



## Leveraging Domestic Shale Gas Production Through Exports

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#### **Extensive Broad-Based Shale Resource Base**



## **U.S. Rig Activity**





#### **Resulting Productive Capacity Estimates Vast**

- Existing conventional production to continue declining from current 40% share of supply
- Unconventional production, led by gains in gas shales, projected to achieve capacity of 50+ Bcf/d
- Total North American productive capacity 90+ Bcf/d by 2020





Source: Advanced Resources International, Model of Unconventional Gas (MUGS) (2010). \*Assuming sufficient demand and Base Case natural gas price (\$US, Henry Hub).

> Unconventional gas is currently a critical component of U.S. supply and will continue to grow into the future



Source: Encana, IHS Energy

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Bcf/d

www.encana.com

#### **Projected U.S. Gas Production Growth**

- Unconventional gas = 61% of 2010 natural gas production
- Potential 11 Bcf/d new production from unconventional gas 2015 vs 2009 (34%)



5 Source: Advanced Resources International Inc. (Aug 2010), EIA



## U.S. Proved Non-Producing Reserves

- Non-producing proved U.S. gas reserves +100% since 2003 to 98 Tcf
- Represents 13 Bcf/d of LNG exports for 20+ years
- Over 3,000 gas wells drilled but not hooked up representing ~8-10 Bcf/d of latent 1st -year production





## **Oil Production Drives Investment Decisions for Gas**

- Liquids production from shale plays > 3 million barrels per day by 2020
- Associated natural gas > 7 Bcf/d of "costless" supply



7 Source: Advanced Resource Intl; presentation to Cheniere Board, March 2011; Cheniere Research



## **Energy Consumption by Sector and Source 2011**





EIA 2010 Outlook

#### **Productive Capacity Relative to Demand**

#### 2010 Annual Energy Outlook



Source: Energy Information Administration Annual Energy Outlooks, 2004 and 2010 Productive Capacity estimated from EnCana's projections for North America.



## **Global Natural Gas Reserves**



Source: 2011 BP Statistical Review (Global Reserves); Advanced Resources International US Natural Gas Resources & Productive Capacity, CHENI August 2010 (US Resource Base); MIT, The Future of Natural Gas, 2009 (shales economic below \$6)



## **Venting and Flaring**

- The U.S. vented and flared 165 Bcf of natural gas in 2009
- North Dakota's share amounted to 27 Bcf; +156% increase on 2007 levels
- There are many "New Bakkens" emerging in liquids-rich shale plays (Eagle Ford, Niobrara, Permian, Granite Wash)





#### **Established U.S. Exports of All Energy Sources**

2008 U.S. Energy Exports (Trillion Btus)





#### **Global LNG Demand**



#### **Attractive Oil Linked Market Prices**

#### Spread bt oil linked and U.S. natural gas prices averaging \$9-\$11/mmbtu



## **Europe - LNG Import Terminals (Bcf/d)**



#### **Regas Terminals in Latin**



## **US Balance of Trade Deficit**

- Petroleum imports accounted for 55% of \$500 billion US trade deficit in 2010
- LNG exports, domestic shale oil production will improve US trade balance by \$130+ billion



17 Source: US Department of Commerce, US Census Data, Cheniere Research



#### **Sabine Pass Liquefaction Project**

- Cheniere owns & operates 4 Bcf/d Sabine Pass LNG terminal in Louisiana
- Cheniere is developing a project to add liquefaction trains, transforming the facility into the first bi-directional LNG terminal that can import & export LNG
  - 4 LNG Trains, each 4 mtpa (16 mtpa total project)
  - 20-yr fixed price contracts for 14 mtpa or 2 Bcf/d of bi-directional service
  - Begin construction 2012, begin operations 2015
- The Company is seeking equity capital to partially fund the project
  - Equity expected to represent ~20-30% of total funding requirements with the remainder funded via non-recourse project debt financing
- LNG value chain:

#### **Expansion Project**

#### **Current Operations**



LNG is natural gas cooled to -260°F in order to be transported by ship to distant markets



## Sabine Pass to Become Bi-Directional Import/Export Facility





#### Proposed Liquefaction Project will Transform Sabine into First Bi-directional Import / Export Facility



#### **Current Facility**

- 853 acres in Cameron Parish, Louisiana
- 40 ft ship channel 3.7 miles from coast
- 2 berths; 4 dedicated tugs
- 5 LNG storage tanks (17 Bcf of storage)
- 4.3 Bcf/d peak vaporization
- LNG export licenses approved

#### **Liquefaction Expansion**

- Four liquefaction trains, each 4.0 mtpa nominal LNG processing capacity
- Additional Equipment to include:
  - ConocoPhillips' Optimized Cascade® LNG Trains
  - Six GE LM2500+ G4 gas turbine driven refrigerant compressors per train
  - SAC water injection for emissions control
  - Gas turbine inlet air humidification
  - BASF aMDEA acid gas removal unit



#### Sabine Pass Liquefaction Infrastructure - Jobs

- Infrastructure Investment ~ \$6 B
  - \$2.3 B Materials & Equipment
  - \$1.6 B Potential U.S. sourced equipment
  - \$1.0 B Construction wages/benefits
- Direct Jobs
  - 100-200 permanent jobs with an avg annual salary of \$120,000
  - Average construction jobs of 1,800 for four to six years
  - Peak of 3,000
  - 13 million man-hours
- Indirect Jobs
  - Will support 30,000-50,000 permanent jobs in exploration and production
- Construction timeline 2012-2018



## Expanding U.S. Natural Gas Exports Would ...

- Promote liberalization of the global natural gas trade through the fostering of a global, liquid market, based on prices cleared in free and openly traded natural gas markets;
- Advance national security and the security of U.S. allies through diversification of global natural gas supplies;
- Increase economic trade and ties with foreign nations, including neighboring countries in the Americas, and displace environmentally damaging fuels in those countries;
- Reduced reliance on foreign sources of oil by promoting domestic production of petroleum and by encouraging the drilling of wells in areas where there is a significant amount of natural gas associated with crude oil and natural gas liquids ("NGL");
- Improve U.S. balance of payments through the exportation of approximately 2 Bcf/d of natural gas valued at approximately \$5 billion, and the displacement of \$1.7 billion in NGL imports thus furthering the President's National Export Initiative;
- Promote stability in domestic natural gas pricing by raising domestic natural gas productive capacity; and
- Stimulate state, regional and national economies through job creation, increased economic activity and tax revenues, including the direct creation of approximately 3,000 engineering and construction jobs during the course of the project and, indirectly, 30,000-50,000 permanent jobs in the exploration and production sector.





## **ConocoPhillips Optimized CascadeSM LNG Train**

#### Bechtel and ConocoPhillips Collaboration Agreement

- 40-plus year history
- Proven, Reliable Design
  - Template Designs exist for a variety of conditions and compressor configurations
  - Kenai Alaska, 1969
  - Atlantic LNG Trains 1, 2, 3 and 4\*, 2005\*
  - Egyptian LNG Trains 1 & 2, 2005
  - Darwin LNG, 2006
  - Equatorial Guinea LNG, 2007
  - Angola LNG, under construction

#### Process Advantages

- Reliability design concept based on two 50% compressors for each refrigeration cycle
- Turn-down Two-in-one concept provides for ~100% efficiency at 60-80% utilization
- Intermittency fast start-up and cooldown





## **ConocoPhillips-Bechtel – Global LNG Collaboration**

#### **Proven Designs**





## LNG Project Support & Regulatory

- Very strong local support: Cameron Parish officials, Louisiana state and federal congressional delegations, parish & state agencies
- Strong support from most gas producing states
- Cheap ethane by-product means added competitive landscape for chemical industry (\$35/Bbl for ethane vs \$90/Bbl for naphtha)
- Job implication 30,000-50,000
- Balance of trade improvement ~\$7 B
- Positive foreign policy implications of U.S. role in global gas markets

#### Regulatory

#### **FERC:** Authorization to Construct

- Base site permitted
- NEPA pre-filing 7/26/10 for expansion
- Some agencies already in agreement
- Formal application due after six months notice period 1/31/11
- Estimated approval 2011

# Other Environmental Permits DEQ Title V Air Permit - 12/20/11 DNR Coastal Use Permit - 3/28/10 DEQ Water Quality Cortification - 6/22/10

- DEQ Water Quality Certification 6/22/10
- USACE Section 404 Wetlands 1/31/11



## Sabine Pass Liquefaction Proposed Project Timeline





## Bi-directional Service at Sabine Pass Provides Opportunity to Arbitrage Henry Hub vs. Oil

#### Worldwide LNG prices predominantly based on a prices of oil = \$10 - \$25 / MMBtu

| LNG Contract Price |    |       |    |       |  |  |  |  |  |
|--------------------|----|-------|----|-------|--|--|--|--|--|
| Indexation %       |    | 11%   |    | 15%   |  |  |  |  |  |
| at \$90/bbl        | \$ | 9.90  | \$ | 13.50 |  |  |  |  |  |
| at \$150/bbl       | \$ | 16.50 | \$ | 22.50 |  |  |  |  |  |

#### Cost to deliver gas from Sabine Pass to Europe & Asia = \$7 - \$12 / MMBtu

|                       |   | Europe  |                              |      |                              | Asia |                              |                                 |   |
|-----------------------|---|---|------------------------------|------|------------------------------|------|------------------------------|---------------------------------|---|
| (\$/MMBtu)            |   | Low   |                              | High |                              |      | Low                          | High                            | _ |
|                       | Henry Hub<br>ity Charge<br>Shipping<br>Fuel | \$  | 4.00<br>1.75<br>1.00<br>0.40 | \$   | 6.50<br>1.75<br>1.00<br>0.65 | \$   | 4.00<br>1.75<br>2.80<br>0.40 | \$ 6.50<br>1.75<br>2.80<br>0.65 | _ |
| Deliv                 | vered Cost                                  | \$  | 7.15                         | \$   | 9.90                         | \$   | 8.95                         | \$ 11.70                        |   |
| Current<br>LNG Market | 30 – 40 Bcf/d                               | LNG contracts indexed to oil prices – rule of thumb 11% to 15% of crude oil prices              |                              |      |                              |      |                              |                                 |   |
| Growth<br>Market      | 100 Bcf/d                                   | Power generator switching from oil to gas – paying \$13 to \$19 / MMBtu for fuel oil and diesel |                              |      |                              |      |                              |                                 |   |
|                       |   |   |                              |      |                              |      |                              |                                 |   |

