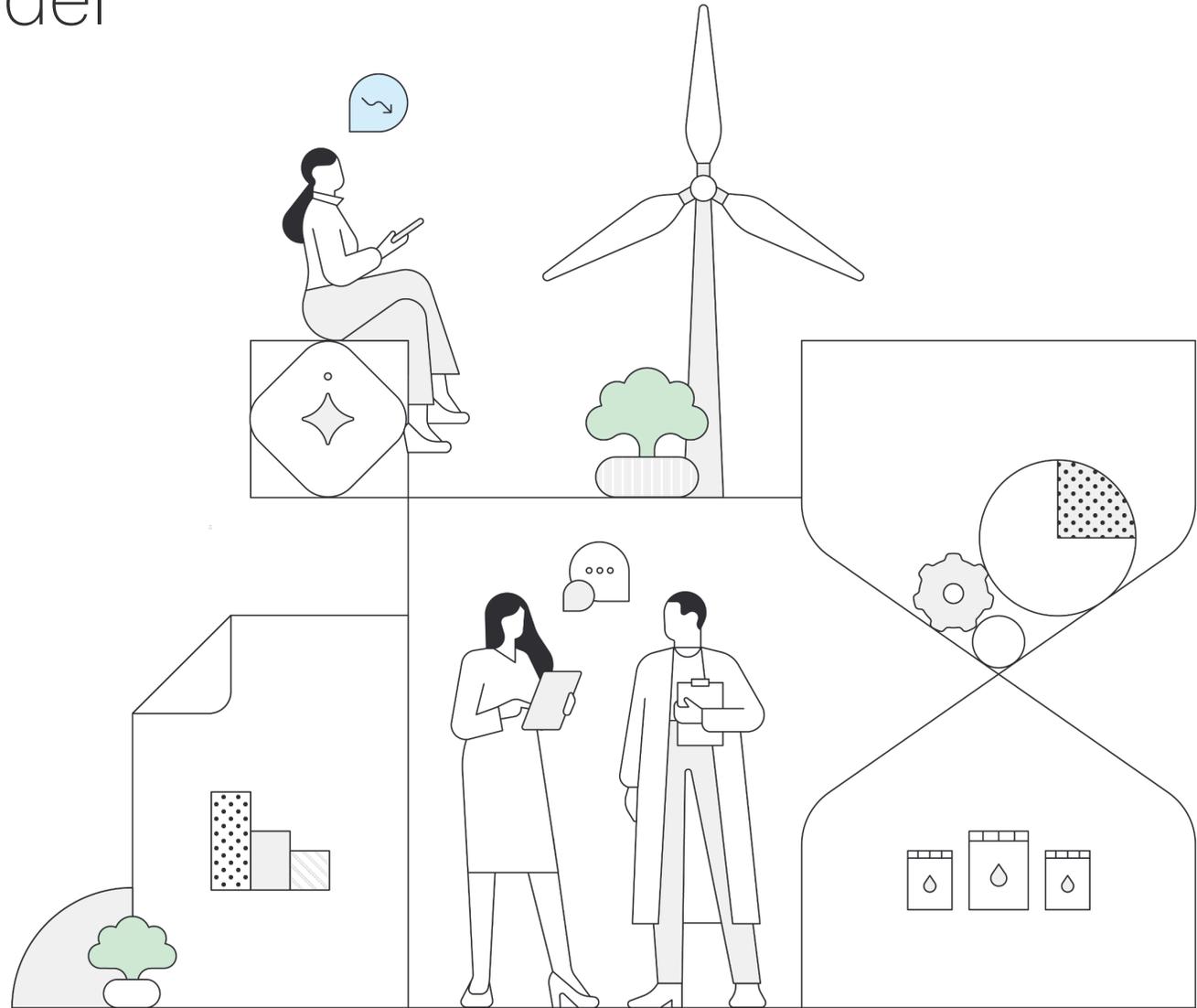


# Green Corridor Cost Model Package



# Introduction: Model objectives

## What this document and Excel is

This document is a reference guide to the Excel Cost Model for the Green Corridor at the End-of-Feasibility Stage

This document and the Excel serve three primary purposes:

1. Offer a comprehensive overview of the model's calculations, including its structure and framework
2. Provide a detailed breakdown of input factors and their significance
3. Present a breakdown of the model's outputs



## What this document and Excel is not

The model is not a detailed cost estimate suitable for final investment decision-making

Additional research and analysis are required on key parameters, including but not limited to:

1. Further refinement of capital expenditure and operational expenditure estimates, aligned with the detailed engineering phase
2. Further refinement of cost of capital incl. market validation of rate of returns based
3. Comprehensive stress-testing, including market validation of the projected willingness to pay for a green cargo premium



# Content



Output assessment: cost gap and externalities



Calculations: Model setup



Model overview and how-to-guide



# Content



Output assessment: cost gap and externalities



Calculations: Model setup

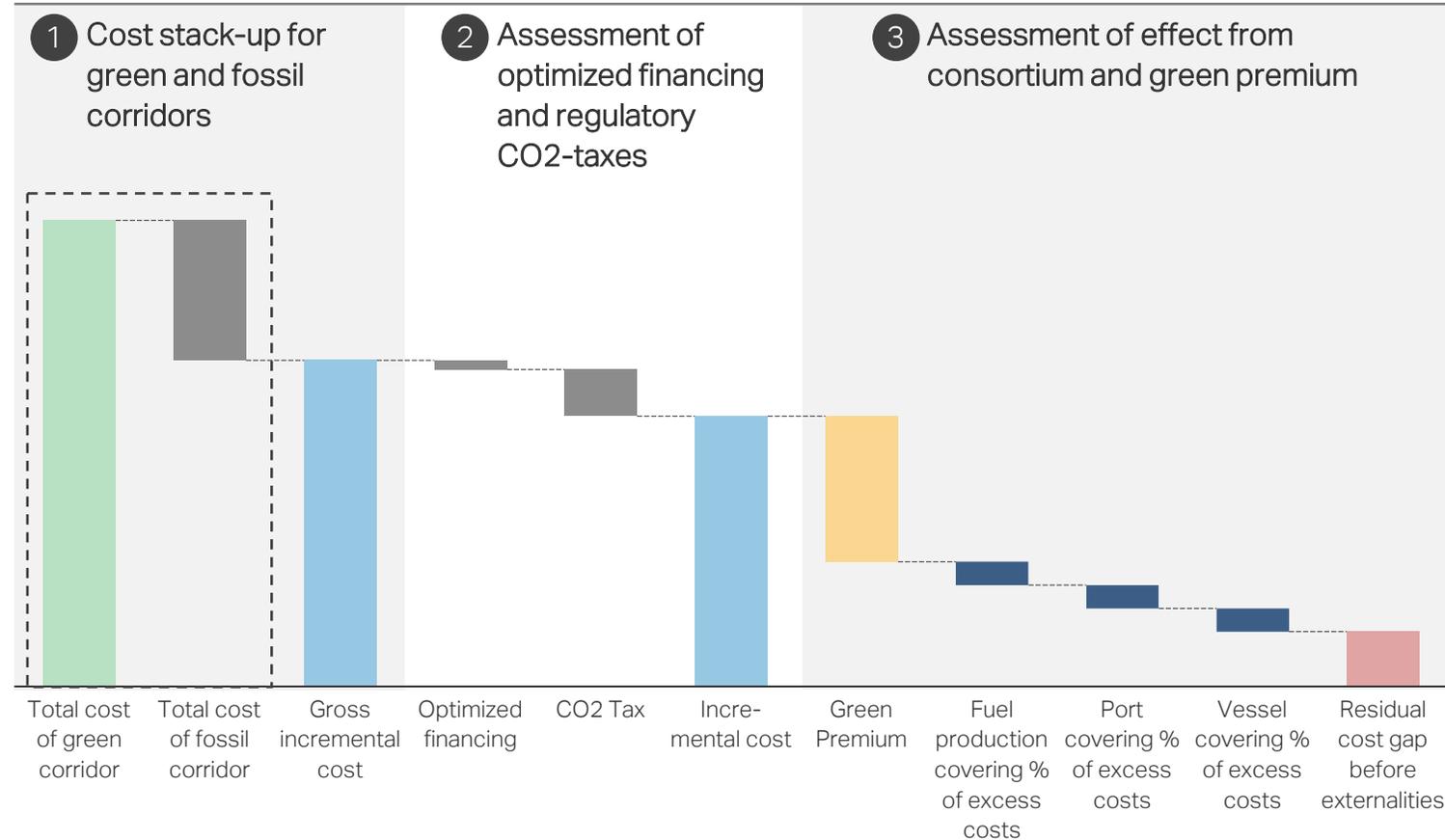


Model overview and how-to-guide

# Model outputs: The cost model estimates a residual cost gap<sup>1</sup>

Deep-dive

## Breakdown of total incremental cost of green option, USDm<sup>1</sup>



## Commentary

- 1 The total costs for both the green and fossil corridors are calculated, incorporating consortium cost estimates and standardized financing terms
- 2 The impact of optimized financing and the introduction of regulatory effects (e.g., mid-term measures) is accounted for, assuming stakeholders are willing to bear these costs
- 3 The consortium are willing to absorb additional incremental costs without passing on the cost to the cargo owners. Cargo owners are expected to be willing to pay a green premium

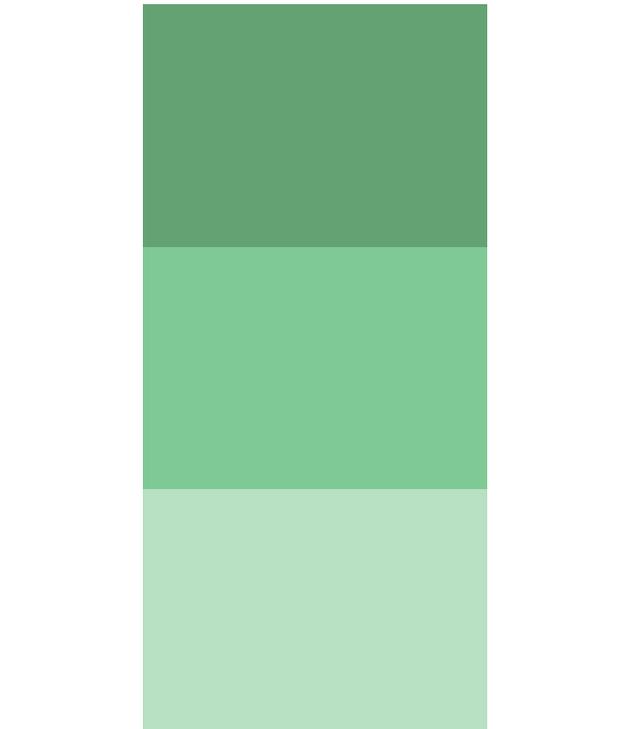


1. Present value numbers

Source: MMMCZCS Cost model

# Deep-dive on model outputs: Green corridor cost estimates are divided into value chain parts<sup>1</sup>

Green Corridor cost, USDm<sup>1</sup>



Total cost green option (gross)

Category

Description



**Fuel production**

- Building a fuel production plant or purchasing fuel, and includes both CAPEX and OPEX



**Port**

- Building the port infrastructure or chartering, and includes both CAPEX and OPEX for the storage and barge



**Vessel**

- Building and operating vessels, and includes both CAPEX and OPEX

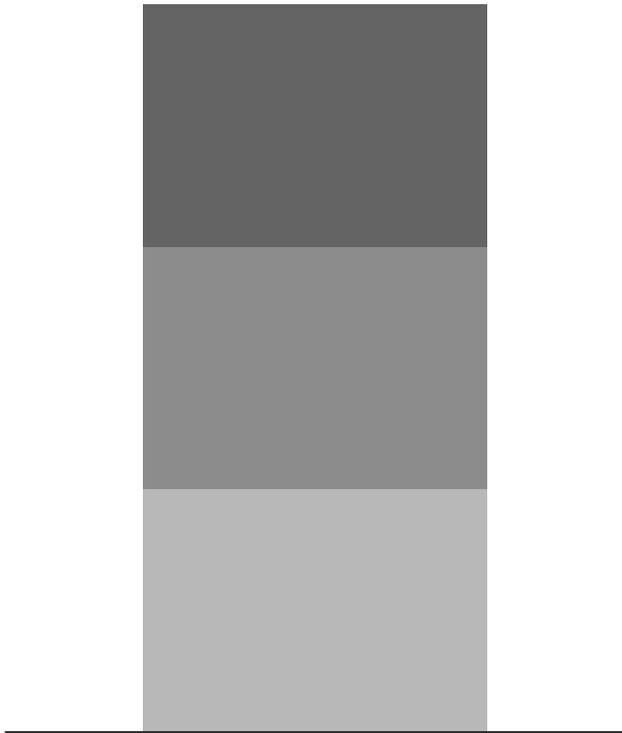


1. Present value numbers

Source: MMMCZCS Cost model

# Deep-dive on model outputs: Fossil corridor cost estimates are divided into value chain parts<sup>1</sup>

Fossil Corridor cost, USDm<sup>1</sup>



Total cost fossil option (gross)

Category

Description



Fuel purchasing

- Purchasing fuel



Port

- Utilizing existing port infrastructure, and includes both CAPEX and OPEX for the storage and barge



Vessel

- Building and operating vessels, and includes both CAPEX and OPEX



1. Present value numbers

Source: MMMCZCS Cost model

# Deep-dive on model outputs: Externalities (GDP-effects and jobs) are calculated based on investments

■ CAPEX ■ OPEX

Category	Investment, USDm <sup>1</sup>	Years of construction /operations	One-time off GDP-add per year of effect, nominal effect		One-time off jobs-added per year of effect, nominal effect	
			Multiple <sup>2</sup>	USDm <sup>1</sup>	Multiple <sup>3</sup>	# of jobs, ('000)
Fuel production	■	X	0.XX	■	XX	■
	■	X	0.XX	■	XX	■
Port (storage)	■	X	0.XX	■	XX	■
	■	X	0.XX	■	XX	■
Vessel	■	X	0.XX	■	XX	■
	■	X	0.XX	■	XX	■
Total	■ ■			■ ■		■ ■



1. Nominal values; 2. For each USD spend, the GDP is expected to increase by the multiple; 3. For each 1 USDm investment, the number of jobs is expected to increase by the multiple

Source: MMMCZCS Cost model, MGI

# Externalities: Process steps for calculation

## Data and structure



- **Data:** The externalities are based on the Input-Output tables from OECD
- **Structure:** Input-Output tables show inter-industry transactions, links to final demand, and differentiation between value added and intermediate consumption

## Methodology and process



- **Methodology:** Based on OECD ICIO accounts, they use industry data to create multipliers via Leontief's approach
- **Process:** Data on employment, labor, and savings is compiled

## Definitions



- **Focus on initial and direct effects:** The externality-analysis combines Initial effects (sector operations) and Direct effects (tier-1 suppliers), excluding Indirect and Induced effects, to capture non-induced supply chain impacts
- **Short-term impact:** Impacts calculated are limited to short-term activities like construction, calculated using sector multipliers:

## Calculations



- **Leontief model:** Based on Wassily Leontief's Nobel Prize-winning methodology<sup>1</sup>

## Assumptions



- **Fixed ratios:** Inputs scale proportionally with output, as reflected in multipliers
- **No price changes:** Ignores supply constraints, which may limit calculated impacts
- **Static data:** Assumes uniform production and excludes tech or time-based changes



1. The model analyzes inter-industry relationships using the equation  $X = (I - A)^{-1}Y$ , where  $(I - A)^{-1}$  is the Leontief inverse. The process involves creating an identity matrix, subtracting the A matrix, and inverting  $(I - A)$  to calculate type 1 (excluding household and labor)



# Content



Output assessment: cost gap and externalities



Calculations: Model setup



Model overview and how-to-guide

# Model overview: Project output based on several inputs and three core calculations

Deep-dive on following page

## There are four input-categories



### Green Corridor

- Three major cost categories incl. preliminary financing terms:
  - Investment and operations of a fuel production, port and vessels

### Fossil Corridor

- Three major cost categories incl. preliminary financing terms:
  - Investment and operations of a fuel production, port and vessels

### Regulatory Configurator

- Regulatory configurators incl. MtM<sup>2</sup>, IRA, FuelEU and EU ETS

### Consortium and WtP<sup>1</sup>

- Consortium cost absorption and cargo owners' willingness to cover some of the incremental cost gap



Model calculations

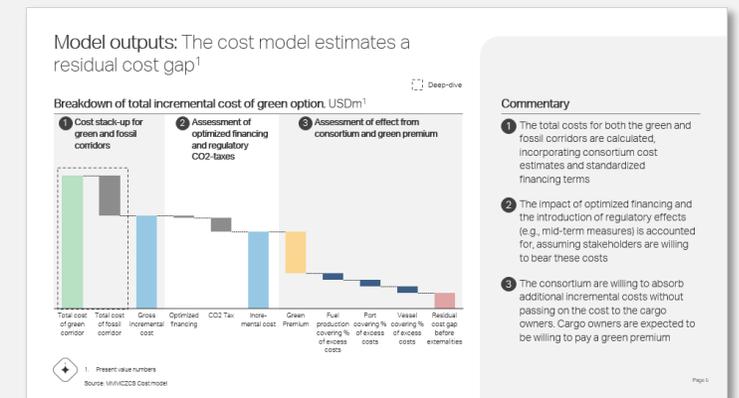


## Model output



The residual cost gap before externalities is computed by calculating:

- 1 Cost stack-up for green and fossil corridors
- 2 Assessment of optimized financing and regulatory configurators
- 3 Assessment of effect from consortium and green premium



1. Willingness-to-Pay
2. Mid-term measures

Source: MMACZCS Cost model



# Content



Output assessment: cost gap and externalities



Calculations: Model setup



Model overview and how-to-guide

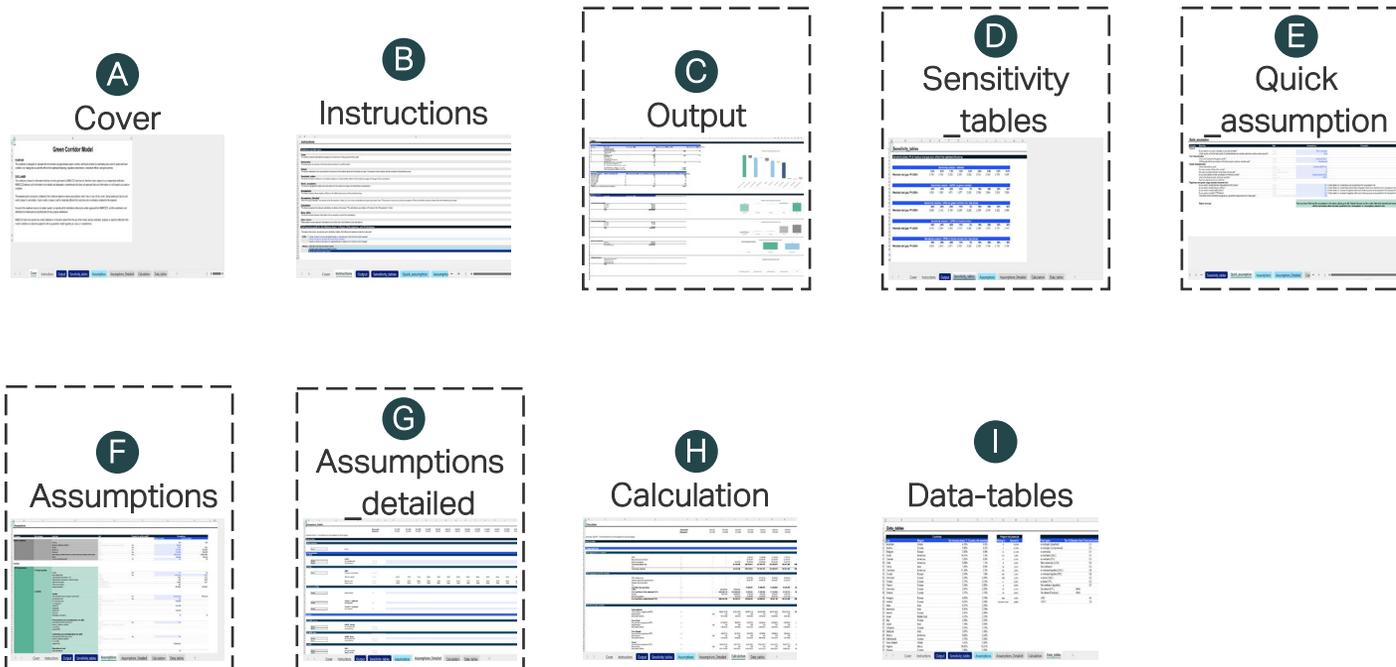
# The model is based on nine main tabs in Excel

☐ Deep-dive next



## Excel-model

9 main tabs are included in the model:



## Explanation of Excel tabs

- A** Cover of the model, incl. purpose and a disclaimer
- B** Instructions on how to use the model incl. how to understand the different tabs and cells
- C** Output generated based on the input in the assumption tab
- D** Sensitivity analyses of key assumptions in the model
- E** Quick assumption sheet to run a high-level calculation
- F** Assumptions on a high-level
- G** Detailed assumptions if known on a granular level
- H** Calculations based on input values from the assumption tabs
- I** Relevant input going into the model



# C: How to read and use the Output-tab (1/2)

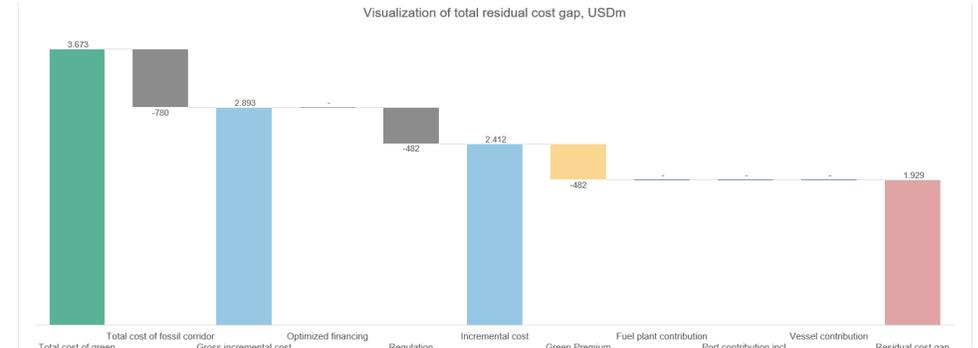
## Screenshot from tab



Reference	Description	Present value, USDm	CO2-abatement cost, USD/ton of CO2	CO2-abatement cost, USD/ton of Cargo
1	Total cost of green corridor	-	3573	-
2	Total cost of fossil corridor	-	780	-
3	Gross incremental cost	-	2,893	1,465
4	Optimized financing	-	-	-
5	Penalties	-	402	-
6	Incremental cost	-	2,412	1,221
7	Green Premium	-	402	-
8	Fuel plant contribution	-	-	-
9	Port contribution, port fee waived	-	-	-
10	Vessel contribution	-	-	-
11	Residual cost gap before externalities	-	1,929	977
12	Share of cost gap that is related to the ports	-	-	-
13	Share of cost gap that is related to the rest of the green corridor	-	1,929	-
14	Total CO2 abated over lifetime, tonnes of CO2e	-	-	1975,548
15	Total cargo moved over lifetime, tonnes of cargo	-	-	88,600,000

Externalities - category	Lifetime or construction time	GDP: nominal values, USDm per year of lifetime or construction time	Jobs: nominal values, # of jobs per year of lifetime or construction time
Fuel Production - CAPEX	25	736	3476
Fuel Production - OPEX	25	10	204
Port (Storage) - CAPEX	25	97	741
Port (Storage) - OPEX	25	2	2
Port (Berth) - CAPEX	25	0	479
Port (Berth) - OPEX	25	0	4
Vessel - CAPEX	25	170	7389
Vessel - OPEX	25	89	89
<b>Total (for one year with effect from externalities)</b>		<b>1,082</b>	<b>43,351</b>



## Description



- **Residual cost gap breakdown:** This table provides a detailed breakdown of the residual cost gap, offering insights into the remaining financial gap after accounting for costs, subsidies, and other mechanisms
- **CO<sub>2</sub> abatement:** The table also includes data on CO<sub>2</sub> abatement, quantifying the environmental benefits achieved through the green corridor or other sustainability measures
- **Externality effects:** The table highlights the broader externality effects, such as the estimated impact on GDP and the number of jobs created

- **Visual illustration of the residual cost gap breakdown:** This section provides a graphical representation of the residual cost gap, offering a clear and intuitive visualization of its components



# C: How to read and use the Output-tab (2/2)

## Screenshot from tab



Reference	Description	Present value, USDm
<b>1. Total cost of green corridor</b>		
	Fuel production	2.833.465.026
	Port - Storage	57.557.354
	Port - Barge	39.523.460
	Vessel	743.442.054
	<b>Total</b>	<b>3.672.987.894</b>
<b>2. Total cost of fossil corridor</b>		
	Fuel purchase	136.710.638
	Port - Storage	7.729.088
	Port - Barge	-
	Vessel	635.142.886
	<b>Total</b>	<b>779.582.612</b>



## Description



- **Detailed cost stack-up:** A detailed cost stack-up is displayed for each component of the overall cost gap, providing a clear breakdown of contributing factors
- **Example:** the green corridor section includes a comprehensive cost breakdown, covering fuel production or purchase, port-related expenses, and vessel costs

- **Visual illustration:** On the right-hand side, a visual representation of the cost stack-ups is provided, offering an intuitive overview of the cost components



# D: How to read and use the Sensitivity\_labels-tab

Screenshot from tab



**Sensitivity tables**

Sensitivity tables, PV of residual cost gap excl. effect from optimized financing

	Sensitivity analysis - Inflation								
	0,0%	0,5%	1,0%	1,5%	2,0%	2,5%	3,0%	3,5%	4,0%
Residual cost gap, PV USDm	2.159	2.190	2.220	2.251	2.282	2.314	2.345	2.376	2.407

	Sensitivity analysis - CAPEX on green corridor								
	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%
Residual cost gap, PV USDm	1.059	1.365	1.671	1.977	2.282	2.588	2.894	3.200	3.506

	Sensitivity analysis - OPEX on green corridor incl. fuel prices								
	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%
Residual cost gap, PV USDm	2.096	2.142	2.189	2.236	2.282	2.329	2.376	2.422	2.469

	Sensitivity analysis - CAPEX on fossil corridor								
	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%
Residual cost gap, PV USDm	2.418	2.384	2.350	2.316	2.282	2.249	2.215	2.181	2.147

	Sensitivity analysis - OPEX on fossil corridor incl. fuel prices								
	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%
Residual cost gap, PV USDm	2.459	2.415	2.371	2.327	2.282	2.238	2.194	2.150	2.106

Description



- **Sensitivities:** This section presents five sensitivity tables, illustrating how the total residual cost gap (excluding the impact of optimized financing) varies in response to changes in key assumptions, such as inflation, CAPEX, and OPEX



# F: Structure and sources used for the Assumptions-tab

Input	Category	Subcategory	Sources used for generalized assumptions
Green Corridor	Fuel	CAPEX	Cost estimates from MMMCZCS industry insights for different fuel types; financing costs and discount factors based on local treasury bonds and risk-premium based on Damodaran)
		OPEX	Cost estimates from MMMCZCS industry insights for different fuel types
	Port	CAPEX	Cost estimates from MMMCZCS industry insights for storage and barge; financing costs and discount factors based on local treasury bonds and risk-premium based on Damodaran)
		OPEX	Cost estimates based on MMMCZCS industry insights
	Vessel	CAPEX	Cost estimates from MMMCZCS industry insights based on different vessel types, sizes and fuel types; financing costs and discount factors based on local treasury bonds and risk-premium based on Damodaran)
		OPEX	Cost estimates based on MMMCZCS industry insights
Fossil corridor	Fuel	Fuel purchase	Fuel price estimates from MMMCZCS industry insights for different fuel types
	Port	CAPEX	Cost estimates from MMMCZCS industry insights for storage and barge; financing costs and discount factors based on local treasury bonds and risk-premium based on Damodaran)
		OPEX	Cost estimates based on MMMCZCS industry insights
	Vessel	CAPEX	Cost estimates from MMMCZCS industry insights based on different vessel types, sizes and fuel types; financing costs and discount factors based on local treasury bonds and risk-premium based on Damodaran)
		OPEX	Cost estimates based on MMMCZCS industry insights
	Regulatory Configurator	Regulation	Mid-term measures, EU Fit for 55, EU ETS, IRA proxy
Consortium and Willingness-to-Pay	Consortium	Fuel effect	Based on expected cost absorption from the consortium subject to user-input
		Port effect	Based on expected cost absorption from the consortium subject to user-input
		Vessel effect	Based on expected cost absorption from the consortium subject to user-input
	Cargo green premia	Green premium factor	Based on expected willingness-to-pay from the cargo owners subject to user-input

The Assumptions sheet allows users to model various components, including the green corridor, fossil corridor, regulatory configurators, consortium cost absorption, and cargo owners' willingness to pay. Standardized assumptions are automatically pre-filled when only a limited set of inputs is available



# E: How to read and use the Quick\_assumption-tab

## Screenshot from tab



Category	Question	Unit	Assumptions	Comments
<b>Quick assumption</b>				
<b>General</b>	Do you want to run a quick calculation or go more into depth?	Option	Quick calculation	
	Which country will be the main country (if corridor between two countries, select one country as main country)?	Option	Chile	
<b>Fuel characteristics</b>	What is the fuel type for the green corridor?	Option	e-methanol (DAC)	
	Will the green fuel be purchased or will a fuel production plant be manufactured?	Option	Manufactured	
<b>Vessel characteristics</b>	Which vessel will be used?	Option	Container (8000 TEU)	
	How many vessels will be on the corridor?	# of vessels	4	
	How many roundtrips will each vessel have to do per year?	# of roundtrips per year	10	
	Do you know distance or fuel consumption for the fossil corridor?	Option	Distance (nautic miles)	
	What is the distance (nautic miles) per roundtrip?	Nautic miles	2,000.0	
	Fuel consumption per trip excl. pilot fuel	Tonnes		
<b>Regulatory and green cargo premium characteristics</b>	Do you want to include mid-term-measurements (IMO) effects?	Option	Yes	Further details incl. reward-option can be specified in the "assumptions"-tab
	Do you want to include IFA proxy effects?	Option	Yes	Further details incl. reward-value and end-year of regulatory effect can be specified in the "assumptions"-tab
	Do you want to include FuelEU effects?	Option	Yes	Further details incl. end-year of regulatory effect and corridor exposure can be specified in the "assumptions"-tab
	Do you want to include EU ETS effects?	Option	Yes	Further details incl. end-year of regulatory effect and corridor exposure can be specified in the "assumptions"-tab
	What share of the incremental cost gap do you assume the cargo owners are willing to pay?	Constant % of incremental cost covers	10%	
<b>Output message:</b>			Once you have filled out the assumptions in the above, please go to the 'Output'-tab and see the results. Note that standardized assumptions will be used unless other has been specified in the 'assumptions' or 'assumptions_detailed'-tabs	

## Description



- This sheet is designed for high-level calculations of the residual cost gap with minimal input requirements
  - Columns B and C outline the key assumptions necessary to run the model
  - Column E allows users to input the required data to estimate the residual cost gap
- To activate the sheet, users must select "Quick Calculation" in cell E5. For scenarios where more detailed assumptions are available, users should select "In-Depth Calculation" in cell E5 and refer to the "Assumptions" tab, as indicated in the green output message
- In total, users need to provide inputs for 14 assumption lines (highlighted in blue cells) to run the model and calculate the residual cost gap. Once all required inputs are completed, the high-level output estimate will be displayed in the "Output" tab



# F: How to read and use the Assumptions-tab

## Screenshot from tab



Assumptions							
Category	Sub-category	Line item	Unit	Required to run the model?	Green Corridor	Assumptions	
						Green Corridor	Fossil Corridor
<b>Global assumptions</b>							
		Currency	None			USD	USD
		General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")	Yes		General	
		Inflation	%	Yes		2.00%	2.00%
		Model start	Date	Yes		01-01-2027	01-01-2027
		Model end	Date	Yes		01-01-2056	01-01-2056
		Main country (if corridor between two countries, select one country as main country)	Choose	Yes		United States	United States
		Region				Americas	Americas
		Activate optimized financing?	Choose	Yes		No	No
<b>Corridors</b>							

## Description



- **Column B** outlines the main categories of assumptions, while **Column C** breaks these down into sub-categories, and **Column D** specifies the individual line items. **Column E** indicates the unit of measurement for each assumption
- **Column F** highlights whether user input is required to run the model
- In **Column G**, users can input data specific to the green corridor, while **Column H** is designated for inputs related to the fossil corridor
- If users are working with general assumptions (e.g., a consistent 2% annual inflation rate across the model), they should select "General." For more detailed assumptions, users should select "Detailed" and navigate to the corresponding line in the "Assumptions\_Detailed" tab to input yearly values
- The first category in the model covers **global assumptions**, including inflation rates, model start and end years, country selection (which influences factors such as cost of debt, discount rates, and externalities), and optimized financing (which determines whether more favorable financing terms can be achieved)



# F: How to read and use the Assumptions-tab

## Screenshot from tab



Corridors							
1.0 Fuel production	1.1 Project specifics	Tax rate	%	Yes	0%	0%	
		Fuel production type	Option	Yes	e-ammonia	LSFO	
		Fuel production characteristic - LHV	GJ/ton		18.80	41.20	
		Fuel production characteristic - emission intensity	gGHG/GJ		2.80	93.28	
		Main fuel consumption	tonnes/year/vessel		10.486	5.037	
		Pilot fuel consumption	tonnes/year/vessel		252	-	
		Energy consumption	GJ/year total per vessel		207.512,81	207.512,81	
		1.2 CAPEX	<b>Timeline</b>				
			Is the fuel purchased or is a fuel plant manufactured?	Option	Yes	Manufactured	Purchased
			Is the timeline known?	Option	Yes	No	
			Pre-construction start	Date (must be 1st in the month)		01-01-2027	
			Pre-construction	Years			
			Implied FID	Date		01-01-2028	
	Construction		Years				
	Implied CCQD	Date		01-01-2030			
	Operations	Years					
	Implied years of operations	Years		25	25		
		<b>Preconstruction costs (assuming linear cost split)</b>					
		Is the estimated CAPEX costs known?	Choose	Yes	No		
		General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")				
		Total CAPEX	USD				
		Implied CAPEX	USD		-		
		<b>Construction costs (assuming linear cost split)</b>					
		Is the estimated CAPEX costs known?	Choose	Yes	No		
		General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")				
		Total CAPEX	USD		2.558.889.309		
		Implied CAPEX	USD				
		<b>Depreciation of asset</b>					
		Depreciation (linear)	Years		25		

## Description



- **Fuel production assumptions:** The second category focuses on fuel production, where users must select the type of fuel for both the green and fossil corridors
- **Fuel type selection:** Users can specify whether the fuel will be purchased or if a fuel production plant will be constructed
- **CAPEX cost specification:** If users are aware of either general or detailed CAPEX costs for these options, they can input this information here, including the relevant timeline for implementation



# F: How to read and use the Assumptions-tab

## Screenshot from tab



<b>1.3 OPEX</b>				
<b>Fuel purchase</b>				
Is the fuel cost known?	Option	Yes		No
Main fuel - fuel cost	USD/year			
Pilot fuel - fuel cost	USD/year			
Implied fuel cost	Fuel cost prices changes yearly - see "Assumptions_Detailed"			See Assumptions_Detailed
<b>OPEX - costs</b>				
Is the OPEX known?	Option	Yes		No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")			
Feedstock expenses	USD/year			
O&M	USD/year			
Other OPEX (land lease, etc.)	USD/year			
Implied total OPEX excl. fuel purchase	USD/year			See Assumptions_Detailed
<b>1.4 Financing of CAPEX</b>				
Are financing terms known?	Option	Yes		No
General or detailed assumption?	Option			
<b>Debt tranche 1</b>				
Share of CAPEX financed through debt tranche	%			
Implied share of CAPEX financed through debt tranche	%			
Reference rate	%			
Risk-margin added	%			
Implied cost of debt	%			5.8%
Time to maturity on debt	Years			
Implied time to maturity on debt	Years			25.00
Structure	Fixed option			Equity-first
Payment profile	Fixed option			Annuity
<b>Debt tranche 2</b>				
Share of CAPEX financed through debt tranche	%			
Implied share of CAPEX financed through debt tranche	%			
Reference rate	%			
Risk-margin added	%			
Implied cost of debt	%			5.8%
Time to maturity on debt	Years			
Implied time to maturity on debt	Years			25.00
Structure	Fixed option			Equity-first
Payment profile	Fixed option			Annuity
Implied equity share of financing	%			30%
Is the discount factor known?	Option	Yes		No
Is the optimized financing known?	Option			
Discount factor	%			
Optimized financing (cost of debt)	%			4.2%
Implied discount factor	%			4.2%
Implied optimized financing (cost of debt)	%			5.8%
Optimized financing scenario, total PV of Fuel Production	USD Present Value			-
				2.952.857.031

## Description



- **Fuel cost and OPEX:** After completing the CAPEX-section, users can specify whether the fuel cost is known if the fuel is purchased. Additionally, users can provide details on any OPEX costs associated with fuel production
- **Financing options:** The model includes the ability to define financing options, allowing for two tranches of debt. By default, standard financing assumptions are applied. This can be customized by choosing "yes" to confirm that the financing terms are known, enabling the user to input general or detailed financing details, incl. interest rates or repayment terms
- **Discount factor and optimized financing:** Users must specify whether the discount factor<sup>1</sup> and/or optimized financing costs<sup>2</sup> are known. If these details are not provided, the model will automatically apply standardized assumptions



1. Used to get to the present value of the residual cost gap
2. Used as an add-in if it is assumed possible to get "better than normal" financing terms

Source: MMMCZCS Cost model

# F: How to read and use the Assumptions-tab

## Screenshot from tab



2.0 Ports		2.1 Project specifics					
		Do you want to include storage, barge or both?	Choose	Yes		Storage & Barge	Storage & Barge
		Specific tax rate	%	Yes		0%	0%
	2.2 CAPEX - Storage	<b>Timeline</b>					
		Is the timeline known?	Option	Yes		No	No
		Pre-construction start	Date (must be 1st in the month)				
		Pre-construction	Years				
		Implied FID	Date			01-01-2028	01-01-2028
		Construction	Years				
		Implied CDD	Date			01-01-2030	01-01-2030
		Operations	Years				
		Implied years of operations	Years			25	25
		<b>Preconstruction costs (assuming linear cost split)</b>					
		Is the estimated CAPEX costs known?	Choose	Yes		No	No
		General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")				
		Total CAPEX	USD				
		Implied CAPEX	USD			-	-
		<b>Construction costs (assuming linear cost split)</b>					
		Is the estimated CAPEX costs known?	Choose	Yes		No	No
		General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")				
		Total CAPEX	USD			48.753.991,57	6.547.734,32
		Implied CAPEX	USD				
		<b>Depreciation of asset</b>					
		Depreciation (linear)	Years			25	25

## Description



- **Port section overview:** In this section, users can define the port infrastructure for both the green and fossil corridors by selecting one of three options: "storage," "barge," or "both." Depending on the selection, specific cells in the model will automatically unlock or remain locked to guide the user's input
- **Customizing timeline and CAPEX:** Similar to the fuel production section, users have the option to specify the timeline and CAPEX costs for the selected port infrastructure—whether it's storage, barge, or both. Standardized assumptions are applied unless otherwise specified by the user



# F: How to read and use the Assumptions-tab

## Screenshot from tab



<b>2.3 CAPEX - Barge</b>			
<b>Timeline</b>			
Is the timeline known?	Choose	Yes	No
Pre-construction start	Date (must be 1st in the month)		No
Pre-construction	Years		
Implied FID	Date	01-01-2028	01-01-2028
Construction	Years		
Implied COD	Date	01-01-2030	01-01-2030
Operations	Years		
Implied years of operations	Years	25	25
<b>Preconstruction costs (assuming linear cost split)</b>			
Is the estimated CAPEX costs known?	Choose	Yes	No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")		No
Total CAPEX	USD		
Implied CAPEX	USD		-
<b>Construction costs (assuming linear cost split)</b>			
Is the estimated CAPEX costs known?	Choose	Yes	No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")		No
Total CAPEX	USD	31458.059,07	6.547.734,32
Implied CAPEX	USD		
<b>Depreciation of assets</b>			
Depreciation (linear)	Years	25	25
<b>2.4 OPEX</b>			
<b>OPEX - costs</b>			
Is the estimated OPEX costs known?	Choose	Yes	No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")		No
(Storage) Total OPEX	USD/Year		
Implied - (Storage) Total OPEX	USD/Year	58.512	7.857
(Barge) Total OPEX	USD/Year		
Implied - (Barge) Total OPEX	USD/Year	125.832	26.191

## Description



- **OPEX:** After the CAPEX section, users can input OPEX estimates for both the barge and storage. If no specific cost estimates are available, the model will automatically apply standardized assumptions to ensure continuity
- **Financing:** The financing section follows the OPEX section and mirrors the structure of the financing options provided in the fuel production section. Users can either rely on standard financing assumptions or specify custom financing terms if detailed information is available



# F: How to read and use the Assumptions-tab

## Screenshot from tab



3.0 Vessel	3.1 Project specifics				
	Specific tax rate	%	Yes		0%
	Vessel type	Type	Yes	Container (8000 TEU)	Container (8000 TEU)
	Vessel fuel pilot fuel / bio-diesel blend for fossil	Choose	Yes	LSFO	Bio-diesel (HTL)
	Pilot fuel LHV	LHV		41,20	
	Share that is pilot fuel of total energy consumption	%	Yes	5%	
	Number of vessels	#	Yes	4	4
	Do you know the actual capacity?	Option		No	No
	Actual capacity	Tons of cargo per vessel moved per roundtrip			
	Implied capacity	Tons		112.000	112.000
	Do you know the actual utilization?	Choose	Yes	Yes	Yes
	Actual utilization	%		90%	90%
	Implied utilization	%		90%	90%
	Roundtrips per year	Roundtrips per vessel per year	Yes	20,0	20,0
	Do you know the distance/fuel consumption for the green or fossil corridor?	Option	Yes	Fossil corridor	
	Do you know distance or fuel consumption?	Choose	Yes		Distance (km)
	Distance for a round trip?	Km	Yes		2.000,0
	Fuel consumption per trip excl. pilot fuel	Tonnes (green fuel)			
	Extra energy added on top	%	Yes	0%	
	Implied total fuel consumption (main fuel)	Fuel consumption per year per vessel (ton)		10.486	5.037
	Implied total fuel consumption (pilot fuel) / bio-diesel blend for fossil	Fuel consumption per year per vessel (ton)		252	
	Energy consumption	GJ/year total per vessel		207.512,81	207.512,81

## Description



- **Vessel:** The third section focuses on vessel operations. Here, users must select the type of vessel operating on the corridor, specify the pilot fuel type, and indicate the share of pilot fuel (as the main fuel was already defined in the fuel production section)
- **Operational details:** Users are required to input key operational parameters, including the number of vessels operating on the corridor, their capacity, utilization rates, and the number of roundtrips each vessel completes per year
- **Energy consumption:** For both the green and fossil corridors, users must specify either the roundtrip distance or the fuel consumption per roundtrip. Based on this input, the model will automatically calculate the energy consumption for each corridor. Additionally, users have the option to include extra energy consumption for the green corridor



# F: How to read and use the Assumptions-tab

## Screenshot from tab



3.2 CAPEX				
<b>Timeline</b>				
Is the timeline known?	Option	Yes	No	No
Pre-construction start	Date (must be 1st in the month)			
Pre-construction	Years			
Implied FID	Date		01-01-2028	01-01-2028
Construction	Years			
Implied CCID	Date		01-01-2030	01-01-2030
Operations	Years			
Implied years of operations	Years		25	25
<b>Pre-construction</b>				
Is the estimated CAPEX costs known?	Choose		No	No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")			
Total CAPEX per vessel	USD			
Implied CAPEX	USD		-	-
<b>Construction costs</b>				
Is the estimated CAPEX costs known?	Choose	Yes	No	No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")			
Implied CAPEX per vessel	USD			
Implied total CAPEX	USD/Vessel		510.252.000,00	419.324.000,00
<b>Depreciaton of asset</b>				
Depreciation (linear)	Years		25	25
3.3 OPEX				
<b>OPEX - costs</b>				
Is the OPEX known?	Option	Yes	No	No
General or detailed assumption?	Choose (if detailed, use "Assumptions_Detailed")			
O&M	USD/Vessel/Year			
Other OPEX	USD			
Implied total OPEX per vessel	USD/Vessel/Year		3.368.147,27	3.175.747,27

## Description



- **Timeline, CAPEX, and OPEX:** Similar to the fuel production and port sections, users can provide details on the timeline, CAPEX, and OPEX estimates for the vessel section
- **Exclusion of fuel costs:** It is important to note that fuel costs should not be included in this section, as they are already accounted for in the fuel production section. This ensures that cost inputs remain consistent and avoid duplication



# F: How to read and use the Assumptions-tab

## Screenshot from tab



### Regulatory Configurator

4.0 Regulation							
4.0 Regulation	4.1 General	Vessel energy consumption	GJ used per year per vessel			207.513	207.513
		Fuel production characteristic - LHV	\$/ton			18,8	41,2
		MM: Bio-diesel blend, LNG or pure LSFO penalty cost?	Option	Yes			LNG
	4.2 Mid-term measures	FuelEU and ETS: Bio-diesel blend or pure LSFO or LNG?	Option	Yes			Pure LSFO or LNG
		Activate IMD-mid-term measures regulatory impact forecast (EMPC83)	Option	Yes			Yes
		Reward option	Option			CIA Reward Rate Base (90 to 60% of cost gap)	CIA Reward Rate Base (90 to 60% of cost gap)
	4.3 IRA (proxy)	Activate IRA Proxy measures?	Option	Yes			Yes
		Use own value of credit?	Option				No
		Last year for IRA effect	Year				2038
		Value of credit of hydrogen	USD/kg of hydrogen				
	4.4 FuelEU	Implied value of credit used	USD/kg of hydrogen				2,0
		Activate FuelEU measures?	Option	Yes			Yes
		Last year for FuelEU effect	Year				2027
	4.5 EU ETS	FuelEU penalty cost	USD/tonne VL_SFOeq				2.736,00
		Corridor exposure	%				100%
Activate EU ETS measures?		Option				Yes	

## Description



- **Regulatory configurators:** In this section, users must first select whether liquefied natural gas (LNG), bio-diesel, or low-sulfur fuel oil (LSFO) should be used for calculating the mid-term measures, FuelEU, and EU ETS regulatory effects
- **Mid-Term Measures:** Users must specify whether mid-term measures should be included in the calculation and whether rewards should be factored in
- **IRA Proxy:** The user must indicate if the IRA proxy should be included in the calculation (related to a credit given based on the amount of hydrogen included in the fuel). If so, they need to provide the timeline for the effect and specify a value to be used in the model
- **FuelEU and EU ETS:** Finally, users need to determine whether FuelEU and the EU ETS should be included in the calculation. If included, they must specify the timeline for the effect, a specific penalty cost for FuelEU, and the percentage of the corridor that should be exposed to FuelEU and the EU ETS



# F: How to read and use the Assumptions-tab

## Screenshot from tab



Consortium cost absorption, Willingness-to-pay and externalities

5.0 Consortium cost absorption				
<b>5.1 Green fuel production</b>				
Manual value or share of excess CAPEX costs?	Option	Yes		Share
Manual input	Present value USD			
Share of excess CAPEX costs	%			0%
Manual value or share of excess OPEX costs?	Option	Yes		Share
Manual input	Present value USD			
Share of excess OPEX costs	%			10%
Implied discount factor applied	%			4.2%
<b>5.2 Green port</b>				
<b>Storage</b>				
Manual value or share of excess CAPEX costs?	Option	Yes		Share
Manual input	Present value USD			
Share of excess CAPEX costs	%			50%
Manual value or share of excess OPEX costs?	Option	Yes		Manual
Manual input	Present value USD			
Share of excess OPEX costs	%			
Implied discount factor applied	%			4.2%
<b>Barge</b>				
Manual value or share of excess CAPEX costs?	Option	Yes		Manual
Manual input	Present value USD			-
Share of excess CAPEX costs	%			
Manual value or share of excess OPEX costs?	Option	Yes		Manual
Manual input	Present value USD			
Share of excess OPEX costs	%			
Implied discount factor applied	%			4.2%
<b>5.3 Green vessel</b>				
Manual value or share of excess CAPEX costs?	Option	Yes		Share
Manual input	Present value USD			
Share of excess CAPEX costs	%			50%
Manual value or share of excess OPEX costs?	Option	Yes		Share
Manual input	Present value USD			
Share of excess OPEX costs	%			0%
Implied discount factor applied	%			4.2%
<b>5.4 Port fee</b>				
Implied fee for using the port	USD, based on first year of operation (total OPEX)			200,000.00
Do you want to waive any of the port fees?	Option	Yes		Yes
% of fee/OPEX you want to waive?	%			5%

## Description



- **Consortium absorption:** In this section, users can define the cost absorption by the consortium. This can be specified either as a percentage share of the CAPEX and OPEX or as an absolute monetary amount
- **Port Fee Waiver Option:** Additionally, users have the option to waive a portion of the implied port fee, which corresponds to the OPEX associated with the port. This provides flexibility in modeling cost-sharing arrangements within the consortium



# F: How to read and use the Assumptions-tab

## Screenshot from tab



6.0 Green Cargo Premia	6.1 Willingness to pay			
		How do you want to calculate the willingness to pay?	Option	Yes
		Percentage on top of fossil	%	Yes
		Activate scenario 1	Straight-line - 100% on top of fossil covered by 2050	No
		Activate scenario 2	Straight-line - 100% on top of fossil covered 10 years after model start	No
		Activate scenario 3	Staircase increase every 4th year	No
		Activate scenario 4	Constant % on top of fossil costs covered	Yes
		Implied cargo moved per year	Tonnes	8.064.000
		Implied cargo moved in lifetime	Tonnes	201.600.000
		Implied transportation cost of cargo moved per year	Present value per ton, USD	19
		Implied incremental transportation cost of cargo moved per year	Present value per ton, USD	13
		WtP of incremental costs in beginning	%	
		Which scenario to activate	Scenario to choose	
		Activate scenario 1	Straight-line - all cargo covered by 2050	No
		Activate scenario 2	Straight-line - all cargo covered 10 years after model start	No
		Activate scenario 3	Staircase increase every 4th year	No
		Activate scenario 4	Constant % of incremental cost covered	Yes
		Implied discount factor applied	%	4,2%

7.0 Externalities	7.1 Externality split			
		Fuel Production - CAPEX	Is it part of the domestic economy?	Yes
		Fuel Production - OPEX	Is it part of the domestic economy?	Yes
		Port (Storage) - CAPEX	Is it part of the domestic economy?	Yes
		Port (Storage) - OPEX	Is it part of the domestic economy?	Yes
		Port (Barge) - CAPEX	Is it part of the domestic economy?	Yes
		Port (Barge) - OPEX	Is it part of the domestic economy?	Yes
		Vessel - CAPEX	Is it part of the domestic economy?	Yes
		Vessel - OPEX	Is it part of the domestic economy?	Yes

## Description



- **Willingness-to-Pay section:** This section allows users to model the willingness-to-pay of cargo owners. Users can define the green premium either as a percentage share of the incremental cost gap or as a percentage added on top of the fossil cost. For both options, users can set an initial starting value and select from four scenarios that determine how the green premium will evolve over time
- **Externality split:** In this section, users can decide whether externalities should be calculated for specific segments of the value chain within the green corridor. Alternatively, users can opt to exclude externality calculations, depending on the desired scope of the analysis



# F: How to read and use the Assumptions-tab

## Screenshot from tab



8.0 Residual cost gap closing mechanism		8.1 Port utilization	
<i>This helps to derive subsidies required specifically to realize port infrastructure</i>			
Will more vessels than the ones added be using the storage and/or barge facility?	Option	Yes	Yes
Barge - capacity	Tonnes of capacity		10,240,00
Barge - availability	Days per year		180,00
Barge - utilization	%		80%
Density to convert from cubic metric to tonnes	Factor		1,28
Implied total barge capacity	Metric tonnes per year		1,890,462
Implied ships needed to break even	Number of vessels		20
Implied utilization for break even	%		9%
WIP per vessel per tonnes of capacity used	LSD per vessel per tonnes		30,0
Alternative cost per fossil vessel per tonnes in Methanol equivalent	LSD per vessel per tonnes		
Implied incremental willingness to pay per tonnes	LSD per vessel per tonnes		29
Number of vessels using the storage and barge in year 1 of operations	Number of vessels		4,0
Number of vessels using the storage and barge in year 2 of operations	Number of vessels		4,0
Number of vessels using the storage and barge in year 3 of operations	Number of vessels		4,0
Number of vessels using the storage and barge in year 4 of operations	Number of vessels		6,0
Number of vessels using the storage and barge in year 5 of operations	Number of vessels		8,0
Number of vessels using the storage and barge in year 6 of operations	Number of vessels		12,0
Number of vessels using the storage and barge in year 7 of operations	Number of vessels		18,0
Number of vessels using the storage and barge in year 8 of operations	Number of vessels		18,0
Number of vessels using the storage and barge in year 9 of operations	Number of vessels		18,0
Number of vessels using the storage and barge in year 10+ of operations	Number of vessels		18,0

## Description



- **Residual cost gap closure mechanism:** The final section provides a mechanism to address part of the residual cost gap through port subsidies
- **Barge capacity and utilization:** Users can specify the barge's capacity, its availability (e.g., the number of days per year it can be used), and its expected utilization (the percentage of the barge capacity anticipated to be used)
- **Willingness-to-pay and break-even calculation:** Users must also define the expected willingness-to-pay per ton of capacity used by vessels from the barge. Based on these inputs, the model calculates the break-even point for the port, expressed as the "implied number of ships needed to break even."
- **Usage:** Users can then modify the "number of vessels using the storage and barge in year X of operations." The model will reflect these changes in the "Output" tab, showing how much of the residual cost gap is allocated to the port
- **Assumption on storage capacity:** This mechanism operates under the assumption that there are no capacity limitations for the storage.



# G: How to read and use the Assumptions\_Detailed-tab

## Screenshot from tab



Assumptions Detailed			
	Start period	End period	
	01-01-2027	01-01-2028	
	31-12-2027	31-12-2028	
<i>Instructions: Click the "-" on the left hand side to see the assumptions for each sub-category</i>			
<b>Green Corridor</b>			
<b>Global assumptions</b>			
General	Inflation	%	
<b>1.0 Fuel production</b>			
<b>1.1 CAPEX</b>			
Detailed	CAPEX	Total USD	
Detailed	Pre-construction total	Total USD	
Detailed	Construction total	Total USD	
<b>1.2 OPEX</b>			
General	OPEX	Total USD	
	Total opex excl. fuel purchase	Total USD	
	OPEX incl. feedstock	USD/ton	662,25 617,79
	Main fuel - prices	USD/ton	753,09 699,13
	Pilot fuel - prices	USD/ton	602,91 596,74
<b>1.4 Financing of CAPEX</b>			
Detailed	Equity drawdowns	USD	
Detailed	Tranche 1 - commercial	USD	
Detailed	Debt drawdowns	USD	
Detailed	Tranche 2 - government	USD	
Detailed	Debt drawdowns	USD	
<b>2.0 Ports</b>			
<b>2.2 CAPEX - Storage</b>			
General	CAPEX - Storage	Total USD	
General	Pre-construction total	Total USD	
General	Construction total	Total USD	
<b>2.3 CAPEX - Barge</b>			
Detailed	CAPEX - Barge	Total USD	
General	Pre-construction total	Total USD	
General	Construction total	Total USD	

<b>2.4 OPEX</b>		
General	OPEX (Storage) Total OPEX	Total USD
General	(Barge) Total OPEX	Total USD
<b>2.5 Financing - Storage</b>		
General	Equity drawdowns	USD
General	Tranche 1 - commercial	USD
	Debt drawdowns	USD
General	Tranche 2 - government	USD
	Debt drawdowns	USD
<b>2.6 Financing - Barge</b>		
General	Equity drawdowns	USD
General	Tranche 1 - commercial	USD
	Debt drawdowns	USD
General	Tranche 2 - government	USD
	Debt drawdowns	USD
<b>3.0 Vessel</b>		
<b>3.2 CAPEX</b>		
General	CAPEX	Total USD
General	Pre-construction total	Total USD
General	Construction total	Total USD
<b>3.3 OPEX</b>		
Detailed	OPEX	Total USD
<b>3.4 Financing</b>		
General	Equity drawdowns	USD
General	Tranche 1 - commercial	USD
	Debt drawdowns	USD
General	Tranche 2 - government	USD
	Debt drawdowns	USD

## Description



- **Detailed assumptions:** If the "Detailed" option is selected for assumptions in the "Assumption" tab, users must provide detailed inputs in the "Assumptions\_Detailed" tab
- **Yearly assumptions:** Users can input detailed assumptions on a yearly basis for global parameters (e.g., inflation), as well as for both the green corridor and the fossil corridor. The input fields for the green and fossil corridors are identical, ensuring consistency in data entry
- **Overwrites:** For the fuel production, port and vessel section, users can manually overwrite the default CAPEX, OPEX, and financing inputs to reflect specific assumptions or data

