

Project Apollo

Scaling PVT Module Manufacturing: Opportunity to Invest in a Game Changing Solar Technology Company

June 2023

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Transaction Overview and Rationale



The Transaction

- Sunmaxx, a highly innovative photovoltaic thermal module (PVT) technology company, will run a competitive process to find additional resources and investors to support its scale up plans. The Company is seeking:
 - **€8m in a Series A** funding round ('the **Transaction**'), after the recent closing (12/22) of its €3.25m Seed II round led by **MAHLE** New Ventures and **TGFS** Technologiegründerfonds **Sachsen**
- The **main shareholders** MAHLE and TGFS are **extremely supportive** of Sunmaxx's growth plans by **committing to invest approx. €3m in the Transaction**. They look forward to working closely with the new investor(s) to take the Company to the next level
- The Series A offers a **unique opportunity to participate in the reshoring of part of the solar value chain in Europe**, and to do so with **state-of-the-art technology** that is **well ahead of the competition in terms of performance, efficiency** (heat and electricity), **quality** ('Made in Germany') and **scalability** (mass production-ready)
- Sunmaxx's **PVT modules**, combined with sole-heat pumps and/or seasonal storage systems, **address customers' demand for stable and affordable energy costs**, particularly **for heating**, and the urgent **need to reduce their carbon footprint**, by **decarbonising heat** and **electricity intensive industrial production facilities** and **fossil-fuel based district heating** at **game-changing lower cost** vs current alternative solutions. Sunmaxx's **activities are directly aligned with UN SDG 7** (Affordable and Clean Energy) , **11** (Sustainable Cities and Communities), **12** (Responsible Production and Consumption) and **13** (Climate Action)
- Subject to the signing of the confidentiality agreement, qualified and interested parties will be provided with a confidential information package as well as additional details on the next key milestones of the process

Transaction Rationale

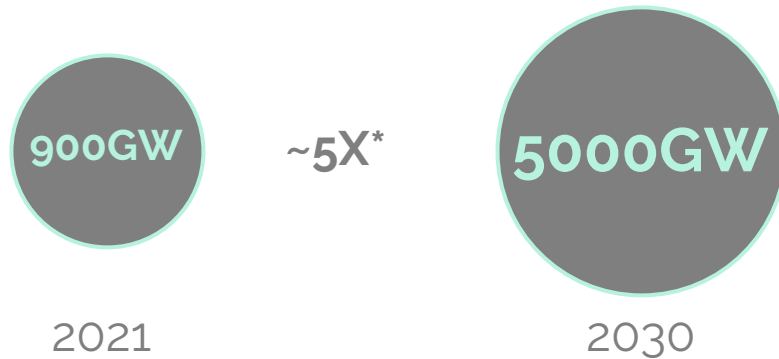
- With the Series A funding Sunmaxx will:
 - **Expand its sales, R&D and production teams**,
 - Further **innovate and develop its technology** and
 - **Accelerate its market entry by completing the development and ramp up of a 50 MW nameplate production line** in Saxony (with **expansion potential to > 100MW**). The **location** is already **secured** under a 7-year lease and the main **equipment** has already been **ordered** at attractive delivery conditions (and with supplier penalties). **Production** is planned to **start in December 2023**. **De-risking of the initial production plan** has already started

Sunmaxx decarbonises heat and electricity intensive industrial sites, gas-fired district heating and residential buildings with highly efficient, cost effective, scalable and unique PVT modules that combine state-of-the-art PV technology with cutting edge thermal management knowhow from the automotive industry

Fast-Growing Global PV and PVT Panel Market

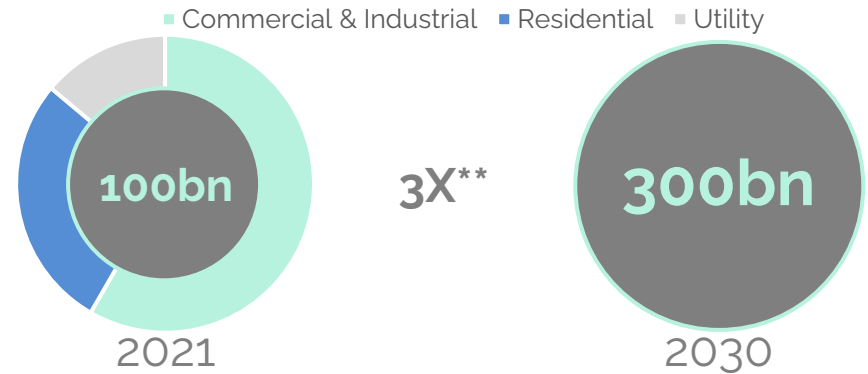


Global Installed Solar PV Capacity



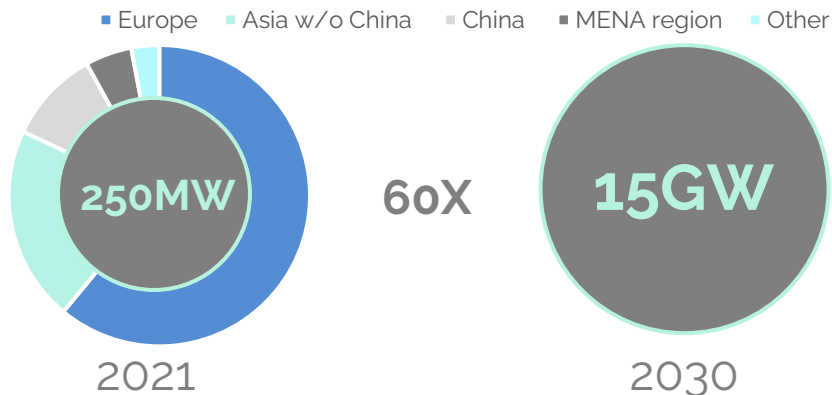
Source: IEA. *CAGR: 20%. Note: 2022 installed capacity: 1,185GW

Annual Global PV Panel Market Value (\$)



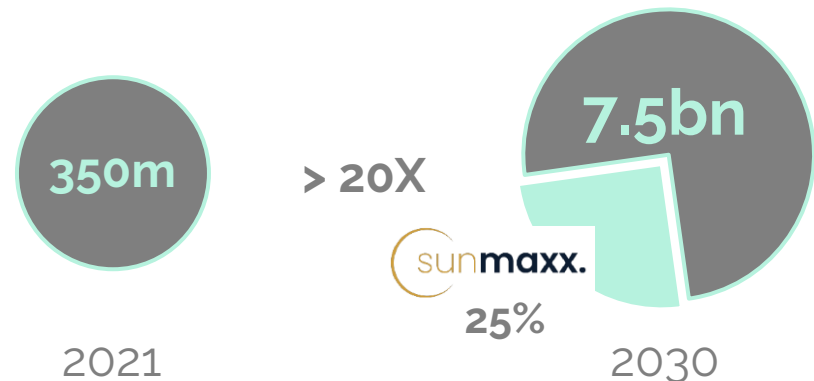
Source: Custom Market Insights 2022 and Company data.. **13 % CAGR,

Global Installed Solar PVT Electrical Capacity



Source: IEA data and AEE INTEC and Company data.

Global Annual PVT Panel Market Value (\$)



Source: Company data based on IEA 2021.

Sunmaxx Aims to be a Global PVT Leader with 25% Market Share in 2030

Sunmaxx at a Glance



Company Description

- Sunmaxx is a photovoltaic thermal module technology company based in Dresden, founded in 2021 by CEO Dr Wilhelm Stein
- The company aims to **decarbonise power and heat intensive industrial manufacturing processes, gas-fired district heating and residential homes**. Its PVT modules, combined with heat pumps and/or geothermal earth storage **offer a solution at significantly lower investment vs current alternatives, with shorter pay-back period (7-10 years), attractive returns (10-15% IRRs) and strong environmental impact** (100% decarbonisation of heat and net climate neutrality for electricity)
- Sunmaxx is currently the **only company worldwide** that combines **cutting edge high performance automotive thermal technology (EV battery aluminium cooling plates)** with the **latest photovoltaic technology**, achieving **independently verified 80% module efficiency** (electricity and heat) and **designed for volume production and easy installation**
- It has developed a **unique and proprietary automated PV laminate (glass) and aluminium integration process**, seamlessly **combining the two materials** with very **different mechanical and thermal characteristics**
- Sunmaxx owns 100% of the IP needed to manufacture its modules**. It cooperates with the German Fraunhofer Institute on R&D and has developed a high quality materials supplier and partner network, comprising facility planners, installation companies, heat pump providers, etc

R&D Partner



Award

Finalist for the Inter-Solar award 2023



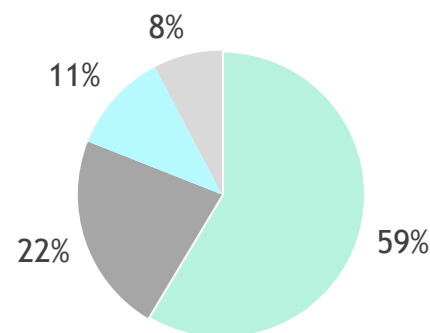
Source: Company data

Top Tier Customers

- Despite its short operating history, Sunmaxx has been able to attract a **high quality customer base** for concept studies and pilot projects



Current Shareholder Structure (fully diluted)



■ Founder ■ MAHLE New Ventures ■ TGFS ■ VSOP

Highly Experienced Management Team and Board



- Over **80 years of combined technical and business experience** across different industries (e.g.: solar, construction, semiconductors, consulting)
- Extensive **industrial scale up expertise, growing teams and businesses to up to 500 employees** in short periods (3-7 years)

Management Team

Dr. Wilhelm Stein, CEO



Dr. Stein has >25 years of managerial experience in the high-tech industry. He has a doctorate in physics and has already founded and grown numerous companies, successfully establishing them on the market. Since the start of his career, he has had a particular interest for the solar industry

Dr. Jiri Springer, CTO



Dr. Jiri Springer has >20 years of experience in solar and semiconductors. He received his Ph.D. in physics and photovoltaics in Germany and the Czech Republic. He played a leading role in setting up and operating numerous solar and semiconductor production facilities

Uwe Gey, CFO



Uwe Gey has managed the commercial aspects of various companies and developed them from start-ups to international medium-sized businesses. As graduate in business studies, he also brings valuable experience from his previous consulting background

Franz Ziering, CSO



Franz Ziering has more than two decades of experience in sales in the solar industry. He has a background in electrical engineering and his past experiences include senior sales positions at industry players such as Bosch Solar and Esdec

Advisory Board

Norman Nagel



Norman Nagel has more than 10 years of experience in the automotive industry and currently leads MAHLE's global business and (advance) product development in the field of industrial thermal management

Birthe Roß



Birthe Roß is an investment manager at TGFS. She draws on her experience as a VC specialist in the early-stage phase to support young tech companies in their development in the fields of Advanced Materials, Cleantech, and Foodtech, among others

Kai Malkwitz



Kai Malkwitz is a successful entrepreneur in the cleantech industry as well as a business angel and consultant to more than a dozen companies. He has a broad network of investors and industry experts

Unique Proprietary Technology and Integration Process



Manufacturing process of the SUNMAXX PX – 1

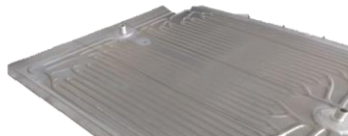
Materials

PV-Laminate



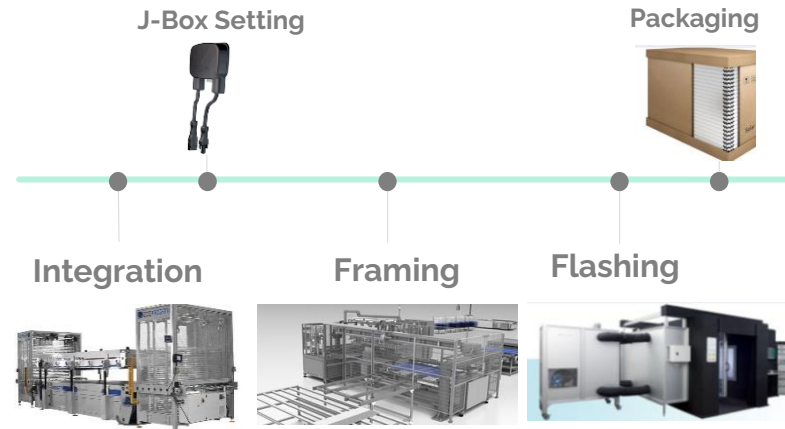
- Standard PV module
- EU PV Suppliers

Aluminum Plate



- High performance automotive technology adopted from battery cooling in electric vehicles. Plate is used as heat exchanger in Sunmaxx module
- Supplied by MAHLE

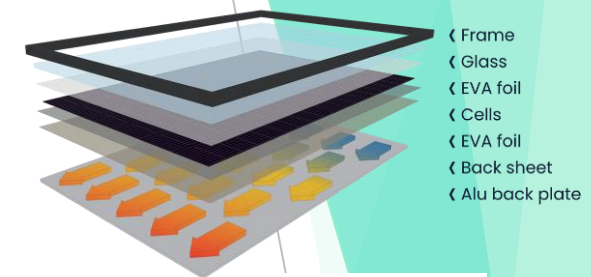
Automated Integration Process



- Patented, proprietary, automated and fully scalable manufacturing process**
- Mass-produced input materials
- Complex adjustments to standard solar machinery
- Proprietary Integration process of glass and metal that requires adaptations to both temperature and size
- Already working on next generation product designs (Gen 1-5) for optimized industrialization potential and lower production costs

Finished Product

Sunmaxx PX-1



- Sunmaxx PX-1 combines PV technology and advanced automotive thermal management to concurrently generate heat and electricity
- Sunmaxx PX-1 maximizes efficiency and profitability of advanced renewable heating systems with sole-heat pumps that can be used as single source or in combination with seasonal storage systems. These systems provide Seasonal Performance factors of > 6 (vs standard air-heat pumps at 3). Size and investment for seasonal storage systems can be reduced by up to 75%

First Ever Highly Efficient, Affordable & Fully Scalable PVT Module

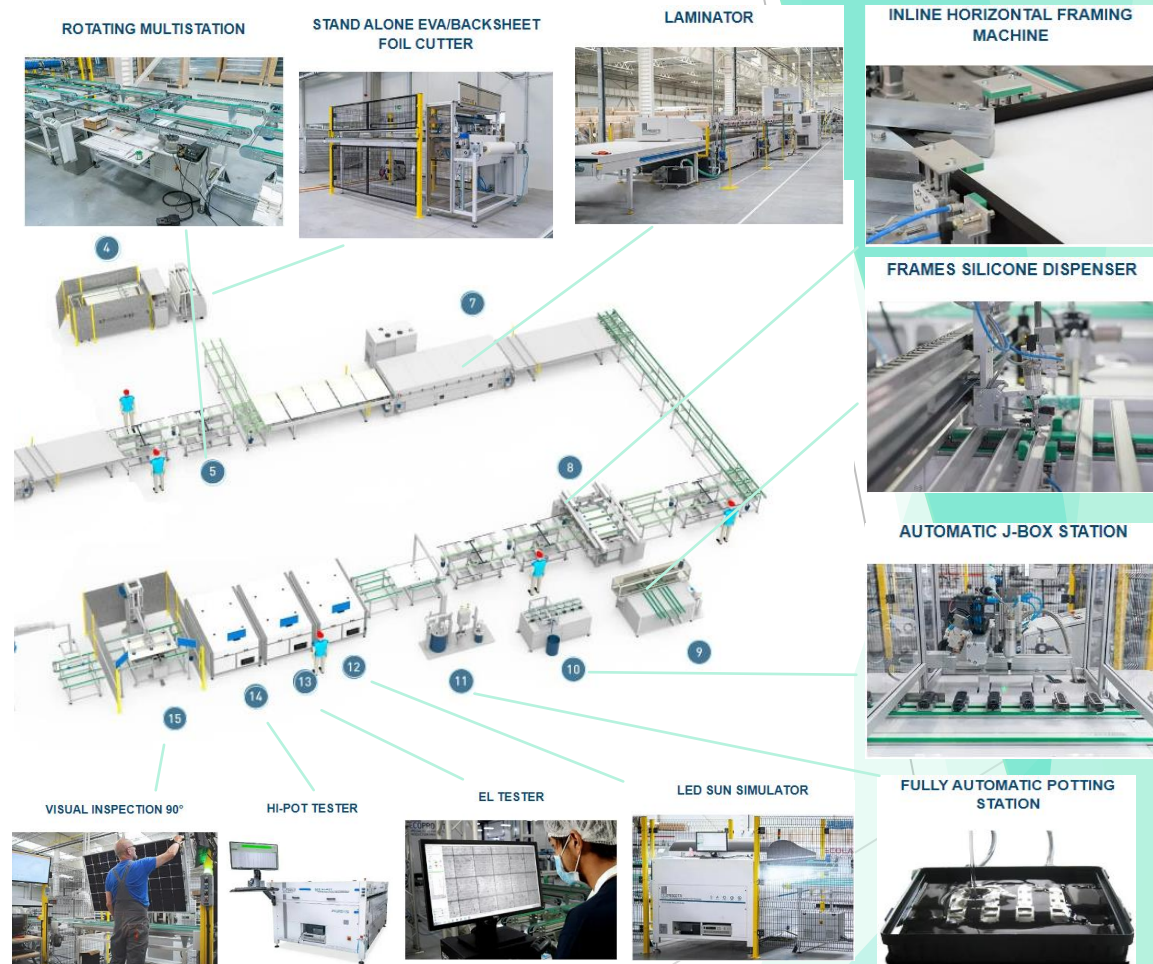
Source: Company data; Note: Pictures for illustrative purposes only

Sunmaxx Production Site Under Development



Pic: Production site Sunmaxx

- Brownfield project (near Dresden, Saxony)
- 7-year lease secured
- 4000 m² production space
- 50 MW nameplate capacity (4 shifts)
- Expansion to > 100 MW possible
- High automation grade
- Equipment already ordered
- Production start December 2023






First Automated PVT Production Site Globally

Source: Pictures by Ecoprogetti, for illustrative purposes only

Targeting Markets with High Demand Potential

- Focus on large scale customers and projects

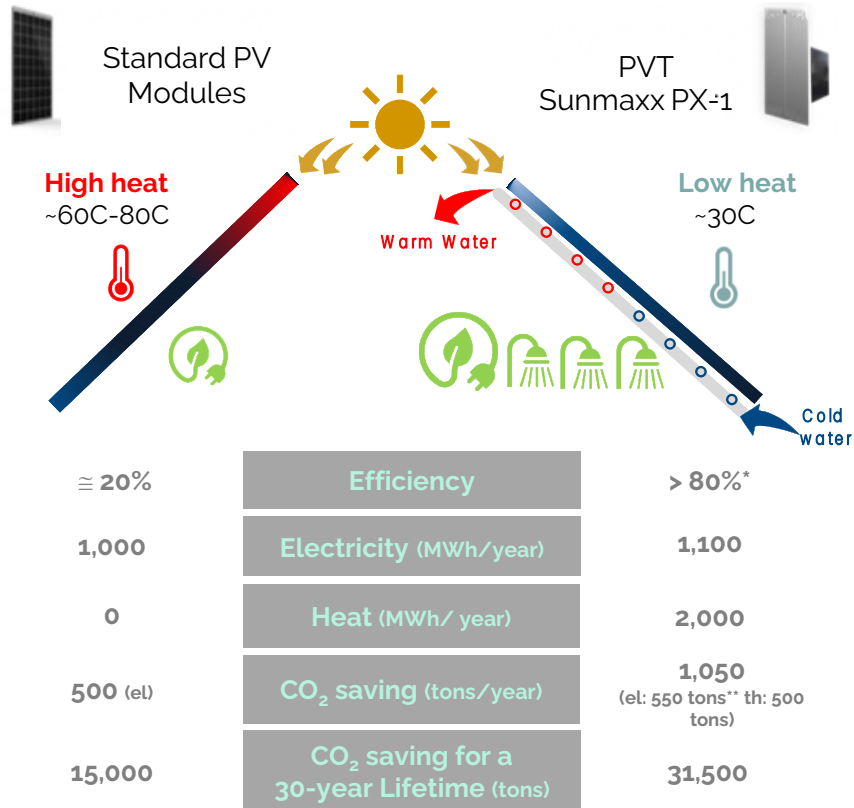
	Commercial & Industrial	District Heating	Residential
Driver	Complete decarbonisation of Industrial production sites (electricity & heat) with no more on-site fossil fuel consumption. Real climate-neutral production	Cities' demand for low temperature District Heating to replace their fossil-based high-temperature district heating network	Sole heat pumps replacing air heat pumps due to their high electricity needs (especially in the winter) and noise levels, not suitable for cities. Renewable heat production replacing most fossil-fuel heating
Strategy	Targeting medium to large scale industrial customers directly Collaboration with energy planning groups and contractors	Targeting municipalities and local energy companies directly Collaboration with energy planning groups and contractors	B2B strategy Collaboration with wholesalers and direct targeting to installer groups
Project Size	Number of panels: 1,000-100,000 Electricity*: 400kWp to 40MWp Thermal* : 1.2MW _{th} to 120MW _{th}	Number of panels: 500-10,000 Electricity*: 200kWp to 4MWp Thermal*: 600kW _{th} to 12MW _{th}	Number of panels: 6-200 Electricity*: 2.5kWp to 80kWp Thermal*: 7.5kW _{th} to 240kW _{th}
Traction	<ul style="list-style-type: none"> LOI in place or advanced negotiations with: 	<ul style="list-style-type: none"> Sunmaxx part of high level industry consortium for turn-key low-temperature district grid solutions. OTA in place with: 	<ul style="list-style-type: none"> Orders /LOI in place with: 

Note: * Capacity. Source: Company data

Compelling Value Proposition: Solid Return and CO2 Impact



1 MW PV Installation vs 1 MW Sunmaxx PVT



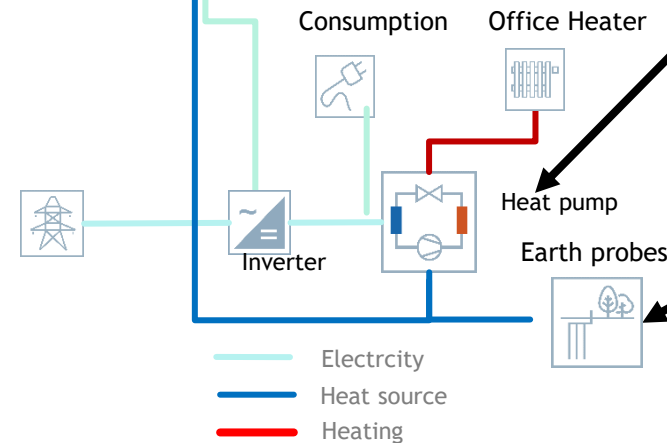
Sunmaxx PVT System Implementation



PVT-modules:
Provide Heat & electricity with > 80% efficiency

Sole Heat pump:
Needs electricity and source heat to run

Seasonal energy storage (earth probes): Storing solar heat from summer to winter



The most energy efficient, sustainable and reliable renewable heating

Average System Payback of 7-10 Years (10 - 15% IRR) and LCOH of 0.05 – 0.10€/kWh

Source: Company data. Notes: *Independently verified. ** Typical CO2 conversion factors taken for location Germany. LCOH = Levelized Cost of Heat

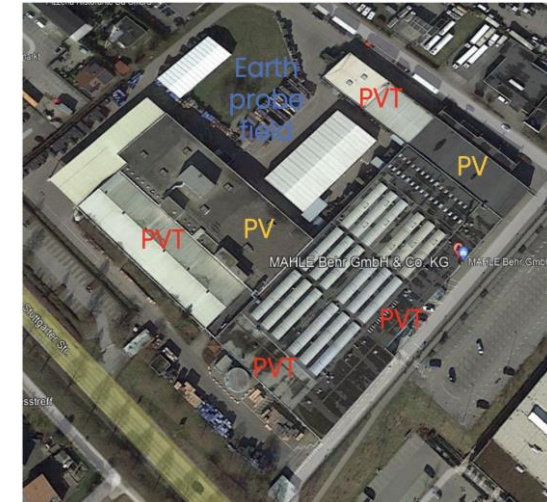
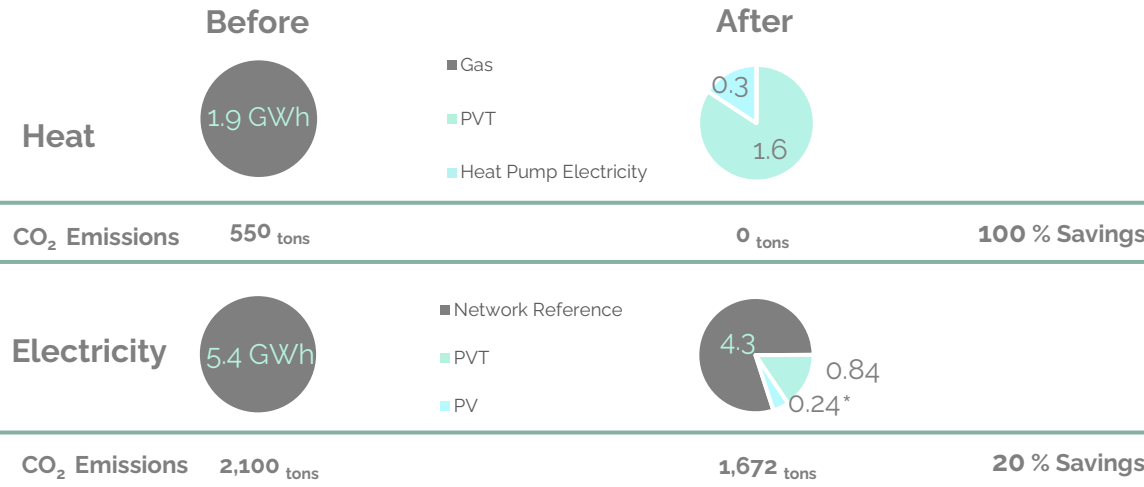
Case Study: Decarbonisation of MAHLE Vaihingen/ Enz Site



- The study was performed on an industrial site of 17 000 m² owned by MAHLE. The current heat needs of 1.9 GWh are satisfied through the use of natural gas
- The objective is to achieve complete decarbonization of heat and reduce electricity bought from the grid. With a 4MW adjacent PV installation all site energy requirements would be fully CO₂ free

Full Decarbonisation of Heat

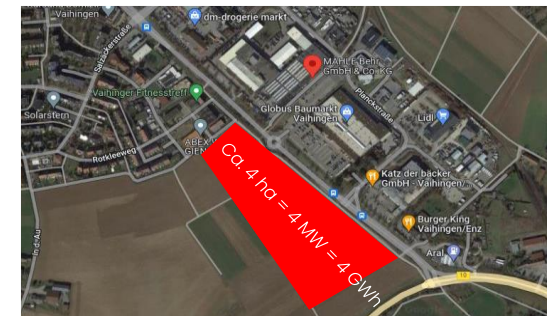
Heat 100% decarbonized and reduced electricity consumption from the grid by 20%



Full Decarbonisation of All Energy Needs

- 4MW adjacent greenfield solar installation for **complete carbon neutrality**:
 - Own investment: € 2-3m
 - PPA with a contractor (10-15 year commitment for fixed price electricity)
 - Investment part-funded by contractor

Source: Goodmen Energy. Note: *+ 0.3 GWh for Heat Pump

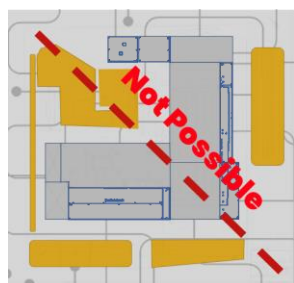


Case Study: Decarbonisation of MAHLE Vaihingen/ Enz Site



- Benefits of using PVT with geothermal heat (for seasonal storage):
 - Significantly lower investment and drilling km (20km (with PVT) vs 80km (without PVT))
 - Energy cost more than halved (LCOH and potentially LCOE)

Standard System (with Geothermal)



Used Areas
Geothermal
Energy Source

0 MWh
PVT



0 % of Heat
Needs

€9.2m
investment



Cost of Heat:
€17.5 ct/kWh

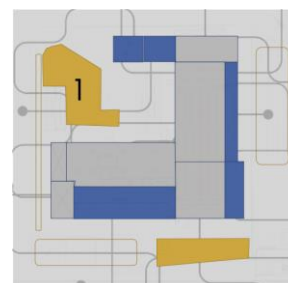
560 Pieces
Needed



Drilling:
140m depth

Too Expensive and Not Feasible

Sunmaxx PVT with Seasonal Storage



Used Areas
Geothermal
Energy Storage

Used Areas PVT

1600 MWh
PVT



≈ 85 % of
Heat Needs

€4.2m
investment*



Cost of Heat:
€8.5 ct/kWh

155 Pieces
Needed**



Drilling:
140m depth

Optimal Solution (10-year payback)

Sunmaxx PVT with Seasonal Storage is Most Cost-Effective and Efficient Solution to Fully Decarbonize an Energy Intensive Production Site

Source: Goodman Energy Note: * with government subsidies. ** Geothermal earth probes can be substituted by other seasonal storage solutions, such as hot water storage tanks

Strong Supplier and Partner Network

- **Exceptional Tier One** Supplier and Partner **Eco-System** for complete system installations in all three target markets

Laminate and Aluminum Plate Suppliers



Installation Companies



Heat Pump Provider



Energy System Site Planners



R&D Partners



Other Partners

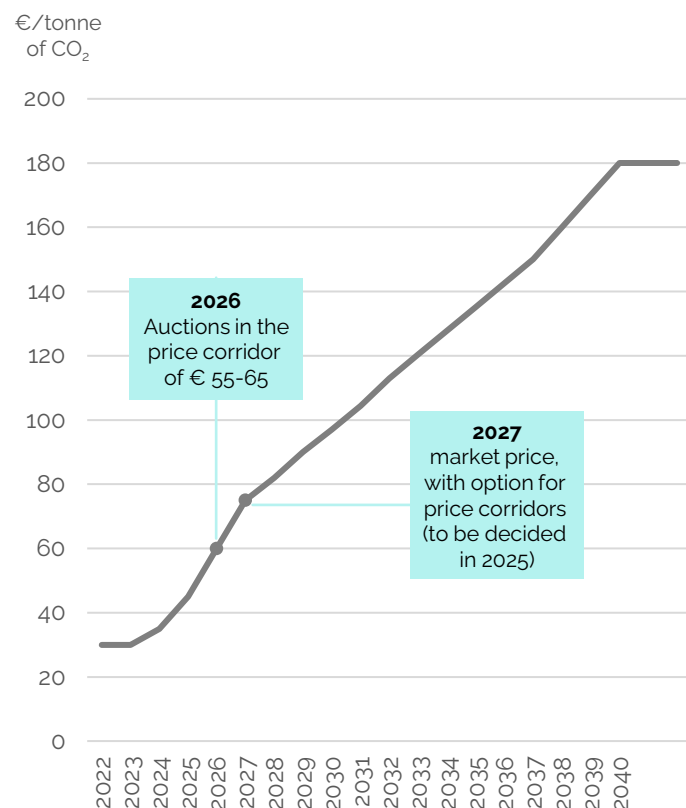


Note: * Cooperation agreement under negotiation

Favorable Regulatory Environment



German Carbon Pricing Evolution 2022-2040



Source: German Emission Trading Authority and Goodman Energy (Linear extrapolation of current regulation).
Note: Prices per tonne of emitted CO₂

EU ETS Amendment

The EU Commission's legislative proposal for a revision of the EU ETS was approved on 25 April 2023. It envisages a reduced cap and more ambitious linear reduction factor for GHG emissions and a **separate new ETS (ETS II) for buildings and road transport** (sectors already covered in Germany's national carbon pricing system)

The **ETS II** will be established **starting in 2027** and will **put an absolute cap on emissions** which will gradually decrease to reach a 43% reduction of emissions in 2030 vs 2005. The regulation will apply to fuel distributors. **All allowances will be auctioned and none will be allocated for free**

Source: Council of the European Union

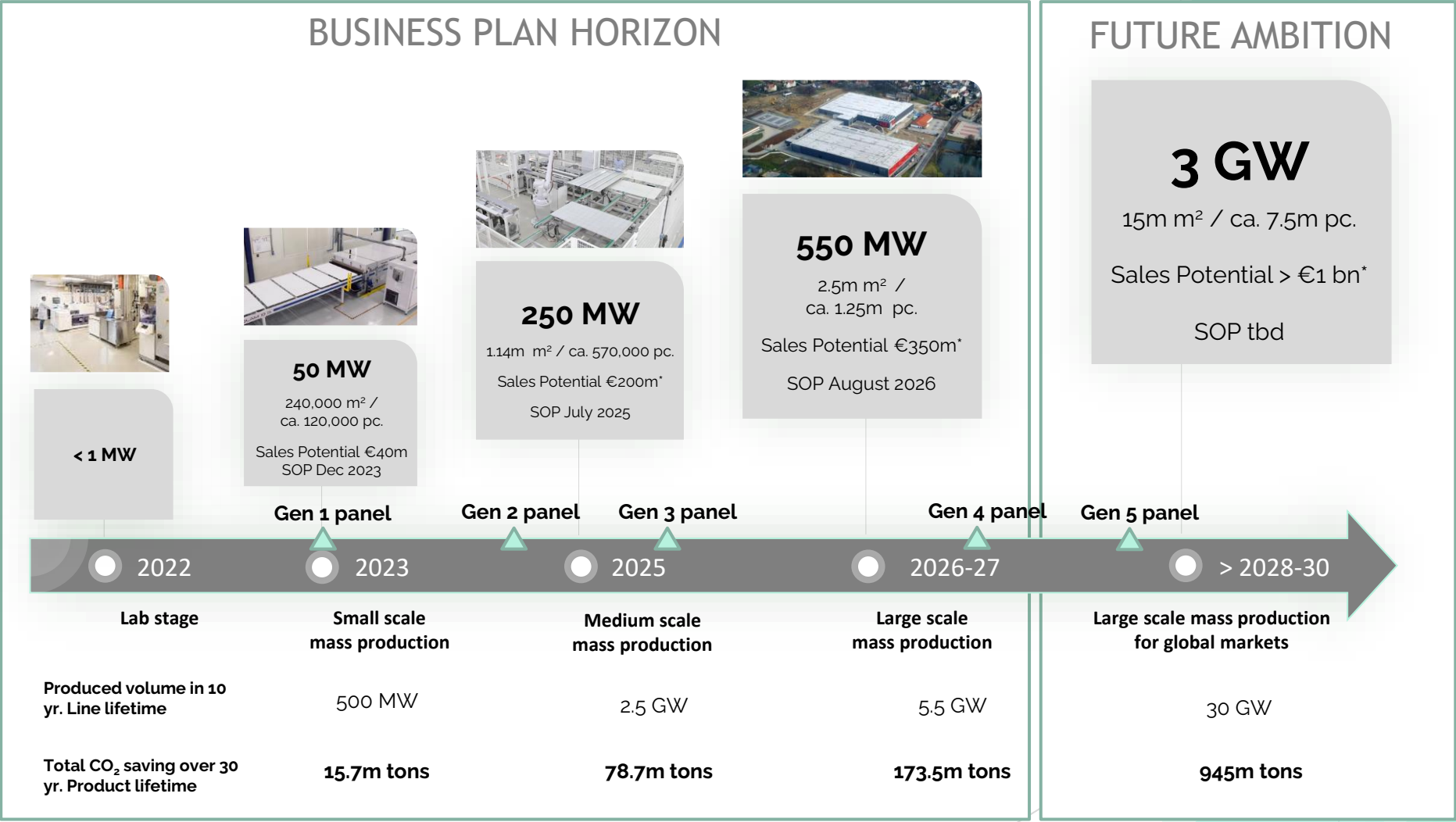
German Buildings Energy Act Amendment Proposal

The Buildings Energy Act sets out requirements for the energy performance of buildings and the use of renewable energy in buildings. Amendments to the bill are currently being discussed in parliament. The draft bill stipulates that:

- Every newly installed heating system (in new and existing buildings, residential and non-residential) **must use at least 65% renewable energy from 1 January 2024**
- The **end date for the use of fossil fuels in heating systems is 31 December 2044**
- **All technology can be used to achieve the target 65%.** The options include: connection to a heating network, electric heat pump, direct electricity heating, **hybrid heating (heating based on solar thermal energy)**, etc

Source: German Federal Ministry for Housing, Urban Development and Building

Roadmap to Large Scale Mass Production

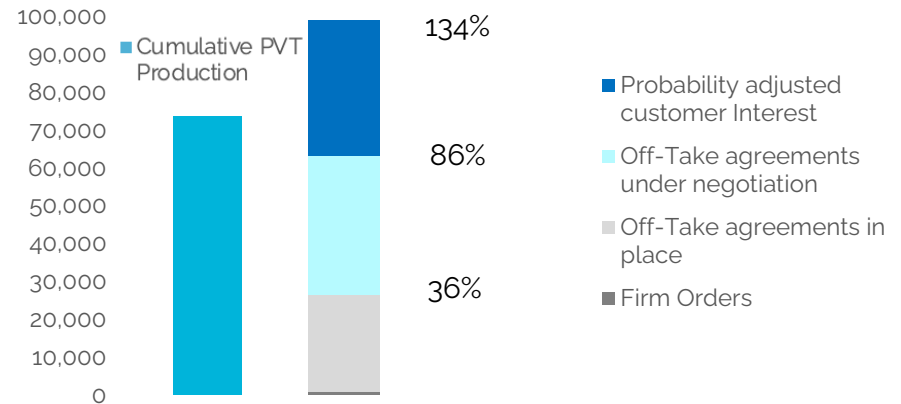


Source: Company data. Note: * assumed sales price adjustment to mass production. m = million

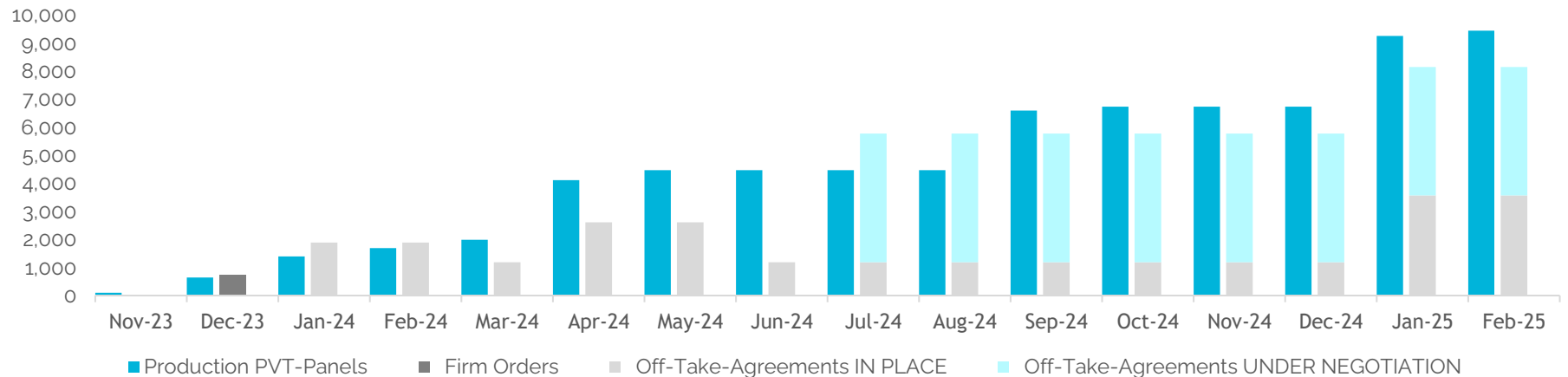
Production Plan Materially De-Risked

- **Sunmaxx targets a 50% coverage** (firm order and off-take agreements in place) **of its first-year production before December 2023**
- Its **potential target market** (including module volumes from customer enquiries conservatively adjusted for 10% order conversion potential) already **covers >130% of its planned production up to Feb-2025**
- **Customer enquiries from Europe, North America and Asia**

Coverage of Cumulative Panel Production Dec 2023 – Feb 2025



Monthly PVT Panel Production vs Firm Orders and Off-Take Agreements

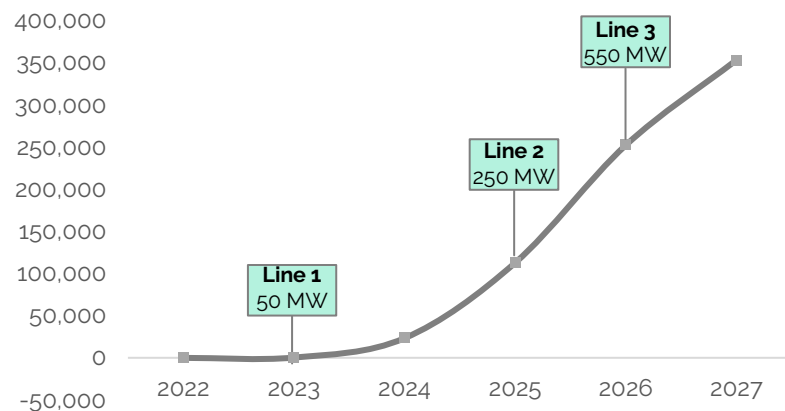


Source: Company data. Note: 10% conversion probability of current customer discussions excluding firm orders and off-take agreements.

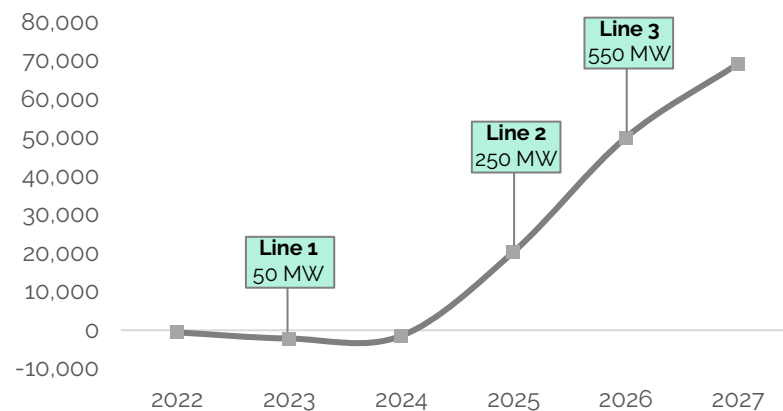
Sunmaxx Financials Reflecting Current Roadmap



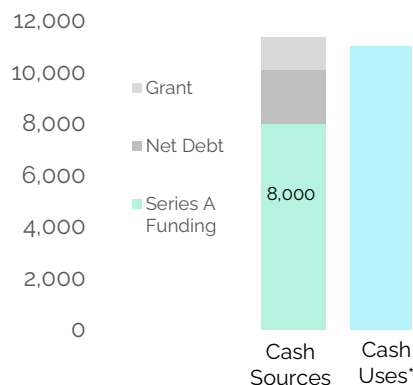
Forecast Revenue Growth (€, '000)



Forecast EBITDA Growth (€, '000)

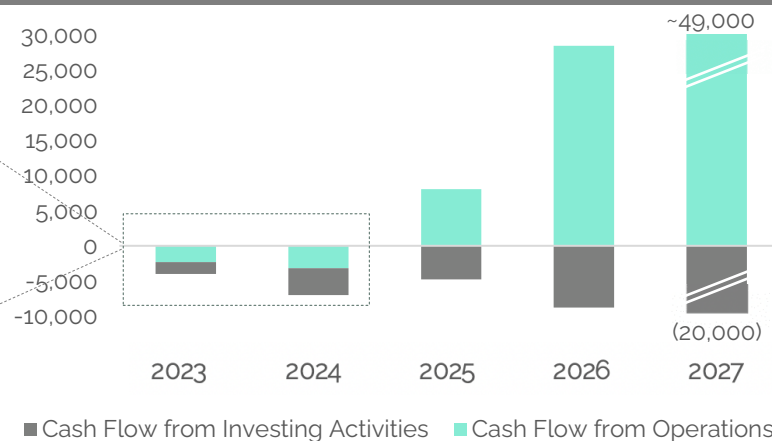


2023-24 Cash Sources and Uses (€, '000)



Note: Cash at the end of 2022 = €3.5m

Cash Outflow/Inflow (€, '000)



Source: Company data. Note: *Cash Uses = Cash Flow from Operations and Investing Activities

Why Invest?



- 1 Revolutionary PVT Technology Designed for Volume Production at Game Changing Lower Cost and Shorter Pay-back vs Comparable Alternatives
- 2 Fast Growing Global PVT Panel Market Expected to Grow >20x to \$7.5bn annually in 2030
- 3 Target 25% Market Share in 2030 Driven by Highly Automated and Scalable Manufacturing Process
- 4 De-Risked Initial Production Plan with 80% Output Coverage from Firm Orders and Off-take Agreements
- 5 Sustainable Premium Margins Driven by Innovation, Superior Efficiency and 'Made in Germany' Quality
- 6 Exceptional Management Team with Decades of Industrial Scale Up and Solar Sector Experience

 sunmaxx.

Decarbonizing Heat and Electricity Intensive Industrial Processes, Fossil-Fuel Based District Heating and Residential Homes



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