

NEXT GENERATION EFFICIENCY ENHANCEMENT FOR MARITIME VESSELS.

Innovative cleantech solution
with high social, ecological & economical impact

 Save energy.

 Save money.

 Save the planet.



MARINE

GREEN
TECHNOLOGY



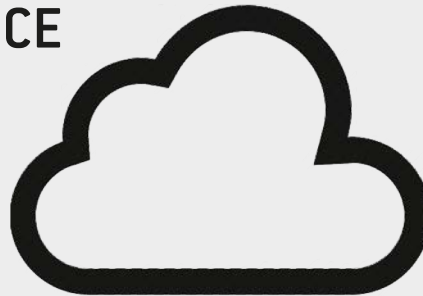
REGULATORY DRIVERS & BACKGROUND



+90%
OF GLOBAL TRADE
BY SHIPPING
(FURTHER GROWING UNTIL
2050 DUE TO GLOBALIZATION)



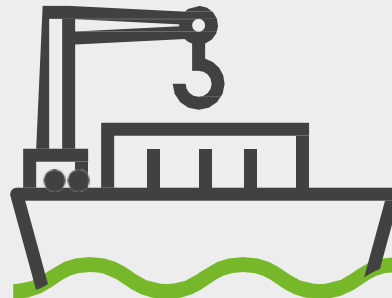
IMO DIRECTIVE TO REDUCE
CO2 UNTIL 2050
BY **50%**
(JUST TO STAY AT CURRENT LEVEL)



0,05%
GLOBAL
SULPHUR CAP 2020
(0,01% in ECAs)



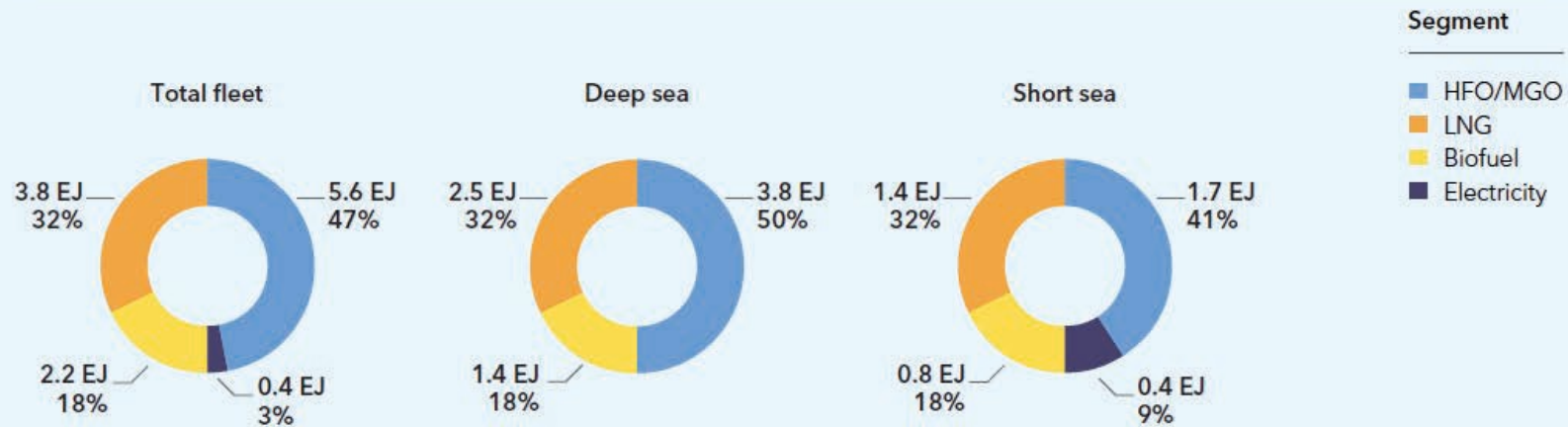
SHIPS HAVE TO BECOME
10%
MORE EFFICIENT
--> EVERY 5 YEARS
(IMO EEDI REGULATION / MPEC)





ALL STUDIES SHOW THAT INDUSTRY DEPEND ON FOSSIL FUELS UNTIL 2050 & BEYOND

FIGURE 5.3 SHIPPING ENERGY MIX 2050



Source: DNV GL

>> RESULTING PROBLEMS & CHALLENGES WITH FOSSIL FUEL
 >> NEED TO BE ADDRESSED TODAY



PROBLEMS WE ARE ADDRESSING

HIGH FUEL COST → 50-80% OF TRANSPORT OPEX = FUEL COSTS

HIGH EMISSIONS → CLIMATE CHANGE / GLOBAL WARMING (struggle to keep < 1,5 degrees celsius)

HEALTH IMPACT → AIR POLLUTION SINGLE BIGGEST IMPACT IN HEALTH

43% of all chronic pulmonary disease 29% of all lung cancer

25% of all ischaemic heart disease 24% of all deaths from stroke



World Health Organization



DIRTY INEFFICIENT COMBUSTION OF FOSSIL FUEL ENGINES

PM EMISSIONS OF 15 LARGEST SHIPS

=

PM EMISSIONS OF ALL CARS WORLDWIDE





FS MARINE+ NEXT GENERATION EFFICIENCY ENHANCEMENT



WORLDS FIRST APPROVED SOLUTION OF SUCH TECHNOLOGY
FIRST MOVER / UNIQUE & PATENTED IN 40 COUNTRIES
SATISFIED CUSTOMERS + MANUFACTURER SUPPORT (MAN SUPPORT)



FS MARINE+ is an easy to deploy, state-of-the-art retrofit solution for maritime vessels that **generates on demand through onboard electrolysis a hydrogen synthgas which is injected with water & methanol into the air intake of the engine(s)** which leads to a cleaner and more efficient combustion process.



"This project is being funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 806083"





FS MARINE+ FIELD & LABORATORY PROVEN



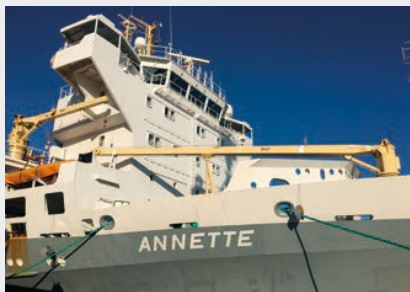
FIELD PROVEN FOR 2,5 YEARS

WITH WORLD MARKET LEADER IN
HEAVY LIFT CRANE SHIPPING



MV ANNETTE -

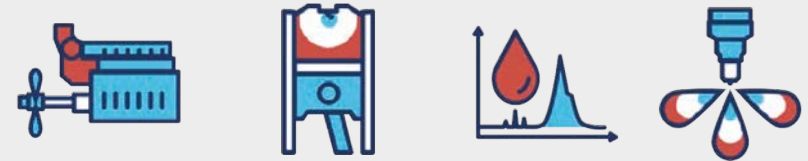
LARGEST HEAVY LIFT CRANE SHIP IN EUROPE



OVER 16% NET SAVINGS

IN FUEL CONSUMPTION

LAB PROVEN IN A LEADING LAB IN EUROPE



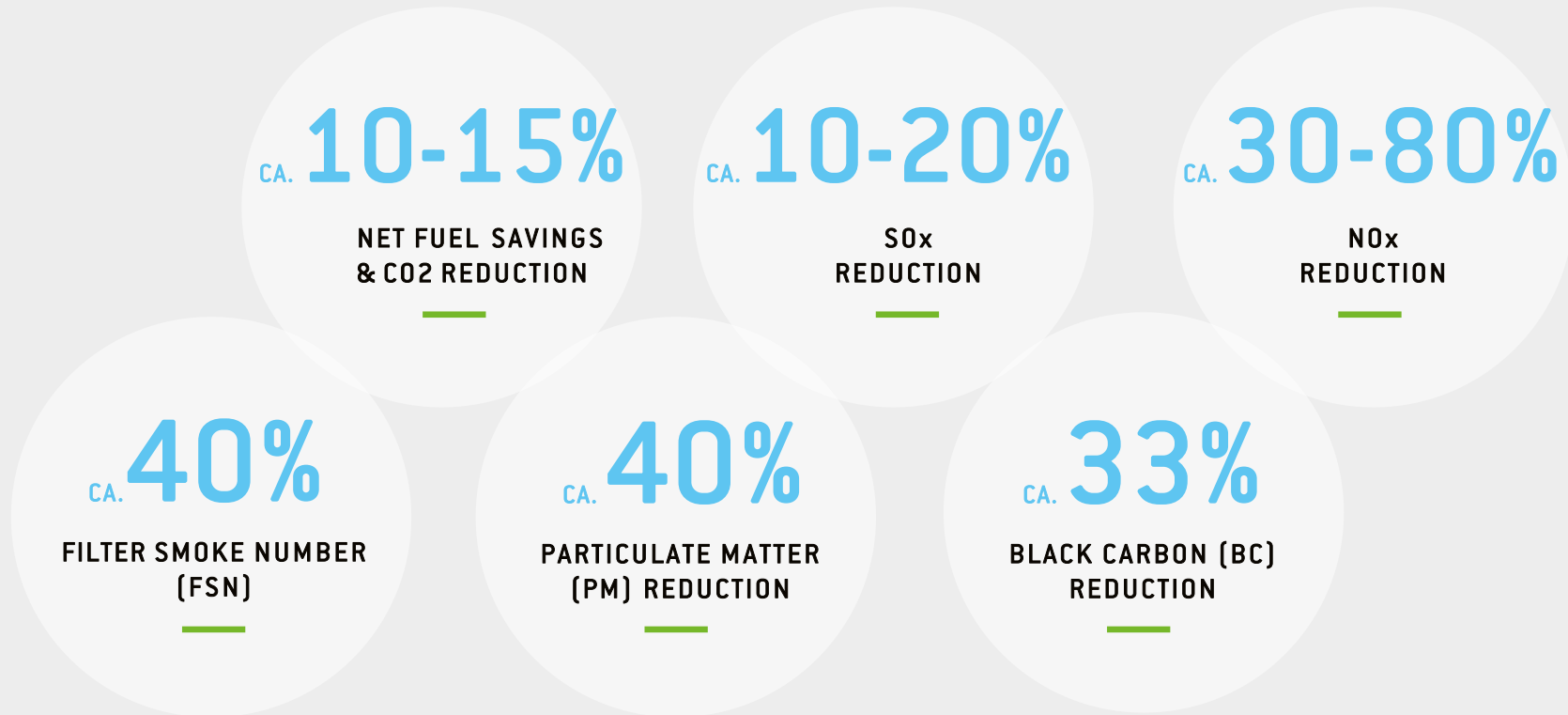
SERVING





FS MARINE+ UNIQUE BENEFITS FOR OUR CUSTOMERS

> KEY ENABLER FOR CO₂ / CO_{2e} AND GHG REDUCTION STRATEGY FROM IMO (MPEC)



WHY CUSTOMERS WANT TO BUY IT?

- WE HELP CUSTOMERS TO SAVE COSTS (OPEX) & INCREASE PROFITS
- **10% NET OPEX SAVINGS** - CONTRACTUALLY GUARANTEED
- **3 YEAR ROI WITH 5 YEAR WARRANTY + PERFORMANCE GUARANTEE**



CUSTOMERS / TRACTION / FALLBACK

EXCELLENT TRACTION

GOOD TRACTION EVEN BEFORE OFFICIAL LAUNCH

→ LOIs for 200+ ships in 2 weeks (EU H2020)

FIRST CUSTOMERS ARE SATISFIED & COMMITTED

→ SAL HEAVY LIFT GmbH validated the solution for 2,5 years to full satisfaction and want to equip 6 vessels **(5 MIO EUR REVENUE!!)**

MARKET LEADERS APPROACHING FUELSAVE

→ FS got requests & invitations by MAERSK / CARNIVAL / CMA CGM / LOUIS DREYFUSS / HYUNDAI HEAVY INDUSTRIES / CROISI / COSCO / DFDS, etc.

3BN "WEIGHTED" SALES FUNNEL

--> IDENTIFIED & GROWING

HUGE SECONDARY MARKETS

- > STATIONARY POWER GENERATION (16 BN USD P.A.)
- > DIESEL-ELECTRIC TRAINS (2,5 BN USD P.A.)
- > HEAVY DUTY VEHICLES (2 BN USD P.A.)

CUSTOMERS

→ SHIP OWNERS / OPERATORS

→ ENGINE MANUFACTURERS

→ SHIP YARDS

→ LEASING COMPANIES





FUNDING / INVESTMENT - SERIES A



USE OF FUNDS – GROWTH & SCALE UP

3,35 Mio EUR COMPANY STRUCTURE & SCALE UP

- ✓ STRUCTURE (Dashboards, Accounting, CRM, etc)
- ✓ CAPEX / HR – Staffing / IP Management
- ✓ **CREATE INVENTORY FOR SALES**
- ✓ Inventory Optimization / economies of scale
- ✓ Hire CEO & VP Sales with shipping trackrecord
- ✓ Marketing / Trade Shows / PR

0,70 Mio EUR R&D TOOLING & GENERAL TYPE APPROVAL

- ✓ R&D / Manufacturing Tools - Cost Optimization
- ✓ Get Certifications & General Type Approvals

0,45 Mio EUR SECURE 3 MIO LOAN (15 years for 2,7 % interest)

- ✓ to validate sales model with EU market leaders (i.e. MAERSK / CMA CGM / NAVAL Group) establish monthly cashflows from EaaS / BLT / contracting models

WHERE WE ARE?

We developed, built, patented and validated an innovative new tech with huge market potential & impact + we have first customers and first project revenue in Q1 2019

WHAT WE ARE LOOKING FOR?

We are now looking for Series A funding for our GTM to take the operation to the next level ramp up operations & service, structure the company for growth and prepare for larger rollouts and spin-off an own FS MARINE+ entity with dedicated shipping focus. We like to attract talent and involve a VC as multiplier and help us in growing the company to its huge and unique potential.

OVERALL TOTAL:

UP TO 4,5 Mio EUR

PREFERRABLE SMART MONEY

+ AFFINITY TO SHIPPING & CLEANTECH



FINANCIAL PLAN 2019–2023



MIN. FORECAST 2023 (WITH SERIES A)

REVENUES	218,6 Mio. EUR	[<0,5% OF SOM]
EBITA	75,6 Mio. EUR	
BREAK-EVEN	H1 2020	
IRR	126%	
UNITS SOLD	191	[MAERSK has 800 ships]
JOBS CREATED	55	

INVESTMENT OPPORTUNITY 2019

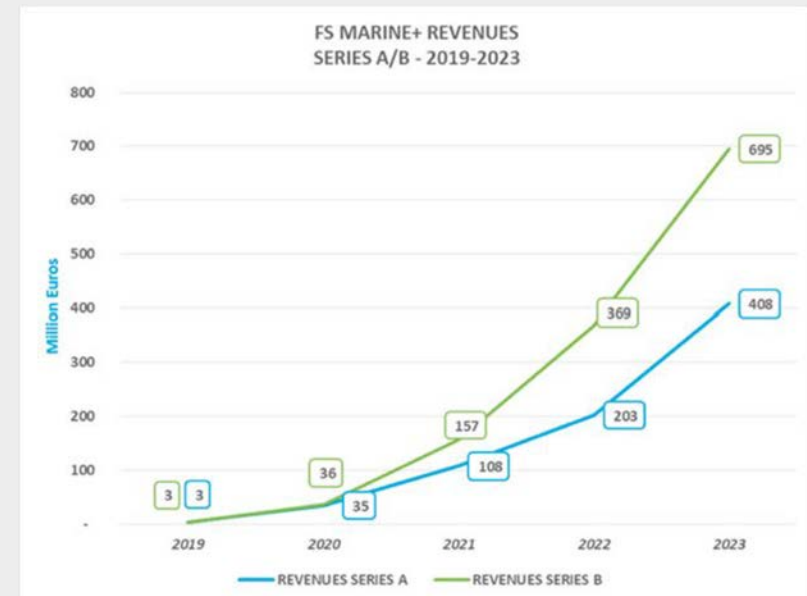
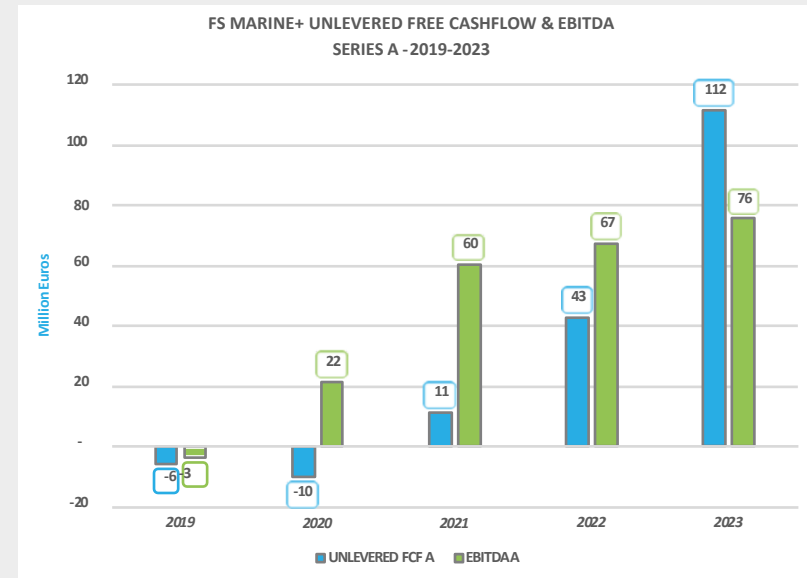
NPV	ca. 56 Mio. EUR	[DCF 25%]
INVESTMENT OPP	15% equity for 4,5 Mio EUR	

CoC Return

MIN. 21
[with Series A]

CoC Return

MAX. 106
[with Series A]





CONCLUSION / SUMMARY

- + FUNDED BY THE EU + AWARDED “BEST CLEANTECH COMPANY”**
→ [TOP SME IN EUROPE - H2020 CHAMPION + won Boston MIT pitch event (RE BIP)]
- + FIELD & LABORATORY PROVEN + RIGHT TIMING**
→ [solution that addresses current challenges in the market]
- + UNIQUE & PATENTED TECHNOLOGY**
→ [unique on the market & registered / protected in 40 countries]
- + MARKET DRIVERS SUPPORTING ADOPTION (REGULATORY DRIVERS)**
→ [high competition, rising oil prices, climate directives, paris co2 reduction agreement / global sulphur cap 2020, etc.]
- + HUGE OPPORTUNITY & MARKET**
→ [first mover → 43bn recurring every 15 years]
- + FIRST CUSTOMERS COMMITTED → FIRST PROJECT 5 MIO EURO!!**
→ SAL / Harren & Partner – world market leader heavy lift shipping
- + EXCELLENT TRACTION FROM WORLD MARKET LEADERS**
→ MAERSK / CMA CGM / HHI / CARGILL / CROISI, etc. all expressed interest already
→ Started Discussion for US Navy Pilot – FUELSAVE USA office (opening Q1 2019)
- + PERFECTLY POSITIONED FOR 2020 SULPHUR CAP (WIN-WIN)**
→ Helping customer to save money & reduce OPEX to increase cashflow
→ Increase in profitability → biggest driver & motivator for customer



"This project is being funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 806083"



WE WOULD BE DELIGHTED TO HEAR FROM YOU UPON YOUR KIND INTEREST...

FOR INQUIRIES
PLEASE FEEL FREE TO CONTACT:

Marc Sima

CEO/ President - BoD
sima@fuelsave.de



*JOIN THE
EFFICIENCY REVOLUTION!*

www.fuelsave.de



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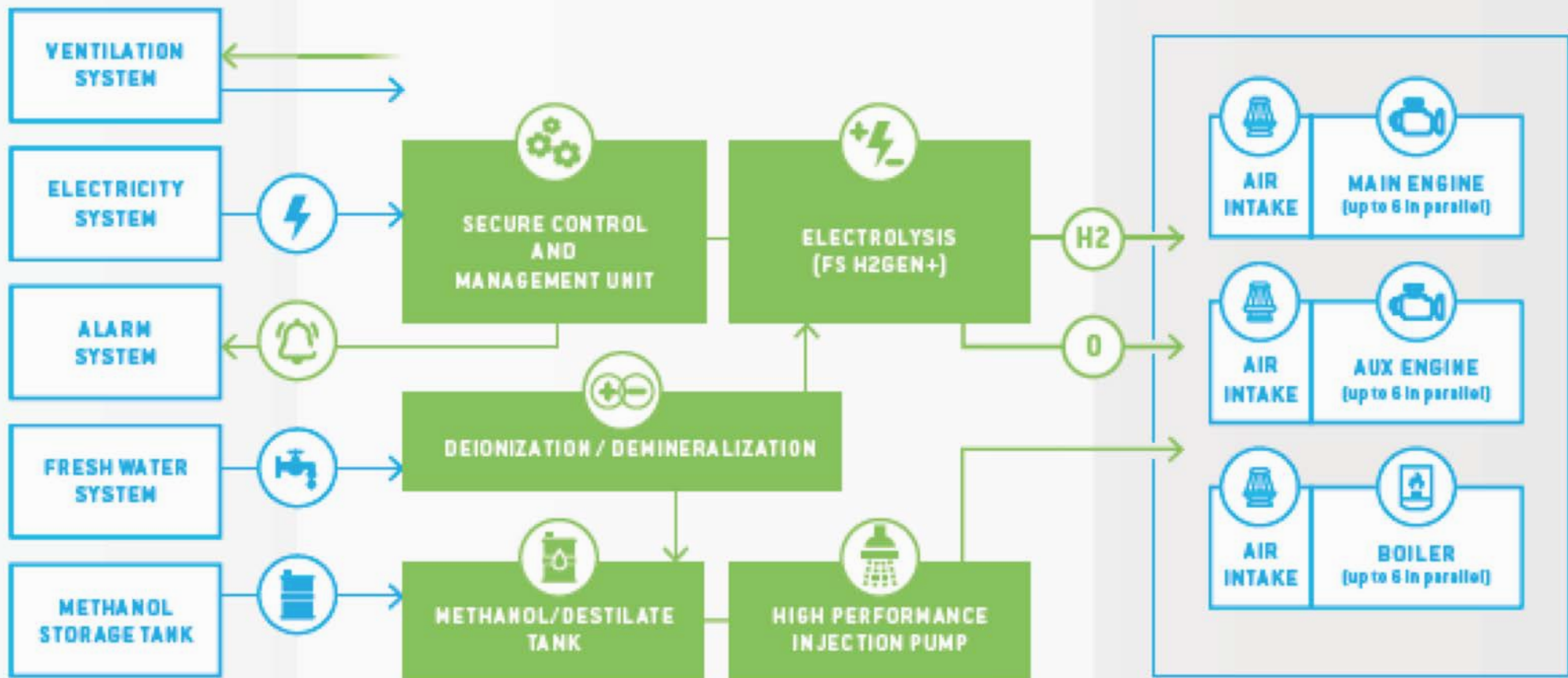
FS MARINE+ ANNEX



FS MARINE+ INTERFACES & HOW IT WORKS



SCHEMA & FLOW DIAGRAM



CUSTOMER INTERFACES

FUELSAVE / FS MARINE+

CUSTOMER ENGINE(S)



SOLUTION – FS MARINE+

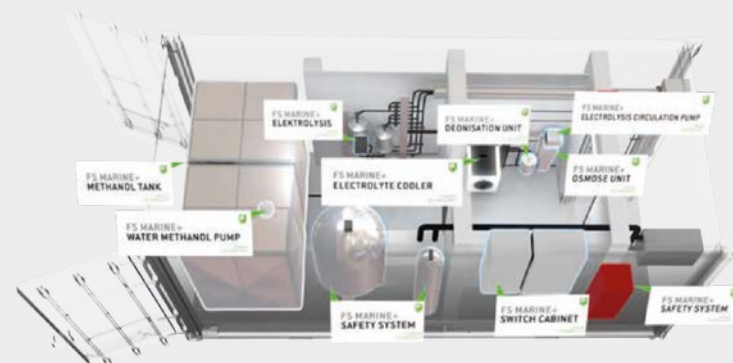
>> REDUCE FUEL CONSUMPTION & CUT EMISSIONS



THROUGH DYNAMIC & LOAD BASED INJECTION OF :

- >> HYDROGEN (P2G)
- >> OXYGEN
- >> METHANOL
- >> WATER

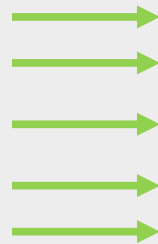
INTO THE AIR INTAKE
IN THE RIGHT WAY



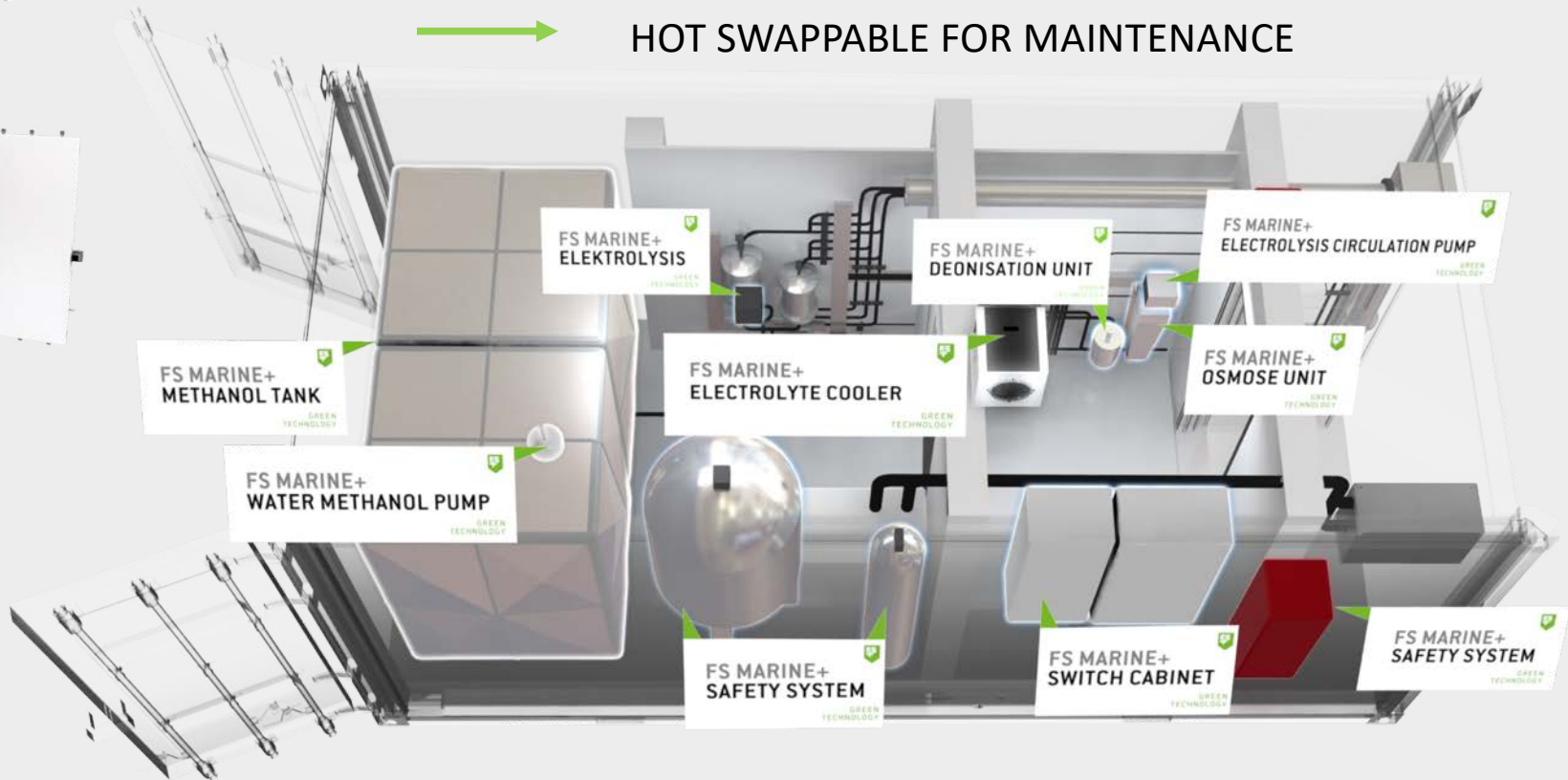


FS MARINE+ CONTAINERIZED “AIO” SOLUTION

(ASSET / REUSE / HOTSWAP / PLUG & PLAY)



- SOLUTION BECOMES AN ASSET
- REUSABILITY FROM ONE SHIP TO ANOTHER
- PLUG & PLAY
- MINIMUM SHIP PREPARATION COSTS
- HOT SWAPPABLE FOR MAINTENANCE



FOR SHIPS OR EVEN PORT AUTHORITIES → RENT OUT FOR CLEANER ENERGY

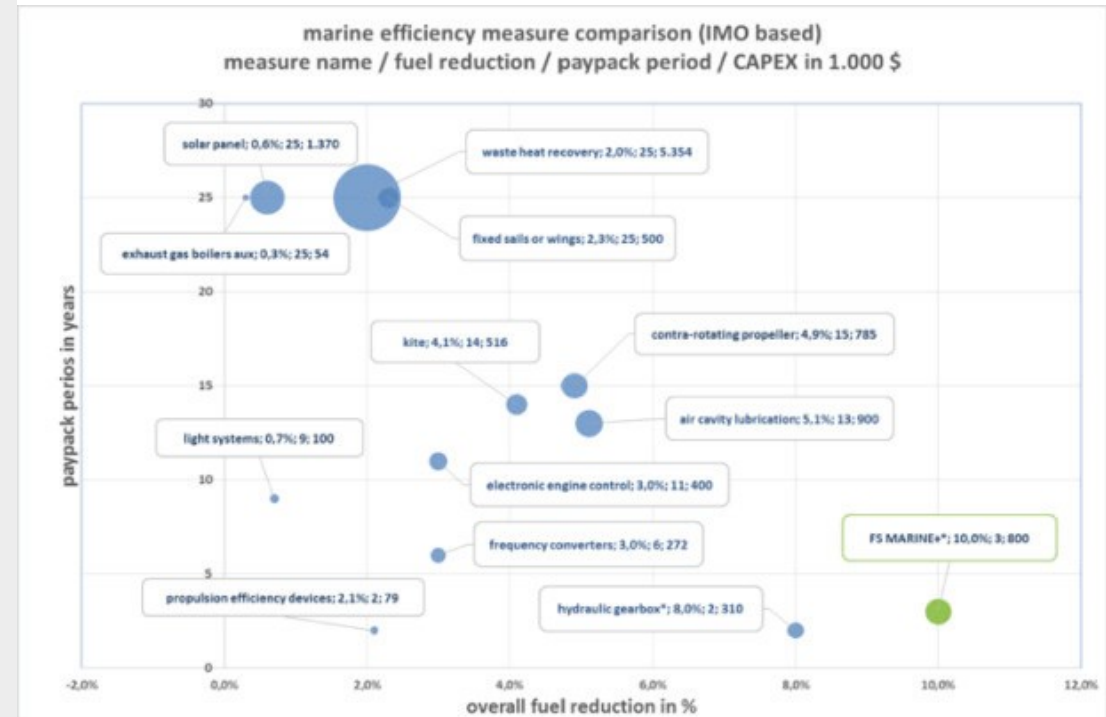
FS MARINE+ COMPETITION

+ The official **DNV GL / IMO** – Efficiency appraisal tools show that FS MARINE+ is **OUTPERFORMING OTHER IMO ANALYZED MEASURES IN EFFICIENCY ENHANCEMENT AND ITS ROI**



FURTHER. FASTER. TOGETHER

+ According to **CARBON WAR ROOM / ROCKY MOUNTAIN INSTITUTE (RMI)** **ONLY EMISSION REDUCTION SOLUTION WITH SUCH POSITIVE ROI**



POTENTIAL GAME CHANGER IN SHIPPING !!



BUSINESS & SALES MODEL

B2C - DIRECT SALES & VIA WORLDWIDE SERVICE & INSTALLATION PARTNERS

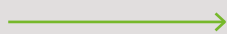
B2B - SALES & SERVICE CHANNELS WITH WORLDWIDE FOOTPRINT

(I.E. MAN / CBH / HYUNDAI HEAVY INDUSTRIES / CARGILL → ROADMAP ESTABLISHED)

FUELSAVE IS INTENDING TO OFFER **3 BUSINESS & PRICING MODELS**
AS PART OF THE GTM AND GROWTH & ACCELERATION STRATEGY



BUY



OUTRIGHT SALE WITH SERVICE AND WARRANTY + PERFORMANCE GUARANTEE



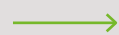
RENT TO OWN (BLT)



RENT / LEASE FOR A FIXED PERIOD + OWNERSHIP TRANSFER



SHARE (EaaS)



PERFORMANCE BASED PROFIT SHARING WITH CUSTOMER

WITH SMART CONTRACTS – AUTOMATED MONEY TRANSFER BASED ON SAVINGS CONNECTED TO REAL-TIME MONITORING & BI REPORTING



GROWTH & ACCELERATION STRATEGY

1. VALIDATE BUSINESS MODELS WITH MARKET LEADERS

- solution pays for itself through savings
- OPEX Savings > Monthly Repayment

2. STRATEGIC PARTNERSHIPS WITH WW PRESENCE

- i.e. HHI / CBH / Pelle Sietas / MAN, etc

3. ENTER LICENSING / CONTRACTING MODELS

- CASHFLOW + MULTIPLICATORS

4. OFFER FINANCING MODELS (BLT, EaaS)

- with financial service providers
- with VCs and partners

TO MAXIMIZE REVENUE
OVER SOLUTION
LIFETIME..





SHIPPING MARKET (TAM/ SOM)

- CONCENTRATED MARKET / VISIBILITY / AWARENESS
MAJORITY OF VESSELS OWNED BY FEW CUSTOMERS
- ONE INTERNATIONAL GOVERNING BODY - IMO
GOOD VISIBILITY AND AWARENESS

TOTAL ADDRESSABLE MARKET (TAM)

INLAND – WORLDWIDE MERCHANT SHIPS	200.000+
SEAGOING – WORLDWIDE MERCHANT SHIPS	51.405+

CONSERVATIVE APPROACH INCLUDING ONLY 30-50% OF SHIPS.

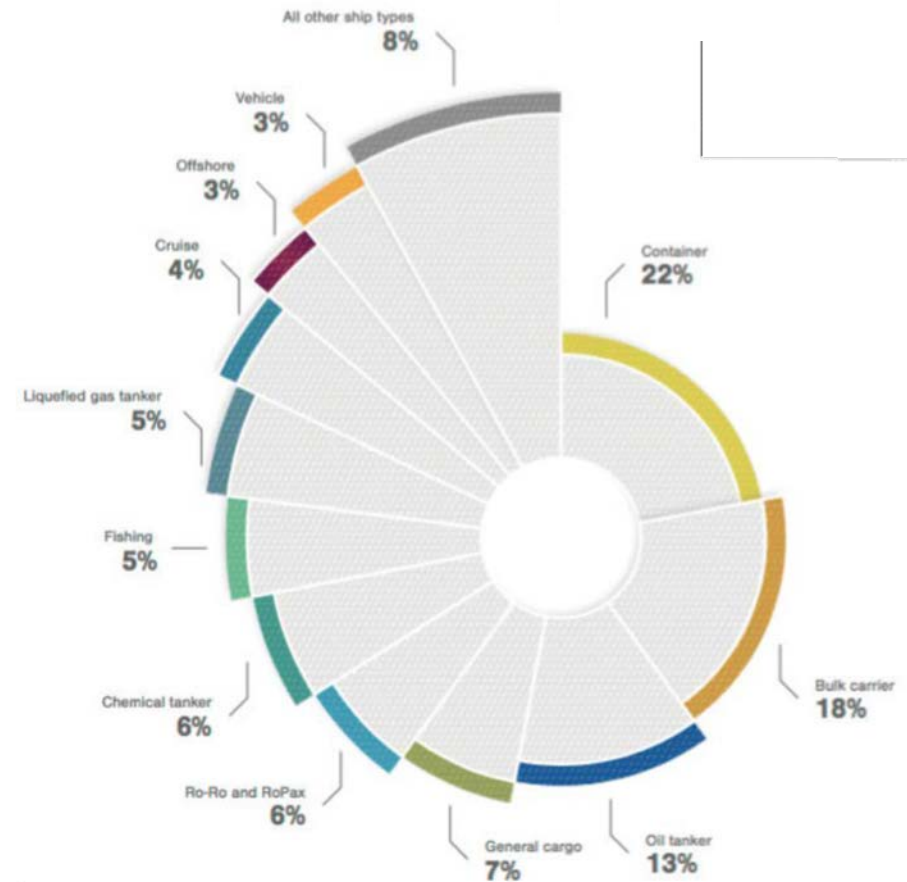
SERVICEABLE & OBTAINABLE MARKET (SOM) THE TAM / SOM IS RECURRENT EVERY 15 YEARS

TAM	ca. 86 BN USD
SOM	ca. 43 BN USD



MARINE

GREEN TECHNOLOGY





COMPLEMENTARY BUT INTERCHANGEABLE MANAGEMENT TEAM

WE ARE EFFICIENCY TECHNOLOGISTS OUT OF CONVICTION & PASSION WITH **COMBINED 85+ YEARS OF EXPERIENCE**
IN EFFICIENCY TECHNOLOGIES, SHIPPING & CORPORATE GOVERNANCE

DIRK HOFFMANN

CTO / HEAD OF R&D
THE INVENTOR
& EFFICIENCY TECHNOLOGIST



MARC BUSSON

CFO (CCEF)
FINANCE & STRATEGY
(FRENCH FOREIGN TRADE
ADVISOR APPOINTED BY PM)



HEINO ECKERICH

TECHNICAL DIRECTOR
THE SHIPPING ENGINEER
& EFFICIENCY TECHNOLOGIST



JAN BRUGGER

COO / GM
THE CARETAKER



MARC SIMA

CEO / PRESIDENT - BOD
THE ENTREPRENEUR





FS MARINE+ HIGH IMPACT SOLUTION



TOTAL CO₂-E REDUCTION

9,7%

OR 91.107.500 TONNES

OF GLOBAL CO₂-E EMISSIONS FROM SHIPPING
(POSSIBLE TO INCREASE TO 20%)



HIGH POSITIVE IMPACT

ECONOMICAL IMPACT	OUR CUSTOMERS INCREASE PROFITABILITY
ECOLOGICAL IMPACT	LESS EMISSIONS & AIR POLLUTION
SOCIAL IMPACT	REDUCTION IN HEALTH IMPACT
GOVERNMENT IMPACT	REDUCTION IN HEALTH COSTS (BNS OF USD)



FS MARINE+ HIGH IMPACT + HIGH SAVINGS



TOTAL MARINE FUEL CONSUMPTION P.A.	300 MILLION TONNES	(TAM)
FS MARINE+ FUEL SAVING POTENTIAL P.A.	30+ MILLION TONNES SAVINGS (TAM)	
FS MARINE+ COST SAVING POTENTIAL P.A.	CA. 16,8 BN USD SAVINGS	(TAM)
	CA. 8 BN USD SAVINGS P.A.	(SOM)

BUSINESS CASE FOR CUSTOMER

	CASE A	CASE B
CUSTOMER FUEL COST P.A	9.500.000 USD	3.500.000 USD
FS MARINE+ OPEX SAVINGS P.A.	950.000 USD	350.000 USD
PRICE FOR FS MARINE+	2.500.000 USD	990.000 USD
ROI FOR FS MARINE+	<2,7 YEARS	<2,9 YEARS
CUSTOMER NET SAVINGS (5 YEARS)	2.250.000 USD	760.000 USD
CUSTOMER NET SAVINGS (15 YEARS)	9.250.000 USD	3.270.000 USD



FS MARINE+ GHG EMISSIONS REDUCTION POTENTIAL



TOTAL CO₂-E REDUCTION

9,7%

OR 91.107.500 TONNES

OF GLOBAL CO₂-E EMISSIONS FROM SHIPPING (POSSIBLE TO INCREASE TO 20%)*

**WITH ECONOMIES OF SCALE, GENERAL TYPE APPROVALS & SMALLER FORM FACTORS THE OVERALL TAM / SOM FOR FS MARINE+ CAN BE GREATLY EXTENDED TO HAVE AN EVEN BIGGER IMPACT & CO₂-E REDUCTION POTENTIAL, MAKING IT TO A KEY ENABLING TECHNOLOGY FOR SUSTAINABLE GHG REDUCTION.*

1. CARBON DIOXIDE (CO₂)

932 MILLION TONNES *50% APPLICATION
*10% REDUCTION

= **46.600.000 TONNES CO₂ REDUCED** OR

5%

OF THE GLOBAL CO₂ EMISSION FROM SHIPPING

2. NITROUS OXIDE (N₂O)

46 THOUSAND TONNES *50% APPLICATION
*50% REDUCTION

= **11.500 TONNES N₂O REDUCED** OR

25%

OF THE GLOBAL N₂O EMISSIONS FROM SHIPPING

CO₂-E REDUCTION (20 YEAR GWP)
11.500 TONNES *289

= **3.323.500 TONNES CO₂-E REDUCED**
P/A (RATIO OF 289:1)

3. BLACK CARBON (BC)

78 THOUSAND TONNES *50% APPLICATION
*33% REDUCTION

= **12.870 TONNES BC REDUCED** OR

16,5%

OF THE GLOBAL BC EMISSIONS FROM SHIPPING

CO₂-E REDUCTION (20 YEAR GWP)
12.870 TONNES * 3.200

= **41.184.000 TONNES CO₂-E REDUCED**
P/A (RATIO OF 3200:1)



FS MARINE+ AIR POLLUTION REDUCTION POTENTIAL

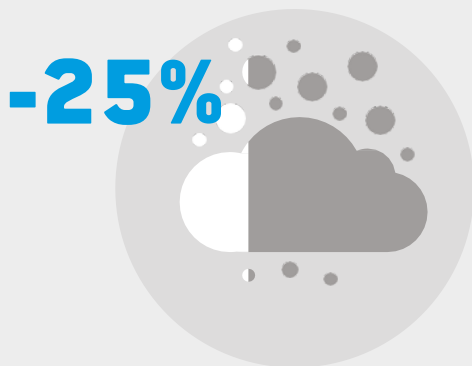
The Global Burden of Disease (GBD) study estimates that **air pollution** – indoor and outdoor combined – **was the cause of 5.5 million premature deaths globally in 2013**. [source: OECD]

The annual global welfare costs associated with the premature deaths from outdoor air pollution, calculated using estimates of the individual willingness-to-pay to reduce the risk of premature death, are projected to rise from **USD 3 trillion in 2015 to USD 18-25 trillion in 2060**. [source: OECD / WHO]

1. NITROGEN DIOXIDE [NOX / NO2]

19 MILLION TONNES *50% APPLICATION *50%
REDUCTION

= **4.75 MILLION TONNES NOX / NO2
REDUCED, OR**



**of the global NOx emissions
related to shipping**

2. PARTICULATE MATTER [PM]

1.402 MILLION TONNES *50% APPLICATION
*40% REDUCTION

= **280,4 THOUSAND TONNES
PM REDUCED, OR**

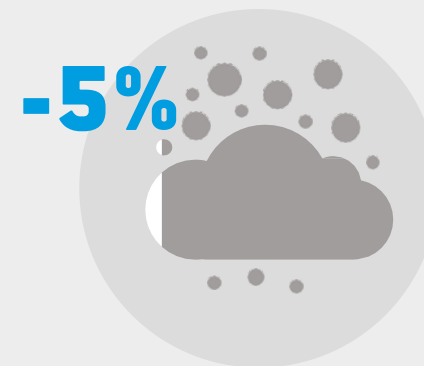


**of the global PM emissions
related to shipping**

3. SULPHUR OXIDES [SOX]

10.5 MILLION TONNES *50% APPLICATION *10%
REDUCTION

= **525 THOUSAND TONNES SOX
REDUCED, OR**



**of the global SOx emissions
related to shipping**

EFFICIENCY ENHANCEMENT EMISSION REDUCTION WITH GUARANTEED ROI

OPEX SAVINGS

PRICING MODELS & BUSINESS MODELS

BUSINESS CASE FOR CUSTOMERS

GHG REDUCTION IMPACT

 Save energy.

 Save money.

 Save the planet.



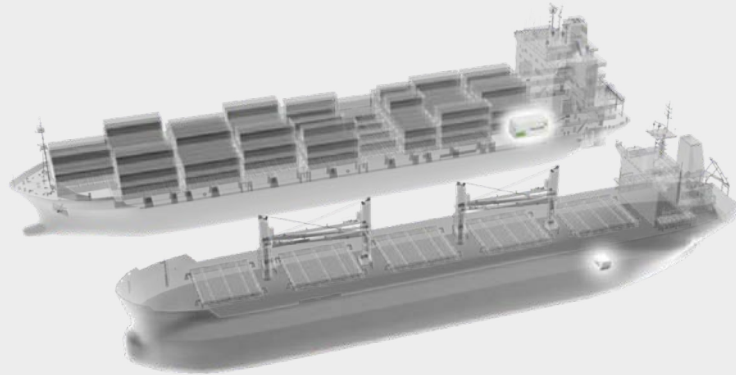
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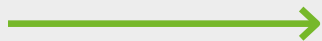
FS MARINE+ UNIQUE SELLING POINTS (USPs)

THE PATENTED SOLUTION ADDRESSES DIRECTLY THE PROBLEM OF DIRTY AND INEFFICIENT COMBUSTION OF COMBUSTION ENGINES AND DIRTY FOSSIL FUELS AND TACKLES THE ROOT OF THE PROBLEM NOT ONLY TREATING A SYMPTOM.

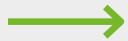


WORLD'S FIRST

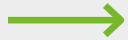
1. IT IS THE WORLD'S FIRST ONBOARD HYDROGEN GENERATION AND INJECTION UNIT FOR SHIPS OF ITS KIND.
2. WORLD'S FIRST APPROVAL BY DNV GL FOR SUCH TECHNOLOGY
3. COMBINES FIRST MOVER ADVANTAGE WITH YEARS OF EXPERIENCE



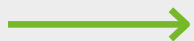
UNIQUE COMBINATION OF EFFICIENCY ENHANCEMENT & REAL EMISSION REDUCTION



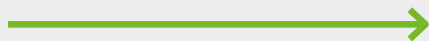
FIELD TESTED & PROVEN IN REAL LIFE OPERATIONB & **VERIFIED** BY THIRD PARTIES



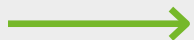
EMISSION REDUCTION+ POSITIVE ROI - TO SAVE MONEY (UNIQUE VALUE-ADD)



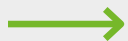
BENEFITS INDEPENDENT OF OTHER MEASURES - **WORKS ALWAYS WHEN ENGINE RUNS**



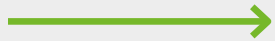
EASY TO RETROFIT - TO ANY EXISTING OR NEW MARITIME VESSEL



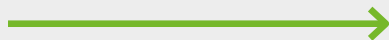
UP TO 6 ENGINES / BOILERS CAN BE SUPPORTED IN PARALLEL WITH 1 UNIT



AVG. PAYBACK WITHIN 3 YEARS OF INITIAL 5 YEAR WARRANTY - **EXTENDABLE FOR 15 YEARS**



GUARANTEED ROI WITHIN WARRANTY PERIOD - **PERFORMANCE GUARANTEE**



TRANSFERRABLE FROM ONE SHIP TO THE NEXT ONE - **MAXIMIZE ROI**



FS MARINE+ MARKET DEFINING OPEX SAVINGS

- 10%
FUEL COST SAVINGS
GUARANTEED

VERIFIED OPEX SAVINGS

- **REDUCED FUEL CONSUMPTION**
 - **OVER 16% NET DEMONSTRATED** THROUGH THE IMPROVED COMBUSTION EFFICIENCY
- **REDUCED MAINTENANCE COSTS & REDUCED LUBE OIL COSTS**
 - 300% LUBE OIL LIFE EXTENSION → 500H TO OVER 1500H
- **LESS WEAR & TEAR THROUGH CLEANER COMBUSTION AND LESS SOOT, ETC.**
- **LESS VIBRATIONS AND SMOOTHER ENGINE RUN**

OTHER OPEX SAVINGS

- **OPEX SAVINGS FOR BOILERS**
- **OPEX SAVINGS FOR SCRUBBERS**
- **OPEX SAVINGS FOR SCR / EGR**
- **ENERGY SAVINGS FOR REDUCED AIR INTAKE COOLING (FREQUENCY PUMP)**
- **INCREASE IN TURBO CHARGER EFFICIENCY DUE TO COOLER AIR AT INTAKE**
- **REDUCED TURBO CHARGER MAINTENANCE DUE TO CLEANER EXHAUST**
 - **BETTER VOYAGE PLANNING AND BETTER LOAD PROFILES**

*SAVE ENERGY,
SAVE MONEY,
SAVE THE PLANET.*



FS MARINE+ NET ENERGY BALANCE & NET SAVINGS

- IN ORDER TO PERCEIVE THE REAL NET SAVINGS AN ENERGY BALANCE HAS TO BE TAKEN INTO ACCOUNT SUBTRACTING ON A COST BASIS THE INPUT MATERIAL USED FOR THE GENERATED OUTPUT TO GET TO REAL NET SAVINGS.
- FS MARINE+ HAS BEEN PROVEN IN REAL LIFE TO ACHIEVE MORE THAN 16% NET SAVINGS ONLY THROUGH FUEL CONSUMPTION REDUCTION
- THESE 16% NET SAVINGS DO NOT EVEN TAKING INTO ACCOUNT THE ADDITIONAL SAVINGS FROM THE REDUCED MAINTENANCE AND LONGER LUBE OIL USE AND POSITIVE CLEANING EFFECTS ON THE ENGINE, ETC.

	AUXILIARY ENGINES				MAIN ENGINES			
	500	1000	2000	6000	10000	15000	20000	
Engine Power (FP) in kW	500	1000	2000	6000	10000	15000	20000	
Number of engines	1	1	1	1	1	1	1	
Specific Fuel Oil Consumption (SFOC) in g/kWh	240	240	240	181	181	181	181	
Price Fuel Oil (FO) \$/Tonne	\$ 790.00	\$ 790.00	\$ 790.00	\$ 500.00	\$ 500.00	\$ 500.00	\$ 500.00	
FOC in Tonne	0.12	0.24	0.48	0.925	1.81	2.715	3.7	
Fuel Oil Costs \$	84.00	189.60	379.20	462.50	900.00	1367.25	1850.00	
Price Methanol per Tonne	\$ 450.00	\$ 450.00	\$ 450.00	\$ 450.00	\$ 450.00	\$ 450.00	\$ 450.00	
Price Water per Tonne	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	
Price Power per kWh	\$ 0.21	\$ 0.21	\$ 0.21	\$ 0.21	\$ 0.12	\$ 0.12	\$ 0.12	

#	CONSUMABLES COSTS							
	\$	\$	\$	\$	\$	\$	\$	\$
3.00%	\$ 1.62	\$ 3.24	\$ 6.48	\$ 12.49	\$ 24.98	\$ 37.46	\$ 49.95	\$ 62.44
1.00%	\$ 0.54	\$ 1.08	\$ 2.16	\$ 4.16	\$ 8.31	\$ 12.47	\$ 16.62	\$ 21.15
2.50	\$ 1.14	\$ 2.28	\$ 4.56	\$ 8.68	\$ 16.62	\$ 24.94	\$ 32.46	\$ 40.98
7.00	\$ 3.78	\$ 7.56	\$ 15.12	\$ 29.04	\$ 57.96	\$ 86.92	\$ 113.88	\$ 145.50
5	\$ 2.70	\$ 5.40	\$ 10.80	\$ 20.80	\$ 41.60	\$ 62.40	\$ 83.20	\$ 104.00
0.10	\$ 0.72	\$ 1.44	\$ 2.88	\$ 5.62	\$ 11.24	\$ 16.86	\$ 22.48	\$ 28.10
0.20	\$ 1.44	\$ 2.88	\$ 5.76	\$ 11.24	\$ 22.48	\$ 33.72	\$ 44.96	\$ 56.20
20%	\$ 0.96	\$ 1.92	\$ 3.84	\$ 7.68	\$ 15.36	\$ 23.04	\$ 30.72	\$ 38.40
5	\$ 4.80	\$ 9.60	\$ 19.20	\$ 38.40	\$ 76.80	\$ 115.20	\$ 153.60	\$ 192.00

DETAILING THE MEASUREMENT SERIES IN HAMBURG:

OPEX REDUCTION (GROSS SAVINGS) = 25,01% GROSS

- 0,60% E-POWER
- 7,60% METHANOL
- 0,70% COMPRESSED PRESS. AIR / FRESH WATER



OPEX-REDUCTION (NET SAVINGS) = 16,11% NET

MATURE TECHNOLOGY FIELD & LAB PROVEN

FIELD / LAB PROVEN
THIRD PARTY VALIDATIONS
INSTALLATION OPTIONS
REAL-TIME MONITORING
METHANOL STORAGE
SAFETY CONCEPT ASPECTS

 Save energy.

 Save money.

 Save the planet.



MARINE

GREEN
TECHNOLOGY



FS MARINE+ STAKEHOLDERS & INVOLVED PARTIES

Parties Involved as of today...

We are proud to have achieved several worlds first together with our partners over the last 3 years with clear improvements to the „state of the art“ in sustainable efficiency enhancement

INVENTED BY...



DEVELOPED FROM...



CUSTOMIZED FOR...



VERIFIED BY...



APPROVED FROM...



GREEN TECHNOLOGY

FUNDED BY...



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FS MARINE+ “MV ANNETTE” RETROFIT INSTALLATION “IN-SHIP”





FS MARINE+ APPRAISED BY ENGINE COMPANIES & EXPERTS

CARL BAGUHN HAMBURG (CBH) IS THE ENGINE SERVICE COMPANY OF SAL HEAVY LIFT WHERE THE FS MARINE+ SYSTEM HAS BEEN INSTALLED.

CBH ARE ONE OF THE MOST RESPECTED AND OLDEST (OVER 100 YEARS) ENGINE SERVICE COMPANIES & SPECIALISTS IN GERMANY



FOLLOWING THE FS MARINE+ INSTALLATION ABOARD THE SAL HEAVY LIFT SHIP MV ANNETTE, CBH MANAGING DIRECTOR CARSTEN KÖRBELIN SAYS:

"IT IS A MATTER OF FACT. WE HAVE BEEN MAINTAINING THE OWNER'S AUX ENGINES FOR SOME YEARS. THEY RUN ON MDO, HAVE ALWAYS BEEN WELL MAINTAINED AND OPERATED UNDER NORMAL CONDITIONS. BUT SINCE WE INSTALLED THE FUELSAVE SYSTEM, THE ENGINE HAS BECOME MUCH CLEANER. THERE IS NO VISIBLE SOOT AND ENGINE RUNNING IS MUCH SMOOTHER, WITH REDUCED LEVELS OF NOISE AND VIBRATION. THE IMPROVEMENT IS ASTONISHING. THIS IS SOMETHING VERY SPECIAL."



FS MARINE+ FIRST PROJECT – IN-SHIP SOLUTION

„IN-SHIP SOLUTION“

FIRST PROJECT (CONTRACT CLOSING)



- ✓ 6 SHIPS TO BE EQUIPPED
- ✓ SISTER VESSELS OF SAME TYPE
- ✓ WITH MAIN ENGINE (12,5 MW) BOILER & 3 AUX ENGINES (3MW)
- ✓ WITH A **COMBINED ENGINE POWER OF CA. 93 MW.**
- ✓ **GURANTEED ROI IN 3 YEARS**
- ✓ 5 YEAR STANDARD WARRANTY / SMA + PG (UP TO 15 YEARS MAX)

MV „TRINA“



MV „REGINE“



MV „FRAUKE“

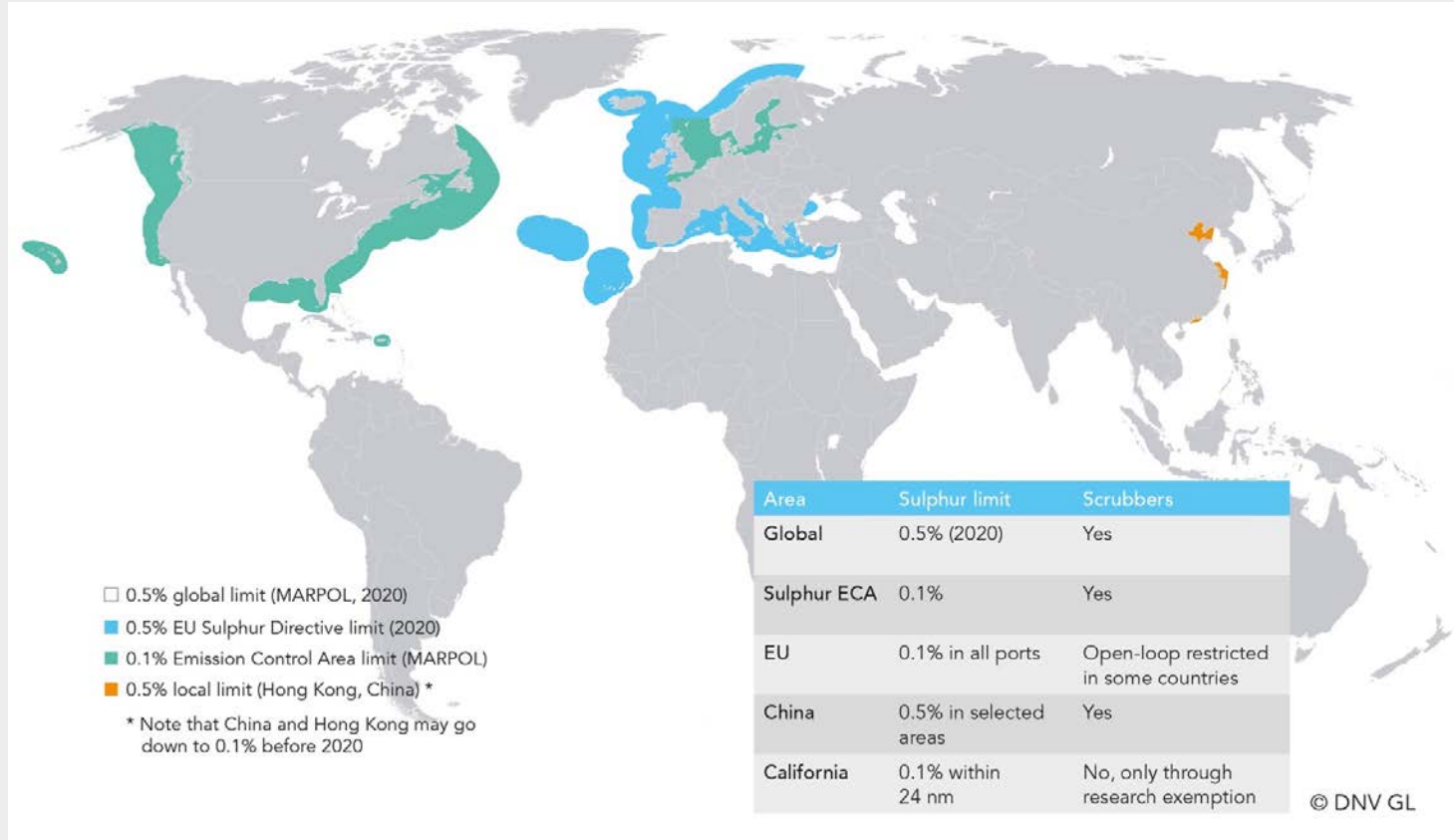


MV „ANNE-SOFIE“



J.J. SIETAS TYPE 176

FS MARINE+ SULPHUR CAP 2020 – CHOICES & OUR VALUE ADD



4 BASIC CHOICES FOR OPERATORS:

- INSTALL SCRUBBER (USE WITH HFO)
- INSTALL LNG
- USE MDO / MGO (DISTILLATE)
- USE NEW COMPLIANT FUELS



FS MARINE+ NO SCRUBBER REPLACEMENT! BUT:

- SCRUBBER NEEDS MORE ENERGY
→ BETTER BUSINESS CASE & ROI
- HIGHER FUEL PRICES & HIGHER OPEX
→ BETTER BUSINESS CASE & ROI



FS MARINE+ CHOICES & HOW WE CAN MAKE A DIFFERENCE?

HFO WITH SCRUBBER



-10%

OF TOTAL FUEL COSTS
AS OPEX SAVINGS

DISTILLATE FUEL



-10%

OF TOTAL FUEL COSTS
AS OPEX SAVINGS

NEW COMPLIANT FUELS



-10%

OF TOTAL FUEL COSTS
AS OPEX SAVINGS

LNG AS FUEL



-5%

OF TOTAL FUEL COSTS
AS OPEX SAVINGS
+ REDUCTION METHANE SLIP



FS MARINE+ ADVANTAGES VS. SCRUBBERS

FS MARINE+ **FUTURE PROOF IN THE FUEL TRANSITION**

- ONCE CLEAN FUELS ARE AVAILABLE AT GOOD PRICES, SCRUBBERS WILL BECOME OBSOLETE
- WHILE EVERYONE STILL WANTS TO SAVE ENERGY AND MONEY, SO SOLUTIONS SUCH AS FS MARINE+ ARE MORE ROBUST TOWARDS FUEL TRANSITION AND WAY MORE FUTURE PROOF.

FS MARINE+ **PROVIDES DIRECT OPEX SAVINGS + A REAL CO2 REDUCTION**

- **FS MARINE+ REDUCES FUEL CONSUMPTION & OPEX // SCRUBBERS NEED MORE ENERGY** IN THE PROCESS AND EVEN INCREASE CO2 EMISSIONS, WHILE DECREASING CO2-E EMISSIONS.

FS MARINE+ **TACKLES THE PROBLEM – NOT TREATING A SYMPTOM**

- WITH FS MARINE+ THE COMBUSTION GETS MORE EFFICIENT AND CLEANER, WHICH REDUCES AUTOMATICALLY THE AMOUNT OF POLLUTION THAT IS GENERATED DIRECTLY WHERE IT IS CREATED

FS MARINE+ SYNERGIES WITH SCRUBBERS

FS MARINE+ **COMPLIMENTARY ENABLES MORE EFFICIENT + SMALLER SCRUBBERS**

- DUE TO THE CLEANER EXHAUST, SCRUBBER WASTE WATER TREATMENT CAN BE BUILT SMALLER AND MORE ENERGY EFFICIENT + LESS OPEX (LESS CHEMICALS NEEDED)

FS MARINE+ **IDEALLY SUITED FOR USE WITH HFO + SCRUBBERS**

- BUSINESS CASE WITH SCRUBBER + HFO EVEN BIGGER THAN WITH HFO
→ SINCE THE SCRUBBER IS USING MORE ENERGY IN THE PROCESS.