RHETORIC WITHOUT REASON: THE DANGERS OF DIVESTMENT

Partnership for Affordable Clean Energy

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SUMMARY

Simply put, divestment is the selling of stocks deemed by an individual or institution as unworthy of holding. Over the past several years, a small but vocal faction of environmental advocates has seized on the idea of energy stock divestment. Reports earlier this year showed 701 global institutions managing assets estimated at $5.46 trillion divesting energy holdings.[1]

While energy divestment first targeted university endowments, it soon spread to public pension funds. As the U.S. continues to back away from the Paris Climate Accord, and oil and gas pipeline projects continue to develop to serve growing demand, divestment activists have begun to target specific projects. In spring 2017, USBancorp issued a lengthy public statement announcing it would no longer finance oil and gas pipelines.

Cloaked in grassroots populism, energy divestment is one of the most anti-democratic social movements afoot today, gambling with the retirement security and education costs of untold numbers of U.S. citizens. Arguments against divestment are clear and compelling:

- University endowments are meant to support students' education now and for the long haul. Endowments are not intended to be political vehicles.
- Similarly, pension funds are created and maintained to support employees and their families in retirement. Employees deserve the most financially rewarding retirement possible; divestment advocates should not be allowed to use other people's money to advance social causes.
- When divestment targets specific banks and energy projects, costs rise for millions of consumers as much-needed energy may be delayed in coming to markets. This in turn may slow economic growth or recovery.
- Divestment fails to accept the fact that fossil fuel-based energy is needed now and will be for decades to come, until technology enables widespread, viable alternatives.

In response to these trends, PACE has expanded our own examination of divestment. It is critical for regulators, lawmakers and consumers to understand that the spread of energy divestment isn't a smarter way forward for pensioners, investors or even for clean energy proponents. On the contrary, divestment threatens pension beneficiaries, investors and may even deter leading energy companies from pursuing sustainable energy projects.

THE TRUE EFFECTS OF DIVESTMENT

Environmentally conscious investors hurt their own cause by divesting. After being divested, stocks are sold back into the secondary market, picked up by investors who may have much less interest in pushing management to invest in sustainable practices or renewable energy projects. Management's responsibility is to current stock

1 March 6, 2017 by NEPC, LLC Investing Impact Committee, "Fossil Fuel Divestment Considerations for Institutional Portfolios," p. 2, see http://www.nepc.com/insights/fossil-fuel-divestment-considerations-for-institutional-portfolios.

owners, not previous ones. Investors who relinquish their seat at the table out of protest are trading their material leverage for nominal hope - you can't flip over the table if you aren't even in the room.

Oxford University Professor William MacAskill, who focuses his academic research on "effective altruism" asserts that divestment campaigns are misguided if they intend to "reduce companies' profitability by directly reducing their share prices." He further provides the example that if someone sells a share of Exxon Mobil for slightly less than market value, the shares purchased at the lower rate are then sold <u>at the market rate</u> and therefore, "the market price stays the same; the company loses no money and notices no difference."

Prof. MacAskill also asserts "[a]s long as there are economic incentives to invest in a certain stock, there will be individuals and groups – most of whom are not under any pressure to act in a socially responsible way – willing to jump on the opportunity. These people will undo the good that socially conscious investors are trying to do."[2]

In the wake of claims that divestment strategies helped advance apartheid's demise in South Africa, economists studied how U.S. divestment movements affected the South African financial market and the share prices of U.S. companies with South African operations. Divestments made in hopes of exerting political pressure turned out to have no discernible effect on the share price of these companies. Why? "the boycott primarily reallocated shares and operations from 'socially responsible' to more indifferent investors and countries."[3] Investors looking to ***punish*** these companies by pulling their money out simply made room for new owners more concerned with future profits than with political activism.

Today, large foreign investors such as China, Russia or developing countries are taking that seat, especially in the energy field. While these outside players show apparent interest in energy innovation and investment in their own nations, they have little reason to support long-term sustainability in the United States over short-term dividends and profits.

Even some green advocates admit that divestment doesn't actually harm the targeted energy companies. According to Mark Gunther, who is sympathetic to the energy divestment movement, "[green investment funds] deserve credit for living up to their principles. But even if a flood of institutions and individuals follow their lead and sell their stocks in fossil fuels—which is unlikely—the Exxons and Chevrons of the world will go on burning fossil fuels." The energy "divestment campaign is about more than selling stocks—it's about building a grassroots environmental movement, starting on college campuses."[4]

ENERGY DIVESTMENT ON COLLEGE CAMPUSES: FAILING GRADES

Over the past four years, PACE repeatedly examined the divestment movement on college campuses. We warned about the potential for a massive price tag in the billions for even a single university and reported on why some universities such as Stanford decided ***against*** divestment, where the Board of Trustees concluded that "[we] do not believe that a credible case can be made for divesting from the fossil fuel industry until there are competitive and readily available alternatives." Several other major universities also declined to adopt divestment, including Harvard, Princeton, Columbia, MIT, NYU and the University of Michigan.

Whether it is a flea-market or a stock market, there are always costs to transactions. The decision to divest large positions from energy assets come with a number of costs. The mandate for a well-balanced portfolio requires

2 October 2015, The New Yorker, by Prof. William MacAskill, "Does Divestment Work?", p. 2 of 6, see https://www.newyorker.com/business/currency/does-divestment-work
3 id
4 January 29, 2013, Mark Gunther, "Deep Green Investing," see https://ensia.com/voices/deep-green-investing/

"As long as there are economic incentives to invest in a certain stock, there will be individuals and groups...willing to jump on the opportunity."

"The problem I have found...is that trying to use an investment portfolio to accomplish social or political causes comes up short in every way you can imagine."

these endowments and institutions to accept responsibility for replacing the investment position with equally well-performing assets. The "frictional costs" of doing so are quite high, as documented by Arizona State University Professor Henrik Bessembinder.[5]

As defined by Bessembinder's academic research, frictional costs include "transaction costs and ongoing monitoring and active management costs." These are "likely to be substantial …[because] …endowments are long-term investors that tend to hold illiquid assets that are costly to sell. [E]ndowments frequently invest in mutual funds or commingled funds, which requires them to sell more than just fossil-fuel-related assets in order to divest. [Where]…there is no well-defined and agreed-upon list of assets that are fossil-fuel-related, investment managers must undertake a degree of active management in order to maintain compliance with divestment goals."

Prof. Bessembinder estimates that over two decades, endowments could lose anywhere from 2 to 20 percent of their value due to frictional costs. For a typical university, this could mean a loss of between $1.4 billion and $7.4 billion.

Vassar trustee Christine Wood brought 30 years of investment management experience to her role, which helped her confront a range of social investing/divesting campaigns. She said, "[t]he problem I have found, in every instance, without exception, is that trying to use an investment portfolio to accomplish social or political causes comes up short in every way you can imagine."[6] A silver lining may be that the push for university divestment went on long enough for others, especially public pension managers, to examine the experiment and understand how the movement earned failing grades for financial prudence <u>and</u> effective activism.

PENSION FIDUCIARY FUNDAMENTALS

Bedrock financial entities like the U.S. Federal Reserve and public pension funds are supposed to be insulated from political pressures.[7] The far-looking nature that defines these types of institutions is highly vulnerable to an increasingly myopic political environment.

Under Department of Labor ERISA regulations, pension funds must follow a fiduciary standard that requires investment decisions only in the interests of plan participants.[8] In fact, "pension fiduciaries have a unique obligation to act on behalf of others— namely, the beneficiaries of the pension plan. Under the federal Employee Retirement Income Security Act (ERISA)1 of 1974, fiduciaries must act in the 'exclusive interest' of these beneficiaries, with the interests of the pension plan sponsor (the governments that fund the plan) and the fiduciaries themselves being secondary."[9]

The Department of Labor also advises that "[t]he primary responsibility of fiduciaries is to run the plan solely in the interest of participants and beneficiaries and for the exclusive purpose of providing benefits and paying plan expenses. Fiduciaries must act prudently and must diversify the plan's investments in order to minimize the risk of large losses.[10]

Pensions are designed to be there for the long haul. Developing "… an investment policy is crucial to

5 May 11, 2016, Prof. Hendrik Bessembinder, "Frictional Costs of Fossil Fuel Divestment," p. 3, see http://www.noia.org/wp-content/uploads/2016/06/Bessembinder-Report-FINAL-1.pdf

6 May 24, 2013, Kristen Domonell, "Is Fossil Fuel Divestment a Wise Move?" p. 5, <u>University Business</u>, https://www.universitybusiness.com/article/divestment-debate

7 July 19, 2016, Simon C.Y. Wong, "Public Pension Funds Perform Better When They Keep Politics at Bay," <u>Harvard Business Review</u>, https://hbr.org/2016/07/public-pension-funds-perform-better-when-they-keep-politics-at-bay

8 March 6, 2017 by NEPC, LLC Investing Impact Committee, "Fossil Fuel Divestment Considerations for Institutional Portfolios,", p. 3, see http://www.nepc.com/insights/fossil-fuel-divestment-considerations-for-institutional-portfolios.

9 2002, by the Government Finance Officers Association, Nicholas Greifer, "Pension Investing: Fundamentals and Best Practices, see http://www.gfoa.org/sites/default/files/PensionInvesting_FundamentalsAndBestPractices.pdf

10 United States Department of Labor, see https://www.dol.gov/general/topic/retirement/fiduciaryresp

maintaining the long-term focus needed to overcome the daily 'noise' of the marketplace. Government pension systems are long-term investors who operate in the public spotlight where they can expect their actions to be carefully scrutinized. Short-term market fluctuations can generate frequent and anxious calls from stakeholders to 'do something' when the wisest course of action may be no action at all."[11]

It is fundamentally dangerous to subject pension holders to the short-sighted goals of revolving legislators, community activism or government bureaucrats. This risk for retirees is even more pronounced given the lasting fallout and uncertainty for many pensions resulting from the global financial crisis a decade ago.

DIVESTMENT HARMS PUBLIC PENSION FUNDS

It's difficult to analyze some university funds because of a lack of publicly available data, but public pension funds tend to have more information available about specific securities. When pension fund managers have the opportunity to weigh in, they frequently oppose divestment. In June 2017, a new study found that public pension funds could lose trillions of dollars by following political directives to divest from fossil fuel-based investments.[12]

University of Chicago Professor of Law and Business Dr. Daniel R. Fischel and his colleagues with the firm of Compass Lexecon examined 11 large pension funds[13] comparing 50 years of performance between actual equity holdings compared with both a broad and narrow divestment case. Their analysis showed potential losses ranging from $3.8 trillion (narrow case) to $4.9 trillion (broad case) over 50 years. While the annual losses from divestment showed up as a weighted average of 0.20 percent lower, the "costs of divestment add up over time." [14]

In cities and states across the nation, divestment advocates are leaning on pension leadership to honor one group's social and political views over their fiduciary responsibilities. Fortunately, many pension managers and oversight boards are relying on information shared by PACE and other organizations and resisting the call to divest.

CALIFORNIA

In 2015, California adopted legislation in 2015 requiring the state's enormous pension funds for state employees (CalPERS) and teachers (CalSTRS) to divest from coal by July 1, 2017.[15] Yet, CALPERS, which is responsible for the retirement benefits of nearly two million people, resolutely decided in April 2017 to "generally prohibit divesting in response to divestment initiatives." CALPERS said:

"These fiduciary obligations generally preclude CalPERS from sacrificing investment performance for the purpose of achieving goals that do not directly relate to CalPERS

11 2002, by the Government Finance Officers Association, Nicholas Greifer, "Pension Investing: Fundamentals and Best Practices, see http://www.gfoa.org/sites/default/files/PensionInvesting_FundamentalsAndBestPractices.pdf

12 June 2017, Prof. Daniel Fischel, Christopher Fiore, Todd Kendall, "Fossil Fuel Divestment and Public Pension Funds," p. 5, see http://divestmentfacts.com/wp-content/uploads/2017/06/Divestment-and-Public-Pension-Funds_FINAL.pdf

13 June 2017, Prof. Daniel Fischel, Christopher Fiore, Todd Kendall, "Fossil Fuel Divestment and Public Pension Funds," p. 3, see http://divestmentfacts.com/wp-content/uploads/2017/06/Divestment-and-Public-Pension-Funds_FINAL.pdf

14 June 2017, Prof. Daniel Fischel, Christopher Fiore, Todd Kendall, "Fossil Fuel Divestment and Public Pension Funds," p. 5, see http://divestmentfacts.com/wp-content/uploads/2017/06/Divestment-and-Public-Pension-Funds_FINAL.pdf

15 May 12, 2015, Rebecca Beitsch, Stateline: Pew Charitable Trusts, see http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/5/12/state-lawmakers-push-pensions-to-divest-fossil-fuel-holdings

"It is fundamentally dangerous to subject pension holders to the short-sighted goals of revolving legislators, community activism or government bureaucrats."

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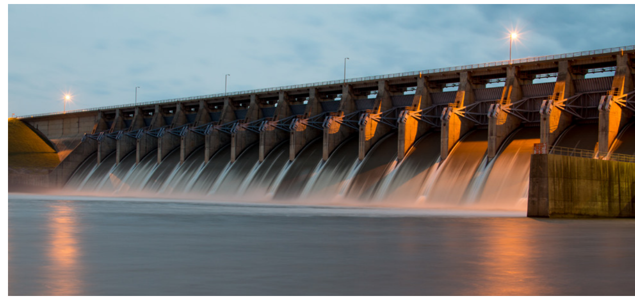


operations or benefits. Divesting appears to almost invariably harm investment performance, such as by causing transaction costs (e.g., the cost of selling assets and reinvesting the proceeds) and compromising investment strategies.

> In addition, there appears to be considerable evidence that Divesting is an ineffective strategy for achieving social or political goals, since the usual consequence is often a mere transfer of ownership of divested assets from one investor to another. Investors that divest lose their ability as shareowners to influence the company to act responsibly." [16]

NEW YORK

Pending legislation would direct the State Comptroller to divest the New York State Common Retirement Fund from companies engaged in the production of fossil fuels. However, there is significant opposition, including from the state's Comptroller and his top assistant. Comptroller Thomas DiNapoli said recently, "Rather than give up its seat at the table by divesting, the state pension fund leverages its role as a large institutional investor to engage with companies as a shareholder ...."[17]

SAN FRANCISCO

San Francisco's city pension board has delayed divestment and is instead balancing engagement strategies with an initial investment in a fossil-free fund. Divestment advocates on the City Board of Supervisors continue to be dismayed, as they have voted for full divestment since 2013. Based on financial integrity concerns, in two years SFERS moved from studying the issue to working on engaging with the fossil fuel companies that make up 2.7 percent of a $20 billion fund.

This fall the debate continues,[18] with SFERS Executive Director Jay Huish defending the practice of holding fossil fuel stocks as a "hedge against inflation" and as long-term investments. Huish also told the SFERS Board that divestment presents a "very difficult legal decision that every fiduciary on every public pension fund across the U.S. is dealing with today … None of them has been able to come forward and do a complete ban." He also flagged the lack of legal analysis supporting pension managers if losses are linked back to divestment decisions.

SEATTLE

The Seattle City Employees Retirement System (SCERS) board voted against adopting divestment in July 2017, despite facing intense pressure from climate activists and former city officials. After studying the issue for an extended period, SCERS' chief investment officer said "We do not see the economic justification. … To our knowledge, there are no investment consultants to U.S. public pensions that have recommended that those public pensions divest from fossil fuel companies." [19]

VERMONT

Vermont state treasurer Beth Pearce serves as Vice-Chair of the state's pension fund. She believes in climate change, but also in her fiduciary responsibility to nearly 50,000 retirees. In 2015, she said adhering to proposed state legislation requiring divestment from polluting funds would "make it difficult for her achieve the investment returns needed to maintain the health of the fund, and

16 April 2017, CALPERS Total Investment Policy, see https://www.calpers.ca.gov/docs/board-agendas/201704/invest/item05a-02.pdf
17 July 24, 2017, Paul Alexander, "Fossil Fuel Divestment Bad Idea for State Pension Fund," Times Union, see http://www.timesunion.com/tuplus-opinion/article/Fossil-fuel-divestment-bad-idea-for-state-pension-11340375.php
18 September 15, 2017, Jennie Rose, "Pension System Balks at Calls to Divest from Fossil Fuels," The Bay City Beacon, see https://www.thebaycitybeacon.com/politics/pension-system-balks-at-calls-to-divest-from-fossil-fuels/article_af59fef0-9bfa-11e7-8e8d-5bea10728c92.html
19 July 13, 2017, Sara Bernard, "Divest City Pensions from Fossil Fuels? Probably Not," Seattle Weekly, see http://www.seattleweekly.com/news/divest-city-pensions-from-fossil-fuels-nope-says-retirement-board/

cost about $10 million annually."[20] "Giving up your seat at the table is not a productive strategy," Pearce said. "If you divest, you no longer have a share of that company and you can't exercise your voting rights to change that company."

The Vermont Pension Investment Committee (VPIC) continued to examine whether divestment fit with its mission and values. Earlier this year, VPIC released a report [21] analyzing divestment impacts, finding that divestment:

> " … does not provide enhanced exposure to companies involved in energy efficiency and renewable energy. Publicly held equity divestment only transfers ownership of fossil fuel securities; it cannot provide fossil fuel alternatives with any new financial resources."

The report further found that:

> "Divestment of fossil fuels ... requires costly restructuring of investments from inexpensive comingled funds, to higher cost separately managed accounts."

DIVESTMENT MOVES ON TO TARGET BANKS AND PROJECTS

Many divestment activists mistakenly believe that the 100 percent renewable future is already here. However, oil and gas will be integral parts of the U.S. energy portfolio for decades to come, for power generation, home heating, commercial applications and transportation. Pipelines move this critical energy source safely and effectively, keeping fuel trucks off highways and railways.

To get at pipelines, divestment forces have begun to target specific banks. The Sierra Club has identified seventeen [22] banks that lend to oil and gas companies, particularly calling out institutions that are financing oil tar sands pipelines.[23] Unfortunately, some have acquiesced. USBancorp, whose U.S. Bank affiliate is one of the largest credit holders for the U.S. government, announced in April 2017 that it would no longer finance oil and gas pipelines and further, would perform more intense examinations of its banking clients' energy infrastructure projects and investments. [24]

It is irresponsible of the Sierra Club and its companion organizations to push individuals or organizations to turn away from significant financial institutions that are inextricably woven into the country's economic fabric. Environmental organizations hold no special expertise in the incredibly complex global financial markets. In touting alternative banks and financial advisers, they fail to note the overwhelming evidence against divestment and ask their supporters to accept these institutions on faith.

Institutions which succumb to divestment pressures also deserve blame. USBancorp and U.S. Bank have built up quite the business line by lending money and providing additional financial services to multiple federal agencies, including those engaged in major energy projects and in implementing Congressional and Administration energy policy. An arbitrary disconnection from these federal activities not only harms the projects, but indirectly harms every U.S. citizen who benefits from the reliable, affordable, energy that oil and gas pipelines deliver efficiently.

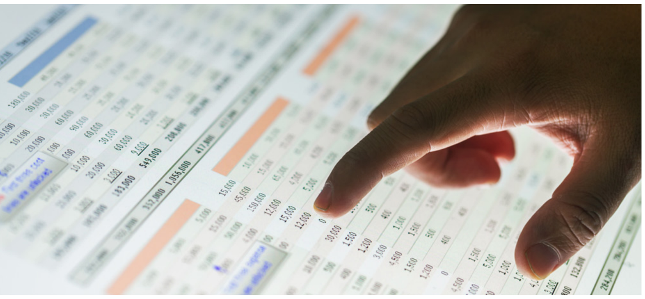
20 May 12, 2015, Rebecca Beitsch, Stateline: Pew Charitable Trusts, see http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/5/12/state-lawmakers-push-pensions-to-divest-fossil-fuel-holdings

21 February 8, 2017, Vermont Pension Investment Committee, "Climate Risk Divestment Discussion," see http://www.vermonttreasurer.gov/sites/treasurer/files/VPIC/PDF/2017/PCA_Climate_Divestment_Report_for_VPIC.pdf

22 Bank of America, Barclays, Citi, Crédit Agricole, Credit Suisse, Deutsche Bank, JP Morgan Chase, Mizuho, MUFG, RBC, SMBC, ScotiaBank, TD Bank, Wells Fargo, CIBC, BNP Paribas, Bank of Montreal

23 June 20,2017, Lena Moffitt, "Divesting from 'Dirty Banks' is a Form of Resistance," Sierra Club Compass, see https://www.sierraclub.org/compass/2017/06/divesting-dirty-banks-form-resistance

24 April 2017, U.S. Bank National Corporation, p. 6, see https://www.usbank.com/pdf/community/Environmental-Responsibility-Policy-Web-Final-April2017.pdf



"Divestment of fossil fuels ... requires costly restructuring of investments from inexpensive comingled funds, to higher cost separately managed accounts."

Research and development efforts, and investments in alternative energy, are increasing among traditional energy companies.

DIVESTMENT CHIPS AWAY AT CLEAN ENERGY PROGRESS

While environmental advocates long for a 100 percent renewable energy future, major energy companies at home and abroad are actually doing something to make "all of the above" energy policies even stronger. Research and development efforts, and investments in alternative energy, are increasing among traditional energy companies. The divestment movement is therefore entirely misplaced because many traditional energy companies are now much more fully integrated and engaged in clean and alternative energy solutions.

Exxon Mobil has spent [25] $8 billion since 2000 "researching, developing and deploying low-carbon technologies," including algae biofuels, agricultural waste biodiesel, and carbonate fuel cells. The company also continually researches how to gain efficiencies in standard industry practices.

BP estimates that renewables are currently meeting three percent of global energy demand, but sees the potential for renewables to grow exponentially. The company has been "producing renewable energy for more than a decade" and ranks among the top U.S. wind energy producers, directly owning 14 wind farms across eight US states … ."[26]

Renewable investments are also increasing among major U.S. electric utilities. For example, NextEra is North America's largest renewable developer. [27] Last year, the Southern Company announced that it would invest $5 billion in renewable energy over the next three-year period.[28] Duke Energy Renewables "generates about 2,300 megawatts of wind power at 19 wind farms across the country, providing enough zero-carbon energy to power more than half a million homes." [29]

DECLINES IN SOME ENERGY STOCKS AREN'T DIVESTMENT WINS

Some divestment advocates point to losses in fossil fuel-based companies' stocks and indexes containing those stocks, jumping to the conclusion that divestment must have worked. This is a spurious analysis, equivalent to saying that since both ice cream sales and shark attacks go up in the summer time, a good deterrent against sharks might be to avoid the musical truck altogether. The sharks aren't drawn to the summer treats—temperatures rise during summer months, which leads to more swimmers as well as more kids clamoring for a refreshing cone. The analogy is exaggerated, but the logic used by divestment advocates is even more unfounded.

A more effective analysis would point to the rise of natural gas as a generation fuel. This sudden influx of an inexpensive and plentiful substitute impacted coal companies' bottom lines and the returns of blended energy funds. Where coal stocks have been sold, it is much more likely due to market conditions for coal.Some divestment advocates assert that the world is ready to transition completely away from fossil fuels. However, as PACE reported earlier this year, the 100 percent renewable energy dream is just that – a dream made impossible at this time by physics and technology.[30] Reliable public data also point to continued and even

25 November 3, 2017, Anna Hirtenstein, "Exxon Quietly Researching Hundreds of Green Projects," Bloomberg, see https://www.bloomberg.com/news/articles/2017-11-03/exxon-is-spending-1-billion-a-year-to-research-green-energy

26 December 2017, BP.com, see https://www.bp.com/en/global/corporate/sustainability/climate-change/renewable-energy.html

27 July 20, 2017, Debbie Carlson, "Why Renewable Energy Investing Has a Bright Future," U.S. News and World Report, https://money.usnews.com/investing/articles/2017-07-20/why-renewable-energy-investing-has-a-bright-future

28 May 9, 2016, Cassandra Sweet, "U.S. Utilities Boost Investments in Wind, Solar Power," Wall Street Journal, see https://www.wsj.com/articles/u-s-utilities-boost-investments-in-wind-solar-power-1462825903

29 2017, Duke Energy, "About Us," see https://www.duke-energy.com/our-company/about-us/businesses/renewable-energy/wind-energy

increased use of fossil fuels across the globe out to 2040. In November 2017, IHS Markit released a study showing that even as vehicle sales decline thanks to ride-sharing services, "demand for oil will keep rising."[31] Just recently, the Energy Information Administration projected out to 2040[32] that:

- Use of all fuels except coal grows.
- Although renewable energy and nuclear power are the world's fastest growing forms of energy, fossil fuels are expected to continue to meet much of world's energy demand.
- Petroleum and other liquids remains the largest source of energy.
- Natural gas is the world's fastest growing fossil fuel.

CONCLUSIONS

When rhetoric overtakes reason, the chances for bad decisions increase exponentially. Divestment from energy stocks or projects based on emotion and subjective policy beliefs is irresponsible. Unfortunately, divestment advocates have combined dynamic spokespeople, the enthusiasm of university students, and high emotions over pipeline projects and the Paris Accord into a persistent effort to tarnish the images of a wide range of energy companies.

Public relations campaigns are accountable, no matter what the tactics and goals, but in delving into the personal financial affairs of millions of people, the divestment movement has gone too far. As divestment advocates stray into offering the equivalent of financial advice to their followers, their statements should be closely scrutinized, called out and refuted. Appointed and elected officials whose first responsibility is to pensioners or investors should be held to an even higher standard. Banks who follow in the ill-advised footsteps of USBancorp should undergo congressional and regulatory inquiries.

As with many ideas and trends based on rhetoric and emotion, the best antidotes are sunlight and facts. PACE will continue to highlight the dangers of divestment as part of our ongoing mission to support energy consumers and ensure that policymakers focus on enabling affordable and reliable energy for all.

30 July 10, 2017, Partnership for Affordable Clean Energy, "Looking Before Leaping: The Debate Over 100% Renewables," see http://energyfairness.org/looking-leaping-debate-100-renewables/

31 Paul Lienert & Jessica Resnick-Ault, "Global Vehicles Sales to Fall by 2040, but Oil Demand to Rise, Study Predicts," Reuters, see https://www.reuters.com/article/us-autos-electric-ihs/global-vehicle-sales-to-fall-by-2040-but-oil-demand-to-rise-study-predicts-idUSKBN1DE0D3

32 September 24, 2017, Energy Information Administration, "International Energy Outlook, 2017," p. 20, see https://www.eia.gov/outlooks/ieo/pdf/0484(2017).pdf

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