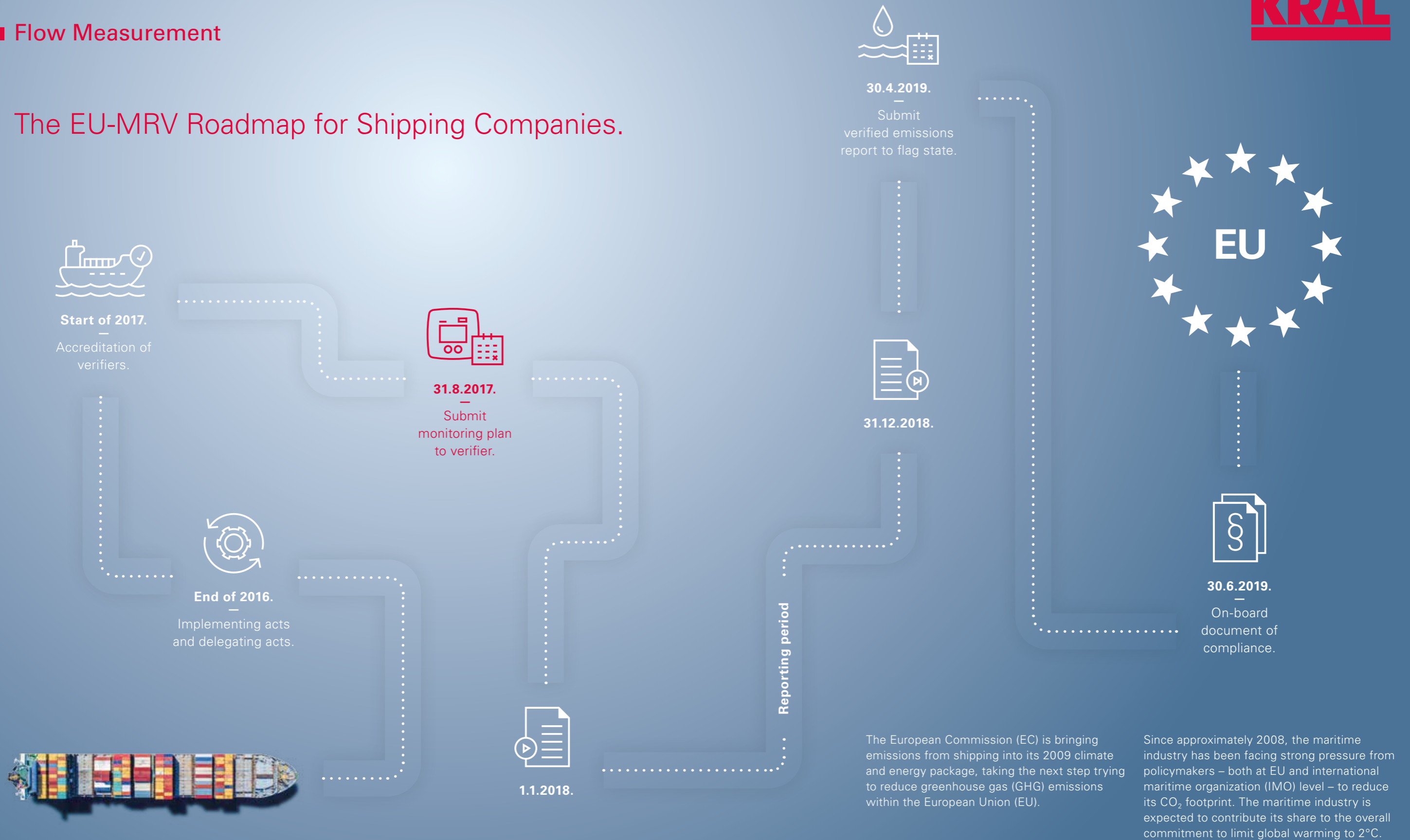


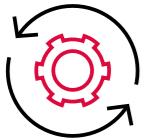
Be
Prepared
for the
EU-MRV
Regulations.
It's Time
to React!



The EU-MRV Roadmap for Shipping Companies.



The EU-MRV Process.



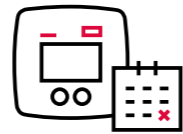
■ **End of 2016.**
Implementing acts and delegating acts.

However, in June 2013, the EU set out a revised strategy for integrating maritime emissions into the EU's policy for reducing its domestic GHG emissions. This revised strategy recommends as a first step only introducing a monitoring, reporting and verification (MRV) scheme for shipping. This will provide the EU with more reliable data on ships' fuel consumption and energy efficiency.



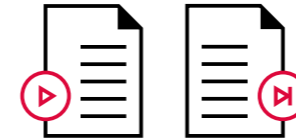
■ **Start of 2017.**
Accreditation of verifiers.

Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending directive 2009/16/EC (hereinafter called the "EU-MRV regulation") entered into force on 1 July 2015.



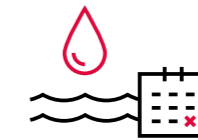
■ **31.8.2017.**
Submit monitoring plan to verifier.

In accordance with the EU-MRV regulation, a vessel's monitoring plan must be verified by an independent and accredited verifier. Shipping companies are requested to submit the monitoring plan to the corresponding verifier for each of their ships, including the method for the determination of fuel oil consumption chosen for monitoring, and report CO₂ emissions and other relevant information by 31 August 2017 at the latest.



■ **1.1.2018 – 31.12.2018.**
1st reporting period.

The first reporting period is from 1 January 2018 until 31 December 2018. Ship owners and operators will have to monitor the CO₂ emissions of their vessels per voyage for all voyages conducted into, between and out of EU ports.



■ **30.4.2019.**
Submit verified emissions report to flag state.

Companies will have to submit an emissions report concerning the CO₂ emissions, average efficiency and other relevant information for the entire reporting period for each ship under their responsibility to the EC and to the authorities of the flag states concerned by 30 April of each year.



■ **30.6.2019.**
On-board document of compliance.

By 30 June 2019, the EU will make publicly available the data of each vessel falling under the EU-MRV regulation. The individual ship-related publication will contain aggregated information (or average data per voyage on the annual basis of all voyages), such as the ship's identity, the annual average fuel consumption, the average CO₂ emissions per distance travelled and the cargo carried.

Reporting Needs:

For each ship (>5000 GT) and for each voyage into, between and out of EU ports.

- Port of departure / arrival.
- **Amount and emission factor for each type of fuel consumed in total [...].**
- **CO₂ emitted.**
- Distance travelled.
- Time spent at sea.
- Cargo carried (ship type specific!).
- Transport work.
- Differentiation of CO₂ emissions between sea and at berth.

Methods for Determining CO₂ Emissions:

Actual fuel consumption shall make use of one of the following methods:

- Bunker fuel delivery note (BDN) and periodic stocktakes of fuel tanks.
- Bunker fuel tank monitoring on board.
- Flowmeters for applicable combustion processes.
- Direct CO₂ emission measurements (less relevant, because no type approved equipment available).

Any combination of these methods may be used if it enhances the overall accuracy of the measurement.

Fuel consumption shall include fuel consumed by **main engines, auxiliary engines, gas turbines, boilers and inert gas generators.**

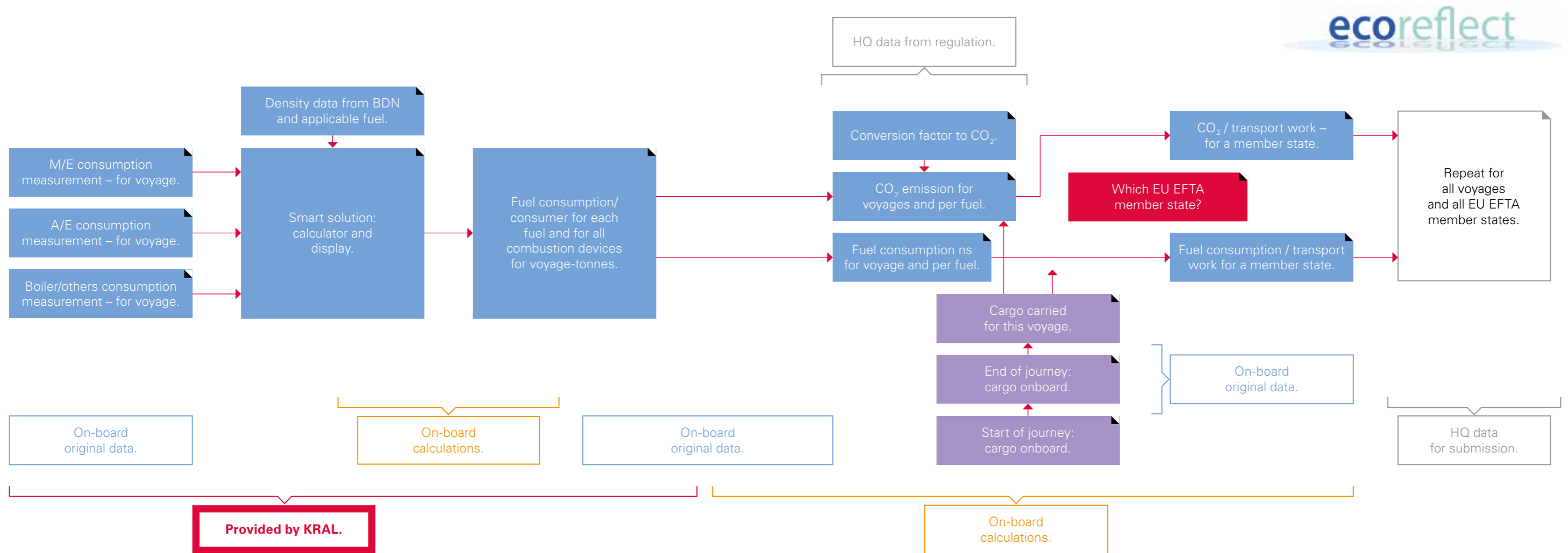
Fuel consumption within ports at berth shall be monitored / calculated separately.

CO₂ emissions = fuel consumption × emission factor.

Measurement Method: Flowmeters on all Applicable Combustion Equipment.

This collection process uses automatic recording of fuel flow through fuel flowmeters located on all applicable fuel flow pipes which includes recording of temperature for fuel. The data is aggregated automatically (normally).

The total volume for different fuels or different densities is adjusted for fuel temperature before density data from the BDN related to the specific fuel is used to convert volume of fuel used to mass of fuel used. The result is multiplied by the emission factor conversion factor.



- Fuel and stuff that is original data held on board.
- Calculations done on board.
- Purple for cargo plus blue edge because it is on-board data.
- KRAL.
- HQ data and control.

Your benefit with measurement "flowmeters for applicable combustion processes":

- Avoidance of data gaps.
- Ability to determine uncertainty of measurement when required from EC.
- Fuel saving and optimization with realtime consumption monitoring.

Flow Measurement

KRAL Solutions.

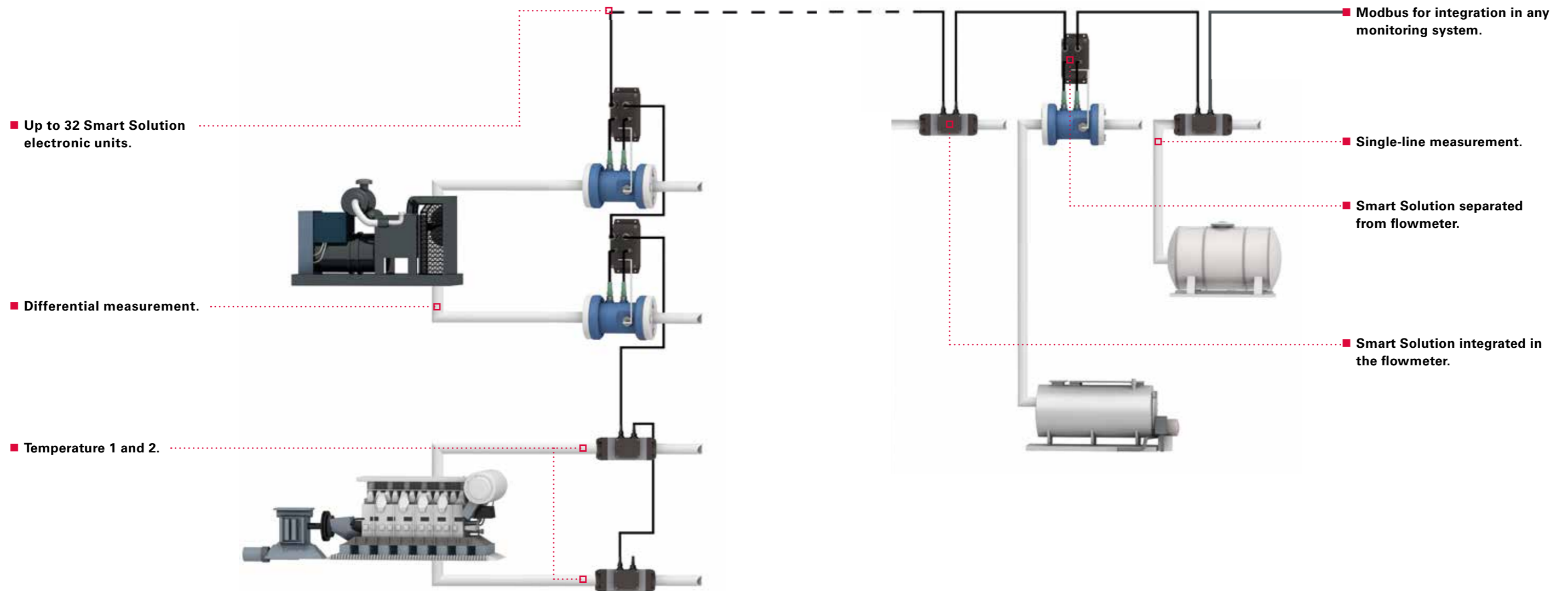
Products and solutions for consumption measurement methods.

1

KRAL Smart Solutions.
Simple installation – manifold usages.



For further information see our brochure "KRAL Smart Solution".
www.kral.at/en/downloads/products/flow-measurement/



Flow Measurement

KRAL Solutions.

Products and solutions for consumption measurement methods.



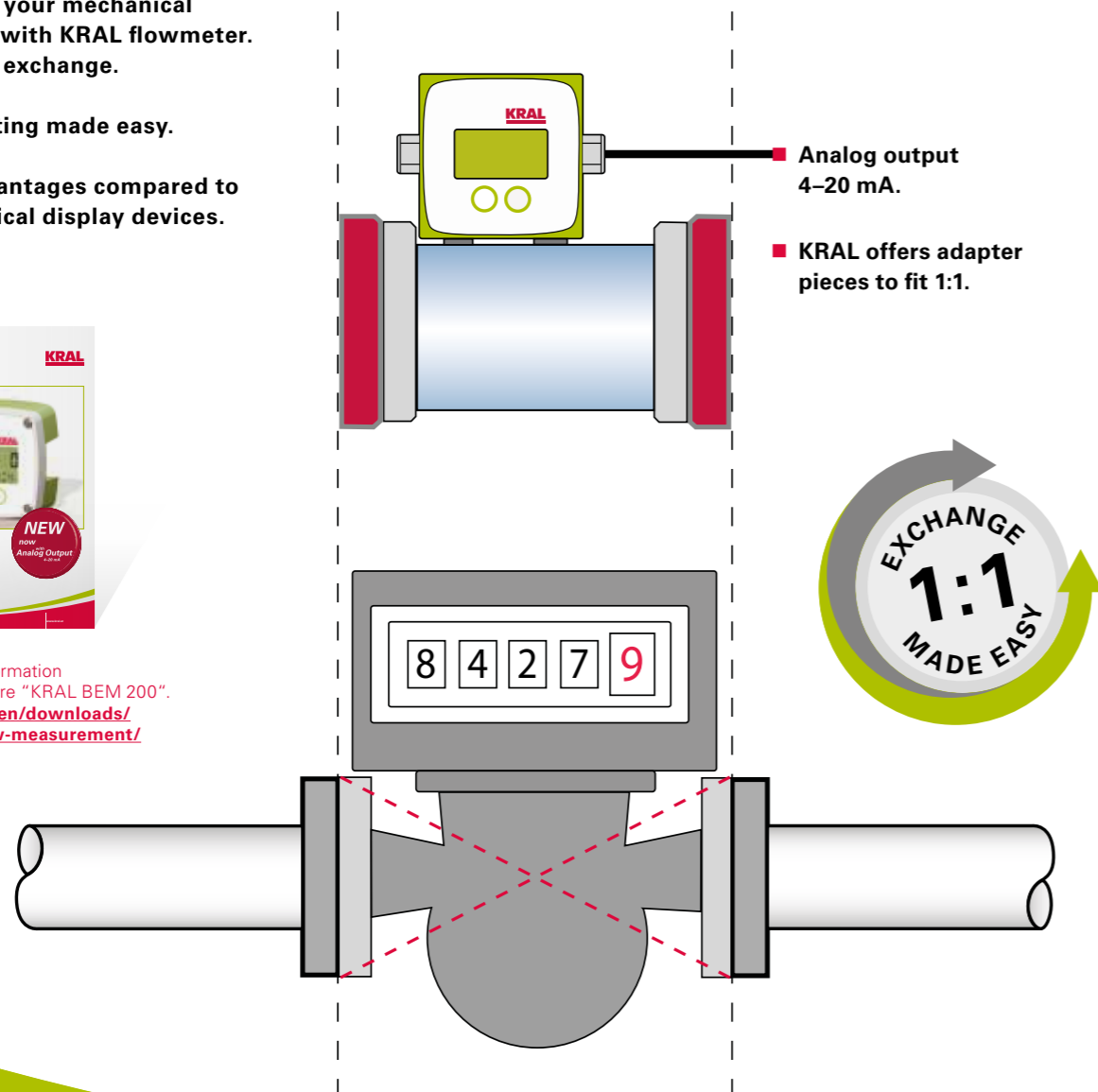
Summary of EU-MRV.

2. **BEM 200.**
The display electronics from KRAL.

- Remove your mechanical counter with KRAL flowmeter. Easy 1:1 exchange.
- Retrofitting made easy.
- The advantages compared to mechanical display devices.



For further information see our brochure "KRAL BEM 200":
www.kral.at/en/downloads/products/flow-measurement/



Monitoring.	<ul style="list-style-type: none"> ■ Ships 5000 GT and above. ■ Voyages to / from EU, Ports of call, EU monitoring plan starting 1 January 2018.
First monitoring period.	<ul style="list-style-type: none"> ■ 2018.
Exemptions.	<ul style="list-style-type: none"> ■ Warships, naval auxiliaries, fish-catching / processing ships, ships not propelled by mechanical means and government ships used for non-commercial purposes.
Parameters.	<ul style="list-style-type: none"> ■ Fuel consumption and CO₂. ■ Actual cargo on-board. ■ Distance travelled. ■ Time at sea & in port.
Reporting.	<ul style="list-style-type: none"> ■ Fuel consumption (port / sea). ■ Transport work (based on actual cargo carried). ■ Distance. ■ Time.
Verification.	<ul style="list-style-type: none"> ■ Independent accredited verifiers.
Reports to.	<ul style="list-style-type: none"> ■ European Commission.
Certification.	<ul style="list-style-type: none"> ■ Document of compliance (June 2019).
Publication.	<ul style="list-style-type: none"> ■ Distinctive public database.
Disclosure.	<ul style="list-style-type: none"> ■ Public.



Do you need our help?

Contact us:
eu-mrv@kral.at
Tel.: +43/5577/86644-0

**Do not miss our next issue concerning
the IMO-DCS regulations. Stay tuned.**