Quantum Solutions

NANO-EMULSION FUEL TECHNOLOGY (NEFT)

A presentation to potential clients or partners

Sofia, June 2014

Context

Global hydrocarbon resources are in a net decline despite new discoveries and identification of new sources such as shale gas. For countries without their own natural resources and/or refining capacity, they are faced with uncertain and often exorbitant oil costs for their power generation. This has an inevitable knock-on effect on their local economies

Dependence on Heavy Fuel Oil (HFO)

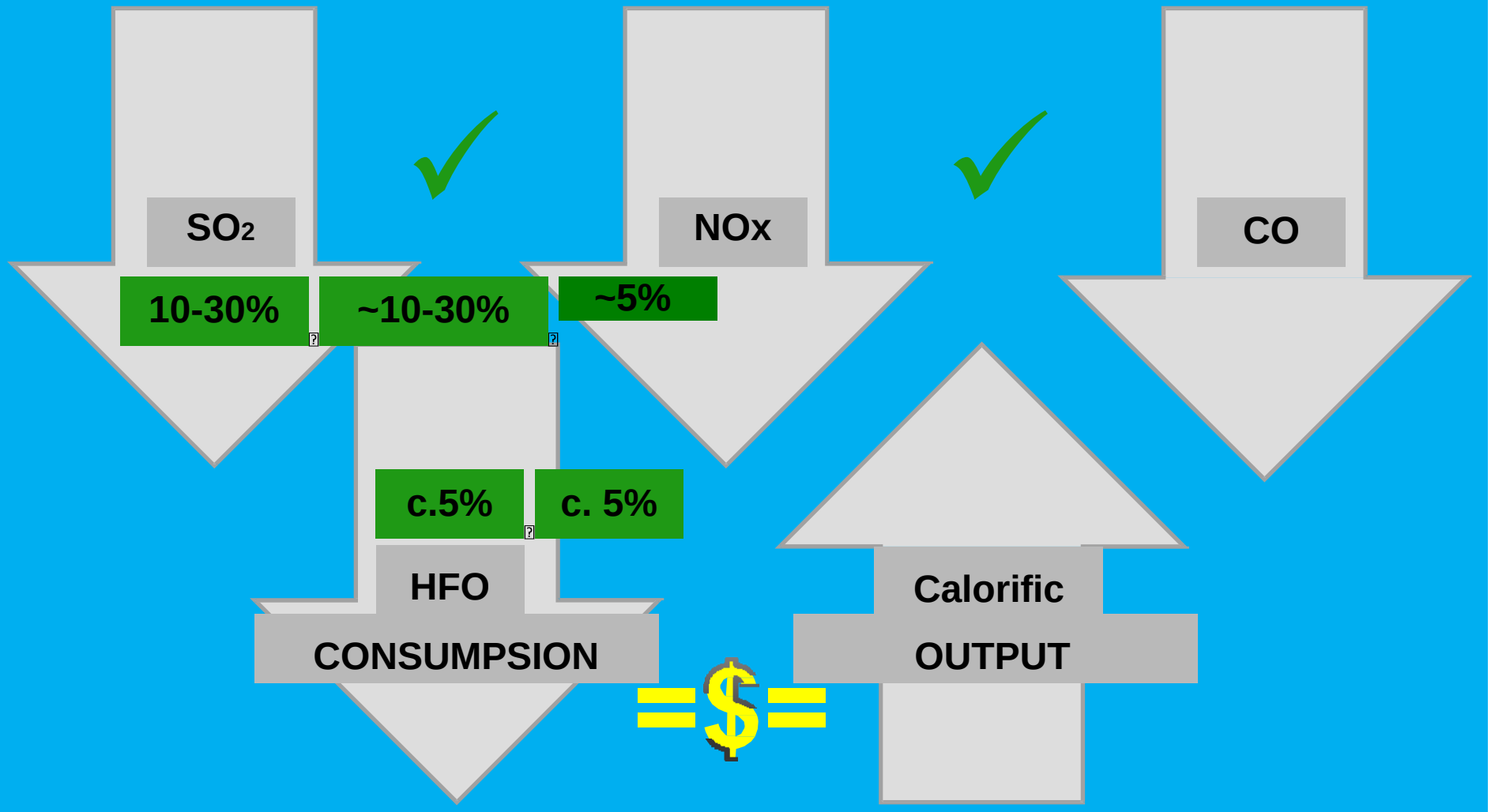
Many countries have developed strategic plans to move on to more efficient power generation eg. LNG, CNG and alternative renewable energy such as Solar, Wind, Bio-degradable, Tidal and Nuclear. In spite of this, these projects are long term and are unlikely to achieve full capacity for many years. In some cases these options are not viable. Therefore in the short term, they will remain dependent upon oil and Heavy Fuel Oil (HFO) in particular as the main feedstock for power and heat generation.

NANO-EMULSION FUEL TECHNOLOGY (NEFT)

We are a service based business that will have an immediate impact on the volume of HFO consumed (and/or increase the capacity of the power to be generated) and as a result reduce the cost of production of energy whilst also reducing adverse pollution and carbon emissions.

NEFT – KEY DELIVERABLES

HARMFUL EMMISSIONS – DOWN ↓



FUEL EFFECIENCY - UP ↑

<u>Professionally verified tests have proven the following:</u>

- **5% or more saving in fuel volume, through the addition of water**;
- **Additional 5% or more saving due to less fuel is required to generate the same amount of energy**. Savings are achieved immediately and are optimised within 3 months;
- Significant reduction in mechanical particles (i.e. soot) released into the atmosphere.
- Significant reduction in SOx and NOx gases emitted during the burn process
- No major equipment replacement & skilled engineering jobs made available locally
- Manufacture, Installation & Commissioning within a relatively short time (3 – 5 months)
- Please note this solution applies to the use of heavy fuel oils, therefore the actual amount of savings achievable is based on fuel type, quality and price of oil (which may fluctuate over time).

Emulsion Process

- The fuel emulsifier technology uses ultrasonic shockwaves to break down the complex hydrocarbon chains and finely disburse ordinary tap water (in volume of between 5-8%) to create a stable mixture.

- As the water molecules attach themeselves to the hydrocabon molecules, the resultant emulsified fuel does not separate even with long term storage (proven up to a year) including freezing and thawing without the use of additives such as surfactants.

In the Burner

- The added water molecules allows a more complete burn of the fuel generating higher temperatures creating a further 5% reduction in consumption as less fuel is required to generate the same amount of energy.

- This complete burn process significantly reduces the amount of mechanical particles (i.e. soot), Sulphur and Nitrous Oxides including a marginal amount of CO_2 gases being generated. This result provides an additional benefit of contributing towards countries achieving their international environmental commitments such as the Kyoto and Rio Agreements

Actual test and exploitation result findings:

Higher quality and more efficient fuel combustion was achieved:

1. The structure of the HFO emulsion means the atomisation of the fuel is finer. A shorter flame torch with higher combustion temperature is achieved during combustion than in untreated HFO.

2. The micron size of the water droplets with concomitant pre-mixing of the magnesium additive emulsion breakdown the conglomerates of ashphaltenes, improves combustion and the screens become cleaner.

3. The HFO Emulsion is burned with lower excess ratio without changing the burner aerodynamics than in the untreated HFO case.

4. Due to hotter combustion of the HFO Emulsion, NOx concentration in flue gases increases from 565 mg/m3 in untreated HFO to 695 mg/ m3 , but the HFO emulsion can be burned with lower air excess, thereby producing less NOx.

5. Due to the reduced So content in the HFO emulsion, concentration of SO2 in the flue gas decreases from 2950 mg/ m3 in untreated HFO to 2630 mg/ m3.

6. The boiler efficiency in the case of the HFO Emulsion increases by up to 4.8% in comparison to untreated HFO combustion.

- An Independent international energy institute has reported these findings.

Business proposal:

Option A: Purchase of the equipment "as is"
Option B: Ordering of equipment of scalable size or otherwise customized
Option C: Joint exploitation

For Options A and B, please contact us for specific offer.

Option C is suitable for a partner who wishes to avoid initial capital. We can offer the following model for co-operation:

- **Capital Investment:** A fuel emulsifier will be provided free of cost in exchange for a 50:50 split on the resulting cost saving.

- **Installation and Operation:** Our engineers will install the fuel emulsifier and calibrate the equipment to achieve optimal operation and savings at a location agreed in advance.

- **Operational Maintenance and Fault Support:** For the first 3 months while our engineers are establishing operations suitably qualified local engineers will be recruited to sustain service operation and maintenance including 1st and 2nd level fault support.

- **Resilience**: Basic spare parts will be included in the maintenance service. However in the instance of a major fault the equipment would stop working until an engineer from the manufacturer can attend. Although this would not affect normal plant operation cost savings on Fuel consumption would cease until a solutions is found. Should a higher level of resilience be required it would incur an additional cost.

NEFT – TYPICAL INSTALLATION

IMAGES OF FUEL EMULSIFIER INSTALLED

A: Shows the controls used by the engineers to regulate flow and pressures during operation.

B: Shows the standard hose connections to the fuel store and output of the emulsion

C: Shows the emulsifier as well as standard pumps and controls.

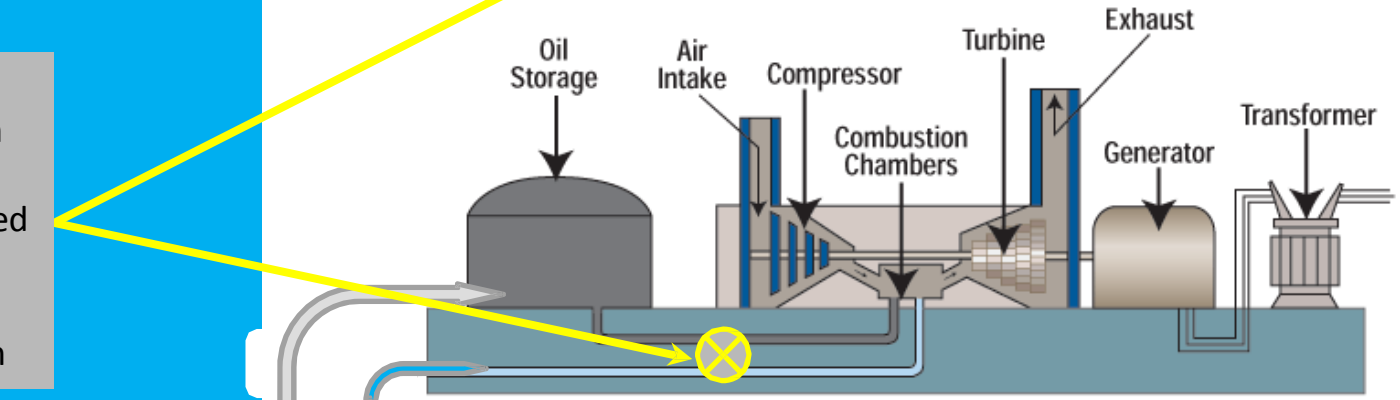
NEFT – TYPICAL INSTALLATION

Processed HFO into Nano-Emulsion is stored & then injected

Nano Emulsion Fuel

StandardHFO

Control valve allows user switch back to standard HFO in case of need and to avoid disruption to energy production



Standard HFO

NEFT installed between storage and combustion. Processed HFO into Nano-Emulsion Fuel injected immediately

For further details please contact us at:

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