



NEUE ENERGIE
Premnitz GmbH



RICHTER
Recycling GmbH

Projekt "H a v e l s t o f f ©"

Aufbau einer großindustriellen Wasserstoffproduktion
am Standort der alten Viskose

Premnitz, Brandenburg, Deutschland, Europa

PLAGAZI
GREEN HYDROGEN FROM WASTE

Projekt "Havelstoff Plant I"

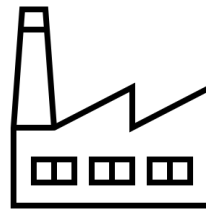
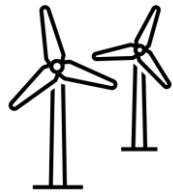
- Musterproduktionsanlage für die klimaneutrale Herstellung von technischen Industriegasen mittels Plasmavergasung
- Investitionssumme: 100 Mio EUR, Schaffung von über 50 Arbeitsplätzen in der Region
- Geplanter jährlicher Output an hochreinem Wasserstoff
7.500 Tonnen

Projekt "Havelstoff ©"



Sauerstoff

Dampf



**Havelstoff Plant I
Premnitz**



**Elektrizität aus eigener
Windenergie**
10 kWh / kg Wasserstoff

CO2 negativer Wasserstoff
~7.500 t/Jahr
99.999% Reinheit

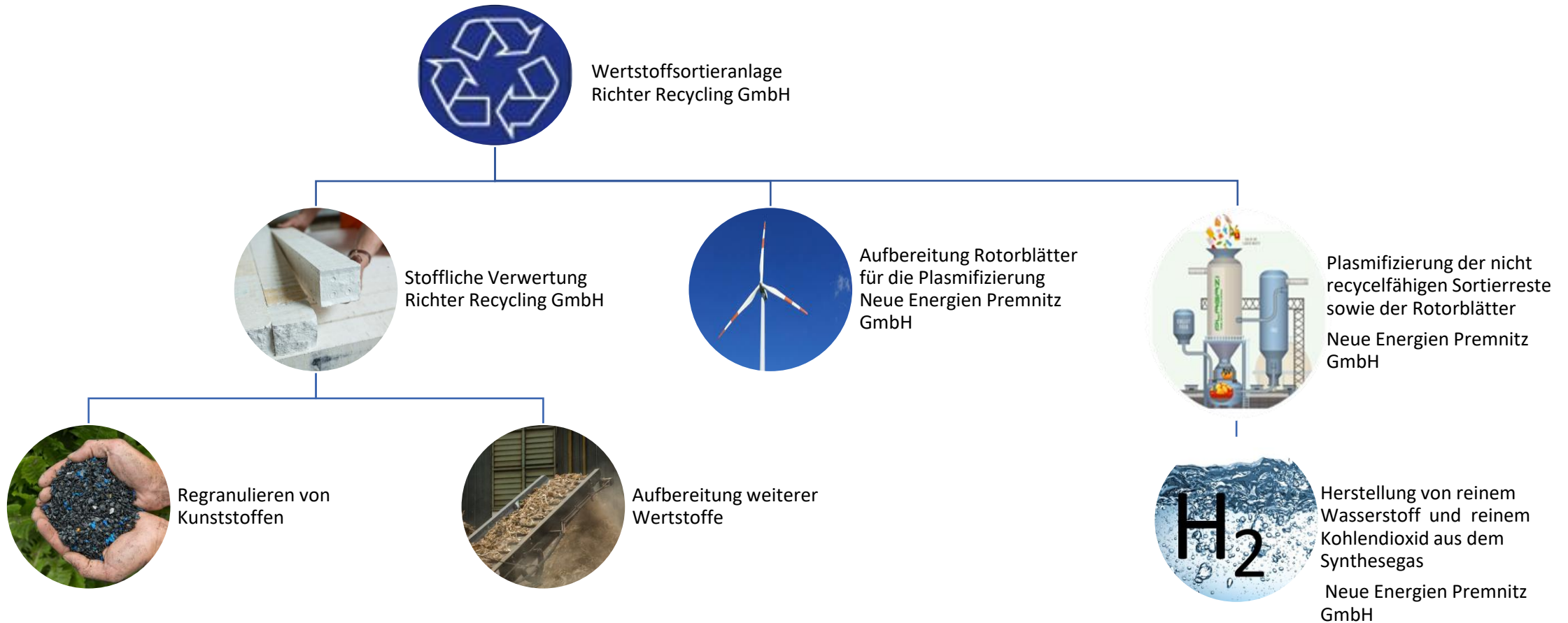
Flüssiges Kohlendioxid
~ 100.000 t/Jahr
in Lebensmittelqualität zur
industriellen oder
lebensmitteltechnischen
Verwendung

Nicht recycelbare Wertstoffe

Spezialisierung auf die nicht
wiederverwertbaren und nicht
recycelbaren Teile von
Rotorblättern von
Windkraftanlagen
44.000 t/Jahr

Kreislaufwirtschaftszentrum am Standort Premnitz

RICHTER Recycling ist ein nach **DIN EN ISO 9001** und **DIN EN ISO 14001** zertifizierter Entsorgungsfachbetrieb



„Viskose“-Revitalisierung

Ehemaliger chemischer Produktionsstandort von nationaler Bedeutung. (Zentrale Sprengstoffproduktion des Deutschen Reiches, Innovationsstandort der I.G. Farben, Produktion von Kunstwolle, Kunstseide und Perlon, DDR Chemiefaserwerk „Friedrich Engels“, dann wendebedingte Deindustrialisierung nach dem Zusammenbruch des Ostblocks)

Durchführung der Sanierung der „Viskose“ (Abtrag der Gebäude, Bodensanierung, Altlastenentsorgung etc.)
von 2015 bis 2018 unter Federführung der Landesentwicklungsgesellschaft des Landes Brandenburg



Viskose – Revitalisierung – Production Site „Havelstoff“

- Eigener B-Plan für die „Viskose“ mit ausgewiesener Industriefläche, Neuverlegung Gleisanschluss auf dem Grundstück, Neuanschluss Medien: Wasser, Abwasser, Havelwasser, Energie, Industriedampf und Anbindung an das überregionale Schienengüterverkehrsnetz



Stadt Premnitz - Bebauungsplan Nr. 9 "Viskose"

M. 1 : 1.000



Plasmagasification-THE CLIMATE SOLUTION

200

million tons of non-recycled waste is incinerated or Landfilled in the EU alone each year.

World Bank Report: 'What A Waste 2.0'

WHY PLAGAZI?



Renewable Energy Sources



Improving our circular economy and waste management issues

PLAGAZI
Unrecyclable waste into green hydrogen

COMPETITIVE GREEN HYDROGEN TODAY!

Low cost competitive with fossil fuels

Energy efficient <10 kWh/kg H₂ - uses the energy in the waste

Local German production

Low carbon footprint + reduces large amounts of carbon emissions by decarbonising heavy industries and replacing fossil fuels.

GREEN HYDROGEN PRODUCTION FROM NON-RECYCLABLE WASTE

Swedish patented technology

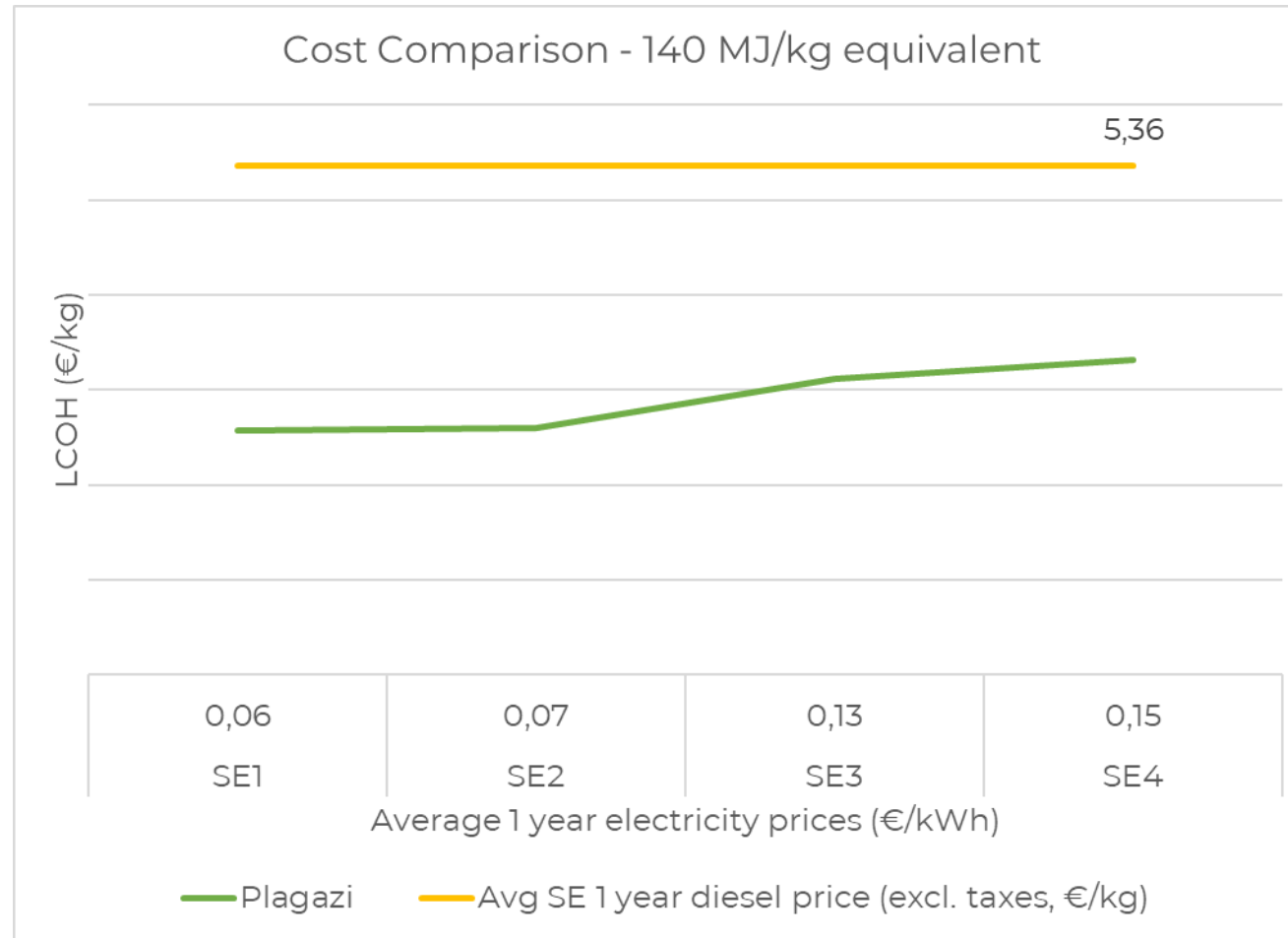
Sustainable according to RED (Renewable Energy Directive) II

– recycled carbon fuel – the carbon atom is used twice

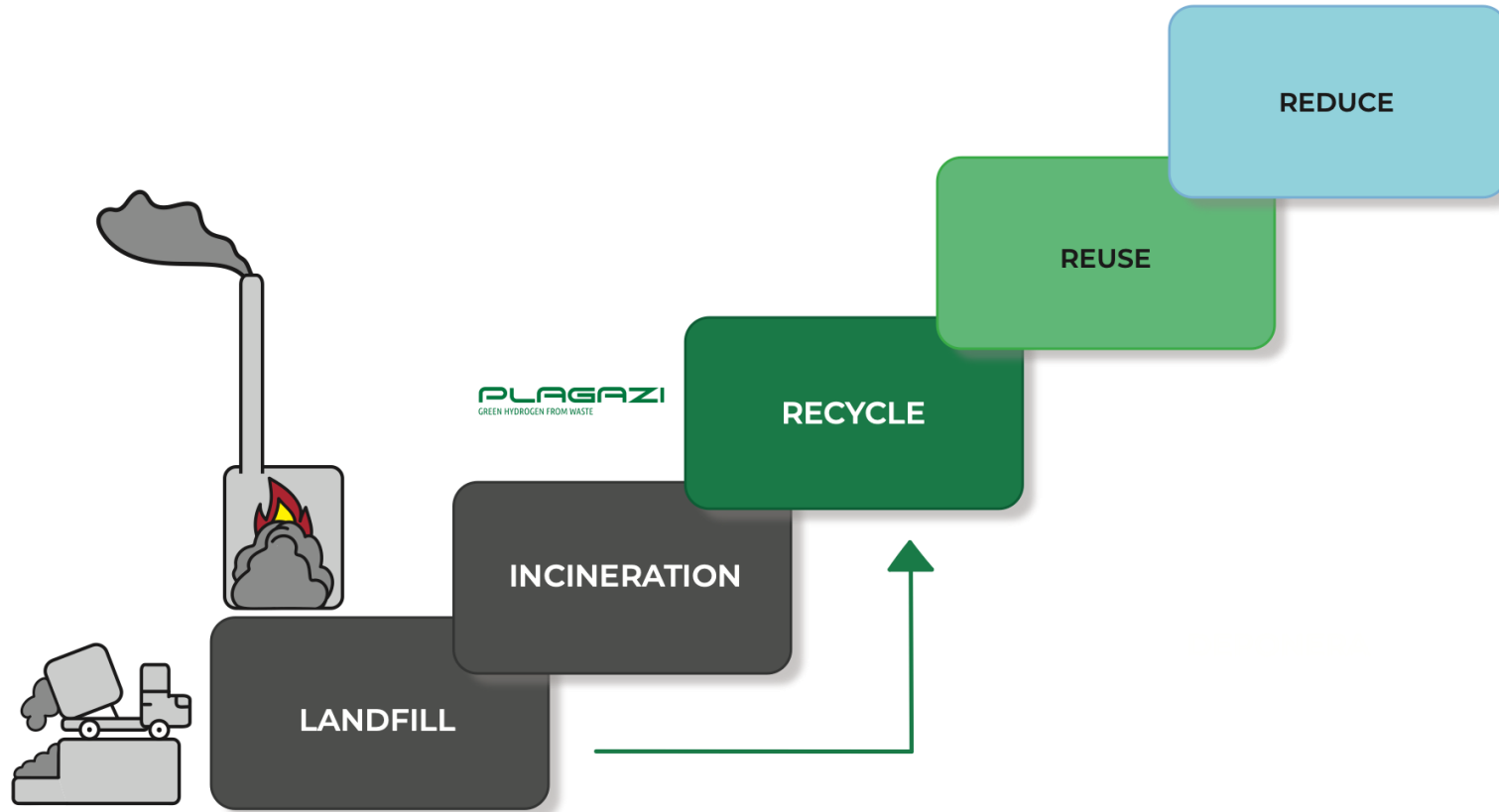
The process has a negative CO₂ footprint and follows the EU Taxonomy

level of <3kg CO₂/kg H₂.

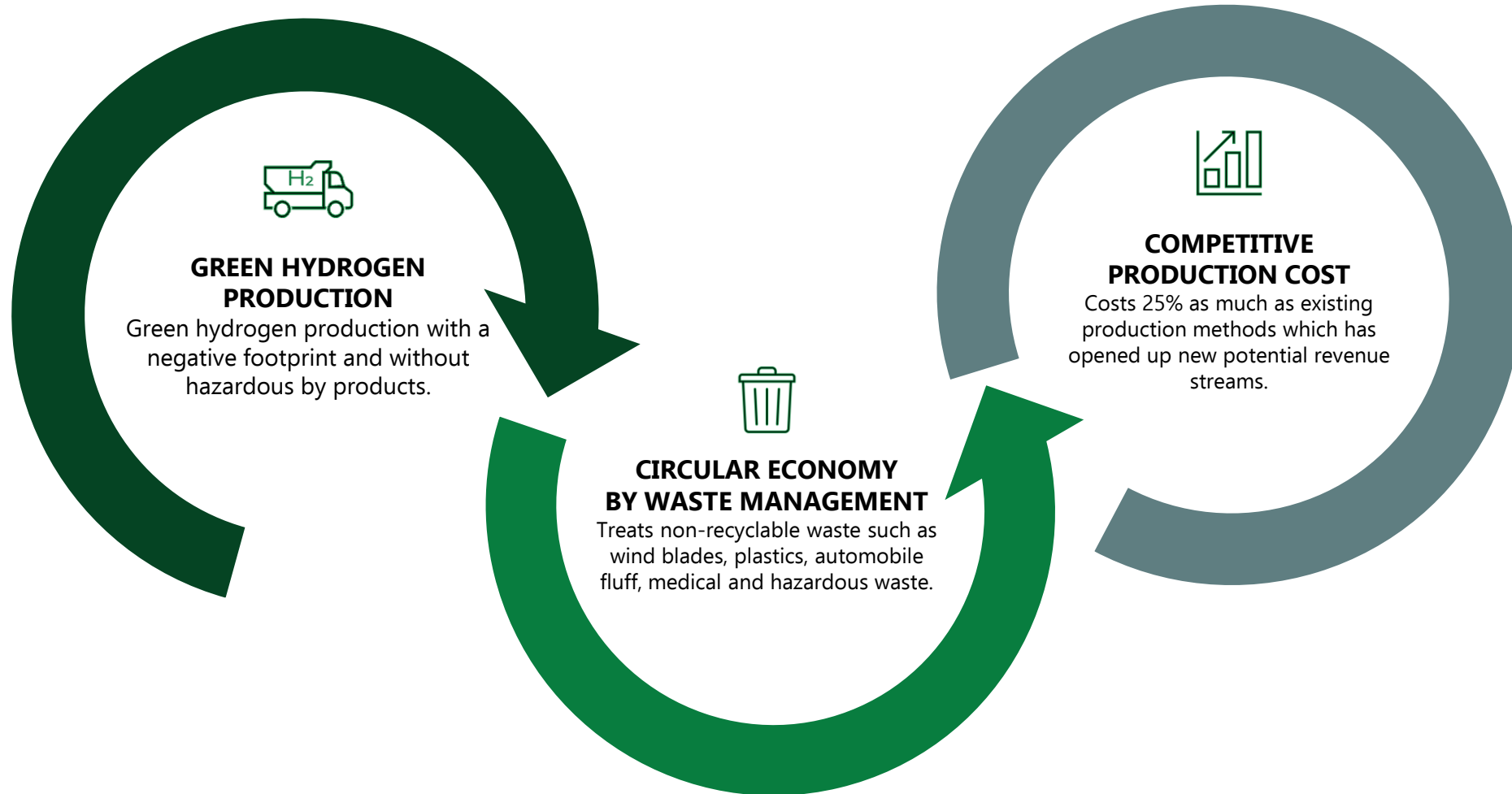
GREEN HYDROGEN PRODUCTION FROM NON-RECYCLABLE WASTE



CIRCULAR ECONOMY



ONE-OF-A-KIND PROCESS



ONE-OF-A-KIND PROCESS

TRADITIONAL SCENARIO

MANUFACTURING
For example: Automobile Industry

CONSUMPTION
& USAGE



WASTE Ex.
ASR

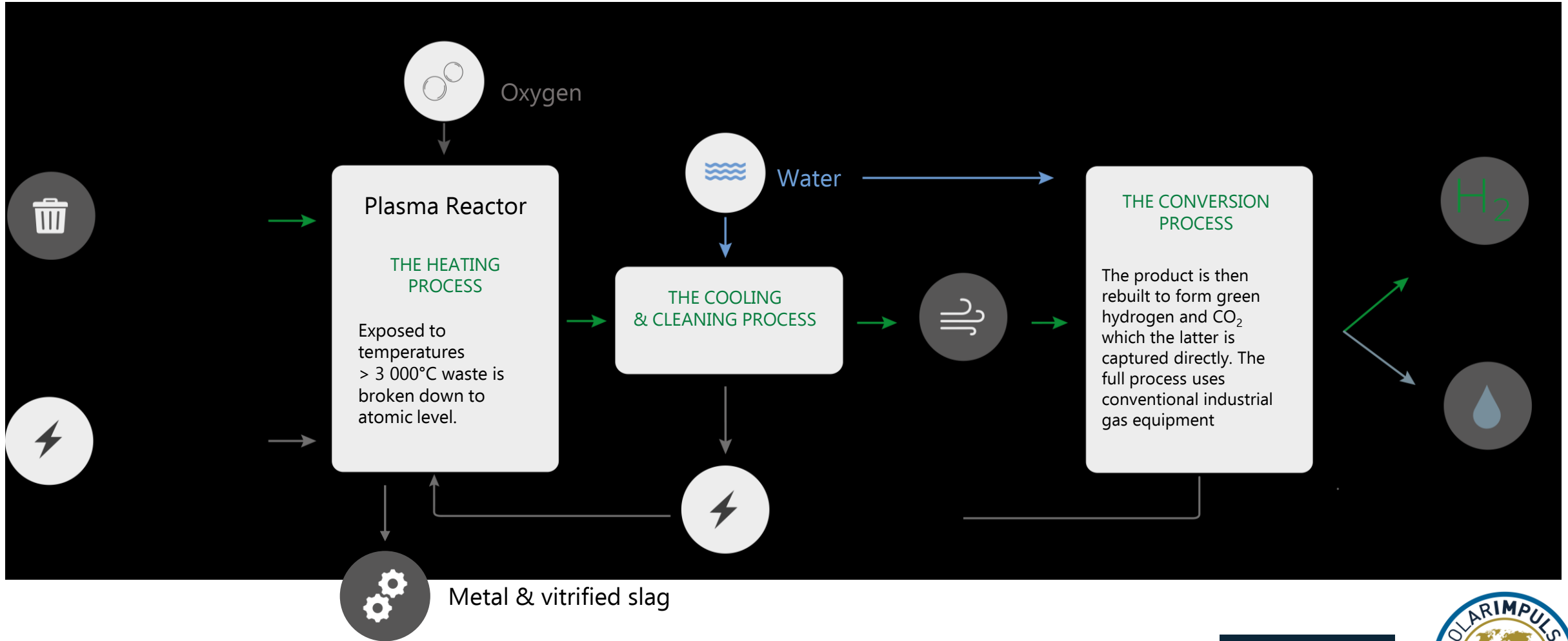


INCINERATION
& LANDFILL

PLAGAZI SCENARIO



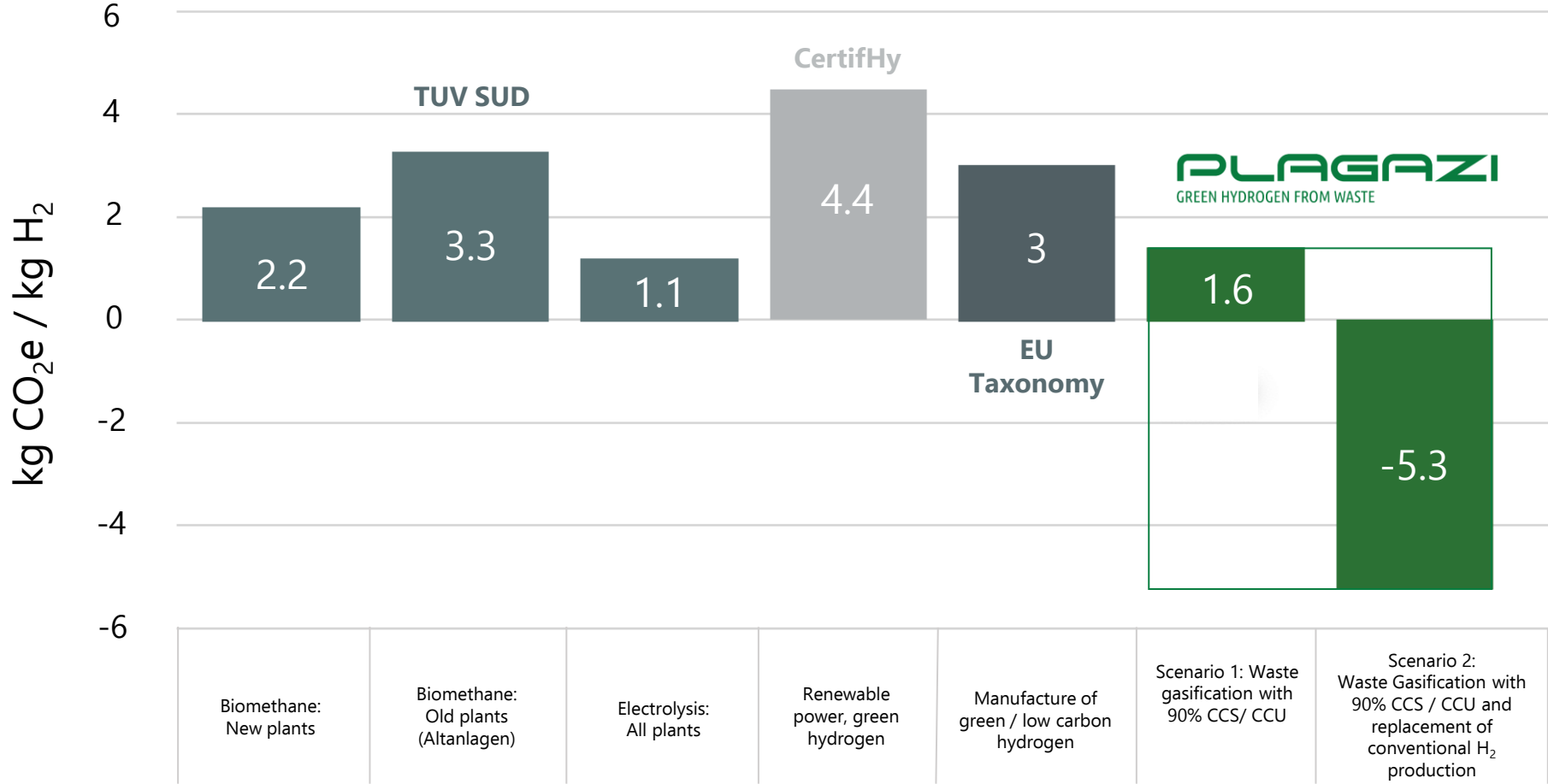
THE PLAGAZI PATENTED PROCESS



CERTIFIED AS GREEN



Plagazi process certified by DNV to be green on a LCA-basis according to European Industry Standards.



The graph compares the modelled Plagazi emissions and shows that the Plagazi process has lower CO₂-emissions per kg of H₂ than all other options.



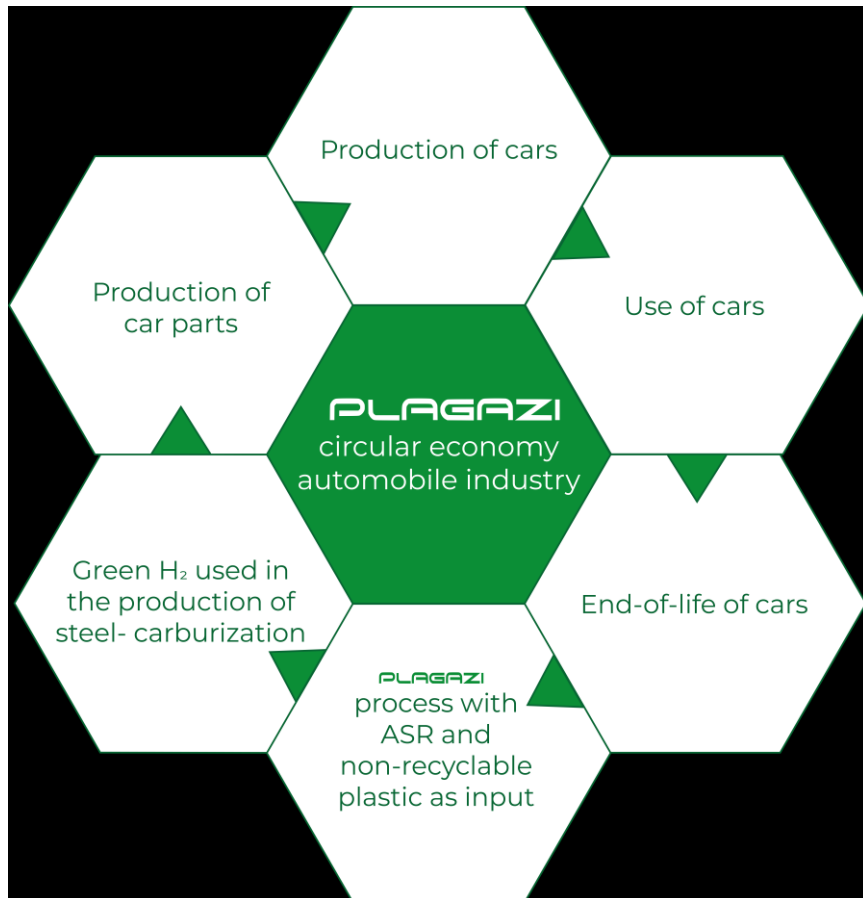
RECYCLING PROCESS ACCORDING TO GREEN DEAL

Plagazi defined as R9: Recycle principle. As it transforms materials from waste and recycles them to:

- Green hydrogen
- CO₂
- Syngas
- Glass slag
- Metal slag

The capability of handling and recycling complex waste mixtures exemplifies Plagazi's commitment to the **circular economy**.

RECYCLING PROCESS ACCORDING TO GREEN DEAL



DNV's view on Plagazi's ability to recycle difficult waste that currently breaks the circularity in specific industries and to produce competitive Hydrogen.

Plagazis play a vital role in the Automobile manufacturing circularity by re-introducing the Automobile Shredder Residue ASR (the last remaining part of a car), waste in steelmaking which goes to the production of new cars.

PLAGAZI PROCESS: GREEN DIRECTIVES

- EU Taxonomy ✓ Green as below 3,0 CO₂e kg/ H₂ kg
- EU Waste Directive ✓ Recycling process
- EU ETS ✓ Not included due to waste treatment
- EU Directive CCS ✓ Accepted as a CO₂e reduction
- RED II ✓ Directives above prioritized otherwise prove 70% GHG reduction in an LCA, or use biomass waste

SOLAR IMPULSE EFFICIENT SOLUTION

The patented Plagazi process has received the “**Solar Impulse Efficient Solution**” Label, rewarding profitable solutions to protect the environment.



WE ARE PART OF THE
#1000SOLUTIONS
TO CHANGE
THE WORLD

The #1000solutions challenge, is an initiative by the Solar Impulse Foundation to select solutions that meet high standards in profitability and sustainability and present them to decision-makers to fast-track their implementation.



WASTE SOLUTIONS

Circular Economy



Wind turbine blades



Automotive shredder residue (ASR)



Plastic



Unrecyclable

GREEN HYDROGEN

Revolutionize H₂ Production



Metal Refining

Steel, copper, aluminum industrial upgrade



Decarbonization

Industry processes. Replacing fossil fuels



Power Generation



Transportation

PLAGAZIS OBJECTIVES

WHAT DO WE WANT TO ACHIEVE?

WASTE SOLUTIONS

Circular Economy



Wind turbine blades



Automotive shredder residue (ASR)



Plastic



Unrecyclable

+

GREEN HYDROGEN

Revolutionize H₂ Production



Metal Refining

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Decarbonization

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Power Generation



Transportation

2030 - Agenda

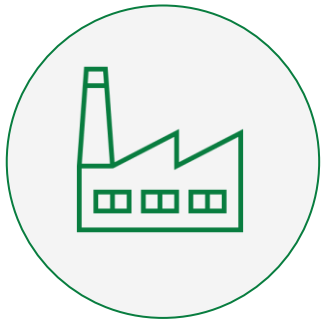


CARBON CAPTURE USAGE

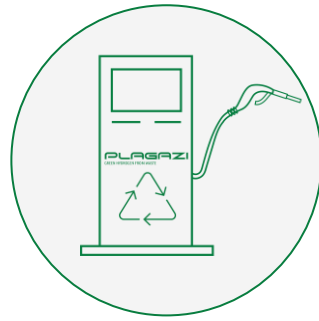
CCU



Greenhouses



Industries



E-fuel production



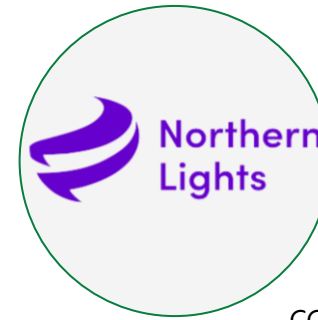
Re-create plastics



Algae production

CARBON CAPTURE STORAGE

CCS



CCS partners



Carbon Credits



GREEN HYDROGEN

Revolutionize H₂ Production

Steam reforming of oil



Gray H₂



Low



CO₂ Positive

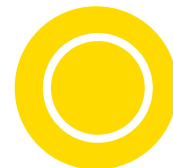
Electrolysis of Water



Green H₂



High



CO₂ Neutral

PLAGAZI
GREEN HYDROGEN FROM WASTE



Green H₂



Low



CO₂ Negative

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PLAGAZI[®]
GREEN HYDROGEN FROM WASTE

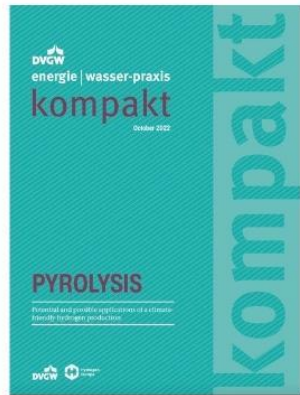
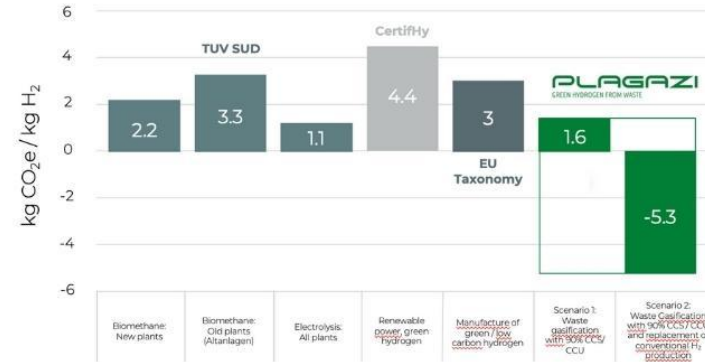
CLEANTECH
50TOWATCH



PLAGAZI IN FOCUS



Plagazi process certified by DNV to be green on a LCA-basis according to European Industry Standards.



VÄTGASSEMINARIUM
Riksdagen
2023-03-08



European Hydrogen Week
24 - 28 October 2022
Brussels, Belgium
euhydrogenweek.eu



European Hydrogen Industry Roundtable



PATENTED TECHNOLOGY & PROOF OF CONCEPT



Plant near Arlington, U.S. | Running since 2011 |
Live with hazardous waste as input in September 2020

BUSINESS CASE EXAMPLE:

Customer Point of View - One HE2000 Unit:

BUSINESS CASE DETAILS:



Plastics/ASR

Type of waste



22 000 ton

Amount of waste p.a.



3 500 ton H₂

Yearly production capacity



€60/ton

Waste Gate Fee



€60/ton

CO₂ Sale Price



€50 m

Turn-key plant Investment (FF)



15 years

Project Horizon



65% via Debt

Rest of investment via Equity



10%

WACC

CUSTOMER FINANCIAL OUTCOME:



6 Years

Project Breakeven



<8 kWh/kg H₂

Electricity Consumption



64%

EBITDA Margin



21%

IRR %



€27,8M

NPV

Gründe für eine besondere Förderung einer Musteranlage

Im kommerziellen industriellen Großeinsatz ist die Technologie neu, so dass bei einer Erstanlage höhere Kosten entstehen
Marktstörungen durch politische Eingriffe

Vorteile der Technologie

Technologie sichert regionale Erzeugung eines wichtigen Energiesegases und gibt damit Versorgungssicherheit für Industrie und Bevölkerung

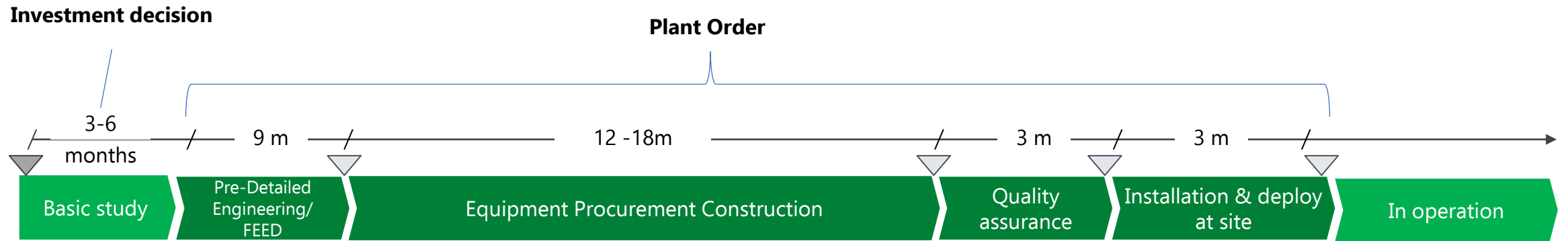
Technologie sichert Grundlast der Wasserstoffherzeugung (äquivalent Gaskraftwerke bei der Stromerzeugung)

Technologie kann für die Einführung der Wasserstoffwirtschaft benötigte Mengen unabhängig von Wetter-, Pandemie- und Politikverhältnissen liefern

Technologie kann Erdgas bei der Kohlenstoffdioxidherzeugung für industrielle und lebensmitteltechnische Anwendungen substituieren.

Technologie kann nicht recycelfähige Abfälle im Rahmen eines echten Kreislaufs einer erneuten Nutzung zuführen

PROCESS



Aktueller Verfahrensstand Genehmigung

- Vorprüfung der Genehmigungsfähigkeit der Anlage beim Landesamt für Umwelt des Landes Brandenburg
- Scoping-Termin und Vorantragskonferenz zum Genehmigungsantrag für eine Plasma Anlage der Neue Energien Premnitz GmbH durch SWECO Deutschland (Dr.-Ing. Weiler, Ressortleiter Gutachten- und Genehmigungsmanagement)
- Teilnehmende Referate des LfU: T 11, T 15, T 26, W15, N1
- Ergebnis:

Einstufung der Anlage als grundsätzlich auf der Fläche der „Viskose“ genehmigungsfähige chemische Produktionsanlage nach Nr. 4.1.12 der 4. BImSchV

Aktueller Verfahrensstand Genehmigung „Havelstoff“

- Verfahren nach dem Bundesemissionsschutzgesetz
- Floristisch-Faunistische Erfassungen
- Bebauungsplan Nr. 9 „Viskose“
- Betriebsgelände ehem. Viskosewerk Premnitz
- Bearbeitungszeitraum März bis Oktober 2022
- Auftragnehmer: Sweco GmbH
- Verfahrensstand: mit Handlungsempfehlungen erfolgreich abgeschlossen

KÖPING HYDROGEN PARK

ONE OF THE **LARGEST** H₂ PROJECTS IN EUROPE

YEARLY PROJECT DIMENSIONS

12'000 tons Green H₂

10 MW District Heating

66,000 ton Non-Recyclable Waste



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ABOUT PLAGAZI

- Founded in 2008, HQ in Gothenburg, Sweden, with subsidiaries in Switzerland, Germany, Spain and the UK.
- Plagazi owns the patented PLAGAZI® process, transforming any type of waste into green hydrogen via plasma gasification.
- Working to develop the **circular economy** by converting non-recyclable waste into green hydrogen
- Plagazi's business model is to design, develop and produce plasma gasification plants.
- The patented PLAGAZI® process' proof of concept exist in Richland / Washington and Arlington / Oregon with our strategic partner

INENTEC®

ORGANIZATION



CEO
Torsten Granberg
Partner



CFO / IR
Gustav Granberg
Partner



Head of Technology
Dr. Thomas Bürki



CCO
Linnéa Granberg
Partner



Head Product Innovation
Linda Lazouni



Patent & Technology
Stefan Källander
Partner



Senior Project Leader
Jesper Moberg



CPO
Leonard Kemper
Partner



Financial Analyst
Edmond Marsch



Marketing Manager
Cecilia Granberg
Partner



CTO
Dr. Soran Shwan



Advisor Finance
Karin Dahlén



Finance Manager
Anders Tiblom



Senior Project Engineer
Daniel Bondeus



Policy
Johan Gröndal



Organization
Peter Schmidt
Partner



Chief Sales Officer
Michael Engsted
Partner



VP Sales Central Europe
Robert Bock
Partner



VP Sales Iberia
Gabriel de Garnica
Partner



VP Sales Iberia
José María Gil de Santivañes
Partner



Head of Process
Jesper Eriksson

BOARD OF DIRECTORS



Henrik
Oretorp

Chairman of the Board

- Former business manager NCC Halland and project manager at Tornet AB



Jorgo
Chatzimarkakis

Board member

- CEO Hydrogen Europe
- Member of CARS 21 (EU high-level in the automobile industry)



Anders
Boman

Board member

- Has held senior positions in the shipping industry for just under 20 years
- Actively acts as chairman and board member in companies such as AlfaWall, Maritim Forum, and WALLENIUS SOL



Valerie
Dujardin

Board member

- 20 years of experience in the impact investment industry
- Chairman of Symbiotics' investment funds



Richard
Fish

Board member

- CEO and Chairman Community Ecopower LLC
- Former CEO and Chairman of Alter NRG corp.

BOARD OF DIRECTORS



Peter
de Joung

Board member

- Background in Investment Banking among others, SEB, UBS and Carnegie



Henry
Lundhammar

Board member

- Owns and manages Dina Kubik AB



Peter
Andersson

Board member

- Private banker Falkenbergs Sparbank



Dr. Stefan
Kaufmann

Board member

- Commissioner for Green Hydrogen at the Federal Ministry of Education and Research (BMBF)
- Appointed to implement the German federal government's national hydrogen strategy

ADVISORY BOARD



Jörgen
Andersson

- Former Swedish Minister of the Interior and Minister of Energy
- Former Member of the Swedish Central Bank
- Former Chairman of Vattenfall
- Former member of the Board of Sydkraft



Tuve
Johannesson

- Former Vice-President of Tetra Pak
- Former Managing Director of Volvo Cars
- Former Chairman of the Board of Findus AB
- Former Member of the Board of SEB, Swedish Match, and Cardo



Tomas
Kåberger

- Board member of Vattenfall
- Former Head of the Swedish Energy Agency
- Chairman of the Renewable Energy Institute in Tokyo
- Professor of Renewable Energy at Chalmers University of Technology



Christian
Gerstädt

- Managing Director of Neue Energien Premnitz GmbH, Main Customer / Project
- Former Interim Managing Director of the Potsdam Chamber of Industry and Commerce
- Former Member of Tax and Finance Committee of German Business

ANY QUESTIONS?

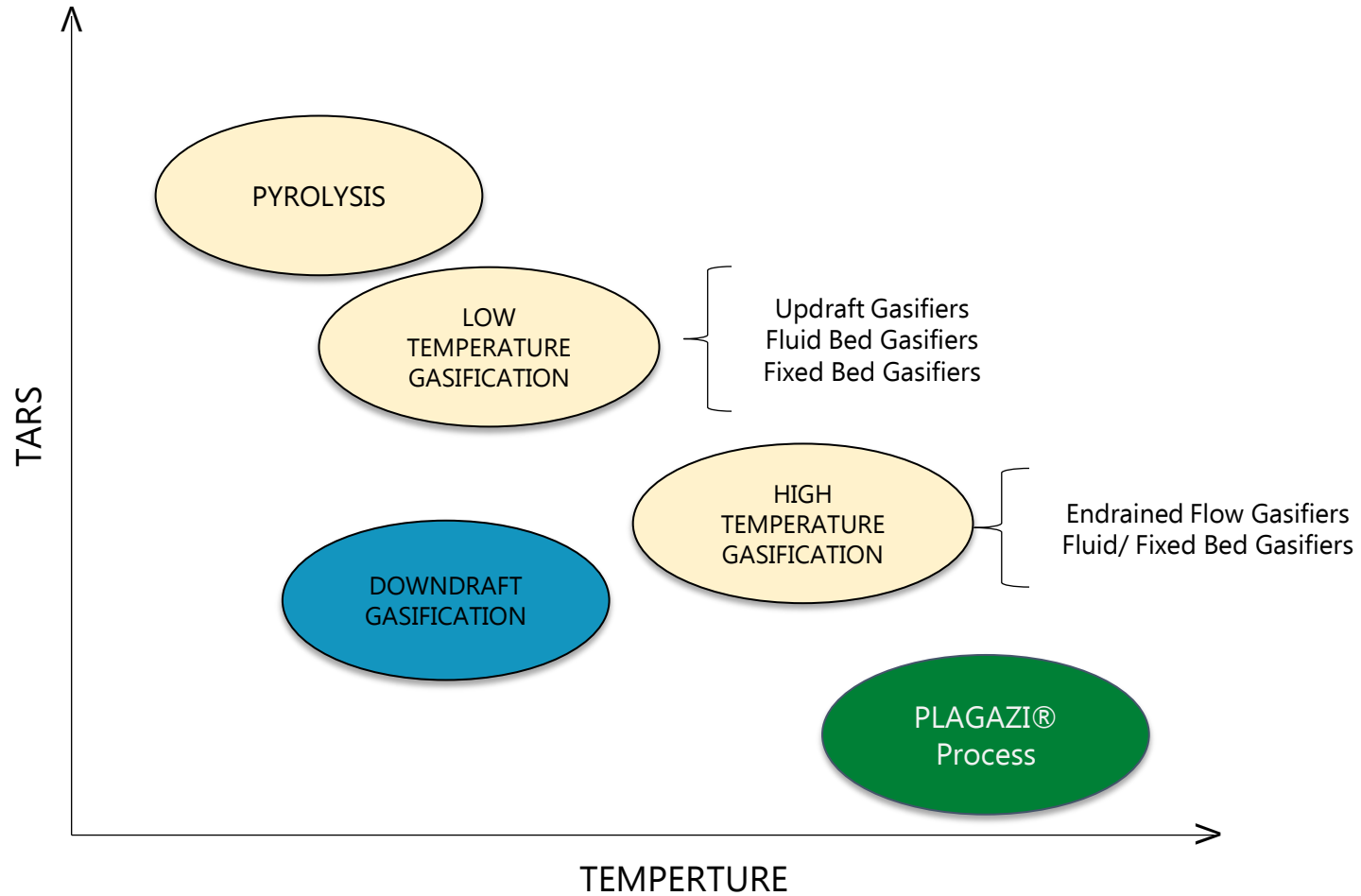
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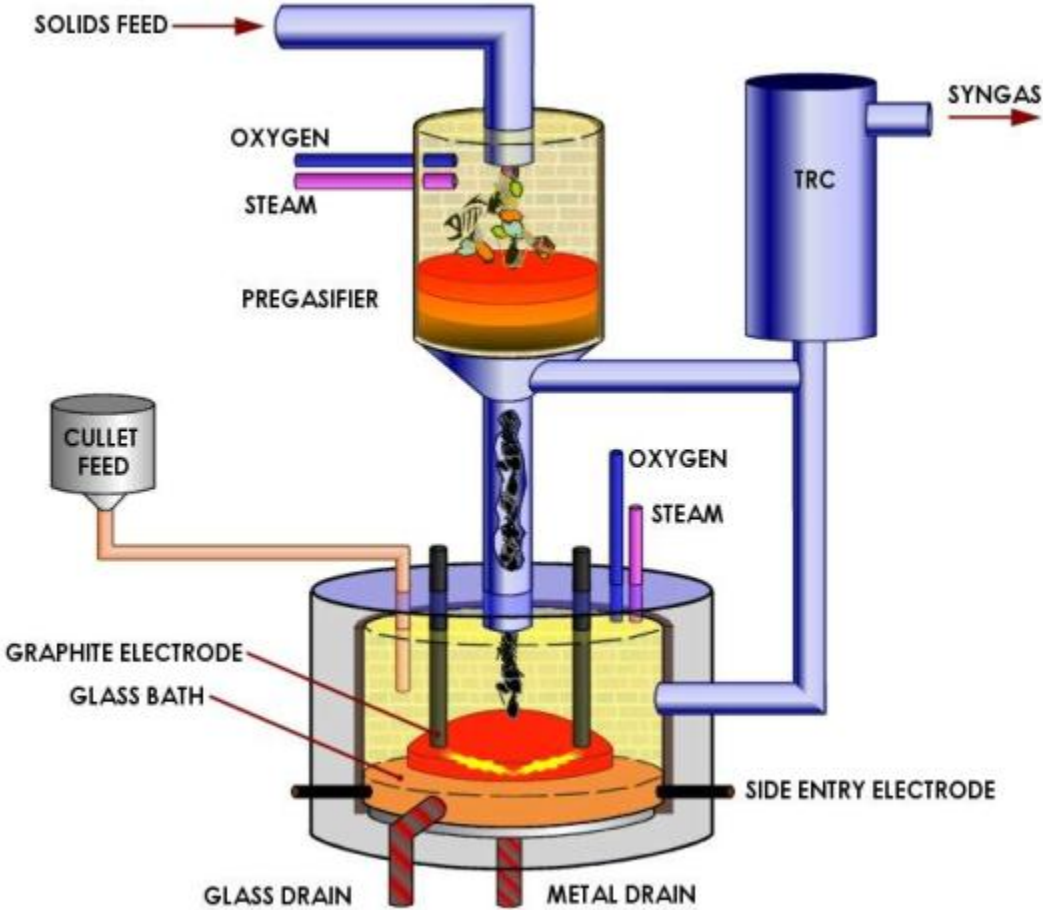
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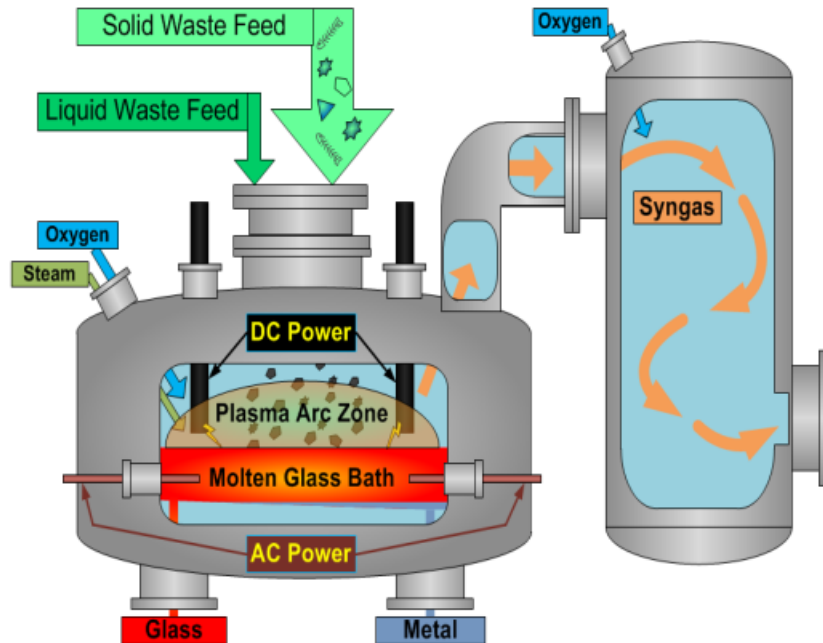
MAPPING vs. PLAGAZI PROCESS



THE PROOF-OF-CONCEPT PLANT



PLAGAZI PEM INTRODUCTION



Waste Transformation Technology

- Optimized plasma gasification
- Intellectual property covered by both and foreign patent in world markets
- Positive net energy balance for conversion of most targeted waste streams

Syngas Use

- Produces ultra-clean syngas for use in downstream conversion technologies
- Negative raw materials cost advantage

Environmental Benefits

- Close to 100% recycling of organics
- Meets or exceeds US EPA requirements
- No potentially hazardous ash, dioxins, furans, or other pollutants

Other Benefits

- Cost competitive with landfill disposal
- Reduces transportation, insurance & environmental costs and liabilities
- Extends life of landfills

Benefits in developing PEM projects

- Standard modular design
- Flexibility to process a variety of heterogeneous waste streams