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*Chair of the Assembly of the Academic Senate
Faculty Representative to the Regents
University of California
1111 Franklin Street, 12th Floor
Oakland, California 94607-5200*

July 10, 2019

**JANET NAPOLITANO, PRESIDENT
UNIVERSITY OF CALIFORNIA**

RE: Academic Senate Memorial on Divestment from Fossil Fuel Companies

Dear Janet,

In May, an Academic Senate Memorial to the Regents proposed by the UCSF Senate Division “to divest the University’s endowment portfolio of all investments in the 200 publicly traded fossil fuel companies with the largest carbon reserves,” met the approval threshold set in [Senate Bylaw 90.D](#). The ballot on the following page was soon thereafter submitted to a vote of all voting members of the Academic Senate. Balloting concluded on July 2.

Today I communicated to the Academic Council that the Faculty of the Academic Senate had voted in favor of the proposed memorial. Of the 3,232 Senate members who voted, 77% voted in favor of the Memorial. Therefore, as directed by Academic Senate Bylaw 90, and in accordance with Regents Bylaw 40.1, I am forwarding to you for submission to the Regents the Memorial along with a tabulation of the votes cast.

Please do not hesitate to contact me if you have additional questions.

Sincerely,

A handwritten signature in brown ink that reads "R. C. May".

Robert C. May, Chair
Academic Council

cc: Provost Brown
Executive Vice President and Chief Financial Officer Brostrom
Chairs of Senate Divisions
Chairs of Senate Committees
Campus Senate Directors
Systemwide Senate Executive Director Baxter

Memorial To The Regents - Voting Results

| Division | Eligible voters | Votes cast | Percent of eligible | For | Against | "Abstain" | Percent for | Percent against |
|---------------|-----------------|-------------|---------------------|-------------|------------|-----------|--------------|-----------------|
| Berkeley | 2539 | 423 | 16.7% | 339 | 84 | 0 | 80.1% | 19.9% |
| Davis | 3026 | 531 | 17.5% | 372 | 159 | 0 | 70.1% | 29.9% |
| Irvine | 1941 | 404 | 20.8% | 291 | 113 | 0 | 72.0% | 28.0% |
| Los Angeles | 3948 | 383 | 9.7% | 273 | 110 | 0 | 71.3% | 28.7% |
| Merced | 296 | 89 | 30.1% | 83 | 6 | 0 | 93.3% | 6.7% |
| Riverside | 1116 | 176 | 15.8% | 138 | 34 | 4 | 78.4% | 19.3% |
| San Diego | 2406 | 522 | 21.7% | 421 | 101 | 0 | 80.7% | 19.3% |
| San Francisco | 2248 | 157 | 7.0% | 120 | 36 | 1 | 76.4% | 22.9% |
| Santa Barbara | 1302 | 363 | 27.9% | 284 | 79 | 0 | 78.2% | 21.8% |
| Santa Cruz | 877 | 184 | 21.0% | 159 | 25 | 0 | 86.4% | 13.6% |
| TOTAL | 19699 | 3232 | 16.4% | 2480 | 747 | 5 | 76.7% | 23.1% |



University of California
1111 Franklin Street, 12th Floor
Oakland, California 94607-5200

June 1, 2019

MEMBERS OF THE ACADEMIC SENATE, [campus name] DIVISION

SUBJECT: Notice of Senate Vote – Fossil Fuel Memorial

Dear Colleagues:

In accordance with UC Academic Senate Bylaws 90 and 95, notice is hereby given that voting is open for the following Memorial to the UC Regents.

The U.C. Academic Senate petitions the Regents to divest the University’s endowment portfolio of all investments in the 200 publicly traded fossil fuel companies with the largest carbon reserves.

UC Senate members systemwide are voting on the memorial, and if a majority of the valid ballots cast approve the Memorial, it shall be sent by the Chair of the UC Assembly to President Napolitano for submission to the UC Regents. As per Senate Bylaw 90, this systemwide vote follows consideration of the memorial by individual Divisions earlier this spring.

A brief account of the memorial’s procedural history, an explanation of its provisions, and succinct statements of arguments in favor and against the memorial are [add where items located at your Division].

To vote [add your divisional instructions].

Voting will continue until [HH:MM a.m./p.m., Day, Month DD], 2019, the deadline for all votes to be cast. If you are unable to access the ballot, please contact [add your divisional information]

Thank you for voting.

Sincerely,

Andrew Dickson
Secretary/Parliamentarian
UC Assembly

[name]
Secretary [or appropriate local title]
[campus name] Division

MEMORIAL TO THE UC REGENTS

BALLOT

Should the following statement be sent to the President of the University for transmission to the UC Regents?

The U.C. Academic Senate petitions the Regents to divest the University's endowment portfolio of all investments in the 200 publicly traded fossil fuel companies with the largest carbon reserves.

YES _____

NO _____

From: UC Academic Senate
To: President of the University of California, for transmission to the Regents
Re: Memorial to the Regents

The U.C. Academic Senate petitions the Regents to divest the University's endowment portfolio of all investments in the 200 publicly traded fossil fuel companies with the largest carbon reserves.

Explanation of the Provisions of the Memorial to the Regents

The Memorial states: “The U.C. Academic Senate petitions the Regents to divest the University’s endowment portfolio of all investments in the 200 publicly traded fossil fuel companies with the largest carbon reserves.”

For purposes of this Memorial, “the University’s endowment portfolio” refers only to funds managed by the Office of the Chief Investment Officer of the University of California.

The Carbon Underground 200 list identifies the largest owners of carbon reserves.

Fossil Free Indexes identifies the top 100 coal and the top 100 oil and gas publicly-traded reserve holders worldwide.

The Memorial petitions the Regents to divest UC’s endowment portfolio of all investments in companies on the Carbon Underground 200 list.

UC currently owns shares in companies on the Carbon Underground 200 list. UC’s holdings of securities in oil and gas drilling and refining firms is approximately three percent of UC’s public equity holdings. In contrast, oil and gas drilling and refining firms represent six to seven percent of the global economy. The Memorial would have the Regents divest entirely from all companies currently on that list.

History of the Memorial to the Regents

On January 17, 2019 the UCSF Academic Senate Ad-hoc Committee on Sustainability held a vote to approve the Memorial to the Regents. The Memorial was approved.

On January 24, 2019 the UCSF Academic Senate Executive Council held a vote to approve the Memorial. The vote passed.

On February 15, 2019 the UCSF Academic Senate voted to approve the Memorial. 238 voted to approve, 50 voted to reject, and 6 abstained. The Memorial was approved.

On March 21, 2019, the Faculty Legislature of the Santa Barbara Division voted to approve the proposed Memorial by a vote of 21 in favor, 4 opposed, and 1 abstention. A total of 20 members is required to reach quorum.

On April 1, 2019, the Divisional Council of the Berkeley Division approved the proposed Memorial unanimously, with 17 of the 18 voting members present.

On April 4, 2019, the UCLA Legislative Assembly voted to approve the proposed Memorial by a majority vote of 35 in favor, 33 opposed, and 7 abstentions.

On April 8, the Santa Cruz division voted to approve the Memorial in a vote of 156 in favor; 28 against; and 2 abstentions.

On April 16, 2019, the San Diego Senate Assembly voted to approve the Memorial by a majority vote.

On April 18, 2019, the Representative Assembly of the Davis Division voted to approve the Memorial to the Regents with 63 in favor, 14 opposed, and 4 abstentions.

On May 1, 2019, the Merced Division approved the proposed Memorial in a full vote of the Division. 91% (101/111) of votes cast were to approve. 9% (10/111) were to disapprove. 5% (6/117) of returned ballots were abstentions.

On May 2, 2019, the Irvine Divisional Senate Assembly voted 11 to 15 with 2 abstentions to reject the proposed Memorial.

The Riverside Division of the Senate voted on the Memorial on May 21, 2019. The motion to approve the memorial passed in a vote of 72 to approve, 0 opposed, 4 abstentions.

The vote meets the threshold set in [Senate Bylaw 90](#), which requires approval by at least three divisions representing thirty-five percent of total Senate members in order to move the Memorial to a mail ballot of all voting member of the Senate.

Arguments in Favor of the Memorial to the Regents

Ensuring that our planet does not undergo catastrophic climate change requires that fossil fuels be phased out in the near future. Thus, being co-owners of corporations devoted to producing fossil fuels is both morally fraught and financially imprudent.

Global warming will have catastrophic consequences.

In the Paris Agreement,¹ 197 countries committed to taking the action necessary to limit global temperature rise this century to <2°C, and aim for a rise of <1.5°C. This requires that less than 20% of existing fossil fuel reserves can be burned, perhaps much less; reserves that must not be extracted if the Paris limits are to be met. In October 2018 the UN Intergovernmental Panel on Climate Change (IPCC) reported that *urgent and unprecedented* systemic changes are needed to reach the target, which they say is affordable and feasible.²

As global temperature has already risen by ~1°C, and atmospheric carbon dioxide already emitted will continue to contribute to warming for centuries to millennia, we may have *already* reached the limit for how much carbon can be burned to remain below a rise of 1.5°C.

If current trends continue, multiple syntheses³ of the best climate science tell us unequivocally that major cities will be destroyed, biodiversity will continue to diminish precipitously, and trillions of dollars in assets will be lost due to sea level rise and extreme weather events. The impact on humans will be monumental and unprecedented. Droughts, floods and climate changes will cause crops to fail, opening the possibility for widespread starvation. Ecosystems will be devastated, which combined with other anthropogenic disruptions, will drive millions of species extinct.⁴ California will not be immune from these impacts.⁵

There is thus an irrefutable scientific rationale for supporting this memorial.

The greatest impact of climate change will be on those least responsible for it, and with the least power to affect it.³

The effects of climate change will be greatest on youth and future generations for hundreds of years,⁶ as well as on poorer countries, and communities of color and the poor in the United States, who contributed the least atmospheric pollution.⁷ We who have benefited most from the last 300 years of cheap energy, and who control the most resources, must act – for them as well as ourselves. In particular, we should support our students, who began the divestment movement at UC, and whose representative bodies all have passed resolutions urging this action. This is a matter of simple fairness, equity, and justice.

Fossil fuel companies are a primary cause for insufficient action countering global warming.

¹ http://unfccc.int/paris_agreement/items/9485.php

² https://www.ipcc.ch/site/assets/uploads/sites/2/2018/07/SR15_SPM_version_stand_alone_LR.pdf

³ https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_summary-for-policymakers.pdf

⁴ <https://advances.sciencemag.org/content/1/5/e1400253.full>

⁵ <http://www.climateassessment.ca.gov>

<http://newsroom.ucla.edu/releases/california-extreme-climate-future-ucla-study>

⁶ http://www.columbia.edu/~jeh1/mailings/2018/20181206_Nutshell.pdf

⁷ <http://www.naacp.org/issues/environmental-justice/>; <http://www.mrfcj.org/>

The business model of the fossil fuel companies calls for continued high fossil fuel use for decades to come.⁸ Despite the imperative, documented above, that they leave most of their existing reserves in the ground, they continue to invest huge sums in exploring for the dirtiest and least efficient remaining deposits and building the infrastructure to enable this.

Perhaps worse, they have willfully delayed an effective global response to the climate crisis for decades by *hiding their own research* which predicted global warming due to atmospheric carbon dioxide. They are heavily subsidized by governments, and their products are sold for a fraction of their true cost because their pollution goes untaxed, allowing them to accumulate enormous wealth and power. They have donated millions of dollars to think tanks that spread misinformation to distort media accounts, fatefully delaying a national conversation that could have started years ago. Their direct and indirect support has helped elect climate-denying senators, representatives, governors and presidents.⁹ By holding their stock we are complicit with their immoral corporate activities.

In addition to these moral and justice-based arguments for supporting fossil fuel divestment, there are sound practical and economic arguments:

Fossil fuel stocks are already a bad investment.

Fossil fuel-free stock portfolios already perform a bit better than fossil fuel-stock containing portfolios, and this difference is likely to grow in the future as the world energy economy shifts to renewable sources.¹⁰ UC's portfolio is not available publicly, but the pension funds for other California educators (CalPERS and CalSTRS) lost \$840 million in coal stocks in fiscal year 2014/5, and a total of \$5.1 billion in oil, gas and coal companies.¹¹ It is possible that UC lost comparable sums since Spring 2014 when the Regents rejected the UC students' request to divest from fossil fuel stocks. In any case, fossil-fuel stocks account for only about only three percent of the endowment portfolio, so they can hardly be considered indispensable to its stability.

Sustainable energy is economically and technically viable

A rapid evolution to a largely carbon-free energy system is essential within the next 15 to 30 years. This is technically possible and increasingly affordable.¹² Divestment is consistent with UC's leadership in climate science and with its Carbon Neutrality Initiative. Divestment by the UC, perhaps the world's most prestigious public university, will have a positive impact on the growing global divestment movement, and thereby hasten the transition to renewable energy.

Thus, divestment is the right thing to do both for the planet and for the University's finances.

⁸ <https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2016-05-05-international-oil-companies-stevens.pdf>

⁹ <https://link.springer.com/article/10.1007%2Fs10584-018-2241-z>; <https://www.nature.com/articles/nclimate2875>

¹⁰ <https://www.sicm.com/docs/FFFI-Booklet.pdf>; <https://www.msci.com/documents/10199/cd04f54f-603c-43ef-8f13-20f24919761b>

¹¹ http://senate.ucsd.edu/media/206129/trillium_asset_management_analysis.pdf

¹² https://link.springer.com/chapter/10.1007/978-3-319-38919-6_12; https://link.springer.com/chapter/10.1007/978-3-319-38919-6_11; <https://openknowledge.worldbank.org/handle/10986/24451>; <http://www.qibebt.cas.cn/xwzx/kydt/201612/P020161221360484614090.pdf>

In Conclusion

A thousand years from now, our generation will be remembered only for what it did, or did not do, to address the climate crisis. An effective response will require, more than anything, a shared political will. You have been presented with this ballot because Academic Senate bodies on nine of our campuses voted, often unanimously, to support it. We invite you to join us, and urge the Regents to publicly affirm that most fossil fuels must stay in the ground by refusing to maintain ownership in the companies that are removing them.

Arguments in Opposition to the Memorial to the Regents

Although countering the effects of climate change is an important and laudable goal, the proposed divestment is an ineffective and probably expensive strategy to achieve this goal. Constraining portfolio holdings risks reduced returns and increased volatility. The proposers of these divestments seem aware that losses are possible since they did not include the UC pension funds (which are subject to fiduciary responsibility requirements). If the proposed divestment leads to lower endowment returns, this will reduce funding for many activities that are important for fulfilling UC's mission - like the Presidential Postdoctoral Fellowship program.

Below are additional reasons to vote against the proposed memorial.

- 1) The amount of the proposed divestment is so small that it is unlikely to change the stock price of the divested companies. The public equity portion of the UC endowment is worth about \$5.1 billion, but only 3.1% of this is invested in stocks listed in the Carbon Underground list. A 2018 study concluded that divestment had been ineffective at changing fossil fuel company activities¹³. It is much more effective to engage rather than divest. The UC Investment Office has a full-time employee dedicated to monitoring firms' actions related to environmental, social, and governance issues such as climate change and sustainability policy. UC uses these holdings across the pension fund (\$68 billion), the endowment, and other fund sources to work with other investors to pressure firms to improve their performance.
- 2) The UC Investment Office already recognizes the importance of climate change. They have selectively divested from companies specializing in tar sands and coal since these are most damaging to the environment (and therefore likely to have poor long run investment returns). Over 6% of the endowment portfolio is invested in companies pursuing new clean energy solutions¹⁴. The UC investment office has been recognized as among the 25 top large fund managers for their investment practices supporting environmental, social, and governance goals¹⁵. We believe that the UC investment managers know what there are doing and should not be micromanaged by the faculty.
- 3) All fossil fuels are not alike, and a complete divestment 'throws out the baby with the bathwater'. There is simply no way for at least the next 10 years that many areas of the country can exclusively use intermittent solar or wind power without baseload electricity generation capacity that comes in part from natural gas. Without natural gas,

¹³ See

https://www.peri.umass.edu/economists/robert-pollin/item/download/776_1ae306cb99a0ace3d577fe91ef68b0ab

¹⁴ Personal communication from UC Investment Office's Director of ESG Integration on April 26, 2019.

¹⁵ See <https://www.newamerica.org/responsible-asset-allocator-initiative/press-releases/raai-releases-2019-ranking-25-most-responsible-asset-allocators/>, <https://www.ucop.edu/investment-office/sustainable-investment/index.html>, and <https://www.ucop.edu/investment-office/files/sustainable-investment-framework.pdf> for more information

large areas of the country would be powerless and have no heat for parts of the year. Moreover, air transportation, steel manufacturing, and plastics all require fossil fuels. If divestment were successful in reducing supply and increasing costs, large areas of the economy would be negatively impacted.

- 4) Reducing CO2 emissions has been distorted by many to be equivalent to eliminating fossil fuel use, but this is not true. Carbon Capture and Sequestration (CCS) is anticipated by most studies to be a critical component in achieving emissions goals. CCS takes CO2 from the atmosphere (or smokestacks) and sequesters it deep underground with fossil fuel technology. This technology can completely eliminate CO2 emissions or even clean existing CO2 from the air while still using fossil fuels. In many areas of the country this approach is more cost effective than a purely renewable solution. Many climatologists believe that eliminating future emissions cannot be done in time to substantially arrest global warming, and that CCS of existing atmospheric carbon is the best near term solution. In the unlikely event that the proposed divestment is successful, it could slow the development and implementation of CCS by existing fossil fuel companies.
- 5) Many other large university endowments (e.g. Stanford, Harvard, and Yale) have considered divestment and have determined that it is counterproductive for achieving greenhouse gas emissions reductions and improving the environment.
- 6) We recognize that the main objective of the proposed divestment is symbolic in nature - it is intended to show that UC faculty care deeply about confronting climate change. However there are many other actions that have the same symbolic value while actually reducing CO2 emissions. For example, UC faculty could vote to substantially increase the fees for campus parking permits and use the funds to subsidize students, staff, and faculty to use transit or bicycling to get to campus. UC faculty could also vote to ask the UC Travel Office to negotiate with airlines to purchase verified carbon offsets for our travel in lieu of receiving frequent flyer miles. These sorts of actions would show that the faculty is willing to sacrifice to help reduce carbon emissions, and will set examples that other firms could follow. In addition, these sorts of actions will likely generate more positive press coverage than the divestment memorial.

Actions to quickly reduce carbon emissions need to be implemented at the campus level, so UC faculty who are concerned about this issue should aim their lobbying efforts at their local campuses. Some campuses have already been recognized for their efforts - UC Irvine was named the top "coolest school" in the country by the Sierra Club in 2018¹⁶. UCOP can help campuses by identifying best practices, but this effort does not need a memorial to the Regents.

The proposed divestment from the UC General Endowment of the Carbon Underground 200 companies is unlikely to have any impact on reducing CO2 emissions and is likely to reduce investment returns from the endowment. Many experts have concluded that CCS

¹⁶ see <https://www.sierraclub.org/sierra/cool-schools-2018/top-20-coolest-schools-2018>

(implemented by existing fossil fuel companies) will be an essential component of any CO2 emissions reduction plan and may be the only solution for removing existing CO2 from the atmosphere. The proposed divestment could, in fact, hurt progress in CCS and consequently hurt efforts to confront global warming. To paraphrase Tolstoy, "The perfect is often the enemy of the good".

Effective action to reduce CO2 emissions requires reducing demand and investing in new technologies. The proposed divestment does nothing to reduce demand and may reduce investment in promising technologies. We therefore urge a no vote on the proposed memorial.

Rebuttal to Arguments in Favor of the Memorial to the Regents

- 1) The pro argument begins with: “avoiding catastrophic climate change requires that fossil fuels be phased out in the near future.” This is factually false. Zero carbon does not equate to zero fossil fuels. Ironically the pro argument reference (authored by Steve Chu, secretary of Energy in the Obama administration) clearly supports our thesis: “The capture of CO₂ in power generation and in industrial processes is a necessary part of the required transition to deep decarbonization.” Carbon Capture and Sequestration (CCS) allows for fossil fuels to be used with zero carbon emissions. Existing fossil fuel companies are best positioned to develop and rapidly implement CCS.
- 2) The argument that we should support our students when they are misinformed makes no sense. As faculty we have an obligation to teach our students (and colleagues) about energy and climate change—not the other way around.
- 3) “Fossil fuel companies are a primary cause for insufficient action countering global warming.” This is incorrect – the key reason for insufficient action is a lack of political will. Only Exxon Mobil has been shown to have hidden their own research on the impacts of global warming. Divestment of UC endowment funds from Exxon would have less impact on this misbehavior than UC joining (or leading) a shareholder resolution to reduce the salaries of Exxon executives.
- 4) “Fossil fuel stocks are already a bad investment” cites CalPERS losses in coal and petroleum stocks in 2014/15. It is misleading to look at one year of stock market returns, and these years corresponded to a significant decline in oil prices. Moreover, UC’s endowment is currently shorting coal stocks. Other firms on the proposed divestment list have performed far better than in 2014/2015. Detailed portfolio selection decisions should be made by investment professionals, not faculty memorials.
- 5) “A rapid evolution to a largely carbon-free energy system is essential within the next 15 to 30 years. This is technically possible and increasingly affordable.” While we hope that this is true, the pro argument provides no reasons why the small amount of money UC could divest from the Carbon Underground list would do anything to help this evolution. In fact, it would hurt, as we have explained in our con argument.
- 6) We fully agree with the pro argument’s assertion that: “The effects of climate change will be greatest on youth and future generations for hundreds of years.” This makes it especially unfortunate that US voters ages 18-29 vote at under 2/3 the rate of the remaining adult population¹⁷.

We completely agree with the pro argument that climate change is a major threat. But as we document in our con argument, divestment could actually slow progress on deploying key technologies for reducing CO₂ emissions. We urge our faculty colleagues to act as leaders of

¹⁷ See <http://www.electproject.org/home/voter-turnout/demographics>

discourse and reason and not be swayed by simplistic politics and sound bites. We urge you to vote no on the proposed memorial.

Rebuttal to Arguments in Opposition to the Memorial to the Regents

The “Con” arguments invoke the following:

Divestment will have terrible consequences.

Some scenarios discussed in the Con arguments would only be applicable if this Memorial demanded the immediate cessation of all fossil fuel burning. It does not. Everyone recognizes that transition to a carbon-neutral civilization is an enormous task that will take many years.

Divestment will make our investments underperform.

Market returns on energy are relatively low compared to other sectors, and do not justify the risks.¹⁸ Divesting the 3% of the endowment now in major fossil fuel stocks would avoid significant financial risks while maintaining returns.

Divestment will do nothing at all.

The very fact that you are reading and thinking about these arguments means that the Memorial has done something positive. We *have* the technology and resources to transition to a carbon neutral civilization, but we lack the political will to take the necessary steps. This political will is rapidly growing: the goal of this Memorial process is to accelerate that growth, by UC faculty and community, our nation, and our world. By divesting, UC would join the largest divestment campaign in history.¹⁹ After being released from prison, Nelson Mandela singled out UC divestment from apartheid as being a catalyst for its end. Our combined ten campuses comprise an unequaled academic community, and our stand will be heard.

Do something else instead.

The Con Argument suggests several actions that we as UC faculty can take to address the climate crisis. We welcome all of them. The Con Argument lauds the actions that are already being taken by UCOP and the ten campuses, as do we. Divestment brings our investment policy in line with our other efforts. Indeed, by helping to raise awareness of the climate crisis, it encourages us to join and expand these actions.

Let's remove the CO2 from the sky instead.

Most realistic scenarios include eventual “negative emissions” as well as steep emission reductions. However, currently there is no validated industrial-scale technology for removing CO2 from the atmosphere. The best pilot plant costs over twice as much to remove the CO2 emitted from a natural gas power plant as to generate the same amount of power with solar.²⁰ The only realistic alternative for dealing with rising atmospheric CO2 levels in the critical decade

¹⁸ <https://www.sicm.com/docs/FFFI-Booklet.pdf>

¹⁹ <https://www.theguardian.com/commentisfree/2018/dec/16/divestment-fossil-fuel-industry-trillions-dollars-investments-carbon>

²⁰ In a recent breakthrough, Keith et al. ([https://www.cell.com/joule/pdf/S2542-4351\(18\)30225-3.pdf](https://www.cell.com/joule/pdf/S2542-4351(18)30225-3.pdf)) demonstrated carbon sequestration in a pilot plant. Using the midpoint of their cost per ton of CO2 (\$172.5), plus storage (\$15), and the current US emission intensity for natural gas (489 kg-CO2/MWhr), one arrives at a cost per MWhr of \$92, compared to the levelized cost of utility-scale solar power of only \$40: <https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2018/>. Thus, to reduce the current CO2 levels to the 350 ppm IPCC consensus limit would cost, using this still pilot technology, ~\$70 trillion: http://www.columbia.edu/~jeh1/mailings/2018/20181206_Nutshell.pdf

ahead is to greatly reduce fossil fuel burning. Indeed, the most recent IPCC report states that greenhouse pollution must be reduced by 45% from 2010 levels by 2030, and 100% by 2050 to remain under 1.5°C. warming.²¹

The fossil fuel companies are our best hope.

Such companies would have no value if their carbon assets are not burned. But if this carbon is burned, the natural world that supports us and all the creatures in it will be severely and permanently harmed for the foreseeable future. The companies have known this for forty years.²² They will not willingly choose to be part of the solution; and indeed, they cannot because it would violate their fiduciary responsibility.

²¹ https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

²² <https://www.nytimes.com/interactive/2018/08/01/magazine/climate-change-losing-earth.html>