«TICA PRO» LLC — official representative of NANJING TICA ENERGY TECHNOLOGY CO., LTD.

PRO
TICA PRO

TICA®

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CONTENT

CHAPTER 01

TICA Introduction

ABOUT TICA

ESTABLISHED IN 1991, TICA IS A PROFESSIONAL SOLUTION PROVIDER IN CLEAN ENVIRONMENT AND THERMAL UTILIZATION

TICA GROUP

Clean Environment

Power & Biogas

Y22 TURNOVER

10.3 Billion RMB **(1.5billionUSD)**

21% Growth rate

TICA CLIMATE

TICA ENERGY

BRANDS

TICA CLIMATE

TICA 天加环境

SMARDT

TICA ENERGY

TICA 天加能源

PureCycle

EXERGY

SEBIGAS

SYSTEM INTEGRATOR

FUCA HVAC Automation

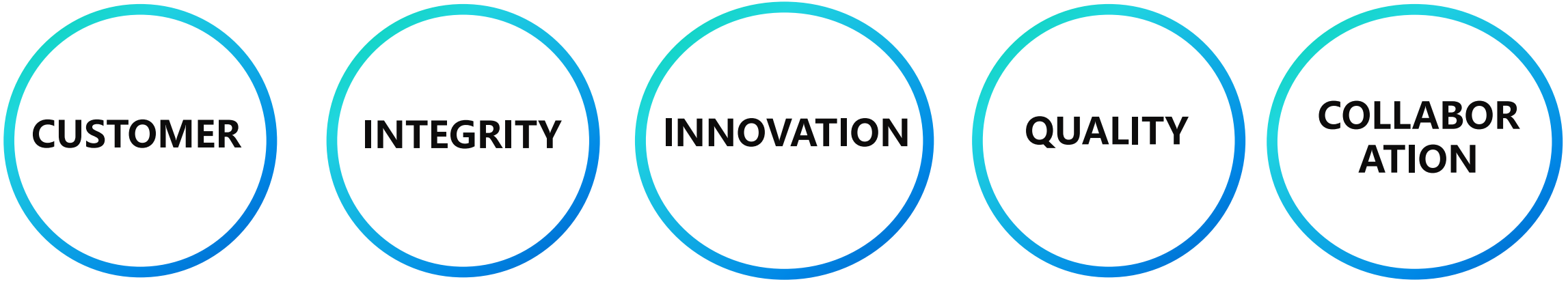
T&Y 途优

VISION AND MISSION

Reliable solution provider for clean environment and thermal utilization.

Innovation for better life.
Value maximization with green power for our distinguished customers.

TICA VALUES



Help Our Customers Succeed

Keep Our Promises

Innovative Ideas

Striving for Perfection

Cooperation & Collaboration

CHAPTER 02

TICA Energy

ABOUT TICA ENERGY

- Established in 2015 with a registered capital of 100 million dollars.
- Focused on thermal energy saving solutions and renewable energy development through ORC technology.
- Full-spectrum and high-efficiency advanced ORC products, which can be deployed in geothermal, industrial waste heat, biomass energy, LNG cold energy, and other applications.

TICA ENERGY ROADMAP

TICA Energy focuses on thermal energy utilization system solutions and renewable energy development to help achieving carbon neutralization.

2015.10

TICA and UTC signed a strategic joint venture, and TICA began to enter the energy field.

2015.12

TICA signed a contract with Pratt & Whitney, a subsidiary of UTC, to complete the acquisition of PureCycle business.

2016

"Nanjing TICA Thermal Technology CO.,LTD" was officially registered and established.

TICA thermal energy base started for construction.

2017

Elected as Vice Chairman Company of China Chemical Energy Conservation Technology Association.

2018

Awarded the certificate of "Technical Center of Low-medium Temperature Waste Heat Power Generation Solution in Petrochemical Industry ".

Won the "BlueSky Award for Global Top Investment Scenarios to Apply New Technologies for Renewable Energy Utilization ".

2019

Acquisition of Italian EXERGY, the world's second largest ORC manufacturer in geothermal power generation.

2020

Acquisition of Italian Biomass Energy Leader SEBIGAS.

Won the first place of "2018-2020 Top 20 Enterprises in Power System Production of China's Geothermal Industry".

2021

The new base was commissioned successfully.

ORC technology won the first prize of "Science and Technology Progress of Chinese Association of Refrigeration".

2022

Renamed as " **Nanjing TICA Energy Technology Co., Ltd**."

GLOBALIZATION OF TICA ENERGY

2015 PureCycle

Acquisition of **PureCycle ORC (low to medium) power generation system** of Pratt & Whitney, a subsidiary of UTC.

2019 EXERGY

Acquisition of the world 2nd largest ORC system provider in geothermal application, **EXERGY of Italy**.

2020 SEBIGAS

Acquisition of the global advanced biomass technology company, **SEBIGAS of Italy**.

ACHIEVEMENTS

Industry Waste Heat Recovery

- Market share of PET industry waste heat recovery power systems

90%

Geothermal

Global installed capacity exceeds 700MW

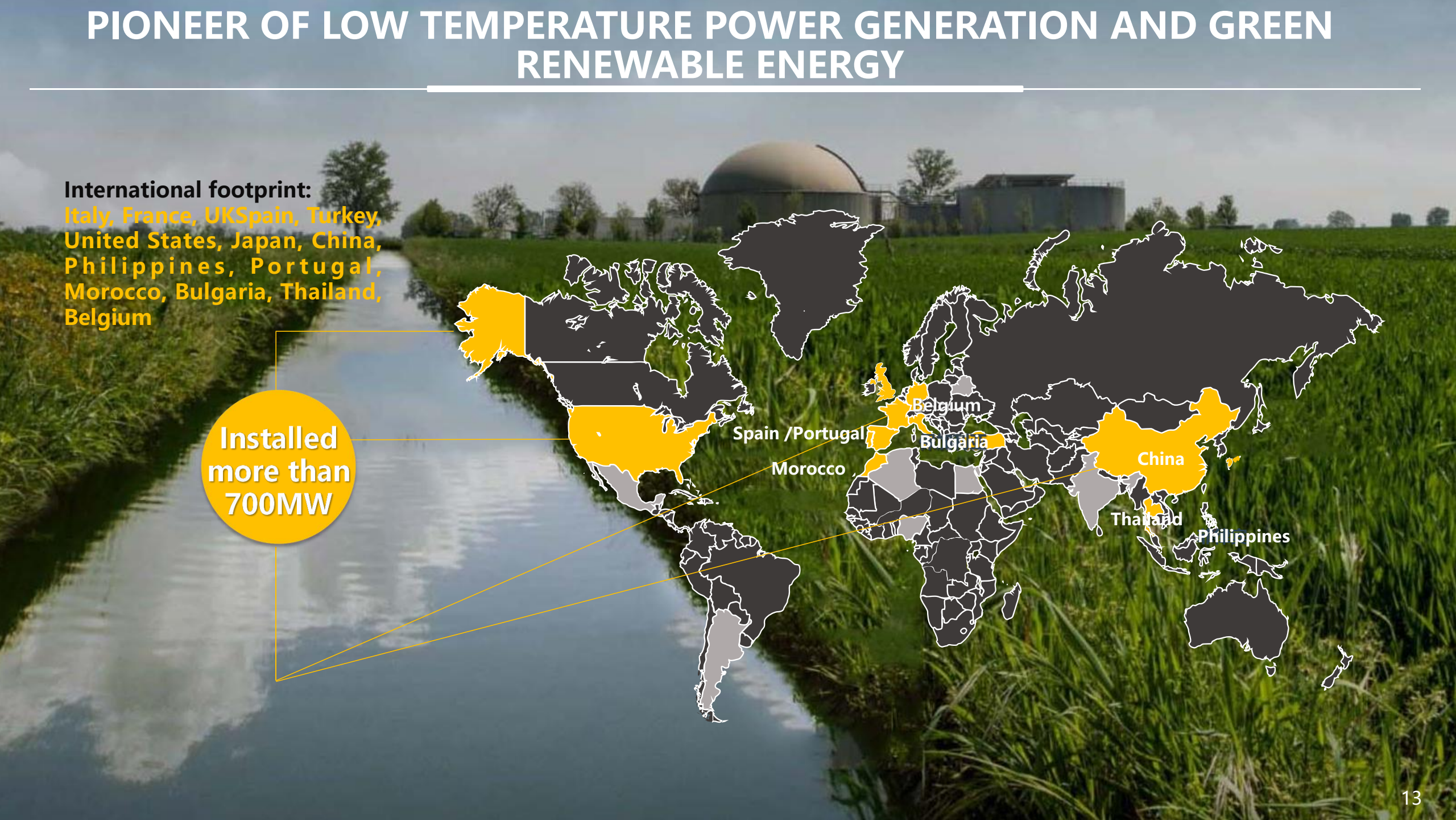
- First place of "Top 20 Enterprises in Power System Production of China's Geothermal Industry in 2021" ;
- Datong Geothermal demonstration project- the highest Geothermal temperature in Eastern China;
- Purcycle enters Japanese market (Oita, Niigata, Kagoshima).

Subsidiary EXERGY

- In 2015, Milan Polytechnic University verified that the isentropic efficiency of EXERGY AKCA geothermal project reached 93.65%.
- EXERGY single disk double pressure turbine won European Geothermal Innovation Award in 2016.

PIONEER OF LOW TEMPERATURE POWER GENERATION AND GREEN RENEWABLE ENERGY

International footprint:
Italy, France, UKSpain, Turkey, United States, Japan, China, Philippines, Portugal, Morocco, Bulgaria, Thailand, Belgium



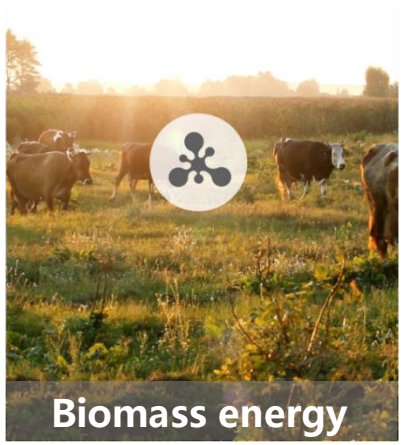
APPLICATIONS

- **Application fields**

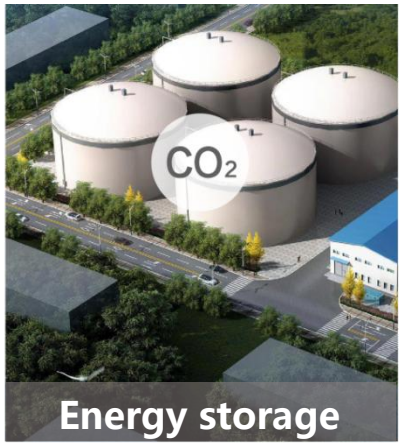

Geothermal (HDR)


Industry waste heat

LNG cold energy


Biomass energy


Solar power



Energy storage

- **Industrial waste heat**


Iron and steel


Petrochemical industry


Non-ferrous metal smelting


Building materials


Coal chemical industry


LNG gasification

Existed business Business under developing

CHAPTER 03

Technical Experts

TECHNICAL EXPERTS

Guy Phuong | Global R&D Director of TICA

- Graduated from the Royal Melbourne Institute of Technology / Michigan State University **Doctor of Aerospace Engineering**
- Won the **World's Highest Efficiency Centrifugal Compressor** design award
- Designed and built **the most advanced** test platform in the world for HVAC compressor
- Developed **the global first** volute design software in centrifugal compressor
- Chief engineer of **the world's first** Patton engine design and development team
- Invited to serve as Technical Chairman of Compressor Technical Committee of **ASME Process Industry Division**
- Awarded one of **the most knowledgeable people in compressor technology ,** design, and development in the world

TECHNICAL EXPERTS

Stefano Selva | EXERGY CTO

- Graduated from Polytechnic University of Milan, Master of Mechanical Energy Engineering
- Visiting instructor of heat exchange technology at Polytechnic University of Milan. Experts in the field of heat conduction and heat transfer
- Former Technical Director of AMEC Foster Wheeler
- CTO of Exergy

CHAPTER 04

Products

PURECYCLE

Full-spectrum standard ORC products

Single unit: 65/110/280/700/1000kW
Multi expander units:
560/1400/1700/2000/2400/2700/3000kW

The system uses the principle of Organic Rankine Cycle, and the technology was derived from American aerospace engine technology. The unit is famous for its safety, stability and high efficiency.

Full Spectrum

From small modular units 280kW up to 3MW

High Reliability

Radial in-flow Turbine (RIT) with high system efficiency and reliability

High Intelligence

Remote control, one-key start-stop

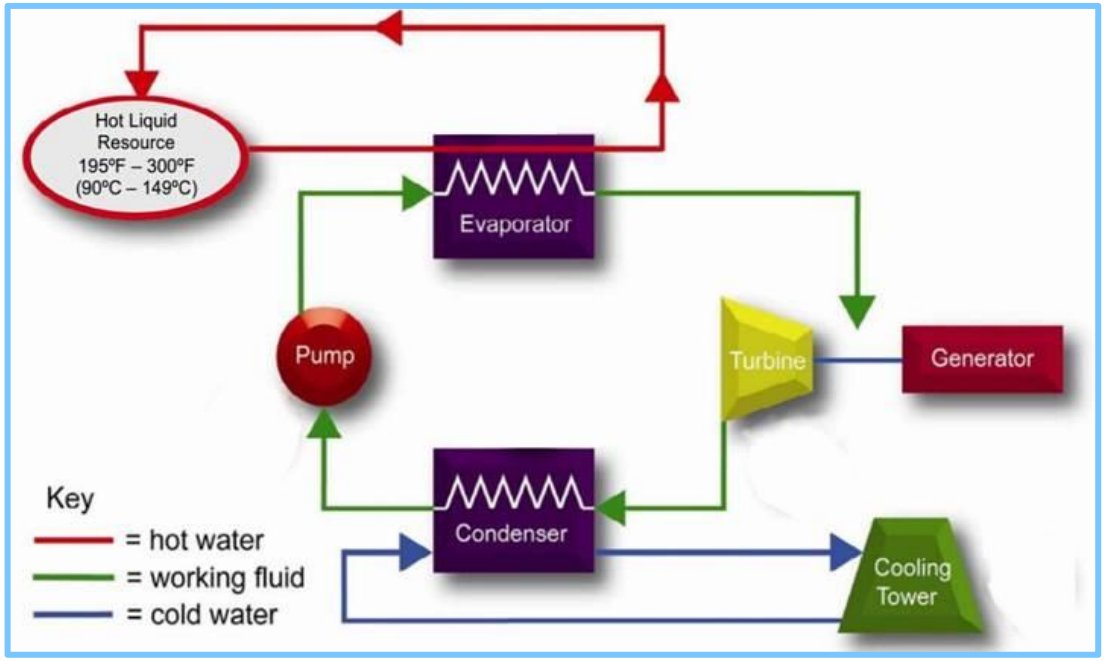
Integrated Design

Modular design with high level integration, skid-mounted structure, easy installation

ORC PRINCIPLE

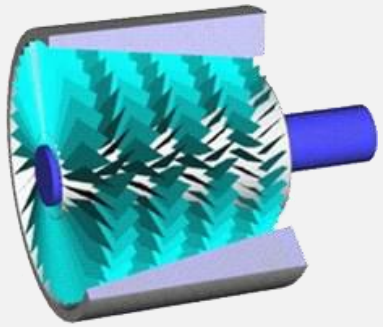
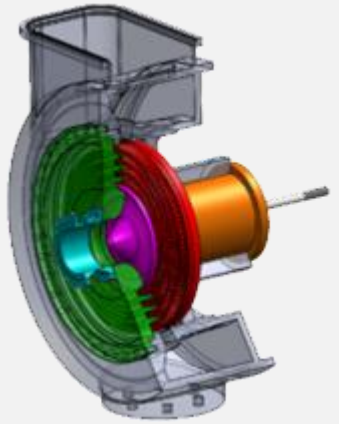
Organic Rankine Cycle Power Generation

The system uses the low boiling point characteristics of organic working fluid to drive the expander to generate electricity under the conditions of medium and low temperature (90-300℃) heat source, and uses the potential energy of working fluid generated by the temperature difference between cold and heat sources to convert low-grade heat energy into high-grade electric energy.



Principle of ORC System

TECHNOLOGY

Expander type	Twin Screw	Axial Flow Turbine	TICA Energy	TICA - Exergy
				
	Twin Screw	**Axial Flow Turbine**	**Radial Inflow Turbine**	**Radial Outflow Turbine**
Reference power range of single system	50kW~1MW	1MW~30MW	100kW~3MW	1MW~33MW
Isentropic expansion efficiency(%)	65~75	75~85	80~85	85~92

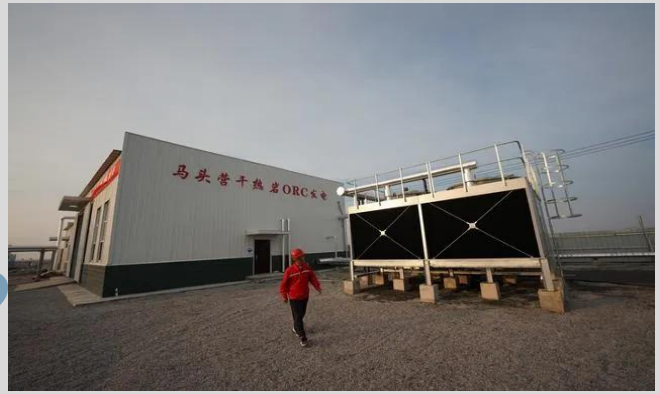
PURECYCLE PROJECTS

China's first HDR(Hot dry rock) power generation project

- Tangshan, Hebei Province
- Capacity 280kW

The first geothermal power generation project

- Datong, Shanxi Province
- Capacity 280kW



PURECYCLE REFERENCES

Installed capacity **30.8MW**

China TONGKUN PET Company
Industrial Waste Heat Power Generation

Installed capacity **1.4MW**

China HUACHANG Coal Chemical Company
Industrial Waste Heat Power Generation

Installed capacity **280kW**

China ZHONGJINSONGYUAN Metallurgy
Industrial Waste Heat Power Generation

Installed capacity **280kW**

Japan Tottori
Incineration flue gas for Power Generation

PURECYCLE REFERENCES

Installed capacity **1.96MW**

Japan Oita
Geothermal Power Generation

Installed capacity **280kW**

China Dynamic Chemical Company
Industrial Waste Heat Power Generation

Installed capacity **5MW**

China CHENGZHI Chemical Company
Industrial Waste Heat Power Generation

Installed capacity **280kW**

Japan Niigata
Geothermal Power Generation

EXERGY PRODUCT

Product scale: ≥1MW

Single Disk up to 9 Stages

- Higher isentropic efficiency per stage
- Better off-design performance

Multi Pressure Inlet

- Enhanced components accessibility
- Possibility for multiple admissions on one disk

Working Fluid Adaptation

- Optimized efficiency by design flexibility, most efficient working fluid

Low Speed (Direct Drive)

- No gearbox
- Low noise and vibrations

Straight Blade With Radial Design

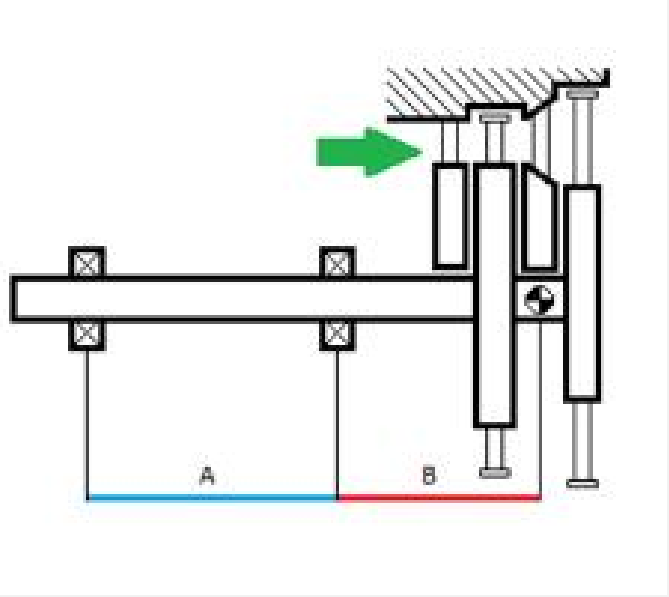
- Minimal 3D turbulence effect.

Built-in Mechanical Group

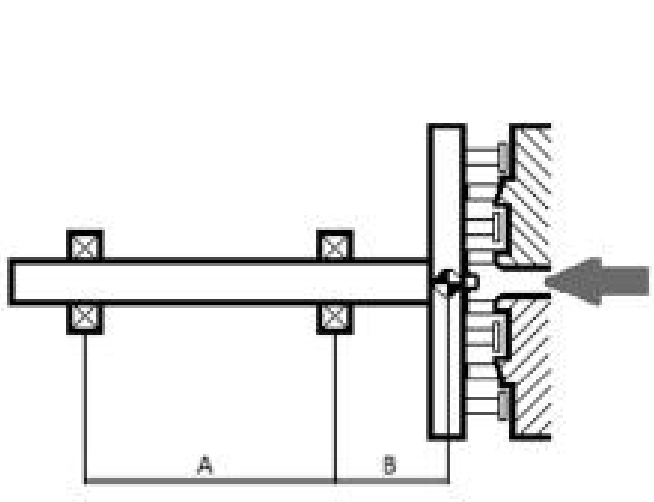
- Simple and fast maintenance. reduced downtimes

EXERGY TECHNICAL ADVANTAGES

ROT structure can realize more stages

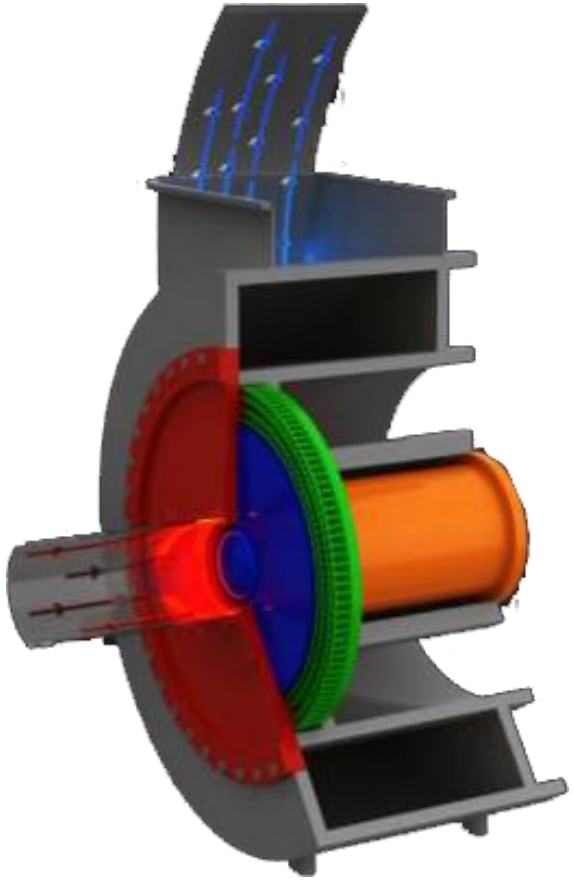


Axial Flow Turbine



- Low vibration, more stages
- Single disk means more simplicity

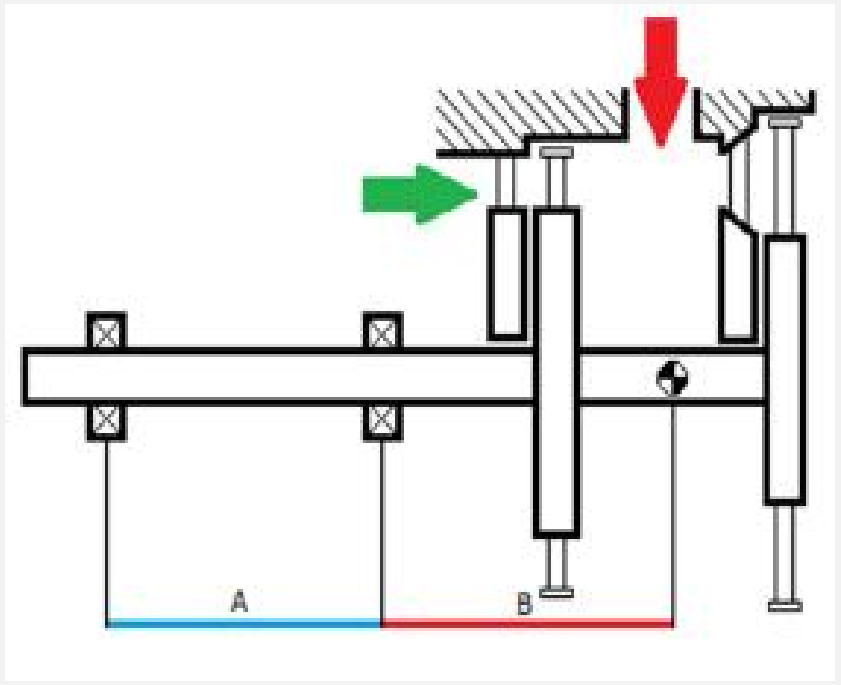
Radial Outflow Turbine



EXERGY TECHNICAL ADVANTAGES

Single Turbine Multistage Heat Source Application

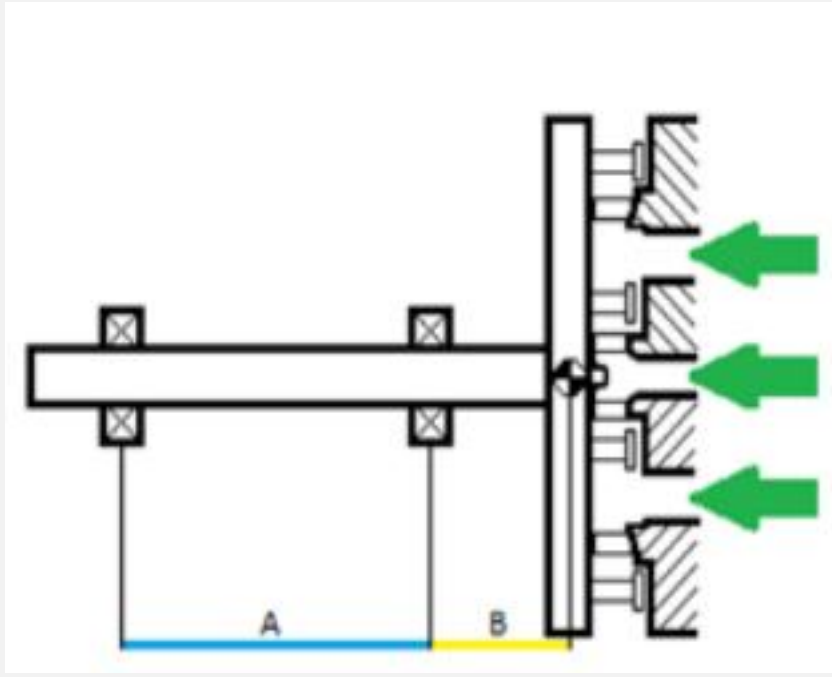
The best ratio between A and B



Axial Flow Turbine

VS

The best ratio between A and B



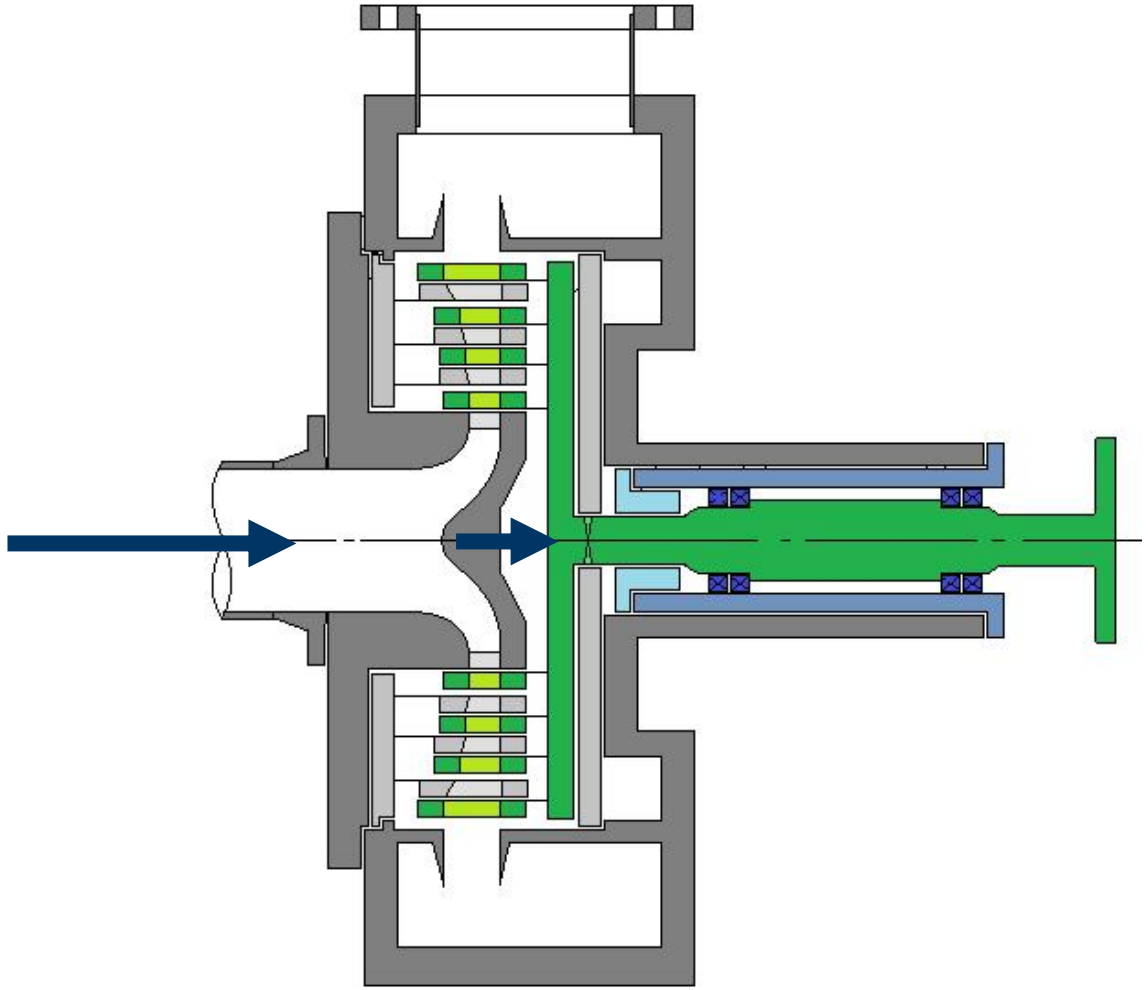
Radial Outflow Turbine

EXERGY ADVANTAGES

EXERGY Removable Mechanical Group

Patented Technology

- That allows to remove the mechanical group without any fluid drainage or loss.
- The built-in mechanical group can be extracted to facilitate and maintain a longer life of the bearings.
- The entire operation can be completed with 3~6 hours.



EXERGY PROJECTS

Installed Capacity **112.5MW**

Turkey | Geothermal Power Generation

Installed Capacity **132MW**

Turkey | Geothermal Power Generation

Installed Capacity **48MW**

Turkey | Geothermal Power Generation

Installed Capacity **4MW**

Portugal | Geothermal Power Generation

EXERGY PROJECTS

Installed Capacity **1.2 MW**

Morocco | CSP Power Generation

Installed Capacity **5 MW**

Thailand | PTT LNG Power Generation

Installed Capacity **1 MW**

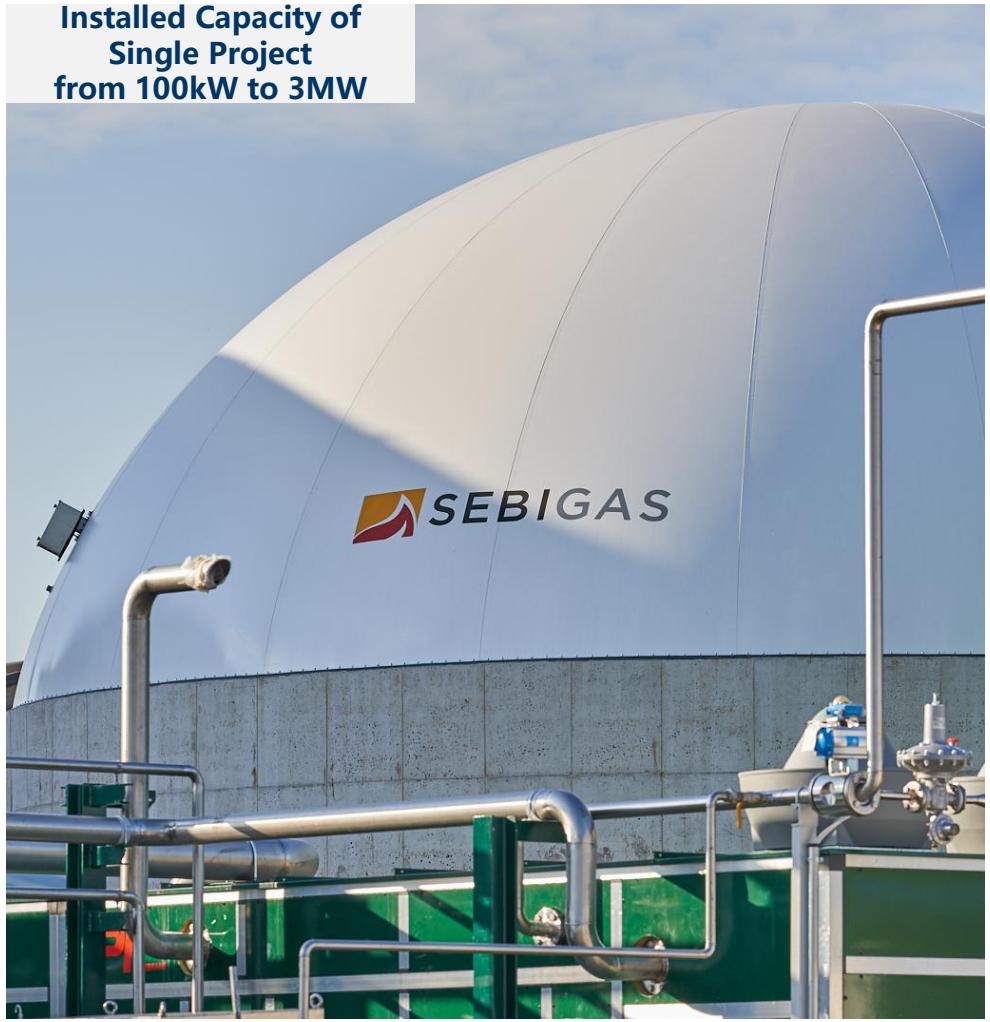
Italy | STELL WHR Power Generation

Installed Capacity **4MW**

Bulgaria | Glass WHR Power Generation

SEBIGAS SOLUTIONS

Installed Capacity of Single Project from 100kW to 3MW



Wide Spectrum

- More than 80 biomass biogas projects have been designed and completed
- The standard module equivalent capacity is 350kW

Stability

- More than 80 projects in operation. The fermentation system can be maintained online without stopping
- Average availability of the system is 98.2%

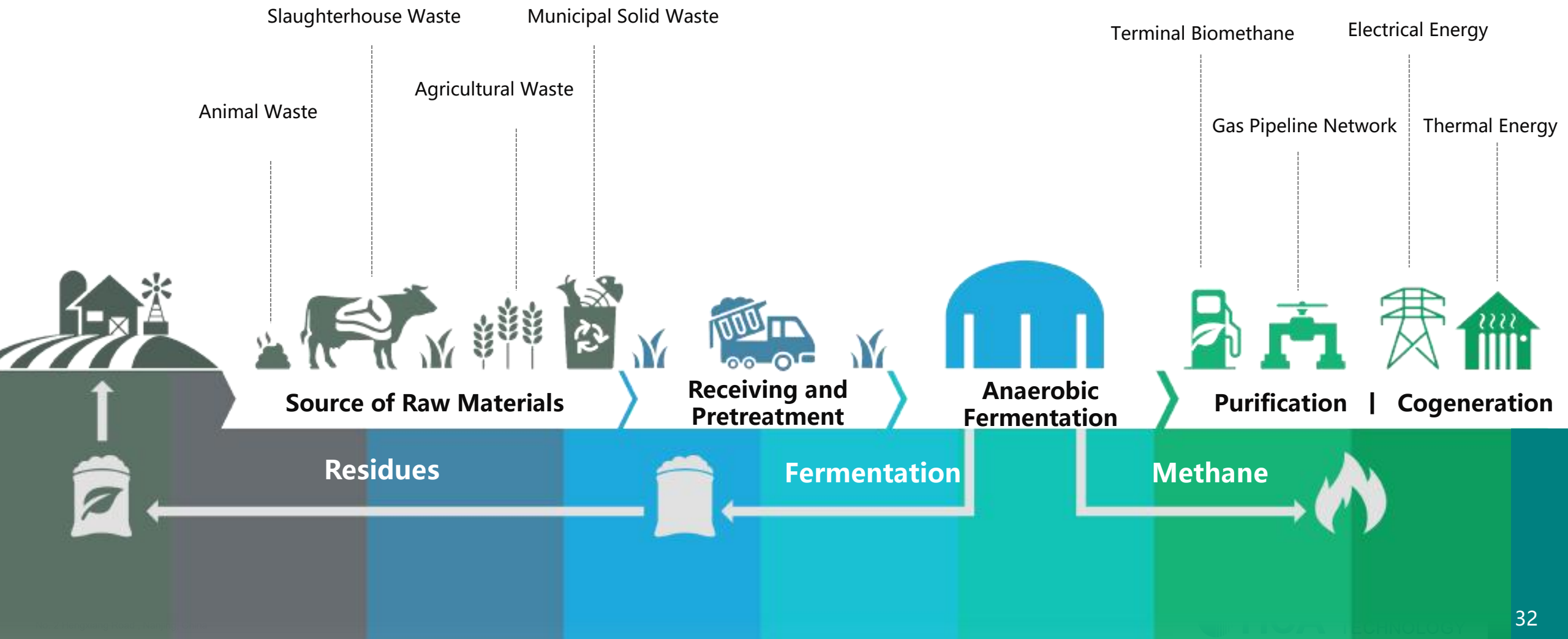
Wide Operating Range

- The minimum ambient temperature of the current operating project is - 30 ℃

Database

- Rich database of biomass organic characteristics
- Customized design according to biomass raw materials with different characteristics in different regions

SEBIGAS APPLICATION



SEBIGAS TECHNOLOGY

SEBIBOX

Patented Technology

Online Replacement and Maintenance

"Submersible + Inclined" Composite Mixing Type

Proprietary Technology

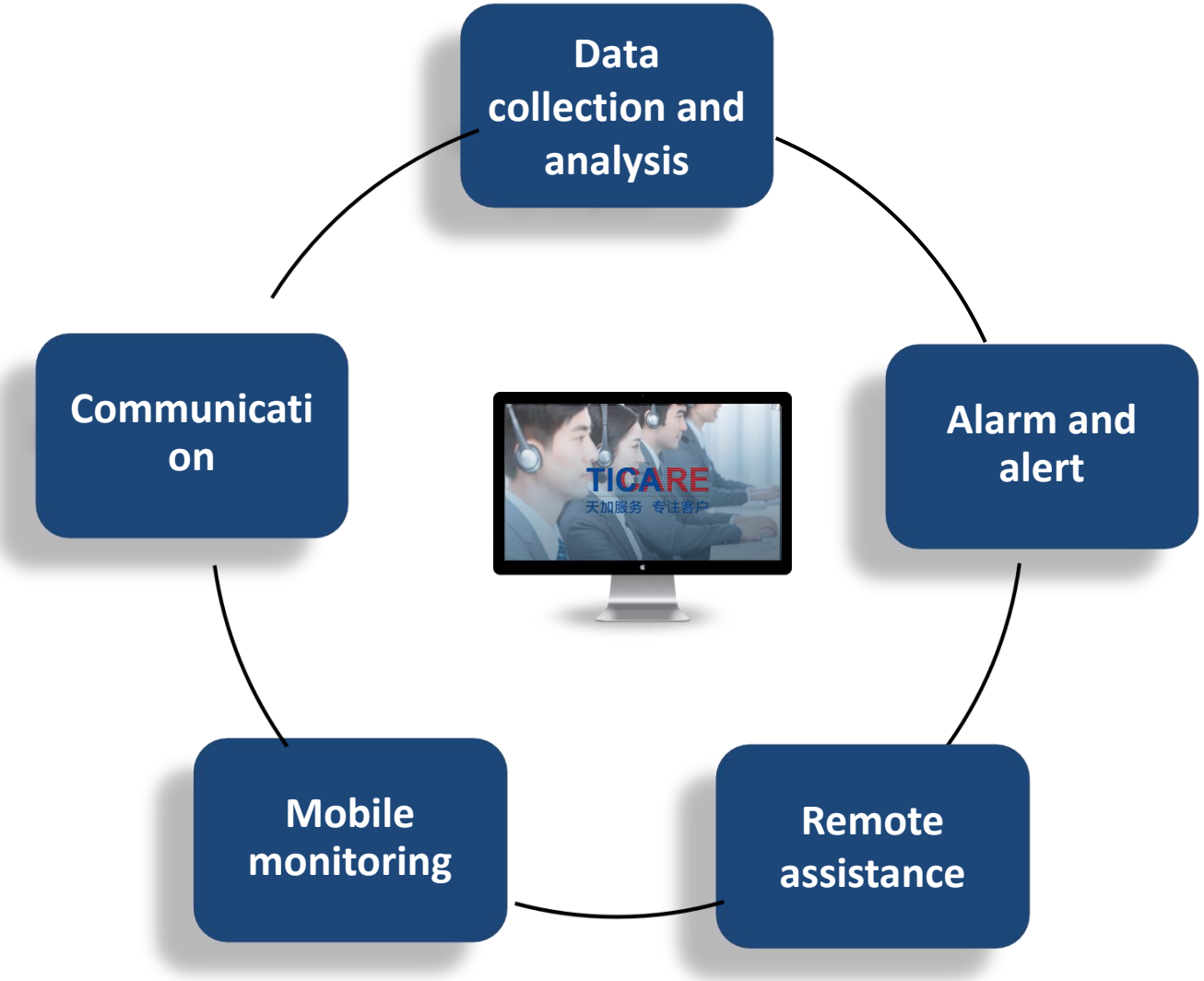
The liquid surface does not crust, and the mixture is more uniform. The fermentation efficiency of raw materials can be increased by 20%

SEBIGAS PROJECTS

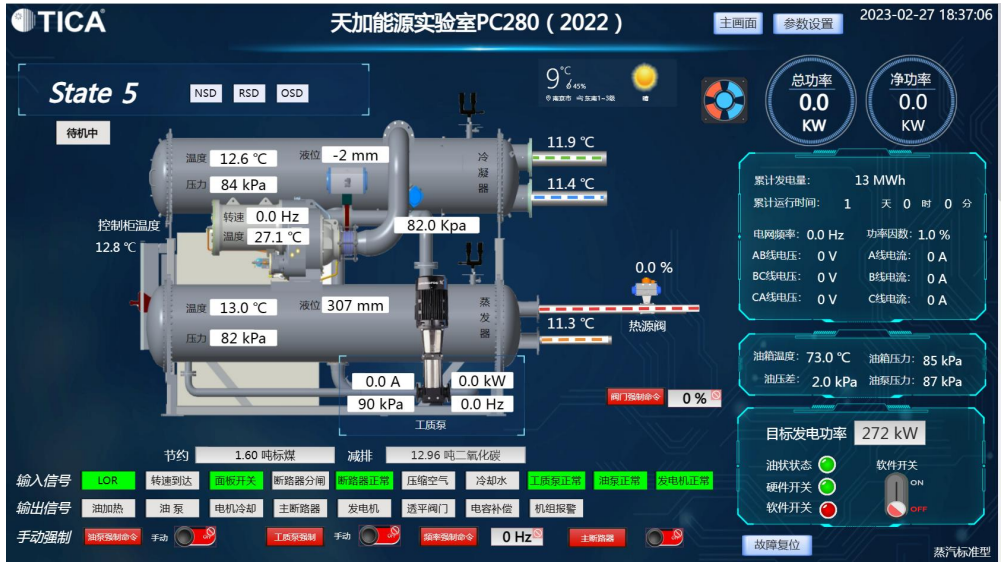
CHAPTER 05

Intelligent O&M Service

TICA ENERGY SERVICE



TICA Energy service offer 24/7 support through remote monitoring systems.



INTELLIGENT REMOTE O&M CENTER

远程监控室
REMOTE MONITORING ROOM

ORC Expert diagnostic system (under construction)

- Real-time monitoring
- ORC operation knowledge base
- Early warning according to operation trend
- Analysis and diagnosis of historical problems

PRO

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