Ackordscentralen

**Phoenix Biopower AB (publ), 559086-8435, in Bankruptcy**

Phoenix Biopower AB (the "Company") was declared bankrupt on February 10th 2025 by Stockholm District Court. The court appointed Erik Osvald at Ackordscentralen Stockholm as official receiver of the bankruptcy.

The Company was founded in 2016, and its business has consisted of developing biopower technology. The Company has conducted its business operations at rented premises in Stockholm, Sweden. At the time of the bankruptcy decision the Company had eight employees.

For more information about the Company's business, assets and history we refer to the tender documents, see below and appendices, which have been drawn up by the Company.

For questions regarding the Company's business, technology and similar, we refer you to Michael Bartlett (michael.bartlett@phoenixbiopower.com) and Henrik Båge (henrik.bage@phoenixbiopower.com).

For questions regarding the bankruptcy, the tender procedure or to make an offer, we refer you to the official receiver Erik Osvald (erik.osvald@ackordscentralen.se) and Sofia Bredhe (sofia.bredhe@ackordscentralen.se).

**The Tender Procedure**

The official receiver hereby invites offers for all or part of the Company's assets.

Offers, in writing, stating the amount in SEK excluding VAT, must be submitted by e-mail to Sofia Bredhe no later than March 16th 2025.

The highest bid will be communicated to all other bidders, who will be given the opportunity to increase their bid within a shorter period of time as determined by the bankruptcy estate. The bankruptcy estate will not disclose who made the bid.

**Terms and Conditions**

The bankruptcy estate transfers property in its existing condition with an exemption of liability for the bankruptcy estate. It is thus the responsibility of the buyer to carry out the necessary inspection of the property in order to clarify the extent of the property, and to detects any faults and defects. The bankruptcy estate reserves the right to correct any errors in this text, in the tender documents and in other documents provided in connection with the tender procedure. The bankruptcy estate also reserves the right to correct any errors and make any changes to the aforementioned information.

The bankruptcy estate has free discretion, i.e. the right to decide for itself which offer is to be considered most favourable to the bankruptcy estate. The bankruptcy estate

reserves the right to cancel the tender procedure before the end of the tender period. Furthermore, the bankruptcy estate has the right to an interim sale during the tender procedure, which means that the transfer of all or part of the assets may take place before the end of the tender period.

The bankruptcy estate does not provide any guarantees regarding the possibility for a buyer to use or dispose of intellectual property rights. Any use of transferred intellectual property rights is the risk of the buyer.

The acquisition of a business from a bankruptcy estate does not mean that the Company´s staff automatically follows.

Transfer of agreements requires the consent of the respective counterparty.

## PHOENIX BIOPOWER AB (PUBL), 559086-8435, IN BANKRUPTCY

### EXECUTIVE SUMMARY

Phoenix Biopower (PBP) is developing a highly efficient biopower technology that can radically improve the economics of plannable, local, and renewable power; the so-called BTC concept. A standardized plant at approximately 11 MWe capacity is a targeted first plant that can utilize woody residues, as a first step towards lower quality fuels.

The BTC plant technology can achieve electrical efficiencies of 40-53% (LHV), depending on scale, by combining high pressure biomass gasification with a gas turbine featuring massive steam injection. The Company is therefore developing three key technology systems: the Top Cycle gas turbine, the Hybrid Fluidized Bed gasifier, and the BTC plant technology.

The revolutionary Top Cycle gas turbine is a platform-technology that may be applied for power plants fired by hydrogen, fossil gas and biomass. This platform, by design, is optimal for CCS/BECCS with superior cost and performance in power generation and $CO_2$ capture. Further, the TopCycle gas turbine is ideally suited to the expected roll-out of a hydrogen-based energy system. With inherently superior fuel flexibility, economics and emissions – with NOx levels second to none – the Top Cycle will be the heart of cost-effective, plannable, flexible power plants with multifuel capacity.

The Hybrid Fluidized Bed (HFB) gasifier is a new, patented, gasification technology that addresses the challenges posed by high pressure gasification. Through its design, the negative effects of high pressure on conventional fluidized bed gasifiers are addressed, resulting in a cost-efficient and effective gasifier with a wide feedstock flexibility. The HFB is therefore well-suited to both BTC and pressurized synthesis and production processes like hydrogen production with BECCS, methanol, sustainable aviation fuel, etc., as well as steel industry and other consumers of green gases.

The BTC technology, Biomass-fired Top Cycle, is a high efficiency technology based on pressurized biomass gasification integrated with the Top Cycle gas turbine. With unique process and heat integration, the BTC nearly doubles the electrical efficiency compared to a traditional steam cycle, thus offering a revolutionary step-change in biopower economics and market potential.

Electricity generated from bioenergy in 2019 increased 5% and reached 589 TWh. IEA Sustainable Development Scenario projections are 922 TWh in 2025 and 1168 TWh in 2030, a near doubling in a decade.

A new, green hydrogen market is emerging. It is expected that green hydrogen will replace fossil-derived hydrogen and fossil fuels for propulsion and power generation. Biomass is a source for the production of hydrogen through gasification. Furthermore, The BTC with its superior fuel flexibility can run on 100% hydrogen, 100% natural gas or 100% syngas and blends of fuels in between.

The BTC represents a great business opportunity for the gas turbine industry where gas turbines become associated with $CO_2$ neutral/negative power generation. Especially since current market forecast points towards a decline after 2023-2025 in GT unit orders and the main market drivers for new capacity are coal and nuclear plants retirements and electrification of societies through the energy transition.

## BACKGROUND

Phoenix BioPower develops highly efficient bioenergy solutions to accelerate the global transition to a climate-neutral society. The technology platform that the company is developing converts biomass into high-value products, such as electricity, industrial gases or hydrogen, with significantly lower climate impact than today's fossil-based methods and at lower costs than today's prevailing technology. With the company's technology platform, for example, up to twice as much electricity can be produced from biomass.

The Company was founded in 2016 by Hans-Erik Hansson, Michael Bartlett, Oliver Paschereit and Henrik Båge with the goal of commercializing BTC technology for highly efficient, flexible and plannable biopower. Since its inception, the company has broadened the number of focus applications for the technology to also meet the need for green industrial gases, such as hydrogen, and to enable negative emissions through BECCS[1] combined with biopower or industrial gas production.

Before the bankruptcy the Company was in a pre-commercial phase and had no sales revenues, but has financed technology development through venture capital, convertible loans, public development support and innovation and growth loans (Almi). In total, approximately SEK 140 million (~13M€) has been invested in the company's technology and business development.

The Company controls the following:

- a wholly owned Swiss subsidiary, Phoenix BioPower Switzerland GmbH, with the aim of ensuring access to Swiss expertise in gas turbine technology. GmbH has an ongoing development project funded by the Swiss authority, SERI.
- a wholly owned Swedish subsidiary, Phoenix BioPower IP Services AB, which owns the new patents generated by the Group (3 families).

[1] BECCS: Bio Energy Carbon Capture and Storage. It involves capturing biogenic carbon dioxide while producing renewable energy and permanently storing this carbon dioxide in bedrock under the seabed. Since the carbon dioxide in biomass comes from the atmosphere, which is then permanently stored in the bedrock, the net becomes negative – Negative emissions.

## ASSETS

The Company's assets consist of:

- 100% of shares in Phoenix BioPower Switzerland GmbH.
- 8 granted patents and 8 applications within 7 families, see table 1 below.
    - The 4 older patent families are owned by the Company.
- 100% of shares in Phoenix Biopower IP Services AB, holding the 3 latest patent families
- Intangible assets, such as design documents, specifications, drawings, drawings, experimental data, simulation data, simulation models, design tools, etc.
- An integrated gasification and combustion test facility for the development and testing of the technology under atmospheric conditions using solid biofuel, hydrogen or LPG as fuel (20-200 kW). This rig is installed and functioning at a site in Stockholm, Sweden, but must be removed and, if necessary, re-established elsewhere.
- Established brand in the Swedish and Nordic energy industry as the only developer of more efficient biopower technology

| Name | Company | Status | SE | EP | US | CN | PCT | EP | DE | SE | US | Priority date | Expire date of patent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Superspool | Phoenix Biopower AB | Manage patent | | | | | IPRP | G | | | P | 2010-02-25 | 2030-02-24 |
| IGWC | Phoenix Biopower AB | Manage patent | | | | | IPRP | G | P | | | 2011-03-11 | 2031-03-11 |
| Super Feeder | Phoenix Biopower AB | Manage patent | | | | | IPRP | G | P | P | P | 2013-12-27 | 2033-12-27 |
| Combustor | Phoenix Biopower AB | Manage patent | | | | | IPRP | G | P | | | 2010-03-19 | 2030-03-19 |
| Hybrid Method of Fluidisation | Phoenix Biopower IP Services AB | Patent and Application | | AP | AP | AP | IPRP | | | P | | 2021-02-23 | 2041-02-23 |
| Control of gas turbine process | Phoenix Biopower IP Services AB | Patent and Application | | AP | AP | | IPRP | | | P | | 2021-08-19 | 2041-08-18 |
| Dual Swirl Mixer | Phoenix Biopower IP Services AB | Application | AP | AP | AP | | IPRP | | | | | 2022-03-09 | 2042-03-08 |
| Staged combustion pilot | | Drafting | | | | | | | | | | | |
| Gear connecting the turbine with two compressors | | Draft | | | | | | | | | | | |

**Table 1:** Patent portfolio summary (AP: application, P active patent, IPRP search report from PCT exists, G granted from EPO).

## MARKET AND THE POTENTIAL OF THE TECHNOLOGY

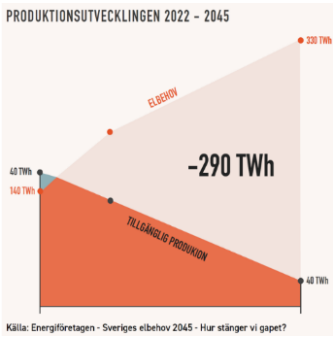



Figure 1: Sweden's electricity needs by 2045

The energy transition that we are going through now places enormous demands on increased electrification. The energy companies calculate that if we are to achieve all the goals, Sweden's entire electricity system must be built, twice over! This is because today's consumption of about 140 TWh is expected to increase to up to 330 TWh. At the same time, a large part of today's production capacity will be retired. This means that new production capacity of up to 290 TWh, or twice as much as Sweden consumes today, must be built in less than 21 years! To illustrate, this corresponds to 30 nuclear power reactors of Forsmark's size, or 15,000 – 20,000 modern land-based wind turbines. The situation is even more challenging in other countries with a high share of fossil energy, such as Germany, Belgium, the Netherlands and several Mediterranean countries.

In this market, the company's biopower technology can be an important part of the future energy landscape. Unlike nuclear power, the company's BTC technology can both offer baseload, but also be regulated both down and up to meet variations in the system from consumption and weather-dependent production. As a combined heat and power plant, it provides local electricity production close to consumption, which stabilizes the local grids, reduces the need for electricity for heating and alleviates the power shortage. Like nuclear power, it also raises the "floor" for electricity production in general.


Figure 2: The global need for renewable energy, hydrogen and negative emissions by 2050.

## BIOENERGY MARKET AND BIOPOWER MARKET

Primary markets for the Company's technology are combined heat and power, BECCS and green industrial gases. The company sees a growing interest in the latter two, mainly so that they are not dependent on either district heating networks or seasonal variations in the same way as combined heat and power for district heating. These two markets are also significantly more global than district heating.

Globally, the energy transition places similar demands as Sweden, but on a much larger scale: renewable electricity production must increase by 55,000 TWh, see Figure 2, which is a larger percentage increase for global production than that in Sweden. Consequently, the potential for renewable technology such as the BTC technology is very large. The company's technology aims for a global market that, according to e.g. the IEA, will grow to €150 billion per year in the long term, according to e.g. the IEA. Providing for only a fraction of this means enormous potential. The company estimates, Figure 3, that the serviceable obtainable market for BTC facilities across the facility sizes and initial feedstocks that the company is aiming for amounts to approximately €1 billion/year in 2025, but will grow at large rates and with expanded capabilities, e.g. for agricultural residues, BECCS.

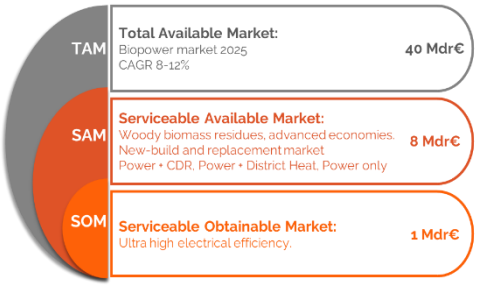



Figure 3: The global market for biopower in 2025, excluding BECCS, industrial gases, etc. Net zero scenarios require a 3-4 times larger production and market than shown.

### CARBON NEGATIVE- AND ENERGY-EFFICIENT INDUSTRIAL GASES

The company's gasification technology can be applied to the production of industrial gases, such as hydrogen, or the production of liquid feedstocks or fuels such as methanol. Biogenic industrial gases are not only carbon neutral but can also be carbon negative. This is made possible by capturing and storing the carbon dioxide released during the process, which not only reduces greenhouse gases but can also generate significant income to reduce production costs. Our technology is also energy-efficient, requiring 5-7 times less electrical energy compared to conventional electrolysis for hydrogen production. This makes it possible to use our gasification technology to create green industrial gases even in areas where there is a shortage of electricity, but where biomass is readily available. Furthermore, the production price is decoupled from the volatile electricity price.

| Market | Outline | Phoenix USP | Market Need (IEA) |
|---|---|---|---|
| **Biopower & heat** *(BTC)* | Local power biopower and combined heat and power (CHP) plants | 3x electricity production for fixed heat supply. | Converting 5% of global district heating to renewables: 14 EJ/a DH (2017). |
| **Biopower with Carbon Dioxide Removals** *(BTC)* | Large-scale biopower with negative CO2 emissions | 60% more electricity per CDR<br>30-50% lower levelized costs | 2 Gt/a CDR by 2050. Requires 20 EJ/a biomass. |
| **Biofuels** *(Gasification technology)* | Gasification plants for biofuels and hydrogen production. | De-couple fuel from electricity price. Higher pressure syngas production. Negative emissions. | Bio-kerosene requires 11 EJ/a biomass by 2050 |
| **Peak Power** *(Gas turbine)* | Utilise 100% H2 and other renewable fuels in the gas turbine for peak power supply | Unique flexibility, same hardware. Ultra-low NOx, CO emissions. Broad operation window. | Hydrogen and e-fuels input to power generation to reach over 12 EJ/a by 2050 |

Targeted end-users for Phoenix plants that produce green industrial gases for energy (i.e. very high temperature process heat) have a consumption equivalent to 200 – 1,600 GWh of biomass per year, or 120 – 960 GWh of hydrogen per gasification unit. This corresponds to medium-sized players in the process industry, such as ceramics, metallurgy and glass. It also corresponds to gasification systems with the same capacity as the BTC plant (20-200 MW biomass). Other players are medium-sized chemical industries where fossil hydrocarbons need to be replaced with green atoms and molecules. The company's technology also has a natural role to play in the

market for biofuels, e.g. sustainable aviation fuel, and industrial feedstocks like methanol. Plants that are significantly larger will face a logistical challenge in supplying the plant with fuel, biomass, especially outside the Nordic region and North America.

### Changed regulations for biogas in Sweden

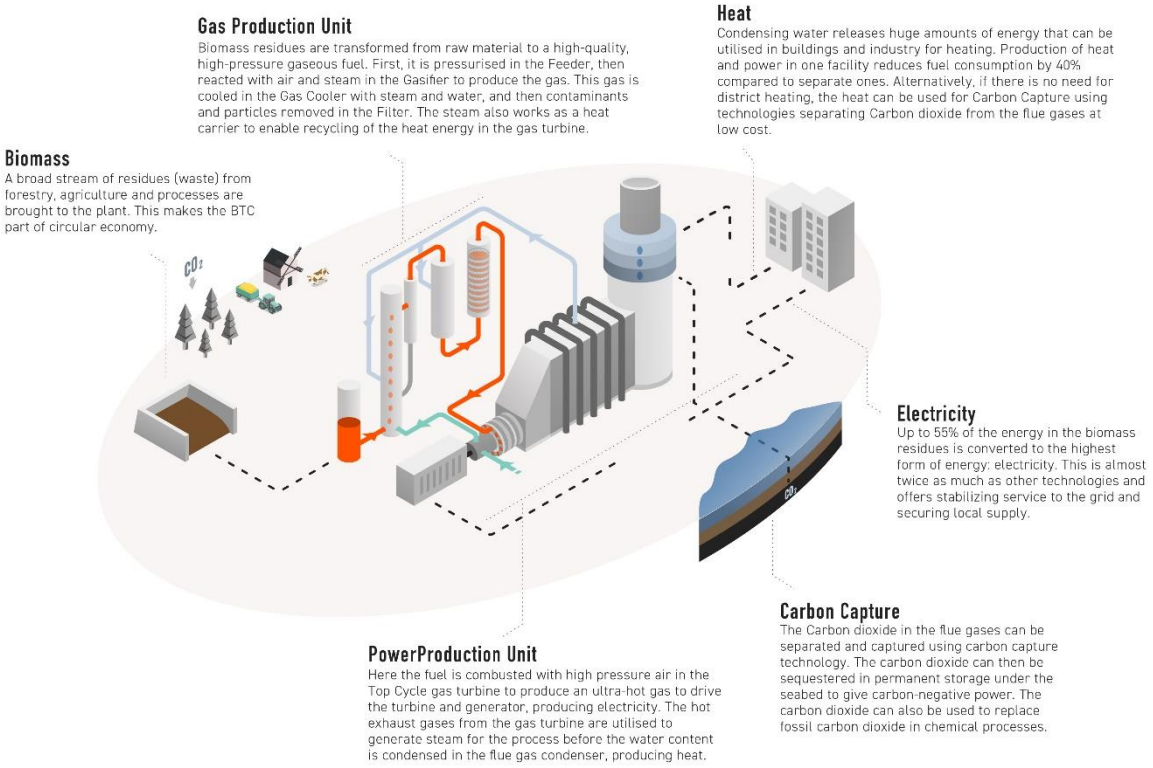
To reach the government's goal of 10 TWh of biogas by 2030 – needed to decarbonize process industry – a proposed change has been made to the definition of biogas. It is proposed to now include gases from thermal gasification, rather than just anaerobic digestion, as well as focus on energy content rather than only methane content. This change is currently in a consultation phase, but is expected to take effect July 1, 2026, enabling a production subsidy that will drive large-scale expansion of thermal gasification of biomass for industrial purposes.

## TECHNOLOGY OVERVIEW

### BTC Plant

Phoenix BioPower AB is developing a new platform technology for the decarbonized economy to provide plannable, local and cost-effective renewable power production as an alternative to variable and weather dependent renewable energy. This technology, called the Biomass-fired Top Cycle (BTC), has the potential to almost double the electrical efficiency from biomass compared to state-of-the-art plants and therefore nearly halves the operating costs. At the same time CO2 can be captured with lower relative power penalty and up to 60 % more electricity produced per ton CO2 captured, enabling very low costs for achieving negative emissions.

The core approach in the BTC is to combine high-pressure gasification integrated with a novel gas turbine process – the Top Cycle – such that all heat is recovered at optimal temperatures by way of steam. In this way, the BTC concept can achieve electrical efficiencies up to 53% at large scales (100+ $MW_e$) and 40-50% at 10-40 $MW_e$ scale.



### TopCycle Gas Turbine

The gas turbine that is a vital part of a BTC plant is being developed to be able to be operated with great flexibility in terms of fuels. Through the patent-pending and innovative combustion system, so-called PACS, a fuel-flexibility is achieved that no other manufacturer can offer today. The company has demonstrated stable operation in tests with such different fuels as gasified biomass and 100% hydrogen, as well as shifts between such fuels during operation, with the same hardware and with low emissions.

The key factor to the efficiency and flexibility of the gas turbine is the massive injection of steam into the combustion chamber of the gas turbine. This results in a gas turbine with a single cycle design that exceeds combined cycle performance with gasification. The high proportion of steam, about 50% of the volume in the combustion chamber, means that a large amount of air compression energy is saved and that the exhaust energy is recovered in an efficient gas turbine instead of a separate steam turbine to a lower efficiency.

The gas turbine is being developed based on the market conditions and technical limitations identified. This means that a minimum size is about 10 MWe and a maximum of 100 – 150 MWe. This breadth of scale, combined with the fact that plants can be built in blocks of parallel units, enables flexible coverage of plants from 10 to 1,000+ MWe. The gas turbine can be used for varying operating profiles, such as base load or peak load.

### Hybrid Fluidised Bed Gasification System

Phoenix gasification technology can be applied outside of a BTC plant for biopower. For example, we have identified a number of applications of gasification technology in the steel/metal and alloy industries. Alternatively, these gases can be used to supply high-temperature heat in the various production stages.

The production of the synthesis gas, which comes from biomass being gasified under pressure and high temperature, is illustrated in the figure here. After the coarse purification of the gas from particles in the cyclone, the gas is sent on to cooling and filtration to further separate contaminants. A reforming or partial oxidation step can be integrated to convert tars and higher hydrocarbons into hydrogen and carbon monoxide.

The advantage for Phoenix BioPower is that we can use the core of the gasification technology developed for the BTC plant in this application. This means that we can apply the technology to more markets with very limited additional development costs. For the customer, the advantage of HFB technology is a lower production cost compared to electrolysis and also compared to other gasification technologies.


**Figure 4:** Sketch of the HFB gasifier. To produce industrial gases, oxygen is used instead of air, as the aim is to minimize the amount of nitrogen gas in the process.

## THE FOUNDING TEAM

The Company was founded in 2016 by Hans-Erik Hansson, Michael Bartlett, Oliver Paschereit and Henrik Båge.

- Hans-Erik Hansson, the fundamental innovator of gas turbine technology and a driving force in the development of integration with pressurized gasification, retired
- Michael Bartlett, CTO. PhD in chemical engineering at KTH. Developed the solution of high-pressure Top Cycle with integrated pressurized gasification together with Hans-Erik Hansson. Experienced technology project manager and product developer.
- Henrik Båge, CEO, Entrepreneur with over 20 years of experience in Cleantech and renewable energy. Former co-founder of SolTech Energy, listed on First North.
- Oliver Paschereit, Head of Combustion Engineering. Professor at TU Berlin and responsible for the development of combustion technology. Extensive experience in both industrial and academic development of combustion technology for gas turbines.

### DEVELOPMENT STATUS

The Company developed unique and patented technology for a BTC facility, including gasification and combustion and system integration. The company was in a development phase to reach the so-called TRL4 (technology readiness level). This means that the technology will be validated in a lab environment and the design basis is ripe for the next phase. Main results so far:

| Vad | Validation | Status |
|---|---|---|
| **PACS** | Validation of full-scale industrial burner prototypes, including front panel cooling, at atmospheric pressure. 3 different burner sizes for different product sizes have been developed and tested for 50, 100, 150 kW/bar power. Bio-syngas, 100% hydrogen, 100% LPG, 100% natural gas, blends and fuel change during operation have been tested at representative velocities, steam levels and other process conditions. | Done for 100, 150 kW/bar. Partially for 50 kW/bar burner. Tested at own rig and at TU Berlin. |
| **PACS** | Preliminary combustion chamber design and computational models for flow, cooling and kinetics. | Done |
| **PACS** | Pressurized combustion in 1 MW power at 1-10 bar. Preparations at TU Berlin, with upcoming tests as part of an EU-funded project. | To be completed by TU Berlin |
| **Gas turbine engine** | A full concept design was made by gas turbine manufacturer Zorya Mashproekt for the 20-25 MWe gas turbine, i.e. ready for detailed design for testing of components at full scale. Development plan and preliminary budget. A smaller 10 MWe gas turbine was also developed in less detail. | Done. |
| **HFB** | Validation of the hydrodynamic conditions in gasification reactor. Made in a cold rig for gasification reactor that corresponds to 5 MW scale and up to 35 bar. | Done. Phoenix designed test rig at RISE. |
| **HFB** | Pressurized gasification test of biofuel in 30 kW power at 10-30 bar with air and oxygen blown operation in a BFB at representative conditions. | Started. KTH, Stockholm. |
| **System** | Validation of systems and their properties under atmospheric conditions. Biofuel gasification, gas | Done. |

| | | |
|---|---|---|
| | purification with a hot gas filter and combustion at 75 – 120 kW biofuel output. Fuel switch from 100% hydrogen to 100% syngas. | Done in our own test rig. |
| **Plant engineering** | Plant feasibility studies with customer for 10 MW, 25 MW, 40 MW and 300 MW (2x150 MW) electrical power with and without CO2 capture for negative emissions. | Done. |
| **Demo plant** | Concept design and engineering for 10 MW demonstration plant. Including concept selection, preliminary design basis for main components. | Done. |

### COMMERCIALIZATION OF THE TECHNOLOGY

Depending on the risk appetite, BTC can be commercialized with different stages. Different parts of the technology platform may also be commercialized independently of each other. For example, gasification technology can be commercialized to produce industrial gases without initial investments being made in the gas turbine. Then only IP needs to be maintained and secured during that time, resold to external party, or abandoned.

Development work can begin to take the gasification and combustion technology to so-called TRL5, which means that the technology is validated in the relevant environment (pressure, temperature, system interface). At TRL5, conventionally, the technology is ready to scale up to industrial scale. During the same period, the projects for the first plant can be started to secure a conditional order with commissioning towards the end of the decade.

The development plan that the company has worked on includes a combined pilot and demonstration plant where the same site is used for both the pilot and demonstration phases, i.e. TRL 6 and 7 and 8 respectively.

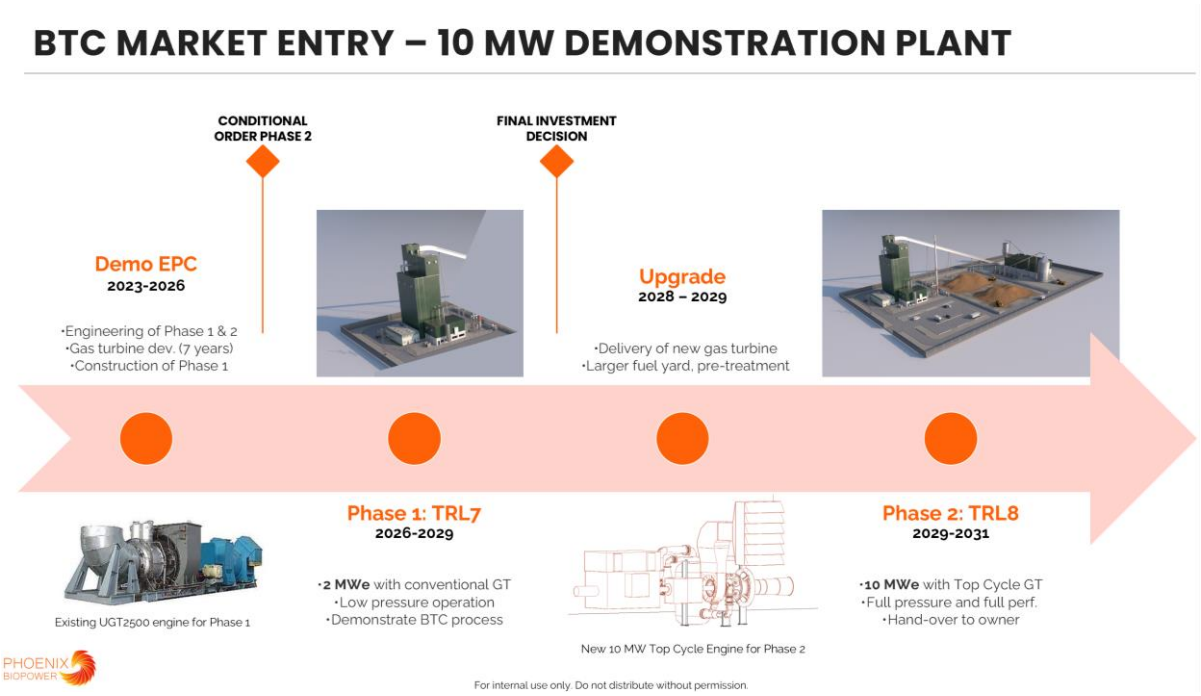



**Figure 7:** Pilot and demonstration project Description of the development into a full-scale commercial demonstration plant. Specified times will need to be adjusted according to the new business plan

**Appendices:**

- Financial annual report for 2023 (Swe), appendix 1.
- Business plan 2024-03 (Eng), appendix 2.
- PBP presentation (Eng), appendix 3.
- Information Memorandum Pepins, Jan-2025 (Swe), appendix 4.
- PBP investor presentation Pepins, Dec-2024 (Swe), appendix 5.