

The Dow Chemical Company

STATEMENT FOR THE RECORD

SENATE ENERGY AND NATURAL RESOURCES COMMITTEE

HEARING ON

Opportunities and Challenges for Natural Gas

February 12, 2013

The Dow Chemical Company Statement for the Record

The Dow Chemical Company appreciates the opportunity to submit these written comments to the Committee on Energy and Natural Resources. Dow is committed to sustainable market-based approaches that further the national interest and competitiveness of the United States.

We applaud the Committee for holding a hearing on opportunities and challenges for natural gas. With forward-looking government policy, the shale gas revolution presents a once-in-a-lifetime opportunity for the country to further critical national goals like economic growth, job creation and investment, energy security and independence.

About Dow

Dow was founded in Michigan in 1897 and is one of the world's leading manufacturers of chemicals, plastics and advanced materials. Dow combines the power of science and technology to passionately innovate what is essential to human progress. Dow connects chemistry and innovation with the principles of sustainability to help address many of the world's most challenging problems such as the need for clean water, renewable energy generation and conservation, and increasing agricultural productivity. Dow's diversified industry-leading portfolio of specialty chemical, advanced materials, agrosiences and plastics businesses delivers a broad range of technology-based products and solutions to customers in approximately 160 countries and in high growth sectors such as electronics, water, energy, coatings and agriculture. More information about Dow can be found at www.dow.com.

Dow is a major user of natural gas and natural gas liquids (NGL), both as an energy source and as feedstock for production of our products. Consequently, we have vast experience that can help inform development of thoughtful, constructive policies on the availability and consumption of natural gas. Natural gas plays a critical role in the U.S. economy, energy policy and the global competitiveness of the United States. In this submission, we will discuss our views on government policies that impact natural gas and the effect of those policies on U.S. competitiveness.

Dow uses natural gas to drive the chemical reactions necessary to turn our feedstocks into useful products, many of which lead to net energy savings. Dow's global hydrocarbon and energy

use amounts to the oil equivalent of 850,000 barrels per day, approximately the daily energy use of Australia.

Notwithstanding the challenges of being an energy-intensive manufacturing company, Dow has continually improved its energy and environmental performance, including limiting greenhouse gas emissions, and we are committed to continuous improvement moving forward. Our manufacturing energy intensity, measured in British thermal units (BTUs) per pound of product, has improved more than 40% since 1990, saving the company more than \$24 billion and 5,200 trillion BTUs. Our 2015 sustainability goals, available at www.dow.com/sustainability/, underscore our energy, climate and other commitments.

As both a consumer and an innovator in energy efficiency and renewable energy technologies, Dow represents a company that believes in an “all of the above” energy policy. As important as the promise of natural gas is, we cannot call upon a single fuel source to do everything we are asking of it.

Manufacturing renaissance

Natural gas is essential for American industry, and growth in shale gas production has been a bright spot for the U.S. economy. Natural gas is an essential component in thousands of everyday consumer products such as cars, appliances, paper, steel, plastic products, pharmaceuticals, and in fertilizer for our farms, in addition to providing heat, hot water, cooking and electric power to tens of millions of residential consumers.

Manufacturing in the United States is undergoing a renaissance, facilitated in substantial part by reasonable and stable natural gas prices. For the first time in over a decade, domestic manufacturers in multiple industries, including petrochemicals, fertilizers, glass, aluminum and steel, are planning to invest in production facilities in the United States. Over 100 new projects have been announced so far, representing approximately \$95 billion in new investments. According to Boston Consulting Group, natural gas price reductions could lead to the addition of approximately 5 million manufacturing jobs. This manufacturing renaissance was unimaginable but a few short years ago.

Dow alone is investing about \$4 billion in new U.S. facilities that will create thousands of new American manufacturing jobs. The outlook for affordable U.S. natural gas was a significant

factor behind our decision to invest on this scale in facilities on the U.S. Gulf Coast. To a great extent, continuing optimism for U.S. manufacturing is founded on the prospect of an adequate, reliable and reasonably priced supply of natural gas.

In and of itself, manufacturing is a critical part of a growing, diversified economy and a major job creator. Beyond that, however, benefits from a strong manufacturing sector ripple throughout the American economy by creating jobs and increasing investments and spending on research and development. For example:

- Each job created in the manufacturing sector leads to at least five more jobs in the larger economy.
- Each job in petrochemical manufacturing creates at least eight more jobs in the larger economy.
- Industrial manufacturing creates \$8 of value in the larger economy for every \$1 of natural gas consumed. The manufacturing sector contributes a higher value added multiplier to the economy than any other sector or any other use of natural gas.
- Manufacturing firms drive innovation by conducting two-thirds of U.S. research and development.

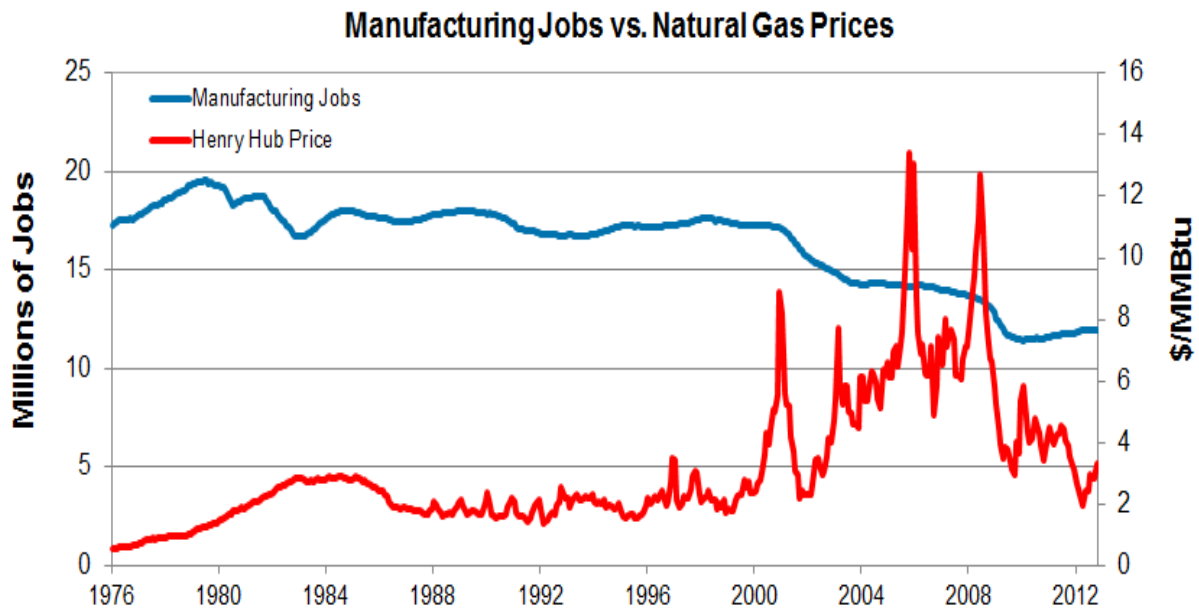
For these reasons, plentiful and affordable natural gas represents a tremendous competitive advantage for American industry. It would be misguided to take actions that threaten this advantage.

Natural gas supply and demand in context

As with any other commodity, the supply of and demand for natural gas determine its price, and the balance between the two is affected by governmental policies. At the same time, U.S. manufacturers are particularly sensitive to natural gas price fluctuations. As natural gas prices rise, manufacturers are more likely than other sectors of the economy to reduce their consumption.

Because of this relatively high demand elasticity, manufacturers tend to serve as “shock absorbers” for the economy when natural gas prices rise. They cut consumption of natural gas, which reduces demand and mutes price volatility for others.

Gas price increases undermine manufacturing jobs. The United States enjoyed relatively stable natural gas prices from the 1970s to around 2000. Between 2000 and 2009, however, U.S. industrial gas demand fell 24% as prices rose to highs of almost \$14.50/MMBtu from a base of roughly \$3.50/MMBtu. Job losses in the manufacturing sector totaled approximately 5.4 million between 2000 and 2009, and volatile natural gas prices were a significant factor. Manufacturing’s high demand elasticity also means that governmental policies that tend to encourage upward pressure on natural gas prices affect manufacturers more than other sectors.

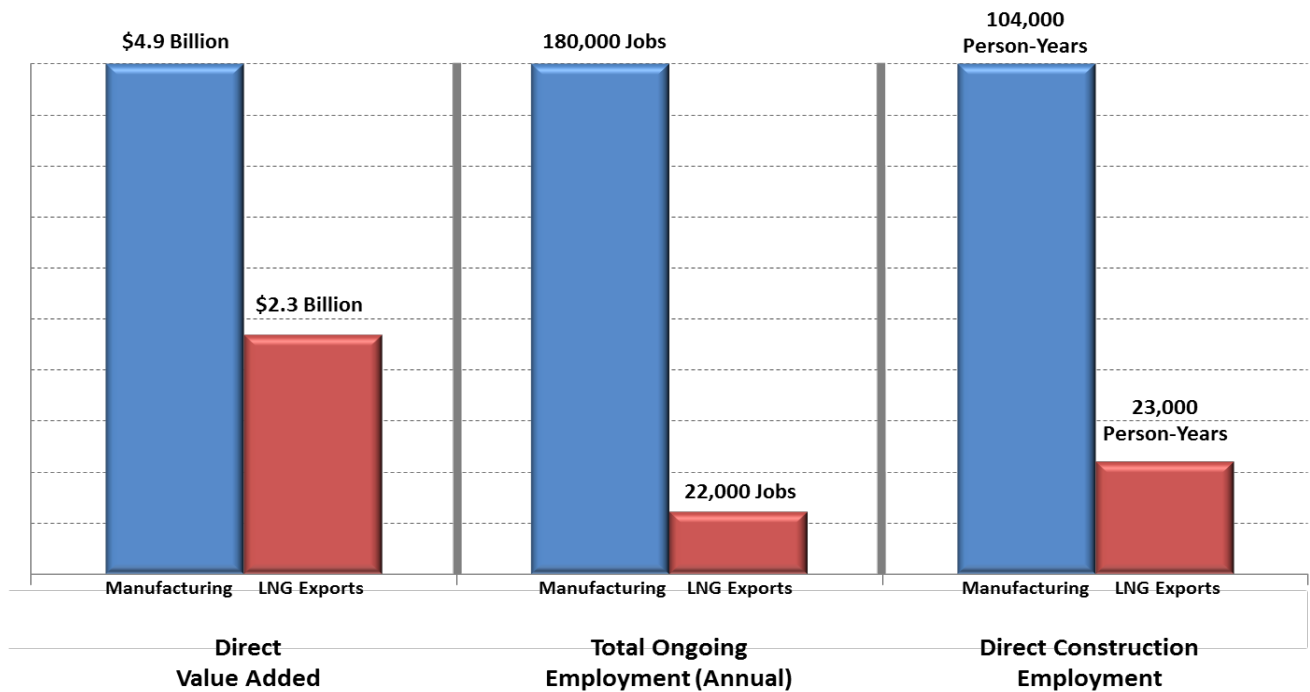


Source: Energy Information Administration; Bureau of Labor Statistics.

Utilizing natural gas domestically would enhance employment and value added throughout the economy. As demonstrated in the chart below, the effect of deploying 5bcf/day of natural gas in the domestic manufacturing sector would be an increase of \$4.9 billion in the national value added (GDP) and a manufacturing employment increase of 180,000 jobs, both directly and through the supply chain.

In stark contrast, exporting that same 5bcf/day of natural gas overseas as liquefied natural gas (LNG) would lead to a GDP increase of only \$2.3 billion and an employment increase of only 22,000 jobs. Moreover, even within the construction sector the payoff from using natural gas domestically far exceeds the benefits of exporting LNG, as the plant-building construction activity associated with increasing the supply of natural gas to energy intensive, trade exposed industries is more than four and one-half times greater than the construction activity associated with LNG exports.

Economic Contributions of Manufacturing Activity Consuming 5 BCF/D Compared to LNG Terminals Exporting 5 BCF/D



Source: Charles River Associates

Shale gas production has created a short-term focus on expanded supply and the effect of that supply on market clearing prices. We believe that focus is misplaced because very few policy-making and investment decisions have an impact over such a short time horizon. Instead, investment and policy-making should be focused on both the medium- and long-term outlook for natural gas.

In the medium- and long-term, domestic natural gas demand growth is expected to be driven by several factors, including:

- The policy-driven shift in electricity production from coal to natural gas,
- Increased investments by industry, which uses forty percent of the nation's natural gas and gas-produced electricity, and
- Increasing numbers of truck and fleet vehicles that use natural gas in lieu of conventional motor fuels.

Companies in the manufacturing, transportation and utility sectors are already making investment decisions based on today's competitive prices and the outlook for affordable and stable natural gas into the future. These decisions will play out over the next ten to twenty years. Our assessments indicate that demand for U.S. natural gas may increase by approximately 60 percent above current levels by 2035. An important corollary question is whether supply can possibly keep up with this new demand.

Sound policy attracts investments and creates jobs

Federal policies on environmental regulation, transportation, electric generation, exports and taxes will have a major impact on natural gas supply and demand, which in turn will have a decisive effect on business investment and job creation for manufacturers. Dow supports policies that stimulate economic growth by facilitating adequate and reliable natural gas supplies at reasonable prices. Congress should be circumspect about policies that could disrupt natural gas supply and pricing, such as:

- Policies that focus consumption on one fuel source or that artificially accelerate demand ahead of supply, such as regulations that encourage rapid replacement of coal fired power plants with natural gas power plants.
- Bans or unreasonable limitations on recovering natural gas and oil through hydraulic fracturing.
- Exporting LNG without a thorough and inclusive process for evaluating the implications for domestic supply and demand, costs to consumers and manufacturers, jobs and economic growth.

Advances in hydraulic fracturing have spurred shale gas supply abundance. Hydraulic fracturing technologies have existed for decades, but recent innovation has made it possible to more economically recover natural gas from shale deposits. While these advances have expanded the supply of natural gas, regulatory authorities at the federal and state levels are scrutinizing the environment effects of this production technology. Dow believes that hydraulic fracturing can be done in a safe and environmentally responsible way. But overly restrictive environmental regulations or moratoria on hydraulic fracturing could greatly reduce future supplies of natural gas, which would have a dramatic impact on the manufacturing sector. A governmental policy that incentivizes use and discourages production is a recipe for higher prices.

Likewise, federal and state regulation of electricity generation could affect demand for natural gas. In the power generation sector, a transformation is underway as utilities and merchant generators switch from predominantly older coal-fired power plants to newer, more efficient natural gas-fired generation. The low price of natural gas is driving some of these changes. Because natural gas power plants emit fewer greenhouse gases than do coal plants, however, several environmental policies, both enacted and proposed, would also encourage fuel switching.

Over the last few years, Congress has considered legislation that would establish a clean energy standard for domestic power generation or that would tax carbon emissions. Such a standard would affect resource allocations and would credit sources of generation that are cleaner than coal. Under some policies, natural gas-fired generation would qualify for this treatment. We urge caution in considering policies that encourage fuel switching between natural gas and coal: electricity producers are already choosing to add gas-fired generation without these additional regulations. Unlike power generation, which can rely on other sources such as nuclear, hydro, wind, solar, biomass, demand response or efficiency measures to meet capacity requirements, homeowners, farmers and the industrial sector do not always have economic alternatives to natural gas.

EPA rulemakings have increased the cost of owning and operating coal-fired power plants. Each of these policies will have the effect of increasing demand for electric generation from natural gas-fired power plants, which will put upward pressure on natural gas prices. Such policies should be designed to avoid precipitously tipping the supply/demand balance in a way that causes volatility in natural gas prices.

Tax policy also affects supply of and demand for natural gas. For example, as part of recent negotiations, some lawmakers have also proposed limits on certain tax incentives that encourage oil and gas exploration and production. Tax policymaking should account for the potential impact of policies on the availability and affordability of natural gas.

As these examples show, government policies may profoundly impact natural gas supply and demand, and thus, the manufacturing sector. At Dow, we understand that forward-looking, thoughtful public policy is a necessary part of addressing the challenges that confront the United States today. At the same time, these policies should also focus on renewing and sustaining our newfound American manufacturing advantage, which we believe is critical to ensuring continued economic and job growth in the United States and overall U.S. competitiveness.

Export licensing

Over 70 years ago, Congress recognized that the import and export of natural gas, a finite natural resource, can have critical implications for U.S. prosperity. In the Natural Gas Act, Congress charged the executive branch with regulating the import and export of natural gas in accordance with the public interest.

The Department of Energy (DOE) has extensive experience evaluating import applications, but it has had limited experience with export applications. Perhaps not surprisingly, there are no clearly established criteria for DOE to apply in determining the public interest with regard to natural gas exporting.

Dow supports expanded exports and trade. However, we also believe it is crucial that DOE have the information and analysis necessary to properly apply the Natural Gas Act requirement that exports be consistent with the public interest. We applaud DOE's recent acknowledgement that an economic study that it commissioned is but one data point in the broad array of considerations that are relevant for a public interest determination. In short, Dow supports an approach to such determinations by DOE that is based on objective criteria and metrics, established through a public process and applied on an incremental, case-by-case basis in a consistent and balanced manner.

Today, DOE is considering 16 applications to export LNG. Since the proposed importing countries do not have a particular type of free trade agreement (FTA) with the United States, these

applications are not covered by the statute's presumption that an FTA represents a determination that the application meets the public interest test. After approving one such application, DOE has temporarily suspended the processing of "non-FTA" LNG export applications. Implicitly recognizing that more is at stake than can be resolved through its traditional approach to processing export applications, DOE commissioned a report from a private firm to evaluate the macroeconomic effects of higher LNG exports.

As detailed in Dow's January 24 submission to DOE,¹ this consultant report is fundamentally flawed and underestimates the potential harmful effects of sharply higher LNG exports. More broadly, though, commissioning the report should be the first step in developing policies that will enable DOE to administer appropriate public interest determinations for LNG export applications. No economic study can account for the full profile of U.S. values that should inform a determination of the public interest with regard to natural gas exports.

The outstanding authorization requests present what is essentially a new challenge. In the modern era, the U.S. government has not faced the need to determine the public interest in connection with requests to authorize exports of large volumes of natural gas. This Committee should encourage DOE to continue its effort to improve the process for evaluating LNG export applications by providing an opportunity for all affected constituencies and the public at large to comment on how best to assess the public interest as it pertains to exports of natural gas.

Newly discovered sources of natural gas present a great opportunity for the United States. At the same time, natural gas remains a finite natural resource with important implications for U.S. energy security, energy independence and the environment. Exports can have supply and price effects that have major impacts throughout the country. The economic impact of LNG exports is also likely to vary by geographic region and by business center. Consequently, public interest determinations should be thorough enough to evaluate nation-wide implications of LNG exports as well as localized effects.

Unchecked LNG export licensing can cause demand shocks, and the resulting price volatility can have substantial adverse impacts on U.S. manufacturing and competitiveness. In the recent past,

¹ Dow's submission is available at http://www.fossil.energy.gov/programs/gasregulation/authorizations/export_study/peter_molinero_em01_24_13.pdf.

the price of natural gas was very high and volatile until the advent of substantial shale gas production. Gas supplies and demand are inherently difficult to predict accurately. Thus, Dow urges a cautious, considered, comprehensive and deliberate approach to assessing the public interest.

Currently, DOE regulations provide for the adjudication of LNG export applications on a case-by-case basis in proceedings that depend on the parties to raise issues relevant to a public interest determination and to support their positions with persuasive evidence. DOE interprets the Natural Gas Act's public interest standard as creating a rebuttable presumption that a proposed export of natural gas is in the public interest. This means that DOE is to approve an application unless those who oppose the application can overcome this presumption.

In its principal order to date authorizing exports of LNG to non-FTA countries, DOE identified certain topics as being relevant to its evaluation of the impact of LNG exports on the public interest:

- the domestic need for the natural gas proposed to be exported,
- whether proposed exports threaten the security of domestic natural gas supplies, and
- any other issue DOE deems to be important, including whether the export arrangement is consistent with DOE's policy of promoting competition in the marketplace by allowing commercial parties to freely negotiate their own trade arrangements.²

The topics that DOE has identified for evaluating the public interest are too narrow and vague to capture all of the critical national, regional and local issues at stake with LNG exports or to offer any useful guidance. In response to the economic study it commissioned, DOE has received more than 370 submissions from a broad array of stakeholders covering an equally broad array of topics. The sheer number of submitted comments reflects the depth of interest regarding this issue. Unfortunately, the current process provides no assurance that DOE will consider all aspects of the public interest in any given proceeding. This is inevitable for an administrative process that depends

² We are encouraged that the Deputy Secretary of Energy recently acknowledged to the Chairman of this Committee that a variety of other topics merit evaluation in connection with LNG export application public interest determinations.

on arguments and evidence submitted by the parties to a specific export application process. These parties are representing their specific interests, and may not adequately represent the totality of the public interest.

A timely DOE rulemaking process to formulate criteria for determining the public interest as it relates to LNG exports could ameliorate some of the shortcomings of the current process. All of the major constituencies affected by LNG exports should have an opportunity to be heard, which could enable DOE to obtain much broader public input and do so efficiently in a single forum. This would increase the likelihood that all relevant considerations will be identified and that cumulative and national effects will be addressed as well as regional effects. The result of such a rulemaking process—establishment of uniform and actionable criteria with measurable metrics—would facilitate balanced, comprehensive consideration of the public interest by DOE, give parties in individual proceedings advance notice of many of the most relevant considerations, and reduce the risk of inconsistent adjudications across applications. DOE would then apply these criteria and metrics incrementally over time in individual application proceedings, which would assure fairness and uniformity, while allowing DOE to consider changes in circumstances from one application to the next.

More importantly, DOE could adopt a mechanism to balance, in the aggregate, exports and U.S. interests that inform the public interest. A new rule of this kind should generally ensure that DOE is presented with adequate and accurate evidentiary records in each licensing proceeding.

While criteria for determining the public interest should be developed as part of the rulemaking described above, we believe the list below provides a good starting point for identifying specific, concrete and forward-looking criteria that DOE should evaluate in connection with LNG export applications:

- Domestic manufacturing: How will exports impact natural gas prices and the supply/demand balance? Will natural gas supply be reduced? Will there be less feedstock for announced investment projects? Will the jobs created by increased exports exceed jobs lost by the manufacturing industry? Will additional exports displace U.S. consumption?

- U.S. consumers: Will exports reduce the supply of natural gas available for utilities or affect consumer prices or energy costs? Will utilities decrease fuel switching to natural gas?
- Energy security: Will exports reduce the volume of natural gas available for domestic use or increase the need to rely on imported petroleum?
- Employment: How many new jobs will be created or existing jobs impacted? Are employment gains in the oil and gas sector offset by job losses in other areas of the economy affected by relatively higher natural gas prices?
- International trade: Will exports improve the U.S. balance of trade payments sufficiently to offset falling exports in other value-adding sectors of the economy? As to proposed exports to FTA countries, are the exports destined for consumption in the FTA country or will there be transshipment of natural gas to non-FTA countries? How can export applications be disposed of in a manner consistent with U.S. trade obligations?
- Environmental: What would the proposed exports' environmental impact be?
- Strategic interests: Will the exports support a strategic American ally in a meaningful way and consistent with stated policy priorities? Do proposed importing countries accord the United States reciprocal favorable international trade treatment? What are the implications for any current or proposed FTA negotiations?
- Price and volatility: How is the LNG contract being priced, and is it linked to oil in some manner? What is the expected short and long term impact on natural gas and electricity price volatility?
- Other regulatory impacts: What is the potential impact of other regulatory decisions on natural gas demand or supply and what is the interplay between those impacts and exports of natural gas?

DOE should apply criteria that result from this rulemaking to applications on a case-by-case basis and in an incremental fashion. This would entail evaluating whether approving each individual application is in the public interest, and whether the incremental impact of approving that application, in light of DOE's prior approvals, would be consistent with the public interest. Again, the last ten years have seen great fluctuations in domestic gas prices, and circumstances can change as drilling techniques are improved, sources of consumption are expanded or the condition of the economy evolves.

Forward thinking public policy can spur American industry

At Dow, we are implementing a comprehensive plan to take advantage of the structural change that has occurred in the natural gas market, a market that we believe is working. Indeed, we have announced plans to invest in American plants based on our belief that natural gas will remain affordable for American industry and consumers. We are not alone in our desire to expand our American footprint and create thousands of new American manufacturing jobs.

Forward-thinking policy is essential for maintaining this momentum. Dow wishes to support U.S. officials at all levels of government to realize a shared vision of affordable natural gas continuing to revitalize American manufacturing and enhancing U.S. competitiveness. We are in year four or five of a 100 year energy advantage, and a thoughtful, prudent approach to policy-making can ensure that we can leverage the competitive advantage to the benefit of all Americans. The country deserves no less.

We appreciate the opportunity to submit this statement. For more information on Dow and our energy plans visit www.dow.com/energy/perspectives.