

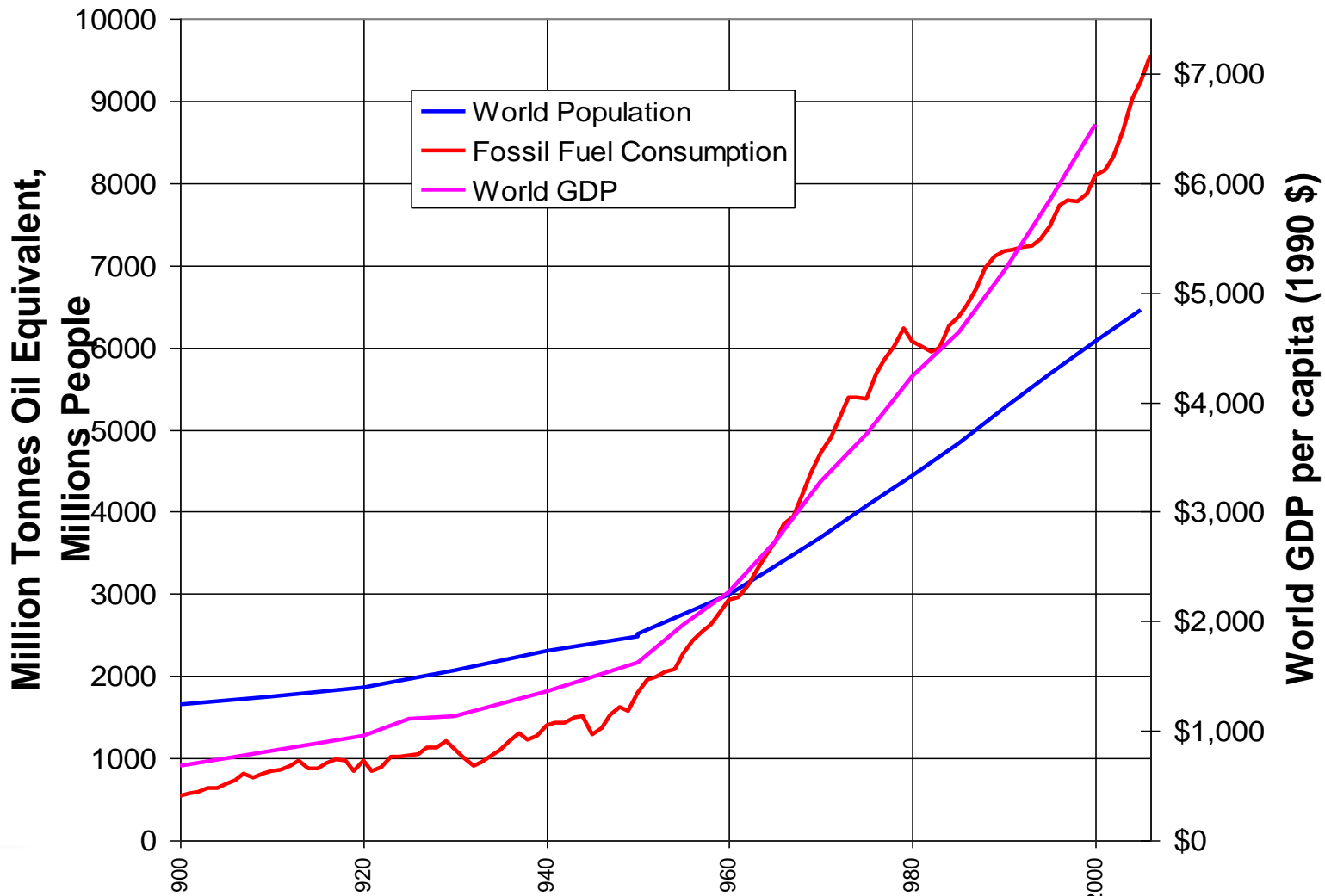


# Green Engineering Technology Day

## Kolding, March 24

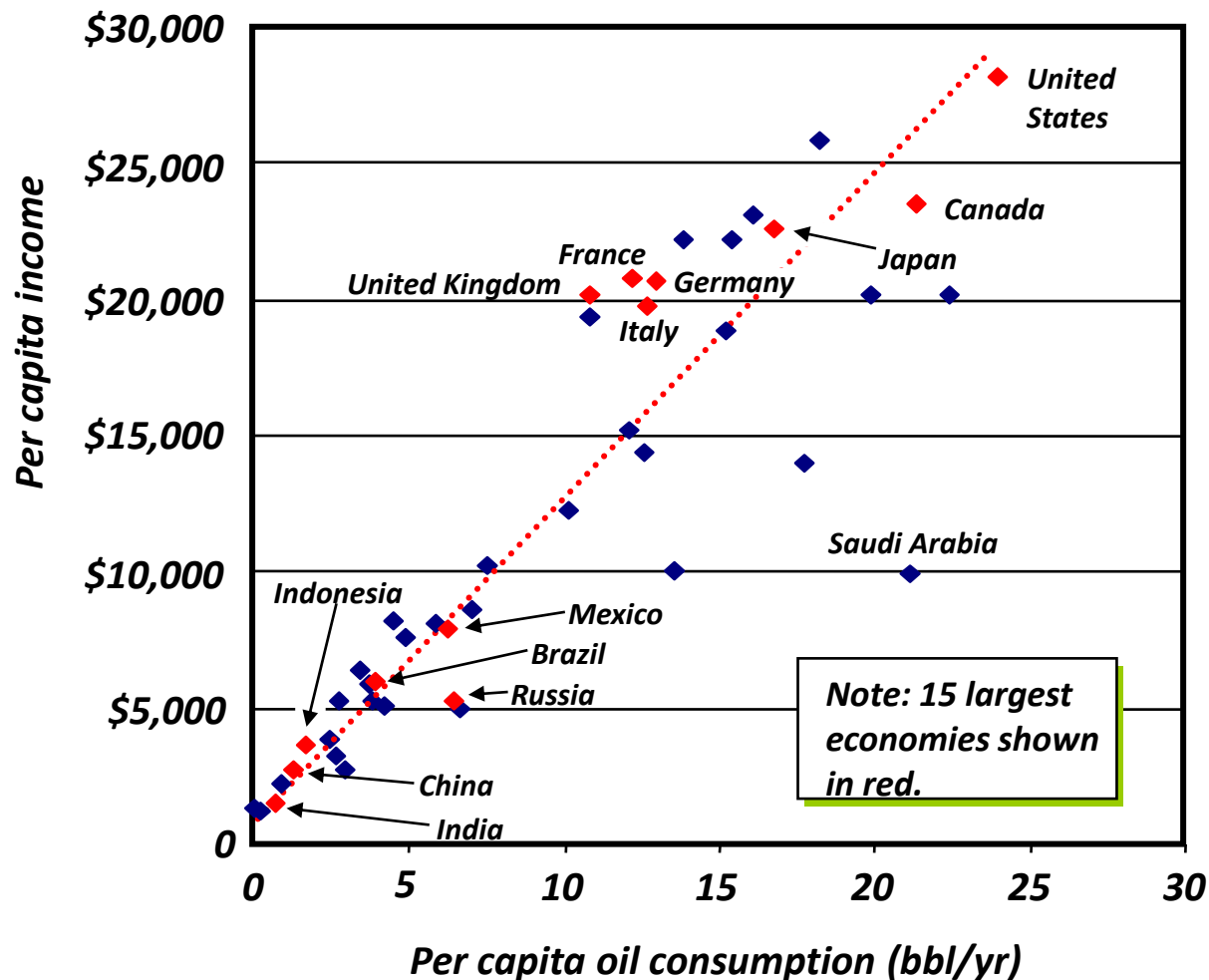
Gert Nilsson  
Managing Director  
National Instruments Denmark

# Maybe the Most Important Plot for the 21<sup>st</sup> Century



Source: Bjørn Lomborg, "The Skeptical Environmentalist," and British Petroleum, "Statistical Review of World Energy 2006."

# Quality of Life and Energy Consumption



Source: Journal of Petroleum Technology, 2001.

# Green Engineering

## **Definition**

*Green Engineering is the use of advanced measurement and control techniques to design, develop, and improve products and technologies resulting in environmental and economic benefits*

## **National Instruments Enabling Technologies**

- *High-Speed and High-Resolution Measurements*
- *Advanced Analysis and Signal Processing*
- *High-Speed and Advanced Control*
- *Embedded System Technology*

## Power Quality & Transmission



## Green Product Design



## Renewable Energy



## Machine & Process Optimization



## Environmental Monitoring



# Key Technologies for Green Engineering

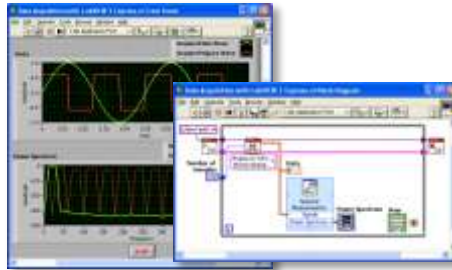


# The NI Approach to Meeting Today's Challenges

## *Low-Cost, Modular Measurement and Control Hardware*



## *Productive Software Development Tools*



## *Highly Integrated, Expandable Platforms*



*Used by thousands of engineers and scientists for automated test, industrial control, and embedded design applications.*



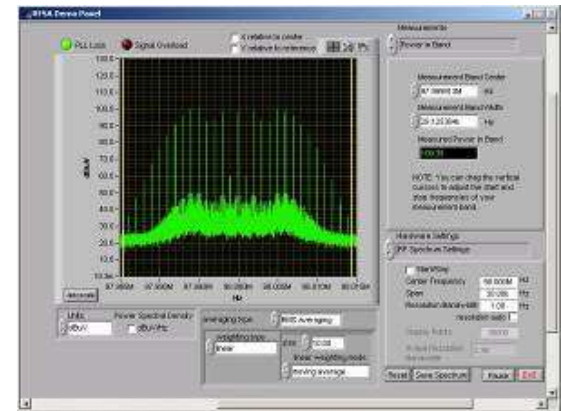
## iPhone



***“Suddenly, the interface isn't fixed and rigid, it's fluid and molten. Software replaces hardware.”***

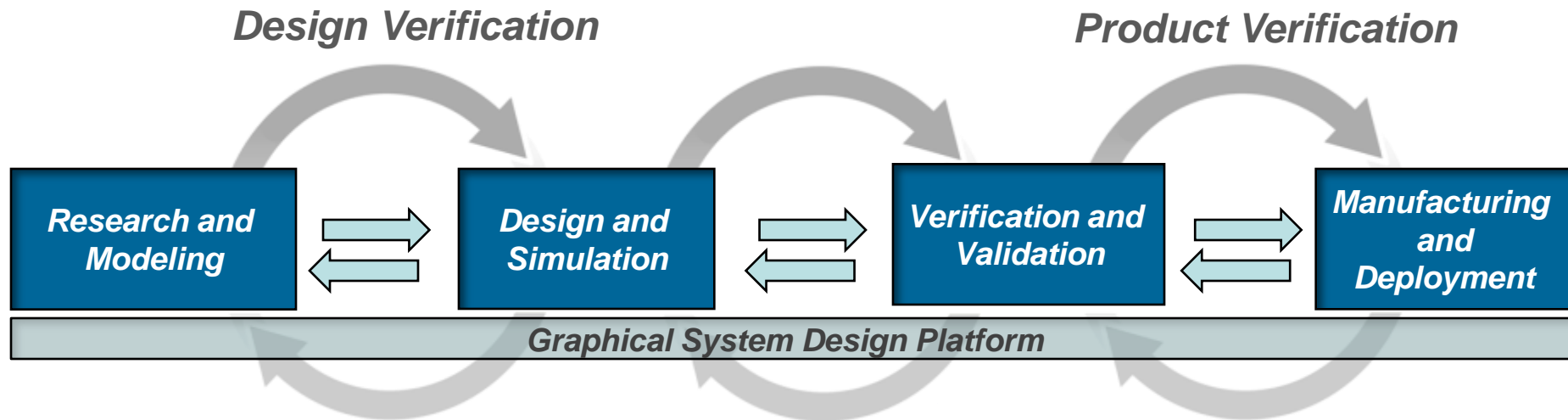
*Time Magazine on the Apple iPhone*

## Virtual Instrumentation





# Platform Spans the Entire Product Lifecycle



# kk-electronic Wind Turbine Control System Testing

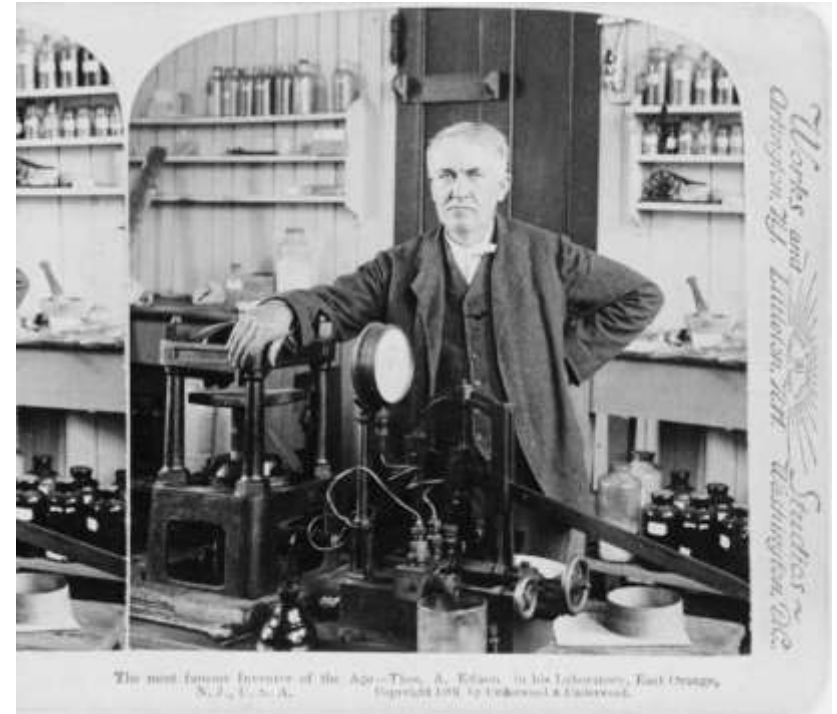
- Automating the final manufacturing tests of wind turbine control systems
- NI TestStand and LabVIEW with NI PXI instruments and SCXI signal conditioning to develop a standard automated test system that can be adapted to global production sites.



***“We cut down the test time of our cabinets from five days to one day, making it feasible to increase production capacity.”***

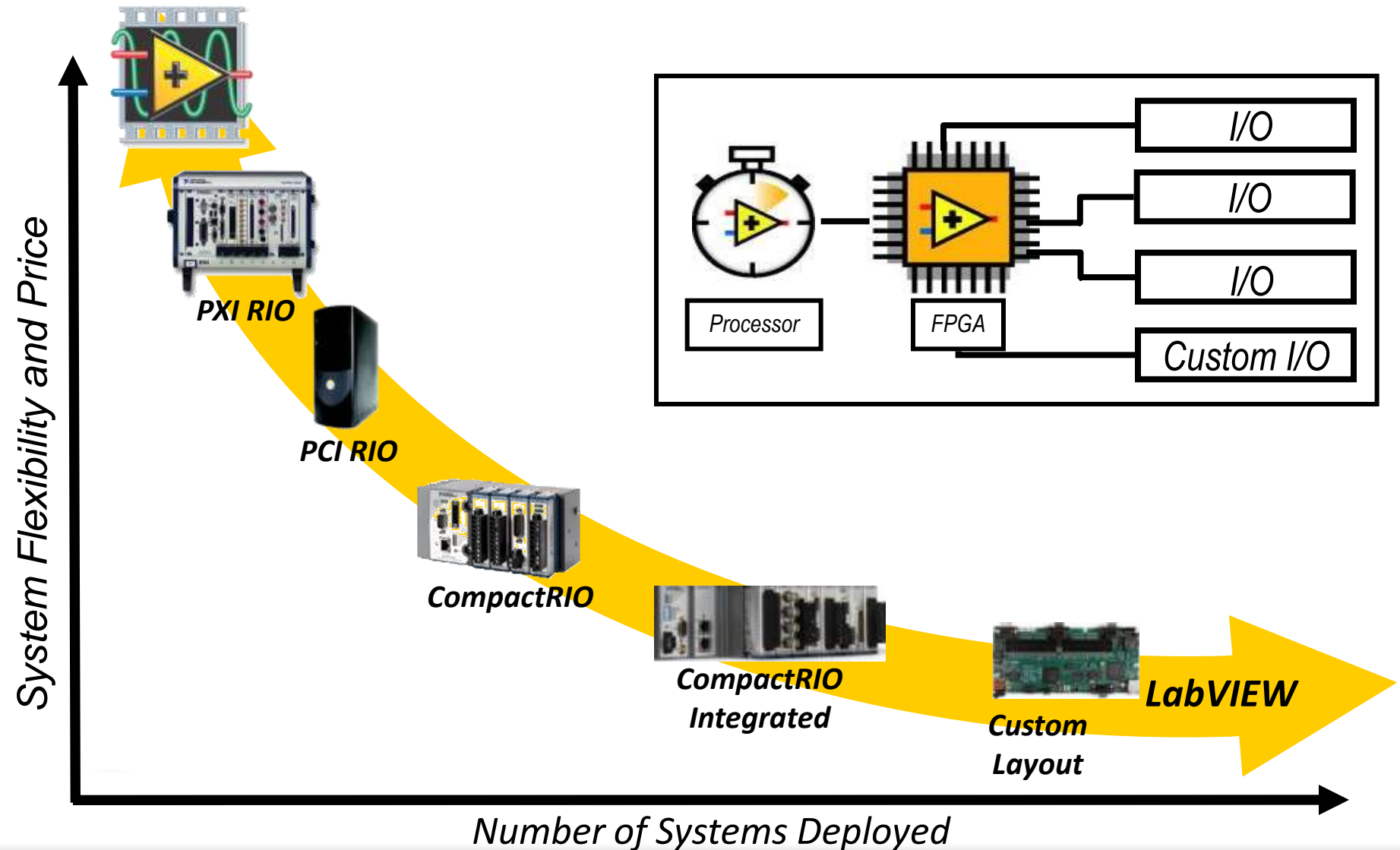
***– Michael Bove, kk-electronic A/S***





# Lab to Market

# Lab to Market Deployment Curve



# Siemens Wind Power Hardware-in-the-Loop Test System Case Study

- Improving the automated testing of frequent software releases of Siemens wind turbine control systems
- A new real-time PXI-based test system for hardware-in-the-loop (HIL) testing of the control system software

*“The modular architecture allows us to scale-up the system to meet the growing requirements of rapidly evolving wind energy technology.”*

*– Samir Bico, Siemens Wind Power A/S*



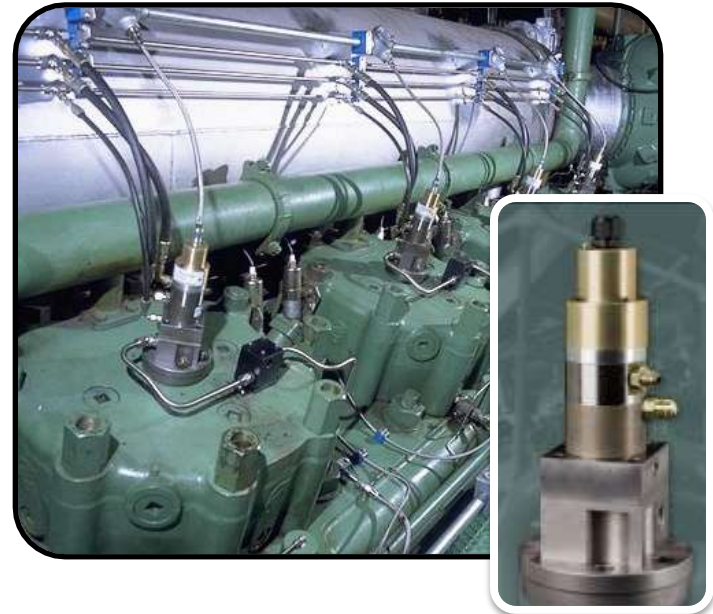


# Measure It and Fix It

## *The Engineering Innovation Process*



***Measure*** Water and Air Quality  
***Measure*** CO<sub>2</sub> and NO<sub>x</sub> Emissions  
***Measure*** Power Usage



***Fix*** Old Engine Controllers  
***Fix*** Wasteful Processes  
***Fix*** New Sources of Energy



# Danish Navy reduces NOx up to 90% with NI CompactRIO

- Reducing NOx emissions of Danish Navy vessels to fulfill the International Maritime Organization requirements for 2016.
- Developing a Selective Catalytic Reduction system based on NI LabVIEW and CompactRIO to reduce Nox emissions of a vessel up to 90%.

***Danish Navy is very pleased with the solution and the quick development time.***

***-Andreas Gamborg  
Dansk Teknologi***

