Reducing Emissions in Chile
by promoting the use of
Combined Heat and Power Plants
in Industry and Commerce

Catalogue of Publications

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

IKI INTERNATIONAL CLIMATE INITIATIVE

Ministerio de Energía

Gobierno de Chile

Agencia de Sostenibilidad Energética

COGENERACIÓN Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

PROJECT CONTEXT

The project **"Reducing emissions through the application of cogeneration in the industrial and commercial sectors in Chile"**, was implemented by **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH**, the Chilean **Ministry of Energy** and the **Energy Sustainability Agency** between 2017 and 2022, on behalf of and financed by **Germany's Federal Ministry for the Environment, Nature and Nuclear Safety (BMU)** through the **Climate Protection Initiative (IKI)** in the framework of Chile-Germany cooperation. The objective of this project was to promote the development of cogeneration in Chile, contribute to the development of appropriate technical regulations for this technology, and bolster the capacities of Chilean institutions in the public, industrial and commercial sectors.

Learn more about this project

cogeneracioneficiente.cl

CHP in the portfolio of 4echile.cl

Video about CHP

2015

Preparation and structuring of the project.
Technical support and stakeholder awareness-raising.

2016

Creation of the cogeneracioneficiente.cl website.
Technical support for the Superintendency of Electricity and Fuels (SEC) in the development of regulations for efficient cogeneration.
Development of the first applied cogeneration course.

2017

Technology tour of Germany with SEC counterparts, review of Germany's cogeneration safety rules and technical regulation and its applicability to Chile.
Review and preparation of pre-feasibility studies for the industrial, commercial, and public sectors

2018

Drafting of potential studies in several productive sectors and the real estate sector in Chile.
Development of a tool to estimate the energy efficiency potential of MSMEs.
Development of an advanced course for the design of cogeneration facilities and exclusive cogeneration contracts.

2019

Policy study on district energy and cogeneration undertaken. Support in the preparation of a draft district energy bill.
Donation of cogeneration equipment to the Catholic University of Valparaiso (Quilpué campus) to implement a cogeneration heat integration laboratory.

2020

Preparation of a specific cogeneration examination for the Energy Sustainability Agency's records. Efficient cogeneration website updated.

2021-2022

Implementation of a cogeneration and trigeneration calculator on the website.
An interactive e-learning cogeneration course and specific courses for renewable energy and demand management are being developed.
Technical studies and reports on cogeneration and hydrogen are being prepared

COGENERACIÓN Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

PROJECT RESULTS

6

Improvement of the policy and regulatory framework by contributing to **six specific regulations** in cooperation with the Superintendency of Electricity and Fuels (SEC).

50

events attended by over

4,000

people

42

training courses were given to **890 professionals**, 156 of whom are women

CO_2

The new CHP installations reduced

379,000

ton/co_2 by 2021

and will reduce a total of

1,069,209

ton/co_2 by 2032

70

consultations and (pre-)feasibility studies for installations were processed by the project

The website **www.cogeneracioneficiente.cl** has received over

68,000

user visits

212

press appearances

COGENERACIÓN Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

SOME OF THE INSTITUTIONS WE HAVE COLLABORATED WITH

ASSOCIATIONS

ACHBIOM Asociación Chilena de Biomasa

ANESCO CHILE AG

PUBLIC AGENCIES

Ministerio de Energía
Gobierno de Chile

Agencia de Sostenibilidad Energética

SEC

COMPANIES

CCU

cmpc

MINDEF

arauco

FUEL DISTRIBUTORS

GASCO

Lipigas

abastible

INTERNATIONAL / REGIONAL (LATAM)

ENGIE

caem CORPORACIÓN AMBIENTAL EMPRESARIAL

Una filial de: Cámara de Comercio de Bogotá

TEACHERS AND RESEARCH NETWORK

PONTIFICIA UNIVERSIDAD CATÓLICA DE VALPARAÍSO

UNIVERSIDAD TECNICA FEDERICO SANTA MARIA

nacap
UNIVERSIDAD TECNOLÓGICA DE CHILE
INSTITUTO PROFESIONAL
CENTRO DE FORMACIÓN TÉCNICA

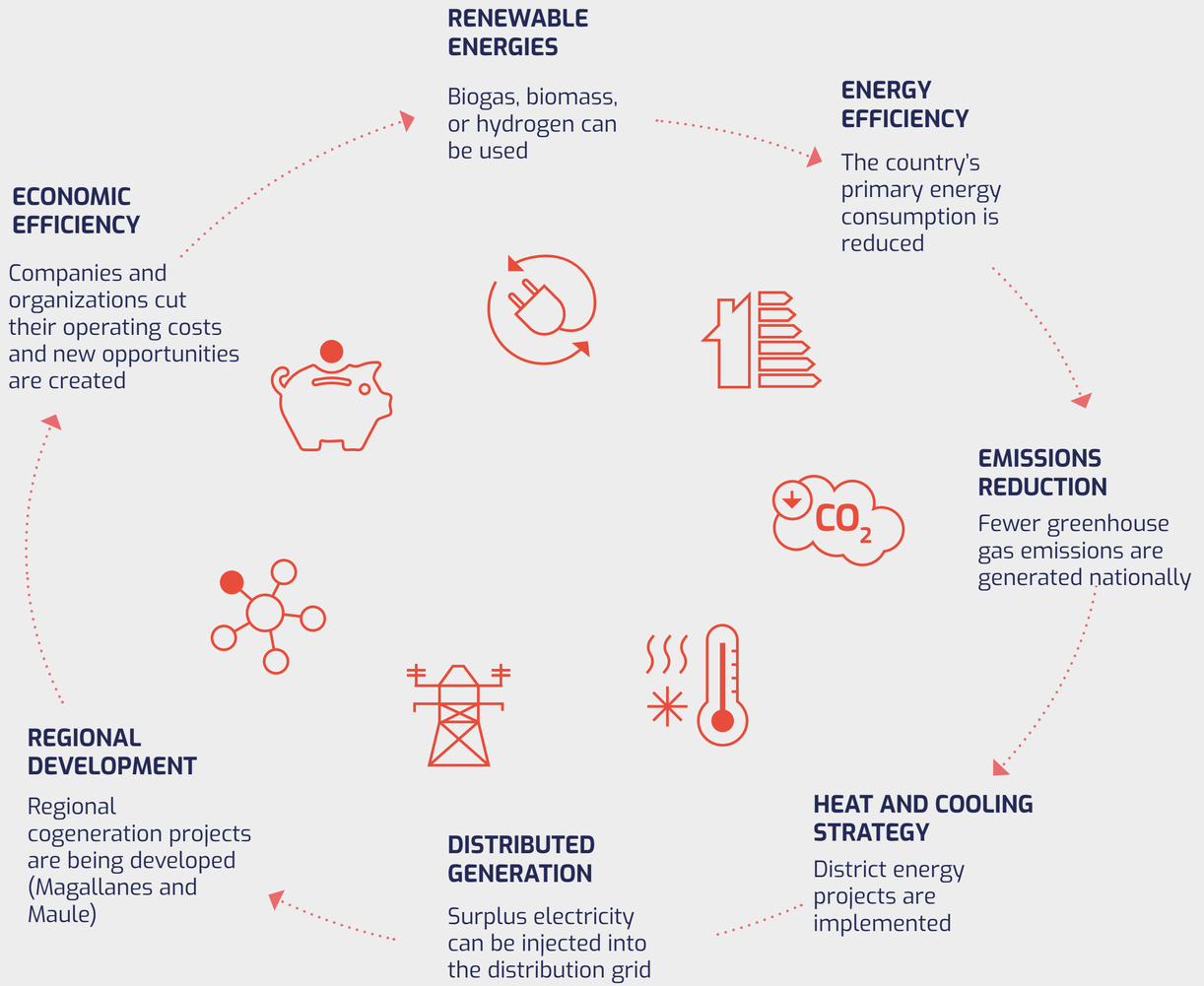
UNIVERSIDAD DE SANTIAGO DE CHILE

BENEFITS OF COGENERATION

Cogeneration technology contributes to the strategic development of public policies, the implementation of new projects, and business opportunities. It promotes the efficient use of energy resources and, in combination with the use of cleaner fuels like biomass, biogas, or hydrogen, makes a double contribution to emissions reduction.

It is present in public policies on energy efficiency, cooling and heat, and distributed generation. Cogeneration is promoted through the development of regional initiatives to implement projects, such as the Magallanes Region (cogeneration in public buildings and hospitals) and the Maule Region (district energy and cogeneration), which improve the quality of energy and people's access to it.

It also creates new business opportunities for companies, organizations, and project developers, favoring the economic efficiency of production processes and the creation of job and business opportunities for the various energy sector actors.



COGENERACIÓN Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

OBJECTIVES

Policy and regulatory framework

- Evaluation of cogeneration experiences in Chile
- Development of technical standards for operating permits
- Contribution to the development of a regulatory framework

Increasing the capacity of Chilean institutions

- Trainings for staff of Chilean institutions
- Creation and support of a technical help desk at Agencia SE
- Support for a quality control system

Cogeneration solutions for the Chilean market

- Analysis of potential for industry and commerce
- Analysis of the potential for new cogeneration applications
- Implementation and evaluation of selected projects
- Technology transfer

Strengthening local capacities

- Training of local consultants and engineers
- Awareness raising and training of decision-makers
- Creation of a cogeneration training center

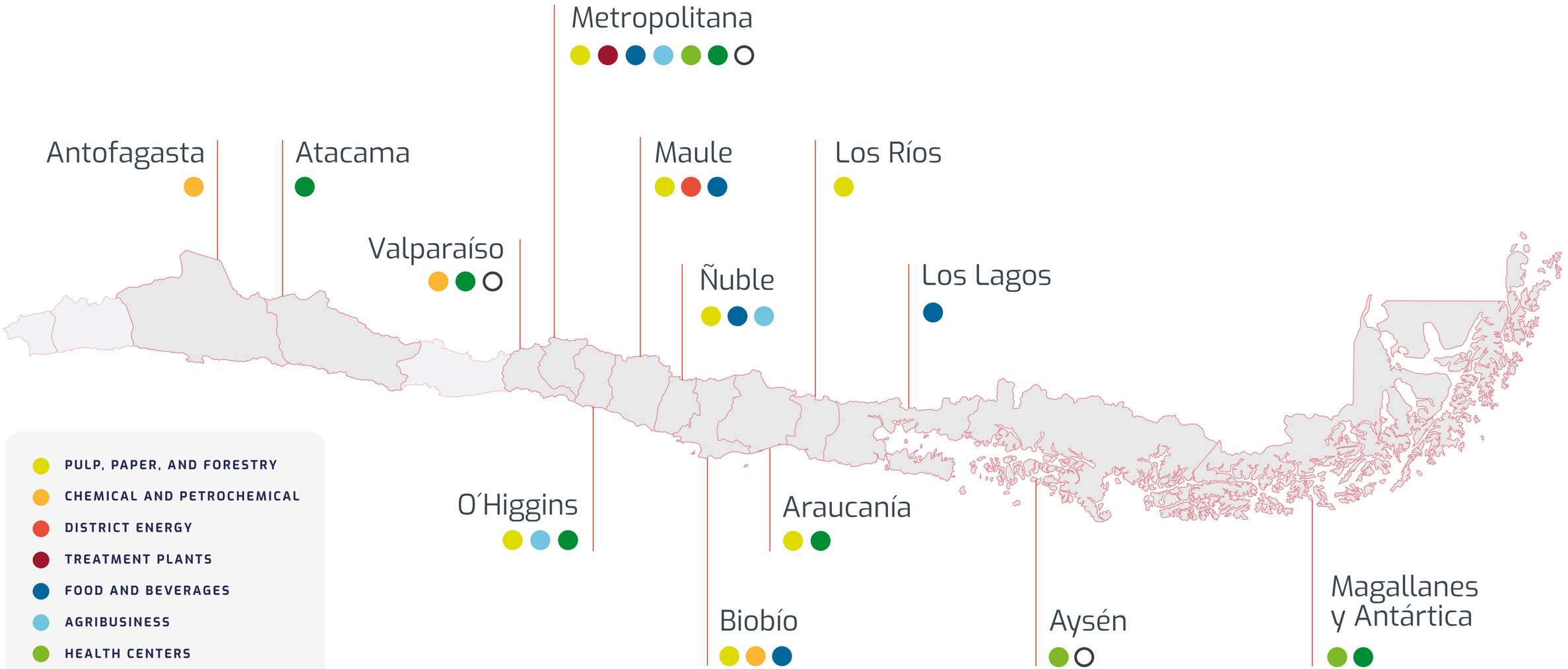
Dissemination and outreach

- Improve the information base on the use and potentials of cogeneration
- Fostering regional exchange on cogeneration

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

COGENERATION IN CHILE AND PRODUCTIVE SECTORS

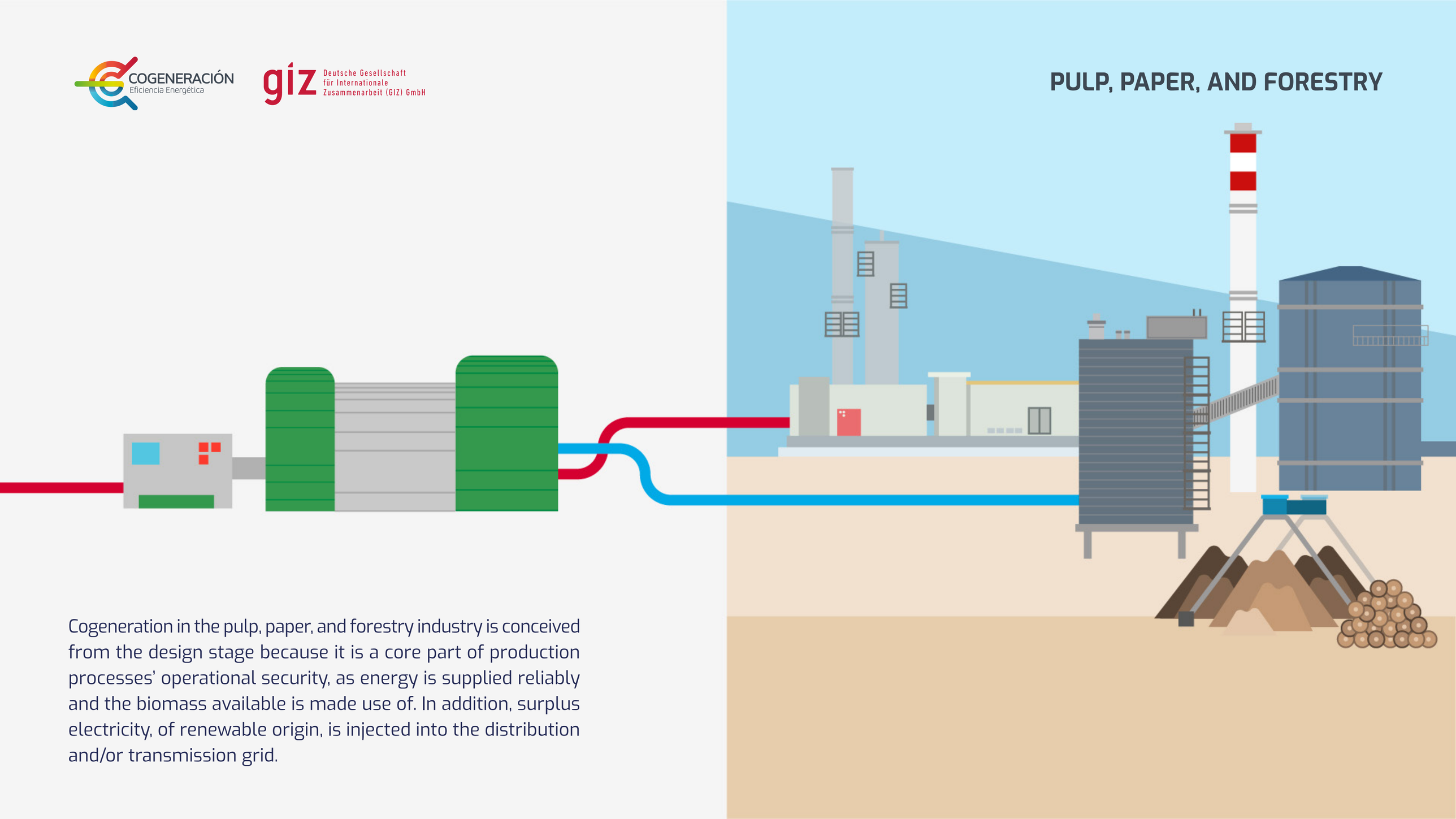


- PULP, PAPER, AND FORESTRY
- CHEMICAL AND PETROCHEMICAL
- DISTRICT ENERGY
- TREATMENT PLANTS
- FOOD AND BEVERAGES
- AGRIBUSINESS
- HEALTH CENTERS
- HOTELS AND BUILDINGS
- OTHERS

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

PULP, PAPER, AND FORESTRY

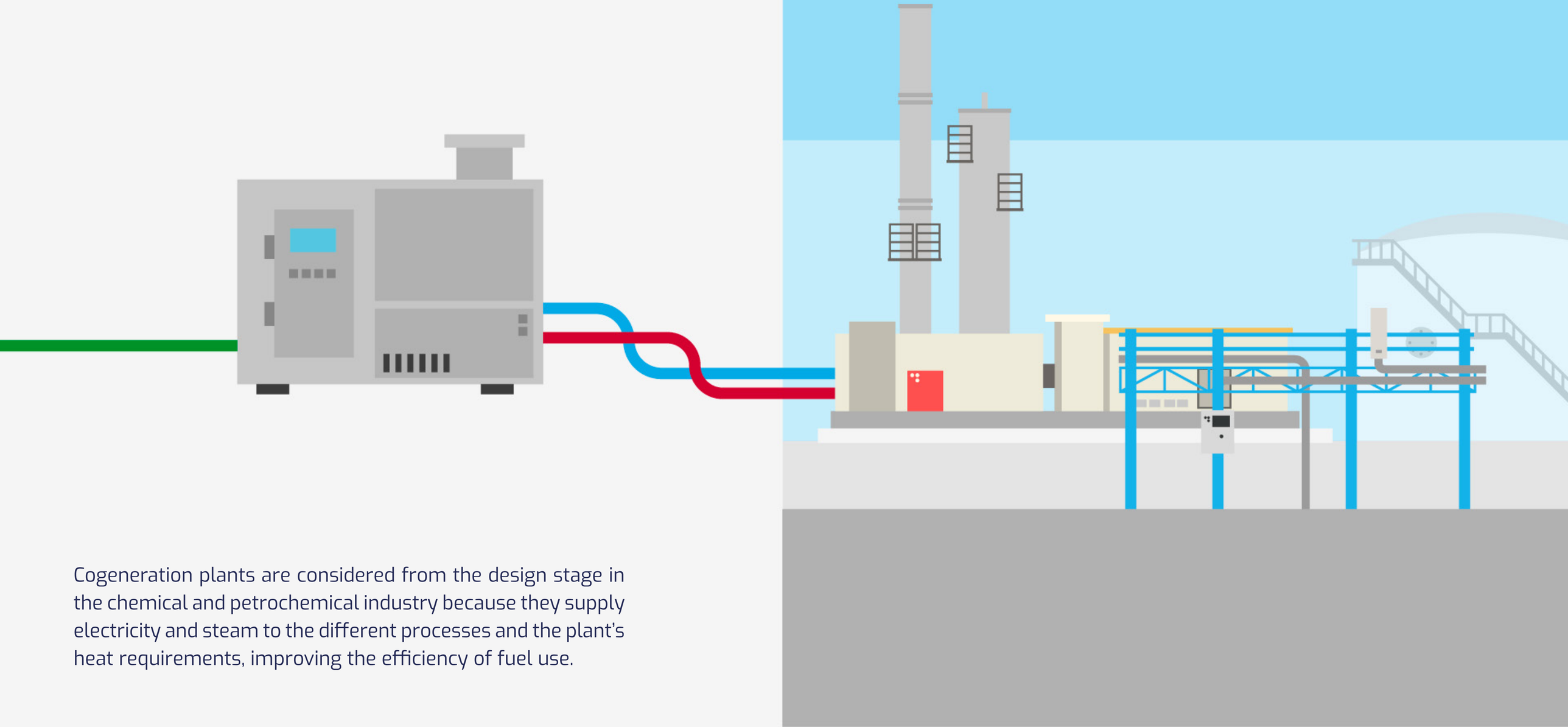


Cogeneration in the pulp, paper, and forestry industry is conceived from the design stage because it is a core part of production processes' operational security, as energy is supplied reliably and the biomass available is made use of. In addition, surplus electricity, of renewable origin, is injected into the distribution and/or transmission grid.

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

CHEMICAL AND PETROCHEMICAL

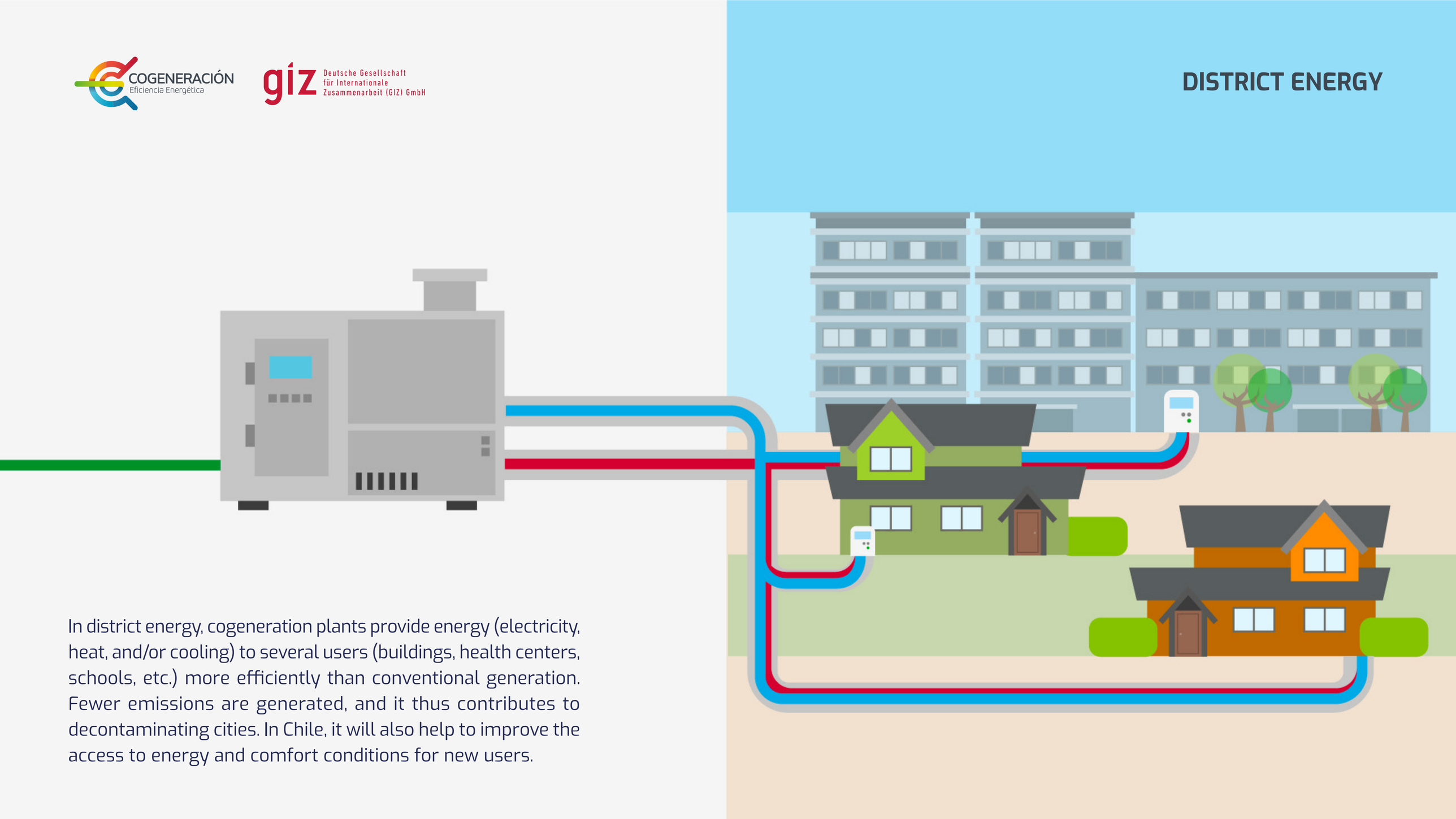


Cogeneration plants are considered from the design stage in the chemical and petrochemical industry because they supply electricity and steam to the different processes and the plant's heat requirements, improving the efficiency of fuel use.

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

DISTRICT ENERGY

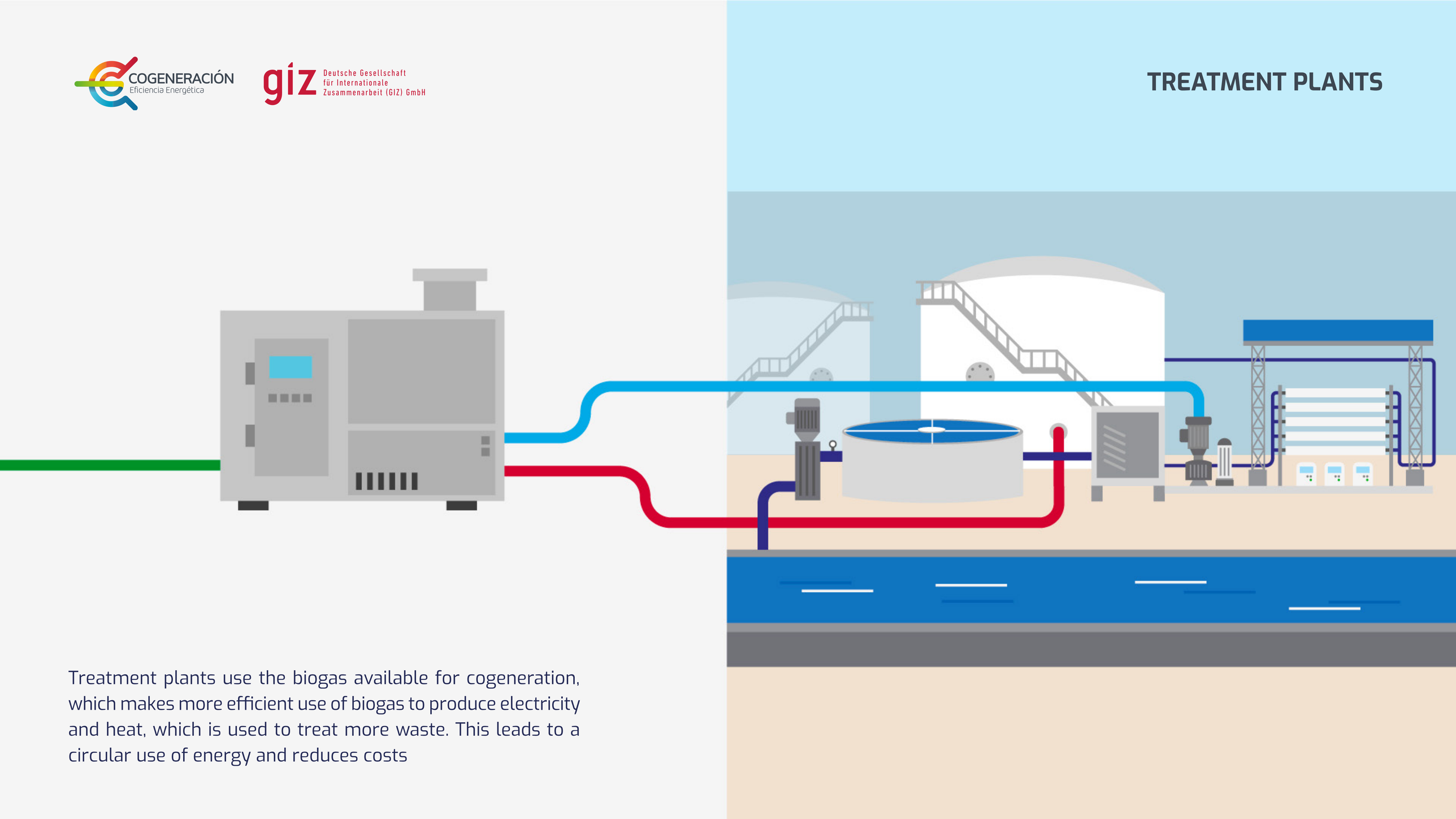


In district energy, cogeneration plants provide energy (electricity, heat, and/or cooling) to several users (buildings, health centers, schools, etc.) more efficiently than conventional generation. Fewer emissions are generated, and it thus contributes to decontaminating cities. In Chile, it will also help to improve the access to energy and comfort conditions for new users.

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

TREATMENT PLANTS

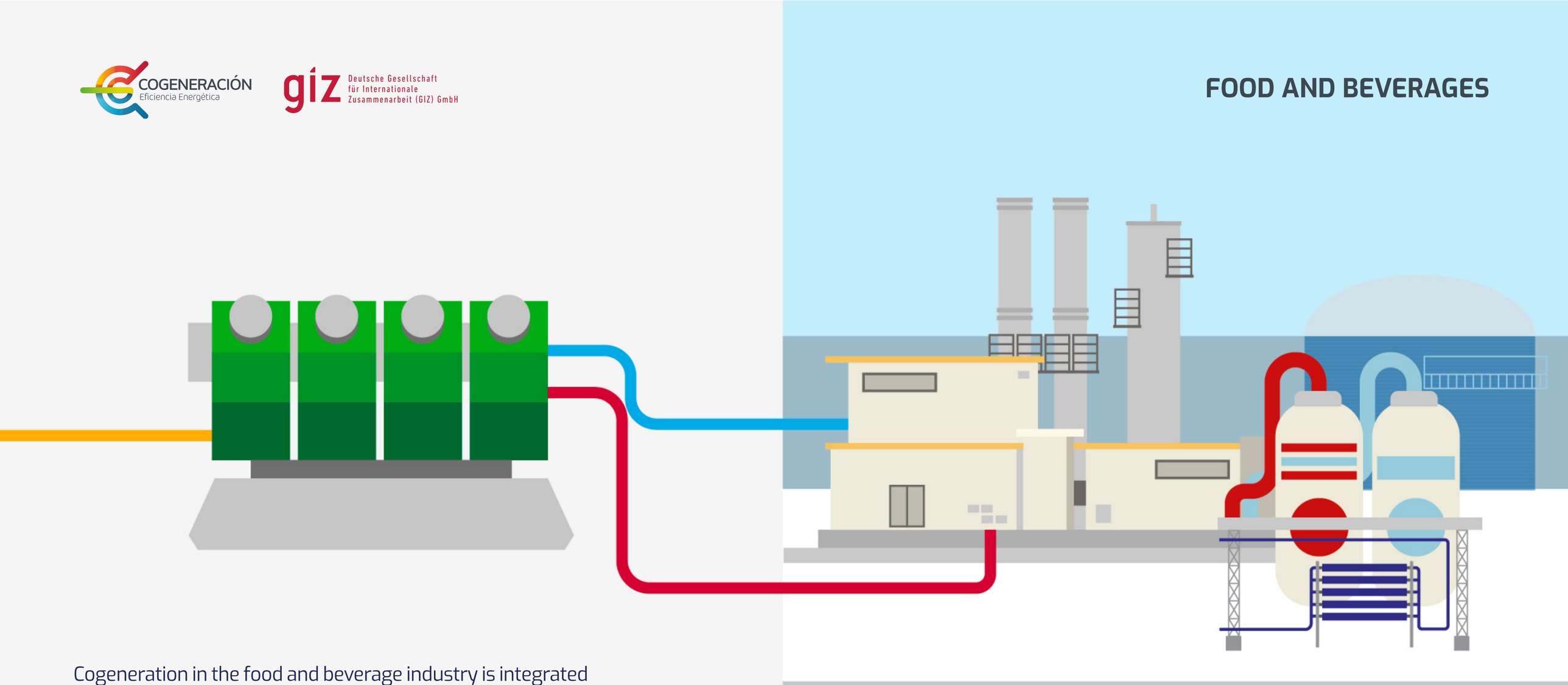


Treatment plants use the biogas available for cogeneration, which makes more efficient use of biogas to produce electricity and heat, which is used to treat more waste. This leads to a circular use of energy and reduces costs

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FOOD AND BEVERAGES

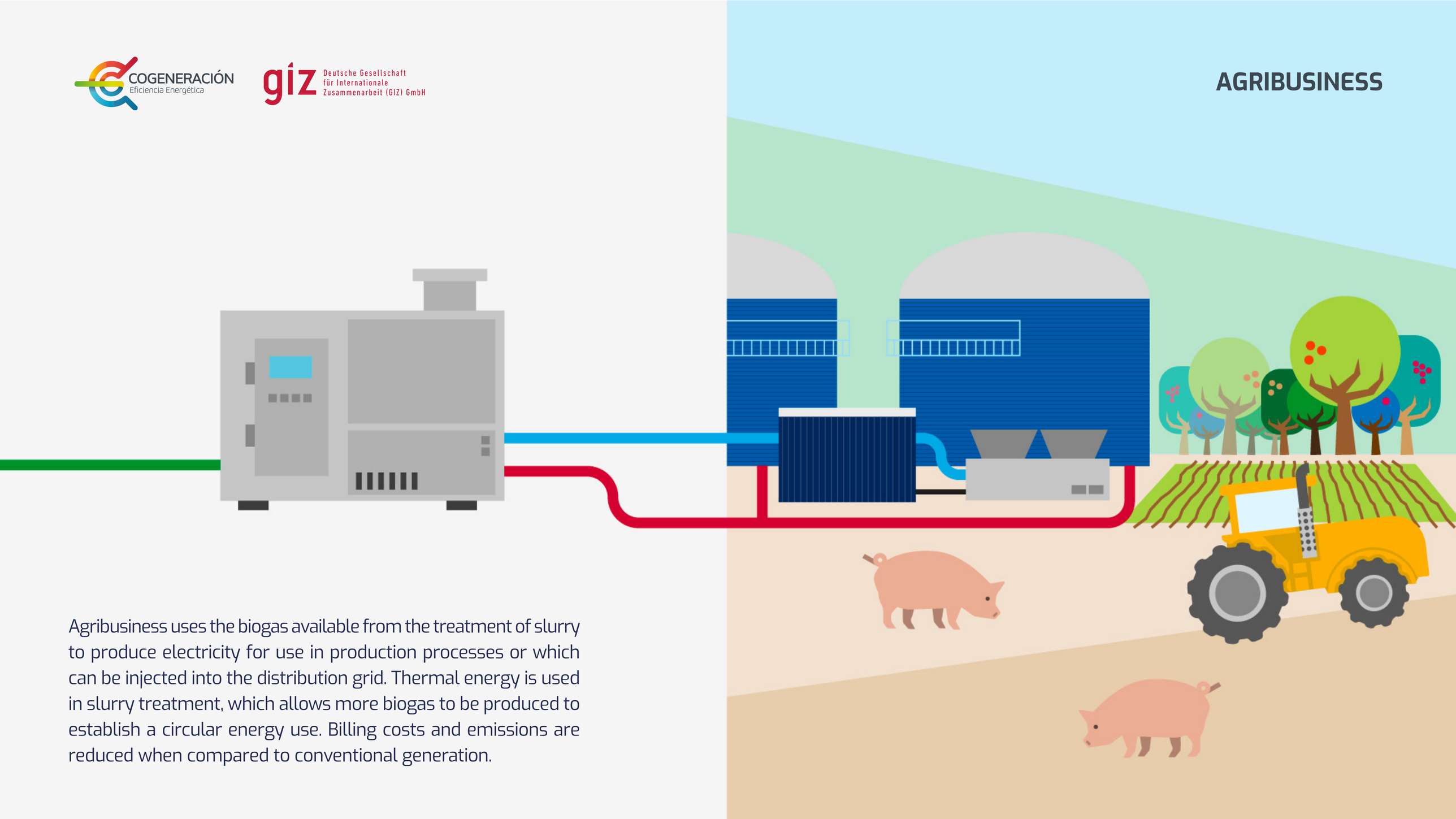


Cogeneration in the food and beverage industry is integrated into the existing thermal power plant to contribute to the supply of energy to the plant's different processes while simultaneously cutting the energy bill. Business models are also generated with ESCOs or fuel distributors, allowing users to cut investment costs or outsource the operation.

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

AGRIBUSINESS

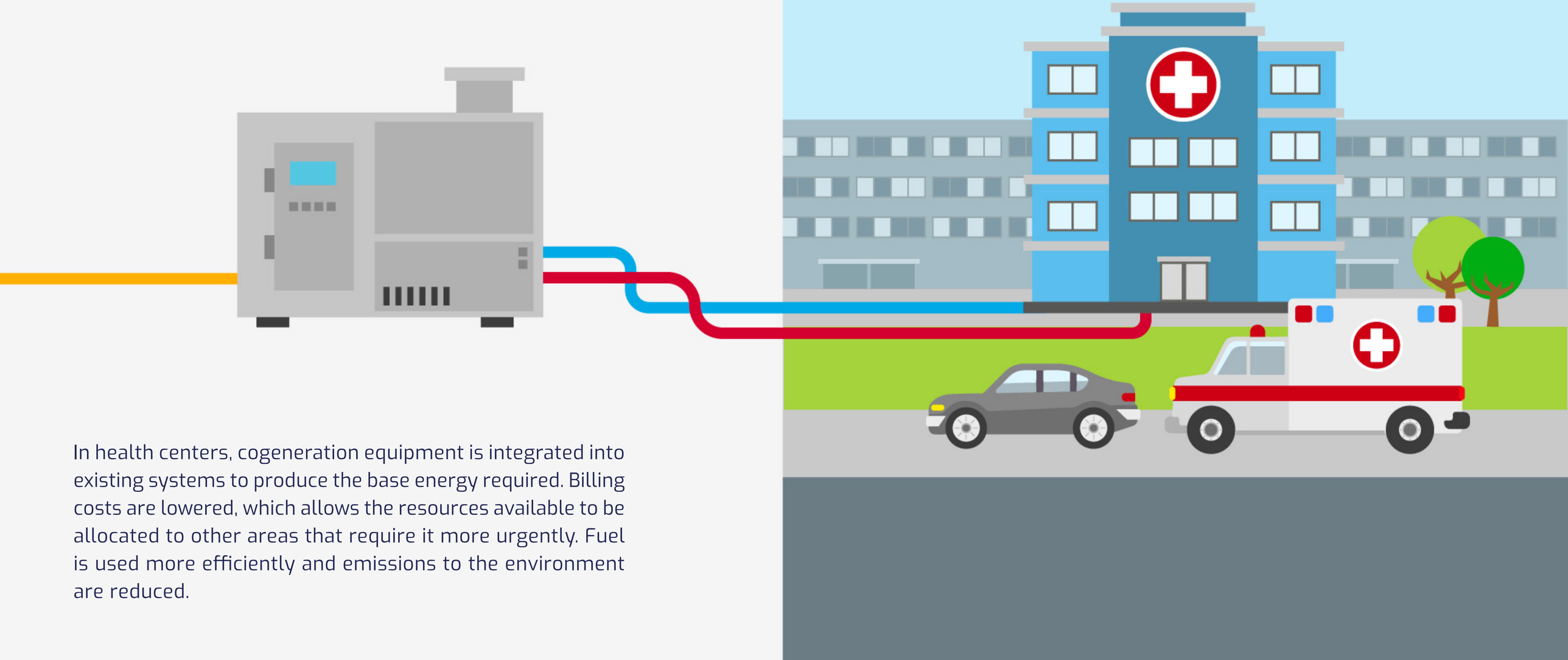


Agribusiness uses the biogas available from the treatment of slurry to produce electricity for use in production processes or which can be injected into the distribution grid. Thermal energy is used in slurry treatment, which allows more biogas to be produced to establish a circular energy use. Billing costs and emissions are reduced when compared to conventional generation.

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

HEALTH CENTERS

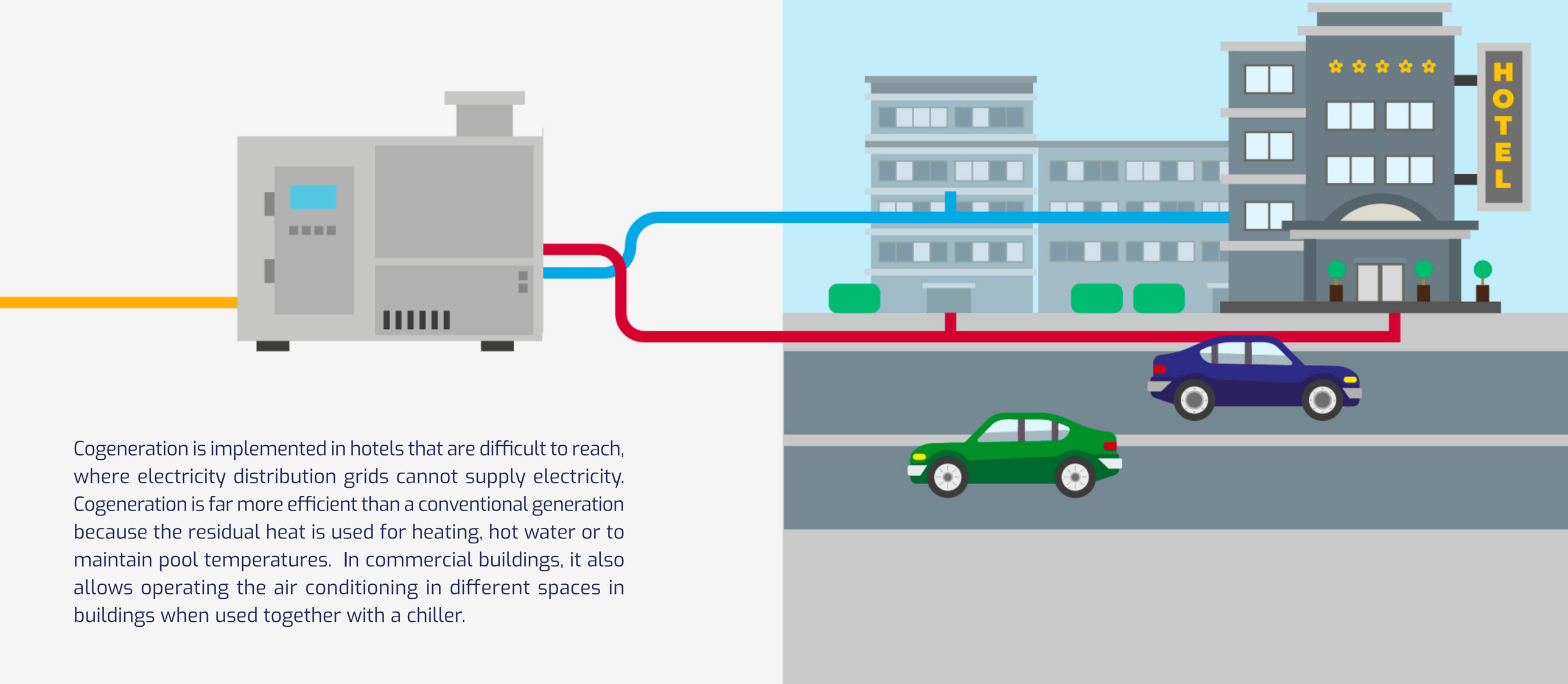


In health centers, cogeneration equipment is integrated into existing systems to produce the base energy required. Billing costs are lowered, which allows the resources available to be allocated to other areas that require it more urgently. Fuel is used more efficiently and emissions to the environment are reduced.

COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

HOTELS AND BUILDINGS.



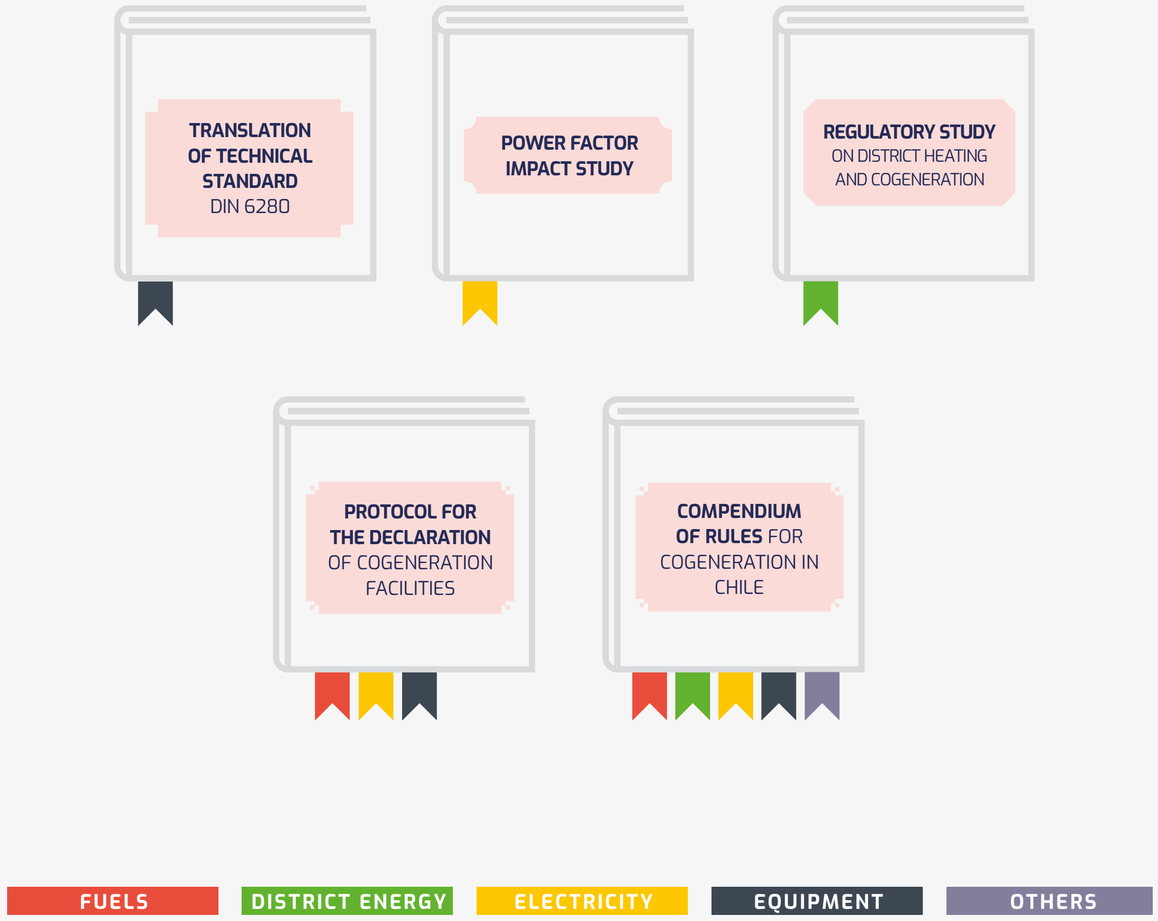
Cogeneration is implemented in hotels that are difficult to reach, where electricity distribution grids cannot supply electricity. Cogeneration is far more efficient than a conventional generation because the residual heat is used for heating, hot water or to maintain pool temperatures. In commercial buildings, it also allows operating the air conditioning in different spaces in buildings when used together with a chiller.

REGULATORY FRAMEWORK

The regulations applicable to electricity, fuels, and equipment must be complied with to implement and operate cogeneration projects, in addition to environmental and health regulations, seismic design, and fire safety regulations.

In this context, a compendium of cogeneration regulations in Chile was complied with, containing a list of regulations applicable to cogeneration projects. A protocol for declaring efficient cogeneration facilities in Chile was also drafted, which reviews the certificates of origin, the required documentation, and the procedure for registering efficient cogeneration facilities with the SEC.

In addition, a regulatory study on district heating was carried out for the development of cogeneration and district energy projects, which subsequently led to the drafting of a bill on district energy.

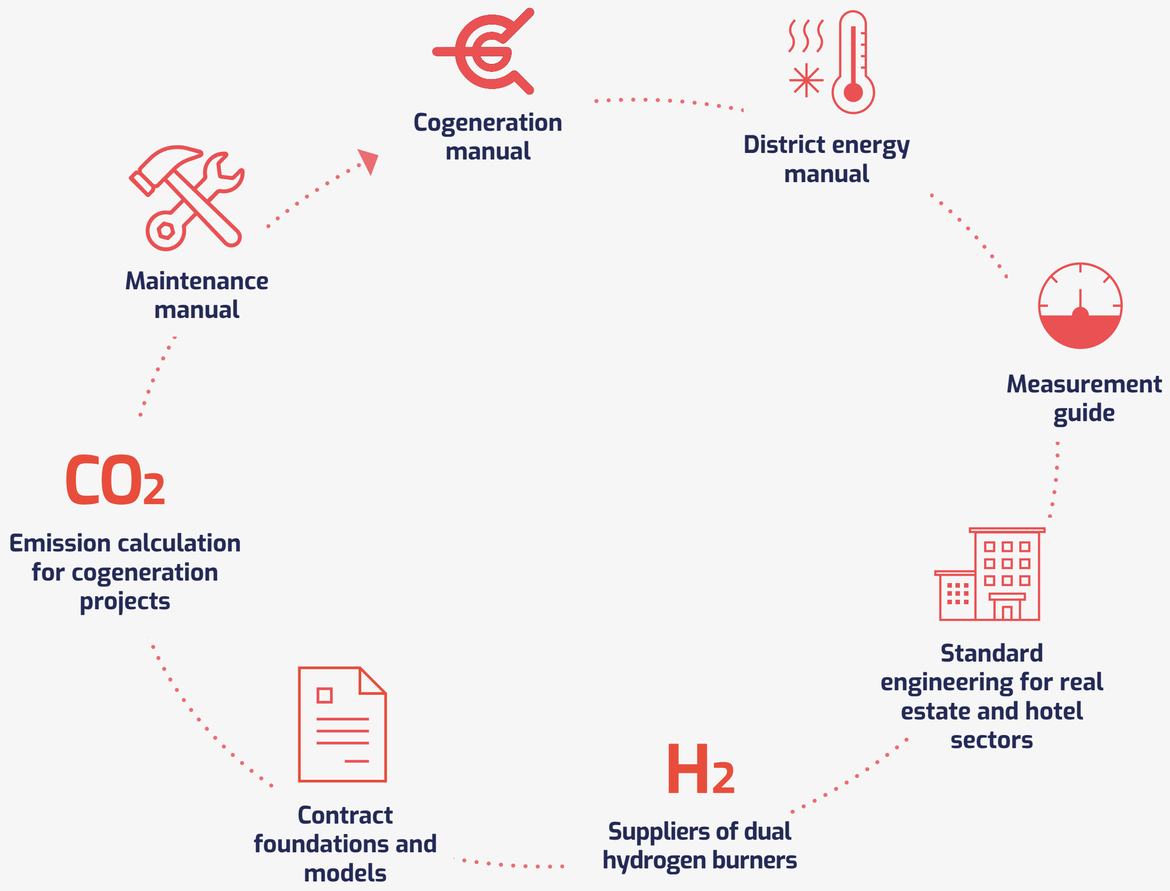


COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

MANUALS AND DOCUMENTS

To support the different stages in a cogeneration project's life cycle, manuals and documents were developed aimed at company energy managers or organizations with the potential to implement cogeneration projects and/or professionals from energy services companies or consultancies. These documents help to guide and standardize procedures and methodologies for the evaluation, design, connection and integration, and operation and maintenance of cogeneration systems

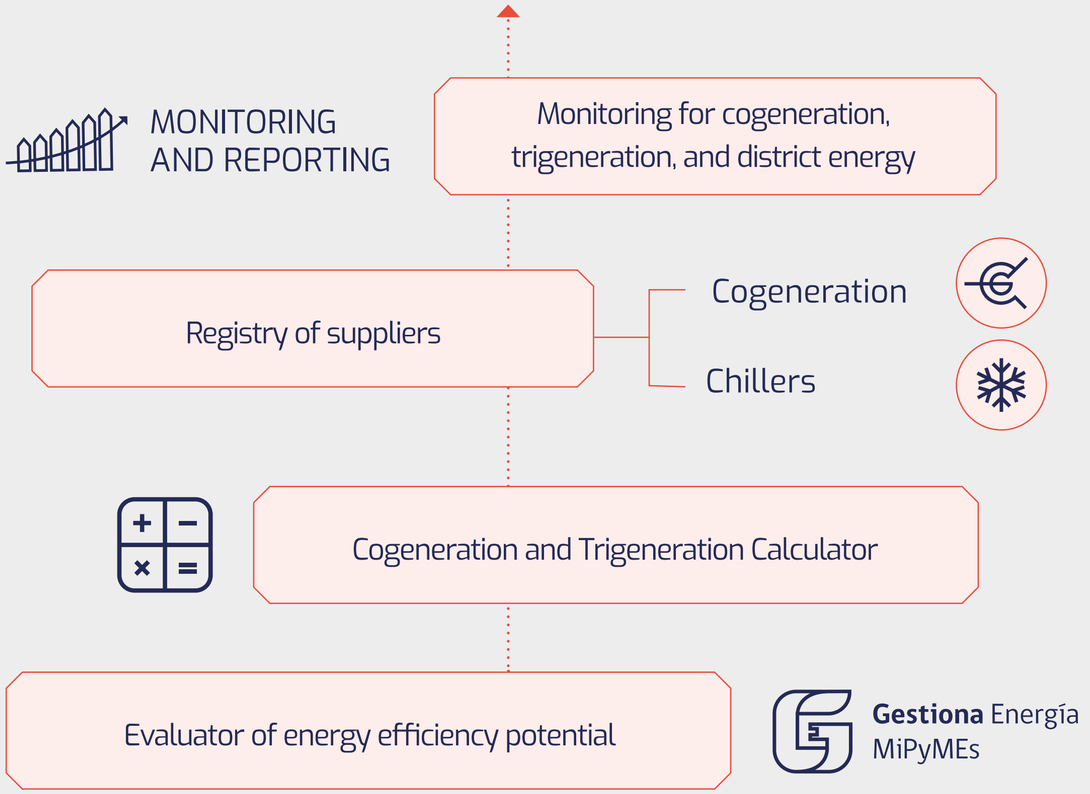


COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

TOOLS

Tools were developed to support the different stages in a cogeneration project's life cycle, aimed at company energy managers or organizations with the potential to implement cogeneration projects and/or professionals from energy services companies or consultancies. These tools allow the technical and economic potential of cogeneration and/or energy efficiency projects to be assessed. They help to connect supply and demand for project implementation, in addition to evaluating and monitoring their operation



COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

STUDIES

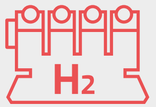
To expand project implementation options in new productive sectors so they can make significant and comprehensive contributions to companies and organizations, studies have been undertaken to determine the best economic and technical, and economic conditions for the development of new projects in Chile.

In addition, studies on new technological applications with engines and fuel cells using cleaner energy such as biogas, biomass, and hydrogen are presented. Some of these technologies are in the process of attaining greater commercial maturity and will play a key role in achieving decarbonization goals in the future

Micro cogeneration

Biogas, district energy, and refrigeration

Cogeneration potential



Hydrogen engines

Fuel cells

Biomass gasification

COGENERACIÓN Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

CAPACITY BUILDING PLAN | PROFESSIONALS

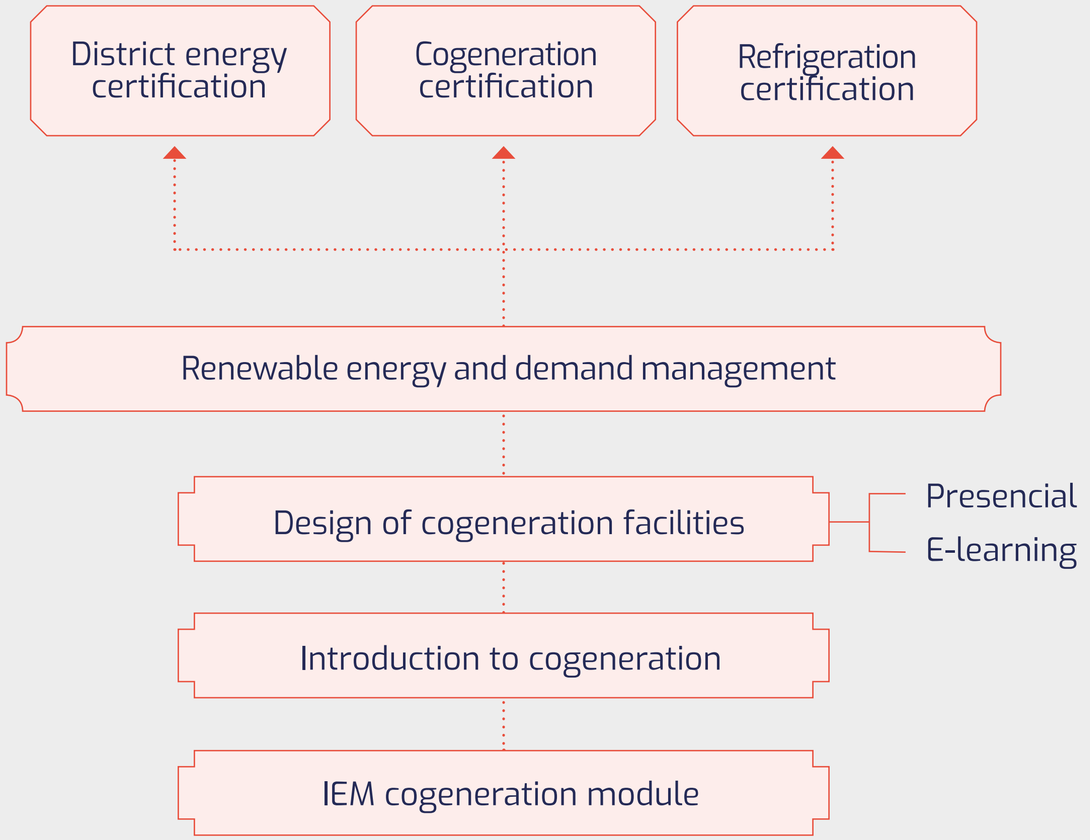
The cogeneration training plan is aimed at energy managers in companies with cogeneration potential, professionals from consulting firms, and energy services companies (ESCOs).

This plan considers three courses and two workshops separated into three levels of difficulty (basic, advanced, and specialization). Training evaluations are conducted at the end of each course and one of the three certification exams is recommended at the end of the plan.

The methodology for implementing these courses includes an expository workshop based on collaborative learning, case analysis, group activities, and/or interactive presentations.

Visit the energy training website for more information on courses and certifications

web Capacitación Energética



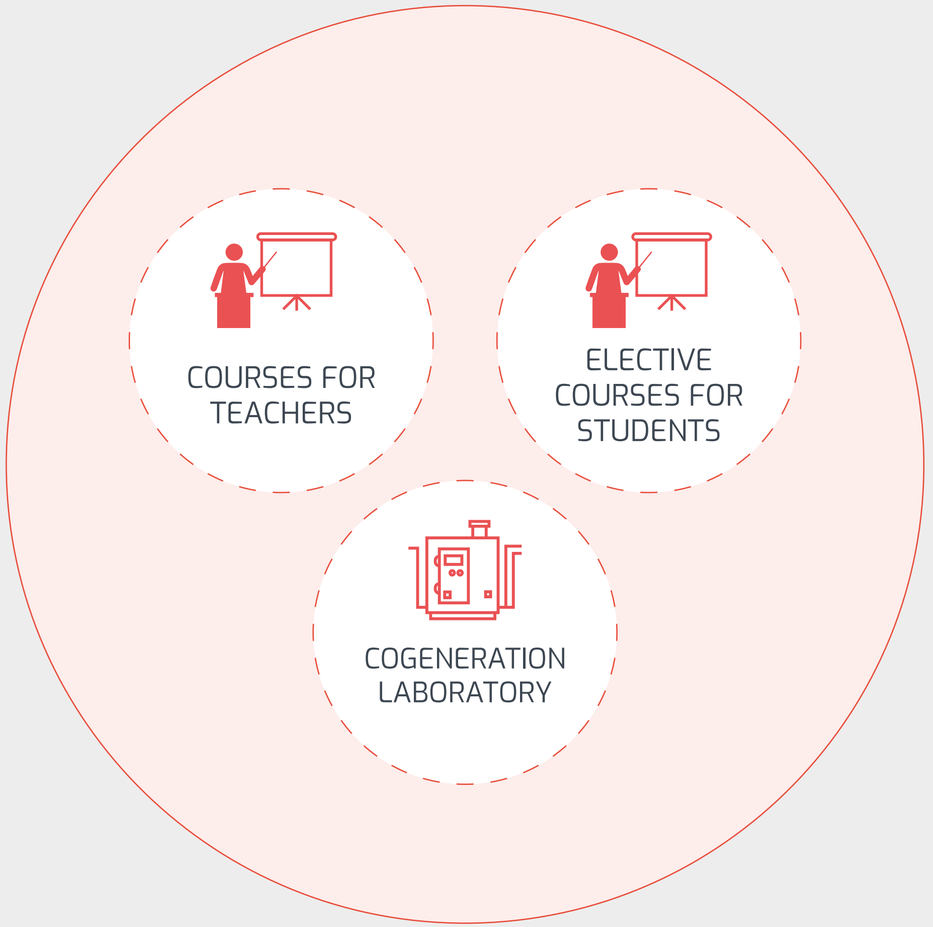
CAPACITY BUILDING PLAN | STUDENTS AND TEACHERS

There is also a training plan consisting of two cogeneration courses, one for teachers and the other for higher education students.

A cogeneration thermal integration laboratory was implemented at the Catholic University of Valparaiso (Quilpué campus) to relate theoretical concepts with practice, fundamental to improving future professionals' analysis and problem-solving capacities, which will allow simulating different types of configurations applied to cogeneration.

Forging ties with higher education institutions and technical training centers expand the profile of new professionals and help to develop new research, such as the INCREASE project

Project INCREASE



COGENERACIÓN
Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

SELECTED PROJECTS

Pre-investment, optimization, and operational studies have been developed for cogeneration projects in the framework of this project.

These cogeneration projects were selected considering regional and technological development, their replicability, and the benefits they yield.

The purpose of the projects selected is to publicize success stories, gain experience and complement the development of initiatives related to cogeneration.

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

Ministerio de Energía
Gobierno de Chile

Agencia de Sostenibilidad Energética

Ministerio de Salud
Gobierno de Chile

Hospital Clínico MAGALLANES

HOSPITAL REGIONAL COYHAIQUE

HOSPITAL DE URGENCIA ASISTENCIA PUBLICA

Gobierno Regional
Región de Magallanes y de la Antártica Chilena
Gobierno de Chile

HOSPITAL COMUNITARIO DE PUERTO WILLIAMS CRISTINA CALDERON

arauco

abastible

Gobierno Regional
Región del Maule
Gobierno de Chile

Ilustre Municipalidad ROMERAL

Pelarco
Tradición que nos une

MINDEF

Agrícola AASA

COGENERACIÓN
Eficiencia Energética

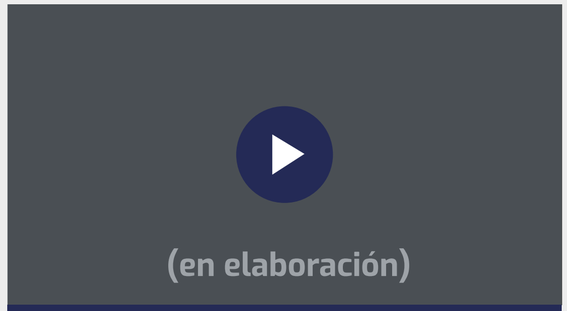
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

VIDEO GALLERY

COGENERACIÓN EN CHILE

COGENERACIÓN
SIMPLEMENTE EFECICIENTE

BIOMASA FORESTAL
CENTROS DE LÓGISTICA Y COMERCIALIZACIÓN



GOGENERACIÓN EN MAGALLANES Y LA ANTÁRTICA

MOLINA
PLANTA DE BIOENERGÍA

QUILPUÉ
SISTEMA DE COGENERACIÓN EN PUCV

VALPARAÍSO
LABORATORIO DE COGENERACIÓN PUCV

SANTIAGO
TRIGENERACIÓN EN CLUB 50

WEBINAR GALLERY

WEBINAR PARA UNA RECUPERACIÓN SOSTENIBLE: INDUSTRIA

WEBINAR PARA UNA RECUPERACIÓN SOSTENIBLE: EDIFICACIÓN

WEBINAR INTERNACIONAL DE ENERGÍA DISTRITAL

EVENTO DE PREMIACIÓN CERTIFICACIÓN DE COGENERACIÓN

Protocol for the declaration of cogeneration facilities

OBJECTIVE

To present the national and international regulations for equipment certification, in addition to establishing a procedure for the certification of cogeneration equipment in Chile.

RESULTS AND APPLICATIONS

This document establishes the procedure for declaring efficient cogeneration facilities in Chile with the SEC.

Tags

NORMATIVE

Publication Year

2022

PUBLICATION

Compendium of cogeneration regulations in Chile

OBJECTIVE

To compile the rules and regulations applicable to cogeneration projects in Chile.

RESULTS AND APPLICATIONS

This document contains a list of rules and regulations for electrical facilities, fuels, equipment, health and the environment, seismic standards, and fire safety. All apply to cogeneration projects in Chile.

–

Tags

NORMATIVE

–

Publication Year

2021

PUBLICATION

Regulatory study on district heating and cogeneration

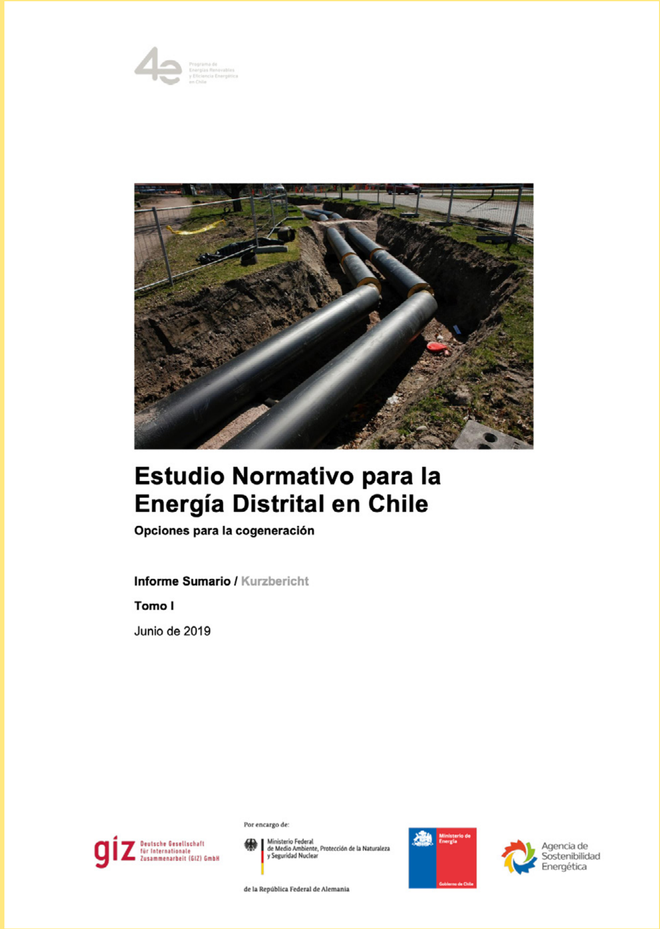
OBJECTIVE

To review international regulations applied to district heating and cogeneration projects.

To develop a regulatory proposal for the development of district heating and cogeneration projects in Chile.

RESULTS AND APPLICATIONS

The international regulations applicable to district energy and cogeneration projects in countries that have developed these technologies more extensively were reviewed. Alternatives for the development of district energy in Chile were proposed based on this review.



Tags

NORMATIVE

Publication Year

2019

PART 1

PART 2

Power factor impact study

OBJECTIVE

Studying the impact of the power factor and anti-islanding protection.

RESULTS AND APPLICATIONS

The effects of distributed generation on the power factor are analyzed and the injection of reactive power by the distributed generator with compensation through condenser banks was proposed as a solution.

The anti-islanding methods used for generation systems that do not use inverters are described for medium and low voltage.

–

Tags

NORMATIVE

–

Publication Year

2016

PART 1

PART 2

Translation of technical standard DIN 6280

OBJECTIVE

Translation of German standard DIN 6280-14 (English- Spanish)

RESULTS AND APPLICATIONS

German standard DIN 6280-14 contains information on power generation groups with internal combustion engines with alternative pistons, specifically for block thermal power plants. This standard establishes the foundations, requirements, components, and maintenance.

Tags

NORMATIVE

Publication Year

2015

PUBLICATION

Suppliers of dual hydrogen burners for commercial and industrial use

OBJECTIVE

To compile a list of suppliers of dual hydrogen burners for commercial and industrial use.

RESULTS AND APPLICATIONS

Suppliers of dual hydrogen burners available in the domestic and international markets were identified. A list of manufacturer contacts, a burner registry, and means of commercialization was compiled.

Tags

MANUALS

Publication Year

2022

PUBLICATION

Emission factors for cogeneration projects

OBJECTIVE

To propose a methodology for calculating the emissions of cogeneration projects in Chile using different types of fuels and commercially available technologies.

RESULTS AND APPLICATIONS

A methodology for calculating emission factors for cogeneration projects in Chile was developed. The proposal is reviewed by a validating agency in Chile.

Tags

MANUALS

Publication Year

2022

PUBLICATION

Best practice guide for measurements in cogeneration systems

OBJECTIVE

To draft a guide for measurement in cogeneration systems considering factors such as thermal energy, electricity, noise, and gas analysis.

To produce four videos of measurement procedures.

RESULTS AND APPLICATIONS

A measurement guide for thermal energy, electricity, noise, and gas analysis was drafted, which includes an initial checklist, personal protection equipment, selection of the measurement point, procedure, and analysis of results. Four videos were also produced to illustrate the measurement procedure.

Tags

MANUALS

VIDEOS

Publication Year

2022

PUBLICATION

ELECTRIC POWER

THERMAL ENERGY

GAS ANALYSIS

NOISE MEASUREMENT

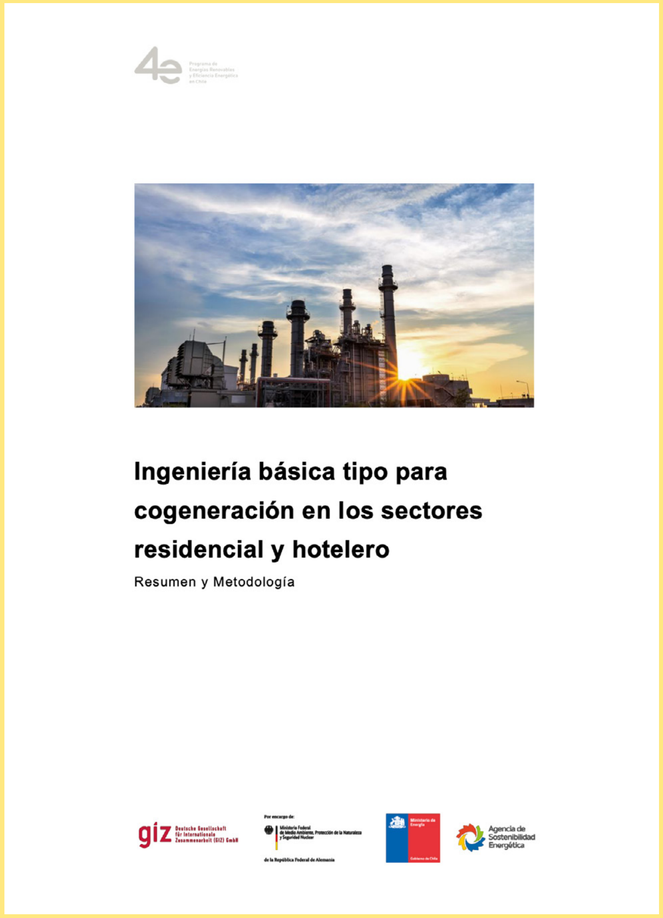
Standard engineering for real estate and hotel sectors

OBJECTIVE

To undertake a standard basic engineering study applicable to small-, medium- and large-scale cogeneration projects in the residential and hotel sector

RESULTS AND APPLICATIONS

Basic reference engineering was undertaken for standard projects, analyzing the operation of the different equipment available in the market. Examples of cogeneration projects in the residential and hotel sector were given, along with the applicable regulations, integration, and economic analysis for each one.



Tags

MANUALS AND DOCUMENTS

Publication Year

2022

PUBLICATION

General maintenance manual for cogeneration systems

OBJECTIVE

To develop a general maintenance manual for cogeneration systems.

RESULTS AND APPLICATIONS

A general maintenance manual was developed for cogeneration systems based on microturbine and combustion engine technologies in the 100 - 1,000 kW power range

Etiquetas

MANUALS AND DOCUMENTS

Publication Year

2020

PUBLICATION

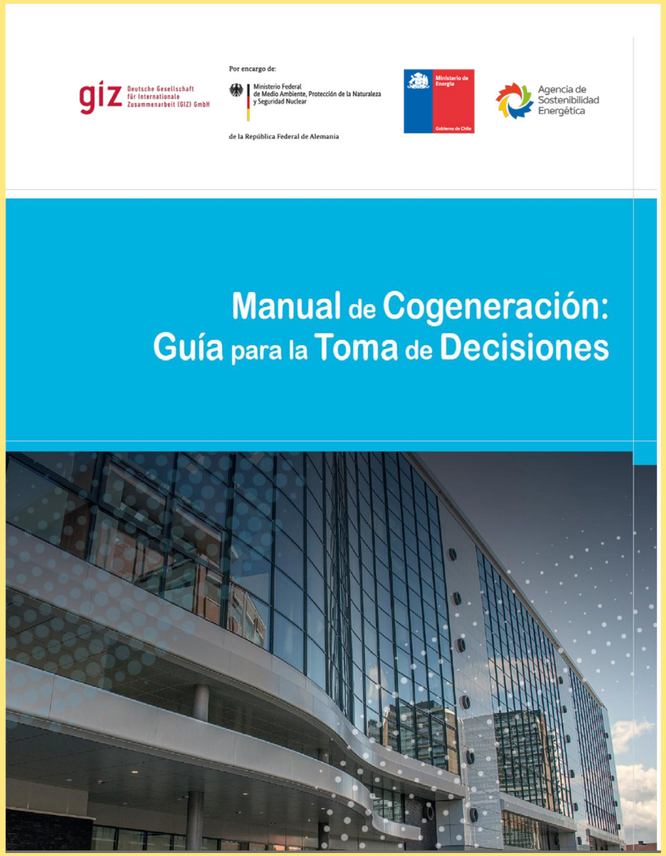
Cogeneration manual

OBJECTIVE

To draft a cogeneration manual as an aid for decision-making, design and installation, and economic assessment.

RESULTS AND APPLICATIONS

A three-volume cogeneration manual was drafted: the first is for decision-making, the second for project design and installation, and the third is for the economic assessment of projects.



Tags

MANUALS AND DOCUMENTS

Publication Year

2020

PUBLICATION

ESCO contract foundations and models

OBJECTIVE

To develop ESCO contract models for the public and private sectors.

RESULTS AND APPLICATIONS

Five ESCO contract foundations and models were developed for the public sector and four foundations for the private sector based on the operation and maintenance of cogeneration equipment or thermal plants.

Informe Final

Proyecto:

Reducción de emisiones a través de la aplicación de la cogeneración en los sectores industrial y comercial en Chile

PN: 14.9042.4-001.00

"Backstopping para modelos de contratos de servicios en Cogeneración"

Santiago, Agosto de 2019

Tags

MANUALS AND DOCUMENTS

Publication Year

2019

Bases and models of contracts

PUBLICATION

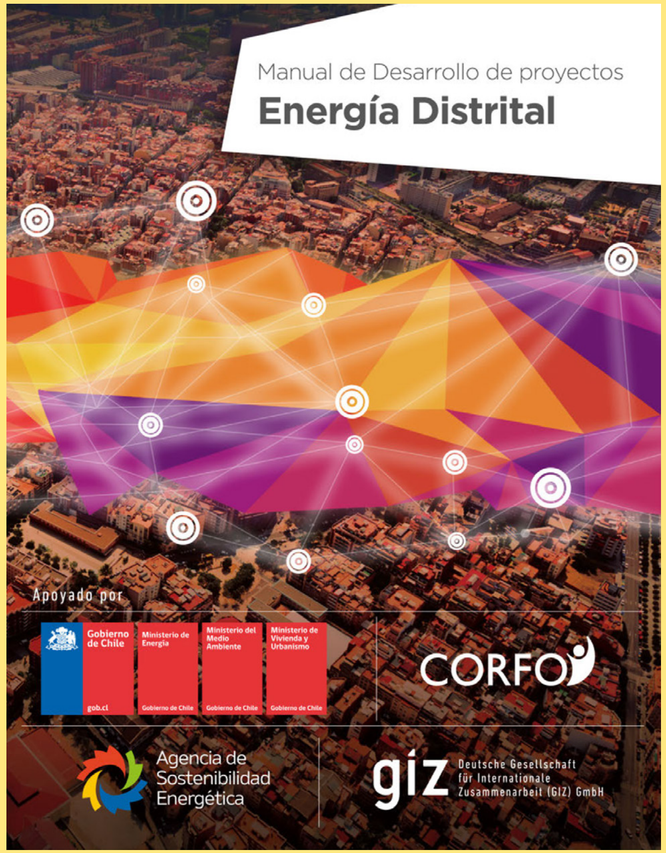
District energy manual

OBJECTIVE

To provide technical support in the development of a district energy manual

RESULTS AND APPLICATIONS

Technical support in reviewing the district energy manual and production of cogeneration-related content.



–

Tags

MANUALS AND DOCUMENTS

–

Publication Year

2018

PUBLICATION

Tool for reporting cogeneration, trigeneration, and district energy projects

OBJECTIVE

To develop a monitoring tool for reporting cogeneration, trigeneration, and district energy projects.

RESULTS AND APPLICATIONS

Three tools for reporting cogeneration, trigeneration, and district energy projects were developed. The tool allows registering information and producing graphs and tables with results, which facilitates project management and goal fulfillment.

Tags

TOOLS

Publication Year

2022

PUBLICATION

Cogeneration and trigeneration calculator

OBJECTIVE

To develop a cogeneration and trigeneration calculator for the preliminary technical-economic assessment of projects.

RESULTS AND APPLICATIONS

This calculator provides general information for conducting a preliminary technical-economic assessment of cogeneration and/or trigeneration systems for the joint production of electricity, useful heat, and/or useful cooling.

–

Tags

TOOLS

–

Publication Year

2022

PUBLICATION

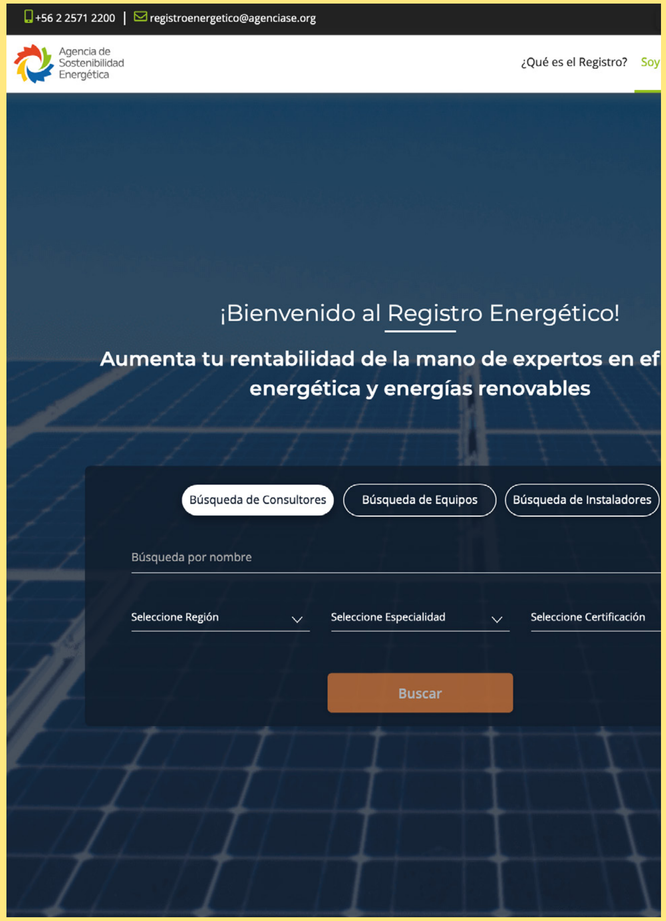
Updated energy registry platform for cogeneration and chillers

OBJECTIVE

To update the sustainability agency's energy registry platform to include a registry of cogeneration and chiller suppliers and equipment.

RESULTS AND APPLICATIONS

A registry of cogeneration and chiller system suppliers and equipment was included on the energy registry website. In addition, a standard registry was developed that will allow new technologies to be included in this registry.



Tags

TOOLS

Publication Year

2021

PUBLICATION

Evaluator of energy efficiency and cogeneration potential for MSMEs

OBJECTIVE

To develop a web-based tool to determine the energy efficiency and cogeneration potential in micro-, small- and medium-sized enterprises..

RESULTS AND APPLICATIONS

A web-based tool that determines the potential of energy efficiency measures and the potential savings potential that can be achieved.

–

Tags

TOOLS

–

Publication Year

2019

PUBLICATION

Design of the website www.cogeneracioneficiente.cl

OBJECTIVE

To develop and design a website for the cogeneration project.

RESULTS AND APPLICATIONS

The website www.cogeneracioneficiente.cl brings together information on cogeneration in Chile, applications, documents, videos, and exclusive tools for cogeneration projects..

–

Tags

WEBSITE

–

Publication Year

2015 - 2022

PUBLICATION

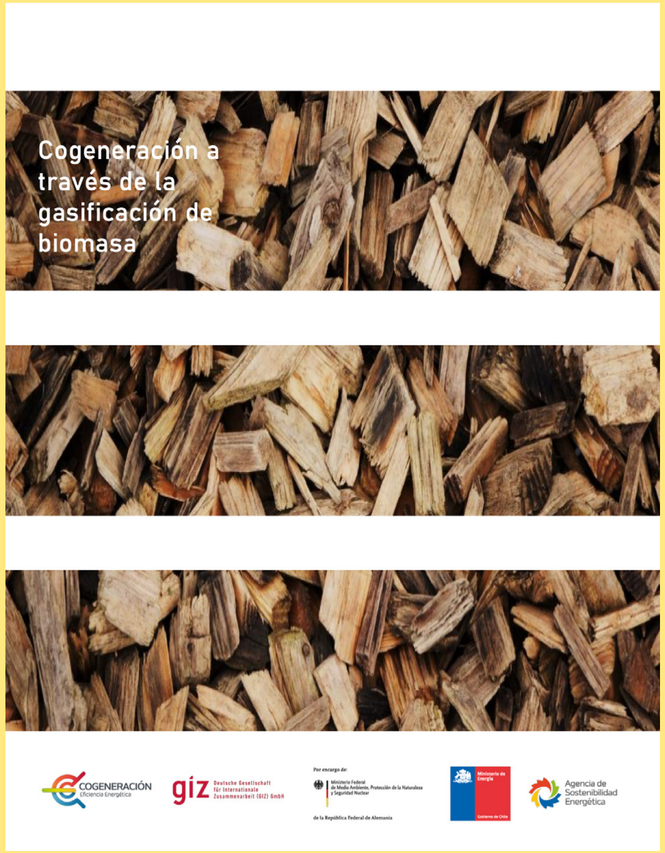
Cogeneration and biomass gasification

OBJECTIVE

To undertake a study of cogeneration with renewable energies that addresses the use of gasified biomass.

RESULTS AND APPLICATIONS

The state of the art of cogeneration based on biomass gasification technology and the main equipment suppliers were reviewed.



Tags

STUDY

Publication Year

2021

PUBLICATION

Cogeneration and fuel cells

OBJECTIVE

To undertake a study of cogeneration with renewable energies that addresses the use of hydrogen in fuel cells.

RESULTS AND APPLICATIONS

The state of the art of cogeneration based on fuel cell technology and the main equipment suppliers were reviewed.

Tags

STUDY

Publication Year

2021

PUBLICATION

Hydrogen-fueled cogeneration engines

OBJECTIVE

To undertake a study of cogeneration with renewable energies that addresses the use of hydrogen in internal combustion engines.

RESULTS AND APPLICATIONS

The state of the art of cogeneration based on internal combustion engine technology and the main equipment suppliers were reviewed.

Tags

STUDY

Publication Year

2021

PUBLICATION

Micro cogeneration Study

OBJECTIVE

To undertake a review of the main suppliers of micro-cogeneration equipment.

RESULTS AND APPLICATIONS

A list of micro-cogeneration equipment suppliers, the models available, and their main technical features were compiled.

Tags

STUDY

Publication Year

2021

PUBLICATION

Study of cogeneration potential

OBJECTIVE

Study of cogeneration potential through energy efficiency in the industrial, public, and commercial sectors.

RESULTS AND APPLICATIONS

The review undertaken in 2021 reveals that there are a total of 56 cogeneration facilities in Chile with an installed capacity of 1418 MWe and 7750 MWt.

Chile's technical-economic cogeneration potential is estimated at 669 MWe and 690 MWt, corresponding to 372 cogeneration facilities.

–

Tags

STUDY

–

Publication Year

2021

PUBLICATION

PUBLICATION

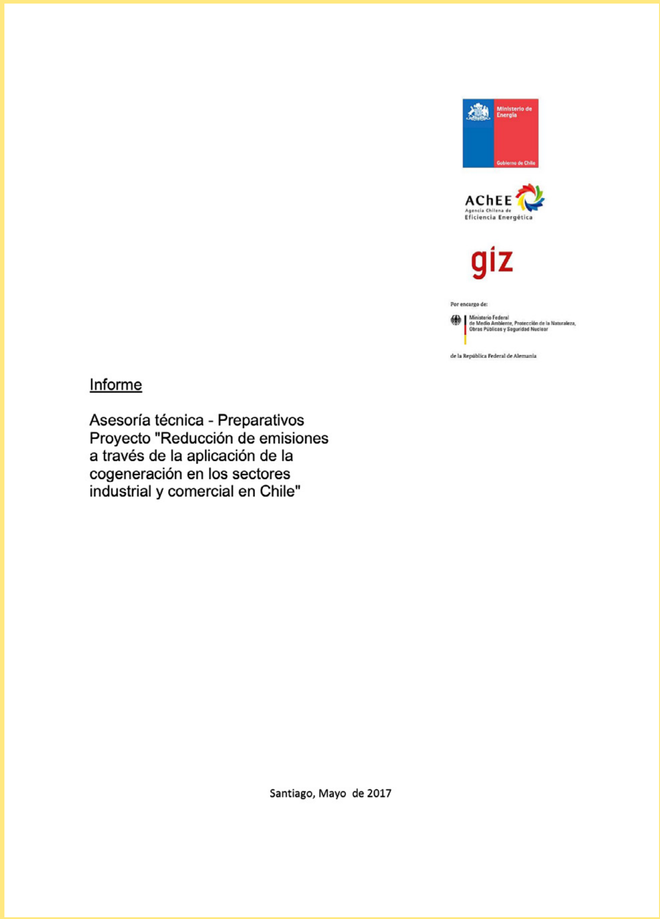
Biogas, district energy and industrial cooling study

OBJECTIVE

To prepare a study related to the development of the cogeneration market and technology in Chile.

RESULTADOS Y APLICACIONES

The cogeneration potential using biogas in the industrial sector was estimated and a directory of contacts for the development of the cogeneration market was compiled.
Technical studies and experiences related to district heating in Europe were reviewed.
A contact directory for the development of trigeneration projects was compiled.



Informe

Asesoría técnica - Preparativos
Proyecto "Reducción de emisiones
a través de la aplicación de la
cogeneración en los sectores
industrial y comercial en Chile"

Santiago, Mayo de 2017

Tags

STUDY

Publication Year

2017

PUBLICATION

Trigeneration and refrigeration certification

OBJECTIVE

Certify specific knowledge in the areas of trigeneration and refrigeration.

RESULTADOS Y APLICACIONES

Certification of specialists with proven knowledge of the design, economic assessment, and operational management of urban heating systems and the installation, commissioning, maintenance, and economic assessment of trigeneration and refrigeration systems using synthetic and/or natural refrigerants.

–

Tags

CAPACITY

–

Publication Year

2022

PUBLICATION

District energy certification

OBJECTIVE

To certify specific knowledge for district energy.

RESULTADOS Y APLICACIONES

Certification of specialists with proven knowledge of the design, economic assessment, and operational management of urban heating systems.

Tags

CAPACITY

Publication Year

2022

PUBLICATION

Cogeneration laboratory

(donation of cogenerator and development of engineering for the laboratory's implementation)

OBJECTIVE

Donation of cogeneration equipment and development of the engineering for the thermal integration laboratory for cogeneration systems.

RESULTS AND APPLICATIONS

A 5.5 kW microgenerator was donated to the Catholic University of Valparaiso, which implemented and launched a cogeneration laboratory. In addition, the university received an operation and simulation manual for the laboratory.

–

Tags

CAPACITY

–

Publication Year

2021

PUBLICATION

Cogeneration, renewable energy, and demand management workshop

OBJECTIVE

Participants are expected to understand specific concepts related to biomass, biogas, and hydrogen projects, in addition to the demand management strategies applicable to cogeneration systems.

RESULTS AND APPLICATIONS

This course is aimed at company energy managers, project managers, technicians, and professionals related to the implementation of energy efficiency projects in productive, commercial, and public sectors.

Three hours in face-to-face or online format.

Tags

CAPACITY

Publication Year

2021

PUBLICATION

Elective course for students

OBJECTIVE

To provide university engineering students with a practical introduction to cogeneration.

RESULTS AND APPLICATIONS

This cogeneration course is aimed at university engineering students. As a prerequisite, students are asked to have completed the subjects of fluid mechanics and thermodynamics at the university.

Tags

CAPACITY

Publication Year

2021

PUBLICATION

Course for teachers

OBJECTIVE

To understand key aspects of cogeneration, from the formulation of a cogeneration project to its successful operation.

RESULTS AND APPLICATIONS

This course is aimed at teachers with an emphasis on the training of engineers, technicians, and operators, professionals specializing in energy and energy efficiency who evaluate potential energy savings, and experts involved in the design and management of energy efficiency programs in organizations of all types.

Tags

CAPACITY

Publication Year

2021

PUBLICATION

Cogeneration certification

OBJECTIVE

To certify specific cogeneration knowledge.

RESULTS AND APPLICATIONS

Certification of the technical and economic knowledge required to assess the implementation and operation of a cogeneration plant.

Tags

CAPACITY

Publication Year

2020

PUBLICATION

IEM cogeneration module

OBJECTIVE

Participants are expected to be capable of understanding the basic concepts underlying a cogeneration system, the main technologies and configurations, the applicable regulations, and the main considerations for the economic assessment of projects.

RESULTS AND APPLICATIONS

This course is aimed at company energy managers, project managers, technicians, and professionals related to the implementation of energy efficiency projects in productive, commercial, and public sectors.
Four hours in face-to-face or online format.

Tags

CAPACITY

Publication Year

2019

PUBLICATION

Design of cogeneration facilities (face-to-face and e-learning)

OBJECTIVE

Participants are expected to be capable of understanding the basic concepts underlying a cogeneration system, facility design, connection and integration of systems, system maintenance, and the economic assessment of projects.

RESULTS AND APPLICATIONS

This course is aimed at company energy managers, project managers, technicians, and professionals related to the implementation of energy efficiency projects in productive, commercial, and public sectors.
16 hours in face-to-face or online format.

Tags

CAPACITY

Publication Year

2018 - 2021

PUBLICATION

Introduction to cogeneration

OBJECTIVE

Participants are expected to be capable of understanding the basic concepts underlying a cogeneration system, the main technologies and configurations, the applicable regulations, and the main considerations for the economic assessment of projects.

RESULTS AND APPLICATIONS

This course is aimed at company energy managers, project managers, technicians, and professionals related to the implementation of energy efficiency projects in productive, commercial, and public sectors.
12 hours in face-to-face or online format.

Tags
CAPACITY

Publication Year
2016

PUBLICATION

Study of a biomass cogeneration project in a pellet plant

OBJECTIVE

To develop the counterparty engineering for a cogeneration project in a pellet plant.

RESULTS AND APPLICATIONS

A review was undertaken, and adjustments and recommendations were made to the company implementing the project to establish improvements before the cogeneration project's implementation phase and the production plant's expansion..

Tags

PROJECT

Publication Year

2022

PUBLICATION

Study of cogeneration optimization and hydrogen production at Arauco's Nueva Aldea plant

OBJECTIVE

To undertake an optimization study of the cogeneration plant.
To carry out a pre-feasibility study for the production of green hydrogen from cogeneration.

RESULTS AND APPLICATIONS

An optimization study was carried out on a pulp production center with a potential of at least 1% optimization of the combustion in the combustion process in the boiler for cogeneration, in addition to a technical potential for the production and consumption of 12 MW in green hydrogen.

Informe Sumario:

Optimización de Cogeneración y producción de Hidrógeno Verde

Planta Nueva Aldea Arauco

Tags

STUDIES

Publication Year

2022

PUBLICATION

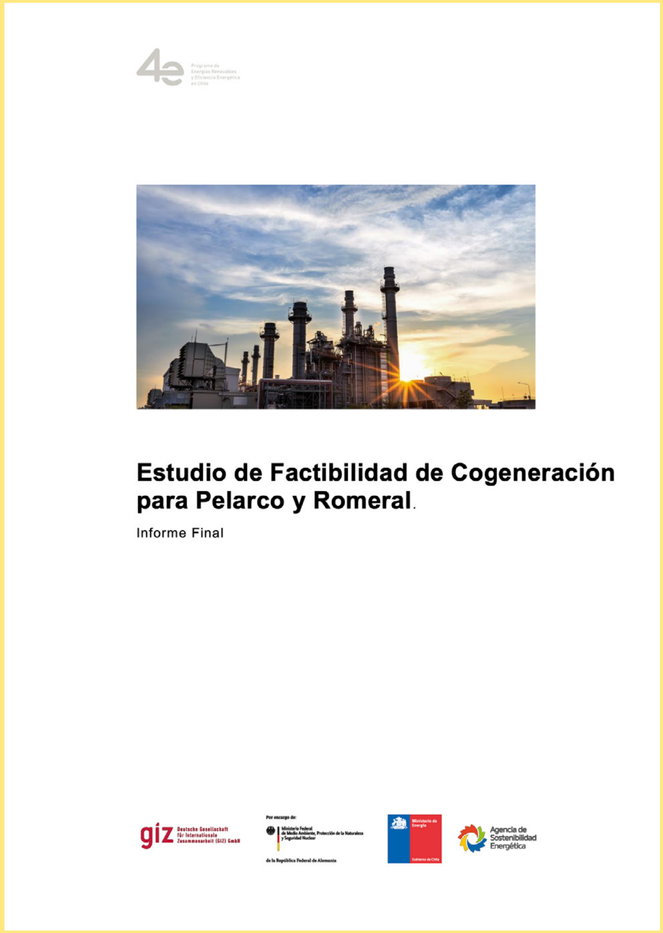
Cogeneration and district energy feasibility study in Romeral and Pelarco

OBJECTIVE

To analyze the technical and economic feasibility of two district energy and cogeneration projects in the municipalities of Romeral and Pelarco.

RESULTS AND APPLICATIONS

A technical feasibility study to implement two cogeneration and district energy systems in the Maule Region was developed. Both thermal power plants are composed of a 5.5 kW cogenerator to deliver the baseload, an accumulator, and two hot water boilers to deliver the maximum demand for ACC and ACS in the district system.



Tags

STUDIES

Publication Year

2022

PUBLICATION

Analysis of power optimization technologies for CMPC's CHP System

OBJECTIVE

To study the operation of two of the company CMPC's production centers and make recommendations for the optimization of the cogeneration plant's productive processes..

RESULTS AND APPLICATIONS

Recommendations were made regarding the operation of the cogeneration plant, which consists in preheating the replacement water with residual energy and improving the homogeneity and quality of the fuel used in combustion processes.

Tags

PROJECT

Publication Year

2021

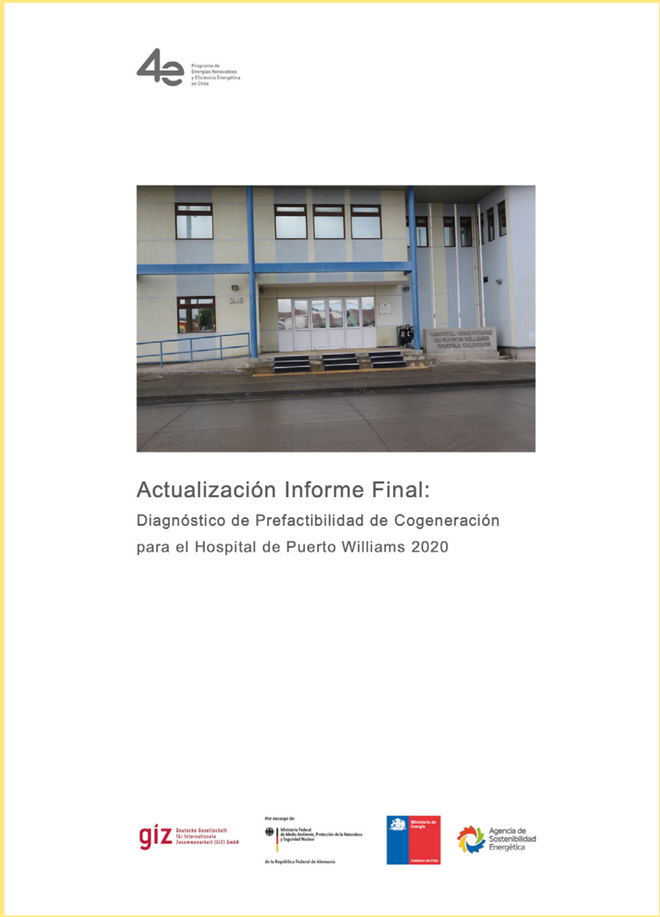
Cogeneration pre-feasibility study for the Puerto Williams Hospital

OBJECTIVE

To perform a pre-feasibility study for the implementation of a cogeneration project at the Puerto Williams Hospital in the Magallanes y Antártica Chilena Region.

RESULTS AND APPLICATIONS

A 5.5 kW cogenerator was conceived for the Puerto Williams Hospital that could operate at full capacity for about 8462 hours a year.



Tags

STUDIES

Publication Year

2020

PUBLICATION

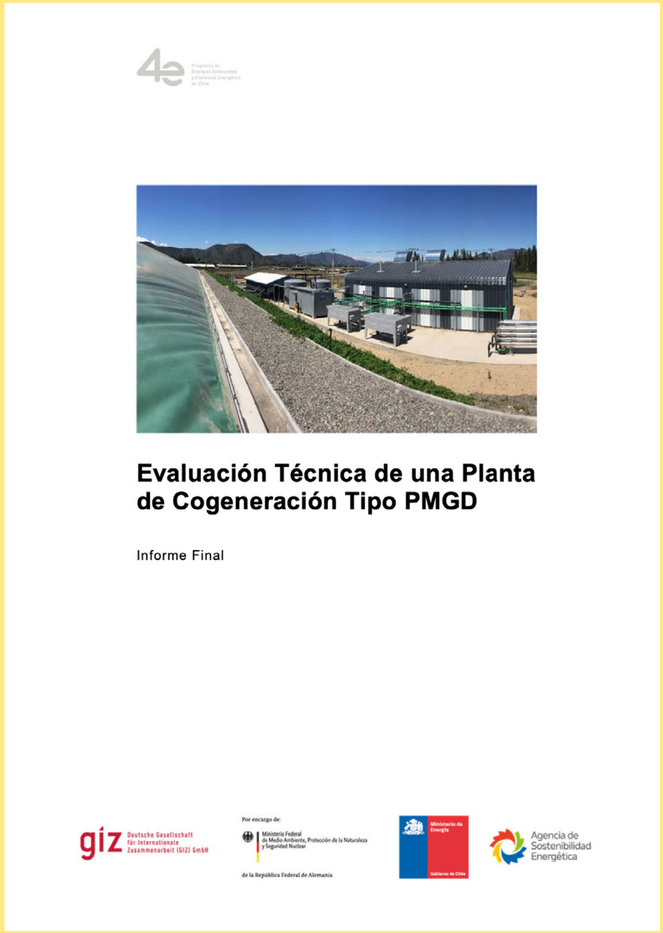
Technical assessment of an SMDG-type cogeneration plant

OBJECTIVE

To determine whether the cogeneration plant meets DS6 on efficient cogeneration facilities.
To propose solutions to maximize biogas generation in the plant.

RESULTS AND APPLICATIONS

It was determined that the cogeneration plant located in the agricultural company AASA complies with what is established in DS6 on efficient cogeneration and recommendations were made to stabilize biogas production in the biodigester.



–

Tags

PROJECT

–

Publication Year

2019

PUBLICATION

Cogeneration pre-feasibility study for the Regional Government of Magallanes y Antárctica Chilena

OBJECTIVE

To perform a pre-feasibility study for the implementation of a cogeneration project in the Regional Government of Magallanes y Antártica Chilena.

RESULTS AND APPLICATIONS

A 5.5 kW cogenerator was conceived for the Puerto Williams Hospital that could operate at full capacity for about 7560 hours a year.
The project's economic assessment determined that it is economically feasible, given the favorable technical and economic indicators.

Informe final

"Diagnóstico de Prefactibilidad de Cogeneración para la Intendencia de Punta Arenas"

Proyecto:
Reducción de emisiones a través de la aplicación de la cogeneración en los sectores industrial y comercial en Chile

PN: 14.9042.4-001.00

Santiago, Marzo de 2018

Tags

STUDIES

Publication Year

2020

PUBLICATION

Hospital operation Report

OBJECTIVE

To present the operational results of the cogenerators installed in public hospitals.

RESULTS AND APPLICATIONS

The operational results of the cogenerators installed in three high-complexity public hospitals were presented: The Public Health Emergency Hospital, the Magallanes Clinical Hospital, and the Coyhaique Regional Hospital.

Tags

PROJECT

Publication Year

2015 - 2022

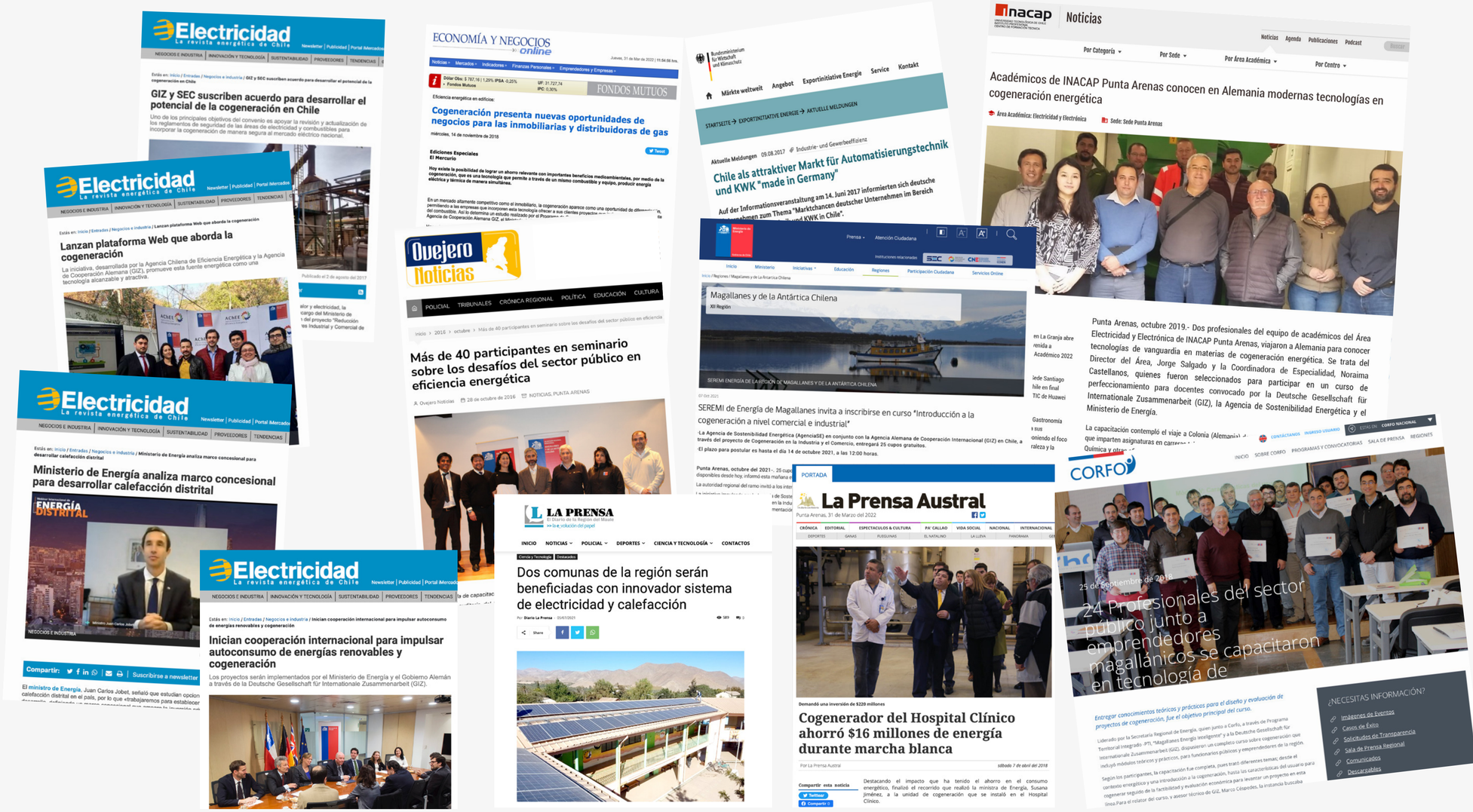
PUBLICATION

COGENERACIÓN Eficiencia Energética

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

PRESS APPEARANCES

212 mentions
in the national and international press and more than 68,000 user visits were recorded on the efficient cogeneration website.

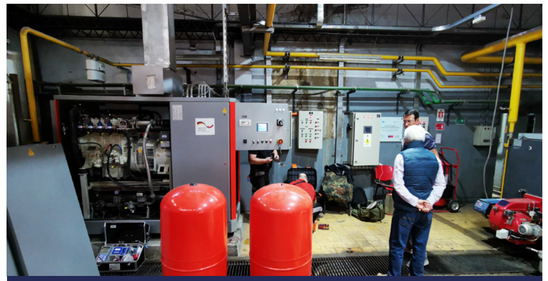


PROJECT ACTIVITIES

COGENERACIÓN E HIDRÓGENO VERDE ARAUCO (2022)

MANUAL DE ENERGÍA DISTRITAL

ENCUENTRO CON EMPRESAS INMOBILIARIAS



SEGUIMIENTO HOSPITALES

LABORATORIO DE COGENERACIÓN (2021)

CIERRE PROYECTO INCREASE (2019)

COOPERACIÓN CON ARGENTINA

CAPACITACIÓN PROFESORES ALEMANIA (2019)

PROYECTO FNDR MAULE ENERGÍA DISTRITAL

GIRA TECNOLÓGICA SEC

CURSO DE COGENERACIÓN SEREMI DE MAULE (2018 Y 2019)

CURSO DE COGENERACIÓN EN COLOMBIA (2019)

Catalogue of Publications

Reducing Emissions in Chile
by promoting the use of
Combined Heat and Power Plants
in Industry and Commerce

For more information:
Programme 4e **“Renewable Energy and Energy Efficiency”** of GIZ in Chile

cogeneracioneficiente.cl

CHP in the portfolio of 4echile.cl

PROJECT TEAM

COGENERACIÓN EN LA INDUSTRIA Y EL COMERCIO

Director of Projects
DAVID FUCHS
Linkedin

Project Coordinator
CECILIA FIGUEROA
Linkedin

Senior Technical Advisor
MARCO CÉSPEDES
Linkedin

Technical Advisor
RAÚL GÁLVEZ
Linkedin

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

IKI INTERNATIONAL CLIMATE INITIATIVE

Ministerio de Energía
Gobierno de Chile

Agencia de Sostenibilidad Energética