

## Overview of Sludge Reduction Measurement

### Methodology:

#### 1. Baseline Data Collection:

- Before installing the IPCO Power homogenizer system, baseline data was collected to establish the initial frequency of desludging events and the average volume of sludge generated. This data served as a control for comparison with post-installation results.

#### 2. Post-Installation Tracking:

- Following the installation of the IPCO Power homogenizer, we monitored both the volume of sludge and the frequency of desludging events over time. This allowed us to directly observe the effects of homogenization on sludge formation, with reduced sludge volumes indicating improved fuel stability and combustion.

#### 3. Extended Desludging Intervals:

- With the homogenizer, intervals between necessary desludging events often extended significantly. For some vessels, desludging frequency was reduced from multiple times per day to once per day or even less frequently, depending on fuel type and engine conditions.

#### 4. Comparative Analysis:

- By comparing pre- and post-installation sludge data, we quantified sludge reduction for each vessel. In studies we conducted, sludge reduction ranged from 50% to 80%, depending on operational factors.

### Summary Results:

- Graphs below provide a simplified visual of the sludge reduction results, showing baseline sludge production vs. post-installation reduction percentages for each vessel.



## Overview of Fuel Savings Measurement

### Methodology:

1. **Baseline Consumption Establishment:**
  - Prior to installing the IPCO Power system, a baseline fuel consumption rate was established under normal operating conditions. In some cases, this was done using our own evaluation protocols, while in others, protocols provided by clients were followed to ensure alignment with their operational standards.
2. **Measurement Techniques:**
  - **Diesel-Electric Vessels:** On vessels with diesel-electric configurations, measurements were often conducted on a generator with a fixed load. This setup allowed for highly stable data collection over a defined period, ensuring precise fuel consumption tracking.
  - **Extended Monitoring on Conventional Vessels:** On vessels with variable loads, fuel consumption was monitored over longer periods, with data filtered to focus on stable engine load ranges. This approach helped isolate the effects of the IPCO Power system on fuel efficiency under consistent conditions.
3. **Tools and Equipment:**
  - **Shaft Power Meters:** Shaft power meters were used to measure the power output and link it to fuel consumption, enabling accurate assessment of fuel efficiency improvements.
  - **Engine Load Data:** Only stable data within specific engine load ranges were used for analysis, ensuring that fuel-saving results accurately reflected typical operational conditions.
4. **Comparative Analysis:**
  - After system installation, post-installation fuel consumption data was gathered under the same or comparable conditions to the baseline measurements. This comparative analysis allowed us to determine the fuel savings achieved by the IPCO Power system while controlling for variables such as load and engine performance.

### Summary Results:

- The following graphs provide a visual summary of the fuel savings observed in 2-stroke and 4-stroke engines across various vessels. Each result reflects carefully controlled measurements under standardized conditions, following either IPCO Power's evaluation protocols or client-provided guidelines.

Client	Vessel	Type	System	Saving
Aksa	Siirt plant	4stroke	FID Improver	1,23%
Cimenterie National	Libanon	4stroke	FID Improver	1,30%
Wagenborg	MV Schieborg	2stroke	FID Improver	2,14%
Wagenborg	MV Schieborg	2stroke	FID Injector	2,50%
Ugland	Carmencita	2stroke	FID Improver	2,60%
Odfjell	Bow Star	2stroke	FID Improver	1,30%
HSS	Makiri Green	4stroke	FID Improver	1,16%
Eukor Car Carriers	Asian Trust	4stroke	FID Improver	2,40%
Wilhelmsen	Topeka	2stroke	FID Improver	2,31%
HAL	Ryndam	4stroke	FID Improver	1,18%
HAL	Ryndam	4stroke	FID Injector	2,23%

