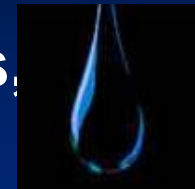




- ┆ A safe and clean fuel
- ┆ Essential to meeting U.S. energy needs
- ┆ Helping drive economic growth

## THE CENTER FOR Liquefied Natural Gas

- **Broad coalition: energy providers, associations and end users**



- **Mission Statement:**

“The Center for LNG strives to be a one-stop information source that distributes educational and technical information. The Center also seeks to facilitate rational issue discussion and the development of public policies that support LNG’s increasing contribution toward meeting the nation’s energy needs and supporting economic growth.”

- — What is LNG?
- — Why the U.S. needs LNG
- — A proven safety record
- — Siting and permitting



# *What is LNG?*

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LNG is natural gas  
in its liquid form



- LNG is the liquid form of the same natural gas 60 million U.S. consumers use daily to heat and cool their homes; that industry uses; and that is used for electric power generation
- LNG is not new -- it has been safely and securely transported and used for over 40 years
- LNG is converted to liquid by cooling to  $-260^{\circ}\text{F}$
- LNG is  $1/600^{\text{th}}$  the volume of gas, allowing for more efficient and economic transportation

# *LNG characteristics*

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- **Odorless, non-toxic and non-corrosive**
- **Less dense than water -- evaporates if spilled**
- **LNG vapors are more difficult to ignite than other common fuels**
- **LNG is not under pressure for shipping and storage**
- **LNG spills would not pollute land or water**

# *LNG -- Bringing it to market*

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- Natural gas is produced in countries that have vast supplies of gas with little demand
- The gas is condensed to a liquid and transported overseas by ship
- When it reaches the receiving terminal, LNG is re-gasified and is distributed via pipeline as ordinary natural gas



**Upon reaching the receiving terminal, LNG is turned back into a gas and sent out via pipelines as ordinary natural gas.**

# *LNG -- long, safe history in U.S*



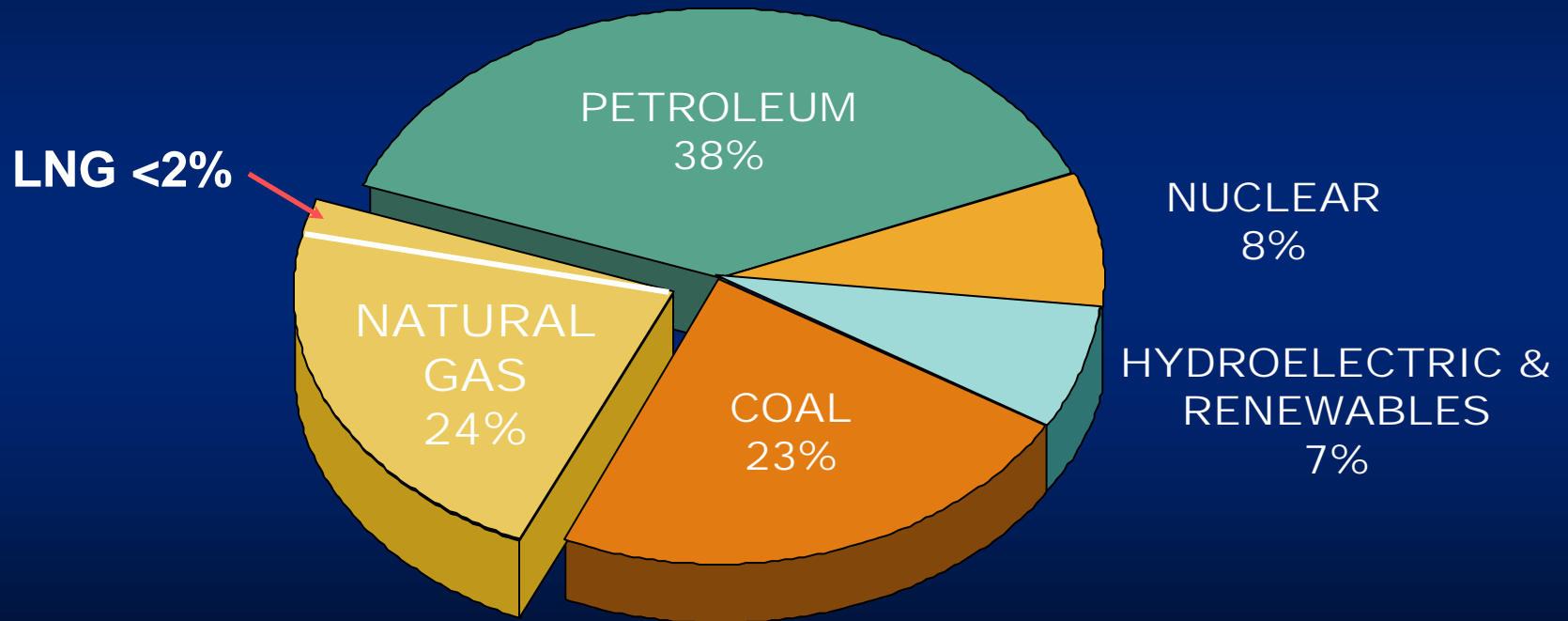
\* Peak-shaving facilities are used for storing surplus gas to meet requirements of peak consumption during winter or summer

● Receiving terminals  
● Peak-shaving facilities\*, other

**There are over 100 LNG peak-shaving, production, transport and storage facilities across the country. Only four of those are receiving terminals.**

# Natural Gas -- key to U.S. energy mix

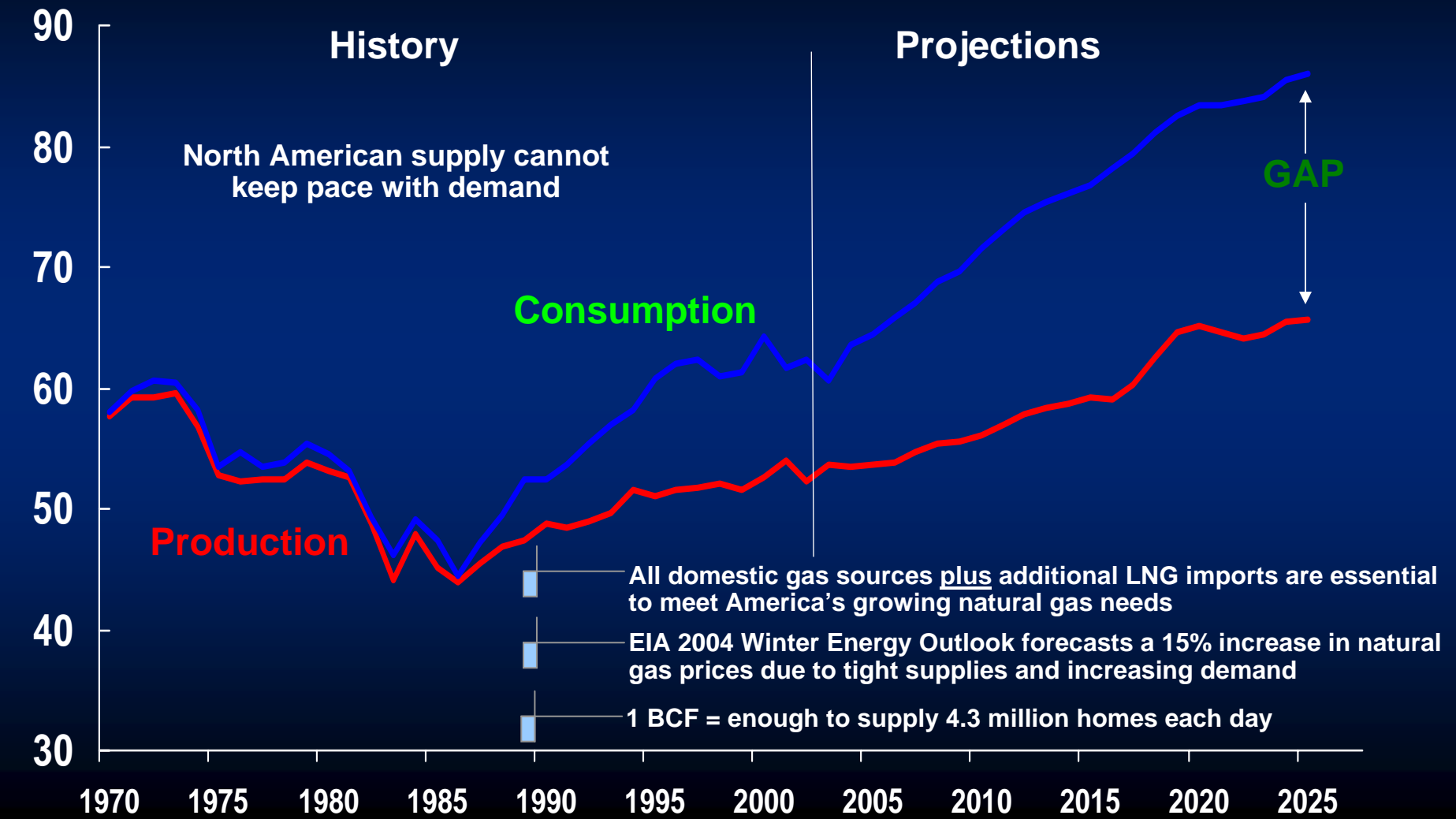
## Average Annual U.S. Energy Use



- 90 percent of recently constructed power plants are fueled by natural gas
- Over the past decade, consumption of natural gas grew 25 percent faster than overall energy use

Source: DOE

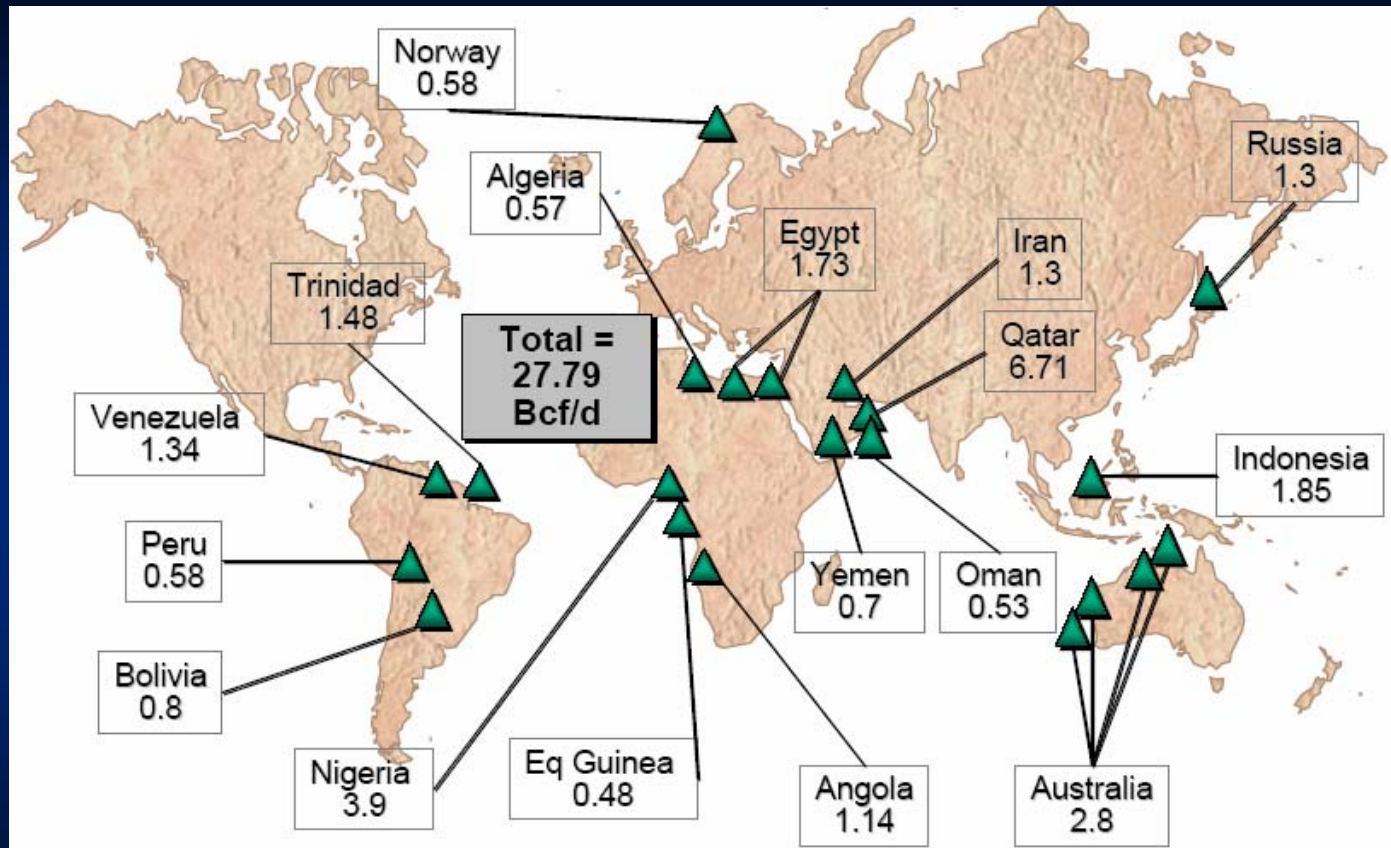
# Natural gas -- meeting the demand challenge U.S. 1970 - 2025 (billion cubic feet / day)



Source: EIA Energy Outlook 2004

# LNG -- diverse global supplies

## New Global LNG Export Capacity Proposed or Under Construction



— LNG supply growing

———— Geographically diverse supply sources

———— Long-term LNG supply outlook robust

# *Growing U.S. LNG imports*

**Net U.S. Imports of Liquefied Natural Gas, 1970-2025**  
(billion cubic feet/day)



Source: EIA Energy Outlook 2004

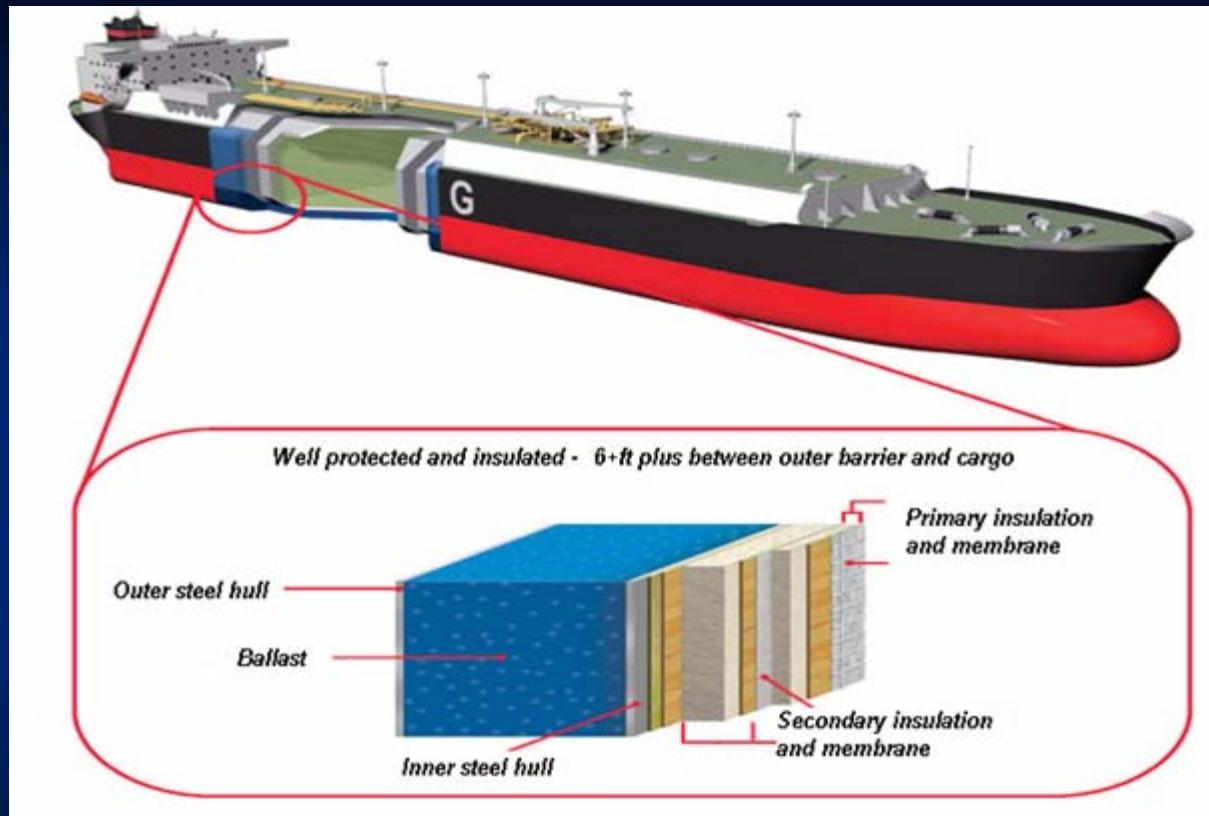
## Safety & Security – *Top priorities for the LNG industry*

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- Robust training, standards, procedures and regulations for LNG operations
- Multiple layers of containment and security for LNG ships
- Multiple containment and security layers for LNG storage facilities, which are designed and constructed using proven technology and materials
- Collaboration with expert agencies: USCG, DOE, FERC, DHS, etc.
  - World has changed since 9/11
  - Multiple agencies working intensely and cooperatively to mitigate risks overall and on site-specific basis
- Safe and secure LNG imports ensure our future energy security

Industry and governments apply strict safety and security standards to the construction of facilities, and the transportation and storage of LNG.

# Marine safety features

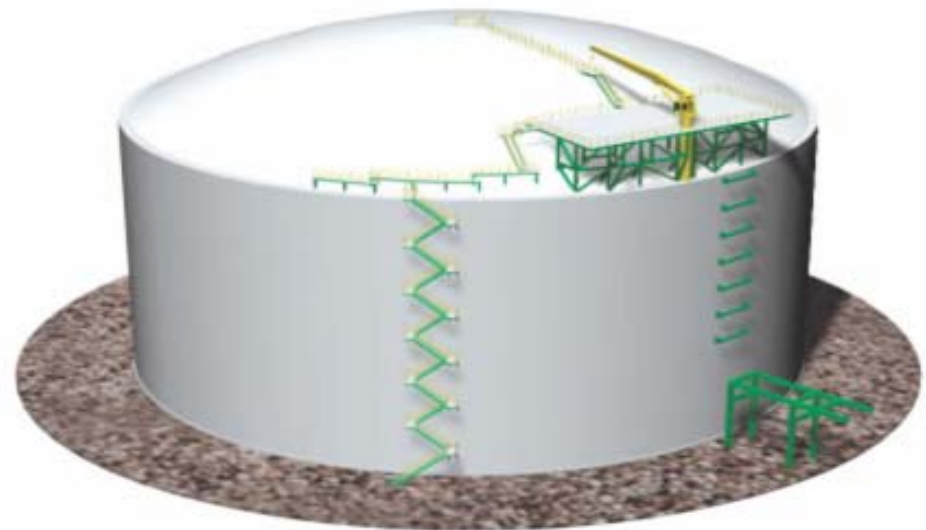
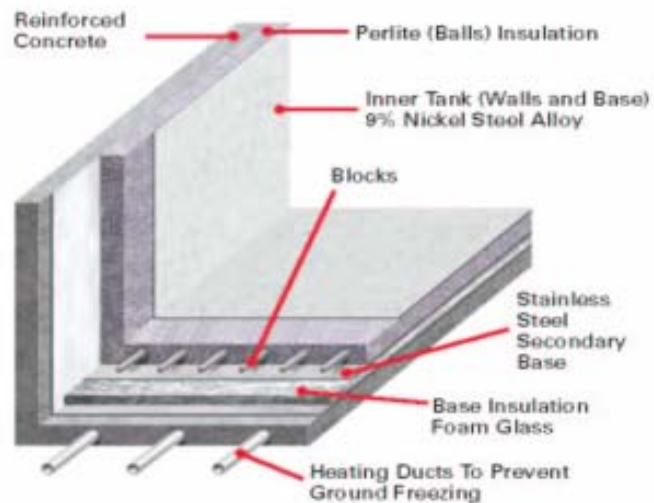


- Double-hull construction: 6-10 ft between hulls
- Cargo tanks provide 3<sup>rd</sup> layer of protection
- Gas detectors and safety alarms for continuous leak detection and monitoring
- Safety and security zones in established port areas

**Excellent safety record – more than 40,000 voyages covering more than than 90 million miles without a major incident in LNG's 40+ year history.**

# Robust LNG storage tank design

Cross section of tank walls:  
About 5.5 ft thick



**Typical LNG storage tank design features multiple containment measures.**

# ***Safety & Security – Key Conclusions from DOE Report by Sandia National Lab***

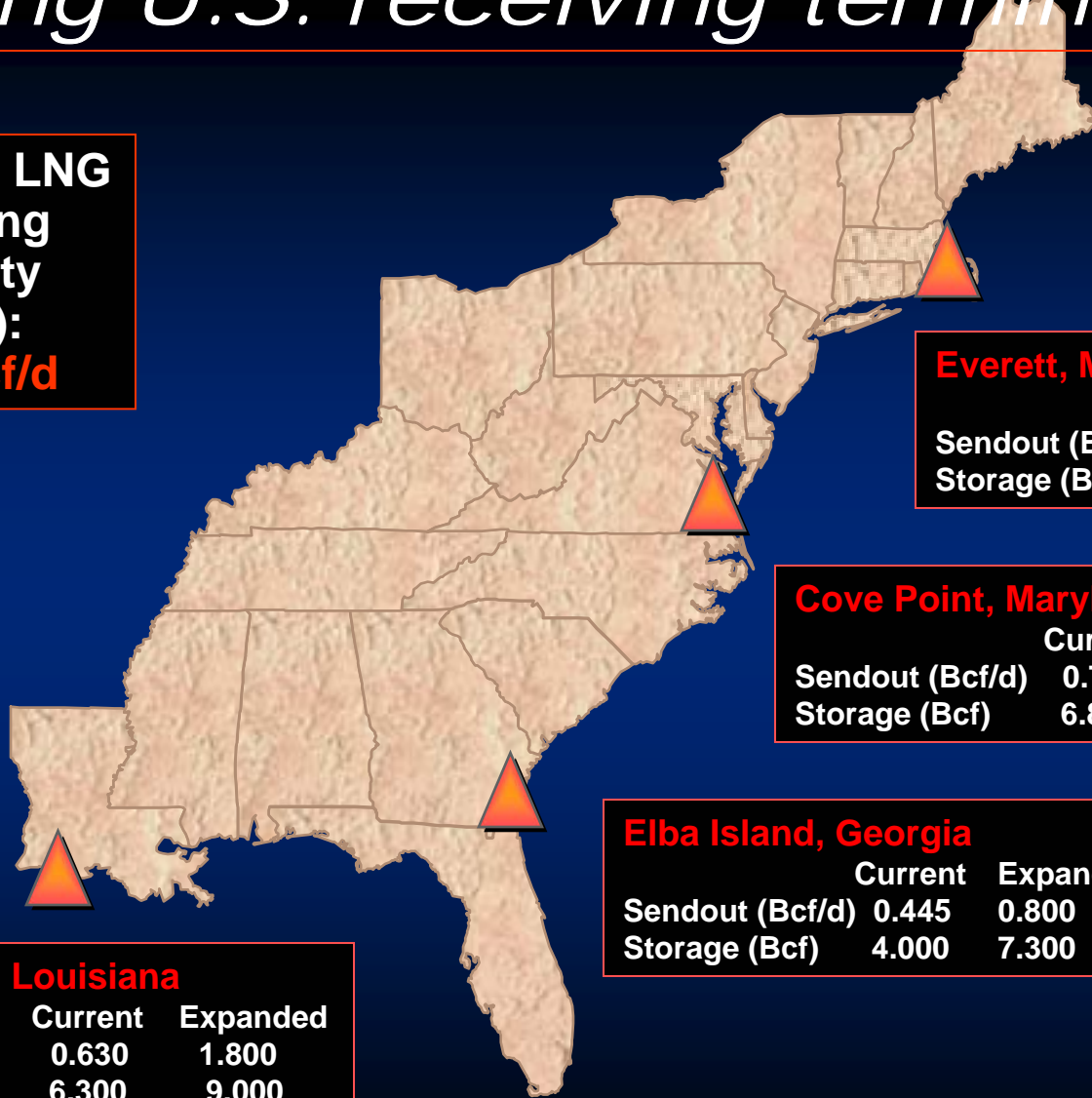
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- The study provides guidance on risk-based approaches for assessing and managing risks of LNG spills on water
- Key Conclusions:
  - Risks from accidental events are small and manageable
  - Risks from intentional events can be significantly reduced through security, planning, prevention and mitigation measures
  - Risk prevention and mitigation measures should be based on site-specific conditions
  - The most significant security measures are proposed for areas where ships are within 1,600 ft (500 m) of critical infrastructure and population centers

**“The Sandia report provides a scientifically supported validation of our view that the risks of LNG are very low and manageable”**  
**- Pat Wood III, Chairman of the FERC**

# Existing U.S. receiving terminals

**Total U.S. LNG  
receiving  
capacity  
(2004):  
2.36 Bcf/d**



## Everett, Massachusetts

	Current	Expanded
Sendout (Bcf/d)	0.535	0.715
Storage (Bcf)	3.300	3.5

## Cove Point, Maryland

	Current	Expanded
Sendout (Bcf/d)	0.750	1.500
Storage (Bcf)	6.800	7.800

## Elba Island, Georgia

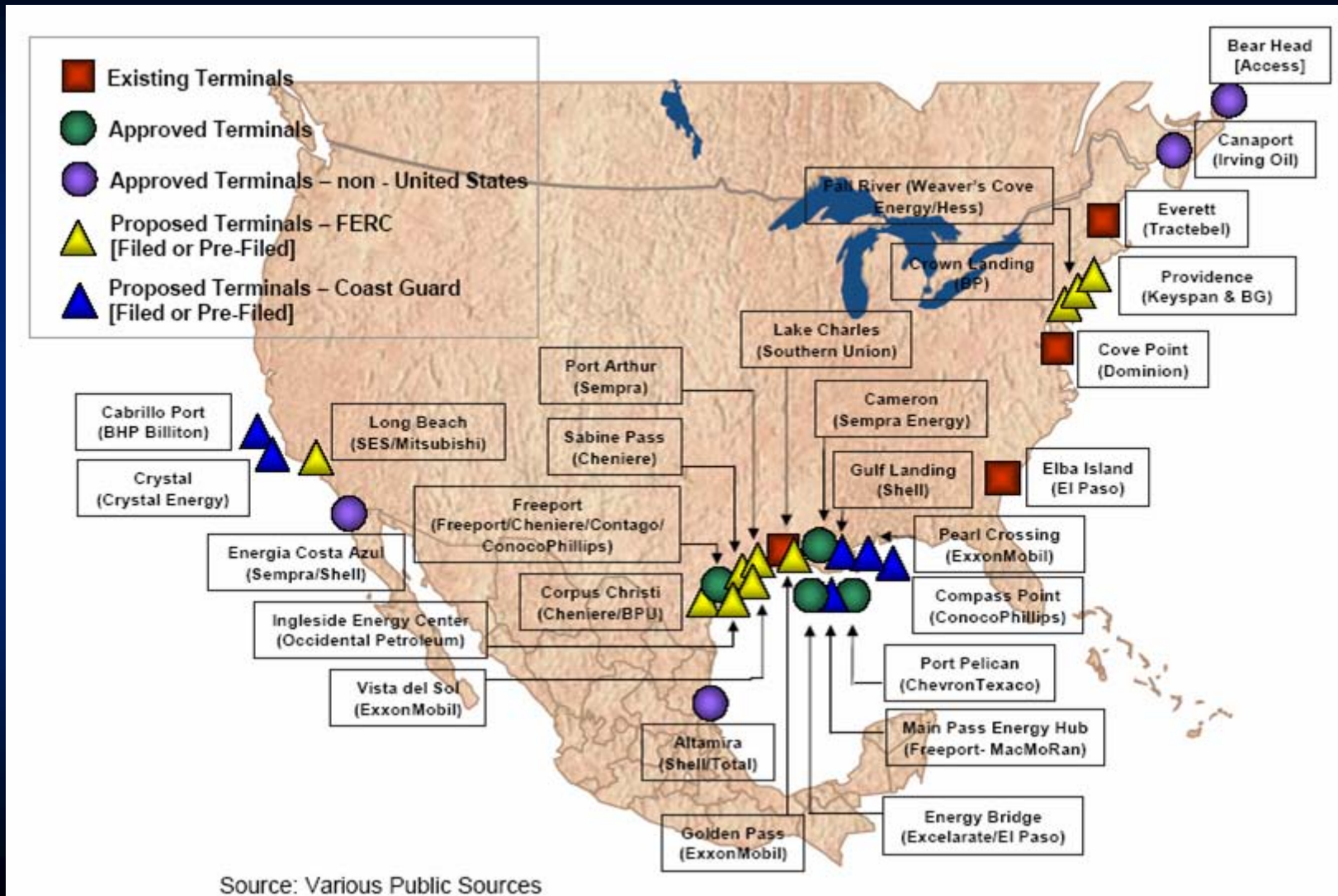
	Current	Expanded
Sendout (Bcf/d)	0.445	0.800
Storage (Bcf)	4.000	7.300

## Lake Charles, Louisiana

	Current	Expanded
Sendout (Bcf/d)	0.630	1.800
Storage (Bcf)	6.300	9.000

**More receiving terminals needed to meet growing gas demand**

# North America LNG Terminal Status -- August 2004



# *Siting LNG terminals*

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## Requirements

- **LNG receiving terminals need:**
  - **Federal, state and local support**
  - **Adequate market**
  - **Deepwater accessibility & harbor facility**
  - **Existing pipeline network**

## Issues

- **Public perception**
- **Safety & security**
- **Investment costs**
- **Long lead times (5-7 years)**
- **Permitting**
  - **NEPA, CWA, CAA, CZMA, dredging**

# LNG project permitting

- **Rigorous 12-18 month process**

- FERC lead for onshore terminals
- USCG lead for offshore terminals

- **NEPA Environmental Impact Statement drives project**

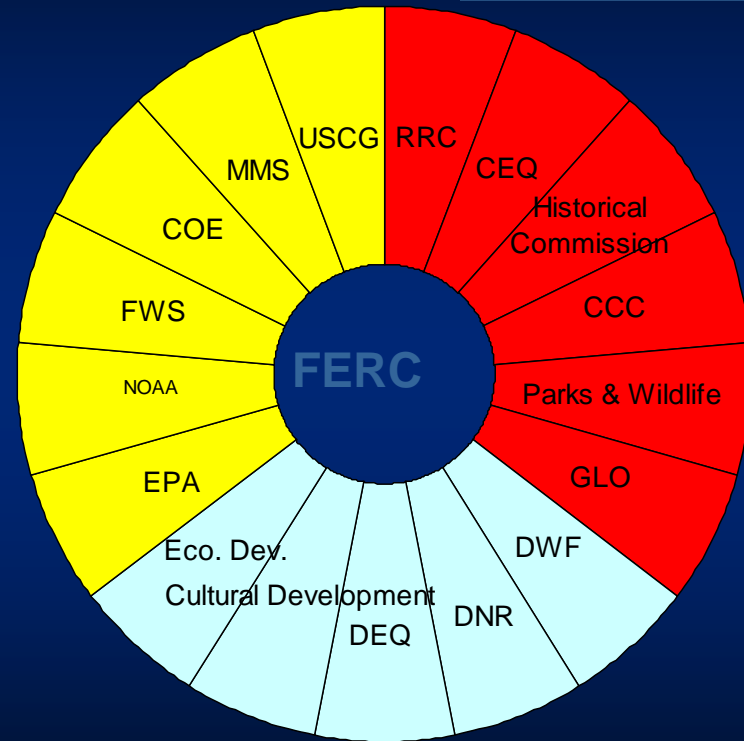
- Collaboration with state and federal agencies
- Multiple opportunities for public input and community meetings

- **13 resource reports required for terminal; 12 more for associated pipelines**

- Engineering design
- Impacts on fish, wildlife, vegetation
- Air and water quality and water usage
- Terminal and ship safety and security
- Impact on cultural resources; socioeconomic effects

**Federal Agencies**  
FERC, Coast Guard, MMS, etc.

**State Agencies**  
Public Utility Commission,  
General Land Office,  
Environmental Agencies,  
Historical Agencies, etc.



Wheel shows 18 primary agencies for a terminal project in Texas with pipeline extending into Louisiana

# *Summary*

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- **More LNG is needed to meet increasing U.S. demands for natural gas**
  - LNG will supplement, not replace, domestic gas production
- **Additional LNG receiving terminals are required in order to accommodate growing demand**
- **LNG is an extensively regulated industry with a proven safety record**
- **U.S. consumers and industry will benefit from new LNG supplies**

**U.S. needs LNG for reliable  
and affordable energy**

*For more information contact or visit:*



THE CENTER FOR  
Liquefied Natural Gas

[www.LNGFacts.org](http://www.LNGFacts.org) 202-289-2253

Dick Sharples, Executive Director

Other resources:

[www.FERC.gov](http://www.FERC.gov)

[www.DOE.gov](http://www.DOE.gov)

[www.USCG.mil](http://www.USCG.mil)

[www.energy.uh.edu/lng](http://www.energy.uh.edu/lng)

# *Energy consumption*

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**Americans consume 62 Bcf/D**  
(Billion cubic feet per day)

**1 Bcf = enough to supply  
4.3 million homes each day**

# Natural gas usage

**Industrial 36%**  
*(Includes agricultural use)*

**Power 28%**

**Residential 22%**

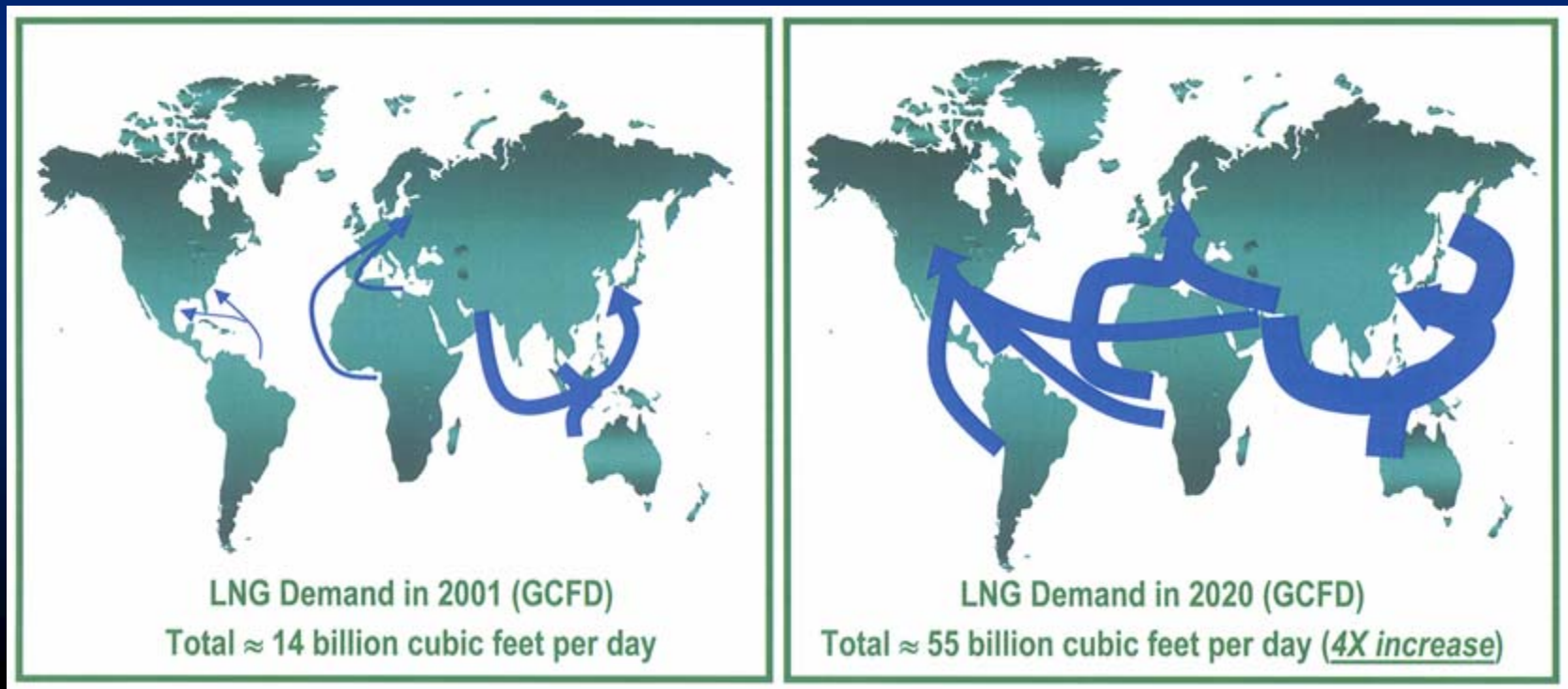
**Commercial 14%**



**Power generation is a key driver for natural gas demand growth**

# Global LNG Use

- Japan and Korea rely almost entirely on LNG for their natural gas needs
- Anticipated rapid growth in LNG shipments to U.S., Europe and Asia to meet rising natural gas needs
- U.S. offers the world's most attractive market for LNG because of our existing nationwide pipeline infrastructure



# U.S. LNG imports - Historical



Source: DOE

\*Through 2Q

# *U.S. / Canada Natural Gas*

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## **Major Transmission Lines**

