



We power the urban clean-up where it is most needed

Turning toxic landfills and open dumps into clean energy,  
jobs and healthy communities

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# 1



## Harvest Waste introduction

# BRINGING >100 YEARS OF EXPERIENCE

Waste Management and Waste-to-Energy from Amsterdam (the Netherlands) to the world

Where waste problems were abundant but were resolved through adequate waste management



The 4<sup>th</sup> generation WtE plant represents High-Efficiency electricity production and maximum resource recovery for a circular economy

First WtE facilities



Landfill prohibition



Conventional WtE  
Designed to be clean



High-Efficiency WtE  
Designed to recover



# OUR SUPERIOR - PROVEN - TECHNOLOGY

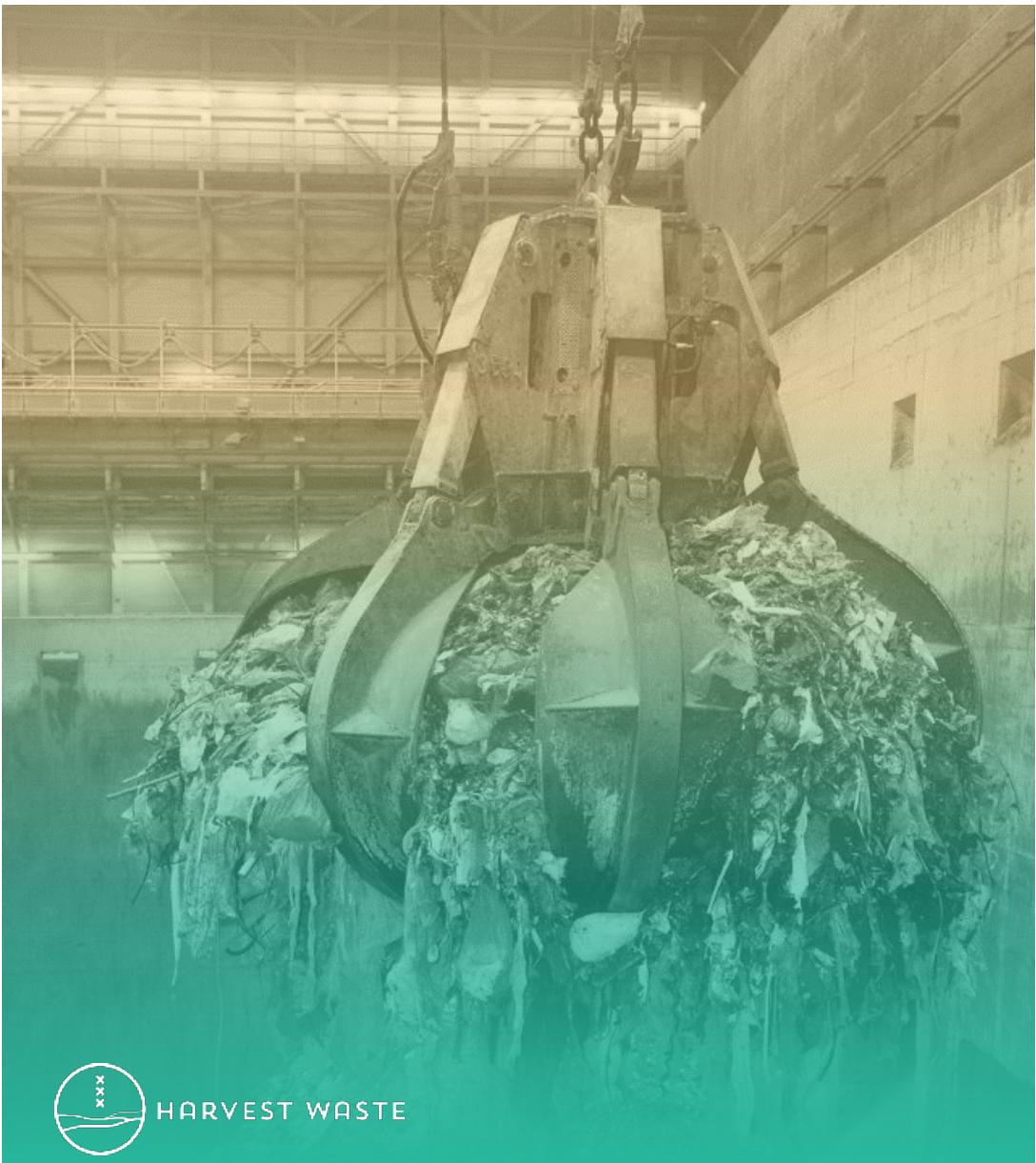
Our High Efficiency WtE concept combines concepts from the nuclear & coal fired energy sectors to maximize recovery of electricity to form an integral part of the circular economy



## Ready for global deployment

- Developed by the Municipality of Amsterdam, the Netherlands. Engineered in Germany
- Has been processing 1,500 tonnes of municipal solid waste per day since 2008 generating 62MW, net
- DNV – GL has indicated that this WtE technology is the most efficient, and in that sense unique in the world

We generate ~40% more electricity from the same amount of waste as competition



HARVEST WASTE

# REFERENCE PLANT

## AEB Amsterdam (High-Efficiency plant)

Construction period	2004 - 2007
Plant fully operational	2008
Waste	Municipal solid waste
Caloric value	$\pm 10\text{MJ/kg}^1$
Capacity	2x 33.6 t/h 1,600 t/day 530,000 t /y
Thermal capacity:	2x 93.4 MWth
Live steam	125 bar / 440°C (option 480°C)
Steam-Steam reheating	14 bar / 330°C

Note 1: The High-Efficiency Waste to Energy technology from Harvest Waste can process waste from 5MJ/kg and higher

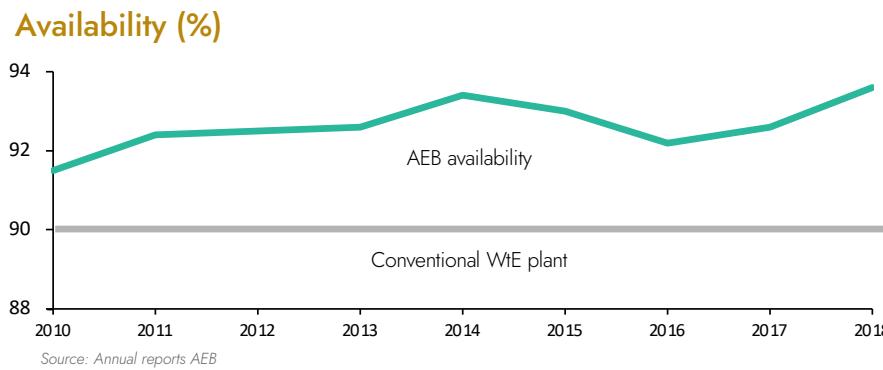
# OUR REFERENCE PLANT

Our reference plant is recognized as the most efficient WtE plant, in operation for over 10 years

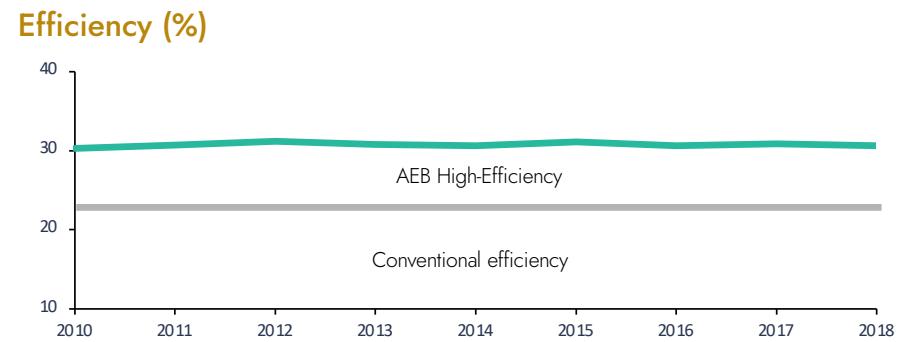
## Proven technology

- The municipality of Amsterdam decided to develop the most advanced WtE technology ever known, and invested close to EUR 50m (on top of the Capex) in the creation, development, concept design of and successful ramp-up of the High-Efficiency (HE) plant
- Harvest Waste's HE technology has been deployed at large scale for over a decade at the AEB WtE facility in Amsterdam, the Netherlands

## The reference plant

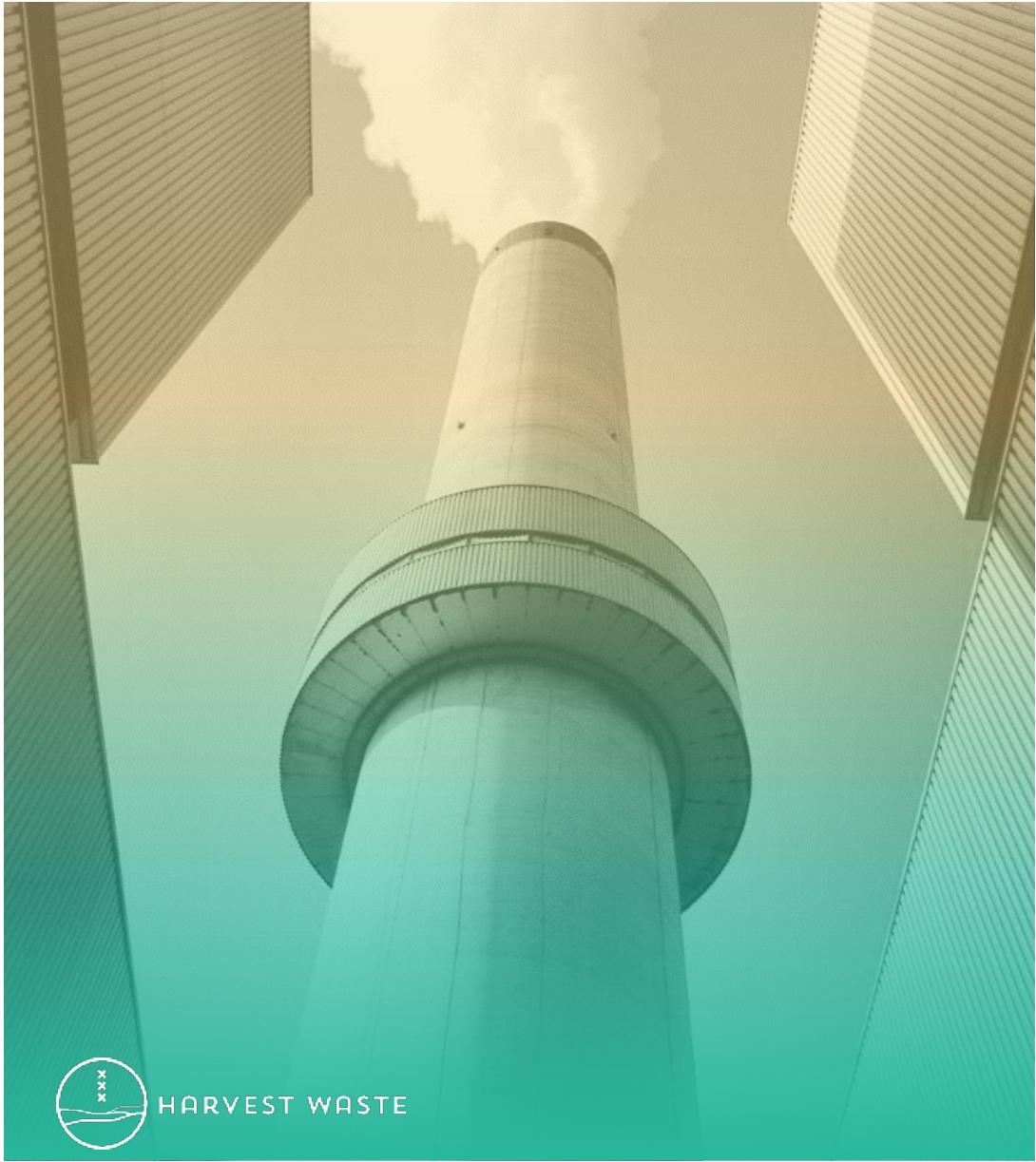


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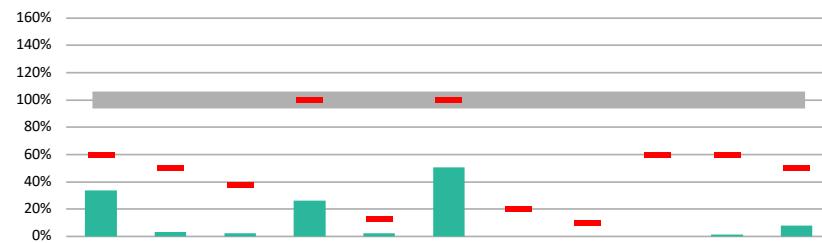


# LOWER EMISSIONS

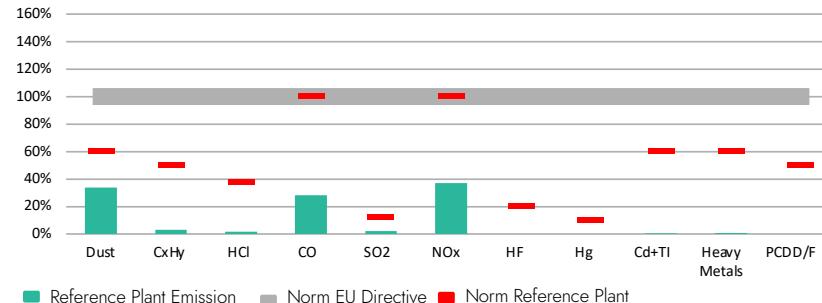
Two reasons for Harvest Waste's reference plant's emissions being significantly below EU standards

- Patented flue gas cleaning concept to remove dioxins
- Combination of dry – wet flue gas treatment

## 2019 emissions



## 2018 emissions



■ Reference Plant Emission ■ Norm EU Directive ■ Norm Reference Plant

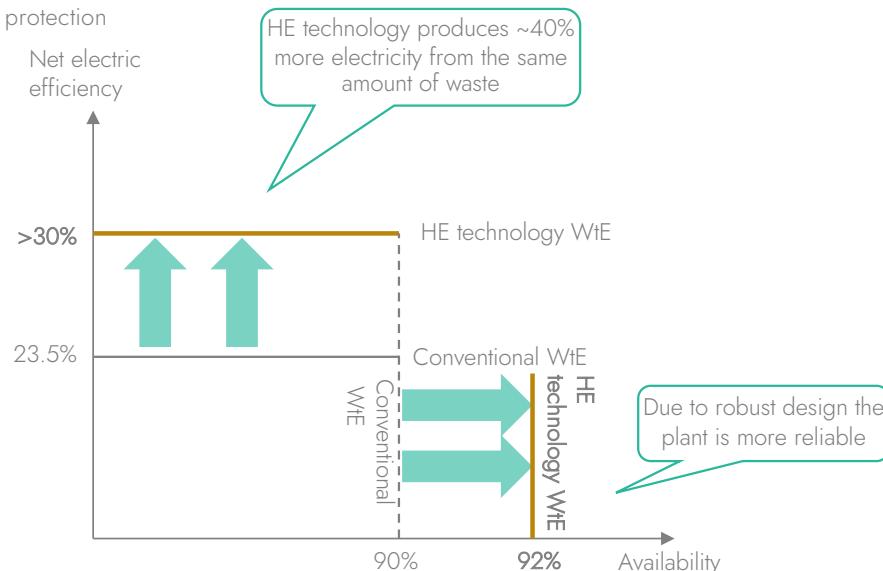
Source: Annual reports AEB

# THE HIGH-EFFICIENCY TECHNOLOGY

HE technology has three advantages: I) higher efficiency, II) lower downtime and III) lower emissions

## Unique IP and proprietary knowledge

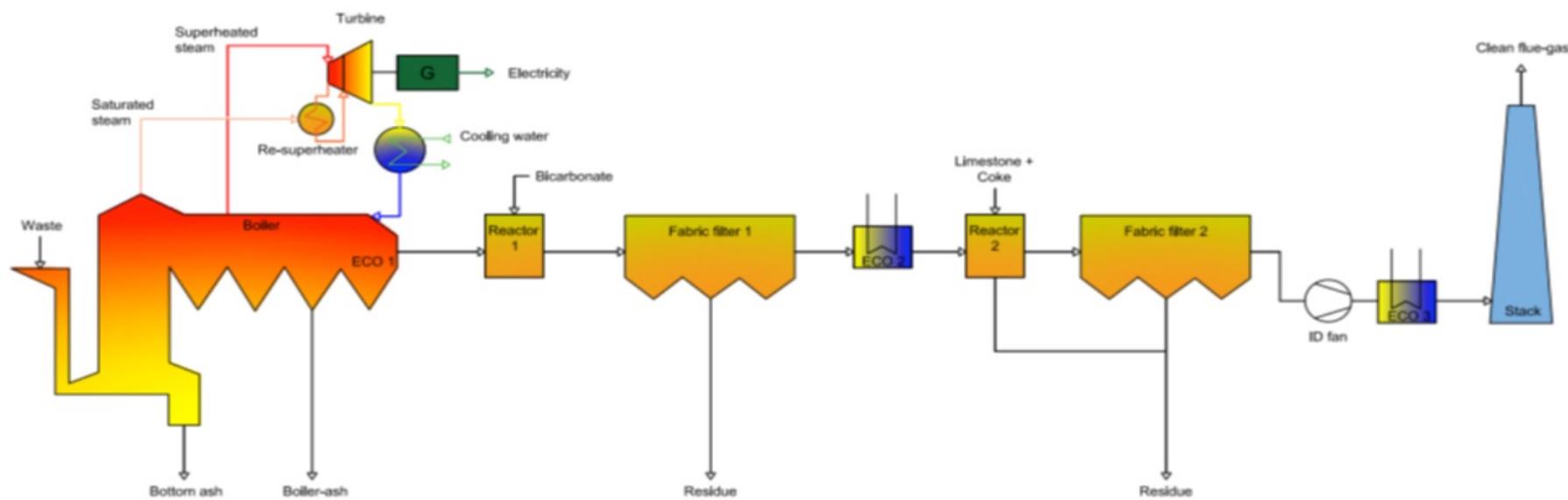
- Unique know-how within the team and exclusive partners
- Harvest Waste has published one patent and is in the process of broadening the IP protection



## Commentary

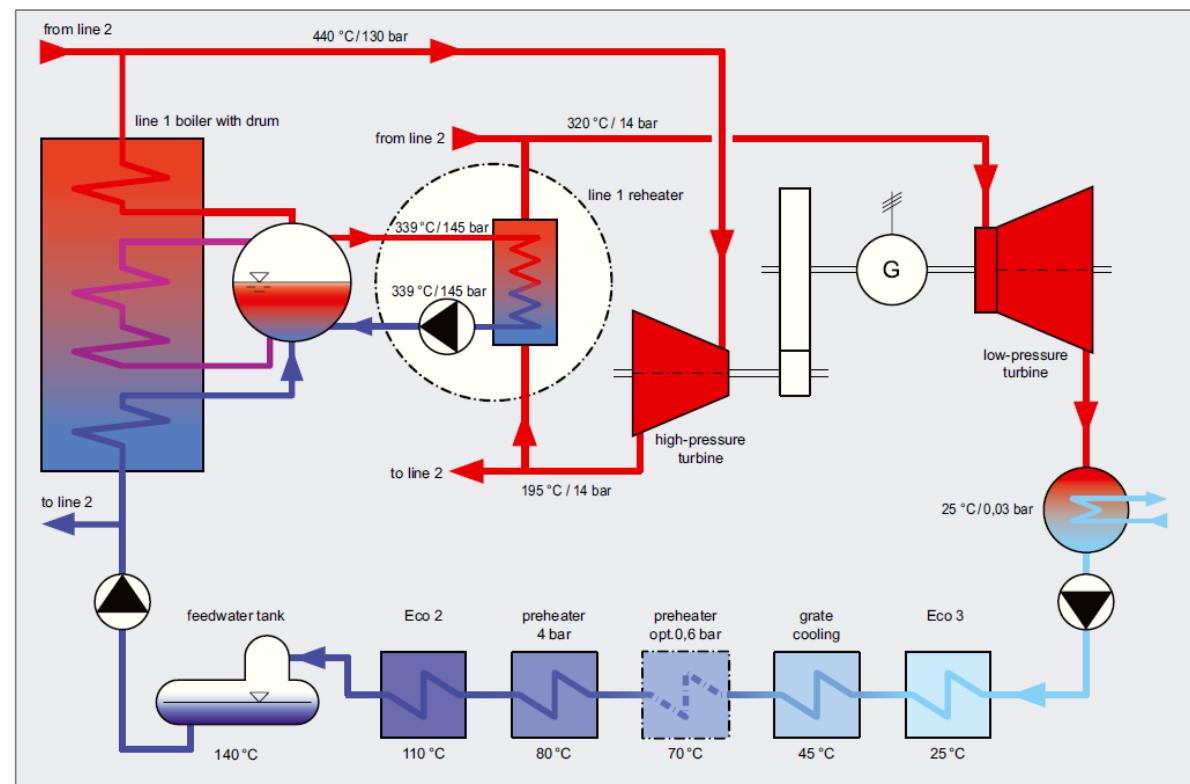
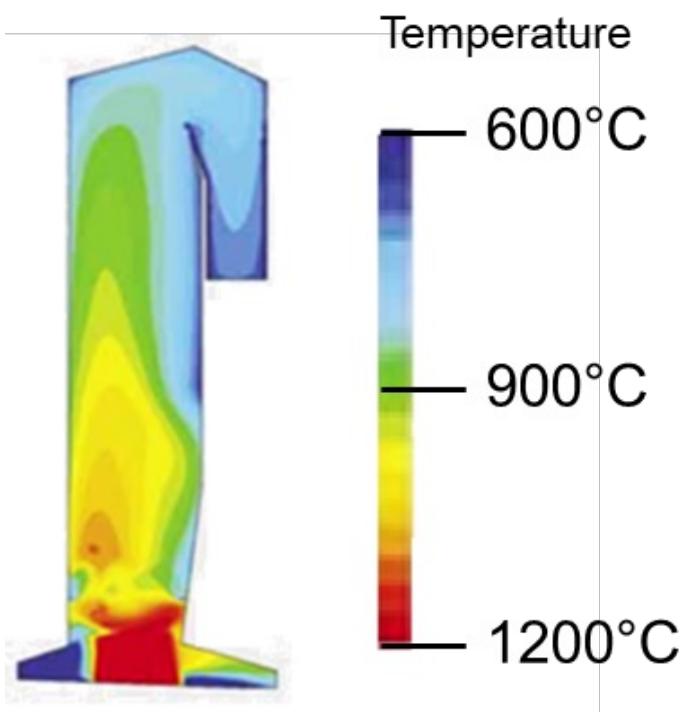
- The High-Efficiency (HE) technology produces ~40% more energy from the same amount of incinerated waste than any conventional WtE technology
- Harvest Waste's reference facility is developed based on the lowest total cost of ownership philosophy, and benefits from various design aspects which increase availability to 92%
- We are continuously improving the efficiency and availability of the concept and are currently working on two new patents based on our lessons learned from the operation of the AEB Amsterdam reference plant
- In addition to the higher electrical output, the HE technology achieves the best environmental performance with the lowest CO<sub>2</sub> footprint per MWh of electricity produced due to reduced oxygen 6% (vs 11% in conventional WtE) required in the incineration process reducing the amount of flue gasses generated

# PLANT DIAGRAM HE WTE



# HW - BOILER & STEAM CONCEPT

Technical outline of the HE boiler and steam parameters



# HW - DOUBLE DRY CONCEPT

## Lot structure of a HE WtE plant

BREF New Plants:

Low Range Emission Limits

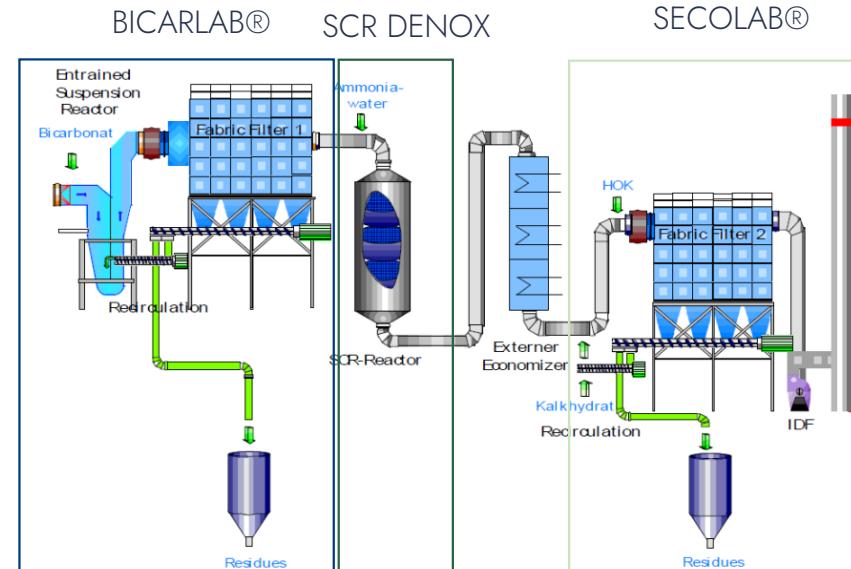
One stage of dry "BICARLAB" – SCR – Eco Seco/VapoLAB

HCl = 2 mg/Nm<sup>3</sup>, dry  
SO<sub>2</sub> = 5 mg/Nm<sup>3</sup>, dry  
Hg = <10 µg/Nm<sup>3</sup>, dry  
PCDD/F = 0,01 ng/Nm<sup>3</sup>/h, dry

NOx < 70 mg/Nm<sup>3</sup>, dry  
NH<sub>3</sub> < 5 mg/Nm<sup>3</sup>, dry



SCR



# 2



## Pipeline

# PROJECT PIPELINE HARVEST WASTE - 2022/Q2



	Indonesia		Brazil		
	Vietnam		Colombia		
	Philippines		South Africa		
	India		Oman		
	India – Mumbai	1500 tpd		Vietnam - Da Nang	750 tpd
	India – Telangana	1500 tpd		Cambodia – Phnom Penh	1200 tpd
	Indonesia - Medan	1500 tpd			
	Vietnam – Soc Trang	750 tpd		Egypt – Cairo	3000 tpd
	Nigeria – Anambra State	750 tpd		Nigeria – Lagos State	1500 tpd
	Pakistan – Lahore	2250 tpd		Saudi - Dammam	2250 tpd
	Palestine - Jenin	1200 tpd		Philippines - Cebu	750 tpd
	Pakistan – Karachi	1500 tpd		Egypt - Gharbia	1200 tpd

Awarded					
	Palestine - Jenin	1200 tpd		Philippines - Cebu	750 tpd
	Pakistan – Karachi	1500 tpd		Egypt - Gharbia	1200 tpd



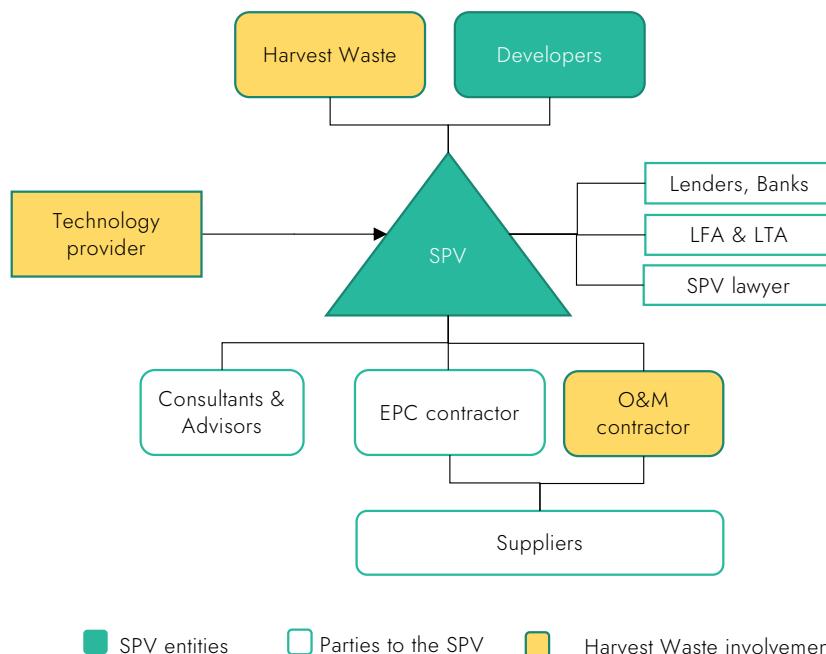
# 3



## Contracting Structure & Strategy

# PROJECT STRUCTURE

## Project structure



## Definition of parties

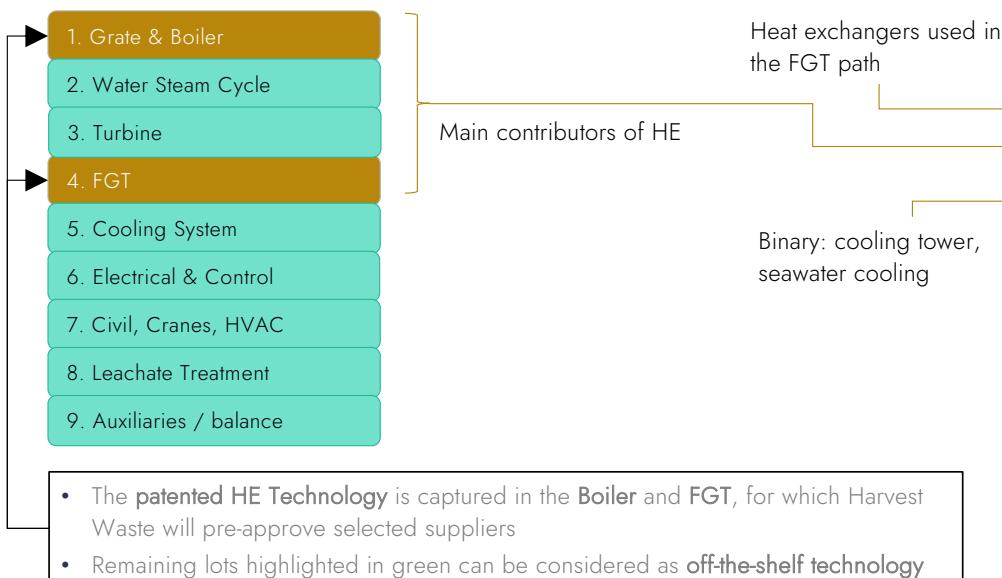
<b>Developers</b>	Co-owners of the Project Company
<b>SPV</b>	Project Company
<b>Technology Provider</b>	Technology provider provides the Basic Design and the technology license to the SPV. Preselects HE-suppliers
<b>EPC Contractor</b>	Detailed design, procurement and construction of the plant. Provides overall performance guarantee
<b>O&amp;M Contractor</b>	Operates and Maintains the plant after hand-over from EPC. Ensures operational performance according to specs
<b>Lenders, Banks</b>	Co-financing the project
<b>LFA &amp; LTA</b>	Lenders Financial & Technical Advisor: will give banks comfort by performing DD on all project aspects
<b>SPV Lawyers</b>	Support SPV in drafting and negotiating contract(s)

# BREAK DOWN VS HE-TECHNOLOGY

## Plant breakdown vs Unique Technology

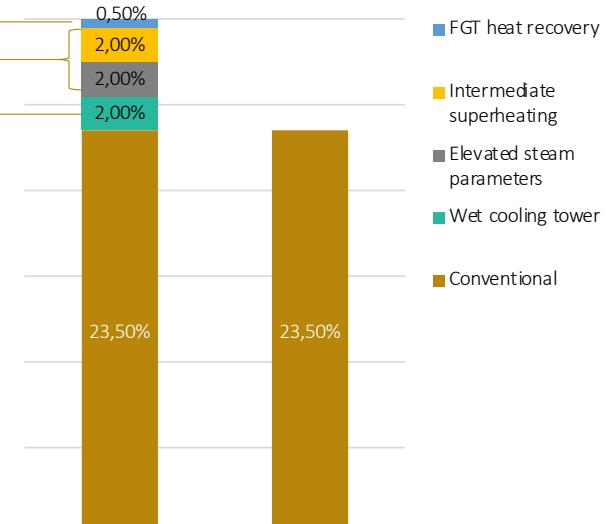
### Plant breakdown

- HW has developed a breakdown to build its plants based on experience gained in the reference plant construction;
- This structure is based on capabilities / competences of various parties;
- It is built up as follows:

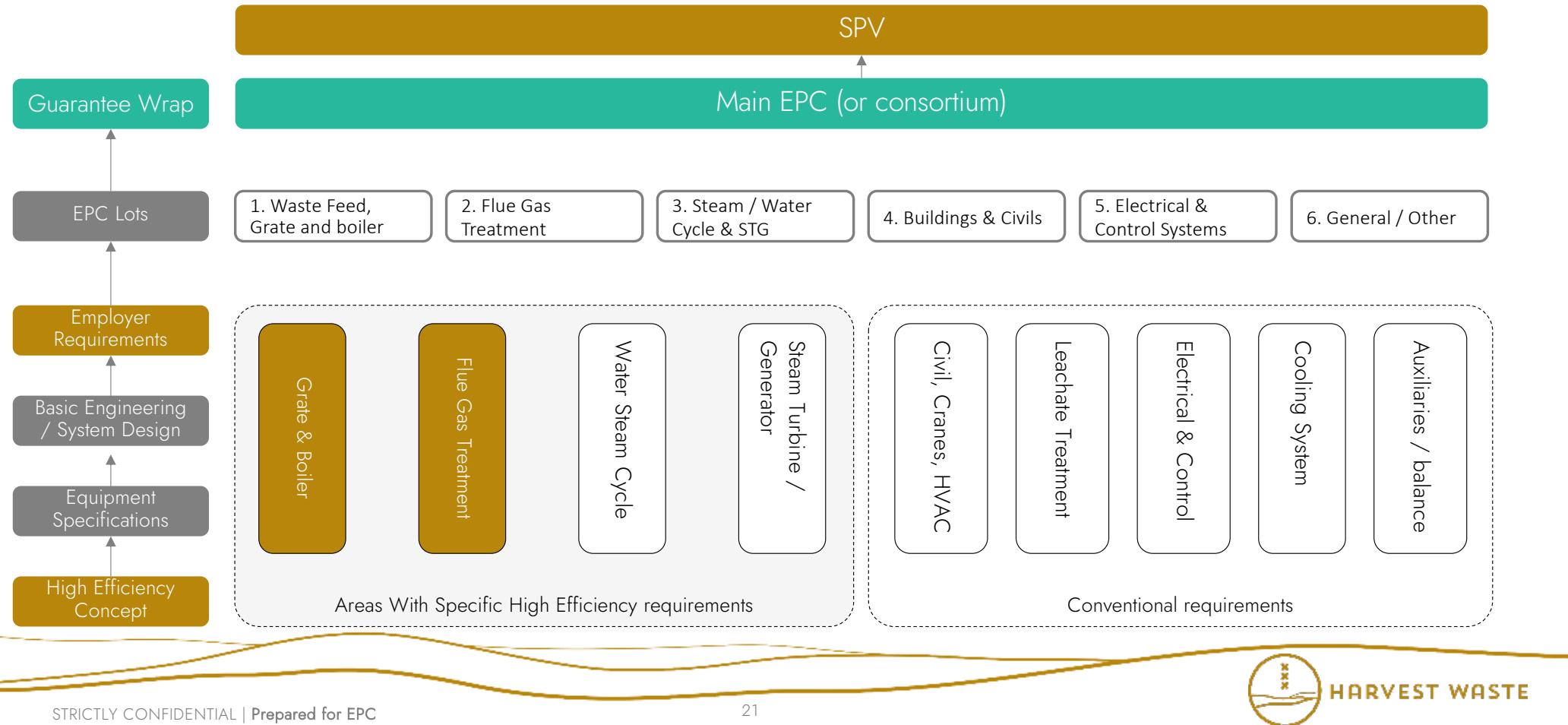


### High Efficiency Technology

- HW's High Efficiency (HE) Technology differentiates itself from conventional WtE by delivering at least 25% more electrical output from the same amount of waste;
- The increase in electrical efficiency is achieved by using a combination of technology and know-how in a patented concept, as shown in the graph below:



# PLANT BREAKDOWN VS REQUIREMENTS



# CONTRACTING STRATEGY - GUARANTEES

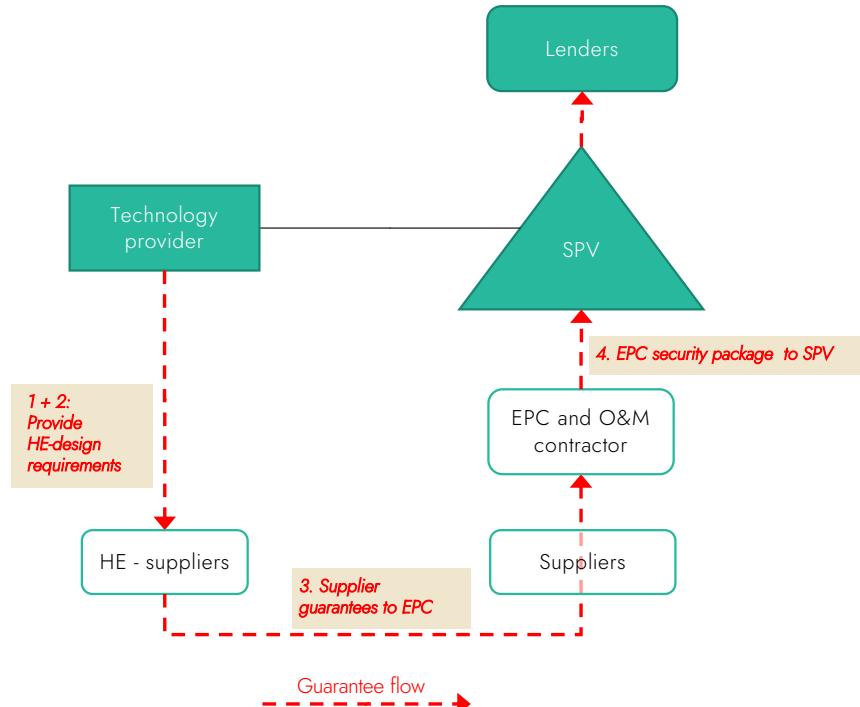
Contracting strategy to secure security package (incl performance guarantee) accepted by lenders

## Guarantee rationale

Knowing that

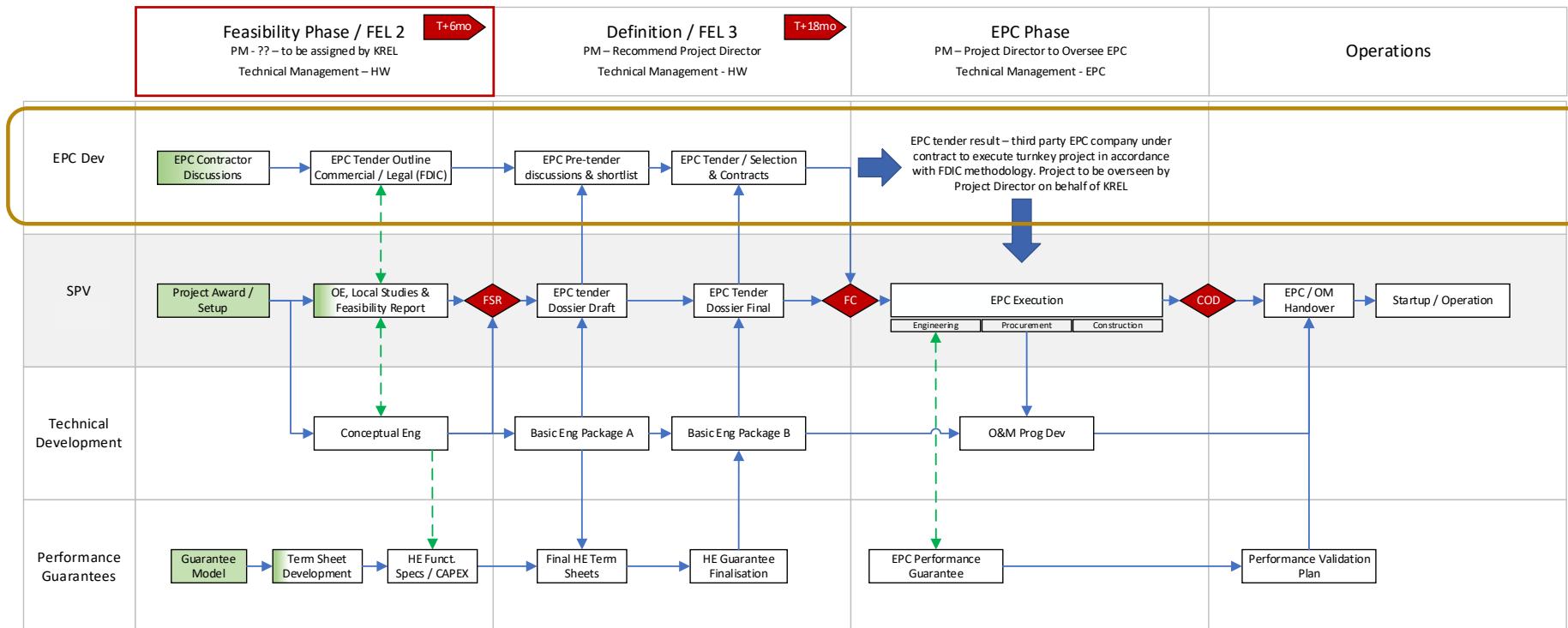
- The SPV does not have the balance sheet to provide the security package for the project. Hence, the SPV must be able to rely on its EPC partner(s)
- The High Efficiency technology is not yet common practise in the market. To get guarantees, specific steps will be taken to safeguard performance guarantees:
  - Technology Provider (HW) develops specific design requirements for the High Efficiency equipment during Feasibility Phase and early Definition phase
  - Parts of the design – including design guarantees - will be developed in more detail to allow suppliers to understand the principles and make them comfortable
  - HE suppliers now can provide (performance) guarantees to the EPC and O&M
  - With these guarantees covered, EPC and O&M can provide the overall security package to the SPV

## Guarantee model



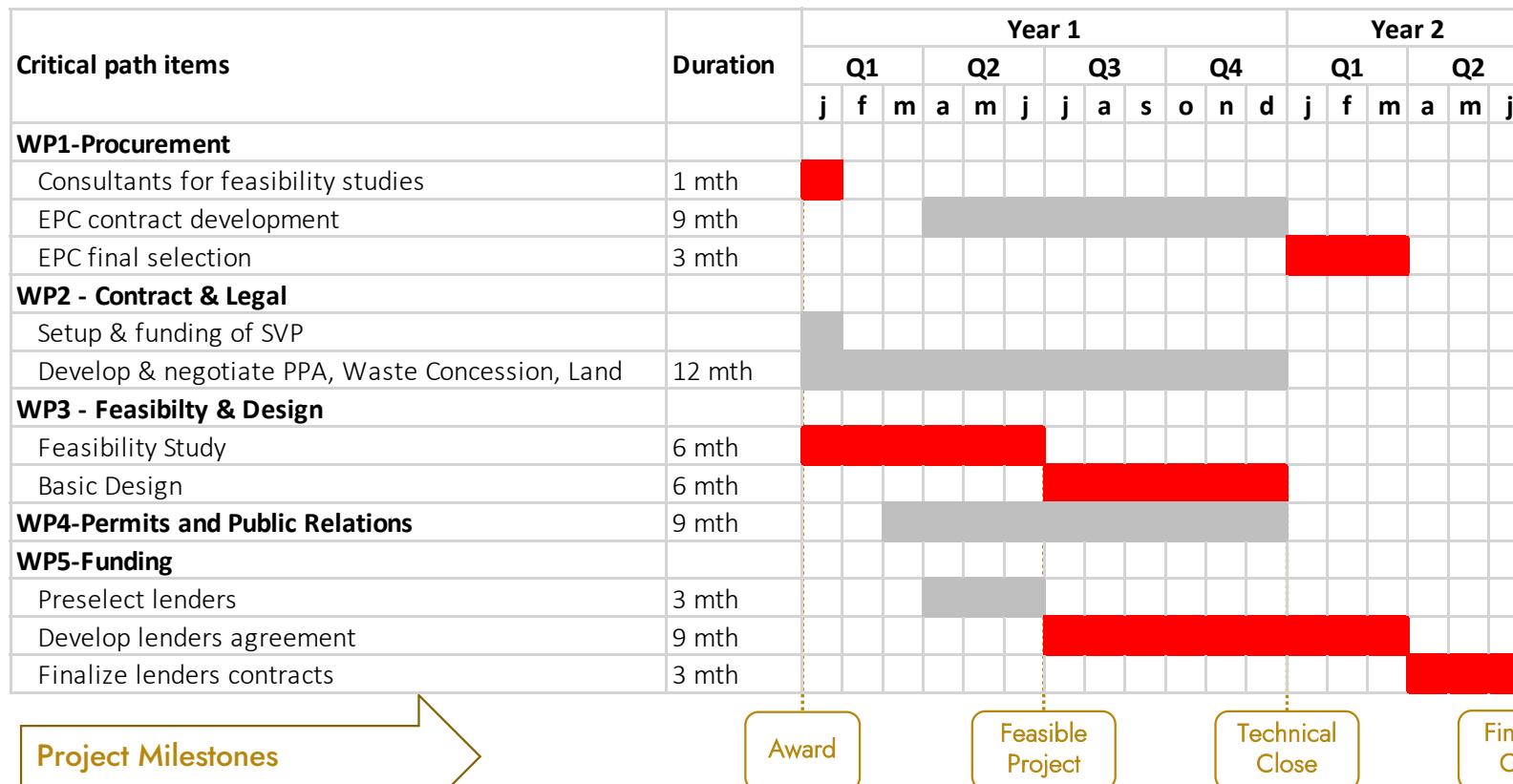
# INTERACTION OF WORK STREAMS

Interactions with other workstreams during project development, inside and outside Harvest Waste



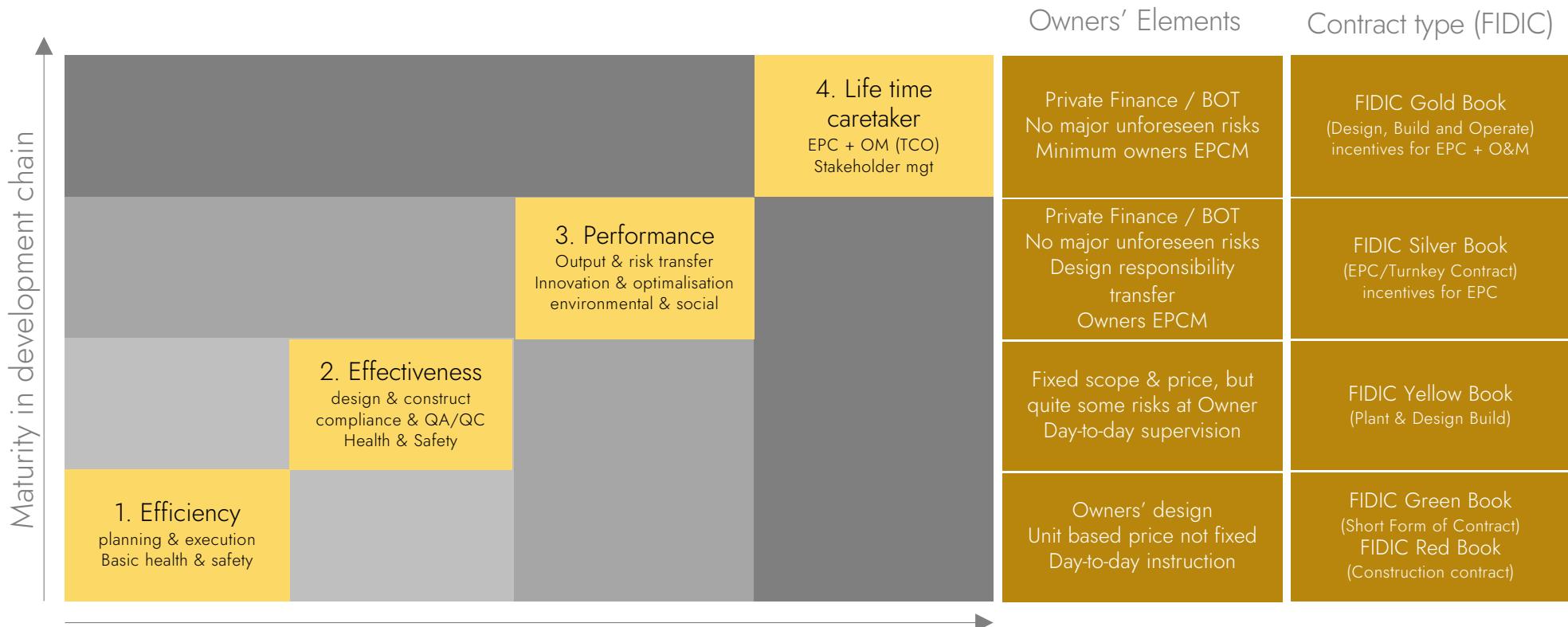
# DEVELOPMENT SCHEDULE BASELINE

Achieving Financial Close within 18 months



# EPC MATURITY LEVELS

Characteristics of different EPC maturity levels vs owners elements and contract types



# MATURITY LEVELS TYPICAL ELEMENTS

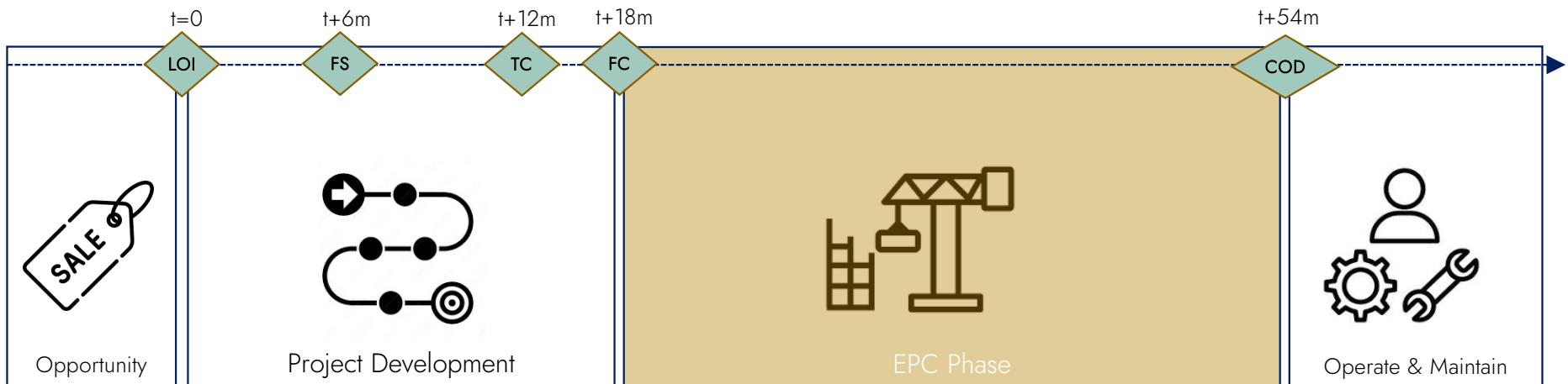
## Characteristics of different EPC maturity levels

1. Efficiency	2. Effectiveness	3. Performance	4. Life time caretaker
<ul style="list-style-type: none"><li>• Workmanship</li><li>• Work planning</li><li>• Internal supervisors</li><li>• Reactive Health &amp; Safety</li><li>• More work = more revenue</li><li>• Basic quality standards (ISO9001)</li><li>• Internal focus</li> <li>• Basic IT</li><li>• No contract management</li><li>• No stakeholder management</li></ul>	<ul style="list-style-type: none"><li>• All elements of level 1</li><li>• Able to optimize &amp; work out owners' design</li><li>• Fully integrated quality policies, control and audits</li><li>• Health &amp; Safety is actively monitored/reported</li><li>• Basic certificates similar to ISO45001 and ISO14001</li><li>• High level of QA/QC</li> <li>• Contract management (subcontractors &amp; client)</li><li>• Parts of design outsourced</li></ul>	<ul style="list-style-type: none"><li>• All elements of level 2</li><li>• Focus on client and performance (improvement)</li><li>• Design includes Basic Engineering. Familiar with system engineering</li><li>• Excellent culture of Quality and HSE (visible)</li><li>• IT: BIM, integrated design packages, 3D modelling</li> <li>• Mgt of design interfaces</li><li>• Stakeholders mgt EPC phase</li><li>• In-house legal support</li></ul>	<ul style="list-style-type: none"><li>• All elements of level 3</li><li>• Focus on all stakeholders</li><li>• Design and execution focuses on total costs of ownership &amp; revenue optimization</li><li>• Managed Services for client</li><li>• IT: design and operational software is integrated</li> <li>• Senior stakeholder mgt, well connected people</li><li>• Stakeholder in project</li><li>• Development experience</li></ul>

# PREFERRED CRITERIA FOR EPC

We are looking for long-term and multi-project EPC partners

- Capable: successfully executed turn-key EPC-contracts for WtE or similar industries & mature organisation
- Entrepreneurial: open to work with pre-selected suppliers and to provide overall performance guarantees
- Comfortable in emerging markets: willing to work in Harvest Waste's target countries



# A



## Appendix



# PROJECT SCHEDULE BASELINE

Achieving Financial Close within 18 months, after which EPC has maximum 36 months for COD

Critical path	Duration	Year 1				Year 2				Year 3				Year 4				Year 5				
		Q1	Q2	Q3	Q4																	
<b>Feasibility and Definition Phase</b>	<b>18 mth</b>	j	f	m	a	j	a	s	o	n	d	j	f	m	a	j	a	s	o	n	d	
<b>WP1-Procurement</b>																						
Consultants for feasibility studies	1 mth																					
HE equipment	6 mth																					
EPC and O&M	9 mth																					
<b>WP2 - Contract &amp; Legal</b>																						
Develop & negotiate PPA, Waste Concession, Land	12 mth																					
<b>WP3 - Feasibility &amp; Design</b>																						
Feasibility Study	6 mth																					
Basic Design	6 mth																					
<b>WP4-Permits and Public Relations</b>	<b>10 mth</b>																					
<b>WP5-Funding</b>																						
Preselect lenders	3 mth																					
Develop lenders agreement	9 mth																					
Finalize lenders contracts	3 mth																					
<b>EPC Phase</b>	<b>36 mth</b>																					
Detailed Design	6 mth																					
Procurement long lead items	12 mth																					
Construction Civil Works	21 mth																					
Construction Process works, including key equipment	12 mth																					
Testing, Commissioning and Startup	6 mth																					
<b>Key Milestones</b>																						
Award	t = 0																					
Project Feasible Y/N?	t + 6 mth																					
Technical Close: design freeze	t + 12 mth																					
Financial Close ( <b>FC</b> )	t + 18 mth																					
Detailed design accepted by SPV	FC + 6 mth																					
Finalize construction works	FC + 24 mth																					
Commercial Operation Date	FC + 36 mth																					

