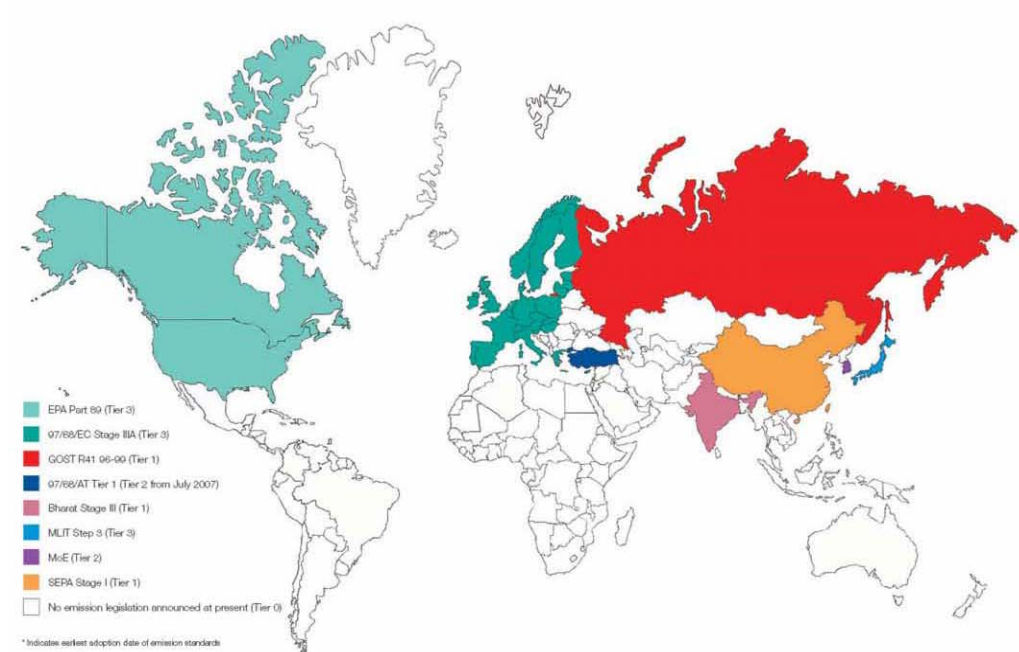
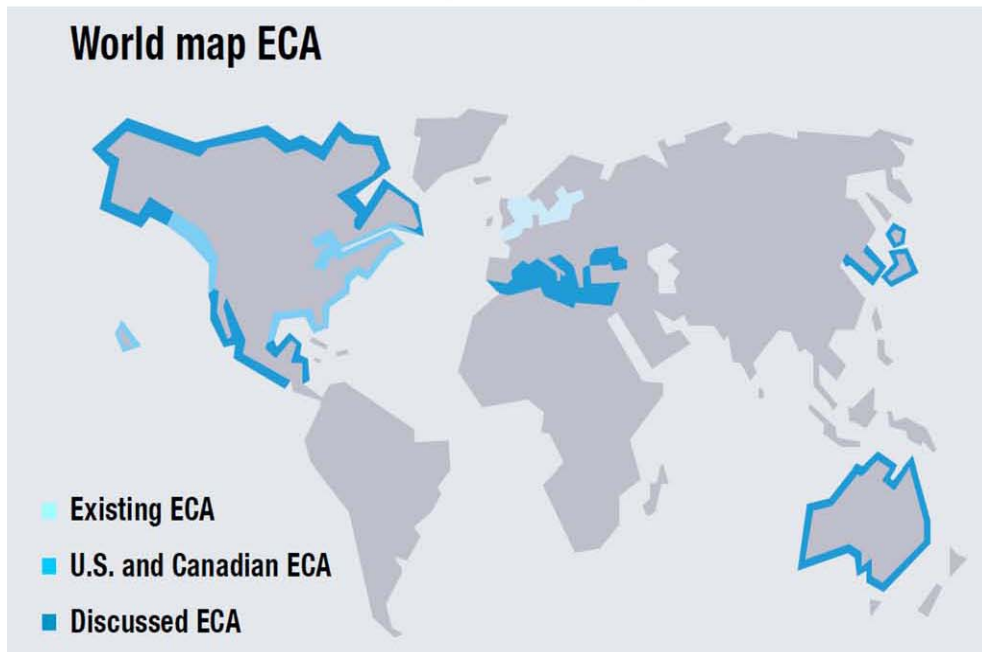


In the 1990s activities has been started to save the environment and a legislation for water (IMO) and land based traffic (TIER) was initiated. Following regulation are currently in force for large bore engines:

## 1. Emission regulation –The force behind

Emission regulation for Emission Controlled Areas (ECA) from Emission regulation for Non Road Application 2016 (IMO TIER III) from 2011





## 2. ISIMARE Fuel Filtration Systems

- Autarkic retrofit kit on existing engines
- Easy application
- Low investment
- Immediate effect
- Up to 9000 liter/h
- Weight: 150 – 230kg
- Size:
- Standard or customized
- Europe Diesel fuel DIN EN 590
- USA Diesel fuel ASTM D975
- Russia Diesel fuel GOST R 52368
- Japan Diesel fuel JIS K 2204
- China Diesel fuel GB252-2000 / GB19147



**Key technology for existing Diesel combustion engines and fuel -stations.**



### 3. Main functions

**Automatic backflush filter with external pressure cleaning and integrated cyclone effect (filter mesh size 3 micron)**

**Automatic dewatering down to 0.1% water content into the filtered fuel**

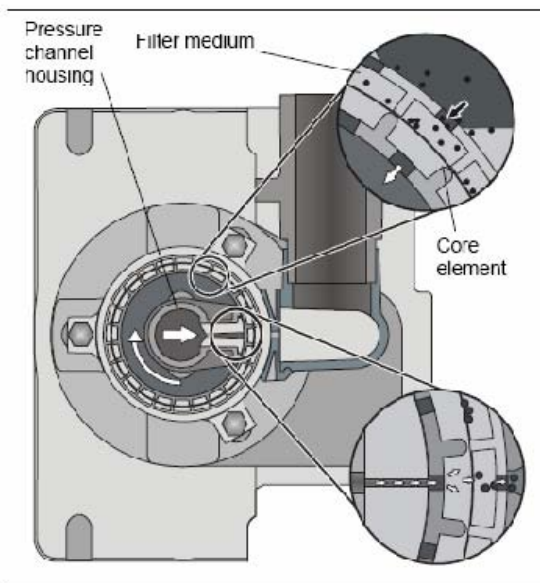
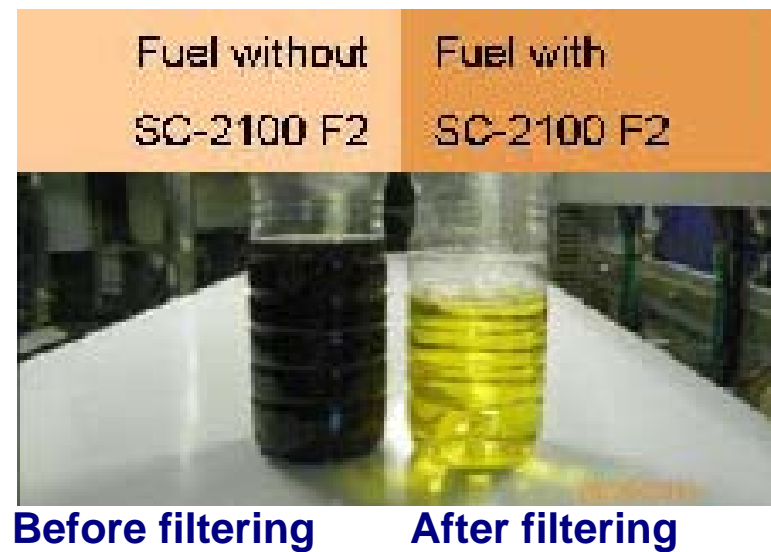
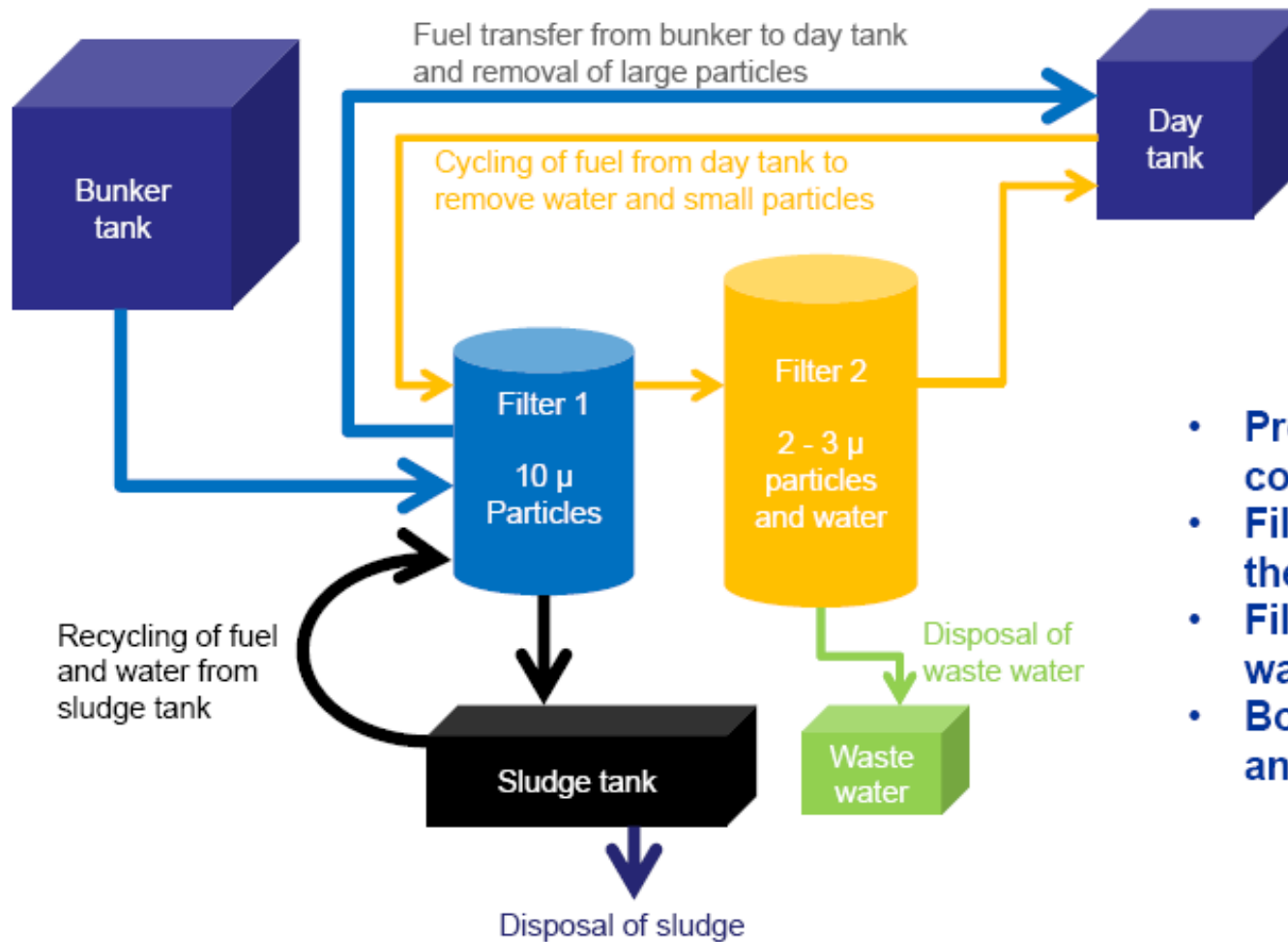


Fig. 1: Separating and clearing principle on the segmented element



### 3. Basic flow chart



- Processes are monitored and controlled automatically
- Filter 1 is self cleaning within the process
- Filter 2, disposal of waste water is automated
- Both filters can be removed and washed

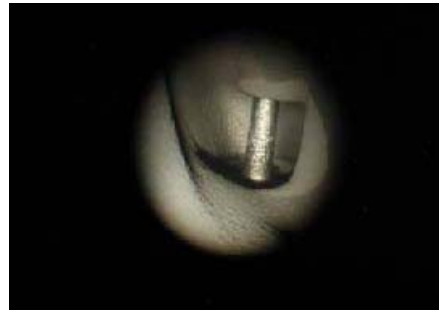


#### 4. Results after 3000 hours engine running

Clean exhaustgas channel



Clean outlet valvearea



**Lower fuel consumption more 10% \***

**Lower emission up to 20%\***

**Lower engine maintenance cost 50%\***

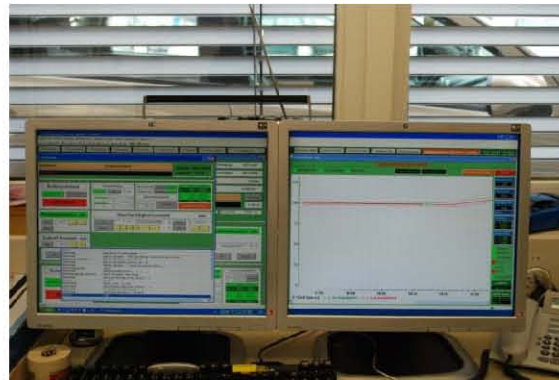
\* dependent of the current installation

#### **Customer's experience / May 2010:**

When the system was built in and running, from the beginning we could recognize a much smoother performance of the engines.

We have less vibration on the engines and also the generators are performing much better with fewer loads. The pre filters (Racor for the Gensets and Separfilter for the engines) are looking like new even after 150 hrs. of running. I can operate the boat with the same rpm at cruising speed with less fuel consumption (approx. 10 to 15%) and a higher speed. (+ 2 kn). Our fuel tanks are like new and absolute clean after circulation the fuel 5 to 6 times thru your system. We also have no smoke of the engines and generators any more. All in all it is really fantastic to have this system on board. I do not need to take care of the fuel quality I am getting from fuel stations all over the world because all water and dirt particles are filtered out of the fuel.

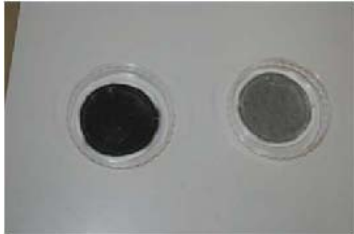
## 5. Laboratory-test EG 715/2007/EG & 692/2008A/EG



### Exhaust gas measuring Type I, EC 715 / 2007 / EC & 692 / 2008A / EG

Order-no:	402732	Test type:	General Test
Date:	2013-01-24	Emission regulation:	692 / 2008A / EG
Vehicle-category:	N1	Emission reduction equipment:	EGR & DPF
used fuel:	Diesel EN/DIN 590	Gear / i-axis:	6m / 3.917
Brand:	IVECO	Start of operation of the vehicle :	2012-10-25
Model:	35C17	Type licence-no:	31B545
Chassis-no:	ZCFC35C3105930618	Weight w/o load:	2500kg
Engine type:	F1CE3481C	Total weight:	3500kg
Cubic capacity:	2998 ccm / DI	Speedometer:	14607km
Catalytic converter:	Oxidation		

## Summary of all results



particle analyses pads


**Berner Fachhochschule**  
**Haute école spécialisée bernoise**  
 Technik und Informatik  
 Technique et informatique  
 Abgasprüfstelle (AFHB)  
 Contrôle des gaz d'échappement  
 Civerdstrass 5  
 2500 Nidau

		standard Diesel		filtered Diesel			filtered Diesel + additive	
		1. NEDC	2. NEDC	1. NEDC	2. NEDC	3. NEDC	1. NEDC	2. NEDC
CO	[mg/km]	148.5	192.7	153.0	155.0	152.0	199.3	176.4
T.HC	[mg/km]	95.4	95.4	103.1		89.4	180.3	178.0
NOx	[mg/km]	1859.9	1524.4	1803.8	1914.7	1820.7	1892.5	1929.2
T.HC+NOx	[mg/km]	1955.3	1619.8	1906.9	1914.7	1910.1	2072.9	2107.2
CO2	[g/km]	300.2	294.2	303.5	302.5	300.6	296.6	296.7
PM	[mg/km]	129.4	57.6	70.2	21.9		98.1	46.0
PN	[#/km]	3.38E+11	3.29E+11	1.96E+11	1.37E+11	1.20E+11	2.80E+11	2.37E+11
Conso.	[l/100km]	11.4	11.2	11.5	11.5	11.4	11.3	11.3

PM... Particulate matter

PN... Particle number

Conso... fuel consumption (calculated)



## 5. Application range

### Direct application on engines which are operating in/around the harbour areas



Tug boats



Yachts



Locomotives

### Indirect application as additional equipment for fuel stations for Diesel vehicles



Trucks, communal



Forklifts




Transport buse, vehicles



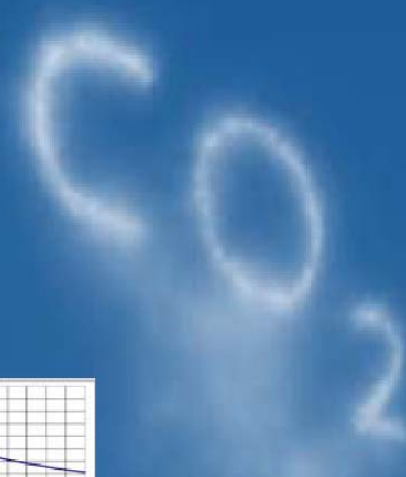



## 6. Results -benefits

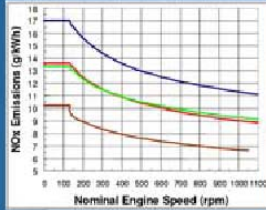
Less particle



Fuel saving




Less NOx



Nominal Engine Speed (rpm)	NOx Emissions (g/kWh) - Blue Line	NOx Emissions (g/kWh) - Green Line	NOx Emissions (g/kWh) - Red Line	NOx Emissions (g/kWh) - Brown Line
0	18	14	12	10
100	17	13	11	9
200	16	12	10	8
300	15	11	9	7.5
400	14	10	8.5	7
500	13	9.5	8	6.5
600	12.5	9	7.5	6
700	12	8.5	7	5.5
800	11.5	8	6.5	5
900	11	7.5	6	4.5
1000	10.5	7	5.5	4
1100	10	6.5	5	3.5

Durability





**For any further questions please contact:**

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**[info@isimare.com](mailto:info@isimare.com)**