

Flow solutions for LNG metering

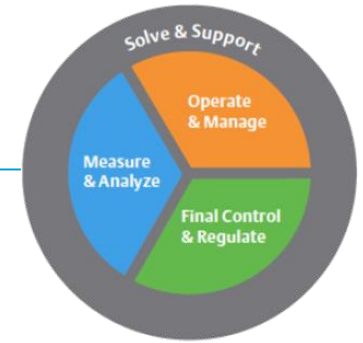
Helene Casellas

**Business Development Manager Oil & Gas
Flow Europe**



Emerson Process Management

Core Offering & **Key Flow Brands**



Taking on the industry's toughest challenges, and bringing predictable success any time, any place



Measure & Analyze

The broadest range of measurement and analytical technologies for process clarity and insight



Operate & Manage

The systems and tools that provide the decision integrity to run your operation at its full potential



Final Control & Regulate

Highly reliable final control technologies to help you regulate and isolate your process with certainty



Solve & Support

Expertise and global resources to help you dependably define, execute and support a strategy throughout the lifecycle of your operation

DANIEL

ROSEMOUNT

Micro Motion

FISHER



ENARDO

roxar
MAXIMUM RESERVOIR PERFORMANCE

Bristol

JEON

TARTARINI PRO

METCO

TESCOM

Emerson is committed to the LNG Market

Major LNG Operations from Earth to Client

- Gas Production
- Compression & Pipeline
- Onshore Liquefaction
- FPSO/GBS
- Ship Loading
- LNG Shipping
- Offshore & Onshore LNG
- Receiving & Regasification
- Terminals
- Pipeline Delivery

Graphic illustrations from Sempra Website



Emerson % of Coverage

100 %	Fisher Control Valves & Regulators, AMS, Remote Operations Controllers & DeltaV, Rosemount Transmitters & Analyzers, Micromotion & Daniel Metering
95-100%	Fisher Control Valves & Regulators, DeltaV, PlantWeb and AMS, Rosemount Transmitters & Analyzers, Micromotion & Daniel Metering Skids, Valve Automation, SAAB Gauging & Ultrasonic
90-100%	Fisher Control Valves & Regulators, DeltaV, PlantWeb & AMS, Rosemount Measurement, Valve Automation, SAAB Ship Gauging & Ultrasonic
95-100%	Fisher Control Valves & Regulators, DeltaV, PlantWeb and AMS, Rosemount Transmitters, Micromotion & Daniel Metering & Skids, Valve Automation, SAAB Gauging & Ultrasonic, AMS MHM and Asset Optimization, SmartProcess Offsites Solutions for Jetty Automation
100%	Fisher Control Valves & Regulators, AMS Remote Operations Controllers & DeltaV, Rosemount Transmitters & Analyzers, Micromotion & Daniel Metering

Current LNG Custody Transfer by Static Tank Measurement

- Quantity invoiced is the transferred LNG energy, given by the product of volume, density and gross caloric value
- Direct and inferred measurements:
 - Tank level, composition and temperature
 - Density, gross calorific value
 - Tank volume
- All lead to a total uncertainty from $\pm 0.5\%$ up to 1%
- Impact is huge: 1% uncertainty on the total value of the global LNG trade in 2010 represented US\$607 million



Which flow technology do you use?

- Do you pay for what you get?
- Do you get paid for what you give?

Accurate and reliable Flow measurement
is key in metering applications

Why Micro Motion for LNG Custody Transfer?

1. All Custody Transfer certifications in place, incl. MID for mass & density
2. Direct mass & density reading
3. Accuracy within 0.1-0.5%
4. Young Modulus – patented temperature compensation calculation to overcome the effects of temperature
5. BOG Solution at hand
6. No obstructions in the pipeline
7. All possible line sizes available & no straight pipeline or flow straighteners required
8. Electronics on a special extender to avoid temperature damages
9. 17 years of cryogenic & LNG experience
10. A wide range of installations, in creation, transport, and downstream distribution

Some LNG related business partners

Viking Line Orders LNG-Powered Cruise Ferry

December 23, 2010 – 2:04 am | Finland



The new generation cruise ferry will be LNG-powered for clean operation.

STX Finland Oy and Viking Line ABP have signed an agreement for the construction of "the most environmentally friendly big passenger vessel to date", for Viking Line, with delivery early 2013. The new generation cruise

ferry uses LNG as fuel; it has no marine emissions and its aerial emissions are extremely low. The vessel has been specially designed to operate in the delicate and shallow waters of the Finnish and Swedish archipelago. The agreement includes an option for a sister ship. The contract price is about EUR 40 million (USD 64 million).



GNOOC LIMITED
中国海洋石油有限公司



cryoEnergy



Saga

Fjordbase Ship Bunkering Terminal

- Located in Flora, Norway
- Terminal commissioned July 1st, 2009
- Allows bunkering of ships and trucks
- Terminal connects to local gas grid
- LNG stored in 500 m³ tank



AGA Gas AB LNG terminal in Nynäshamn



Built up 2010 - Started up May 2011

Choice of technology

Study of two different technology

1. Turbine (volume)
2. Ultrasonic (volume)
3. Coriolis (Mass)

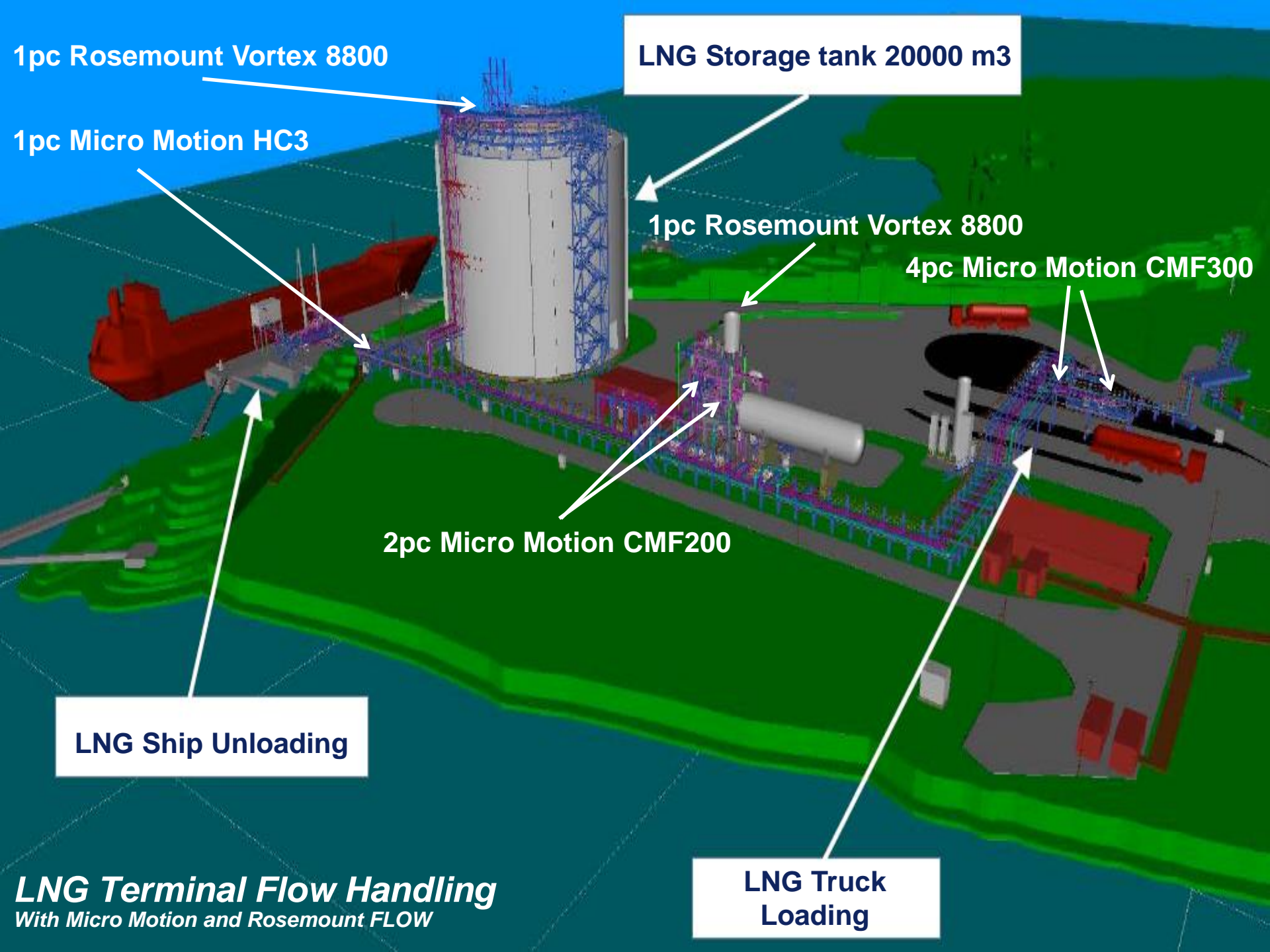
Choice of technology

- Coriolis – Mass flow
- Easy installation, start-up and no moving parts
- Its direct Mass and Density (quality) measurement
- Energy value direct from mass
- Lower risks of measurement uncertainty
- Lower OPEX compeer to volume flow technologies

Choice of supplier

- Micro Motion (*and Rosemount flow – Vortex*)
- Micro Motion gives the end customer experiences of earlier solutions
- Micro Motion gives the best accuracy measurement
- Micro Motion gives the best Smart Diagnostic from the meters
- Micro Motion gives Smart Meter Verification - Self Checking Features at -200 gr C





1pc Rosemount Vortex 8800

1pc Micro Motion HC3

LNG Storage tank 20000 m3

1pc Rosemount Vortex 8800

4pc Micro Motion CMF300

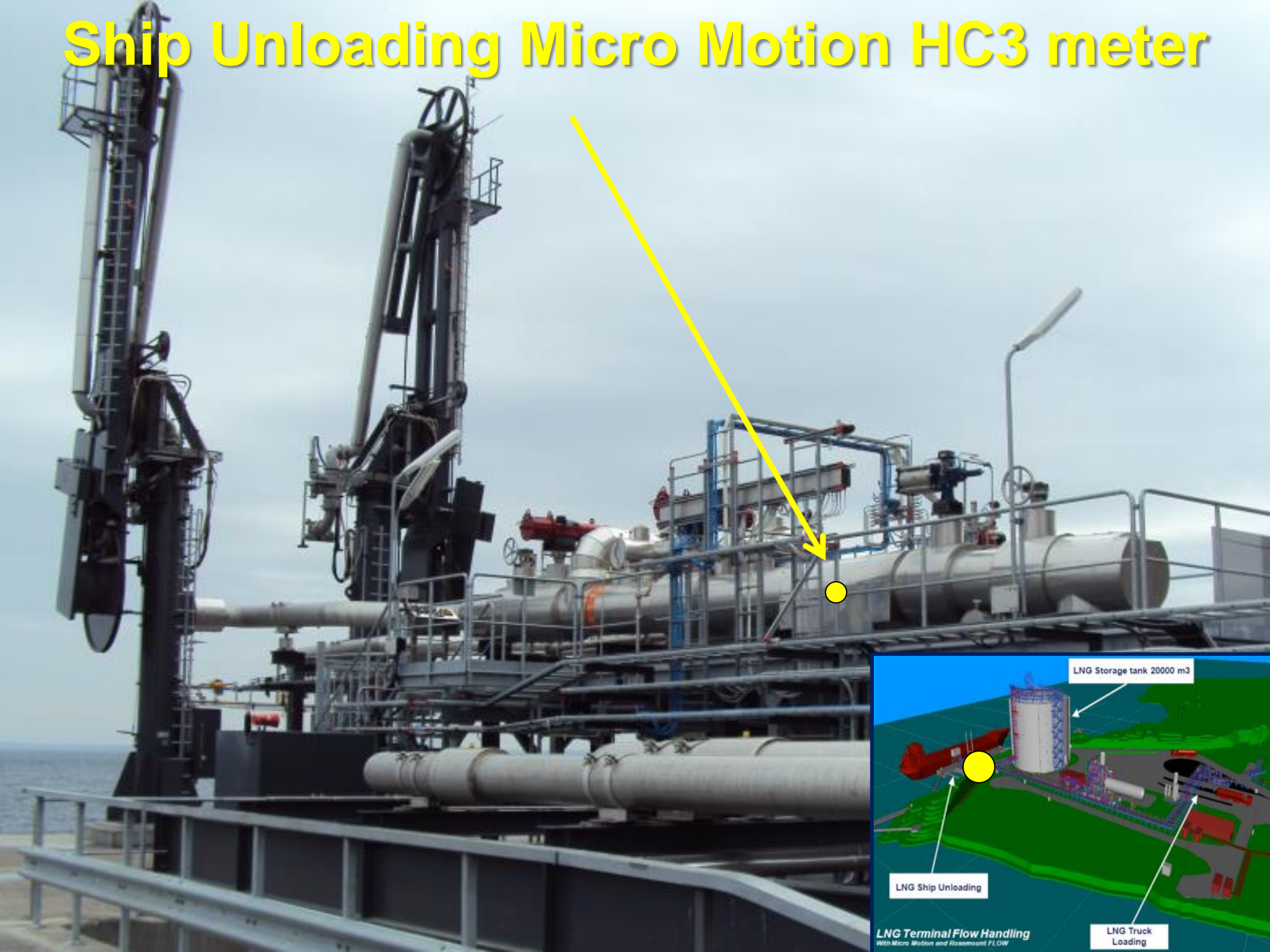
LNG Ship Unloading

2pc Micro Motion CMF200

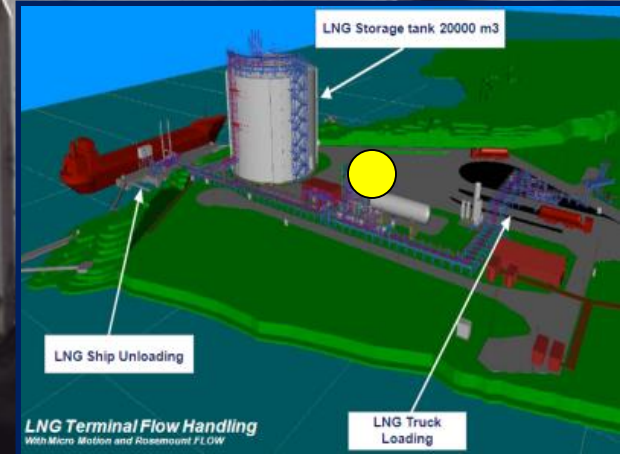
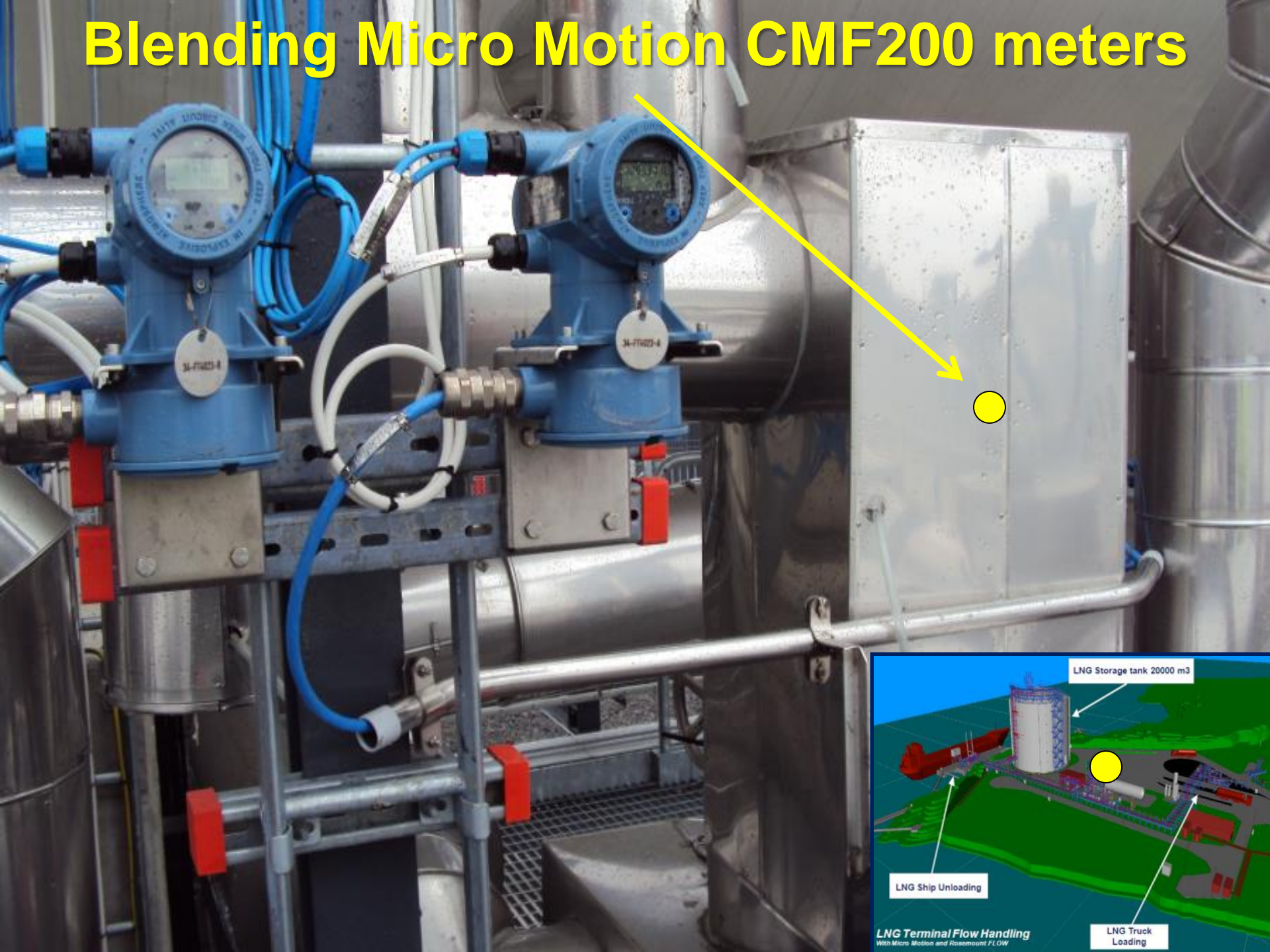
LNG Truck Loading

LNG Terminal Flow Handling
With Micro Motion and Rosemount FLOW

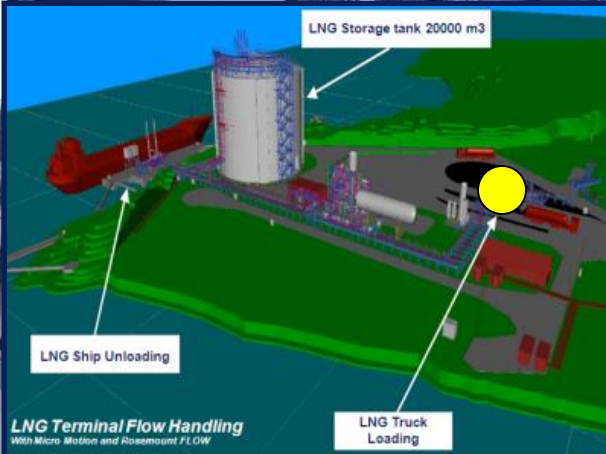
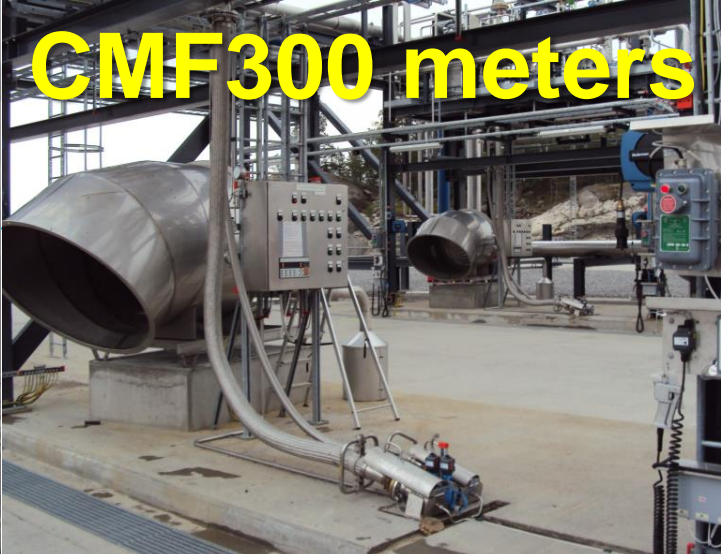
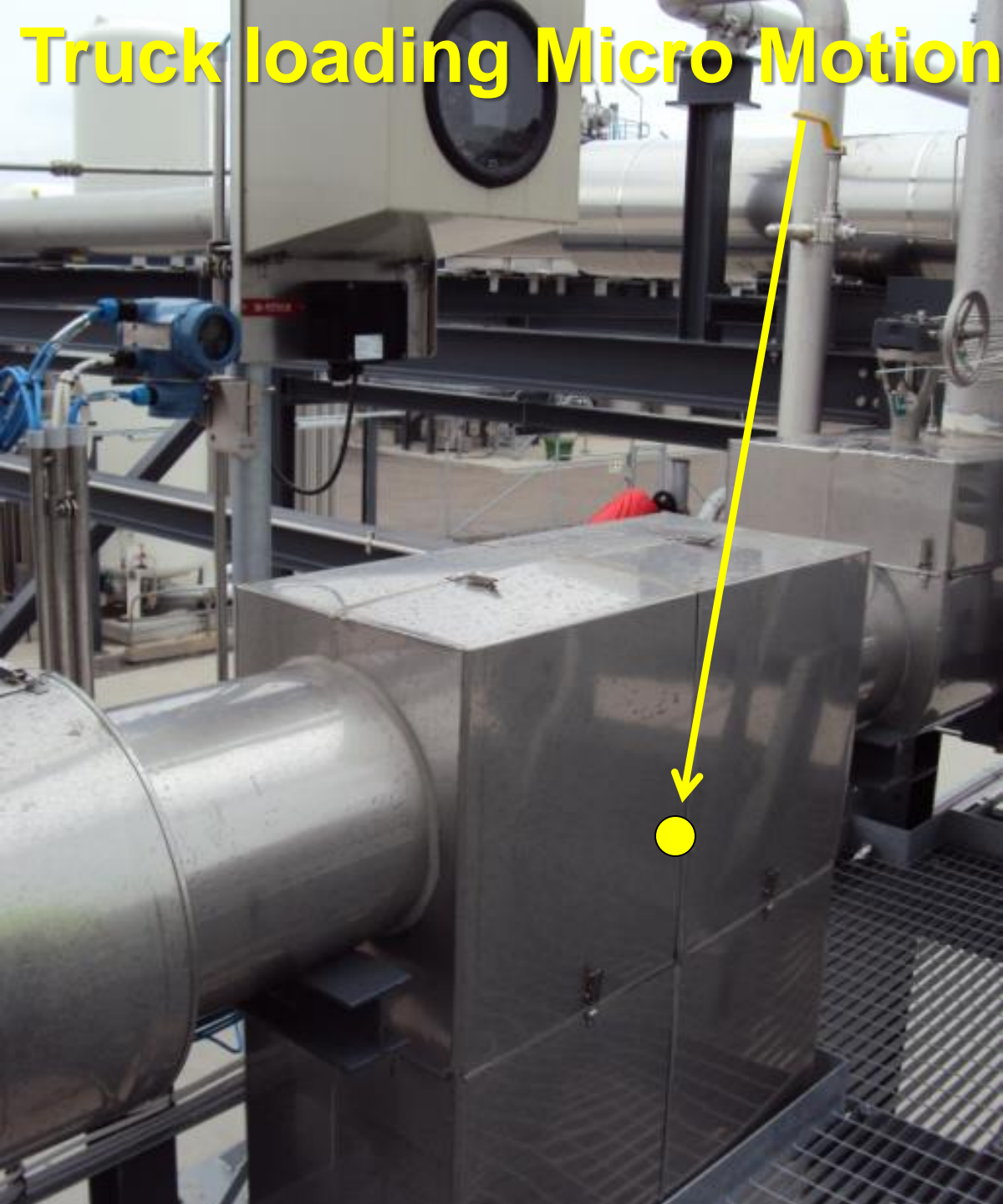
Ship Unloading Micro Motion HC3 meter



Blending Micro Motion CMF200 meters



Truck loading Micro Motion CMF300 meters



Thank You!

