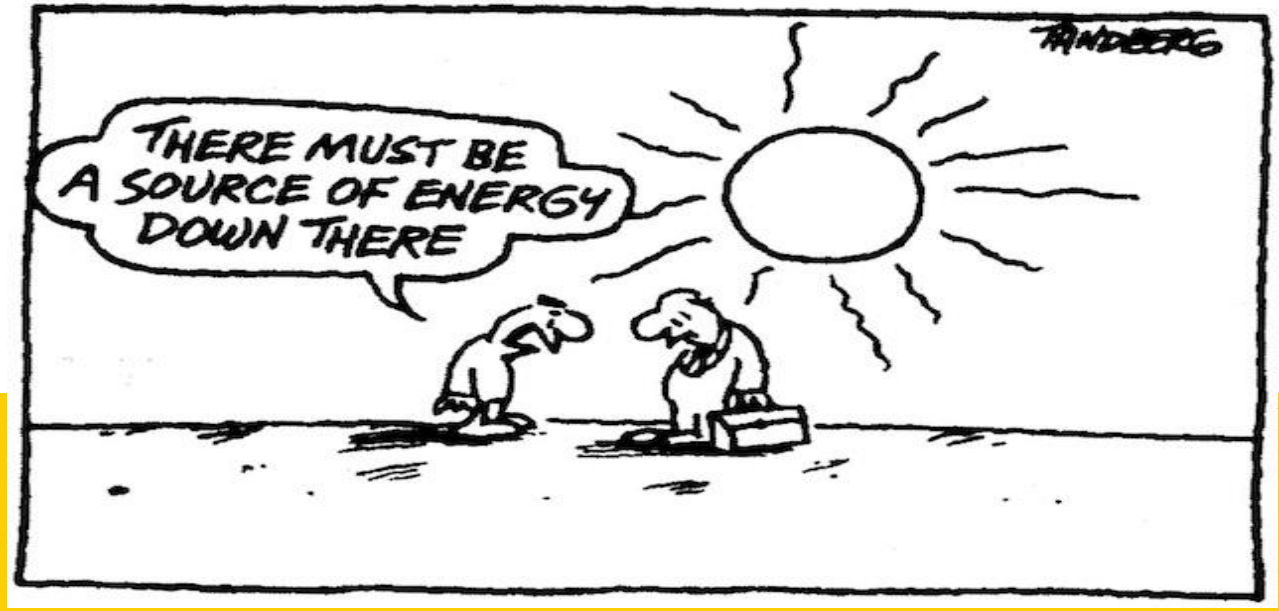
Energy Efficiency and Renewable Energy for the Oil and Gas industry- EU-GCC Clean Energy Network

Basil Elzein
November 9th, 2016



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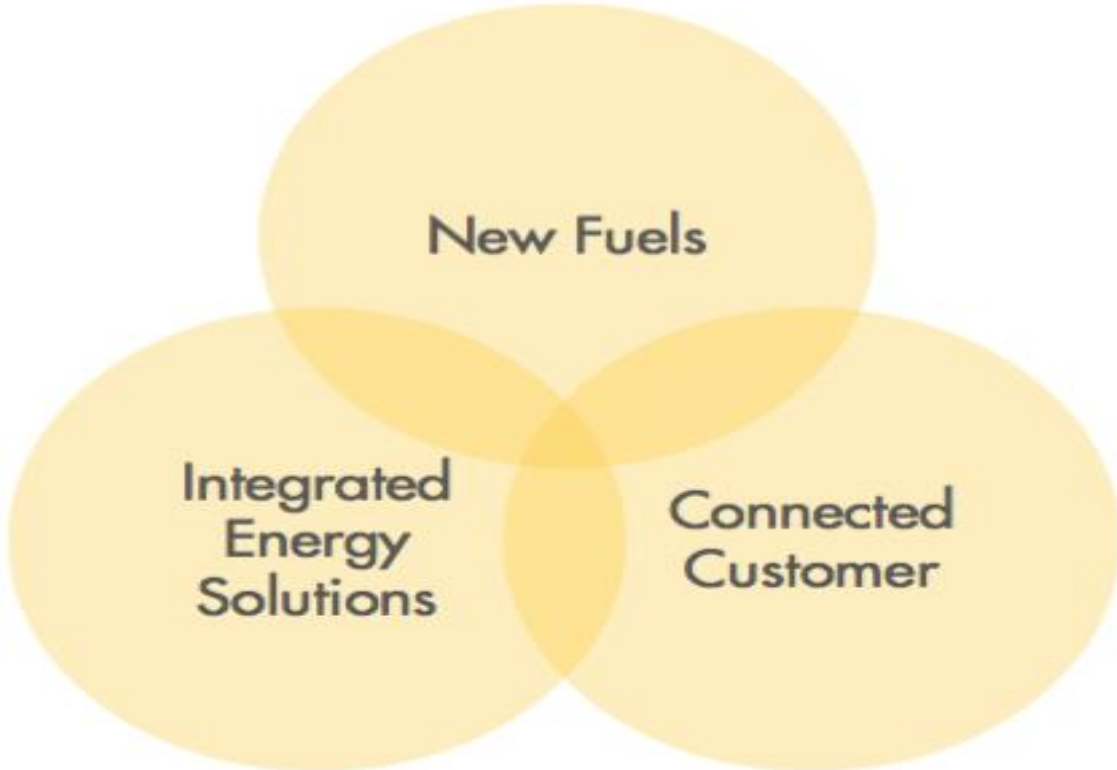
SHELL: OPPORTUNITIES IN NEW ENERGIES
FUTURE OPPORTUNITIES

- Material value + upside
- Assessing options + technologies
- Capped exposure

New Energies

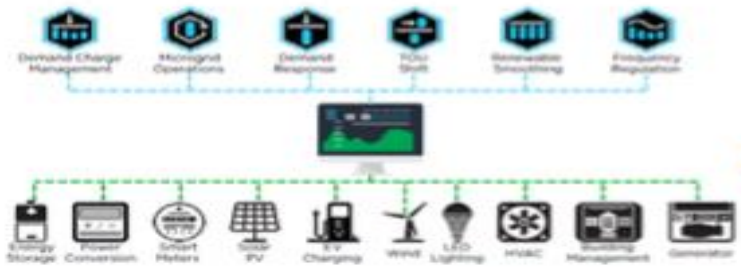


- **Capital employed $1.75 bln : biofuels, wind, solar, hydrogen**
- **$200 mln estimated 2016 spend**

NEW ENERGIES R+D INVESTMENTS – OTHER EXAMPLES

Growing Energy Labs Inc (Geli)

Geli



- Internet of Energy
- Software applications
- Link with energy storage
- Reduce cost and increase reliability of flexible electricity delivery

Kite Power Solutions

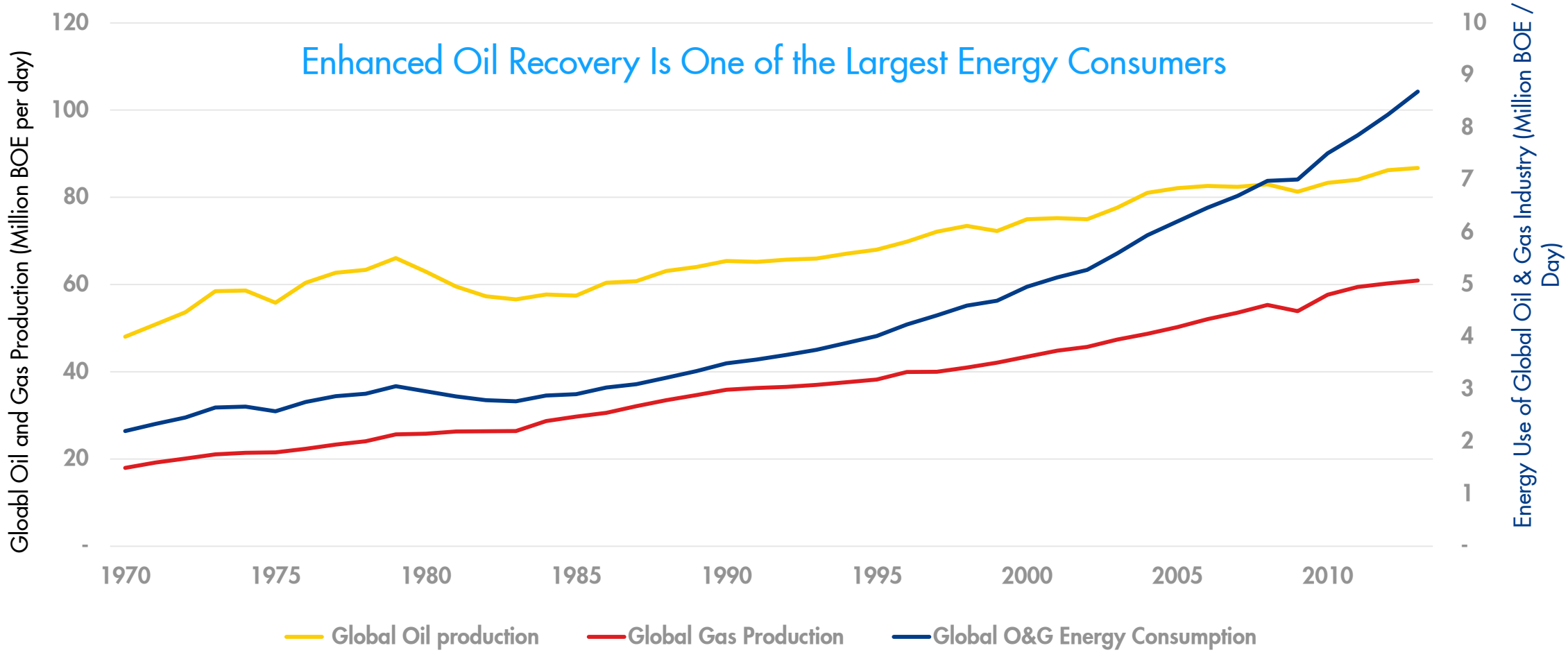
KPS
KITE POWER SOLUTIONS

- Accessing high altitude wind which is less intermittent
- Aim to reduce the cost of wind energy

Aquion Energy

- Develop high-performance batteries
  - non-toxic
  - cost-effective
  - industrial scale
- Balance energy production and demand

Global Oil & Gas Energy Use ~10% global consumption



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Small scale Integration of Renewables into Oil and Gas operations

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Industrial Scale Integration of Renewables into Oil and Gas operations

Glasspoint - PDO Oman
(California, Kuwait)

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Solar into Schools

3 main project objectives:

- **Contribution to Oman's energy transition**
- **Development of commercially competitive and competent Omani solar SME's**
- **Educational awareness on energy choices**

100

The approximate size of each school PV generation system (in kW). Surplus electricity will flow back to the public grid.

We are actively partnering and collaborating with a range of regulatory bodies, agencies and key stakeholders to help successfully deliver the Solar into Schools Project and to contribute to Oman's energy transition by helping build a platform for implementation of small-scale solar projects in Oman.

22

The number of PV generation systems we aim to install into public schools across all Governorates / regions in Oman, over the next 5 years.

4

The number of our first tranche of pilot sites. These sites are located in Muscat, Al-Buraimi, Nizwa and Salalah.

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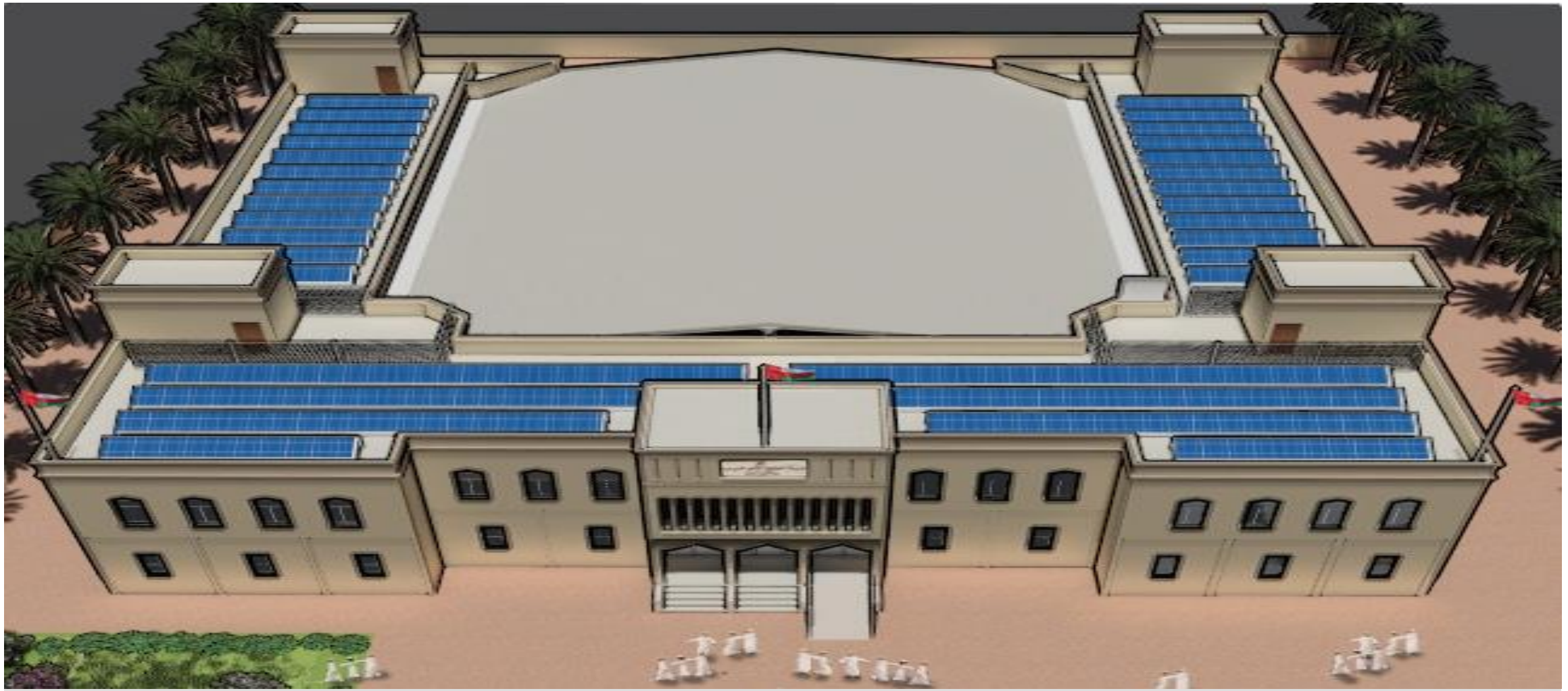
Oman's existing architecture lends itself to installation of roof top PV arrays*



* Indicative image only. Each site will have a bespoke design to take into account individual site conditions and/or constraints.

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CARBON AND Energy MGT INFORMATION SYSTEM (CEMIS)

What is it?

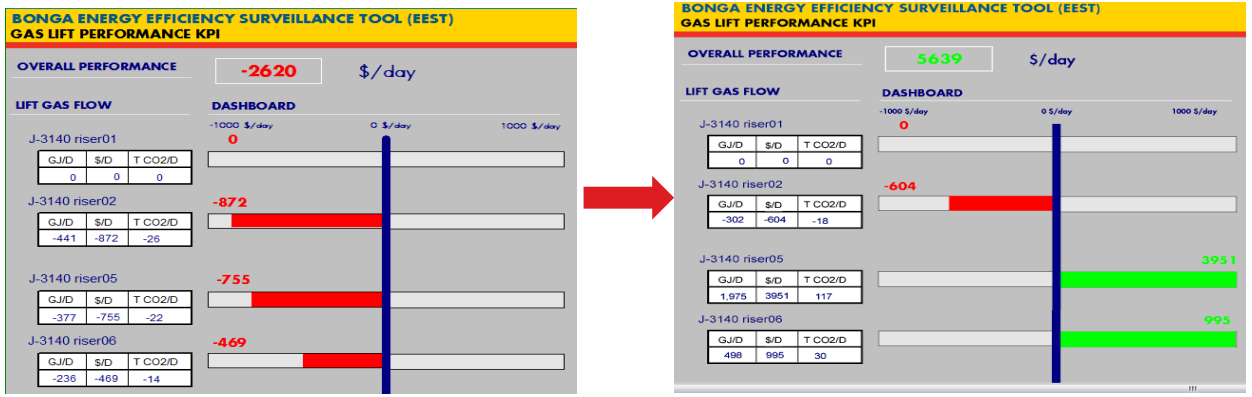
- Current practice: Energy / CO_2 costs and performance gaps is largely
- CEMIS is a combination of structured management processes and monitoring and analysis tools, linked to real-time plant data systems
- Based on an established DSM standard

What can I use it for?

- CEMIS utilises "follow the money approach" by identifying energy drivers and setting targets
  depending on complexity (efforts from cross discipline work (CEM, Smartconnect, etc.) – hardware not included

What will it get me?

- Delivers better predictable people behavior
- Reduces CO_2 output, saves energy, and hence Unit Operating Cost goes down and by saving fuels may increase production
- Bring improved availability through a better stable operation
- Benefit at least 5% of energy use savings



Application Example

- Successful Upstream deployment in asset X
  - Major bad actors discussed in the EEST workshop in December 2013 are addressed, e.g Flaring, Lift gas, water injection, inert gas etc. ($8m gained; $6m – flaring & $2m energy use)
  - Gains from one of the gaps (Lift gas flow), resulted in substantial (oil and gas) production increase (~$70m)
  - Continuous effort needed for further identified gaps.

Cost to implement	Asset manpower required	Timeline FID to implementation/impact
LNG Plant: ~$250k Conventional Plant: $100k	Coordinator: ~40 hrs Engineers: ~40 hrs PI Team: ~50 – 60 hrs	LNG Plant: 6 months Conventional Plant: 3 months

More Info

Maturity: D4-Su

P&T Focal Point: Oluseyi Adeyemo, GSNL-PTE/EUHT

PRODUCTION OIL	OPEX
PRODUCTION GAS	HSSE

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