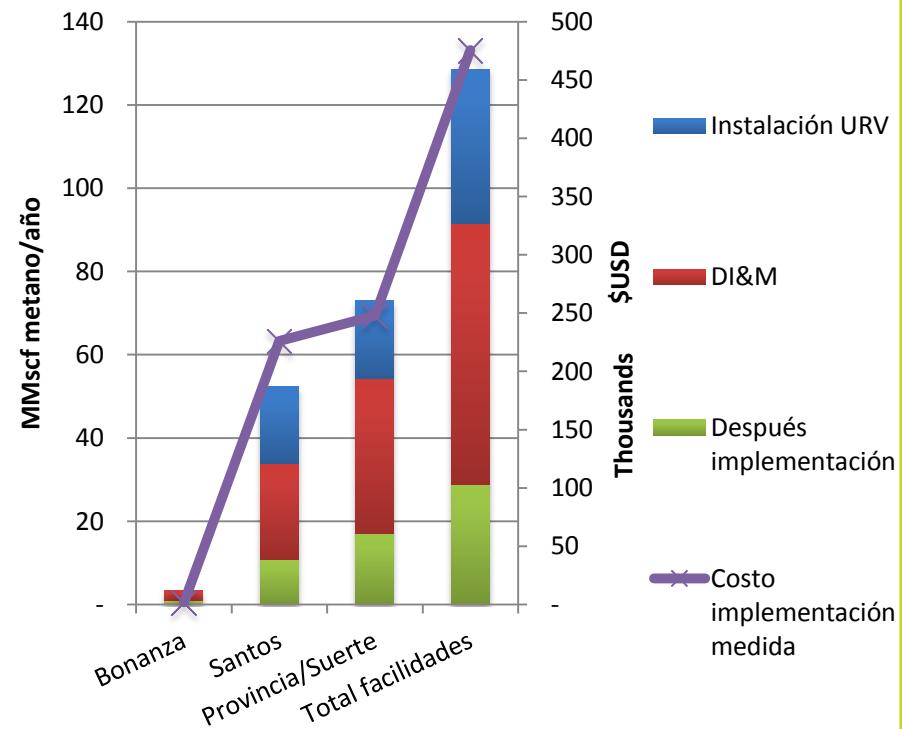
- To promote the reduction initiative in all the company, we are showing benefits getting until now.
- Diffusion of the next CH₄ mitigation activities in production areas in the short time.
- To spread the initiative to all the company in medium and long time.
- [Video.](#)



Fugitive Emission at Production Facility + GasPlant (SOM)



Total Emissions: 131 MMscf/yr Methane



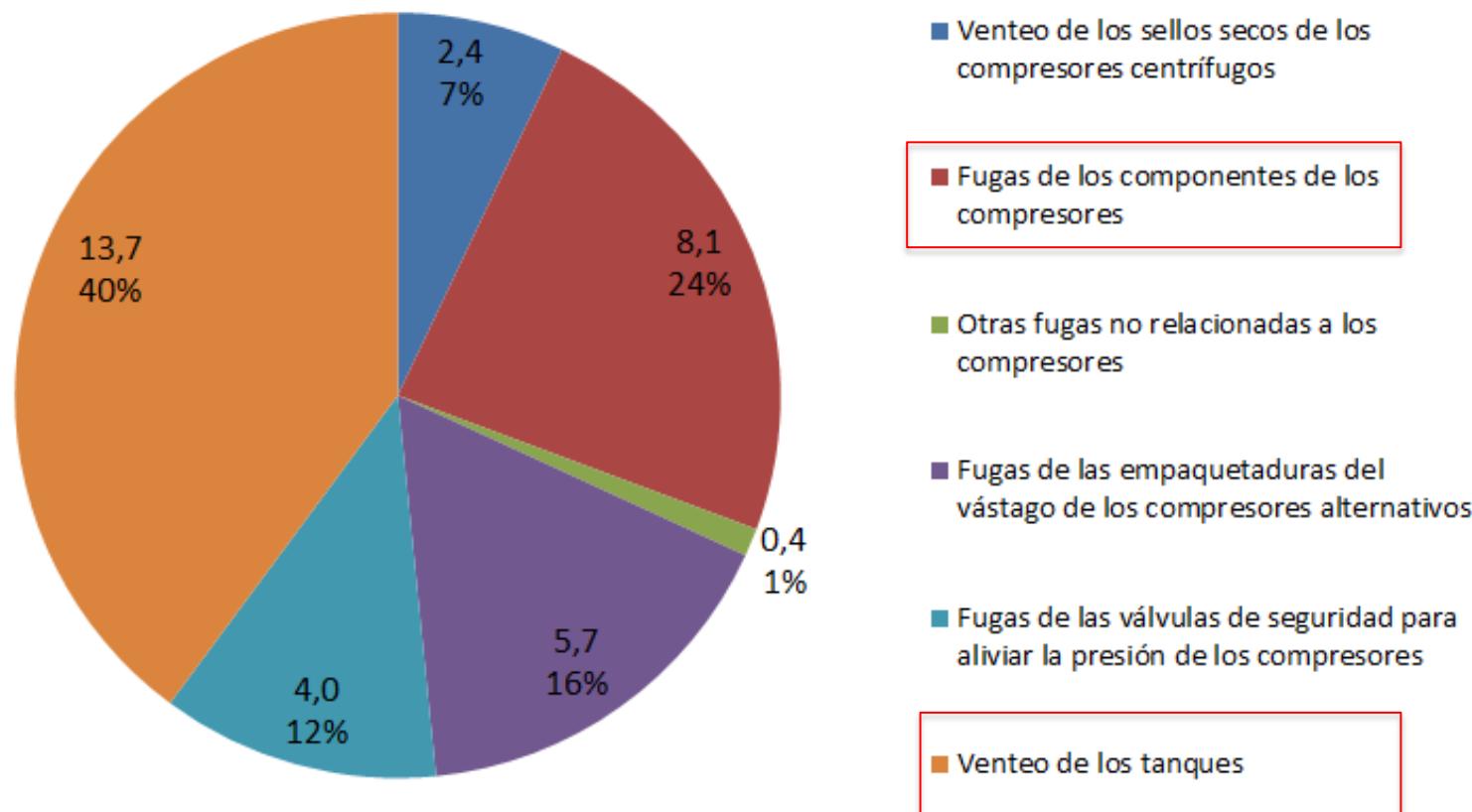
Total Recovery Methane : 100 MMscf/yr

* Gas Price assumed US\$ 3.00/ Mcf

2013: 15.000 ton CO₂e Reports as a goal

Fugitive Emission at Gas Plant (SON, SOA, SOM)

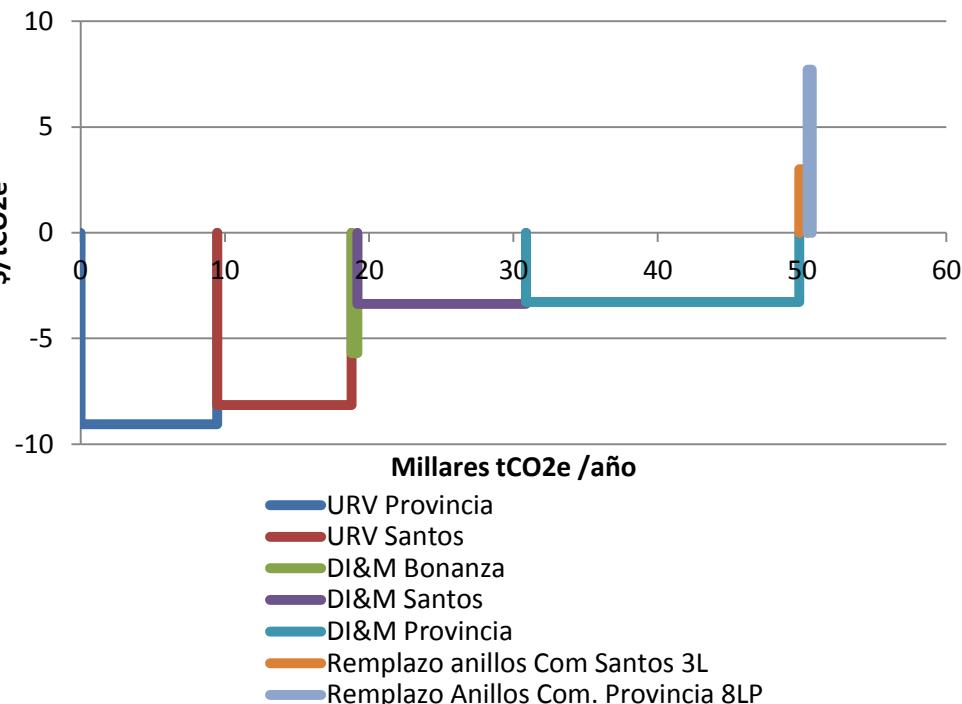
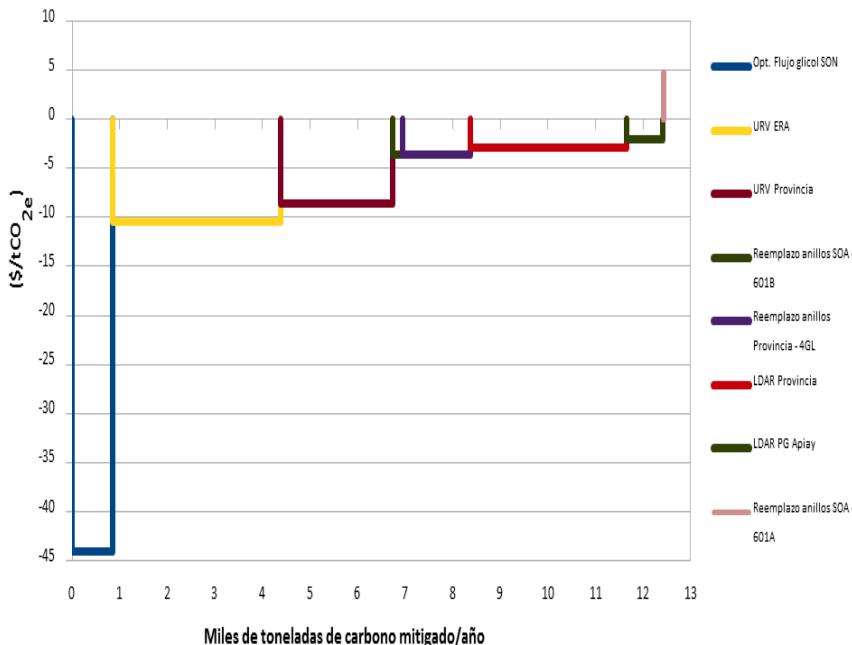
**Principales fuentes de emisiones de metano - Todos los sitios
(MMPC/año)**



Total Emission: 34,3 MMscf/yr



Abatement Cost Curve (ACC)

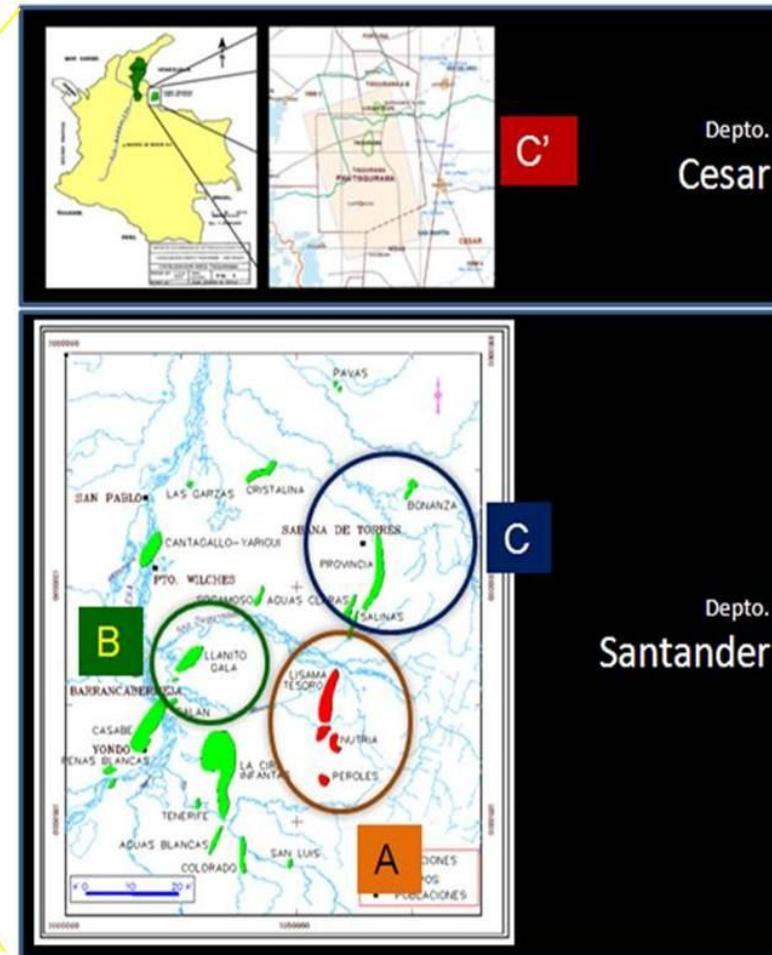


Alternative	Capital Cost (\$USD)	VPN (\$USD)	ROI (%)	Payback (year)
Inspection & Maintenance (I&M)	-\$ 221	- \$ 11.032	-	- 0,1
Glycol Plant Optimization	---	\$ 186.240	N.A.	Inmediato

RECENT RESULTS

GRM

Superintendencia
Superintendencia
Superintendencia
Campo Escalante
Superintendencia



- A** Activo Lisama
- B** Activo Llanito
- C** Activo Provincia (Provincia y Bonanza)
- C'** Activo Provincia (Tisquirama y San Roque)

FIELD APPLICATION



IMPLEMENTATION OF THE RING NET

- * Improving the actual gathering systems.
 - * Working on **a standard for the new projects.**

COMPRESSION SYSTEM LOCATED

PILOTS

- Installation of 6 BGC (2014)
 - Installation 2 Portatil Compressors.

Pozo Hanito 114. Montaje tipo Samson



Pozo llanito 114. facilidades



AUTOGENERATION

- Autogeneration with Diesel : ct\$35 KWh.
 - National Grid : ct\$12 to ct\$16 KWh.
 - Autogeneration with gas: ct\$ 8 KWh

Results by Installing BGC

Pozo Llanito 114, Montaje tipo Samson .



Pozo Llanito 114, facilidades



- Elimination of the venting practice & Recovery of gas.
- Pressure maintenance in the casing of 35 / 45 psig.
- Improvement of 10% in the pump efficiency.

Pozo Nutria 32, Montaje tipo frontal .



Pozo Nutria 39, Montaje tipo Sanson



Consolidated results using BGC

WELL	OIL (BPD)	GAS KPC	# VENTING	KPCD
NUTRIA 23R	42	84	3	8.4
NUTRIA 32	28	112	2	7.5
TESORO 48	38	52	1	1.7
LISAMA 102	50	96	2	6.4
NUTRIA 39	45	89	3	8.9
NUTIRA 35	127	471	2	31.4
LISAMA 77	47	198	2	13.2
LISAMA 142	38	220	3	22.0
TESORO 44	45	153	2	10.2
TESORO 43	100	434	4	57.9
LISAMA 165	38	158	4	21.1
LISAMA 166	24	252	8	67.2
Llanito 114		60	15	30.0
Gala 14		60	15	30.0
TOTAL KPCD				316
TOTAL KPCYR (2014e)				115,279

Pozo Tesoro 44, Montaje tipo frontal .



Pozo Llanito 114, Montaje tipo Sanson



Pozo Gala 14, Montaje tipo Sanson .



Pozo Lisama 165, Montaje tipo Frontal



Activities in progress: 2015...

- **Teca Field:** **Gas measurement** for a group of wells using measuring bag and it was extrapolate for the whole field. The gas reduction potential is of 1.000.000 cubic feet day. The installation of a **Ring net** began the planning period.
 - **Tisquirama Field:** The **Ring net** was completed for the field. The concentration of the **gas is used for autogeneration** and the excess is flared. A project of conversion to GTL is being analyzed.
 - **San Roque Field:** The **Ring net of anulars** was completed for the field. The concentration of the **gas is used for autogeneration** and the excess is vented. **A modern system of torches is in process, for flaring instead of venting.** A project of conversion to GTL flaring is being analyzed.
 - **For new drilling projects:** **Generating a standard** to have the wells connected to a network system of anulars for gas utilization and benefit of depressurization.
 - **Pilot project in Nutria Field:** Pilot of two rented compressors center in two clusters of three wells, to analyze the behavior of the reduction of gas in the anular, **avoiding the flaring and using the gas.**
 - **Elimination of the 100% of the venting project:** or flaring of gas in the wells, its on the third stage of the maturation project process in ECP. It is expected to begin the execution next year.



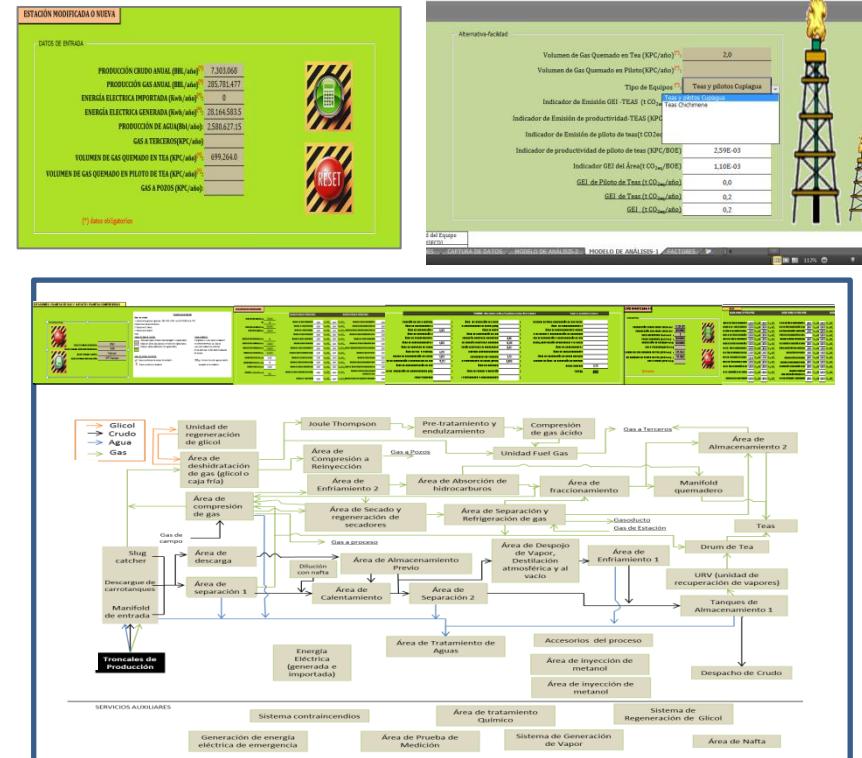
Bolsa calibrada

05/09/2007

➤ Electric autogeneration pilot test with microturbines.

IN ADDITION:

Technical guide for Measurement and LDAR



Tools to:

- Estimate emissions reduction for the new projects and modifications.
 - Estimate CH₄ emissions

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