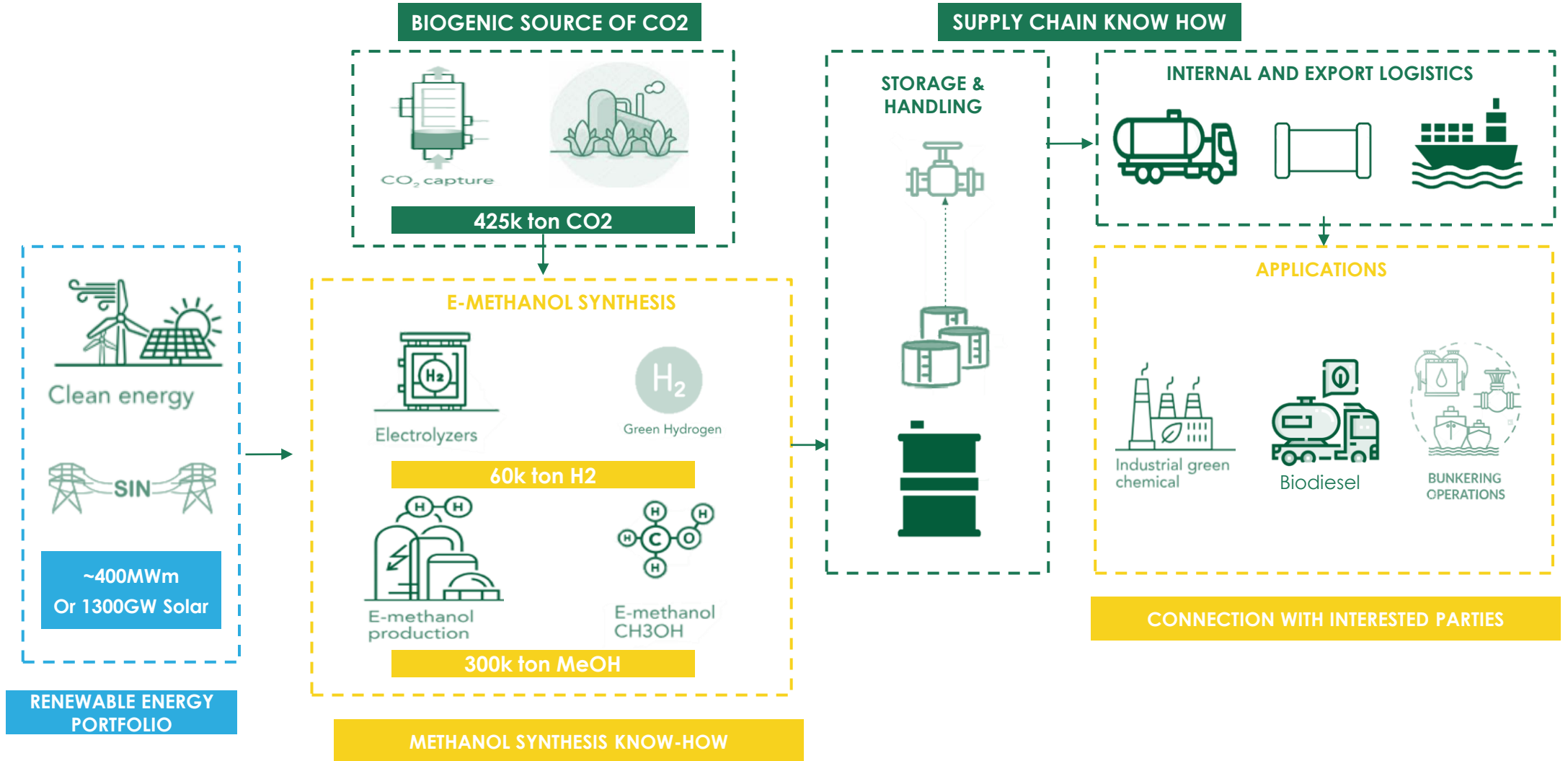


# E-METHANOL - VALUE CHAIN / PRODUCTION PROCESS

We have unique resources and expertise in BR to develop projects like this one



# E-METHANOL – BIG NUMBERS

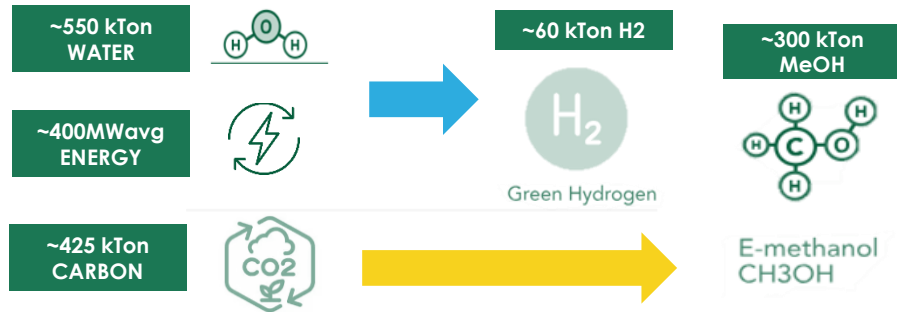
Main figures regarding the investment in e-methanol project

## A ESTIMATED MAIN FIGURES FOR AN AVERAGE PROJECT @ FS

e-Methanol has a potential to be a huge business in the biofuel ecosystem

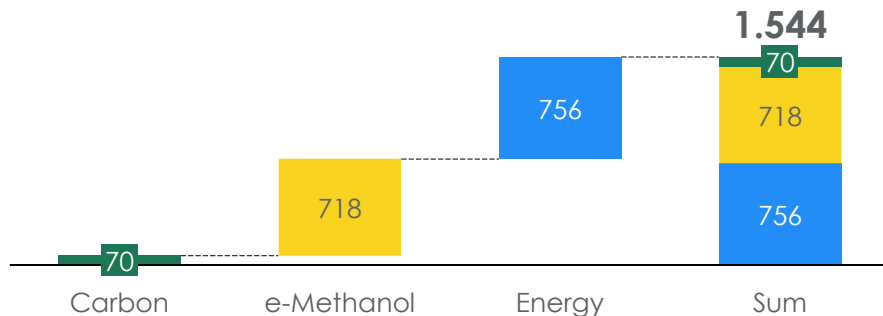
### A.1 BIG NUMBERS

For e-methanol we imagine that the capex to deal with



### A.2 INVESTMENT USD M

For e-methanol we imagine that the capex to deal with

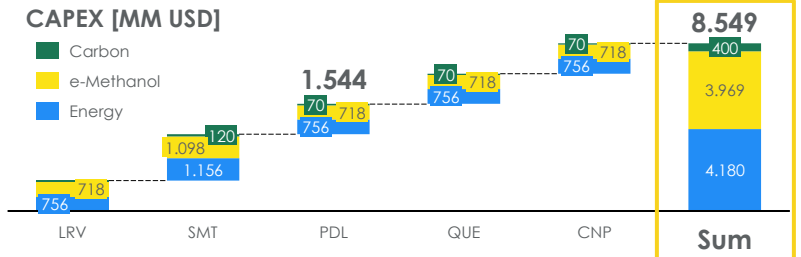


## B ESTIMATED NUMBER CONSIDERING OTHER FS PLANTS

FS already has a huge volume of high purity carbon that would require huge investment and energy needs

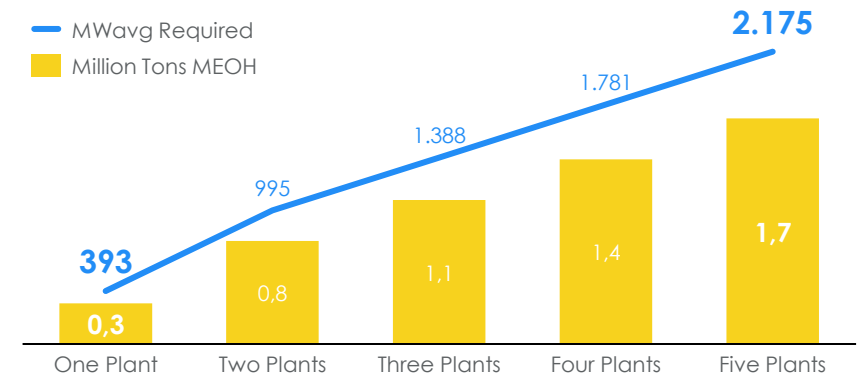
### B.1 INVESTMENT

Roughly figures can reach 8,5 Bi of USD or 40Bi of R\$ in Investment



### B.2 ENERGY REQUIREMENT AND MeOH PRODUCTION

The level of energy, in MWavg needed is almost what the state consumes today



# E-METHANOL – CHALLENGES

Embarking on an e-methanol project presents several challenges. Here are the main ones:

## REGULATORY

Lack of clear policies or incentives for e-methanol production and use can hinder development

## SUSTAINABILITY

Ensure compliance with IMO requirements and highlight the benefits to shipowners/ports.  
Embodied emissions? Certification?  
Biogenic Carbon and Corn

## INFRASTRUCTURE

Stable connections to the power grid ensure a reliable supply of renewable electricity, which is critical for producing e-methanol

## TECHNOLOGY

Scaling up from pilot projects to commercial-scale operations without loss of efficiency or increased costs

## FUNDING

Initial investment for e-methanol production facilities is significant, requiring substantial capital and incentivized lines of funding

## OFF-TAKE / MANDATE

The cost of e-methanol production is higher than its fossil fuel alternatives, making an off-take agreement essential to sustain the project

# E-METHANOL – TECHNOLOGY CHALLENGES

We have unique resources and expertise in BR to develop projects like this one

## A FUEL CONVERSION COMPLEXITY

Fuel storage, fuel handling system, safety system and abatement system changes play a major role in the feasibility study. In newbuilds, owners can select class notations certifying the level of fuel conversion readiness to mitigate risks

	Temp.	Key Consideration	Regulation Readiness	Volumetric Energy Equivalent	Tank Hold Space Comp. Volume
Marine Diesel Oil	@ 20°C	Standard Tank Arrangement	●	1x	1x
Liquified Natural Gas	@ -162°C	Cryogenic System	●	1,6x	2,0x
<b>Ethanol</b>	@ 20°C	Lower Toxicity Flexible Tank	●	1,7x	1,3x
<b>Methanol</b>	@ 20°C	Midly Toxicity Flexible Tank	●	2,3x	1,7x
Ammonia	@ -33°C	Toxic Corrosive	●	2,9x	3,9x
Liquid Hydrogen	@ -253°C	Highly Flammable Cryogenic System	●	4,3x	7,3x
Compressed Hydrogen	@ -350 bar	High Pressure Multiple Tanks Higly Flammable	●	11,7x	19,5x

## B BR MeOH COMPETITIVESS

