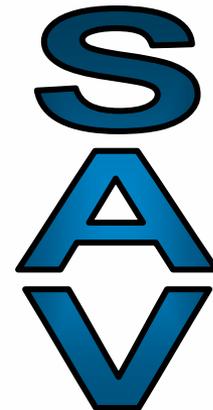


Mustang Engineering, L.P.
Presentation to
LNG Interagency Working Group
Hercules, California
7 December 2006

LNG
Smart[®]
Air
Vaporization



Who is Mustang?



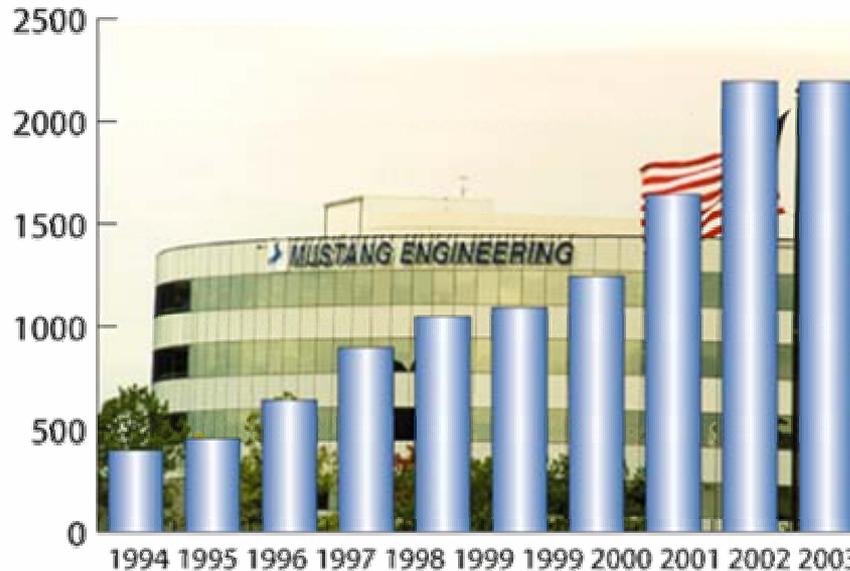
- ***Founded 1987 in Houston, Texas***
- ***Joined Wood Group in 2000***
- ***Engineering & project management***
- ***Services for oil & gas and chemical industries***

Mustang can take your project from Concept to Operations Support

20 consecutive years of growth

Resources 3500+ Strong

Mustang Growth - Personnel



***4500 projects
300 clients***

One of Top Oil & Gas Engineers in World

Top 5 Engineering Company in USA

Mustang Business Units



***Mustang** is a leading engineering firm, providing complete Engineering, Design, and Project Management services and technology to the domestic and international petroleum, chemical, and pharmaceutical industries.*



Oil & Gas



Process & Industrial



Automation



Pipeline



Midstream, LNG/GTL



Process Plants

Wood Group: *Parent of Mustang*

A global market leader in:

- *offshore engineering*
- *subsea pipeline design*
- *mature field enhancement*
- *artificial lift*
- *industrial gas turbine services*



- **\$3.0 bn sales in 2005**
- **16,000 employees worldwide**
- **Operating from bases in 40 countries**

Biographies



Ned Baudat **Director of Projects**

- **40 yrs. of LNG & gas processing experience**
- **Process design, start-up, fabrication, project engineering & project management**
- **LNG liquefaction & regasification, refinery, gas liquids recovery, onshore & offshore**
- **Mustang since December 2003: LNG tech. & projects**
- **17 yrs with Bechtel Global Gas: Project Director, Darwin LNG; Project Mgr., Atlantic LNG Trinidad**
- **Chemical Engineering degree Rice University**
- **Registered professional engineer in Texas**
- **Numerous patents - most recently LNG Smart® products for LNG liquefaction, storage & regas**

Brad Hubbard **Technology & Project Development**

- **31 yrs. project engineering & management of offshore oil & gas facilities, LNG, methanol, GTL.**
- **Mustang since March 2000: Developing offshore LNG regas & liquefaction technology**
- **25 yrs. Amoco: Project Engr. Atlantic LNG Train; offshore gas & production, FPSOs**
- **Ocean Engineering degree Texas A&M University**
- **Registered professional engineer in Texas**
- **Patent for Floating LNG Regas & Liquefaction**

Submerged Combustion Vaporizer (SCV)



- **Advantages**

- **Commonly used in US**
- **Efficient heat transfer from fired gas**
- **Each SCV sized for approx. 150mmscfd; New design for 200mmscfd**

- **Disadvantages**

- **Operating Cost = 1.3% of send out rate used for fuel gas**
- **140 gpm of acid water - requires chemical treatment**
- **Air emissions (CO, CO₂, NO_x)**



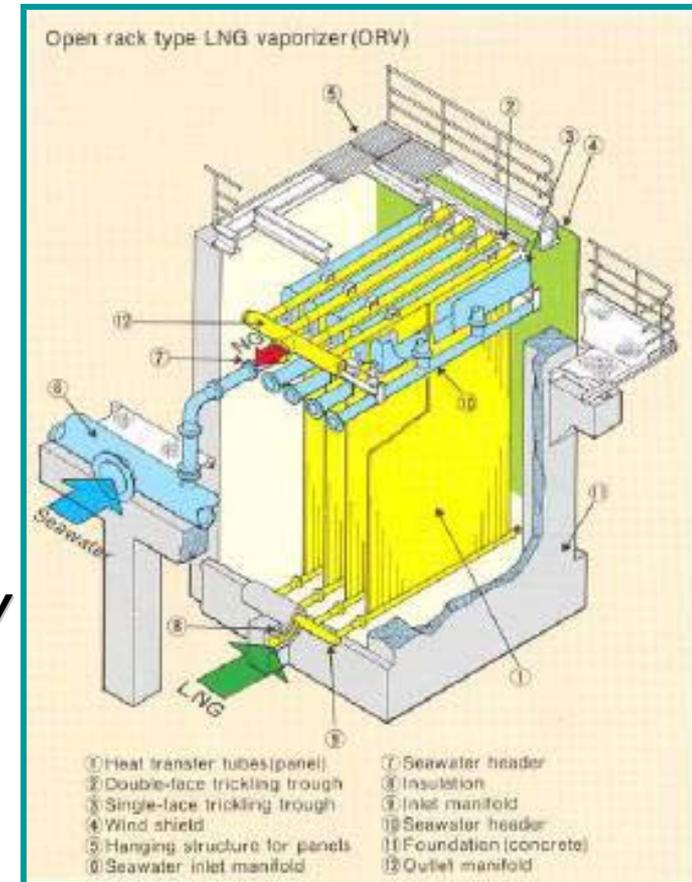
Open Rack Vaporizer (ORV)

- **Advantages**

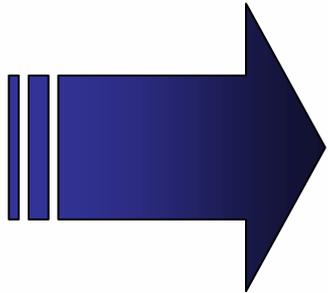
- **Commonly used in Japan, Korea**
- **Relatively small footprint**
- **ORV unit capacity = 0.22 bscfd**

- **Disadvantages**

- **Sodium hypochlorite injection, Chlorine residual**
- **Permitting issues in the U.S.**
- **Water temp sensitive**
- **Seawater quality restrictions / requirements**
- **Reapply coating of tubes to prevent mercury corrosion every 3-4 years**
- **Tubes need to be cleaned every 3 months**
- **Not suitable for offshore floating applications**



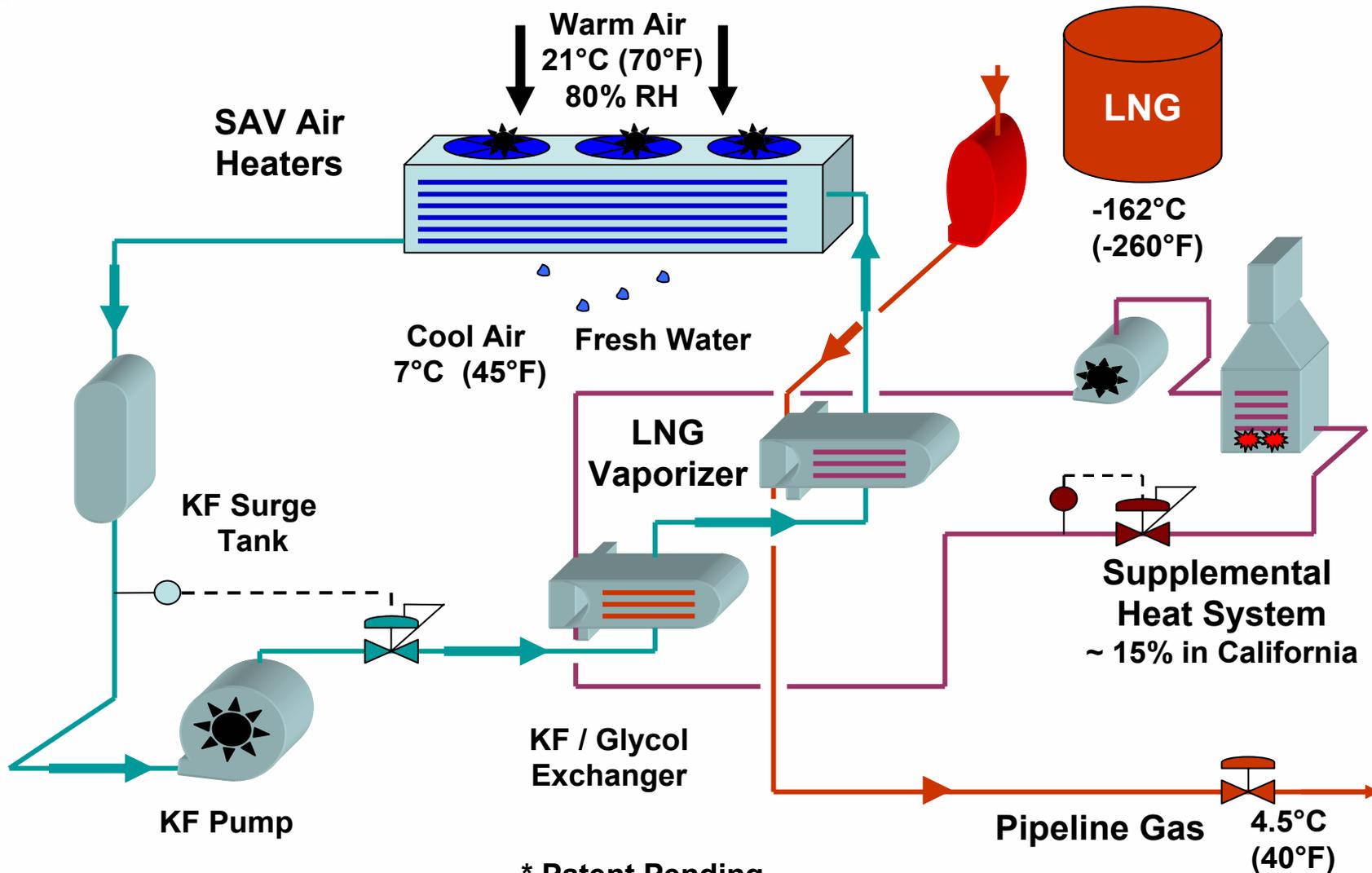
Smart® Air Vaporization



- environment & emissions friendly
- economical
- equipment industry proven

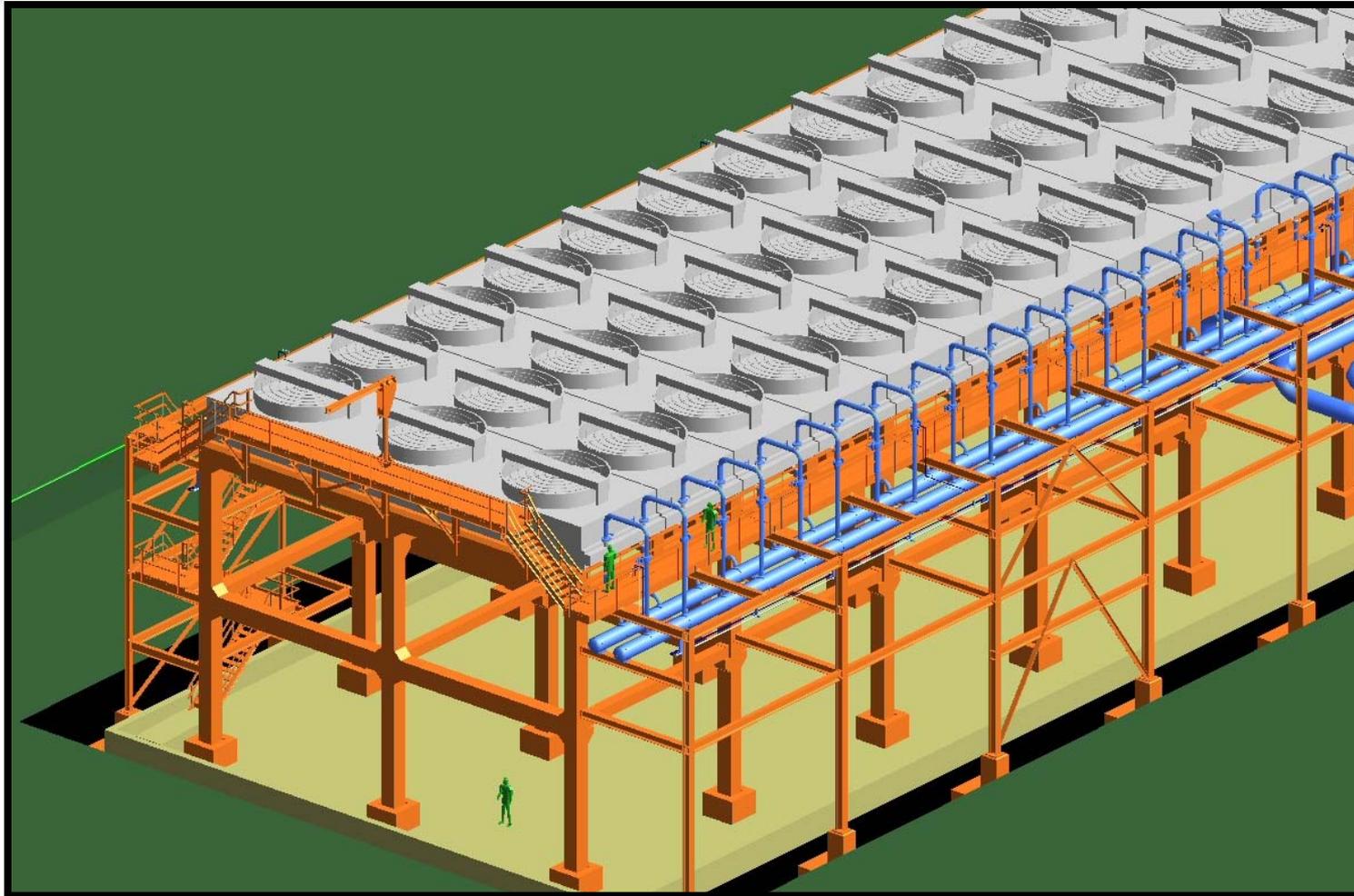
LNG Smart® Air Vaporization Process*

(with Supplemental Heat System)



* Patent Pending

SAV Fin Fan Air Heaters



Rendering of SAV air heaters in an onshore application. Each 3 fan unit is 14' wide by 60' long & mounted on a structure 40' high.

SAV - environment & emissions friendly

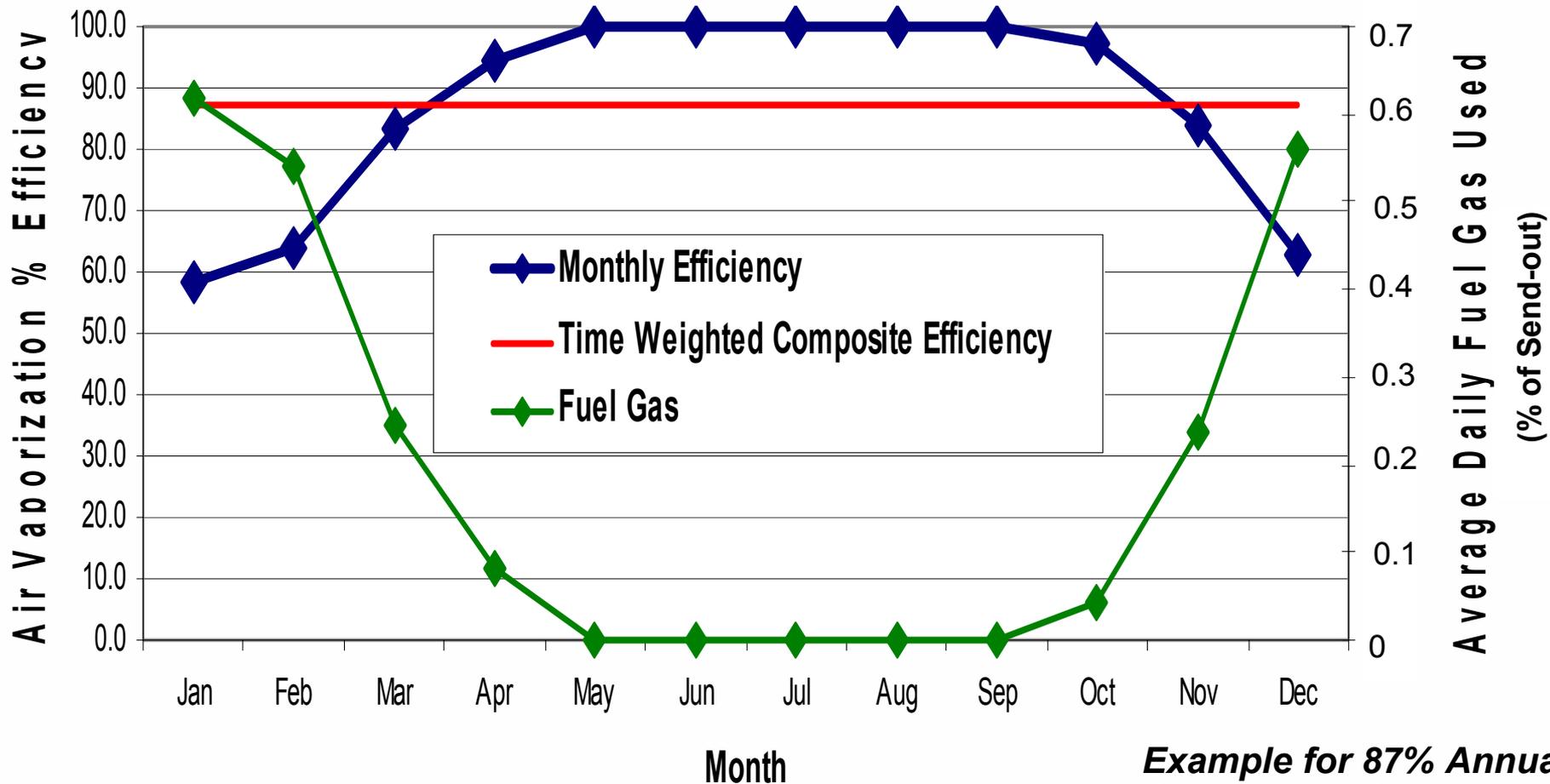


- Safe for people & marine life; no seawater used
- Environmentally friendly intermediate fluids
- By-product ... clean, “fresh water”
- **Reduced air emissions over Submerged Combustion Vaporizers (SCV)**

SAV Monthly Efficiency vs Annual Composite Efficiency



**Basis: 1.0 bscfd Send-out Rate
600 mmBTU/hr Heat duty for LNG Vaporization**



Example for 87% Annual Composite Efficiency

SAV vs. SCV Emissions Example



**Basis: 1.0 bscfd send-out rate – 600 m2 BTU/hr heating requirements
California Coast location**

<i>Vaporization System</i>	<i>Combustion %</i>	<i>NOx tons/yr</i>	<i>CO Tons/yr</i>	<i>CO2 Tons/yr</i>
<i>SCV</i>	<i>100</i>	<i>83.6</i>	<i>62.1</i>	<i>276,860</i>
<i>Smarts® Air Vaporization (SAV)</i>	<i>13</i>	<i>10.9</i>	<i>8.1</i>	<i>35,992</i>

Example for 87% Annual Composite Efficiency

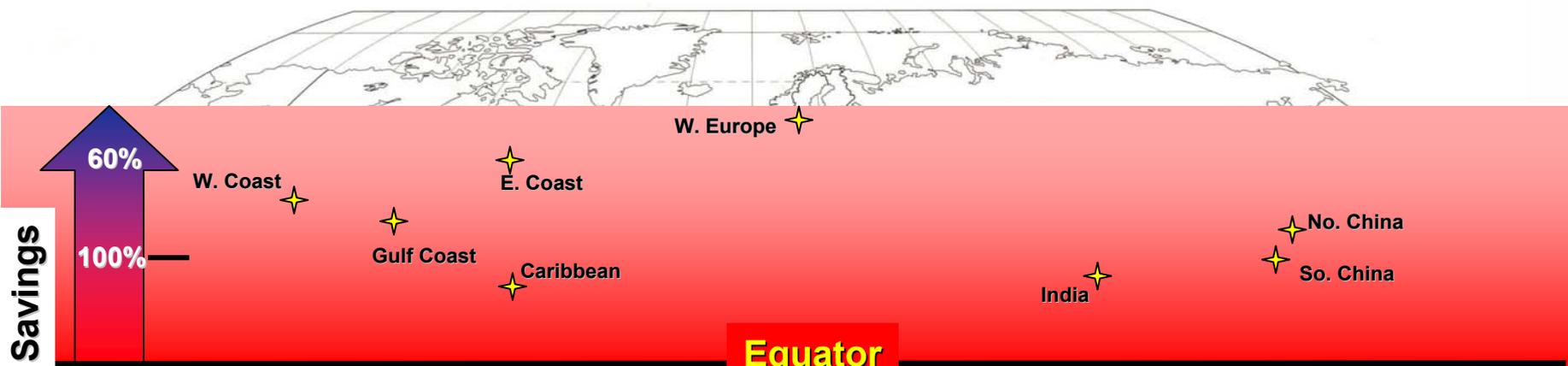
SAV Emission Reduction vs. SCV



**Basis: 1.0 bscfd Send-out Rate
600 mmBTU/hr Heat duty for LNG Vaporization**

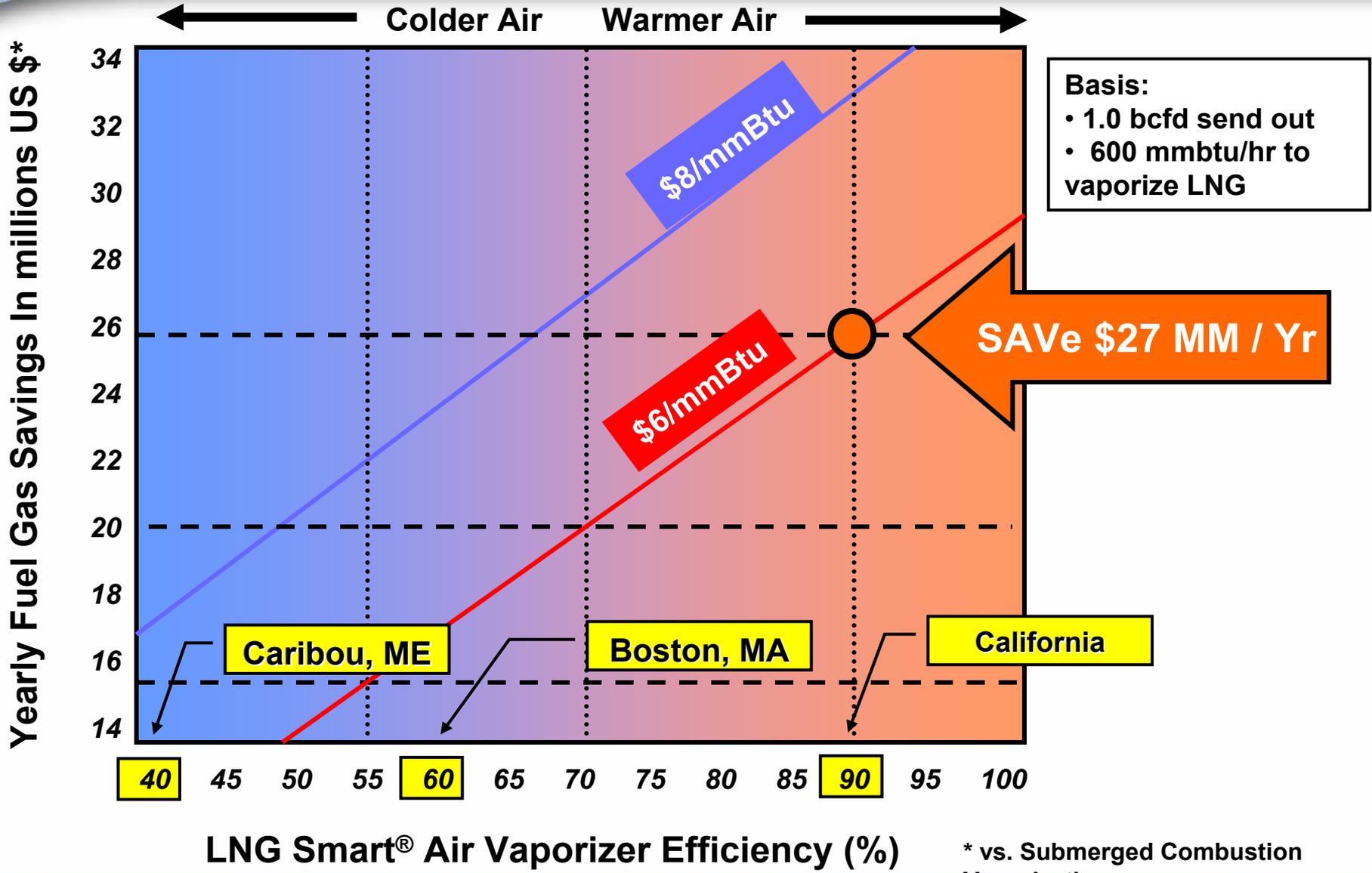
	NOx tons/yr		CO tons/yr		CO2 tons/yr	
SCV Emissions	83.6		62.1		276,860	
LNG Smart® Efficiency %	SAV Emission	Reduction	SAV Emission	Reduction	SAV Emission	Reduction
95%	4.2	79.4	3.1	59.0	13,843	263,017
90%	8.3	75.3	6.2	55.9	27,686	249,174
85%	12.5	71.1	9.3	52.8	41,529	235,331
80%	16.7	66.9	12.4	49.7	55,372	221,488
75%	20.9	62.7	15.5	46.6	69,215	207,645
70%	25.1	58.5	18.6	43.5	83,058	193,802
65%	29.2	54.4	21.7	40.4	96,902	179,959
60%	33.4	50.2	24.8	37.3	110,744	166,116

SAV Efficiency vs. Location



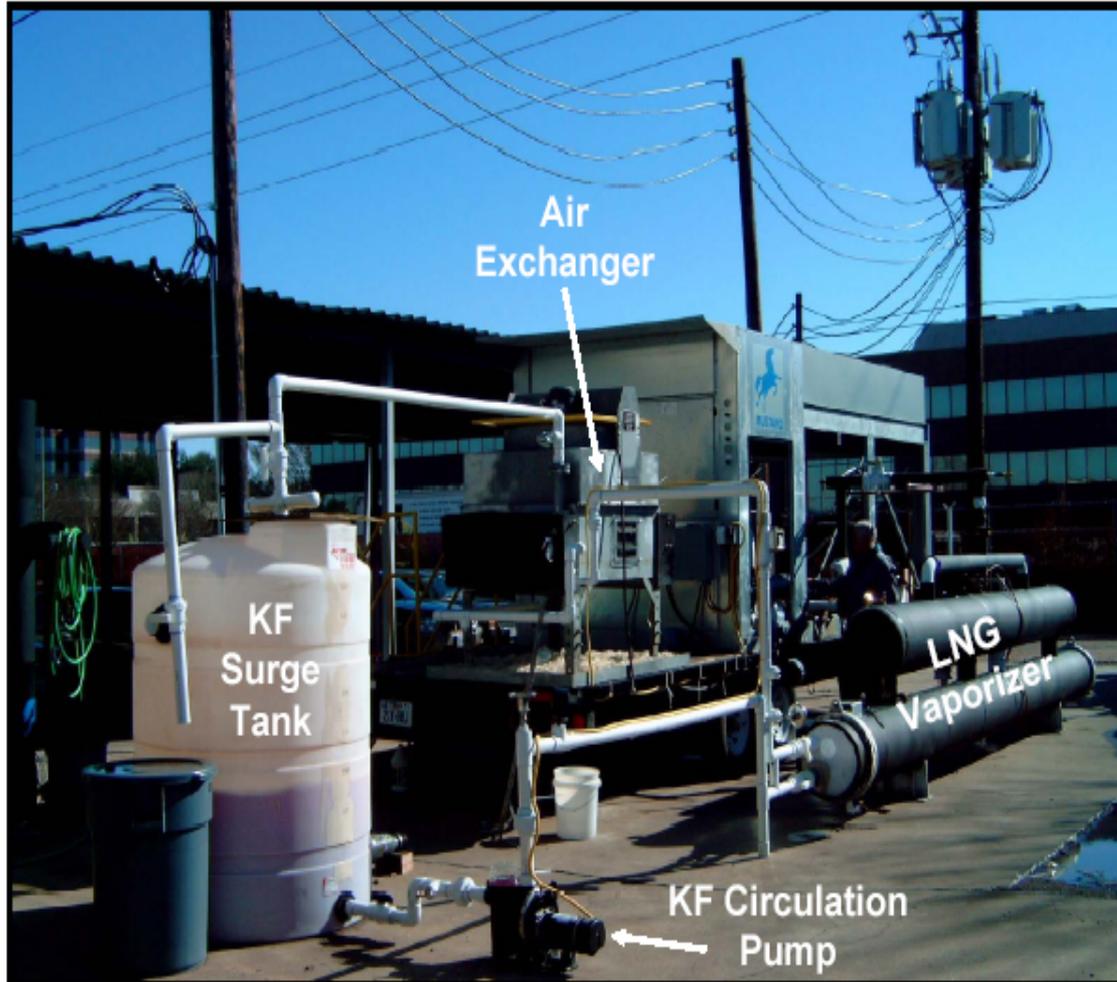
Location	Average Temp.	Average Humidity	% Efficiency (Fuel Gas Savings)
Jamaica	81°F	75%	100%
Lake Charles, La.	68°F	68%	89%
Long Beach, Ca.	64°F	65%	87%
Boston, Maine	51°F	64%	60%
Portland, Oregon	51°F	80%	65%

SAV – economical*



* vs. Submerged Combustion Vaporization

LNG Smart[®] Pilot Plant*



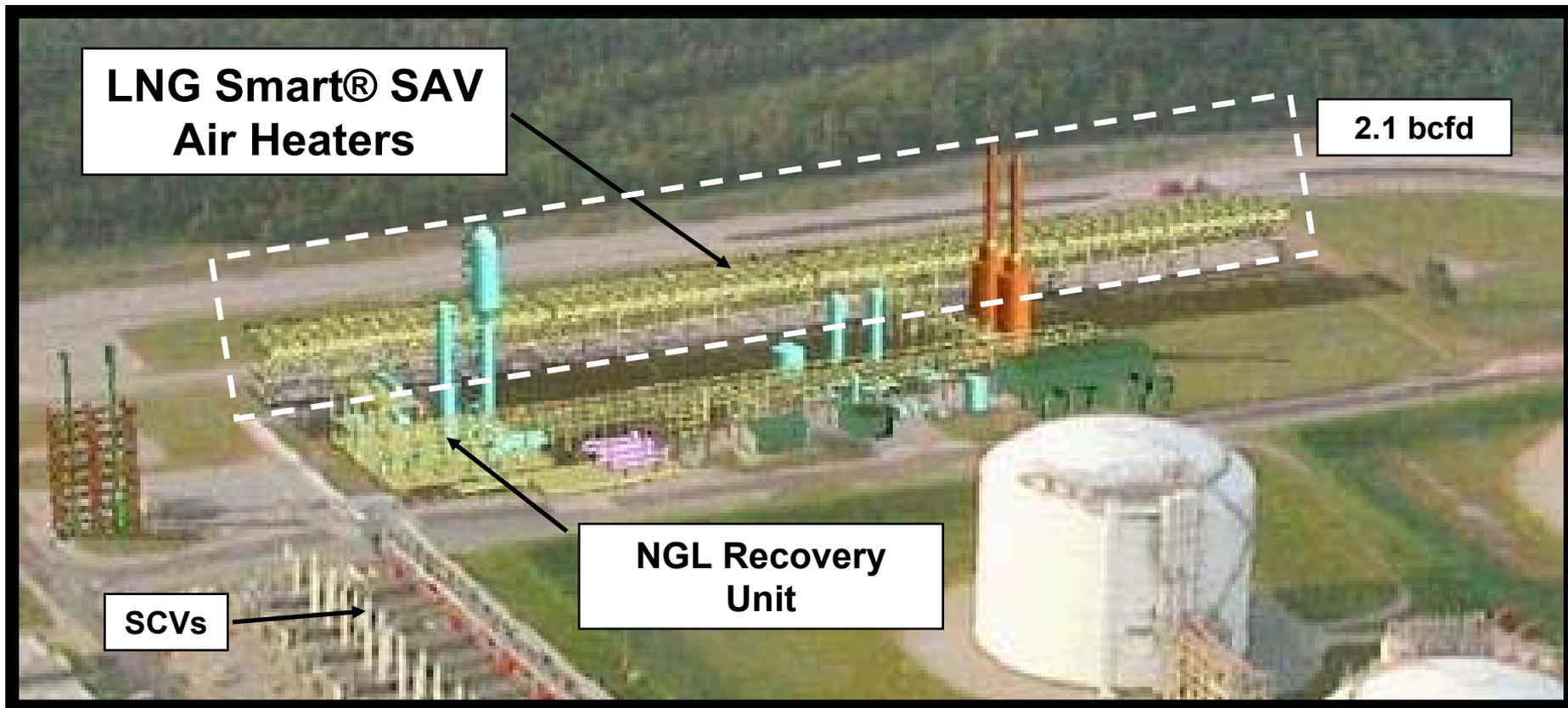
FACTS

- ΔP across coils same for full scale
- Fin fan unit size scale factor = 1/23
- Uses Potassium Formate & water solution for intermediate fluid
- 100% proven equipment
- Same intermediate fluid flow rate per tube
- Same air flow per tube
- Same coil configuration / arrangement
- Same coil diameter and length

SAV Commercialization



- Trunkline, Lake Charles Enhancement Project
- 2.1 bscfd natural gas send-out, Air Vaporization
- 80,000 bpd NGL recovery unit, Btu control
- Scheduled to start up 2nd quarter of 2008

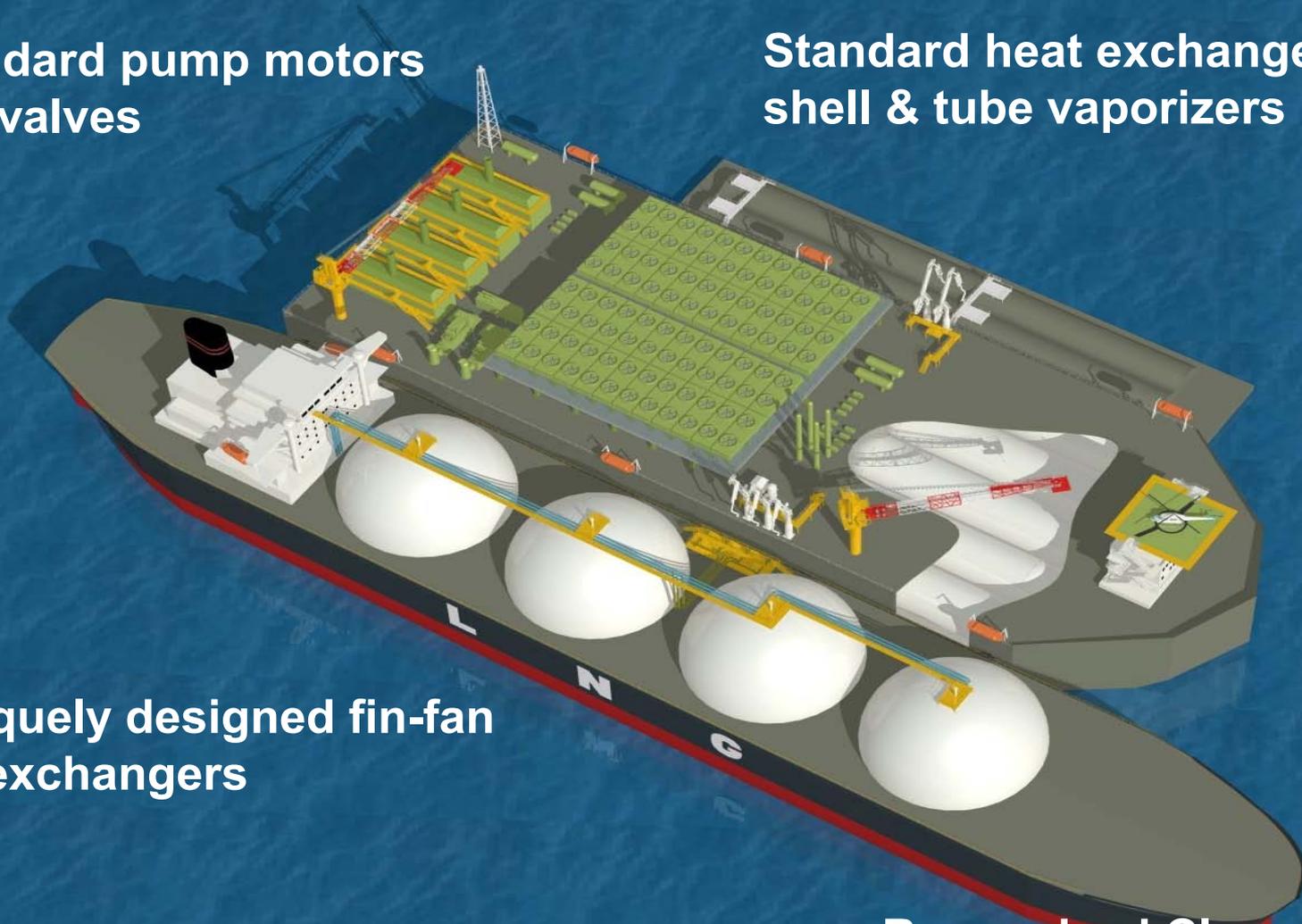


SAV Application on FSRU



Standard pump motors and valves

Standard heat exchangers and shell & tube vaporizers

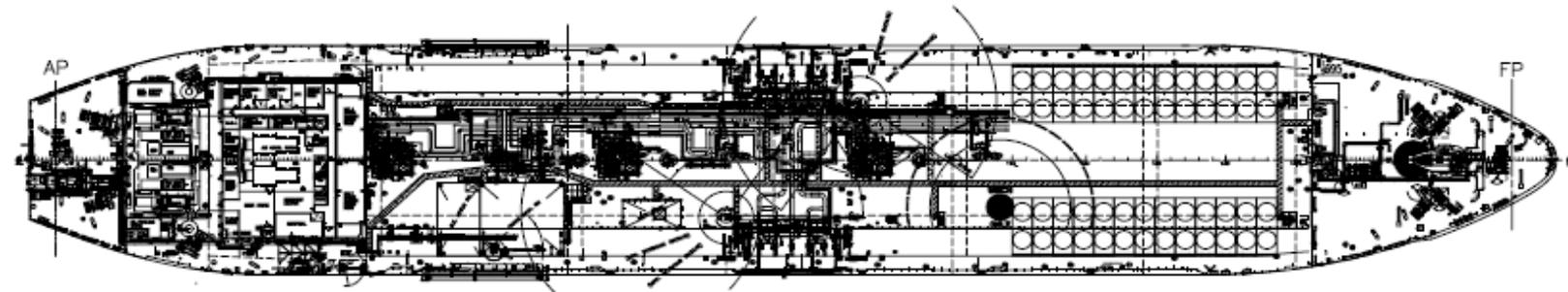
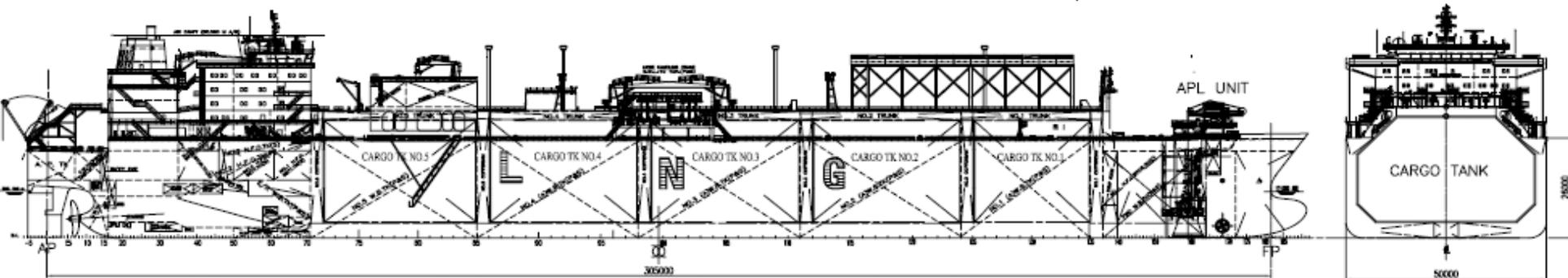


Uniquely designed fin-fan air exchangers

Recognized Class Society linked codes & standards



SAV Application on LNG Carrier



Mustang Smart Air Vaporization 0.8 bcf/d send-out arranged on disconnectable LNG Carrier with Reinforced Membrane Tanks with 150,000 m³ storage

- **LNG Smart® Air Vaporization - minimum fuel gas**
- **Reduces air emissions significantly**
- **Uses no sea water**
- **Horsepower requirements – comparable to SCV and ORV**
- **Area requirements comparable to SCV**
- **Suitable for onshore or offshore installations**
- **Condenses moisture from air – dehumidifier, defogger**
- **Cost savings over fuel gas burning systems**
- **Ambient temperature sensitive – supplemental heat required**

Mustang Engineering

LNG

Smart[®] Air Vaporization

***... providing offshore and onshore
regasification solutions***