



U.S. LNG Exports: Impacts on Energy Markets and the Economy

**Presented to:
U.S. House of Representatives
LNG Working Group**

**Presented by:
Harry Vidas**

May 15, 2013



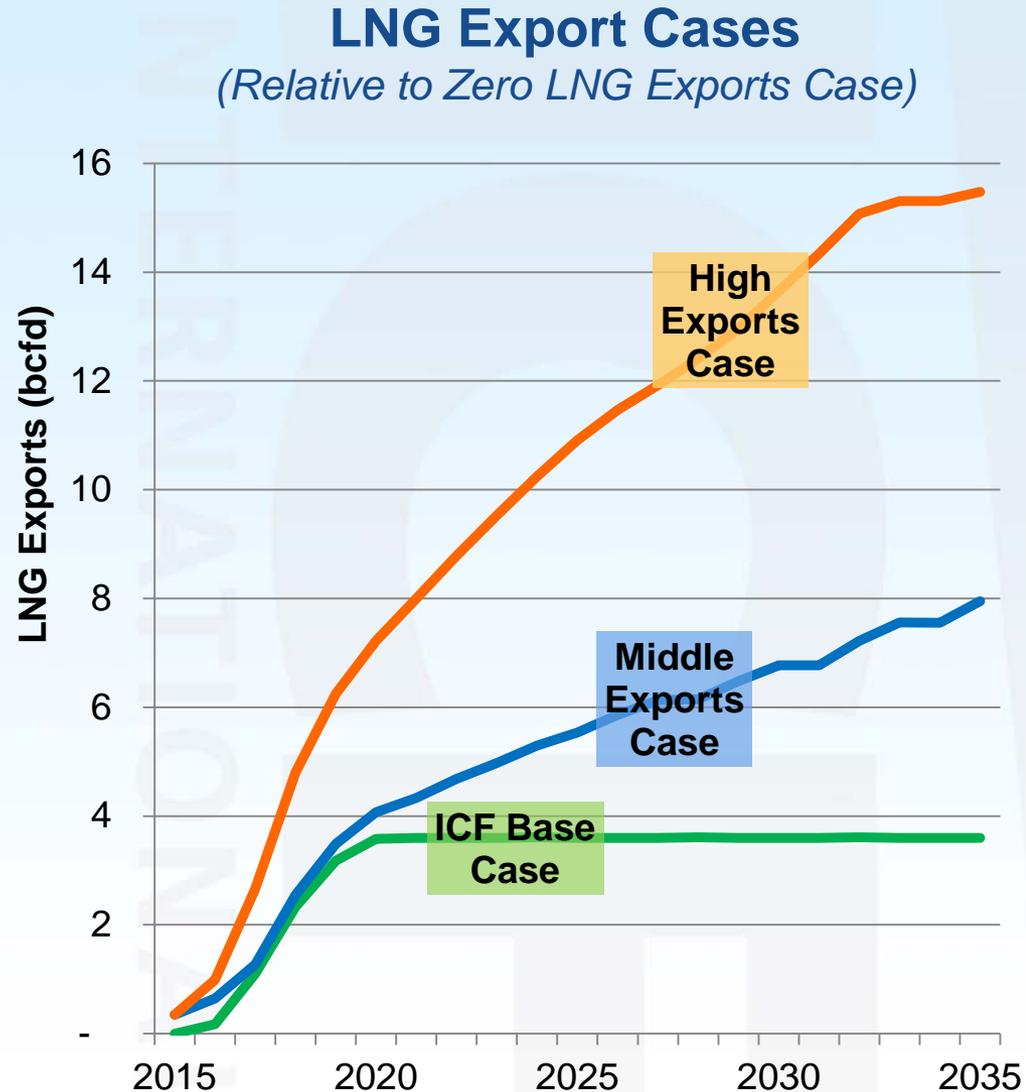
Warranties and Representations. ICF endeavors to provide information and projections consistent with standard practices in a professional manner. ICF MAKES NO WARRANTIES, HOWEVER, EXPRESS OR IMPLIED (INCLUDING WITHOUT LIMITATION ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AS TO THIS PRESENTATION. Specifically but without limitation, ICF makes no warranty or guarantee regarding the accuracy of any forecasts, estimates, or analyses, or that such work products will be accepted by any legal or regulatory body.

Waivers. Those viewing this presentation hereby waive any claim at any time, whether now or in the future, against ICF, its officers, directors, employees or agents arising out of or in connection with this presentation. In no event whatsoever shall ICF, its officers, directors, employees, or agents be liable to those viewing this presentation.



Key steps in this study:

- 1) Evaluate global LNG trade trends and identify a range of possible U.S. LNG export scenarios
- 2) Assess impacts of LNG export volumes on domestic markets (including natural gas, NGL, and electricity production, demand, and pricing) using ICF's Gas Market Model
- 3) Estimate impacts on the U.S. economy through an input-output model, which assesses changes in GDP, employment, and manufacturing (including petrochemicals) attributable to LNG exports
- 4) Compare results to other LNG export studies



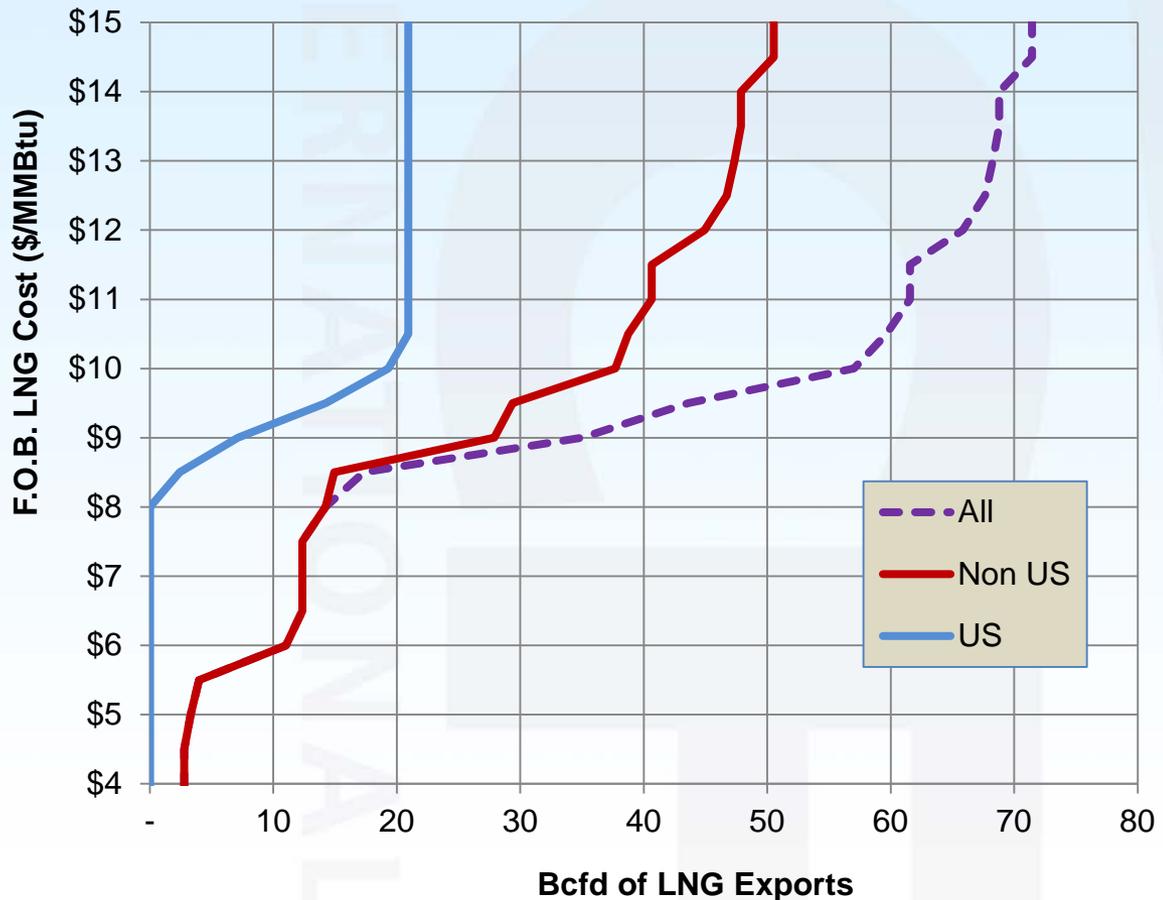
Source: ICF estimates



U.S. LNG exports could capture 8%-25% of incremental global LNG trade by 2035

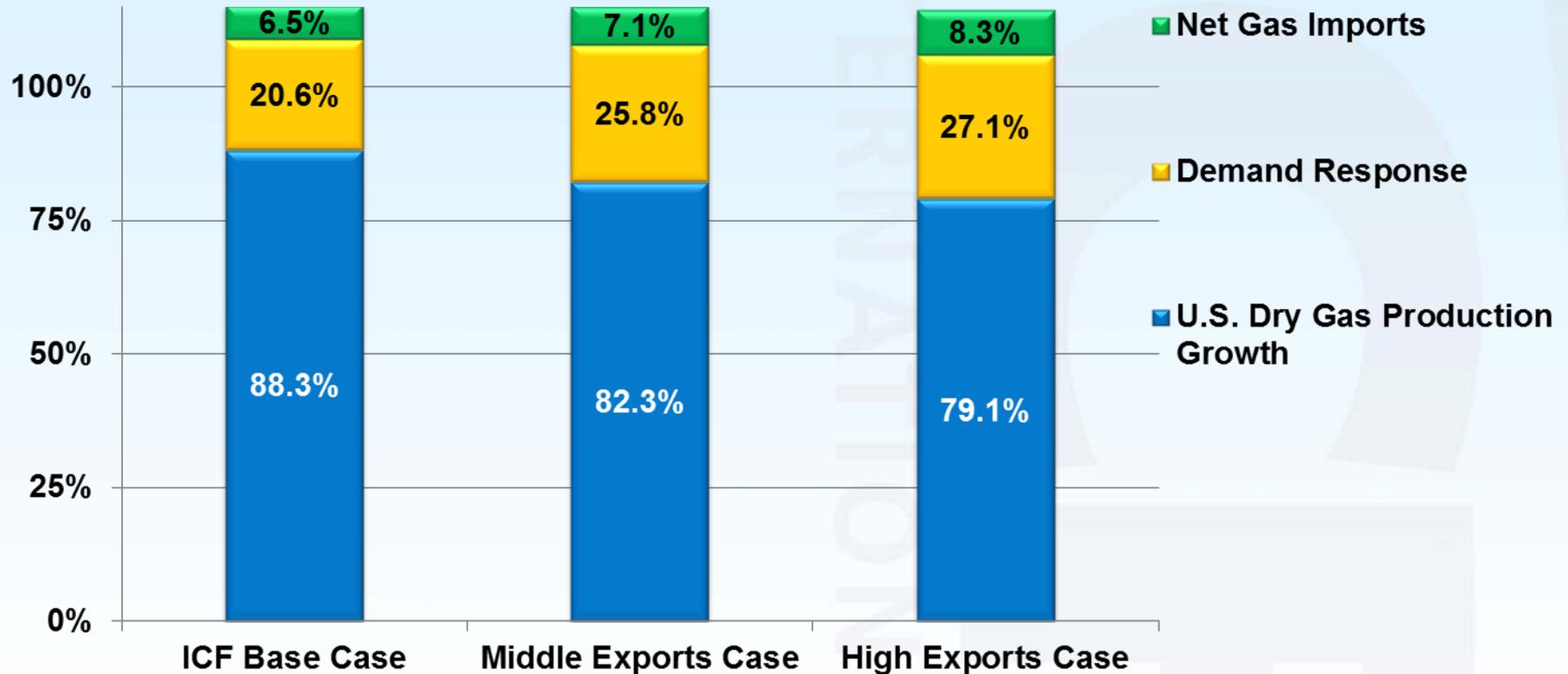
- 63 international LNG export projects (excluding U.S. projects) are currently planned or under construction, with combined estimated capacity of 50.5 Bcfd
- ICF estimates that U.S. LNG exports would comprise 8%-25% of incremental global LNG trade market share by 2035, based on comparisons of project and transportation cost differentials

Supply Curve of LNG Supply Projects Under Construction or Proposed



79%-88% of LNG export volumes are offset by increasing domestic natural gas production

Supply Sources that Rebalance U.S. Natural Gas Markets



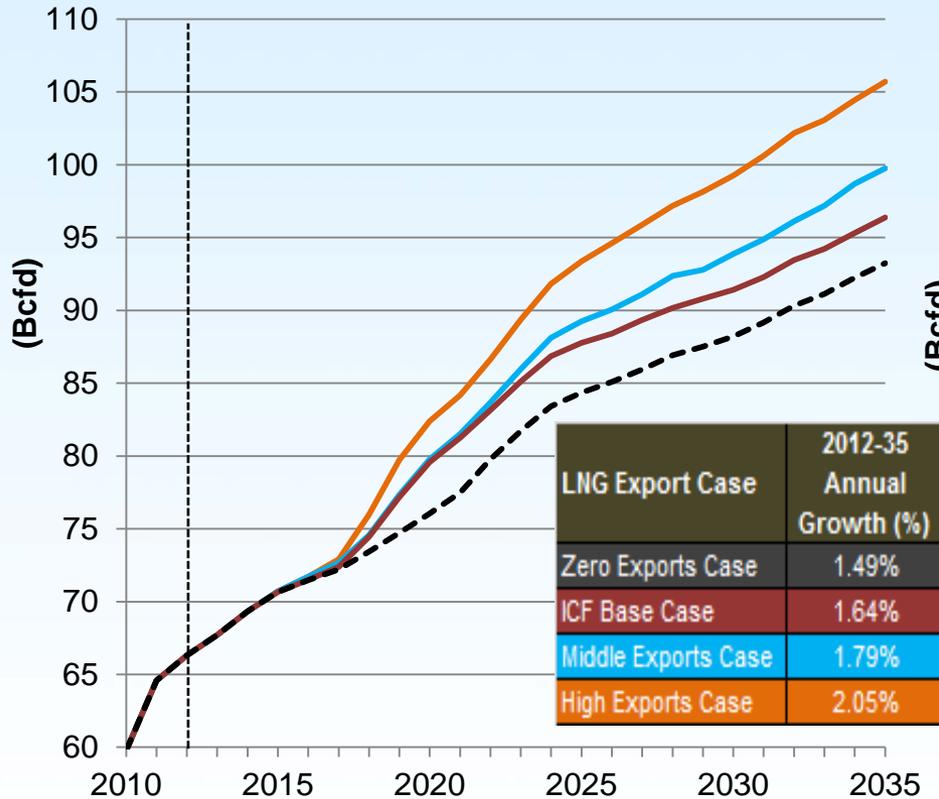
Source: ICF estimates

Note: Each 1.0 Bcfd of LNG exports requires total dry wellhead supplies of 1.15 Bcfd for liquefaction, lease and plant fuel, and LNG exports.

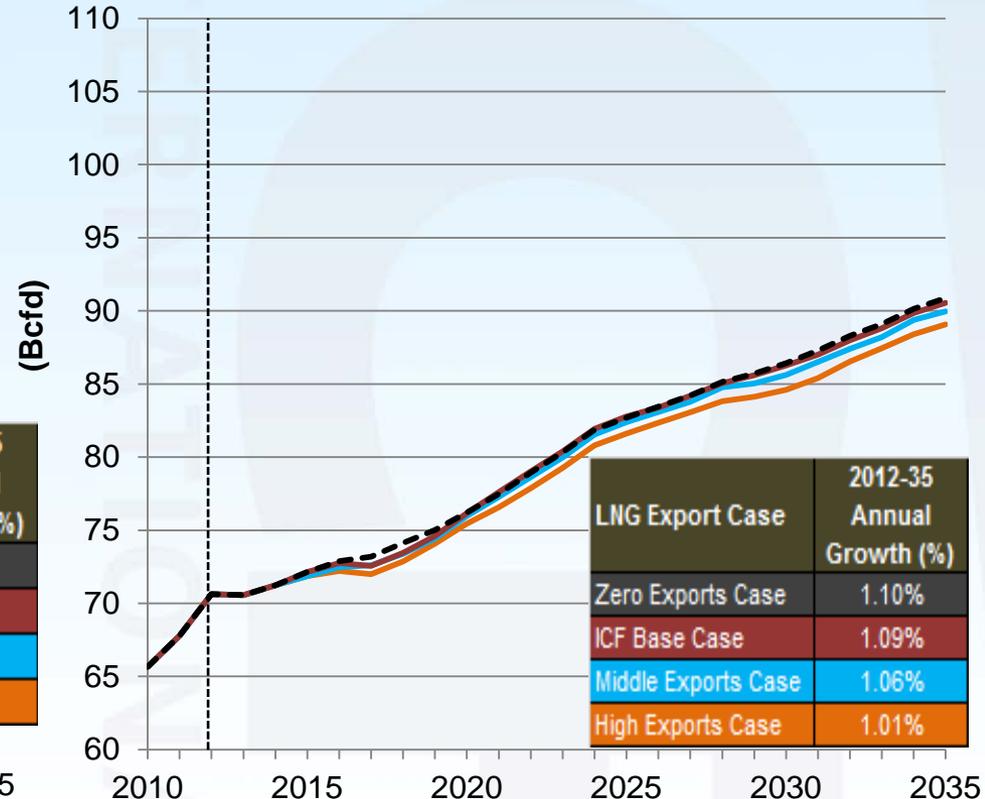


U.S. Domestic Natural Gas Market Changes by LNG Export Case

U.S. Domestic Gas Production Changes



U.S. Domestic Gas Consumption Changes



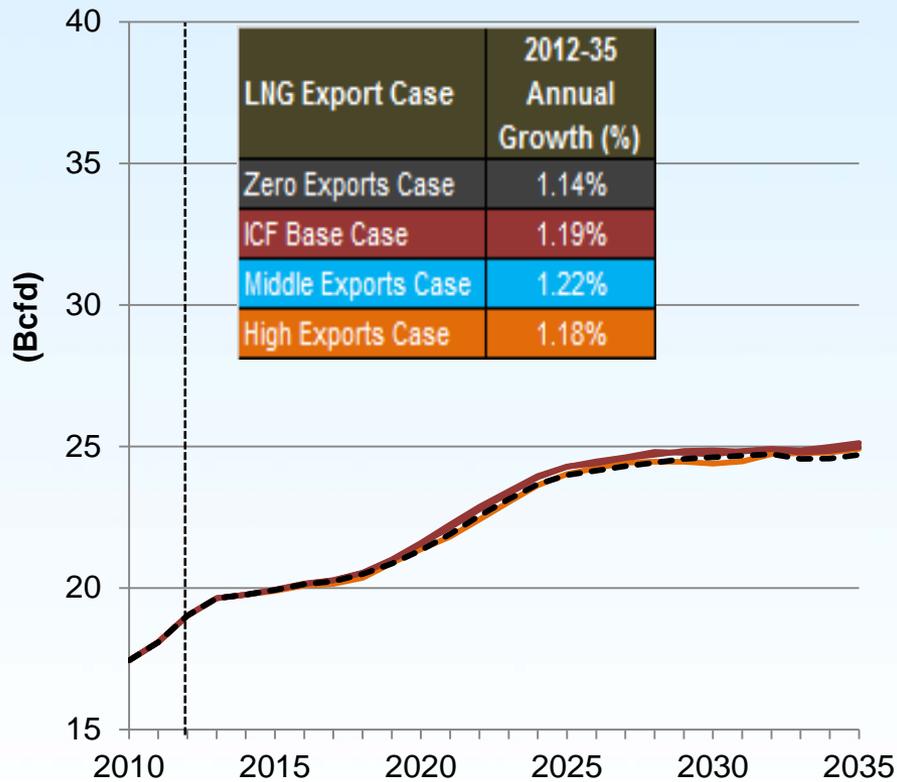
Source: ICF estimates

Note: "U.S. Domestic Gas Consumption Changes" chart (right) does not include LNG export volumes, but does include domestic fuel used for liquefaction.



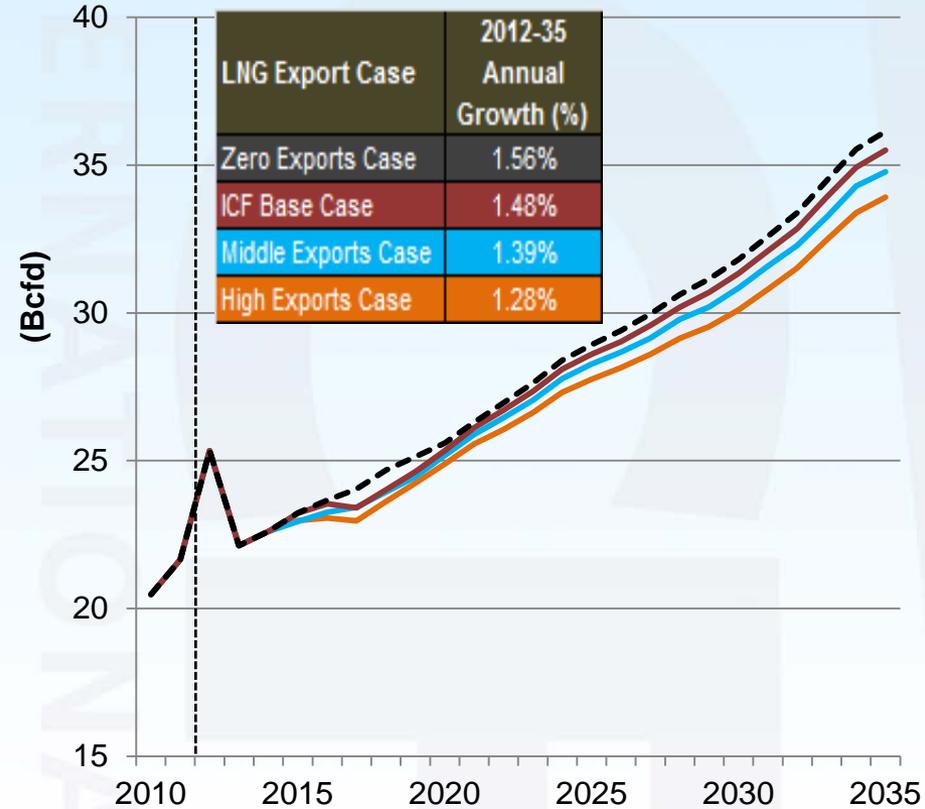
U.S. Domestic Natural Gas Market Changes by LNG Export Case

U.S. Industrial Gas Consumption Changes



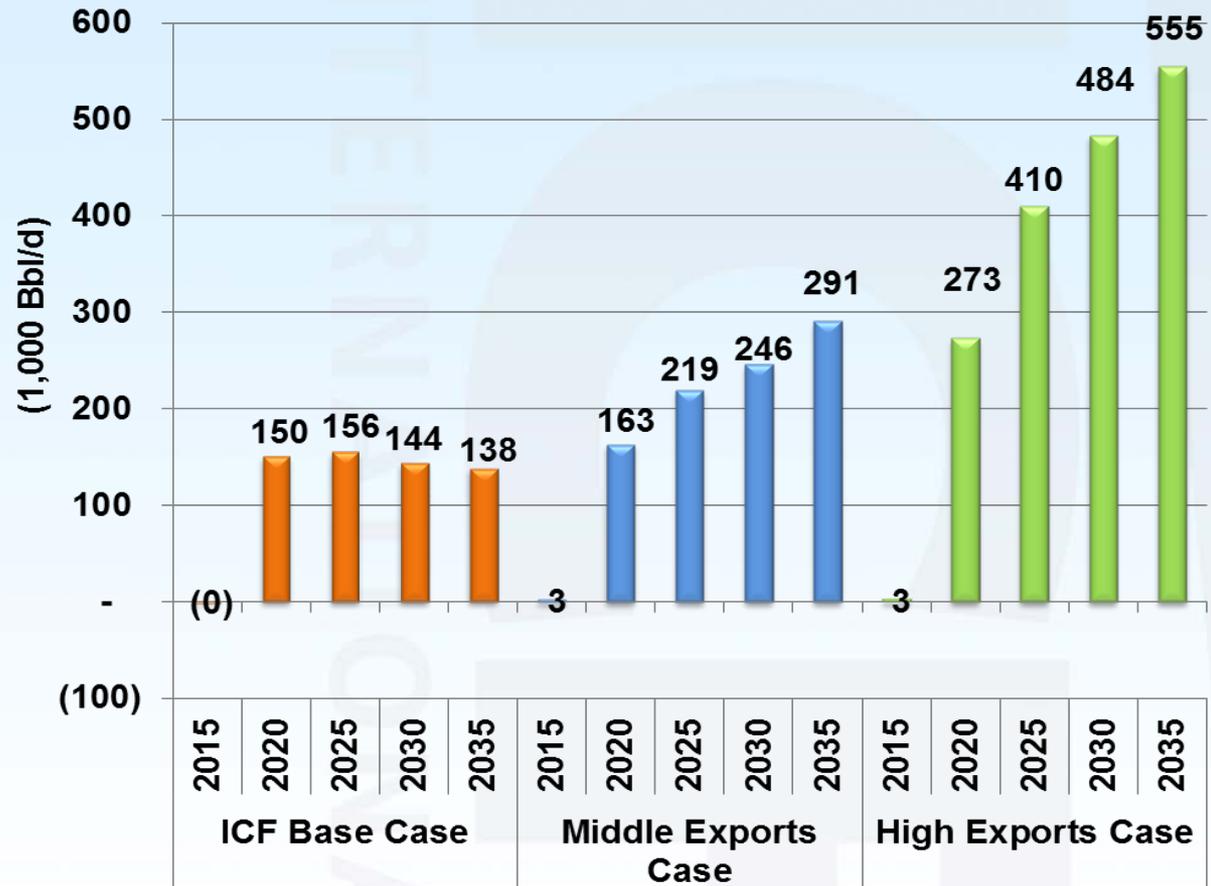
Source: ICF estimates

U.S. Power Sector Gas Consumption Changes



- By 2035, ICF estimates incremental liquids volumes increase between 138,000 barrels per day (bpd) and 555,000 bpd, attributable to LNG exports in the 4 to 16 Bcfd range.

Natural Gas Liquids Volume Changes



Source: ICF estimates

Note: Liquids include condensate/crude oil, ethane (100% of production assumed to go into ethylene production), propane (25% of production assumed to go into propylene production), butane, pentanes+.



Key Economic Impacts (Relative to Zero LNG Exports Case)

Impact (2016-2035 Averages)*	LNG Export Case (Change from Zero Exports Case)		
	ICF Base Case (up to ~4 Bcfd)	Middle Exports Case (up to ~8 Bcfd)	High Exports Case (up to ~16 Bcfd)
Employment Change (No.)	73,100-145,100	112,800-230,200	220,100-452,300
GDP Change (2010\$ Billion)	\$15.6-\$22.8	\$25.4-\$37.2	\$50.3-\$73.6
Henry Hub Price (2010\$/MMBtu)	\$5.03	\$5.30	\$5.73
Henry Hub Price Change (2010\$/MMBtu)	\$0.32	\$0.59	\$1.02

Source: ICF estimates. Note:

* Includes direct, indirect, and induced impacts

Other changes include:

- 7,800-76,800 net manufacturing job gains on average between 2016 and 2035, including 1,700-11,400 net job gains in the specific manufacturing sectors that include refining, petrochemicals, and chemicals
- GDP gains include economic impacts associated with additional hydrocarbon liquids production (produced along with natural gas) and additional petrochemical production attributed to increasing NGL volumes



Study Findings Relative to Other LNG Export Studies

- This study assessed a number of other LNG studies, including NERA's LNG export impact study done on behalf of the U.S. Department of Energy (DOE).
- Similar to NERA's report for the U.S. Department of Energy (DOE), this study finds that LNG exports produce net benefits to the U.S. GDP, which increase as the volume of exports rise (to 16 Bcfd).
- However, this study concludes that those GDP gains are expected to be larger than estimated by NERA. In addition, this study estimates considerable net job gains from LNG exports..
- Key factors leading to a bigger GDP impact in this study, relative to the NERA report, include:
 - A more elastic gas supply curve.
 - An accounting for the impacts of incremental liquids and olefins production.
 - The representation of the price responsiveness of trade with Canada and Mexico.
 - Different assumptions regarding how the domestic labor market and the U.S. current account trade deficit respond to LNG trade.

