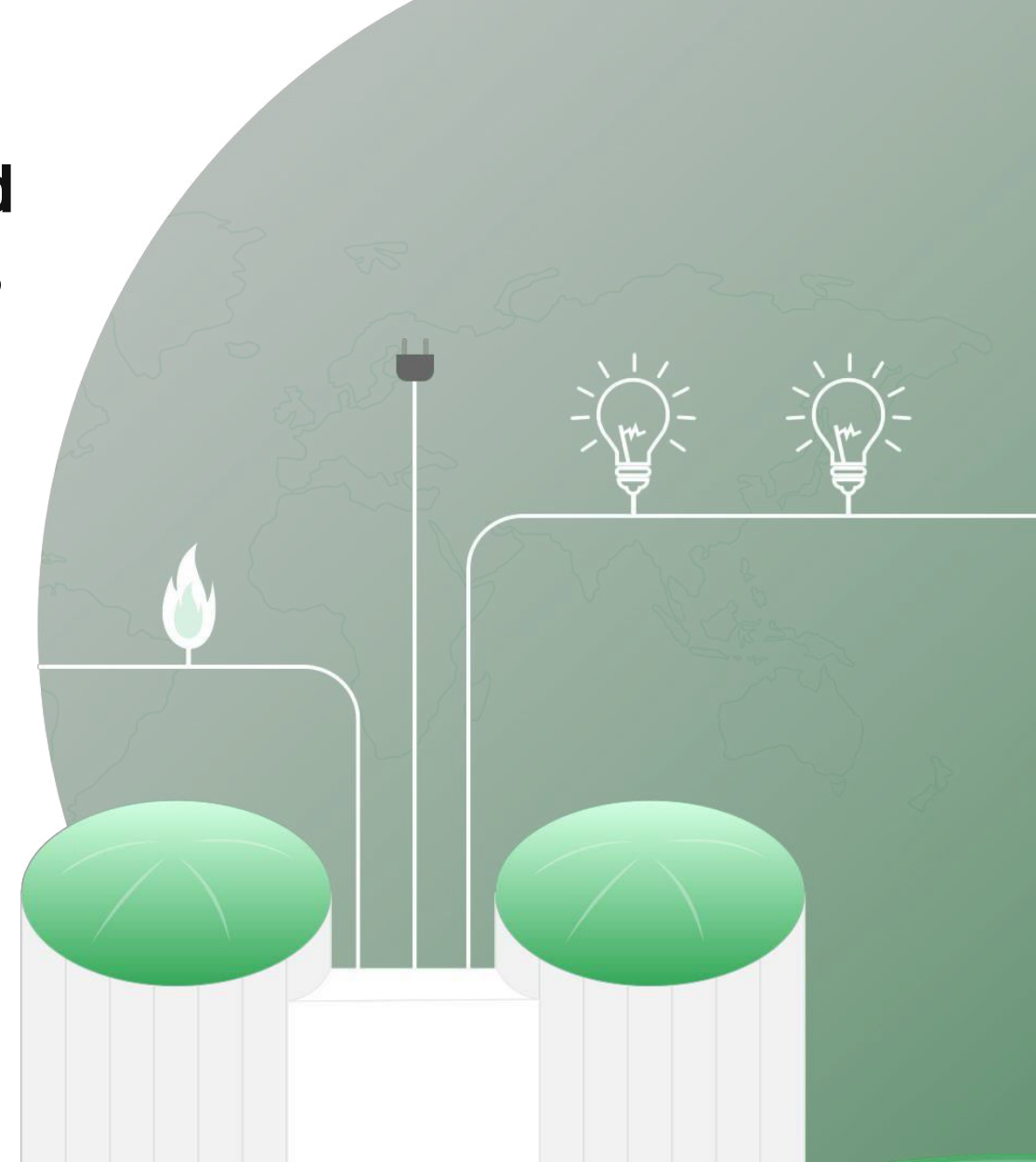


Overview of European biogas technologies and adaptations in emerging/developing markets

ADAPTATIONS OF EUROPEAN TECHNOLOGIES

Insights from Argentina
Jorge Antonio Hilbert

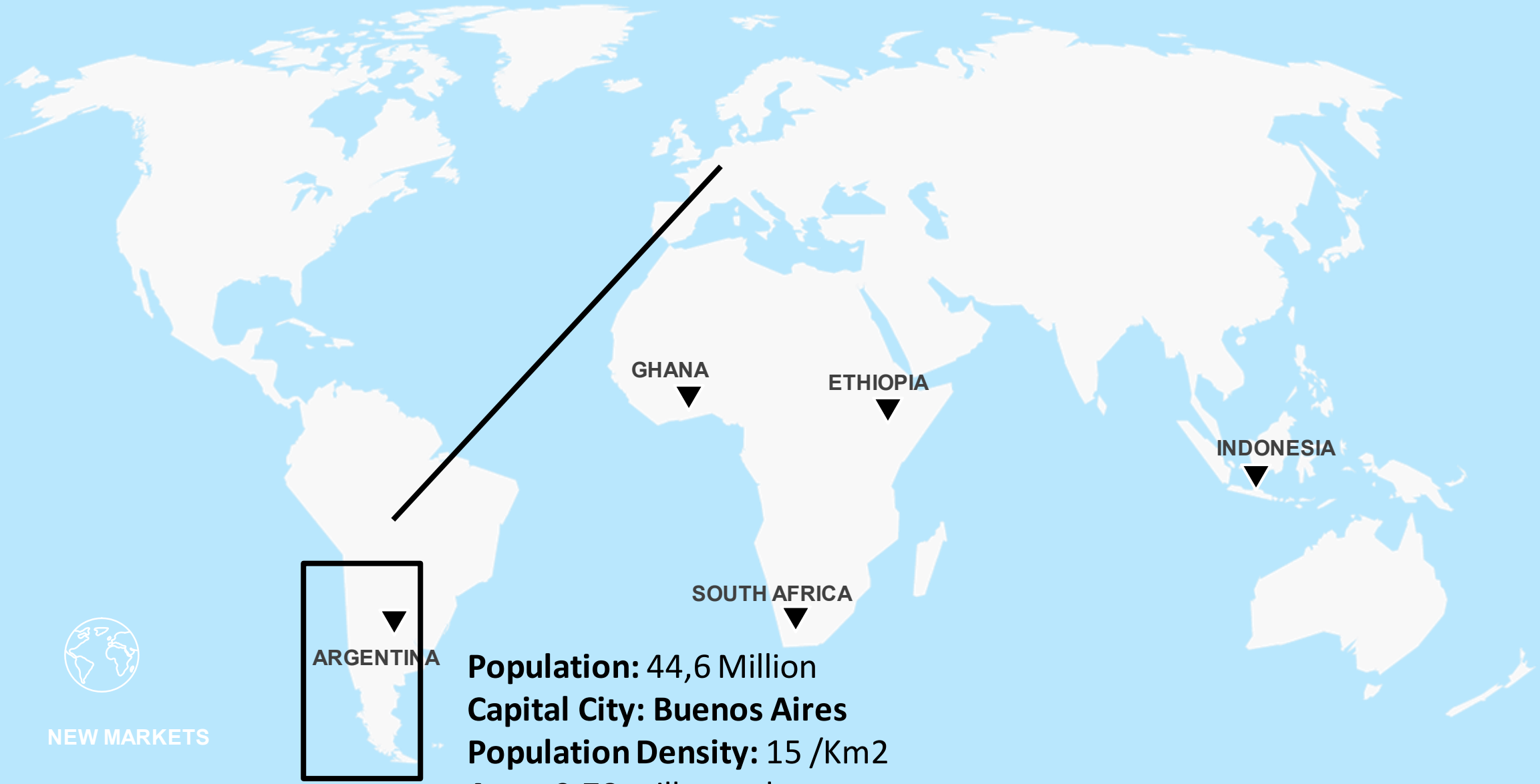


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 857804. The sole responsibility for the content of this document lies with the authors. It does not necessarily reflect the opinion of the EU.



Digital global
Biogas
Cooperation

Geographical Location of Argentina

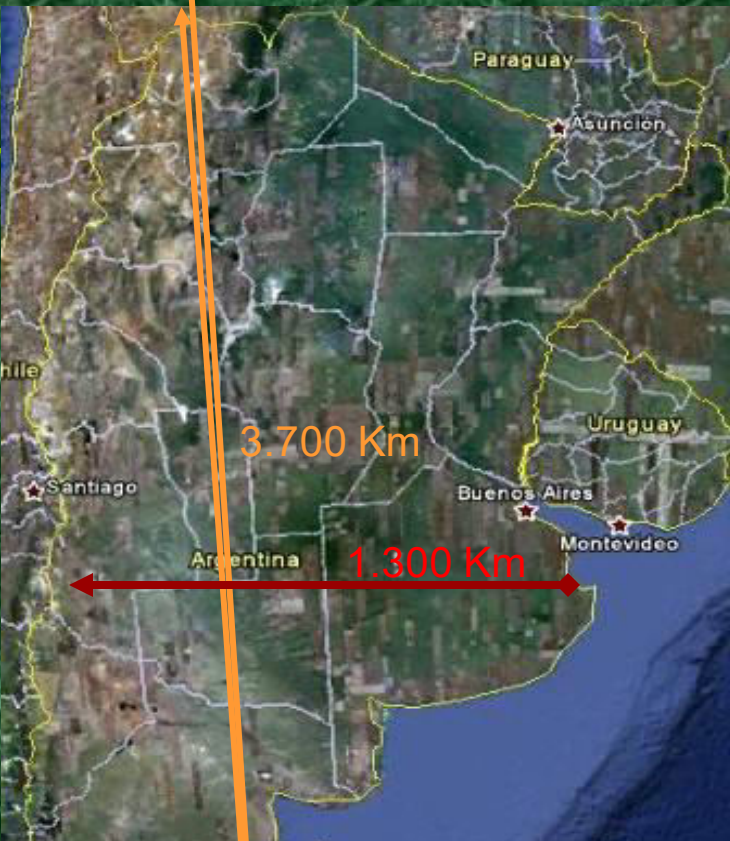


ARGENTINA

Population: 44,6 Million
Capital City: Buenos Aires
Population Density: 15 /Km2
Area: 2,78 millon sq km



NEW MARKETS



IS IT POSSIBLE TO ARRIVE TO SINGLE CONCLUSION FOR A COUNTRY CHALLENGE TO ADDRESS TECHNOLOGY INTRODUCTION COVERING VERY DIFFERENT AGROECOLOGICAL AND SOCIAL REGIONS



NATIONAL STRUCTURE

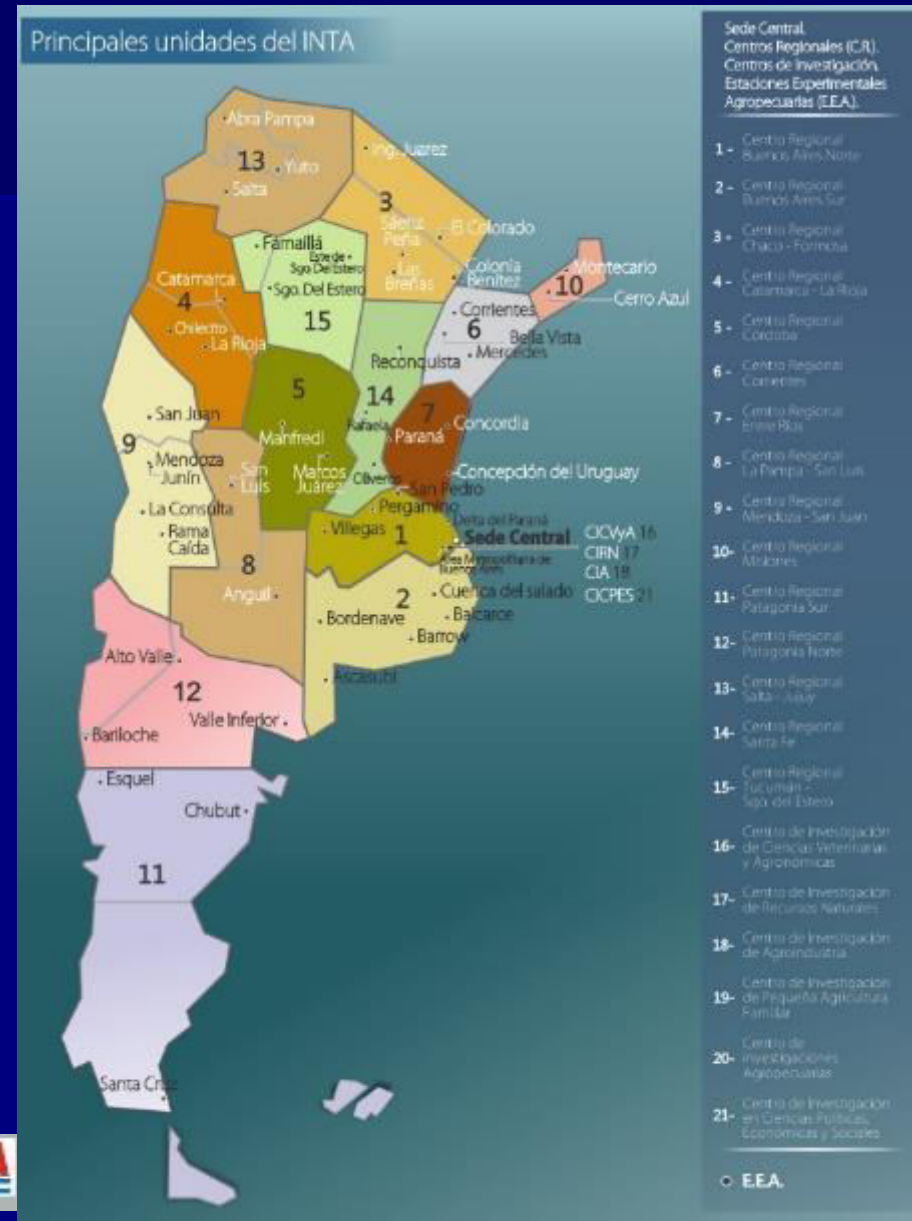
- Central office B.A.
- 15 Regionales centers
- 53 Experimental stations
- 6 Research centers
- 13 Research institutes
- 300 Extension units
- 9 Innovation parks
- INTA group members:
 - Foundation ArgenINTA
 - Private company INTEA S.A

7300 EMPLOYEES

Year budget 270 M dollars

<http://www.inta.gov.ar>

<http://inta.gov.ar/videos/institutional-video-in-english/view>





NATIONAL STRUCTURE

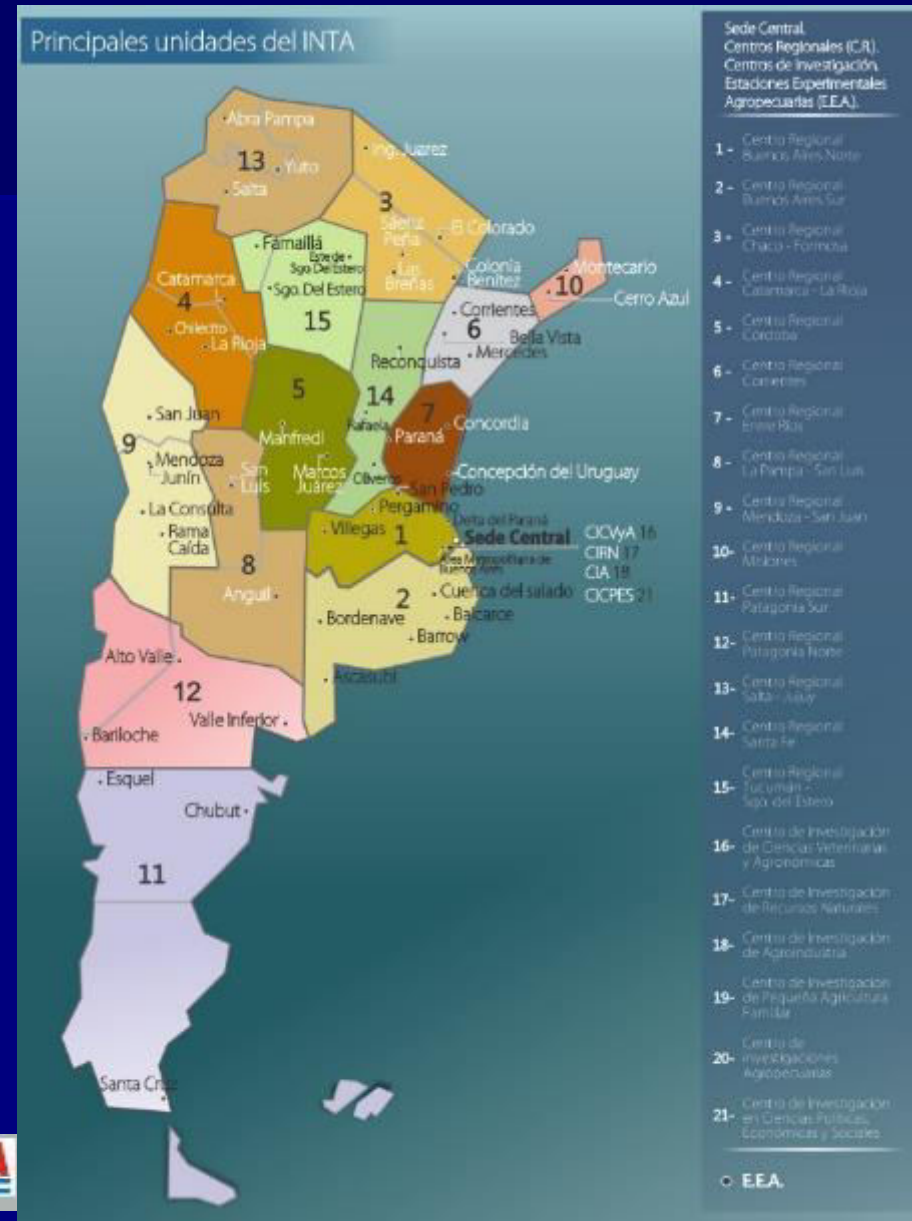
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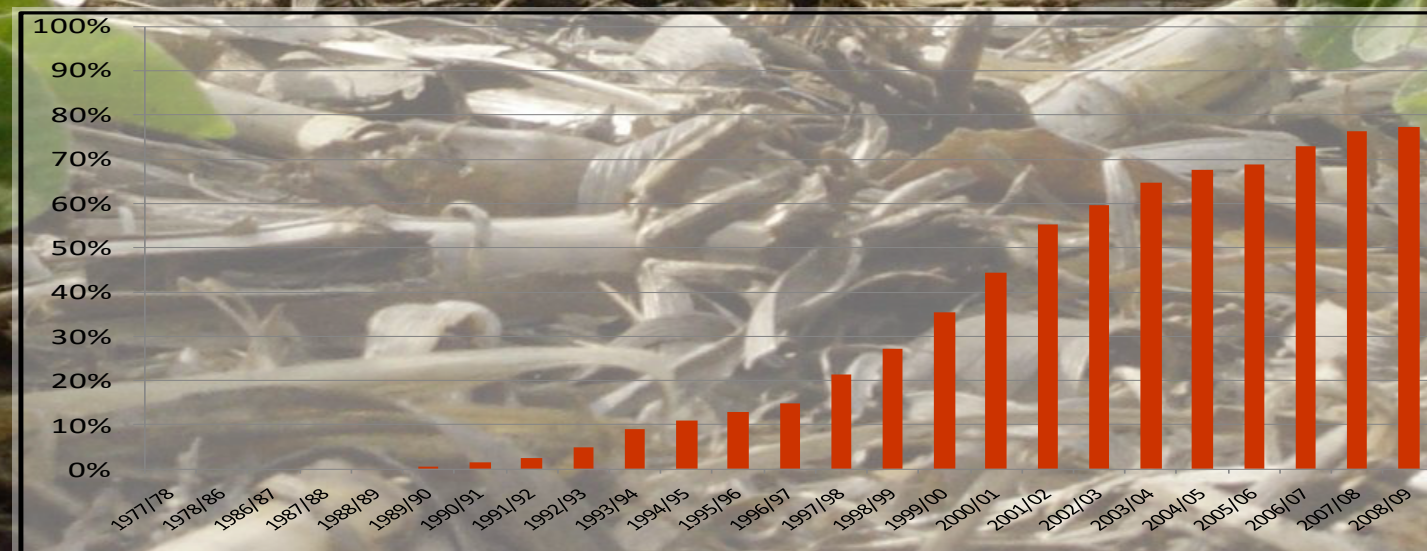
<http://www.inta.gov.ar>

<http://inta.gov.ar/videos/institutional-video-in-english/view>





No till technology conserves energy water resources and carbon in the soils
MORE THAN 80 % OF THE SURFACE



An aerial photograph of a farm. In the upper center, there is a large, long barn with a corrugated metal roof. To the left of the barn is a large, dark brown field. To the right is a lighter brown field. A dirt road or driveway runs along the right side of the barn. There are some smaller structures and vehicles near the barn. The overall scene is a typical agricultural landscape.

AGRICULTURE PRODUCTION

Intensive application of technology

**Farmers knowledge share and permanente
Innovation**

**No subsidezed agricultura very heavy tax over
production**

History and experience

Presition agriculture



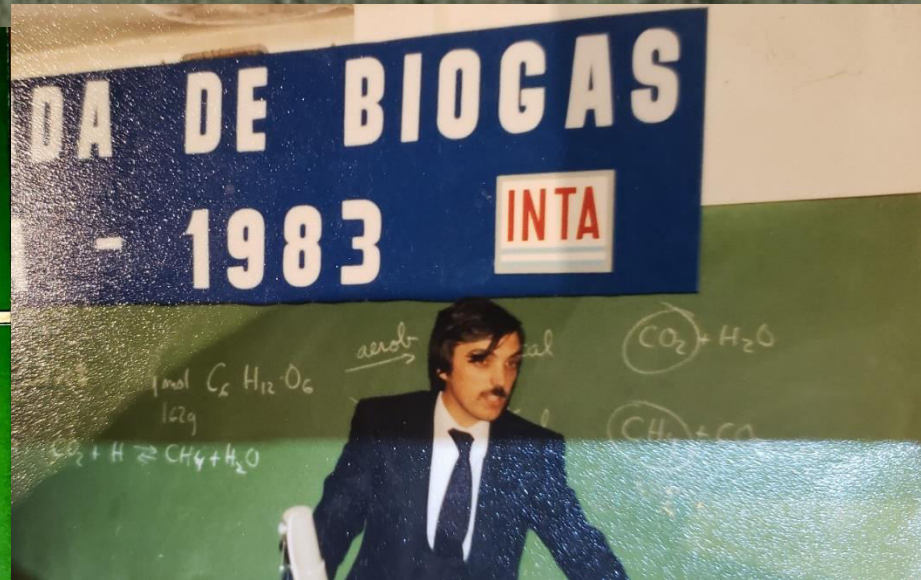
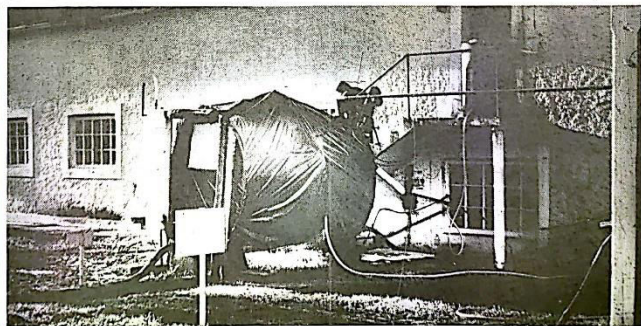
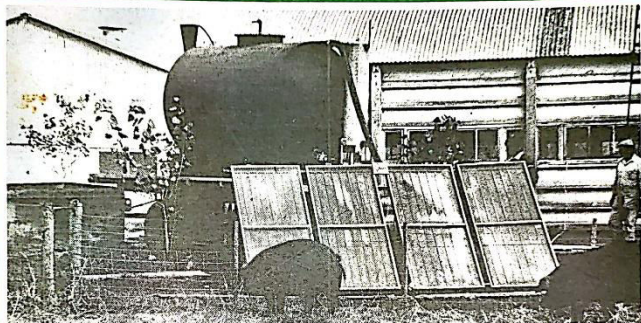
**High tec mature farm machinery industry
& technology
Development of high level employment in
rural towns**

A LONG WAY WITH BIOGAS

Biogas

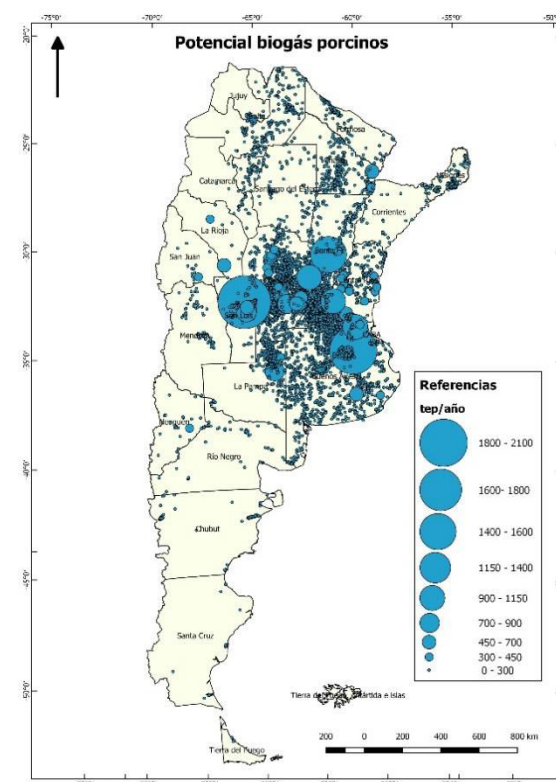
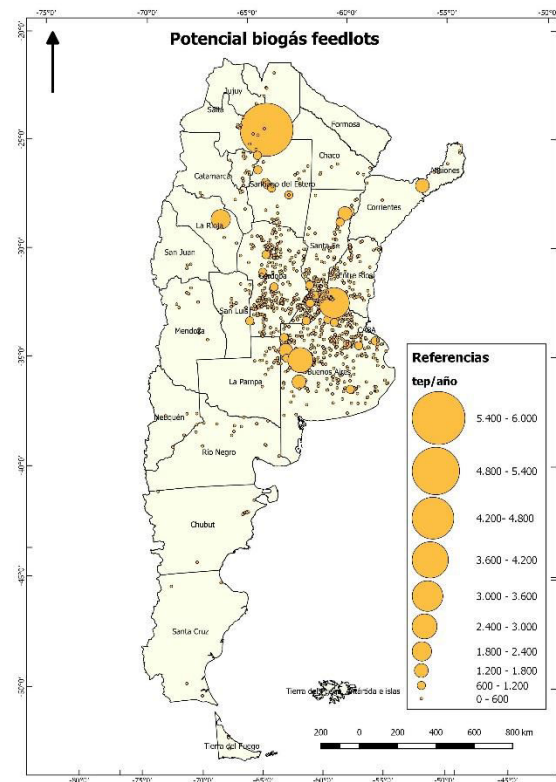
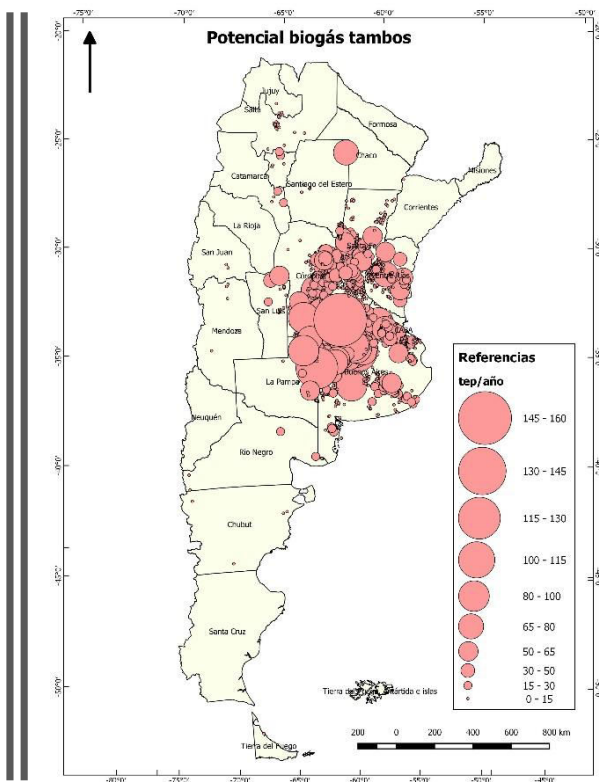
Energía y biofertilización
Manual de producción y utilización

Ing. Eugenio C. Gil Espinosa
Ing. Agr. Jorge A. Hilbert
Ing. Agr. Mario P. Bogliani



DEPARTAMENTO INGENIERIA RURAL - CASTELAR
REPUBLICA ARGENTINA - 1983

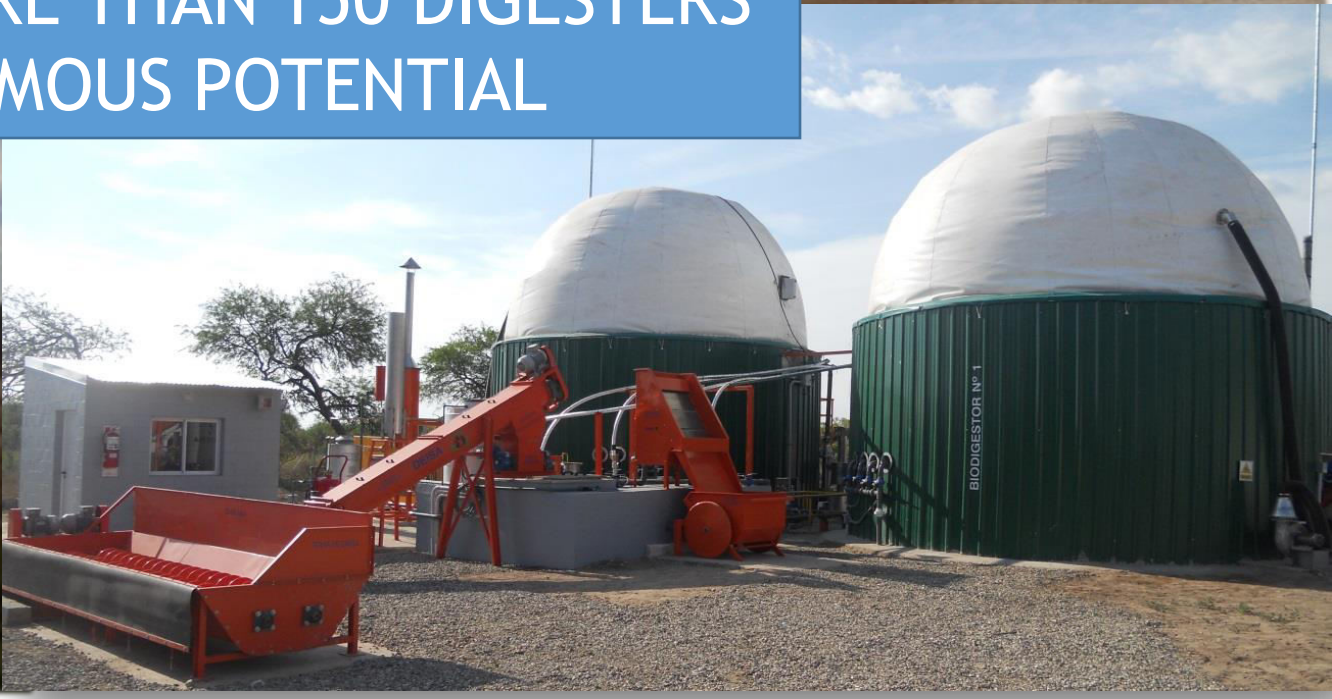




National Map of Biogas Potential-Probiomasa
360.000 TEP

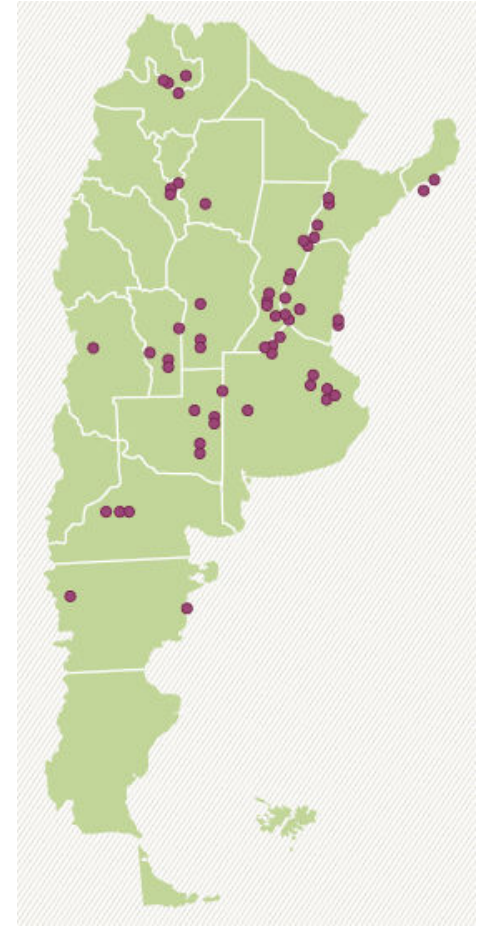


BIOGAS
ARGENTINA HAS MORE THAN 150 DIGESTERS
AND AN ENORMOUS POTENTIAL



National old biogas plants survey analyzing technical aspects

- More than 70 plants were detected in different provinces
- More than 80 % was not using biogas regularly
- 63 % had no temperature control and deficit in mixing systems
- Biogas being used in thermal and electrical production (38%)
- More than 20 technology providers were detected and the number is growing
- No security measures were detected in most of the plants.

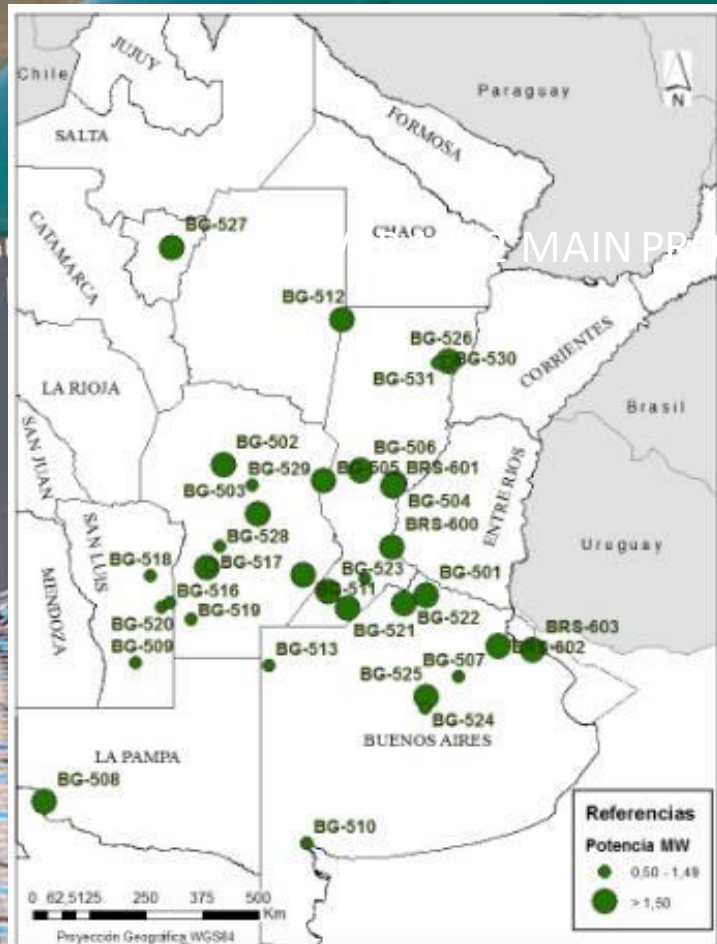
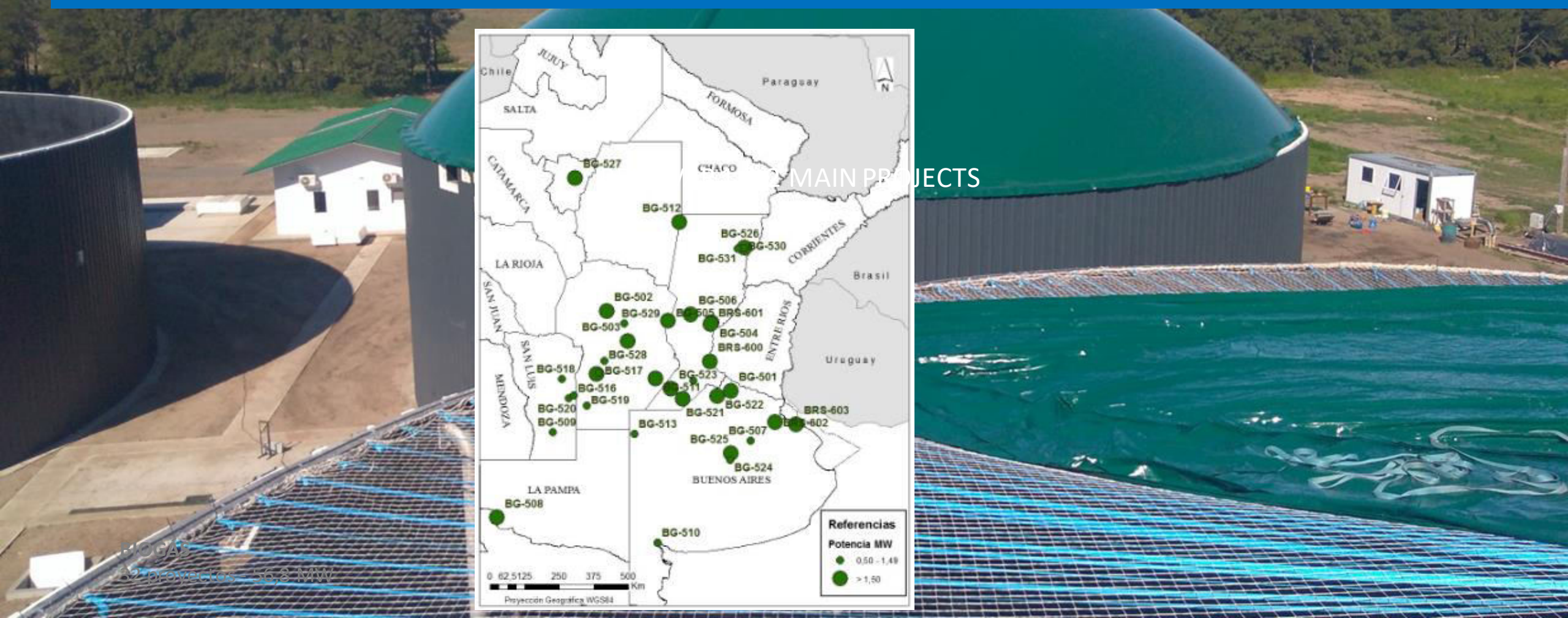


PROJECTS SITUATION IN ARGENTINA PROGRAMA RENOVAR

Round 1: 6 Biogás plants already in operation

Round 2: 32 Biogás plants, 3 Landfill recovery

Mini renovar 3: 14 new projects implementation stage



BIOGÁS
32 proyectos - 56,8 MW

RENOVAR 1 & 2 MAIN PROJECTS

Id	Oferente	Proyecto	Potencia	Provincia	PDI
BG-500	TANONI S.A	BG BOMBAL BIOGAS	1,20	SANTA FE	#7012
BG-501	ARREBEEF S.A.	BG ARREBEEF ENERGIA	1,50	BUENOS AIRES	#9514
BG-502	POLLOS SAN MATEO S.A.	BG POLLOS SAN MATEO	2,40	CORDOBA	#5135
BG-503	ACZIA BIOGAS	BG JAMES CRAIK	2,40	CORDOBA	#5129
BG-504	ACZIA BIOGAS	BG RECREO	2,40	SANTA FE	#7056
BG-505	ACZIA BIOGAS	BG SAN FRANCISCO	2,40	CORDOBA	#5144
BG-506	ACZIA BIOGAS	BG BELLA ITALIA	2,40	SANTA FE	#7051
BG-507	PACUCA S.A.	BG PACUCA BIO ENERGIA	1,00	BUENOS AIRES	#9512
BG-508	AB AGRO S.A.	BG AB ENERGIA	2,00	LA PAMPA	#1049
BG-509	SAN LINO AGROP.	BG BIOGAS SAN LINO	0,60	BUENOS AIRES	#9520
BG-510	INMADE SA	BG RESENER 1	0,72	BUENOS AIRES	#1232
BG-511	CECILIA DEBENEDETTI	BG ENRECO	2,00	CORDOBA	#5143
BG-512	LOS AMORES	BG SANTIAGO ENER. RENOVABLES	6,00	SANTIAGO DEL ESTERO	#4103
BG-513	MARIA ELENA S.A.	BG GRAL. VILLEGAS	1,20	BUENOS AIRES	#9530
BG-514	BIOMASS GROUP	BG AMPLIACION 2	1,20	CORDOBA	#5040
BG-515	BIOELECTRICA 2 S.A.	BG AMPLIACION BIOELECT.2	1,20	CORDOBA	#5040
BG-516	BIOMASS GROUP	BG BIO JUSTO DARACT	1,00	SAN LUIS	#5035
BG-517	BIOGENERADORA CENTRO	BG SANTA CATALINA	2,00	CORDOBA	#5039
BG-518	BIO ENERGIA YANQUETRUZ	BG YANQUETRUZ 2	0,80	SAN LUIS	#5021
BG-519	ANTIGUA ESTANCIA DON ROBERTO	BG EL ALEGRE BIO	1,00	CORDOBA	#5031
BG-520	ANTIGUA ESTANCIA DON ROBERTO	BG DON ROBERTO BIO	1,00	SAN LUIS	#5001
BG-521	OMAR NCESNICH	BG BIOCAÑA	3,00	SANTA FE	#20
BG-522	SEEDS ENERGY	BG PERGAMINO	2,40	BUENOS AIRES	#9500
BG-523	SEEDS ENERGY	BG VENADO TUERTO	2,00	SANTA FE	#7010
BG-524	CARNES DELA PATAGONIA	BG GRAL ALVEAR	1,00	BUENOS AIRES	#9522
BG-525	CARNES DELA PATAGONIA	BG EL MANGRULLO	2,00	BUENOS AIRES	#9523
BG-526	JF SECCO	BG AVELLANEDA	6,00	SANTA FE	#7062
BG-527	CITRUSVIL	BG CITRUSVIL	3,00	TUCUMAN	#4291
BG-528	CLEAR ENERGY	BG JIGENA 1	1,00	CORDOBA	#5033
BG-529	CLEAR ENERGY	BG VILLA DEL ROSARIO	1,00	CORDOBA	#5141
BG-530	SILVINA HACEN	BG DEL REY	1,00	SANTA FE	#7061
BG-531	SILVINA HACEN	BG DON NICANOR	1,00	SANTA FE	#7060

RenovAr MiniRen Round 3



Biogas

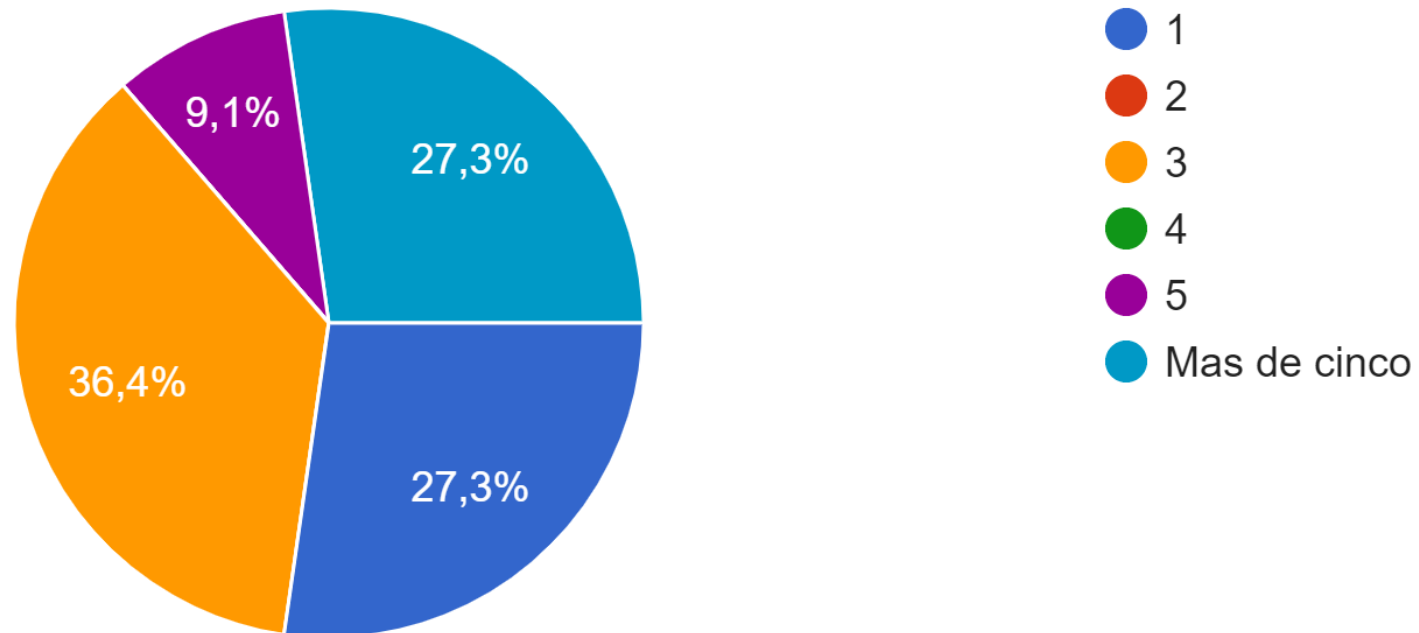
ID OFERTA	TECNOLOGÍA	NOMBRE DEL PROYECTO	OFERENTE	POTENCIA OFERTADA (MW)	PROVINCIA
BG-3500	BIOGÁS	C.T. BIOANGLO	COMPANIA ANGLO DE TIERRAS CORDOBA SA	1,00	CORDOBA
BG-3501	BIOGÁS	C.T. BIO DE SOUZA	AGRO DE SOUZA SA	0,55	BUENOS AIRES
BG-3502	BIOGÁS	C.T. BELL VILLE	ARINCO SA - CLEANERGY RENOVABLES SA	1,20	CORDOBA
BG-3503	BIOGÁS	C.T. BIO-EITTOR ENERGY	EITTOR SA	1,20	BUENOS AIRES
BG-3504	BIOGÁS	C.T. ADECOAGRO ENERGIA	ADECO AGROPECUARIA SA	2,00	SANTA FE
BG-3505	BIOGÁS	C.T. EL TRIUNFO	BIO VERDE ENERGIA LINCOLN SA	1,50	BUENOS AIRES
BG-3506	BIOGÁS	C.T. LA PALOMA BIOENERGIA	ALDO GUSTAVO LONGO	1,00	CORDOBA
BG-3507	BIOGÁS	C.T. BIOGAS ROJAS	SEEDS ENERGY GROUP SA	2,90	BUENOS AIRES
BG-3508	BIOGÁS	C.T. BIOGAS SALTO	SEEDS ENERGY GROUP SA	2,90	BUENOS AIRES
BG-3509	BIOGÁS	C.T. BIOGAS VENADO TUERTO II	SEEDS ENERGY GROUP SA	1,45	SANTA FE
BG-3510	BIOGÁS	C.T. GORINA ENERGIA	GORINA ENERGIA SA	1,50	BUENOS AIRES
BG-3511	BIOGÁS	C.T. BIOGAS SAN LUIS	DIASER SA	2,00	SAN LUIS



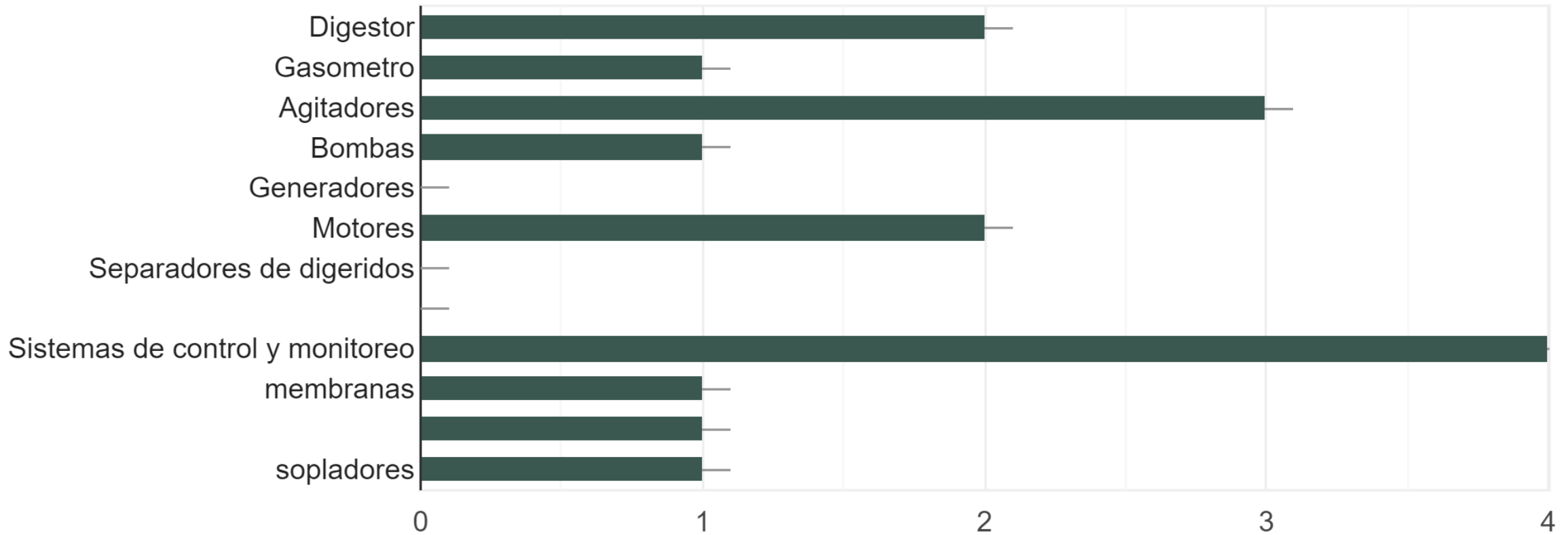
**RESULTS OF ON LINE SURVEY
MADE WITH
DEVELOPERS AND CONSTRUCTION
BIOGAS COMPANIES**

**We received 11 developer answers that represent 35
constructed plants 90 % of new facilities in Argentina**

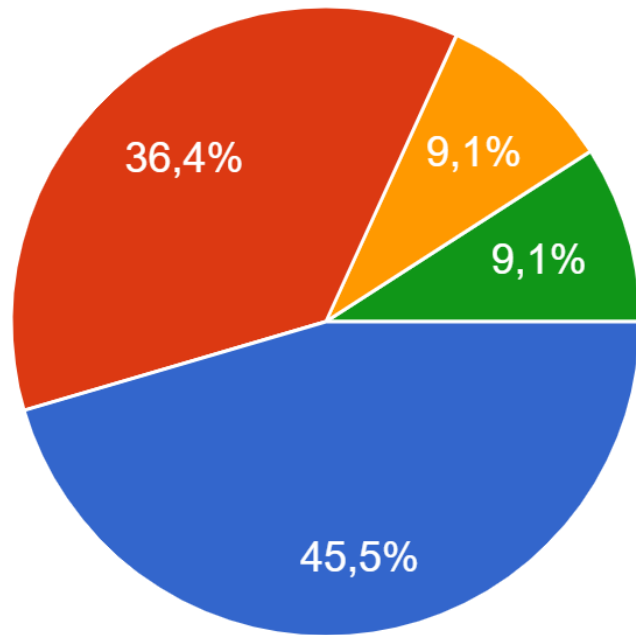
How many projects have you constructed



Type of technology aquired from EU

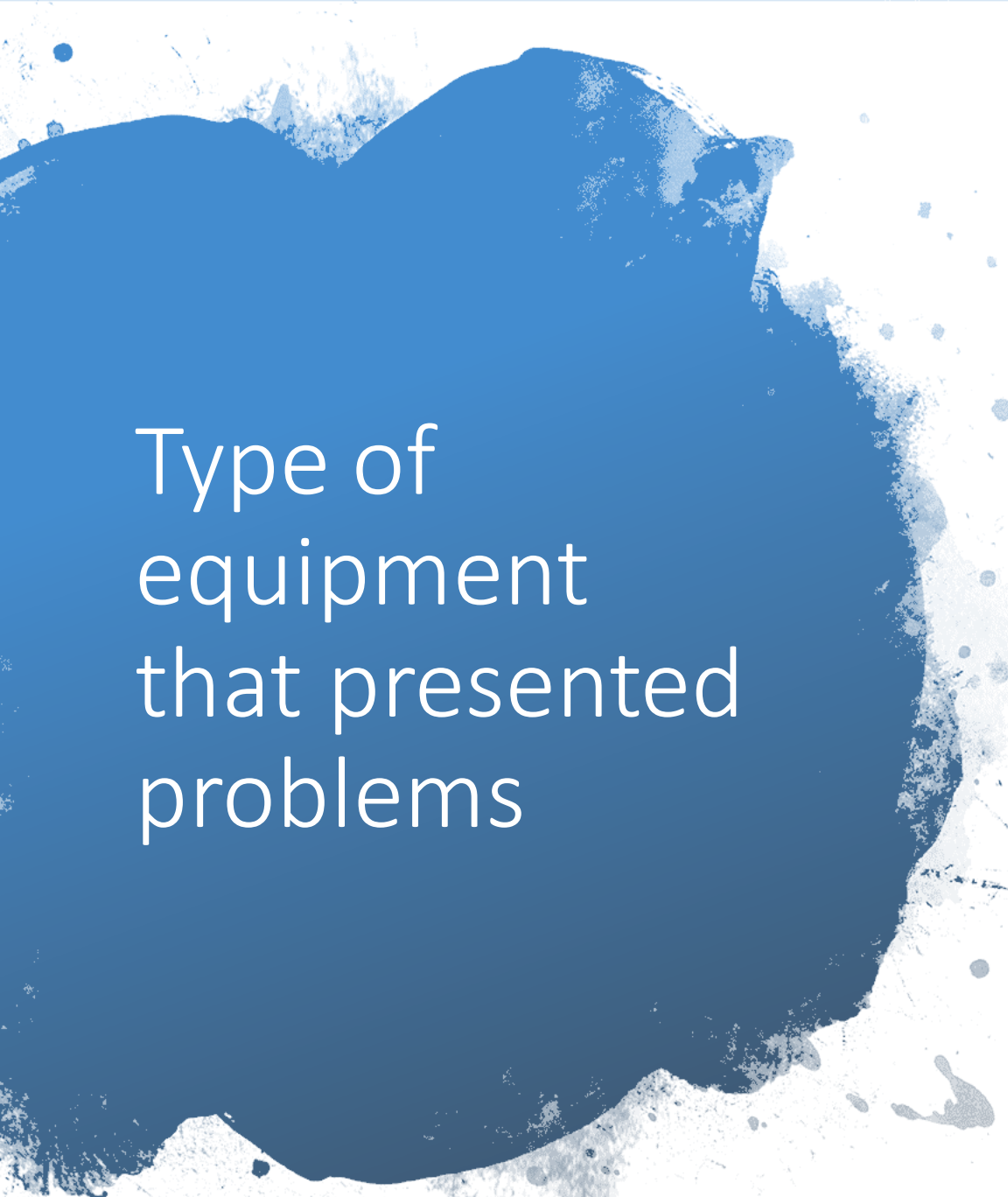


Which type of equipments had no O&M problems



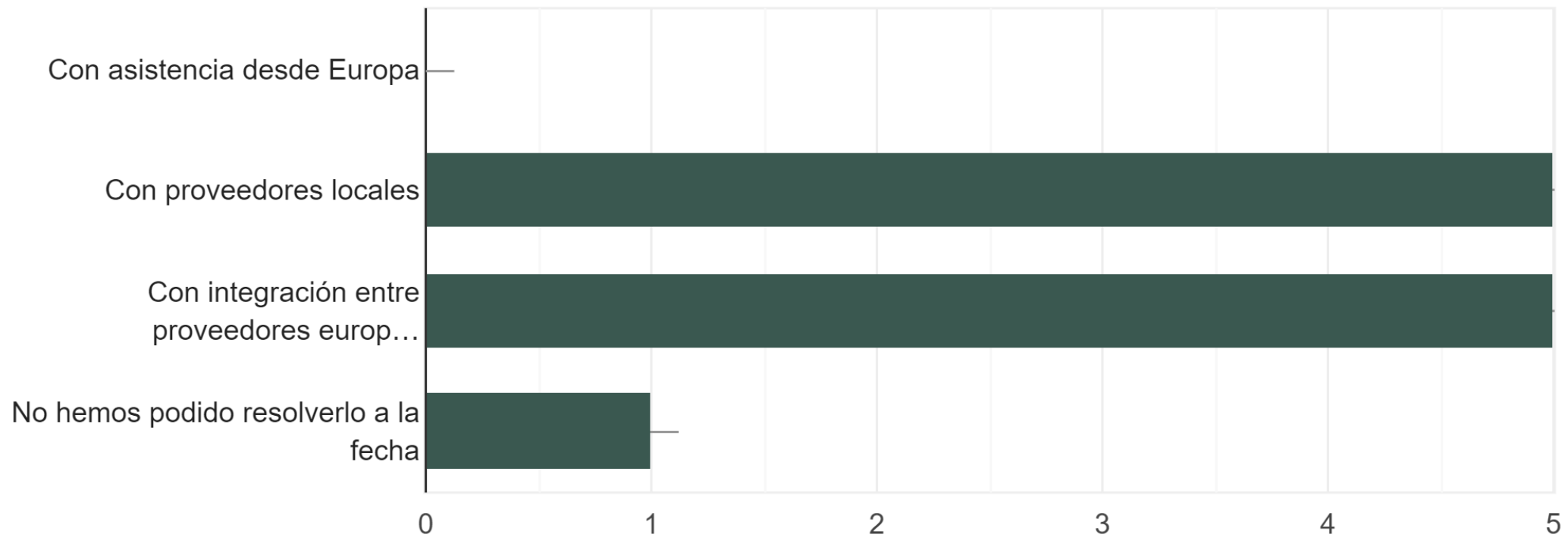
- Todos
- Algunos
- No está en marcha
- Sin operacion aun.





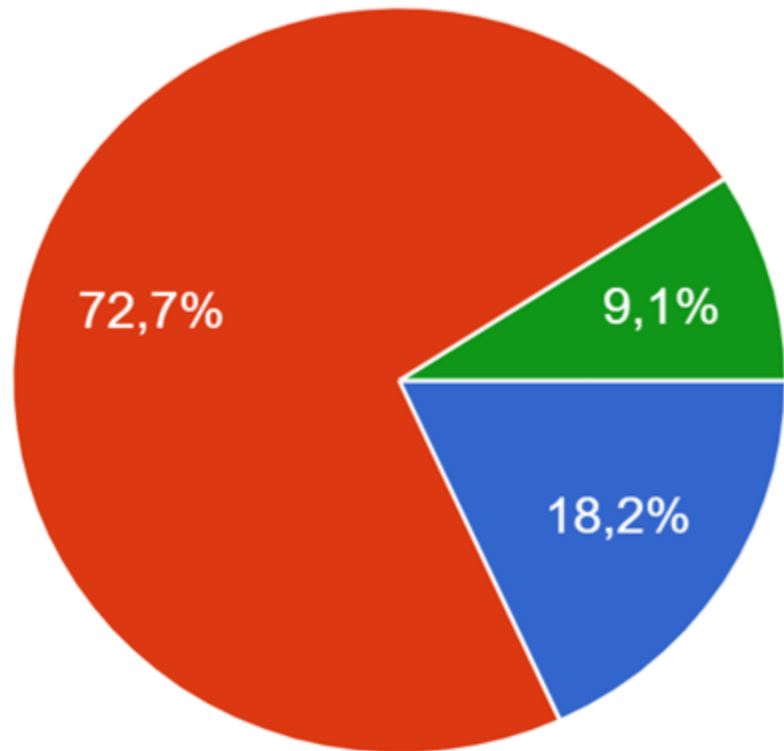
Type of equipment that presented problems

- Stainless steel equipment
- Control systems
- In some cases the heat exchangers get dirty with sludge
- Hot water biodigester heating circuit, cavitation problems
- Inadequate water slopes, it was difficult to integrate additional solar thermotanging.
- Pumps and control systems
- Agitators and pumps
- Pretreatment equipment not suitable for feedstock






How did you solve the problems

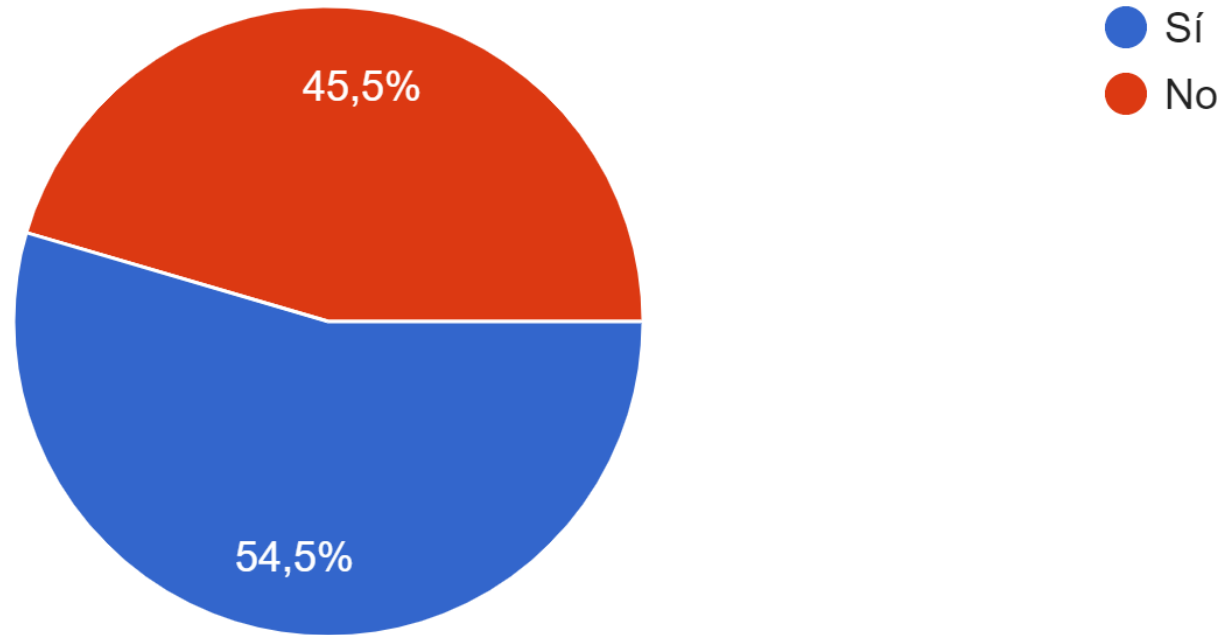
. estima que sería necesaria i.



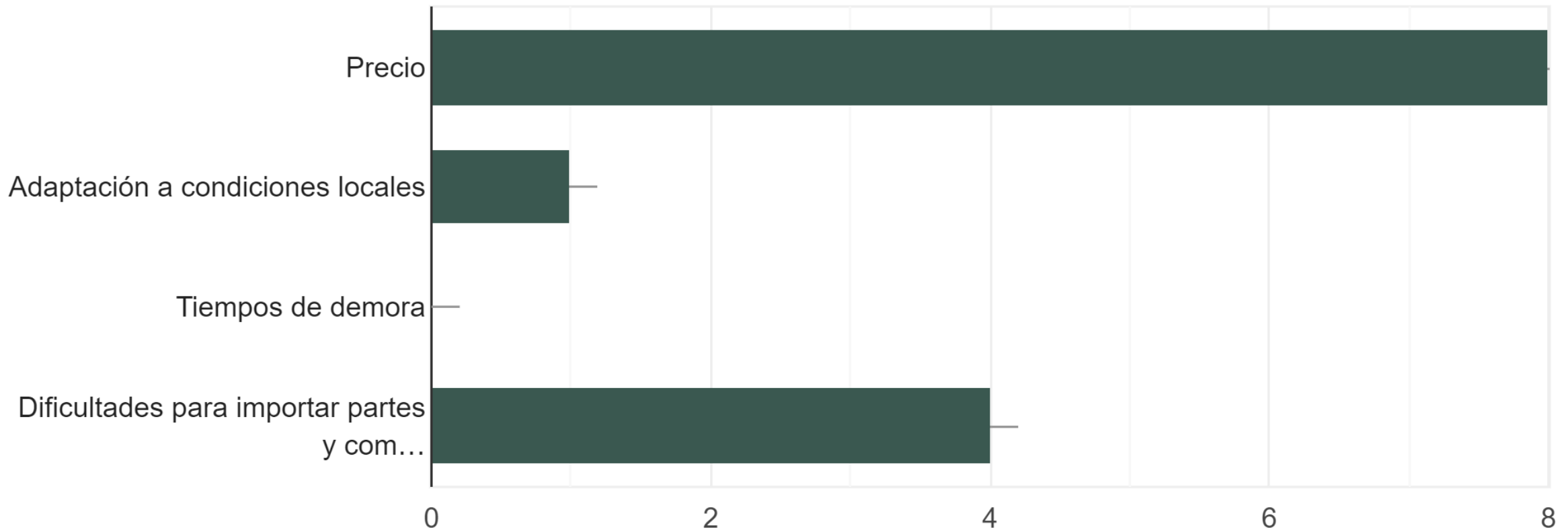
Type of technologies
you think is crucial to
be incorporated from
Europe

-  Some specific parts and components
-  None
-  Integrated systems

Where you able to establish partnerships between European and local providers



Which has been the biggest challenge to incorporate EU technology



Additional comments with EU technology

- **Good experience, local tax difficulties.**
- **Very good experience with european suppliers, german language difficulties.**
- **We propose to establish technology transeference systems under the offset methodology to develop local industrial capacity in order to consolidate domestic suppliers**
- **We propose the incorporation of european technology in work developed in the ibero-american network**
- **For us it was only necessary to purchase measuring instruments, of european origin, nationalized by national companies.**
- **The european biogas industry is recognized as of excellent quality, as are the professionals in the area with whom we have interacted. The cost of equipment is prohibitive for low- and medium-scale projects, making it impossible to acquire and thus learning derived from the use of more reliable technologies.**
- **We propose to facilitate access to technologies that we do not develop in argentina through subsidies and promote the exchange of professionals who can experience first hand in europe.**
- **The experience is good, the improvements is to make strong links and to have trade agreements that help incorporate that technology.**
- **Over time we were selecting suppliers and have managed today to have very strong and secure alliances with specific equipment suppliers with high reliability and competitive prices**
- **In principle quite good, but with very little support in technical implementations**



An aerial photograph of a large-scale agricultural facility under construction. The foreground features four large, cylindrical, grey metal silos with green domes and blue vertical accents. To the left, there are stacks of white pipes. In the background, several long, dark-roofed structures are under construction, and a large area is covered with white plastic mulch. The surrounding landscape is flat and green, with a clear blue sky.

Tigonbu San Luis

Results from field trip workshop and direct interactions



SIX PLANTS AND THREE COMPANIES VISITED

- ✓ **Equipment and technologies for specific feedstocks pretreatment**
- ✓ **Posttreatment equipment & technologies in order to**
 - ✓ **Upgrade digestate**
 - ✓ **Obtain higher value coproducts**
 - ✓ **Field application using precision agriculture techniques**
 - ✓ **Nutrient Management**
- ✓ **Joint Ventures with local industries**



**Digital global
Biogas
Cooperation**

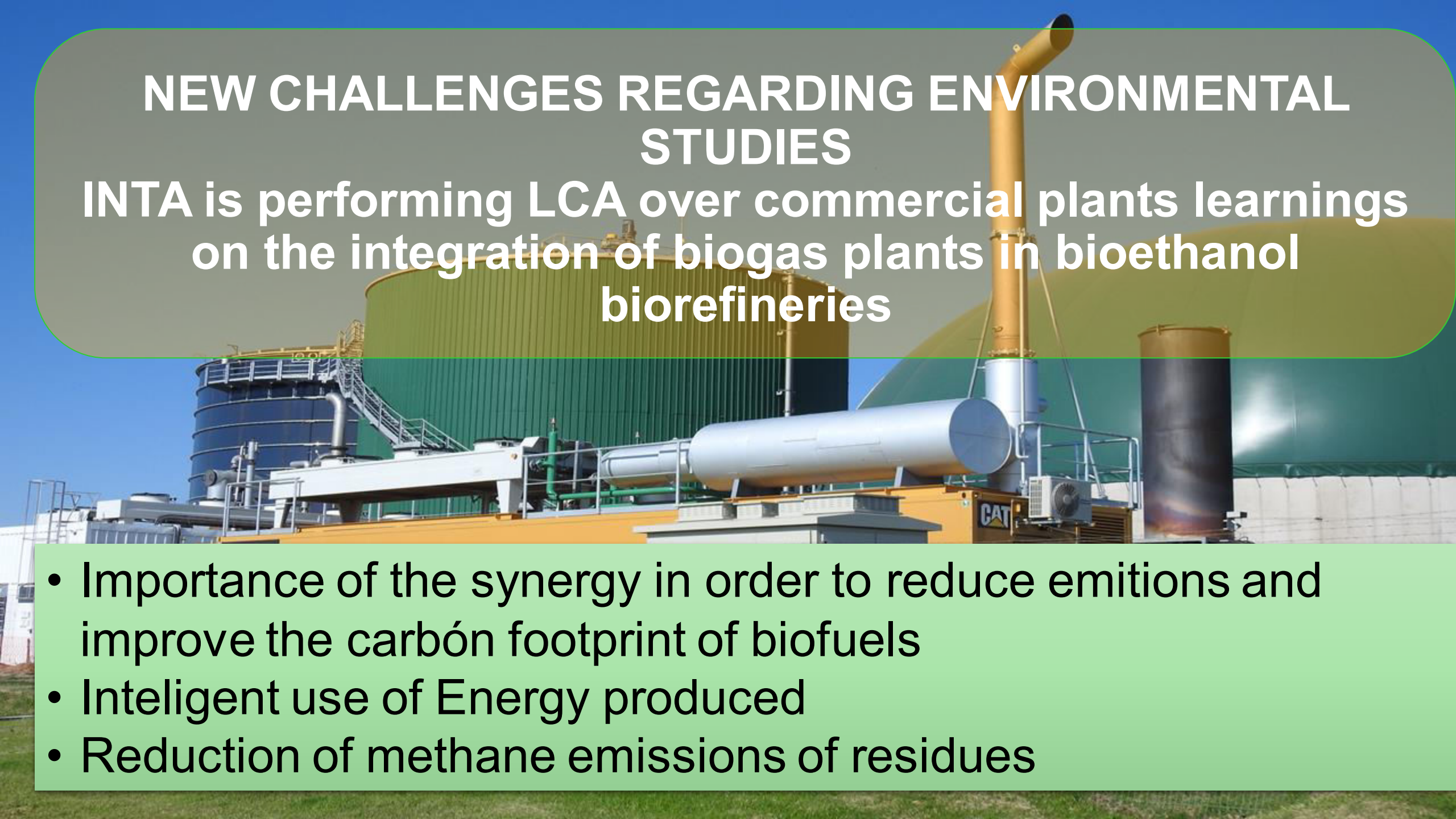


**Instituto Nacional de
Tecnología Agropecuaria**

NEW CHALLENGES REGARDING ENVIRONMENTAL STUDIES

INTA is performing LCA over commercial plants learnings on the integration of biogas plants in bioethanol biorefineries

- Importance of the synergy in order to reduce emissions and improve the carbón footprint of biofuels
- Intelligent use of Energy produced
- Reduction of methane emissions of residues



BIOGAS DONE RIGHT BDR

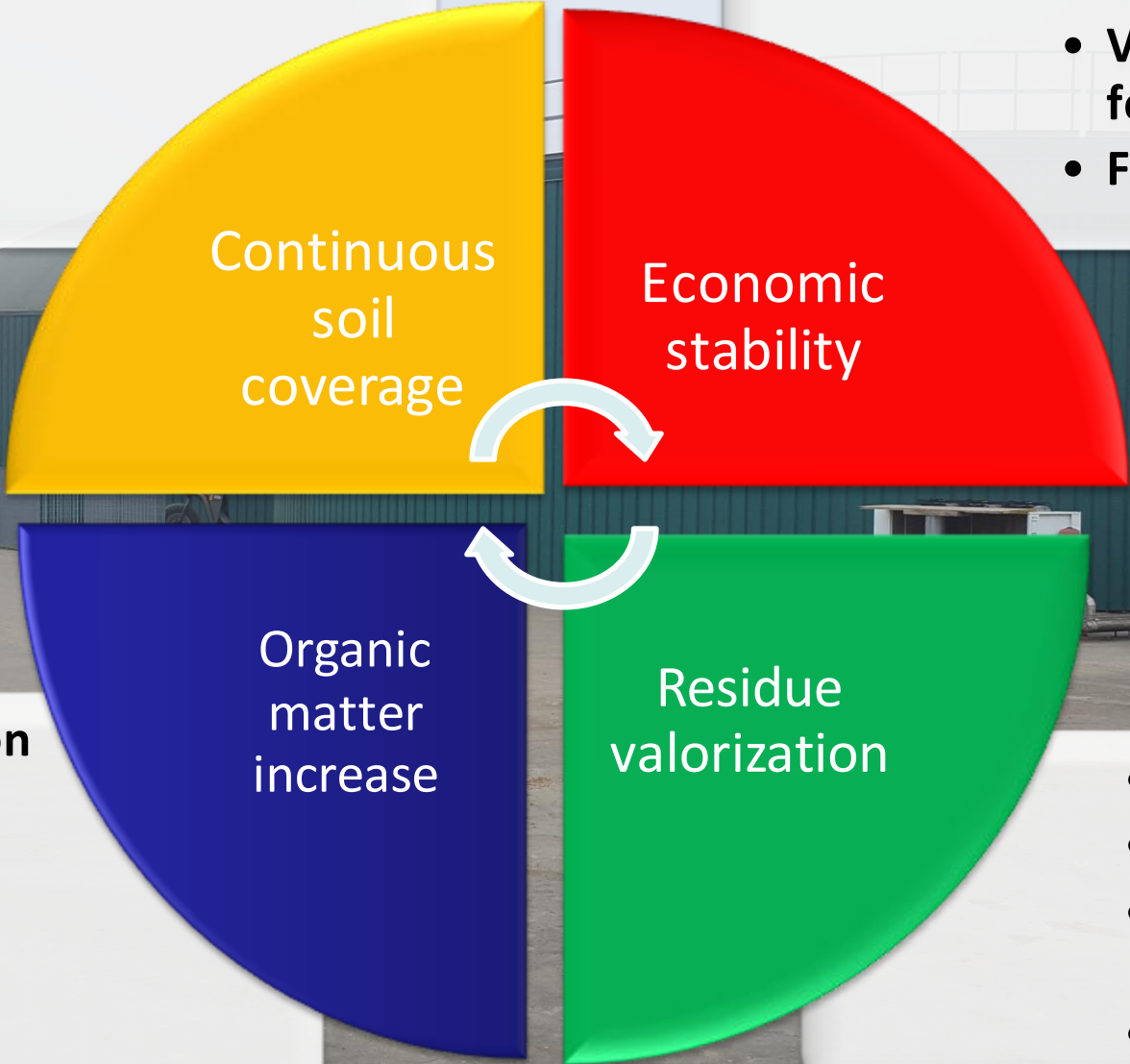
**A NEW PROPOSAL TOWARDS A
SUSTAINABLE DEVELOPMENT OF
BIOGAS**

**OPPORTUNITY FOR EUROPEAN
TECHNOLOGIES**

<https://www.youtube.com/watch?v=Rb-aV-pTYRE>

BDR

- Improve water quality
- Erosion reduction
- Productivity improvement
- GHG reduction



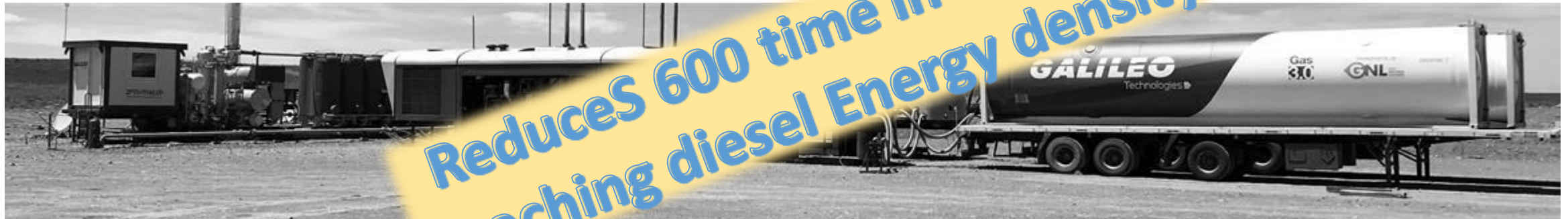
- Increase money flow
- Volatility minimization food feed & energy markets
- Fertilization reduction costs

- Nutrient loss reduction
- Better water use
- Yield and soil fertility increase
- Carbon footprint improvement

- Energy and coproducts
- Emission credits
- External reduction dependence
- ILUC risk reduction



JOINT VENTURE EXAMPLE ARGENTINE CNG & LNG TECHNOLOGY CRYOBOX



**Reduces 600 times in volume
Reaching diesel Energy density**



USOS DEL BIOMETANO – CASOS DE EXITO

Al 2020 la tecnología Cryobox se esta implementando para conectar los pozos hidrocarburiferos de Argentina y el mundo, aislados de los gasoductos troncales. Bajo el mismo esquema de gasoducto virtual, el gas natural de pozo se pone a disposición de los consumidores. El mismo gas natural de pozo, puede ser sustituido por biometano, es decir gas natural de fuentes renovables. Algunos casos de éxito donde la tecnología Cryobox–Bio puede abastecer de BIO-GNL para consumo:



**CENTRALES TERMICAS
DE GENERACION ELECTRICA**



INDUSTRIAS / CONSUMO RESIDENCIAL



TRANSPORTE



Actual situation & forecast

- The RENOVAR program with the different calls produced a new market and incentives for new projects. New administration will respect contracts and last call. There is uncertainty regarding future actions.
- The PROBIOMASA program of the Ministry of Agriculture has a specific biogas program organizing meetings & courses all over the country and online. The program has an updated biogas project data base in a GIS format and specific studies.
- INTA & INTI continue with their projects focusing on design and laboratory support
- New companies in the market are growing most in a mix way with europeans
- There is an increasing lobby to promote biomethane in the new biofuel law.
- There is an increasing interest and awareness on biogas benefits in the agricultura and agroindustry sector.
- Economic instability is always an issue in Argentina



¡Muchas Gracias!

Ing.Agr. M.Sc. Jorge A. Hilbert
Instituto de Ingeniería Rural CIA

Mail hilbert.jorge@inta.gob.ar
jorgeantoniohilbert@gmail.com



<https://sites.google.com/view/jorge-antonio-hilbert/p%C3%A1gina-principalTwitter>



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