



2x EFFICIENCY

**Affärsidéprojekt 2023
FOUNDATIONS**



GOALS

01

Define product offering

02

Update business plan

03

Prepare basis for Pilot Plant

THE ENERGY TRANSITION DRIVES NEW INFRASTRUCTURE

PRODUCTION DEVELOPMENT 2022 – 2045, SWEDEN



=> 200 B€
= 1 000 €/person
until 2045!

DOUBLE EFFICIENCY BIOPOWER

- ✓ **ON-DEMAND**
Flexible, local renewable power
- ✓ **SCALABLE**
Cost-effective and highly efficient
- ✓ **CLIMATE IMPACT**
Biomass wastes as feedstock, CDR credits and biofuel options



1. DEFINE PRODUCT

BIPOWER IS A GROWING RENEWABLE SECTOR

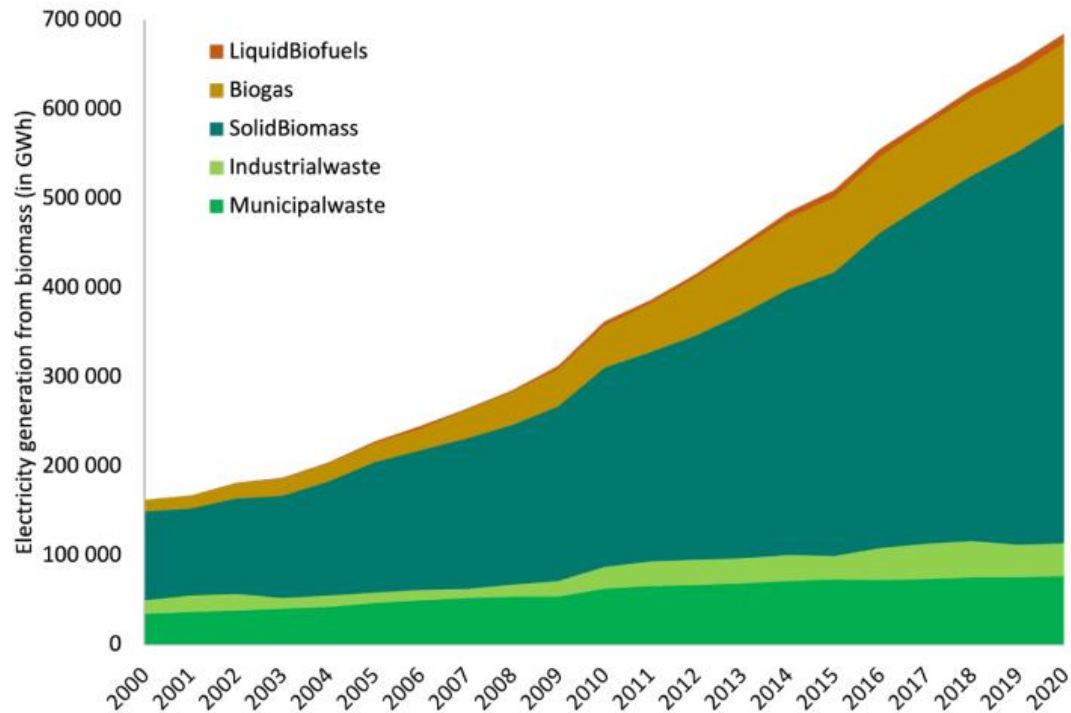


Figure 36 Biopower generation globally

Source: World Biomass Association

Current Market

- Over 100 GW installed capacity
- 9 EJ/a biomass utilized (power-only, CHP)
- Solid biomass dominates
- 15 bn€ / a investment pipeline to 2030

Growth Scenarios

- 5-20x biopower production in 2050 (IEA, IRENA, IPCC)
- With BTC efficiency → 10-40x biopower
- TAM of 150 bn€ / a

----- PHOENIX MARKET APPLICATIONS

LOCAL POWERGEN AND CHP*

20-200 MW bio
10 -40MWe units

Half the fuel costs
3 times more local power
with CHP

CO2-NEGATIVE POWER

80 -200+ MW bio
40 -100+ MWe units

30% lower levelised costs
CO2 Removal Credits
(BECCS)

INDUSTRIAL GASES, H2 AND CHEMICALS

25-300 MW bio-syngas for
H2 / SAF / Methanol etc

High pressure gasifier

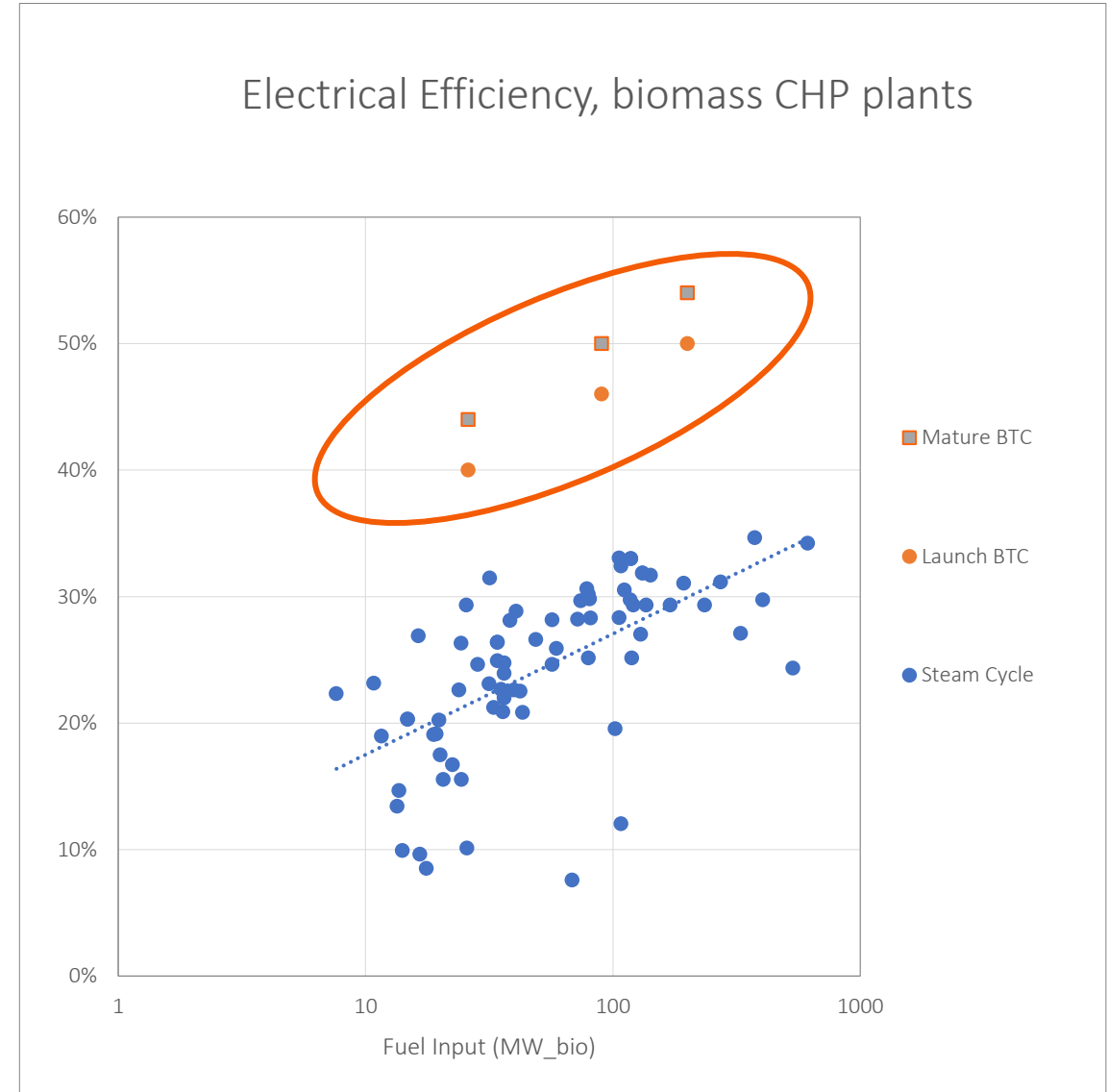
Decouple H2 from
electricity prices
CO2 negative option

*Combined Heat & Power, district heating

----- BTC PRODUCT PERFORMANCE TARGETS



	P10	P40	P100+
Feedstock	Forest residues, pellets, blends with agri residues Gaseous fuels (H2, NG)		
Net power output* (MWe)	10	40	100
Thermal input (MWth)	25	90	200
Net electrical efficiency*	40-44%	46-50%	50-54%
CAPEX (M€/MWe)	3,5 – 5,5	2,5 – 3,5	1,5-2,5



*LHV, forest residues 50%MC. Performance depends on gas turbine technology level. CAPEX depends on maturity, application, site, inflation. No CCS included.

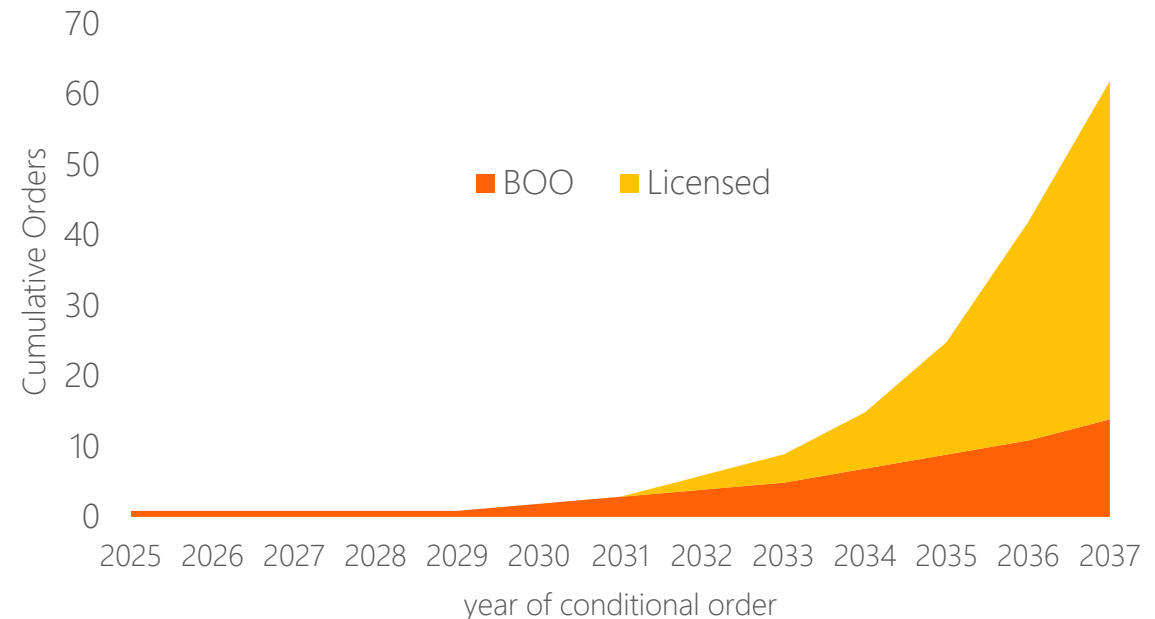


2. BUSINESS PLAN

----- THE MONEY! (BUSINESS MODEL)

1. Market entry strategy: part-own first generation of plants
 - Risk mitigation effort (skin in the game)
 - Plant generates production royalties
 - Asset divestment opportunity
2. Growth Strategy 1: Patent portfolio basis for license revenues gives company ability to scale globally
 - Capacity royalty: 6% installed cost (HW, SW, plant)
 - Production royalties: 4 öre/kWh energy produced
3. Growth Strategy 2: BOO - Build, Own & Operate
 - Finance and build a fleet of (identical) plants
 - Control larger part of value chain
 - Sell Power, Grid services, Heat and/or Neg emissions
 - Synergies from multiple plants in geographic area
 - Expected IRR 10-13 % for 2xP10 BECCS.

Roll out, mid scenario



----- FUNDING NEEDS 2023-2029, GROSS, ESTIMATE

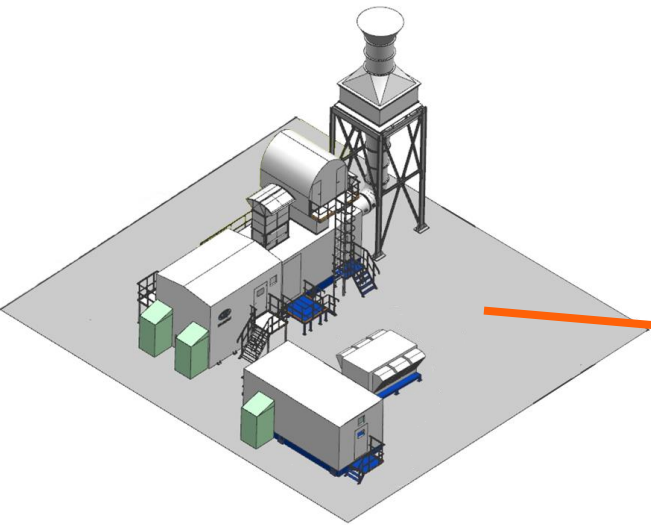
- 140 MSEK Technology development needs 2023-2029 (13 invested YTD 2023)
- 35 – 45 MSEK needed for 2023-2024 10 in the short term
- Total funding needs until 2029 410MSEK.
- Demo plant application to Energy Agency/EU in Q1-2024
- Demo Plant project eligible for 30-50 % public funding
- Demo plant funding: Equity+Debt, Customer and Public, ~30/30/40

CORE DEVELOPMENT (MSEK)	TOTAL	2023	2024	2025	2026	2027	2028	2029
Gas Turbine & Combustion System	53,9	9,0	13,5	8,0	7,0	8,0	4,0	4,4
Gasification System	39,2	8,0	7,0	8,0	6,0	6,0	2,0	2,2
Plant	16,1	2,0	3,0	3,0	3,0	3,0	1,0	1,1
Other (Bus Dev, Proj Mgmt, Sales)	30,7	2,4	4,3	4,0	5,0	5,0	5,0	5,0
Development funding	139,9	21,4	27,8	23,0	21,0	22,0	12,0	12,7
Demo Plant	957,1	2,0	15,0	56,3	165,5	236,2	295,4	186,7
Grand Total	1 097,1	23,4	42,8	79,3	186,5	258,2	307,4	199,4
Public Support	486,9	1,5	19,3	35,7	86,2	116,2	138,3	89,7
Sales	200,0	0,0	0,0	50,0	0,0	0,0	150,0	0,0
Net funding needs	410,2	21,9	23,6	6,4	100,3	142,0	19,1	109,7



3.PILOT & DEMO PLANT

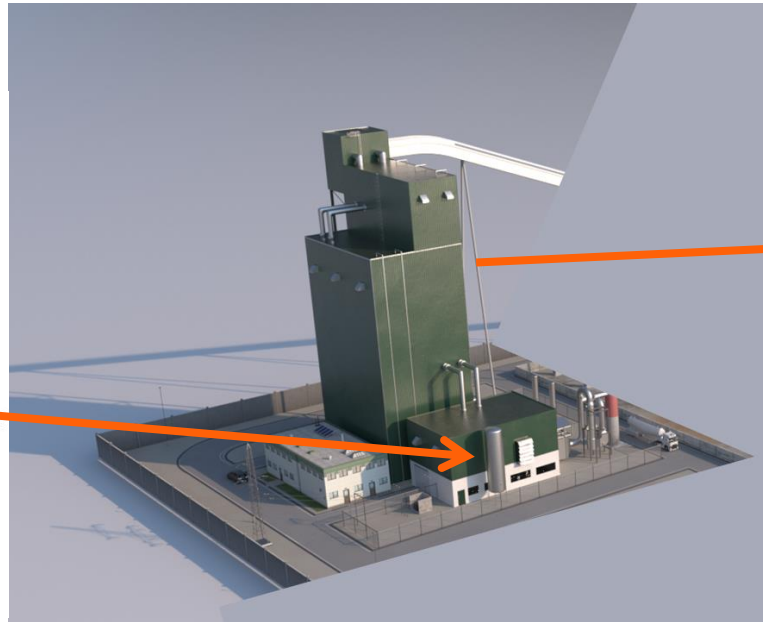
PHASE 0



Re-built gas turbine with Phoenix combustor. H2, NG testing, steam. ~10 bar, 2 MWe

2024 - 2027

PHASE 1



BTC plant. Full-scale gasifier with re-built gas turbine. Biomass pellets-fed. ~10 bar, 2 MWe

2026 - 2029

PHASE 2



BTC plant with new Top Cycle gas turbine. Full fuel yard. Full performance. ~20 bar, 10 MWe

2029 - 2031



7 direct

6 indirect

2x EFFICIENCY

Direct influence

3 GOOD HEALTH AND WELL-BEING	7 AFFORDABLE AND CLEAN ENERGY	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION
15 LIFE ON LAND		

Indirect influence

1 NO POVERTY	2 ZERO WASTE	6 CLEAN WATER AND SANITATION
8 DECENT WORK AND ECONOMIC GROWTH	10 REDUCED INEQUALITIES	14 LIFE BELOW WATER

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<https://vimeo.com/835432877>



Introducing the BTC plant for high efficiency biopower
BTC[®] biomass-fired Top Cycle

SUMMARY

- On-Demand power: flexible & renewable
- 50 – 80 % more electricity from biomass
- 3x more local power from district heating (CHP)
- 65 – 120 €/MWh depending on scale/application
- 10, 40 & 100 MWe units
- Carbon-negative power @50% higher net efficiency
- 30-40 % lower cost/ton for CDR
- First plant commissioned by 2029
- Seed round, 50 MSEK/5M€ Q4-2023
- Funding need 2023-2030: 290 – 500 MSEK (25-43M€)

