



Implementing a Global Best Practice - Review for National Custody Transfer



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Over 30 years experience spanning all aspects of measurement in the hydrocarbon supply chain including the design, testing, consulting & auditing of Measurement Systems.

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شركة نفط الكويت
Kuwait Oil Company
مؤسسة الكويت للتقنية والقياس
Institute of Measurement and Control



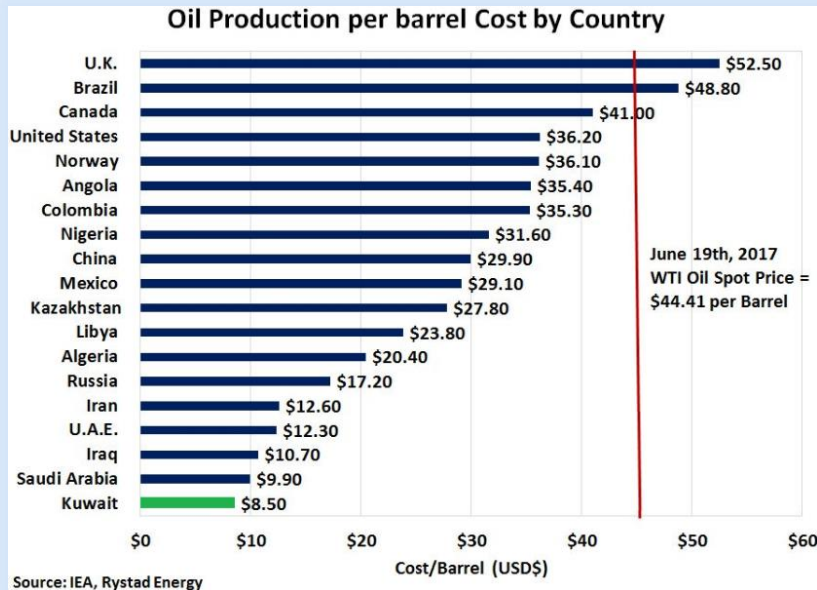
KUWAIT'S OIL TRENDS



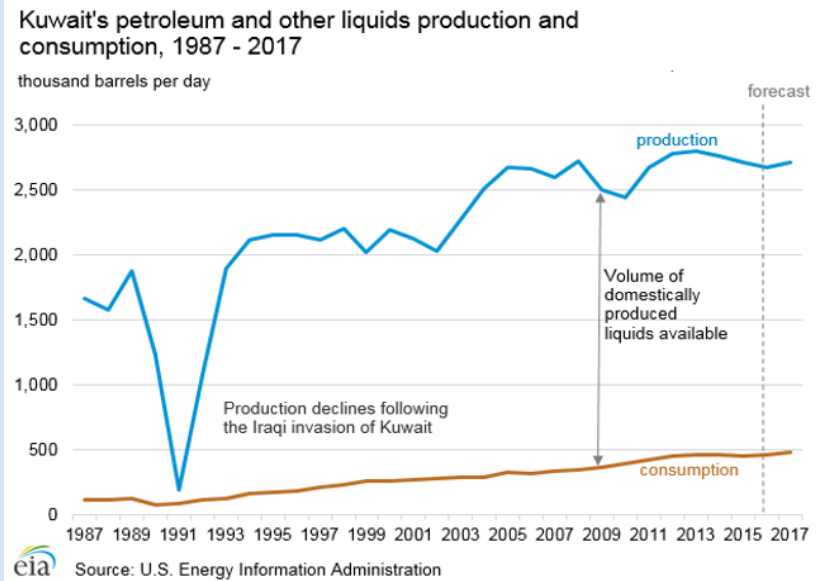
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مؤسسة الكويت للتقنية الحديثة
Kuwait Petroleum Corporation



Kuwait Oil Company (KOC) announced to have received mandate from Kuwait Petroleum Company (KPC) to increase crude oil production from actual 3 million b/d to 4 million b/d by 2020.



Kuwait is the World's 8th Largest Oil Producer.

Market Realist Jan 2017

Kuwait the World's 6th Largest Exporter of Crude Oil.

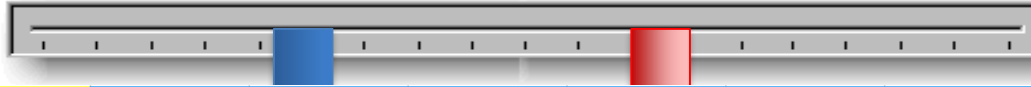
IEA Feb 2017

Kuwait holds the World's 5th Largest Oil Reserves.

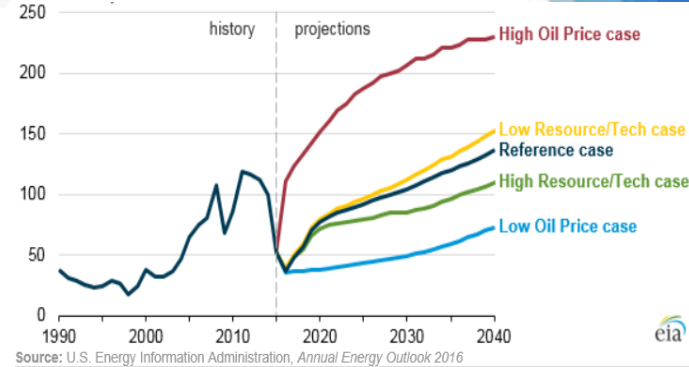
OPEC End 2016



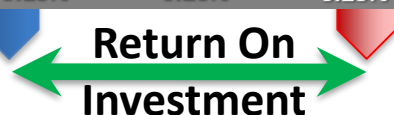
\$ VALUE OF MEASUREMENT



BPH	Yearly Financial Risk @ 50 USD/barrel					
100,000	\$43,800,000	\$65,700,000	\$87,600,000	\$109,500,000	\$131,400,000	\$2,190,000,000
125,000	\$54,750,000	\$82,125,000	\$109,500,000	\$136,875,000	\$164,250,000	\$2,737,500,000
150,000	\$65,700,000	\$98,550,000	\$131,400,000	\$164,250,000	\$197,100,000	\$3,285,000,000
175,000	\$76,650,000	\$114,975,000	\$153,300,000	\$191,625,000	\$229,950,000	\$3,832,500,000
200,000	\$87,600,000	\$131,400,000	\$175,200,000	\$219,000,000	\$262,800,000	\$4,380,000,000
Uncertainty	0.10%	0.15%	0.20%	0.25%	0.30%	0.50%



Return On Investment



Take KPC 's daily production of Crude Oil as **3 MBPD**:
 Estimated **Current** Measurement Uncertainty is +/- 0.25 % = \$136 million RISK !
Target Measurement Uncertainty is +/- 0.15 % = \$82 million RISK !

ROI

LOWERING THE UNCERTAINTY...
REDUCES THE FINANCIAL RISK
 by **\$54 MILLION per YR.**



IMPLEMENT BEST PRACTICES

THE **GOAL** IS TO REDUCE OUR MEASUREMENT UNCERTAINTY.



THE **METHOD** IS TO APPLY BEST PRACTICES ACROSS OPERATIONS, MAINTENANCE, ENGINEERING, TRAINING, AND ADMINISTRATION.



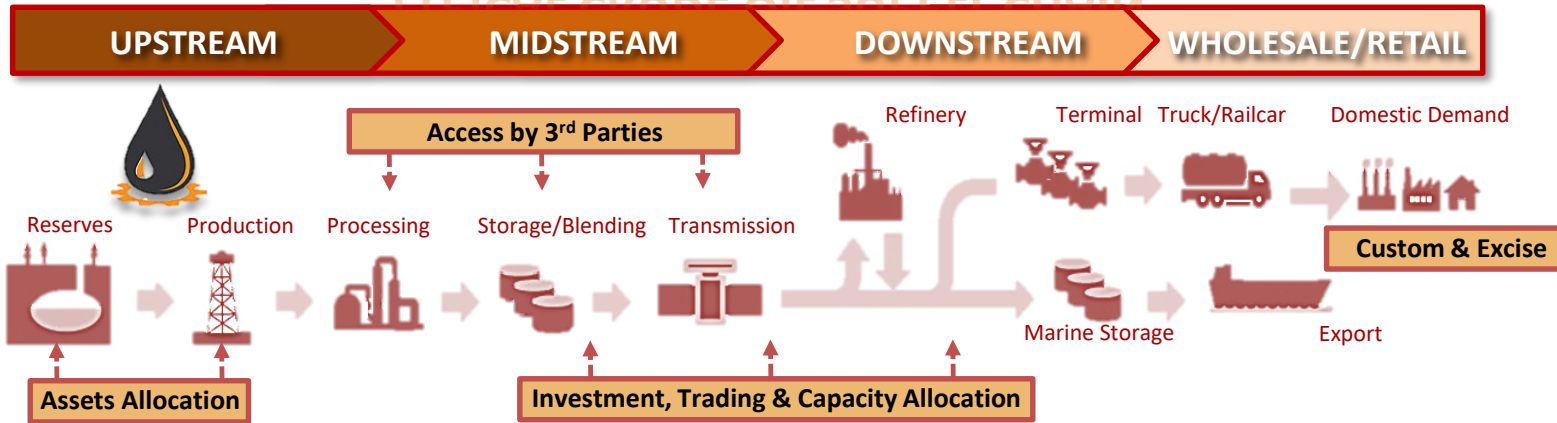
THE **RESULT** IS COMMERCIALY PROVEN RELIABLE & SUSTAINABLE MEASUREMENTS.



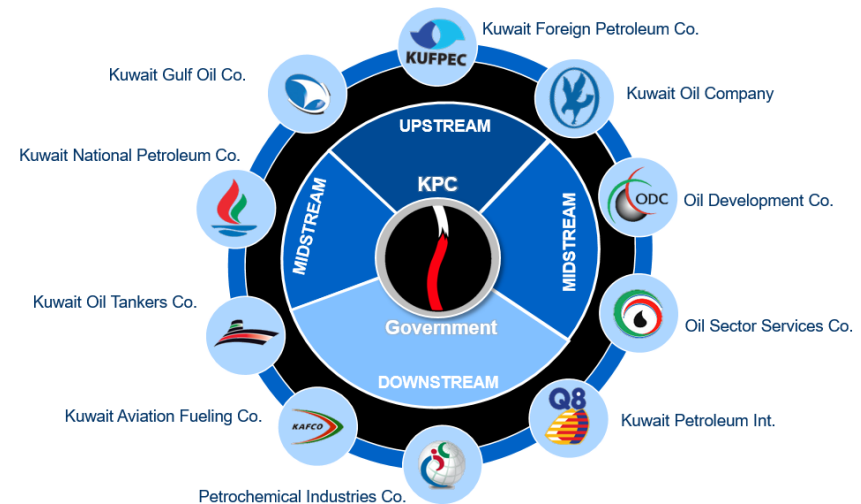
A best practice is a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark.

OPERATIONS

TYPICAL CRUDE OIL SUPPLY CHAIN



Management of measurement, covers the on-going management and operation of the measurement system once production, distribution and sales have commenced



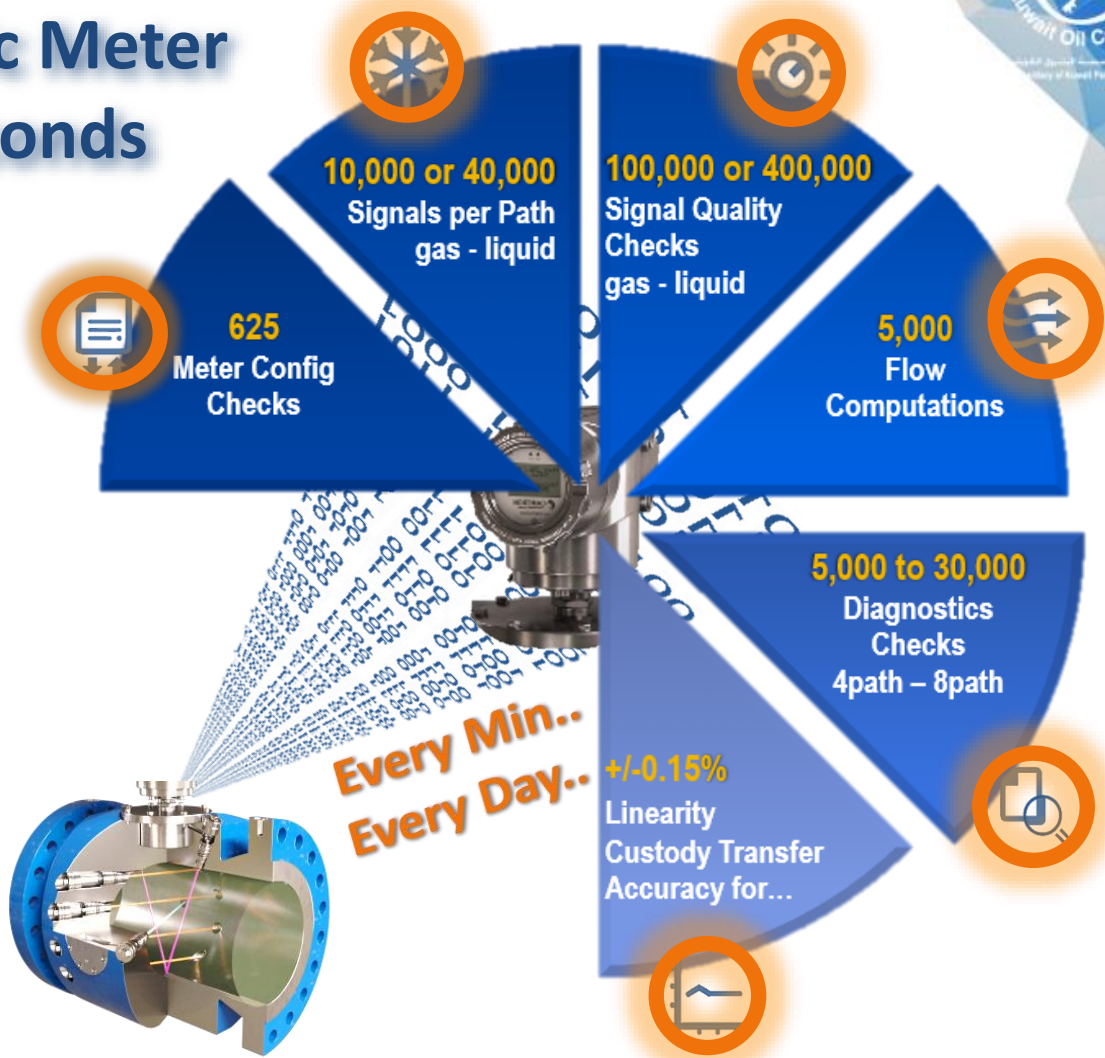
OPERATIONS USING SMART

What Your Ultrasonic Meter Does Every 60 Seconds

Get all the Data you can !..and we'll Think of a Use for it Later



"Without Data Your Just Another Person With An Opinion"
W. E. Deming (1900-1993)



MAINTENANCE USING SMART

Condition Based Monitoring Enhancement

- Resident in the Meter **Electronics**:
 - Moves between calibration lab and site
 - Variables can be acquired over Modbus
 - Simplifies site integration
- **Unique** diagnostic information
- CBM that can be **leveraged** across the USFM range



Quantifying the Meters Performance

- Meters start with a **traceable** calibration
- Meter can tell you if its calibration has **shifted** without removing it from the process
- Calibration can only change with a **structural change** to the Coriolis sensor
- Monitoring diagnostics **verifies** Meter integrity
- Only **re-calibrate** when **or if** the diagnostic information tells you.

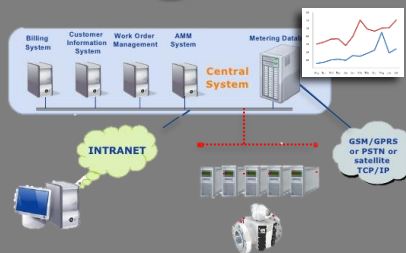


“What Gets Measured Gets Managed”

Peter Drucker (1909-2005)

ENGINEERING THRU LIFE

System Integration



- Ability to utilize Network for Meter Analysis
- Empirical Data Analysis Multi discipline reviews
- Problems can be foreseen before events

Gas Meter Diagnostics

Station Diagnostic Alert 

5 min → 4 hrs → ½ - 2 days

Evaluate Meter or Process Specialist Assessment Root Cause Verified

Traditionally ~ 31 days or next Audit ! to identify cause of increased uncertainty

Fiscal Risk and Evaluate Product Loss/Gain (31days @\$1.2k/day) = \$ 41,200 Loss per Event

Liquid Meter Diagnostics

Station Diagnostic Alert 

30 min → 4 hrs → ½ - 2 days

Evaluate Meter or Process Specialist Assessment Root Cause Verified

Traditionally ~ 7 days or next Prove ! to identify cause of increased uncertainty

Fiscal Risk and Evaluate Product Loss/Gain (7days @\$1.2k/day) = \$ 15,550 Loss per Event

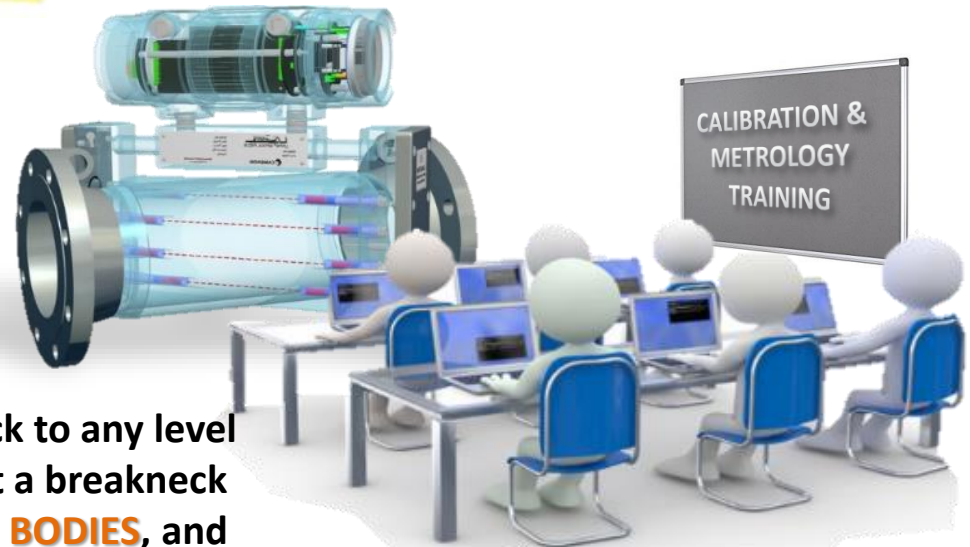
Metrology Best Practices being Applied

TRAINING

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مؤسسة الكويت للتقنية
Kuwait Petroleum Corporation



“I don't see how the industry comes back to any level of activity that is busy without a breakneck amount of **CHASING BODIES**, and there just aren't going to be enough to go around.”

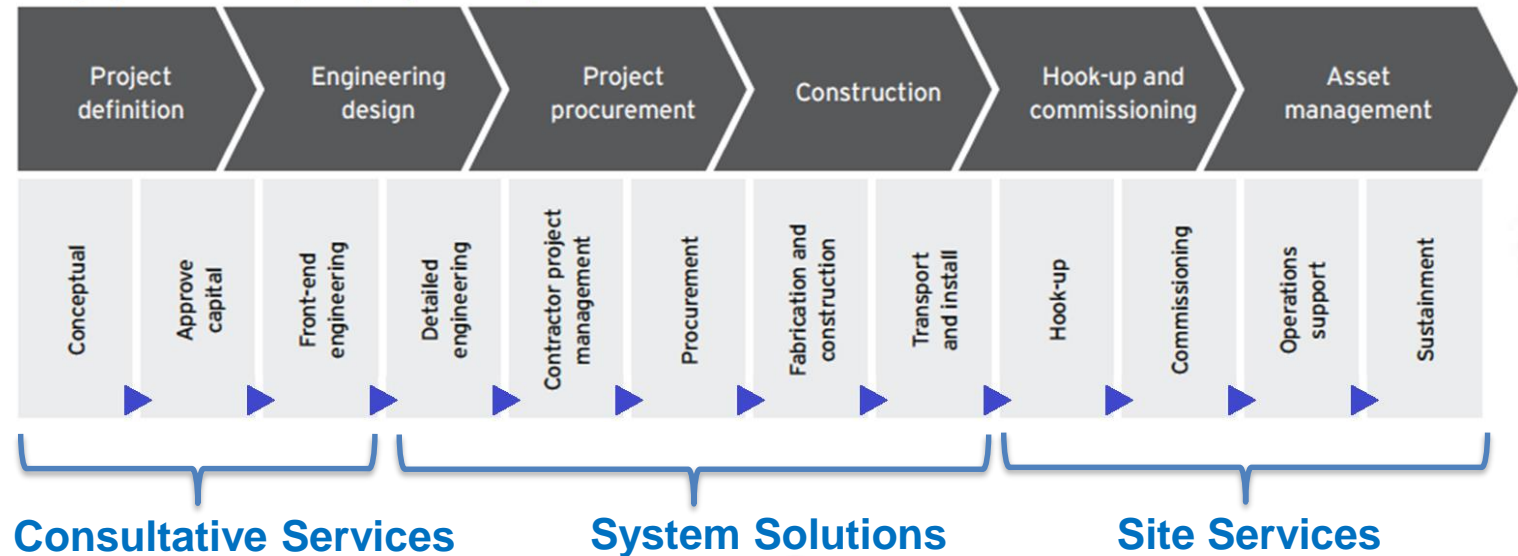
-Jeff Bush, CSI Recruiting president 2016



ADMINISTRATION

Hydrocarbon Measurement Management System HMMS

Stage gates of the capital project life cycle



- FIELD AUDIT**
- HEALTH CHECKS**
- SPOT ASSESSMENT**
- UNCERTAINTY STUDY**
- ALLOCATION REVIEW**



CONCLUSION



HM54 “Guidelines for the Management of Measurement for the UK Upstream Oil and Gas Industry”.

ISO 10012. “Measurement Management Systems – Requirements for Measurement Processes and Measuring Equipment”.



API COPM Committee On Petroleum Measurement Standards presently considering possible development of HMMS Guideline.

Financial Exposure **REDUCED** and
Material Balances **IMPROVED**

LOWER Uncertainty and
OPTIMIZED Performance

SUSTAINABLE and **RELIABLE**
Measurements thro Lifecycle





Thanks for Attention

Back at 10.10am

