



How to Harness a Game-Changing Resource for Export, Domestic Consumption, and Transportation Fuel

Testimony before the Senate Committee on Energy and Natural Resources

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Chairwoman Mary Landrieu (D-LA), Ranking Member Lisa Murkowski (R-AK), and members of the Committee on Energy and Natural Resources, thank you for the opportunity to testify on how to harness a game-changing resource for export, domestic consumption, and transportation fuel. The question has taken on greater urgency due to last winter's increase in domestic natural gas consumption, the approval to export additional volumes of liquefied natural gas, or LNG, and Russia's halting of its natural gas exports to Ukraine.¹

I plan to address several fundamental questions today.

- What criteria should the U.S. Department of Energy, or DOE, use to evaluate whether a proposed LNG export project is in the public interest?
- Are there cost-effective measures that the United States can undertake that would save natural gas, create jobs, and reduce pollution?
- Is elimination of the public interest test for proposed LNG export applications an effective policy to assist Ukraine or other nations threatened by potential high natural gas prices or supply reductions?

Meeting the public interest standard

In the past six years, the United States experienced a dramatic increase in natural gas production, primarily from shale gas generated from improvements in hydraulic fracturing, or fracking, and horizontal drilling.²

Unlike crude oil, there is no world market price for natural gas. Prices vary by nation or region, depending on factors including domestic supplies and transportation costs for exports. For instance, the Japan/Korea Marker, or JKM, natural gas price in May was \$15.56 per million British thermal units, or BTU, of energy.³ Meanwhile, the Henry Hub spot price for natural gas in the United States averaged \$4.60 per million BTU of energy.⁴ Exporting American shale gas to Japan or Korea would be quite profitable compared to selling it here.

The higher natural gas price overseas led companies to submit applications to build and operate LNG export facilities. Under the Natural Gas Act, the Federal Energy Regulatory Commission, or FERC, must approve proposed LNG export or import terminals. For projects that will export gas to one of the 18 nations that have a free trade agreement with the United States, the projects are automatically deemed to be in “the public interest.”⁵ These 18 nations include Canada, Mexico, and the Republic of Korea.⁶

For potential gas importers that do not have a free trade agreement with the United States—including Japan and Europe—DOE must determine whether the “proposed exportation or importation will not be consistent with the public interest,” as required by Section 3(a) of the Natural Gas Act.⁷ Earlier this year, Deputy Assistant Secretary of Energy Paula Gant explained to the House Subcommittee on Energy and Power:

*DOE/FE [Office of Fossil Energy] has identified a range of factors that it evaluates when reviewing an application for export authorization. These factors include economic impacts, international considerations, United States energy security, and environmental considerations, among others.*⁸

Under these criteria, DOE has approved seven LNG export applications. The Sabine Pass facility in Louisiana was the first to receive approval, and is under construction.⁹ Its completion could occur in the fourth quarter of 2015.¹⁰

Public interest determination

On June 4, the DOE proposed to streamline the public interest determination process for applications to allow LNG export to non-free-trade-agreement nations by “acting only on applications for which NEPA [National Environmental Policy Act] review has been completed.”¹¹ In DOE’s view, this would enable the department to better “judge the cumulative market impacts” in its public interest review.¹² It would also enable DOE

to avoid spending scarce resources to review applications for proposed export terminals that may not receive approval by FERC.

Unfortunately, this proposed change in the public interest determination process does not ensure that the economic and climate effects become primary criteria for “evaluating the public interest” of LNG export applications. Instead, they remain secondary criteria.¹³ An evaluation of the individual and cumulative impacts from approval of LNG export applications for non-free-trade-agreement nations should explicitly require an assessment of the increase of LNG exports on wages and electricity prices. It is essential that LNG exports do not significantly lower wages, raise rates, or harm manufacturing. In addition, DOE should evaluate the individual and cumulative impact of additional LNG exports on the emission of carbon, methane, and other climate pollutants.

Large LNG exports possible by 2020, leading to a natural gas price hike

The U.S. Energy Information Administration, or EIA, notes that LNG exports will increase by 14-fold between 2013 and 2020 under a business-as-usual scenario.¹⁴ Before Congress passes legislation to accelerate or eliminate the public interest review process, it is essential to note that DOE has already approved seven LNG applications that could export 11 billion cubic feet per day, or bcf/d, of natural gas—about 14 percent of total domestic production in 2020 under a business-as-usual scenario.¹⁵

Under a business-as-usual scenario without a significant expansion of LNG exports, EIA projects that the cost of natural gas for domestic electricity generation would rise by 32 percent between 2013 and 2020 and 60 percent between 2013 and 2030.¹⁶

A 2012 EIA study of various levels of LNG exports found that “increased natural gas exports lead to increased natural gas prices.”¹⁷ Prices could increase by up to 35 percent by 2018, depending on the supply of shale gas and speed and amount of exports.¹⁸ EIA also found that “On average, from 2015 to 2035, natural gas bills paid by end-use consumers in the residential, commercial, and industrial sectors combined increase 3 to 9 percent.”¹⁹ This would increase electricity bills for end-use customers by 1 percent to 3 percent.²⁰

The EIA study determined that “with additional gas exports, consumers will consume less and pay more on both their natural gas and electricity bill.”²¹ Total average annual electric bills could increase by up to \$10 billion annually between 2015 and 2025.²²

These EIA estimates assume an increase in natural gas exports of no more than 12 bcf/d. Since the analysis was completed in January 2012, U.S. natural gas exports via pipeline have grown by .5 bcf/d.²³ DOE has already approved export applications for a total of 11 bcf/d. There are pending LNG export applications for at least another 24 bcf/d of

natural gas.²⁴ In other words, total natural gas exports could soon significantly exceed the 12 bcf/d that the EIA study assumed would be the upper limit in its analysis. Should natural gas exports expand beyond this amount, they could further increase gas and electricity prices beyond the EIA predictions.

The DOE study by NERA Economic Consulting, “Macroeconomic Impacts of LNG Exports from the United States,” reiterated EIA’s prediction that natural gas and electricity prices would rise with exports. The NERA study determined that “U.S. natural gas prices increase when the U.S. exports LNG.”²⁵ The analysis noted that “the electricity sector, energy-intensive sector, and natural gas dependent goods and services producers will all be impacted by price rises.”²⁶ The analysis was also based on LNG exports of up to 12 billion cubic feet per day—a level that could be exceeded soon.

A significant natural gas price increase could have a severe impact on family budgets for those not employed in the gas industry. EIA reports that the typical household spent an average of nearly \$2,000—or 2.7 percent of their household income—on household energy fuels in 2012.²⁷ Households in the fifth-lowest income bracket spent 6 percent—or twice that portion of their livelihood—on household fuels.²⁸

While gas and electricity prices could rise, DOE projects that “total labor compensation” would decline.²⁹ Its study concluded that “households with income solely from wages or government transfers ... might not participate in [the] benefits” of LNG export expansion.³⁰

Higher natural gas prices could hurt manufacturing

Lower natural gas prices have fueled the recent increase in American manufacturing. Fuel Fix, a Hearst energy publication, reported in March that:

An ample supply of cheap natural gas has ignited a U.S. manufacturing surge projected to expand plant payrolls and drive demand for chemicals, machinery and steel through the end of the decade, according to a report released Thursday.

*Sinking natural gas prices ... are linked to more than 196,000 new manufacturing jobs in major metropolitan areas and a \$124 billion boost to sales for energy-intensive products like fabricated metals and plastics, according to a U.S. Conference of Mayors report on the nation’s industrial growth.*³¹

For instance, Canada’s Methanex, the world’s largest methanol producer, is spending \$1.1 billion to move two of its Chilean factories to Geismar, Louisiana. The plants are expected to open in 2015 and 2016.³² The Dow Chemical Company will spend \$4 billion to build two new plants in Texas and reopen one in Louisiana.³³ These are simply several examples of the manufacturing revival linked to more shale gas production and lower gas prices.

This growth is at risk if more LNG exports boost natural gas prices, as the aforementioned studies indicate would occur. According to EIA, the industrial sector, which includes manufacturers that use natural gas as a feedstock, would experience a 28 percent price increase in direct natural gas costs between 2013 and 2020.³⁴ The price boost would be more than a 50 percent increase between 2013 and 2030.³⁵

LNG exports could reduce net job creation compared to using this gas for domestic manufacturing. A study commissioned by the Dow Chemical Company—an opponent of unchecked LNG exports—found that:

A comparison of the effects of the manufacturing sector using 5 Bcf/d of natural gas versus LNG terminals exporting 5 Bcf/d of natural gas ... clearly shows higher ... employment related to the manufacturing investments.

This is primarily driven by the higher level of investment required to manufacture products using the natural gas than to export it. Natural gas use of 5 Bcf/d in the manufacturing sector requires more than \$90 billion in investments and significant annual spending, while LNG export terminals with 5 Bcf/d of capacity would involve only \$20 billion in new investment.³⁶

This study concluded that “the total direct and indirect employment for the manufacturing sector (180,000 annual jobs) is more than eight times the total direct and indirect employment from LNG exports (22,000 annual jobs).”³⁷

The NERA study commissioned by DOE determined that the expansion of LNG exports would provide net economic benefit to the economy:

In all of these cases, benefits that come from export expansion would more than outweigh the costs of faster increases in natural gas production and slower growth in natural gas demand, so that LNG exports have net economic benefits in spite of higher domestic natural gas prices. This is exactly the outcome that economic theory describes when barriers to trade are removed.³⁸

The study also concluded that higher natural gas prices from LNG exports would hurt manufacturing employment. It determined that:

Higher natural gas prices in 2015 can also be expected to have negative effects on output and employment, particularly in sectors that make intensive use of natural gas.

The manufacturing sector [is] dependent on natural gas as a fuel and are therefore vulnerable to natural gas price increases. These particular sectors will be disproportionately impacted leading to lower output.³⁹

An increase in LNG exports could increase climate pollution

It is irresponsible to discuss energy policies without consideration of the potential contributions to climate change. Recent scientific reports continue to sound even louder alarms about the threat to public health and our environment from unchecked carbon, methane, and other climate pollution. On March 30, the Intergovernmental Panel on Climate Change, or IPCC—the world’s largest deliberative body of scientific study devoted to climate change—released its latest report, “Impacts, Adaptation, and Vulnerability.”⁴⁰ In its strongest language to date, the report warns, “Impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability.”⁴¹

As quoted in *The New York Times*, the report warns that:

*Throughout the 21st century, climate-change impacts are projected to slow down economic growth, make poverty reduction more difficult, further erode food security, and prolong existing and create new poverty traps, the latter particularly in urban areas and emerging hot spots of hunger.*⁴²

The United States’ *National Climate Assessment*, released on May 6, reiterated the IPCC findings. The assessment includes the dire warning that:

Climate change, once considered an issue for a distant future, has moved firmly into the present. ... This National Climate Assessment concludes that the evidence of human-induced climate change continues to strengthen and that impacts are increasing across the country.

Americans are noticing changes all around them. Summers are longer and hotter, and extended periods of unusual heat last longer than any living American has ever experienced. Winters are generally shorter and warmer. Rain comes in heavier downpours. People are seeing changes in the length and severity of seasonal allergies. ...

*Other changes are even more dramatic. Residents of some coastal cities see their streets flood more regularly during storms and high tides. Inland cities near large rivers also experience more flooding, especially in the Midwest and Northeast. Insurance rates are rising in some vulnerable locations, and insurance is no longer available in others. Hotter and drier weather and earlier snow melt mean that wildfires in the West start earlier in the spring, last later into the fall, and burn more acreage.*⁴³

In the United States, climate-related events exact a huge human and economic toll. Examples of these costs include the scorching California drought, record floods in Colorado, and a deadly wildfire season just ahead. Nationwide, in the past three years, there were 34 extreme weather events that each caused \$1 billion or more in damage.⁴⁴ Together, these events took 1,221 lives and caused \$208 billion in damage.⁴⁵

So we must assess the potential impact of LNG exports on U.S. climate pollution. It is well documented that fracking to produce shale gas generates fugitive methane, which is the main component of natural gas.⁴⁶ Methane is a potent climate pollutant, which has 86 times more warming potential than carbon dioxide pollution over a 20-year time period.⁴⁷ This means that significant additional emissions in the near future could spur much more climate change, extreme weather, and other harmful impacts.⁴⁸

Oil and gas production is the second largest source of domestic methane pollution, responsible for nearly 30 percent of it.⁴⁹ The administration's "Climate Action Plan Strategy to Reduce Methane Emissions" noted that "methane equivalent to 127 million tons of carbon dioxide pollution was emitted from production, processing, transmission, storage, and distribution of natural gas" in 2012.⁵⁰

If LNG exports drive an increase in natural gas production—as many predict—this could also spark growth in methane pollution unless strict limits are set to reduce it during the production and transportation phases. This concern led the Environmental Protection Agency, or EPA, to urge FERC "to consider greenhouse gas impacts from increased U.S. natural gas drilling in its environmental review of a natural gas export terminal in Louisiana."⁵¹

The United States must significantly reduce its methane releases to meet its 2020 climate-pollution-reduction goal. Later this year, the EPA will release its methane-reduction ideas for the oil and gas sector, which should include cost-effective limits on this pollutant.⁵² This reduction regime must be promptly implemented in oil and gas fields to avoid further exacerbating climate change. Ignoring the potential increase in methane pollution from additional gas production driven by LNG exports will not make climate change go away—it will only make its impacts more deadly, destructive, and expensive.

DOE must also assess the potential increase in methane pollution when reviewing pending LNG export applications. This evaluation should factor in the cumulative increase in natural gas production from all of the LNG export applications already approved, as well as the impact of the growth in gas production due to additional exports.

Some proponents of additional LNG exports argue that they would benefit the climate by replacing dirty coal-fueled electricity produced in Asia and Europe. Natural gas combustion for electricity emits only half of the carbon pollution compared to coal combustion. However, the National Energy Technology Laboratory, or NETL's, just released "Life Cycle GHG Perspective on Exporting LNG from the U.S." found that there are 50 percent more emissions from the natural-gas-export supply chain compared to coal's supply chain, offsetting the gains due to lower pollution from combustion.⁵³ Thus, the NETL analysis concluded that there was little difference in the total amount of life cycle climate pollution between "U.S. LNG exports for power production in European and Asian markets ... when compared to regional coal extraction and consumption for power production."⁵⁴

Exporting LNG would convert a relatively clean fuel to one with similar emissions levels to coal. At a time when we must sharply reduce climate pollution, we can little afford such a result. LNG export proponents cannot claim that more exports will lower overseas climate pollution because NETL debunked this notion.

Save natural gas, create jobs, cut pollution

One way to lower consumer prices and cut climate pollution is to make our natural gas distribution system much more efficient. A report from the Office of Sen. Ed Markey's (D-MA), "America Pays for Gas Leaks," estimated that the aging network of natural gas pipelines leak significant amounts of this fuel. It determined that:

Gas distribution companies in 2011 reported releasing 69 billion cubic feet of natural gas to the atmosphere, almost enough to meet the state of Maine's gas needs for a year and equal to the annual carbon dioxide emissions of about six million automobiles. ... Gas companies have little incentive to replace these leaky pipes, which span about 91,000 miles across 46 states because they are able to pass along the cost of lost gas to consumers. Nationally, consumers paid at least \$20 billion from 2000–2011 for gas that was unaccounted for and never used according to analysis performed for this report.⁵⁵

Sen. Markey introduced legislation that would begin to plug these leaks. The Pipeline Modernization and Consumer Protection Act, or S. 1767, would "require gas pipeline facilities to accelerate the repair, rehabilitation, and replacement of high-risk pipelines."⁵⁶ Companies would develop a priority list of their pipelines that pose the most risk and adopt a cost-recovery program to pay to repair them.⁵⁷

Sen. Markey also introduced a bill to help stem natural gas leaks from pipelines while creating jobs. The Pipeline Revolving Fund and Job Creation Act, or S. 1768, would provide "grants to states to establish [revolving] loan funds," with each state providing 20 percent of the money in their fund.⁵⁸ It would last for 10 years.

Together, these bills would begin to plug natural gas pipeline leaks, create jobs for workers to repair them, save consumers money due to less wasted gas, and cut climate pollution. Most importantly, they would identify and repair the most hazardous pipelines to reduce the likelihood of another tragic gas explosion, such as the one in Harlem in March.

Companion bills were introduced in the House of Representatives by Rep. Charles Rangel (D-NY). These bills have broad support from organizations that include the United Steelworkers, Consumers Union, New England Gas Workers Association, United Association of Plumbers and Pipefitters, and other interests.

USAID program achieved cost-effective efficiency in Ukraine

The U.S. Agency for International Development, or USAID, has already invested a small amount of funds to reduce Ukraine's woeful energy waste. It launched the Municipal Heating Reform Project, or MHR Project, in 2009, which "selected 38 cities ... for the implementation of project activities and energy efficiency demonstration projects."⁵⁹ The efforts in these cities included "municipal energy assessments, development of municipal energy plans, development of legal and technical specifications for metering equipment, implementation of energy efficient technologies, and monitoring results."⁶⁰

By 2013, the project achieved substantial results. For instance, through 2012, "on average, the implementation of heat metering and control systems resulted in 18.7% savings," according to an Alliance to Save Energy draft report.⁶¹

Engility, a USAID contractor on the MHR Project, noted that it leveraged USAID's investment to achieve the following significant energy, financial, and pollution savings, including:

- 380 million cubic meters of natural gas saved
- \$225 million leveraged for energy-efficiency projects
- 676,000 tons carbon-dioxide-emissions reduction
- 25 Municipal Energy Plans with appropriate local budget support
- 5 Regional Training Centers established
- 34 energy-efficiency or improved heating demonstration projects
- 3,160 people—including 1,760 women—directly trained in energy-efficiency subjects⁶²

The MHR Project was relatively inexpensive. The first three years cost a total of \$15 million.⁶³ It received another \$13.5 million in September 2013.⁶⁴

Efficiency can promptly help Ukraine reduce dependence on Russian gas

Russia recently increased its threat to Ukraine by cutting off its natural gas supplies. Russia hopes to exploit Ukrainian dependence on its gas to dominate this independent nation. In 2012, Ukraine produced only 37 percent of its own gas and imported the remainder from Russia.⁶⁵

The Obama administration recently delivered some cost-effective aid to Ukraine that would reduce its reliance on Russian gas. During Vice President Joe Biden's visit to Ukraine in April, he promised assistance to "maximize energy efficiency, which could deliver potentially huge cost savings to Ukraine and rationalize energy consumption."⁶⁶

Sen. Markey introduced legislation to build on this aid: the Ukrainian Independence from Russian Energy Act, or S. 2433.⁶⁷ He noted that this bill responds to:

*A coalition of 35 Ukrainian mayors ... urgently requesting assistance in increasing the energy efficiency of their buildings, district heating systems, and transportation networks in order to reduce dependence on imports of natural gas from Russia. Ukraine is currently the second most wasteful country in the world with energy. If the country were only as energy efficient as the average country in Europe, that level of efficiency would almost completely eliminate Ukraine's need to import Russian natural gas.*⁶⁸

S. 2433 would provide \$30 million over three years to assist Ukraine with efficiency measures, including replacing inefficient boilers, upgrading district heating systems, plugging leaky pipes, and improving the efficiency of buildings.⁶⁹

Efficiency is faster and cheaper than LNG exports to aid Ukraine

Legislators are understandably concerned about Russia using natural gas as a weapon against Ukraine. *The Washington Post* reported that:

*Many members of Congress are pressing the Obama administration to use energy as a diplomatic weapon and to speed permits for natural gas export terminals to ease Europe's and Ukraine's heavy reliance on Russian supplies.*⁷⁰

There is legislation to fast-track approval of additional LNG export applications by eliminating or truncating DOE's public interest review of proposed exports.⁷¹

Additional approval of LNG exports threatens to further hike natural gas prices and pollution but would do little to help Ukraine. The Sabine Pass LNG facility is the export terminal nearest to completion, and its finish date is at least a year and a half away.⁷² *The New York Times* notes that “half of the gas that will leave [the] facility has already been contracted by India and South Korea. The other half will go to British and Spanish companies.”⁷³

None of the other approved LNG terminals have even begun construction. *The Washington Post* predicts that LNG exports to Ukraine could not occur until “years from now. The earliest gas exports won’t come until late 2015 or 2016, and most won’t get started until 2017 through 2019.”⁷⁴

Oil executives understand that the approval, construction, and operation of LNG export terminals is a lengthy process. *The New York Times* reported that:

‘L.N.G. exports are not about snapping your fingers and making them happen,’ said Marvin E. Odum, president of the Shell Oil Company, which has partnered with Kinder Morgan in a proposed export terminal in Georgia that is awaiting regulatory approval. ‘These are large business development projects that take several years of construction and several years of business development and engineering design.’⁷⁵

The *Times* concluded that “the United States can offer little hope for Europeans eager to diversify their gas sources as Russia occupies Crimea and may threaten other parts of eastern Ukraine.”⁷⁶

The bottom line: Rushing to approve more LNG exports will not provide immediate or prompt relief for embattled Ukraine, but there are other significant ways we can help them.

Rather than eliminate the public interest review of proposed LNG export facilities, the United States should expand the administration’s energy-efficiency assistance to Ukraine by passage of S. 2433 to help slash its energy waste. Some of these efficiency measures could include replacement of inefficient furnaces and compressors with highly efficient American-made models. This would reduce Ukrainian purchases of Russian gas and create jobs both in Ukraine and the United States.

On June 16, new uncertainty was injected into the fate of LNG exports when it was revealed that the federal government may have ignored the law by approving export applications. Based on an investigation by Sen. Markey, the *Houston Chronicle* reported that:

A decades-old decision by the Commerce Department to abandon congressionally mandated restrictions on natural gas exports could jeopardize current plans to sell the fossil fuel overseas. ...

Although Congress passed a law in 1975 directing the government to bar exports of U.S. oil and natural gas, the Commerce Department never got further than crude. And when Commerce formally delegated gas export issues to the then one-year-old Energy Department in 1978, it did so citing a much older 1938 law and the regulations born under it—without any mention of the newer 1975 mandate.⁷⁷

This four-decade disregard of the Energy Policy and Conservation Act of 1975 could halt approval of additional export applications and provides a potent legal argument to those challenging the applications already approved by DOE.⁷⁸ The U.S. Department of Commerce has yet to respond to Sen. Markey’s findings.⁷⁹

Conclusion

The huge increase in domestic shale gas production provides many benefits to the United States, including a home-grown, cleaner, cheaper fuel for electricity generation and more jobs in the oil and gas industry. It has also sparked a domestic manufacturing renaissance. We must ensure that there are strict enforceable limits on the emission of methane and other air and water pollution produced from the production, transmission, and combustion of natural gas.

Likewise, the approval of additional LNG export applications should occur only if they do not cause electricity price spikes that would harm middle- and low-income families and business budgets, lower wages, or impair the recent manufacturing resurgence. Additionally, such exports must help reduce—rather than increase—climate pollution. The cheapest, fastest, most economically beneficial step to meet energy needs in the United States or Ukraine is to launch mass energy-efficiency programs to plug leaky pipes, reduce building energy use, and reduce other sources of energy waste. This would provide much quicker assistance to Ukraine than eliminating public interest reviews for future LNG export proposals.

Endnotes

- 1 U.S. Energy Information Administration, "In the News: Natural gas consumption sets winter record, with residential/commercial sectors surpassing 50% share," *Natural Gas Weekly Update*, April 3, 2014, available at http://www.eia.gov/naturalgas/weekly/archive/2014/04_03/index.cfm.
- 2 U.S. Energy Information Administration, "Technology drives natural gas production growth from shale gas formations," *Today in Energy*, July 12, 2011, available at <http://www.eia.gov/todayinenergy/detail.cfm?id=2170>.
- 3 Platts, "Spot LNG Prices for June Delivery Fell 8.0% on Low Demand," Press release, May 19, 2014, available at <http://www.platts.com/pressreleases/2014/051914/no>.
- 4 U.S. Energy Information Administration, "Henry Hub Natural Gas Sport Price," available at <http://www.eia.gov/dnav/ng/hist/rngwhhdW.htm> (last accessed June 2014).
- 5 U.S. Department of Energy, "How to Obtain Authorization to Import and/or Export Natural Gas and LNG," available at <http://energy.gov/fe/services/natural-gas-regulation/how-obtain-authorization-import-and-or-export-natural-gas-and-lng#LNG> (last accessed April 2014).
- 6 Ibid.
- 7 John Anderson, "Natural Gas Import/Export Regulation" (Washington: Office of Fossil Energy, 2011), available at http://www.usea.org/sites/default/files/event-file/511/Anderson_DOE_LNG_Exports.pdf.
- 8 Paula Gant, "The Department of Energy's Program Regulating Liquefied Natural Gas Export Applications," Testimony before the House Subcommittee on Energy and Power, March 25, 2014, available at <http://docs.house.gov/meetings/IF/IF03/20140325/101953/HHRG-113-IF03-Wstate-GantP-20140325-U1.pdf>.
- 9 Edward McAllister and Ayesha Roscoe, "U.S. regulators approve Cheniere LNG export plant," Reuters, April 16, 2012, available at <http://www.reuters.com/article/2012/04/16/us-cheniere-sabine-idUSBRE83F1A120120416>.
- 10 Cheniere, "Sabine Liquefaction Project Schedule," available at http://www.cheniere.com/sabine_liquefaction/project_schedule.shtml (last accessed April 2014).
- 11 *Federal Register*, "Proposed Procedures for Liquefied Natural Gas Export Decisions," daily ed., June 4, 2014, p. 32261–32264, available at http://energy.gov/sites/prod/files/2014/06/f16/FE.ProposedProced.LNG_.pdf.
- 12 Ibid.
- 13 Anderson, "Natural Gas Import/Export Regulation."
- 14 Ibid.
- 15 U.S. Department of Energy, *Long Term Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States (as of June 11, 2014)* (2014), available at <http://energy.gov/sites/prod/files/2014/06/f16/Summary%20of%20LNG%20Export%20Applications.pdf>; U.S. Energy Information Administration, "Natural Gas Supply, Disposition, and Prices, Reference case," available at <http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AEO2013ER&subject=8-AEO2013ER&table=13-AEO2013ER®ion=0-0&cases=early2013-d102312a> (last accessed April 2014).
- 16 Ibid.
- 17 U.S. Energy Information Administration, *Effect of Increased Natural Gas Exports on Domestic Energy Markets* (U.S. Department of Energy, 2012), available at http://www.eia.gov/analysis/requests/fe/pdf/fe_lng.pdf.
- 18 Ibid.
- 19 Ibid.
- 20 Ibid.
- 21 Ibid.
- 22 Ibid.
- 23 U.S. Energy Information Administration, "U.S. Natural Gas Exports and Re-Exports by Country," available at http://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm (last accessed June 2014).
- 24 U.S. Department of Energy, *Long Term Applications Received by DOE/FE to Export Domestically Produced LNG from the Lower-48 States*.
- 25 W. David Montgomery and Sugandha D. Tuladhar, "Macroeconomic Impacts of LNG Exports from the United States" (New York: NERA Economic Consulting, 2013) available at http://energy.gov/sites/prod/files/2013/04/f0/nera_lng_report.pdf.
- 26 Ibid.
- 27 U.S. Energy Information Administration, "Lower residential energy use reduces home energy expenditures as share of household income," *Today in Energy*, April 18, 2013, available at <http://www.eia.gov/todayinenergy/detail.cfm?id=10891>.
- 28 Ibid.
- 29 Montgomery and Tuladhar, "Macroeconomic Impacts of LNG Exports from the United States."
- 30 Ibid.
- 31 Collin Eaton, "Report: Cheap gas will fuel US manufacturing job surge through 2020," *Fuel Fix*, March 20, 2014, available at <http://fuelfix.com/blog/2014/03/20/cheap-gas-critical-to-u-s-manufacturing-surge-through-2020/>.
- 32 Jack Kaskey, "Chemical Companies Rush to the U.S. Thanks to Cheap Natural Gas," *Bloomberg Businessweek*, July 25, 2013, available at <http://www.businessweek.com/articles/2013-07-25/chemical-companies-rush-to-the-u-dot-s-dot-thanks-to-cheap-natural-gas>.
- 33 Ibid.
- 34 U.S. Energy Information Administration, "Natural Gas Supply, Disposition, and Prices, Reference case."
- 35 Ibid.
- 36 Ken Ditzel, Jeff Plewes, and Bob Broxson, "US Manufacturing and LNG Exports: Economic Contributions to the US Economy and Impacts on US Natural Gas Prices" (Washington: Charles River Associates, 2013), available at http://www.crai.com/uploadedFiles/Publications/CRA_LNG_Study_Feb2013.pdf.
- 37 Ibid.
- 38 Montgomery and Tuladhar, "Macroeconomic Impacts of LNG Exports from the United States."
- 39 Ibid.
- 40 Intergovernmental Panel on Climate Change, "Fifth Assessment Report (AR5)," available at <http://www.ipcc.ch/index.htm#.U0QQ7GbD-70> (last accessed April 2014).
- 41 Intergovernmental Panel on Climate Change, "Summary for Policymakers" (Cambridge, UK: Cambridge University Press, 2014), available at http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf.
- 42 Justin Gillis, "Panel's Warning on Climate Risk: Worst Is Yet to Come," *The New York Times*, March 31, 2014, available at <http://www.nytimes.com/2014/04/01/science/earth/climate.html>.

- 43 Jerry M. Melillo, Terese C. Richmond, and Gary W. Yohoe, eds., *Climate Change Impacts in the United States: The Third National Climate Assessment* (Washington: U.S. Global Change Research Program, 2014), available at <http://nca2014.globalchange.gov/downloads>.
- 44 Daniel J. Weiss and Siri Manning, "2013: Extreme Weather, Extreme Damage," Center for American Progress, March 27, 2014, available at <http://www.americanprogress.org/issues/green/news/2014/03/27/86532/2013-extreme-weather-extreme-damage/>.
- 45 Ibid.
- 46 The White House, "Climate Action Plan: Strategy to Reduce Methane Emissions" (2014), available at http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.
- 47 Ibid.
- 48 Ibid.
- 49 Ibid.
- 50 Ibid.
- 51 Jim Day, "EPA raises greenhouse issue in FERC reviews of LNG export terminals," *The Energy Daily*, April 4, 2014, available at <http://www.theenergydaily.com/publications/ed/10905.html>.
- 52 Ibid.
- 53 Timothy J. Skone and others, "Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States" (Washington: National Energy Technology Laboratory, 2014), available at <http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Life%20Cycle%20Analysis/NETL-LNG-LCA-29May2014.pdf>.
- 54 Ibid.
- 55 Office of Sen. Ed Markey, "America Pays for Gas Leaks: Natural Gas Pipeline Leaks Cost Consumers Billions" (2013), available at http://www.markey.senate.gov/documents/markey_lost_gas_report.pdf.
- 56 *Pipeline Modernization and Consumer Protection Act*, S. 1767, 113 Cong. 1 sess. (Government Printing Office, 2013), available at [http://beta.congress.gov/bill/113th-congress/senate-bill/1767?q={%22search%22%3A\[%22Markey%22\]}](http://beta.congress.gov/bill/113th-congress/senate-bill/1767?q={%22search%22%3A[%22Markey%22]}).
- 57 Ibid.
- 58 *Pipeline Revolving Fund and Job Creation Act*, S. 1768, 113 Cong. 1 sess. (Government Printing Office, 2013), available at [http://beta.congress.gov/bill/113th-congress/senate-bill/1768?q={%22search%22%3A\[%22Markey%22\]}/](http://beta.congress.gov/bill/113th-congress/senate-bill/1768?q={%22search%22%3A[%22Markey%22]}/).
- 59 Embassy of the United States in Ukraine, "USAID Marks Four Years of Success in Improving Municipal Energy Efficiency in Ukraine," Press release, May 13, 2013, available at <http://ukraine.usembassy.gov/events/usa-id-heating-project.html>.
- 60 Ibid.
- 61 Alliance to Save Energy and the International Resource Group, "Ukraine Municipal Heat Reform Project, Energy Monitoring Report For Heating Season 2010-2011: Implementation Of Heat Metering And Weather-Based Control Systems (Draft)." Working Paper (U.S. Agency for International Development, 2011).
- 62 Engility, "Municipal Energy Reform Project (MERP)—Ukraine" (n.d.), available at http://www.engilitycorp.com/files/8613/8669/8425/ENERGY_-_MERP_Rev.pdf.
- 63 A. Delgado and M. Evans, "Inventory of U.S.-led International Activities on Building Energy Efficiency" (Richland, WA: Pacific Northwest National Laboratory, 2010), available at http://www.pnl.gov/main/publications/external/technical_reports/pnnl-19467.pdf.
- 64 Engility, "Municipal Energy Reform Project (MERP)—Ukraine."
- 65 U.S. Energy Information Administration, "Ukraine," available at <http://www.eia.gov/countries/country-data.cfm?fips=UP> (last accessed April 2014).
- 66 The White House, "Fact Sheet: U.S. Crisis Support Package for Ukraine," Press release, April 21, 2014, available at <http://www.whitehouse.gov/the-press-office/2014/04/21/fact-sheet-us-crisis-support-package-ukraine>.
- 67 Office of Sen. Ed Markey, "Markey Introduces Legislation to Boost Ukrainian Energy Independence, Lessening Putin's Power," Press release, June 5, 2014, available at <http://www.markey.senate.gov/news/press-releases/markey-introduces-legislation-to-boost-ukrainian-energy-independence-lessening-putins-power>.
- 68 Ibid.
- 69 Ibid.
- 70 Steven Mufson, "Can U.S. natural gas rescue Ukraine from Russia?," *The Washington Post* Wonkblog, March 25, 2014, available at <http://www.washingtonpost.com/blogs/wonkblog/wp/2014/03/25/can-u-s-natural-gas-rescue-ukraine-from-russia/>.
- 71 Ayesha Rascoe, "U.S. lawmakers mull speedier gas exports to help Ukraine, Europe," Reuters, March 25, 2014, available at <http://www.reuters.com/article/2014/03/25/us-usa-Ing-congress-idUSBREA2O08Z20140325>.
- 72 Cheniere, "Sabine Liquefaction Project Schedule."
- 73 Clifford Krauss, "U.S. Gas Tantalizes Europe, but It's Not a Quick Fix," *The New York Times*, April 7, 2014, available at http://www.nytimes.com/2014/04/08/business/energy-environment/us-gas-tantalizes-europe-but-its-not-a-quick-fix.html?_r=0.
- 74 Mufson, "Can U.S. natural gas rescue Ukraine from Russia?"
- 75 Krauss, "U.S. Gas Tantalizes Europe, but It's Not a Quick Fix."
- 76 Ibid.
- 77 Jennifer A. Dlouhy, "Sen. Markey: Regulatory oversight jeopardizes gas export approvals," Fuel Fix, June 16, 2014, available at <http://fuelfix.com/laredo/2014/06/16/sen-markey-regulatory-oversight-jeopardizes-gas-export-approvals/>.
- 78 Office of Sen. Ed Markey, "Markey: Natural Gas Export Approvals May Be Unlawful," Press release, June 16, 2014, available at <http://www.markey.senate.gov/news/press-releases/markey-natural-gas-export-approvals-may-be-unlawful>.
- 79 Dlouhy, "Sen. Markey: Regulatory oversight jeopardizes gas export approvals."