Clean Energy now: **YES, WE CAN!**
Urgent Action Required

- To break the link between energy growth and emission growth.
- 3,000 + coal fired plants globally - each of them emitting about 3 million tons CO₂ P.A.
- Our focus is on Greenfield plants and retrofit plants with >35 year old boilers.
Who are we?

- A Scandinavian Clean Energy Solution company
  Oslo – Sandefjord – Finspång - Cleveland

- Mission
  Converting fossil fuels to clean energy - Now.

- Company Focus
  Removal of CO$_2$, NO$_x$ & SO$_x$ from coal, gas and oil fired power plants
Sargas in Norway – and around the World!

- Hammerfest 100 MW gas fired - concession to build pending
- **Gas fired retro-fitting**: One 140 MW Sargas plant at Melkøya – Snehit LNG plant could burn exhaust from 2 of 5 of the existing gas turbines and by doing so; fulfill the concession requirements for CO₂ and NOx.
- 100 MW coal fired plant with CO₂ capture and EOR in Wyoming applied to US Department Of Energy (DOE). Sargas Shortlisted.
- Sargas will offer a retrofit of capture tech to one existing coal fired power plants in the USA, third quarter 2009.
- Daewoo Shipbuilding and Marine Engineering Co.(DSME) engineered a Zero emission power plant for modularised, standardized mass production ALL countries can afford.
- Next step is that Sargas and DSME roll out such low cost power plant globally. Sargas has global lead in Low Capture Cost.
What We Do

Integrated power and capture plant fuelled with coal, gas or oil. Modules of 100MWe scalable. Below 2 x 100 MWe

Ultra Low Emissions with 95% CO₂ captured and only 5 ppm NOₓ. In our demo in Sweden we captured over 99% CO₂
“It has been verified that the pilot plant is able to remove between 98 and 99% (by volume) of the initial CO₂ present in the flue gas.”

Results

- NOx
- SOx
- CO
- PM10
- VOC*

Pollutant Emission lb/MMBtu

Sargass Ultra Clean

Lowest US Emission Limit
Based on Proven and Mature Technology

- Sargas concept is based on two mature and existing technologies; Pressurized combustion and Hot Potassium Carbonate (HPC) CO₂ capture

- Pressurized combustion was developed by ABB early 1980’s with plants in operation in Europe, Japan and USA.

- HPC CO₂ capture process was introduces over 30 years ago with over 800 units is in operation.

- Sargas engineers worked with Amines and realized early 2000 that pressurized combustion and HPC was the perfect match and patented the combination with adaptation and critical components

- Sargas has the combustor and chemical competence needed to understand and handle the complexities of Clean Coal
Technology Application

Pressurised Combustion

Pressurised Petrochemical CO2 Capture

Värtan, Stockholm

More than 1000 plants are in operation around the world
Reconfiguring Existing Technologies
We Work Under Pressure

Pressurised combustion & CO₂ capture

Sargas technology integrates “Field Proven” components into an effective powerplant with CO₂ capture.

- Vartan
  Pressurised boiler
- Melkøya
  Pressurised capture
- Sleipner
  Pressurised capture

Capture Technology

Petro-chemical technology
US Opportunities

- 150 new plants planned.
- CO₂ infrastructure used for EOR.
- Federal regulations upcoming. Build permissions without CO₂ capture denied in certain states.
- US Department of Energy funds available for Clean energy projects.
- Sargas and partners are projecting first plant 100 MWe in Wyoming.
Sargas Green Power | Cost of Electricity

Commercial Equipment | Engineering 1 year | Construction 3 years

$0.07/kWh | NOK 0.45/kWh | €0.05/kWh
Husnes

- 4x100 mw coal fired with CO₂-capture
- Location: next to Søral aluminium works
- Industrial ownership: Søral 50/50 Rio-Tinto / Alcan-Hydro aluminium Eramet Norway Sargas
- Target CoE 6 US cents/kwh – incl. Capture
- Output per annum: 3,000 gwh electricity
- 2.5 mill. Ton CO₂
MONGSTAD EVM | CO₂ Capture

- Delivers 600 MW electricity
- Captures 98% to 99% CO₂
- Compact
- Environmentally friendly Absorbent
DIESEL ENGINE RETROFIT – NEXT GEN

CO₂, NOₓ, SOₓ and PARTICULATE REMOVAL

- Pressurized CO₂ capture
- Price reduction HFO with high sulfur content 15%
- Diesel engine – very low power reduction
- Turbo charger thermodynamic operating conditions nearly unchanged
- Turbo charger cleaner, higher efficiency
- Pressurized system and therefore very compact and efficient
**GREEN TANKER**

- Combination vessel.
- CO₂ and Crude Oil.
- Sargas propulsion machinery.
- CO₂, NOx, SOx and particulate abatement.
- Machinery CO₂ stored onboard.
- No ballast voyages.
- High sulphur fuel can be used.
- VOC emission reduced by 75%

**Specifications**

- Length: 311.00 m
- Pressurised Tanks: 7bar/-55°C x 78
- Cargo Tank Capacity: 164,000m³
- Crude Cargo Capacity: 142,100mT
- CO₂ Cargo capacity: 142,100mT
- Service speed: 15,00 Knots
- Redundant machinery:
  - Two Engine rooms
  - Two variable speed electrically driven main propellers
  - Two POD propellers

**DNV: Tanker for Oil, Cargo tanks pressure vessels Type C**
Future Logistics

Large scale schemes require cooperation and governmental support.
**2003**
Company established

**2006**

Technology:
Pressurized CO2 capture with hot Potassium Carbonate

Patents in USA, China, Russia, and pending in Europe.

Concession application for a 100 MW gas fired power plant in Hammerfest supported by Siemens verification study

**2007**
Proven by Demo
Värtan Demo Stockholm.

Verified by:
IFE, Norway
KTH, Sweden
RSE, USA
WorleyParson, USA
Siemens, Germany

Large scale engineering started.

MOU signed for a 400 MW power plant at Husnes Norway.

**2009**
Basic Engineering
(Coal fired Powerplant)

Prospects/Applications:
- DOE Wyoming US for 100 MW

Commercial Partners:
Daewoo, Korea
North American Power
SNC-Lavalin Thermal

NOK 110,0 mill.* as per 02/2009

*)Støtte fra Naturkraft, Norsk Forskningsråd, Petoro, Gassnova og Innovasjon Norge, inklusive Skattefond, totalt ca. NOK 12,9 mill.
Summary

- 98% CO$_2$ capture proven
- Robust plant concept
- Capture Cost = Sargas best in class
- CAPTURE Costs makes CCS affordable for developing world
- Commercial roll-out started
- Public action, not talk, required to speed up global deployment

- Available NOW!
THE WORLD CAN TACKLE ADVERSITY – WITH GREAT LEADERSHIP; E.G.

The Liberty Ships 1941-1945:

- 3,500 ships built in record time
- 650,000 workers employed
- Using obsolete, but readily available engines and boilers.
Sowing the seeds of a cleaner future!