Assessing ExxonMobil's climate change communications

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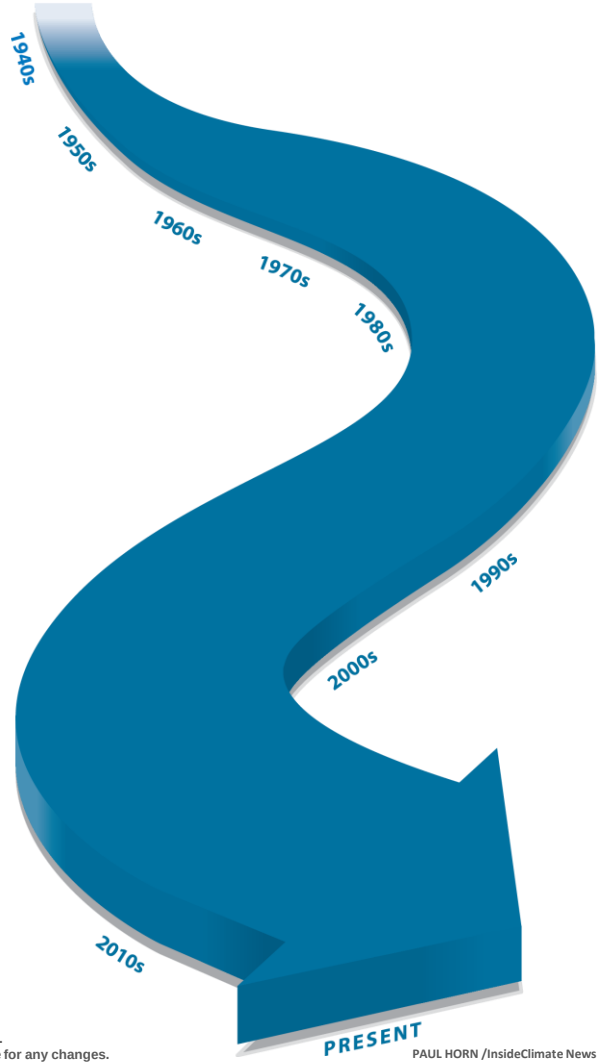
@geoffreysupran

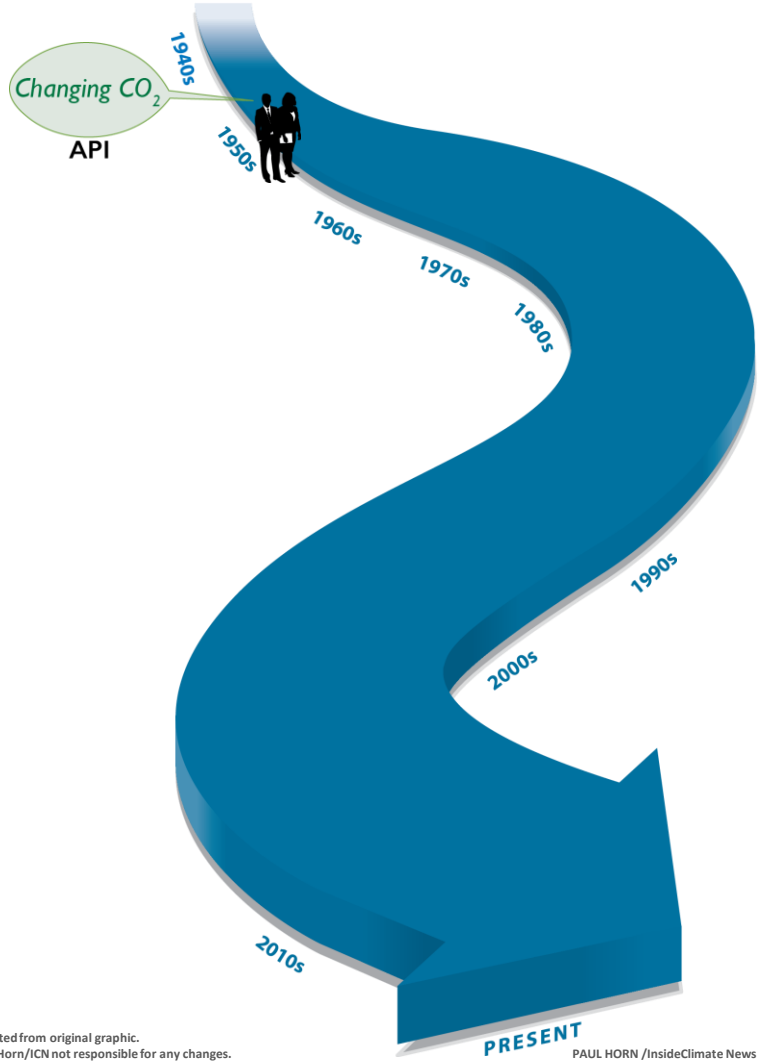
Have communications about climate change by ExxonMobil and other fossil fuel companies misled customers, shareholders, or the public?

A timeline of climate denial



Adapted from original graphic.
Paul Horn/ICN not responsible for any changes.

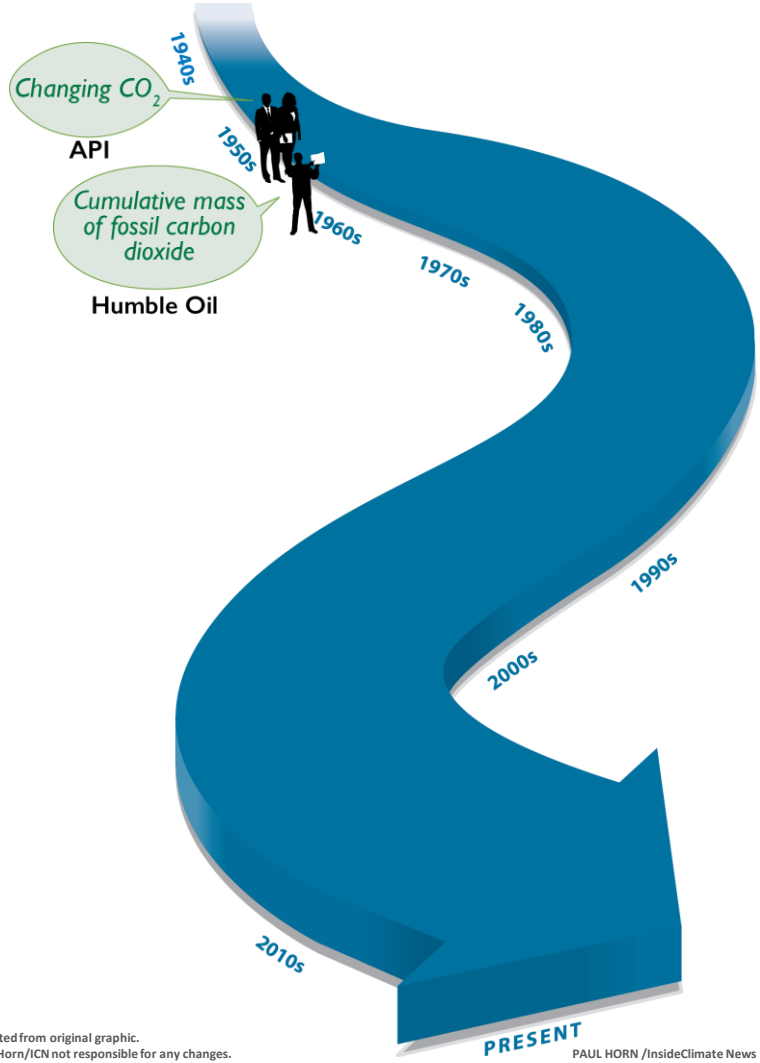
PAUL HORN /InsideClimate News



1954: American Petroleum Institute alerted that fossil fuels increasing atmospheric CO_2

Perhaps the most interesting effect concerning carbon in trees which we have thus far observed is a marked and fairly steady increase in the C^{12}/C^{13} ratio with time. Since 1840 the ratio has clearly increased markedly. This effect can be explained on the basis of a changing carbon dioxide concentration in the atmosphere resulting from industrialization and the consequent burning of large quantities of coal and petroleum. If this explanation were correct, the carbon dioxide content of the atmosphere today would be about 5% greater than it was a century ago.

Franta B *Nature Clim. Chg.* 8, 1024 (2019)



Adapted from original graphic.
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PAUL HORN /InsideClimate News

1957: Humble Oil quantifies "cumulative mass of fossil carbon dioxide"

644 BRANNON, DAUGHTRY, PERRY, WHITAK

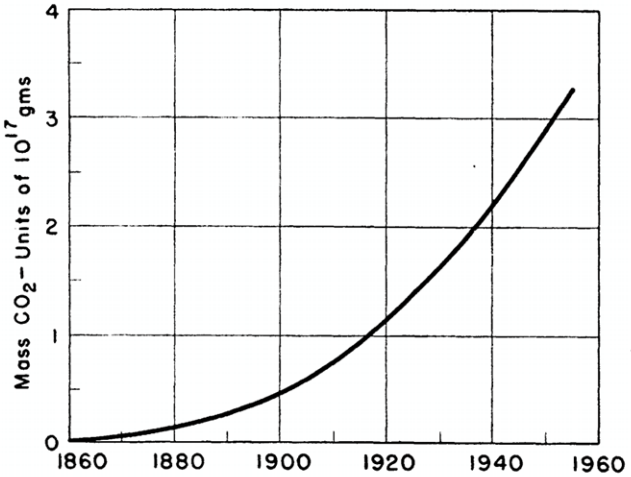

FIG. 1 — Cumulative carbon dioxide released to atmosphere by combustion of fossil fuels

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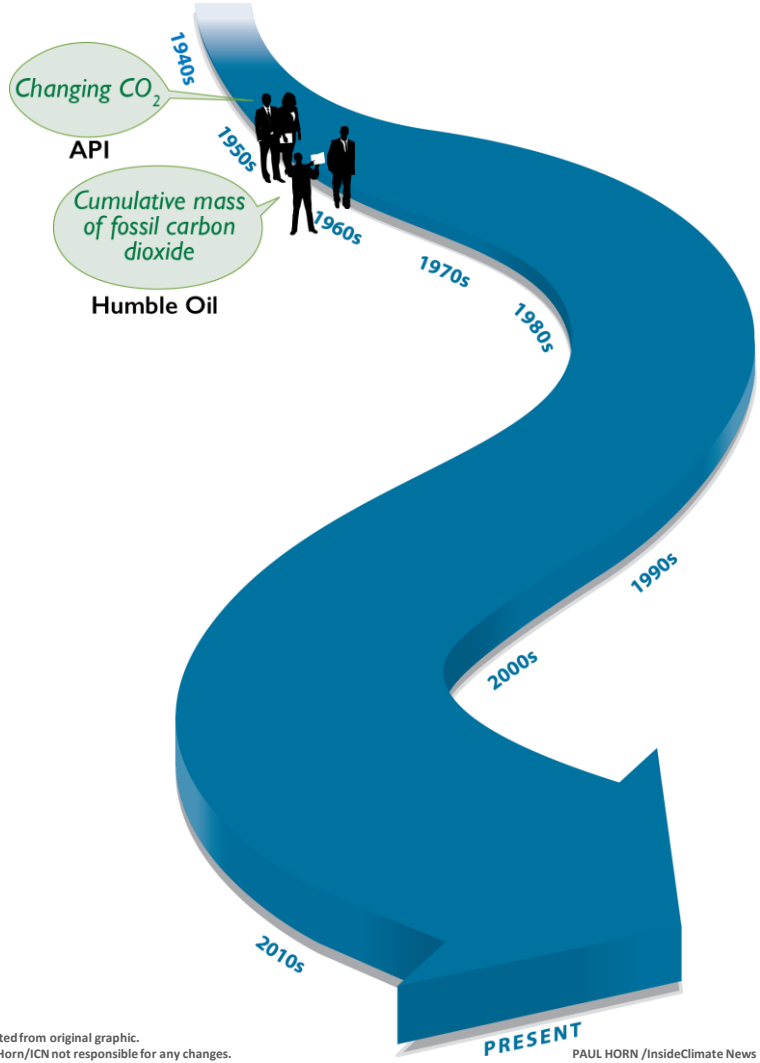
Appraisal of carbon dioxide production from fossil fuels—Although various estimates have been made

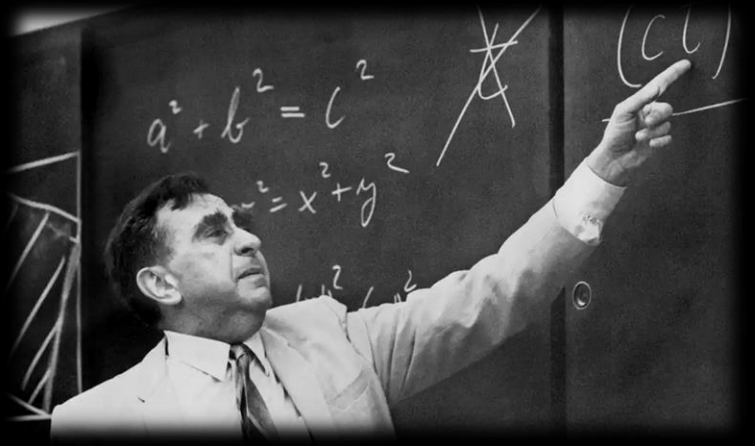
Brannon H R et al. Trans Am. Geophys. Union 643 (1957)



Adapted from original graphic.
Paul Horn/ICN not responsible for any changes.

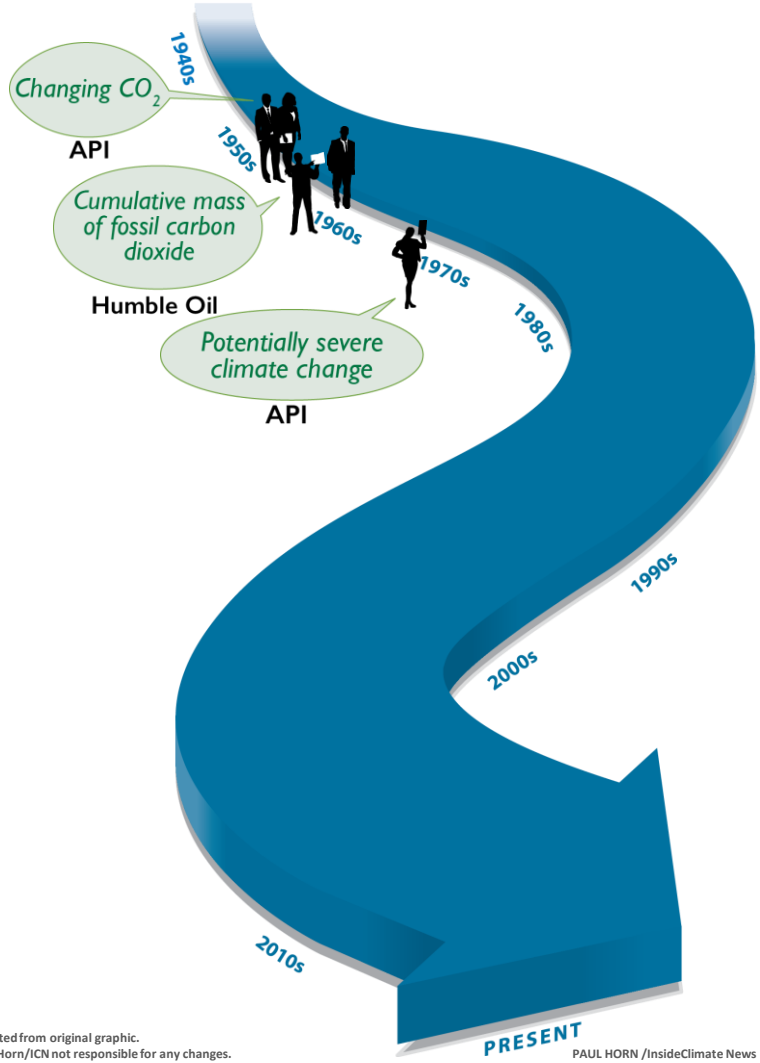
PAUL HORN /InsideClimate News

1959: API warned by Edward Teller about "greenhouse effect", global warming, sea level rise



higher temperature and will radiate more. It has been calculated that a temperature rise corresponding to a 10 per cent increase in carbon dioxide will be sufficient to melt the icecap and submerge New York. All the coastal cities would be covered, and since a considerable percentage of the human race lives in coastal regions, I think that this chemical contamination is more serious than most people tend to believe.

Franta B. The Guardian (1 Jan 2018)



Adapted from original graphic.
Paul Horn/ICN not responsible for any changes.

PAUL HORN /InsideClimate News

1968/69/72: API-commissioned reports warn of potentially "severe" climate change

STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA

Final Report

February 1968

SOURCES, ABUNDANCE, AND FATE OF GASEOUS ATMOSPHERIC POLLUTANTS

Prepared for:

AMERICAN PETROLEUM INSTITUTE
1271 AVENUE OF THE AMERICAS
NEW YORK, N.Y. 10020

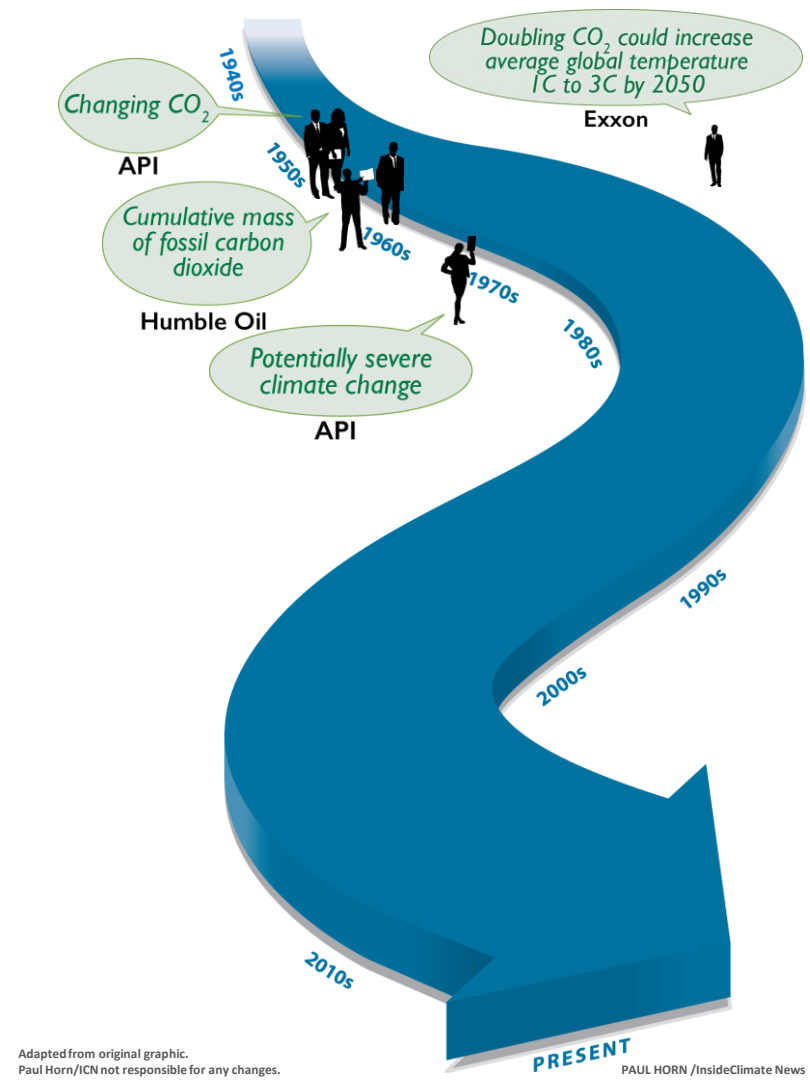
ATTN: MR. W. A. BURHOUSE
ASSISTANT DIRECTOR

C. Summary of Carbon Dioxide in the Atmosphere

In summary, Revelle makes the point that man is now engaged in a vast geophysical experiment with his environment, the earth. Significant temperature changes are almost certain to occur by the year 2000 and these could bring about climatic changes.

If the earth's temperature increases significantly, a number of events might be expected to occur, including the melting of the Antarctic ice cap, a rise in sea levels, warming of the oceans, and an increase in photosynthesis. The first two items are of course related since the increase in sea level would be mainly due to the added water from the ice cap

Robinson E, Robbins R C (1968) Sources, abundance, and fate of gaseous atmospheric pollutants. Final report.
Robinson E, Robbins R C (1969) Sources, abundance, and fate of gaseous atmospheric pollutants. Supplement.
Robinson E (1972) Advances in Chemistry 113, 1



1977: Exxon scientist briefs executives on global warming projections & climatic effects

SUMMARY

07036

I. CO_2 RELEASE MOST LIKELY SOURCE OF INADVERTENT CLIMATE MODIFICATION.

II. PREVAILING OPINION ATTRIBUTES CO_2 INCREASE TO FOSSIL FUEL COMBUSTION.

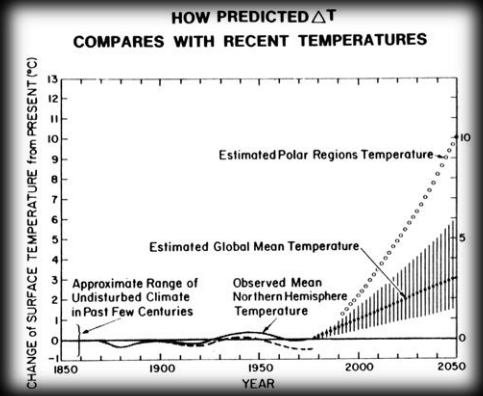
III. DOUBLING CO_2 COULD INCREASE AVERAGE GLOBAL TEMPERATURE 1°C TO 3°C BY 2050 A.D. (10°C PREDICTED AT POLES).

IV. MORE RESEARCH IS NEEDED ON MOST ASPECTS OF GREENHOUSE EFFECT

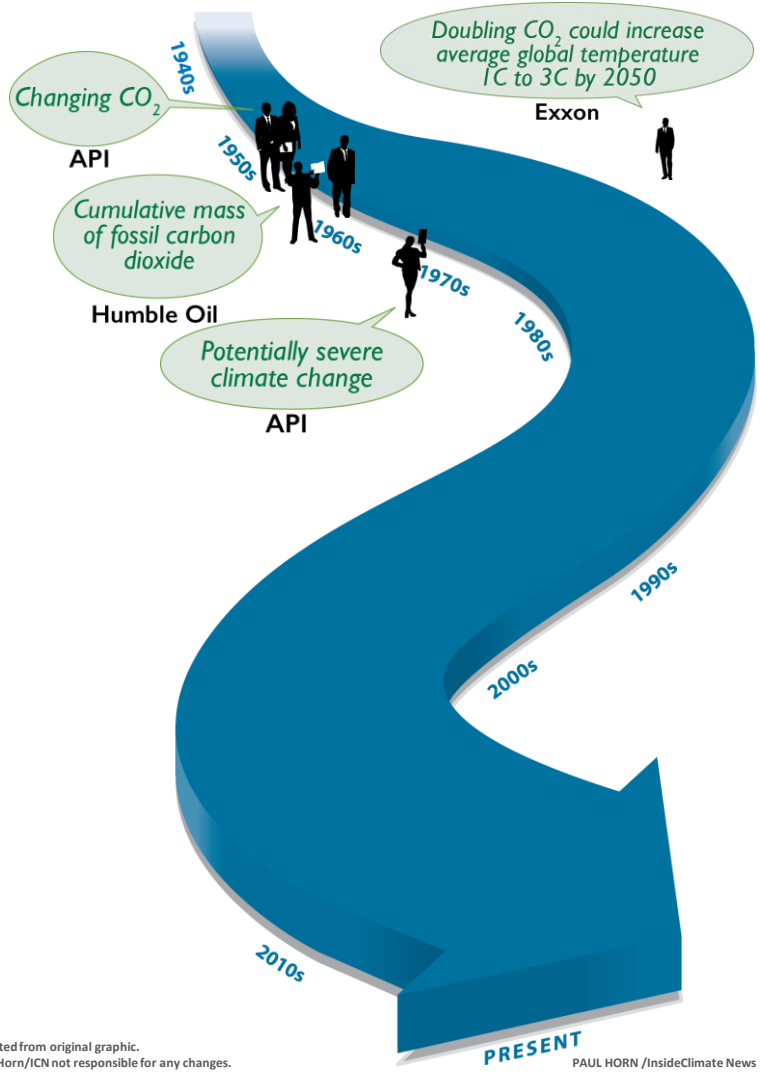
V. 5-10 YR. TIME WINDOW TO GET NECESSARY INFORMATION

VI. MAJOR RESEARCH EFFORT BEING CONSIDERED BY DOE

Dear Frank:



Black J. The Greenhouse Effect (1978)



1978-9: Request for a "credible scientific team" for climate research at Exxon

are associated with that institution.[2]

The rationale for Exxon's involvement and commitment of funds and personnel is based on our need to assess the possible impact of the greenhouse effect on Exxon business. Exxon must develop a credible scientific team that can critically evaluate the information generated on the subject and be able to carry bad news, if any, to the corporation. This team must be recognized for its excellence in the scientific community, the government, and internally by Exxon management. We see no better method to acquire the necessary reputation than by attacking one of the major uncertainties in the global CO_2 balance, i.e., flux to the oceans and providing the necessary data. In addition, the international significance of the proposed programs will enhance the Exxon image in the public domain and provide great public relations value. As a consequence of the above, these programs are prime candidates for early implementation under the National Impact Program charter.

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system. Among other things, we will show here that from a consideration of the surface energy balance alone it is impossible to deduce the surface temperature response to a change in climatic forcing from increased CO_2 emissions, or any other external cause. Accordingly, we accept at this point that a surface temperature rise of the order of 2–3 K for a CO_2 doubling is essentially correct under equilibrium conditions and in the absence of compensating effects.

6667

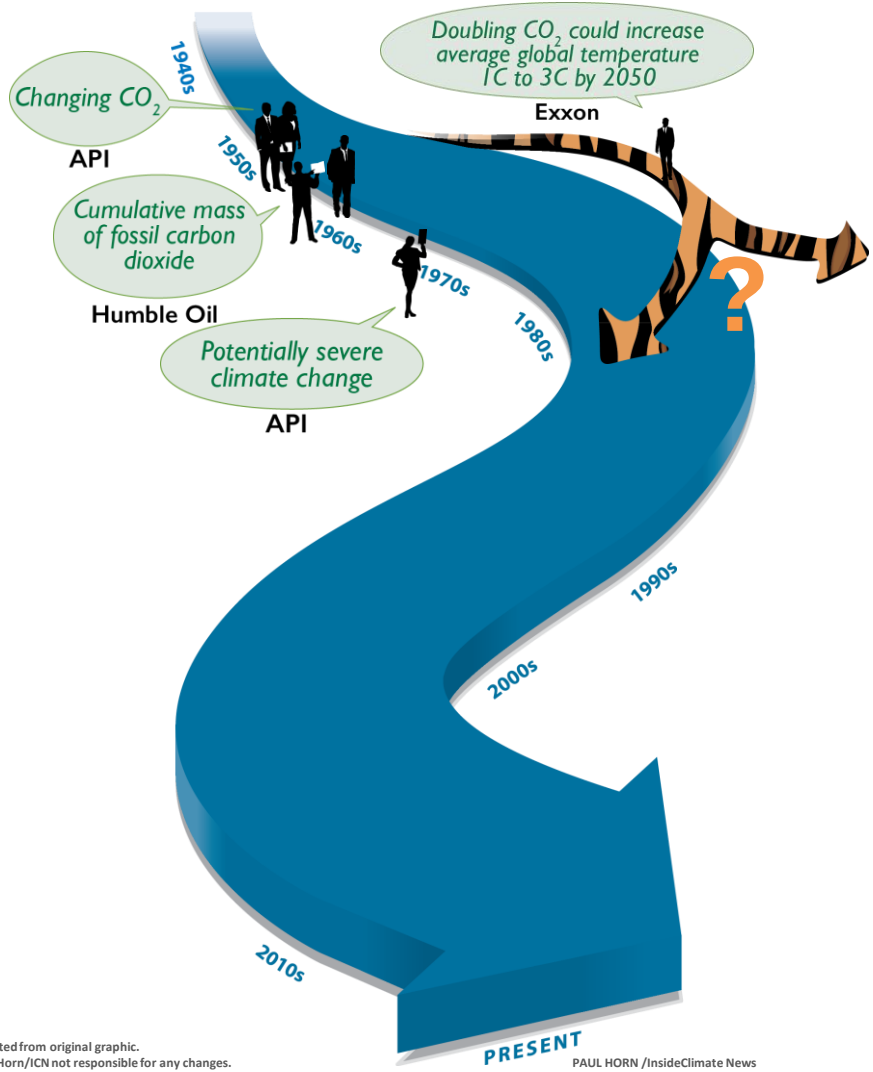
Shaw H. Untitled (request for a credible scientific team) (1978)
Hoffert M I, Callegari A J, Hsieh C-T. J. Geophys. Res. 85 6667 (1980)
Hoffert M I, Wey Y-C, Callegari A J, Broecker W S. Clim. Change 2, 53 (1979)

By the late 1970s, global warming was no longer speculative.

The issue was not were we going to have a problem,
the issue was simply how soon and how fast and how bad was it going to be. Not if.

DR. EDWARD GARVEY
Exxon climate researcher, 1978-83
Interviewed 2015 & 2018

Osborne J (2 Oct 2015) *Dallas News*
Westervelt A (14 Nov 2018) Drilled: A true Crime Podcast about Climate Change, Ep 1



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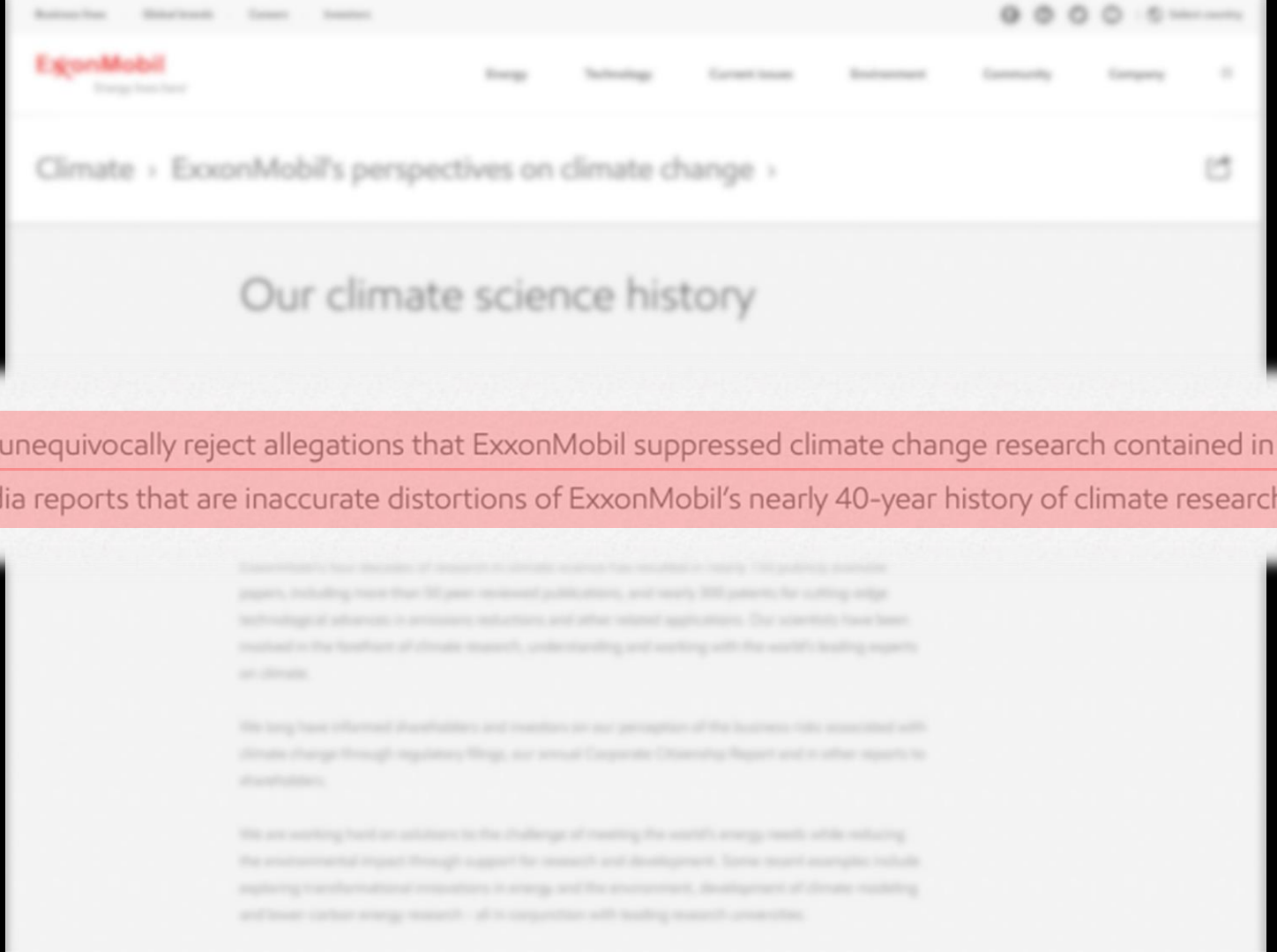
PAUL HORN /InsideClimate News


ExxonMobil
Climate › ExxonMobil's perspectives on climate change ›
Our climate science history
We unequivocally reject allegations that ExxonMobil suppressed climate change research contained in media reports that are inaccurate distortions of ExxonMobil's nearly 40-year history of climate research.

When it comes to climate change, read the documents

Posted: October 21, 2015 by Ken Cohen

Read the documents.

Go ahead, you really should. Read the documents *InsideClimate News* cites that purportedly prove some conspiracy on ExxonMobil's part to hide our climate science findings.

IOP Publishing Environ. Res. Lett. 12 (2017) 084019 https://doi.org/10.1088/1748-9326/aa815f

Environmental Research Letters

LETTER

Assessing ExxonMobil's climate change communications (1977–2014)

Geoffrey Supran[1] **and Naomi Oreskes**

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[1] Author to whom any correspondence should be addressed.

E-mail: gjsupran@fas.harvard.edu

Keywords: anthropogenic global warming, climate change, ExxonMobil, disinformation, content analysis, climate communication, advertorial

Supplementary material for this article is available online

OPEN ACCESS

RECEIVED
22 June 2017

REVISED
17 July 2017

ACCEPTED FOR PUBLICATION
21 July 2017

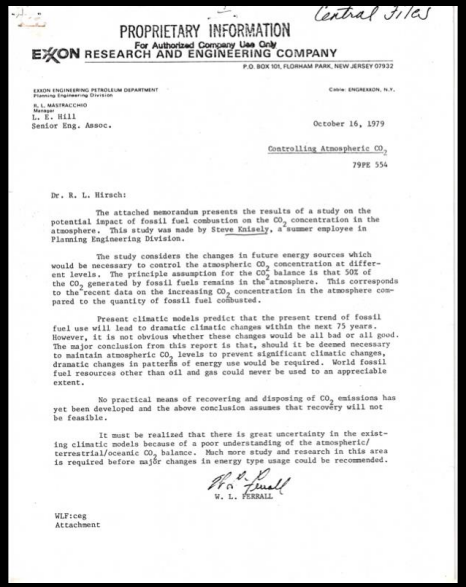
PUBLISHED
23 August 2017

Abstract

This paper assesses whether ExxonMobil Corporation has in the past misled the general public about climate change. We present an empirical document-by-document textual content analysis and comparison of 187 climate change communications from ExxonMobil, including peer-reviewed and non-peer-reviewed publications, internal company documents, and paid, editorial-style advertisements ('advertorials') in *The New York Times*. We examine whether these communications sent consistent messages about the state of climate science and its implications—specifically, we compare their positions on climate change as real, human-caused, serious, and solvable. In all four cases, we find that as documents become more publicly accessible, they increasingly communicate doubt. This discrepancy is most pronounced between advertorials and all other documents. For example, accounting for expressions of reasonable doubt, 83% of peer-reviewed papers and 80% of internal documents acknowledge that climate change is real and human-caused, yet only 12% of advertorials do so, with 81% instead expressing doubt. We conclude that ExxonMobil contributed to advancing climate science—by way of its scientists' academic publications—but promoted doubt about it in advertorials. Given this discrepancy, we conclude that ExxonMobil misled the public. Our content analysis also examines ExxonMobil's discussion of the risks of stranded fossil fuel assets. We find the topic discussed and sometimes quantified in 24 documents of various types, but absent from advertorials. Finally, based on the available documents, we outline ExxonMobil's strategic approach to climate change research and communication, which helps to contextualize our findings.

Online at
bit.ly/ExxonPaper

Internal Documents
37 (1977-1995)



PROPRIETARY INFORMATION
For Authorized Company Use Only
EXXON RESEARCH AND ENGINEERING COMPANY
P.O. BOX 101, FLORHAM PARK, NEW JERSEY 07932

EXXON ENGINEERING PETROLEUM DEPARTMENT
Planning Engineering Division

Cable: ENGNEXXON, N.Y.

R. L. MASTRACCHIO
Manager

L. E. Hill
Senior Eng. Assoc.

October 16, 1979

Controlling Atmospheric CO_2
79PE 554

Dr. H. L. Hirsch:

The attached memorandum presents the results of a study on the potential impact of fossil fuel combustion on the CO_2 concentration in the atmosphere. This study was made by Steve Knisely, a summer employee in Planning Engineering Division.

The study considers the changes in future energy sources which would be necessary to control the atmospheric CO_2 concentration at different levels. The principle assumption for the CO_2 balance is that 50% of the CO_2 generated by fossil fuels remains in the atmosphere. This corresponds to the recent data on the increasing CO_2 concentration in the atmosphere compared to the quantity of fossil fuel combusted.

Present climatic models predict that the present trend of fossil fuel use will lead to dramatic climatic changes within the next 75 years. However, it is not obvious whether these changes would be all bad or all good. The major conclusion from this report is that, should it be deemed necessary to maintain atmospheric CO_2 levels to prevent significant climatic changes, dramatic changes in patterns of energy use would be required. World fossil fuel resources other than oil and gas could never be used to an appreciable extent.

No practical means of recovering and disposing of CO_2 emissions has yet been developed and the above conclusion assumes that recovery will not be feasible.

It must be realized that there is great uncertainty in the existing climatic models because of a poor understanding of the atmospheric/terrestrial/oceanic CO_2 balance. Much more study and research in this area is required before major changes in energy type usage could be recommended.

W. L. Ferrall

WLF:ceg
Attachment

Peer-Reviewed
72 (1982-2014)

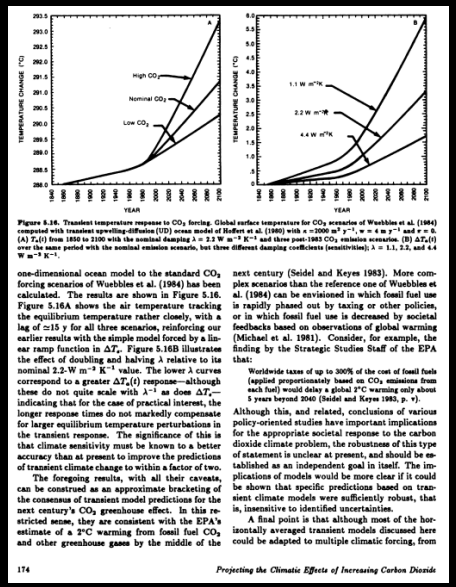


Figure 5.16. Transient temperature response to CO_2 forcing. Global surface temperature for CO_2 scenarios of Wuebbles et al. (1984) computed with transient upwelling-diffusion (UD) ocean model of Hoffert et al. (1980) with $\kappa = 2000$ m^2 y^{-1}, $w = 4$ m y^{-1} and $\tau = 0$. (A) $T_s(t)$ from 1850 to 2100 with the nominal damping $\lambda = 2.2$ W m^{-2} K^{-1} and three post-1983 CO_2 emission scenarios. (B) $\Delta T_s(t)$ over the same period with the nominal emission scenario, but three different damping coefficients (sensitivities); $\lambda = 1.1$, 2.2, and 4.4 W m^{-2} K^{-1}.

one-dimensional ocean model to the standard CO_2 forcing scenarios of Wuebbles et al. (1984) has been calculated. The results are shown in Figure 5.16. Figure 5.16A shows the air temperature tracking the equilibrium temperature rather closely, with a lag of ≃15 y for all three scenarios, reinforcing our earlier results with the simple model forced by a linear ramp function in ΔT_s. Figure 5.16B illustrates the effect of doubling and halving λ relative to its nominal 2.2-W m^{-2} K^{-1} value. The lower λ curves correspond to a greater $\Delta T_s(t)$ response—although these do not quite scale with λ^{-1} as does ΔT_e—indicating that for the case of practical interest, the longer response times do not markedly compensate for larger equilibrium temperature perturbations in the transient response. The significance of this is that climate sensitivity must be known to a better accuracy than at present to improve the predictions of transient climate change to within a factor of two.

The foregoing results, with all their caveats, can be construed as an approximate bracketing of the consensus of transient model predictions for the next century's CO_2 greenhouse effect. In this restricted sense, they are consistent with the EPA's estimate of a 2°C warming from fossil fuel CO_2 and other greenhouse gases by the middle of the next century (Seidel and Keyes 1983). More complex scenarios than the reference one of Wuebbles et al. (1984) can be envisioned in which fossil fuel use is rapidly phased out by taxing or other policies, or in which fossil fuel use is decreased by societal feedbacks based on observations of global warming (Michael et al. 1981). Consider, for example, the finding by the Strategic Studies Staff of the EPA that:

> Worldwide taxes of up to 300% of the cost of fossil fuels (applied proportionately based on CO_2 emissions from each fuel) would delay a global 2°C warming only about 5 years beyond 2040 (Seidel and Keyes 1983, p. v).

Although this, and related, conclusions of various policy-oriented studies have important implications for the appropriate societal response to the carbon dioxide climate problem, the robustness of this type of statement is unclear at present, and should be established as an independent goal in itself. The implications of models would be more clear if it could be shown that specific predictions based on transient climate models were sufficiently robust, that is, insensitive to identified uncertainties.

A final point is that although most of the horizontally averaged transient models discussed here could be adapted to multiple climatic forcing, from

Non-Peer-Reviewed
47 (1980-2014)

Global warming: who's right?

Facts about a debate that's turned up more questions than answers

EXXON CORPORATION
Fall 1996

Advertorials
36 (1989-2004)

The International Pastime?

The Police in Crisis

Growing unease with the mayor.

Taiwan Doesn't Fear the Future

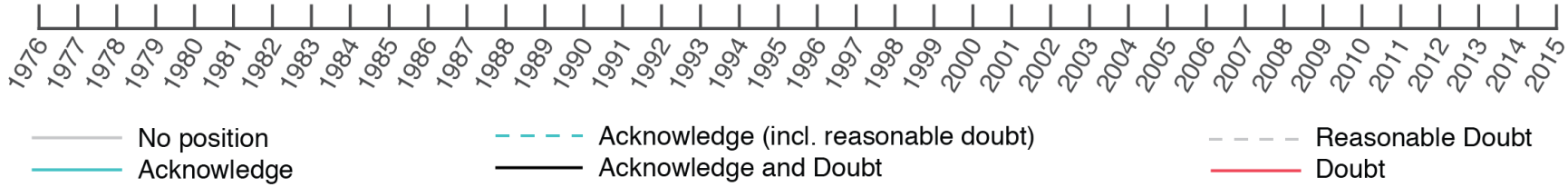
China has calmed down. So should the U.S.

Saddam's Sudan?

How to handle an ally story.

Unsettled Science

ExxonMobil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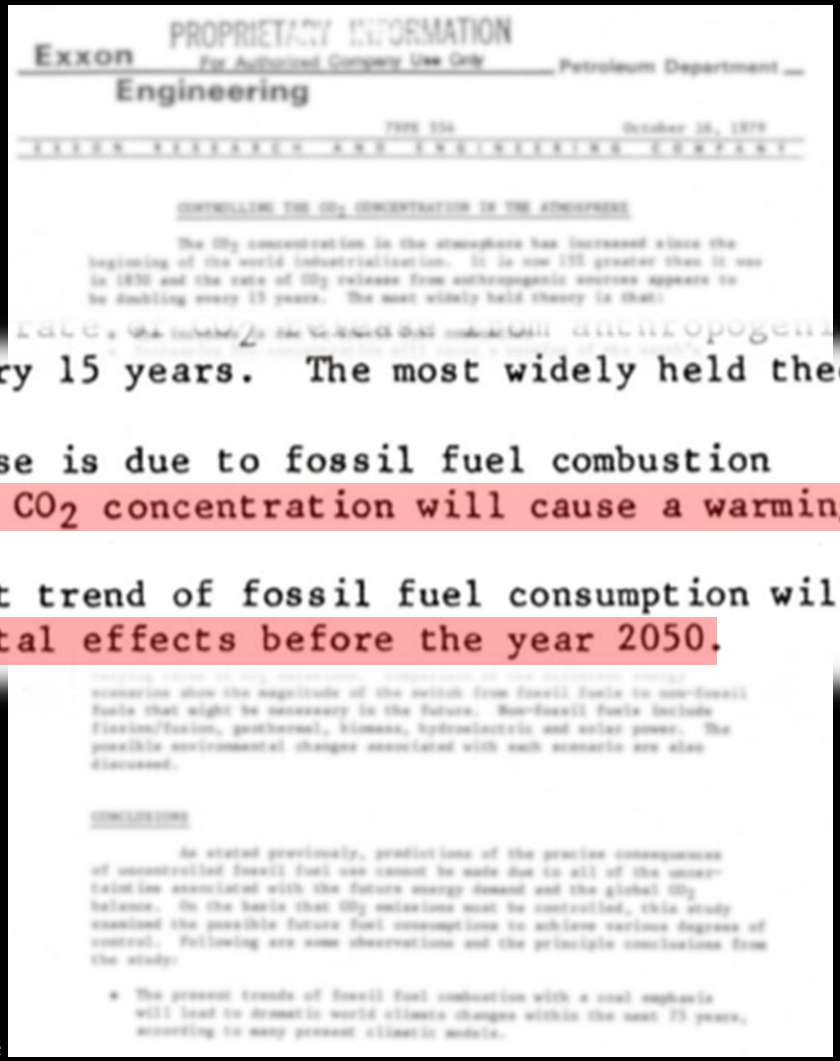


PROPRIETARY INFORMATION

Exxon Engineering — For Authorized Company Use Only — Petroleum Department

7905 554 — October 16, 1979

EXXON RESEARCH AND ENGINEERING COMPANY

CONTROLLING THE CO_2 CONCENTRATION IN THE ATMOSPHERE

The CO_2 concentration in the atmosphere has increased since the beginning of the world industrialization. It is now 15% greater than it was in 1850 and the rate of CO_2 release from anthropogenic sources appears to be doubling every 15 years. The most widely held theory is that:

- The increase is due to fossil fuel combustion
- Increasing CO_2 concentration will cause a warming of the earth's surface
- The present trend of fossil fuel consumption will cause dramatic environmental effects before the year 2050.

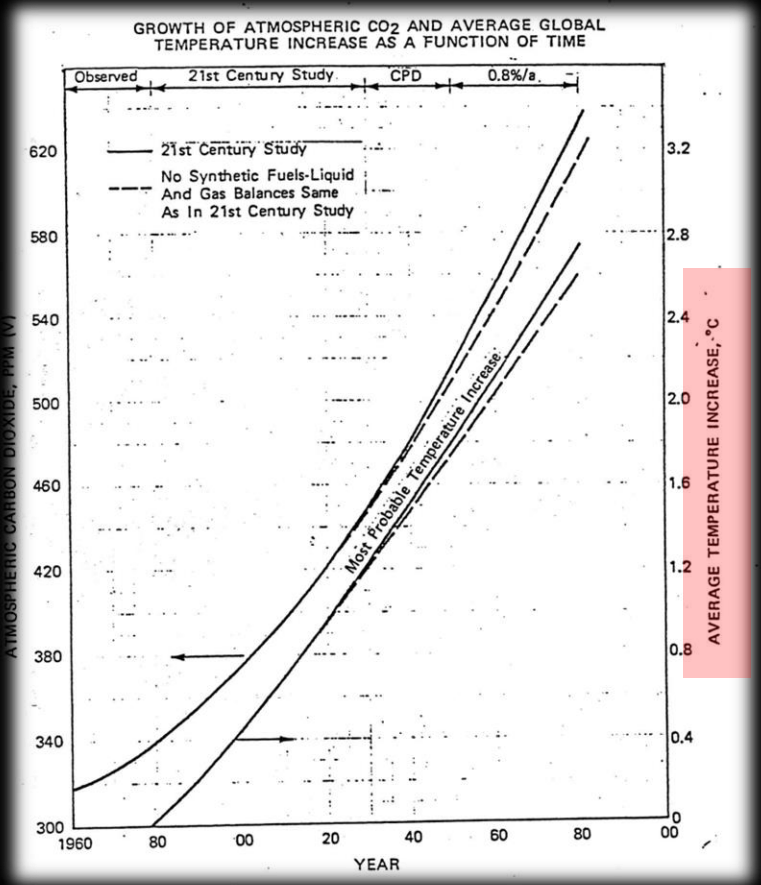
scenarios show the magnitude of the switch from fossil fuels to non-fossil fuels that might be necessary in the future. Non-fossil fuels include fission/fusion, geothermal, biomass, hydroelectric and solar power. The possible environmental changes associated with each scenario are also discussed.

CONCLUSIONS

As stated previously, predictions of the precise consequences of uncontrolled fossil fuel use cannot be made due to all of the uncertainties associated with the future energy demand and the global CO_2 balance. On the basis that CO_2 emissions must be controlled, this study examined the possible future fuel consumptions to achieve various degrees of control. Following are some observations and the principle conclusions from the study:

- The present trends of fossil fuel combustion with a coal emphasis will lead to dramatic world climate changes within the next 75 years, according to many present climatic models.

Mastracchio R L 1979 Controlling Atmospheric CO_2

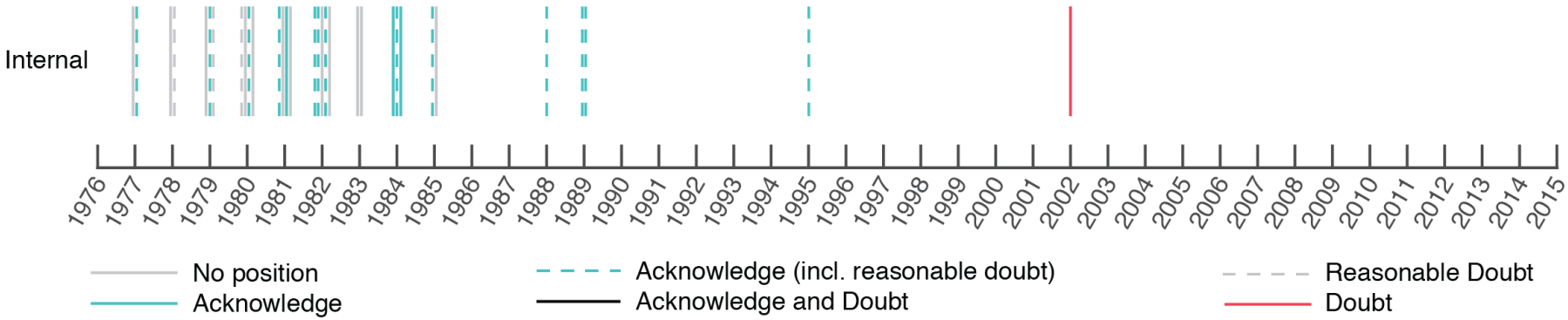


"Estimate of the average global temperature increase" under the "Exxon 21st Century Study-High Growth scenario"

RESULTS/EFFECTS

	EPA	NRC/NAS	MIT	EXXON
• TIME FOR CO_2 DOUBLING	2060	2075	-	2090
• AVERAGE TEMPERATURE RISE	3°C	~ 2°C	1.5-4.5°C	1.3 - 3.1°C
• OTHER GASES IMPACT	-1.6 to 3.3°C	~1°C	-	-
• SEA LEVEL RISE	150 cm, 2040 215 cm, 2100	70 cm 2080 (3-4°C rise)	-	-
• PRECIPITATION	POSSIBLE MAJOR CHANGES	DRIER MIDWEST	SIGNIFICANT, BUT UNPREDICTABLE	-
• AGRICULTURAL	PLUSES & MINUSES	BENEFITS WILL BALANCE DEBITS	SIGNIFICANT, BUT UNPREDICTABLE	-
• AIRBORNE CO_2 FRACTION	0.6 to 0.8	0.4 - 0.6	0.4 to 0.6	0.53
• IMPACT OF ALTERNATE ENERGY SOURCES	SMALL	INSENSITIVE	LARGE	INSENSITIVE

Glaser M B 1982 CO2 'Greenhouse' Effect
Shaw H 1984 CO2 Greenhouse and Climate Issues EUSA/ER&E Environ. Conf., New Jersey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Acknowledge
Acknowledge (incl. reasonable doubt)
Acknowledge and Doubt
Reasonable Doubt
Doubt

responses expected for these forcings.

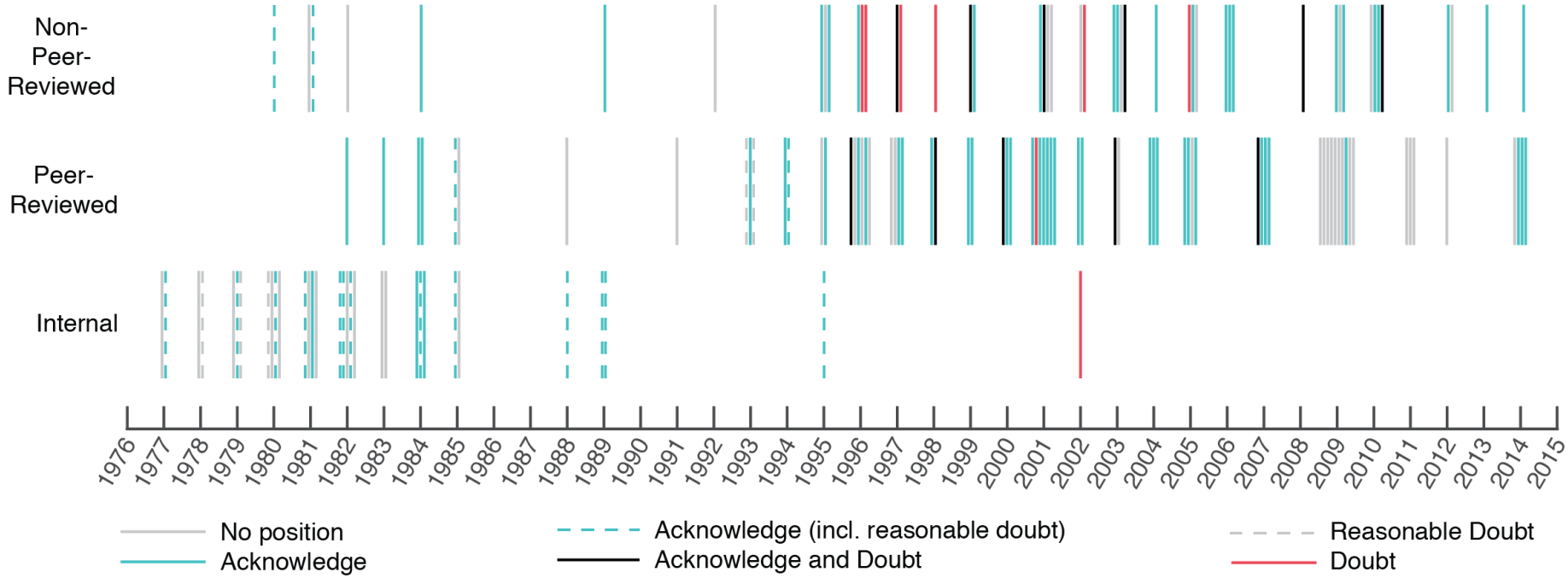
The body of statistical evidence in Chapter 8, when examined in the context of our physical understanding of the climate system, now points towards a discernible human influence on global climate. Our ability to quantify the magnitude of this effect is currently limited by uncertainties in key factors, including the magnitude and

Summary for Policymakers

There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

The SAR concluded: "The balance of evidence suggests a discernible human influence on global climate". That report also noted that the anthropogenic signal was still emerging from the background of natural climate variability. Since the SAR

Santer B D et al. IPCC SAR WG1 Ch 8 (1996)
Albritton D L et al. IPCC TAR WG1 (2001)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No position
Acknowledge
Acknowledge (incl. reasonable doubt)
Acknowledge and Doubt
Reasonable Doubt
Doubt

Reset the alarm

rationing? Probably not.

Let's face it: The science of climate change is too uncertain to mandate a plan of action that could plunge economies into turmoil. Yet, that's what nations seem prepared to do.

Scientists cannot predict with certainty if temperatures will increase, by how much and where changes will occur. We still don't know what role man-made greenhouse gases might play in warming the planet.

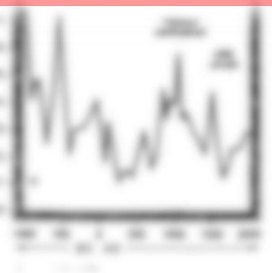
We're not impugning the existing science or suggesting that "our science is better than

Mobil

Mobil 1997 Reset the alarm
The New York Times

Unsettled Science

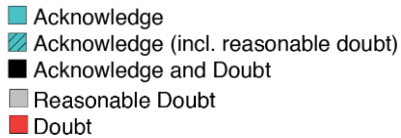
changes throughout Earth's history. Against this backdrop of large, poorly understood natural variability, it is impossible for scientists to attribute the recent small surface temperature increase to human causes



ExxonMobil

ExxonMobil 2000 Unsettled science.
The New York Times

The more public ExxonMobil's climate communications are, the more they communicate doubt



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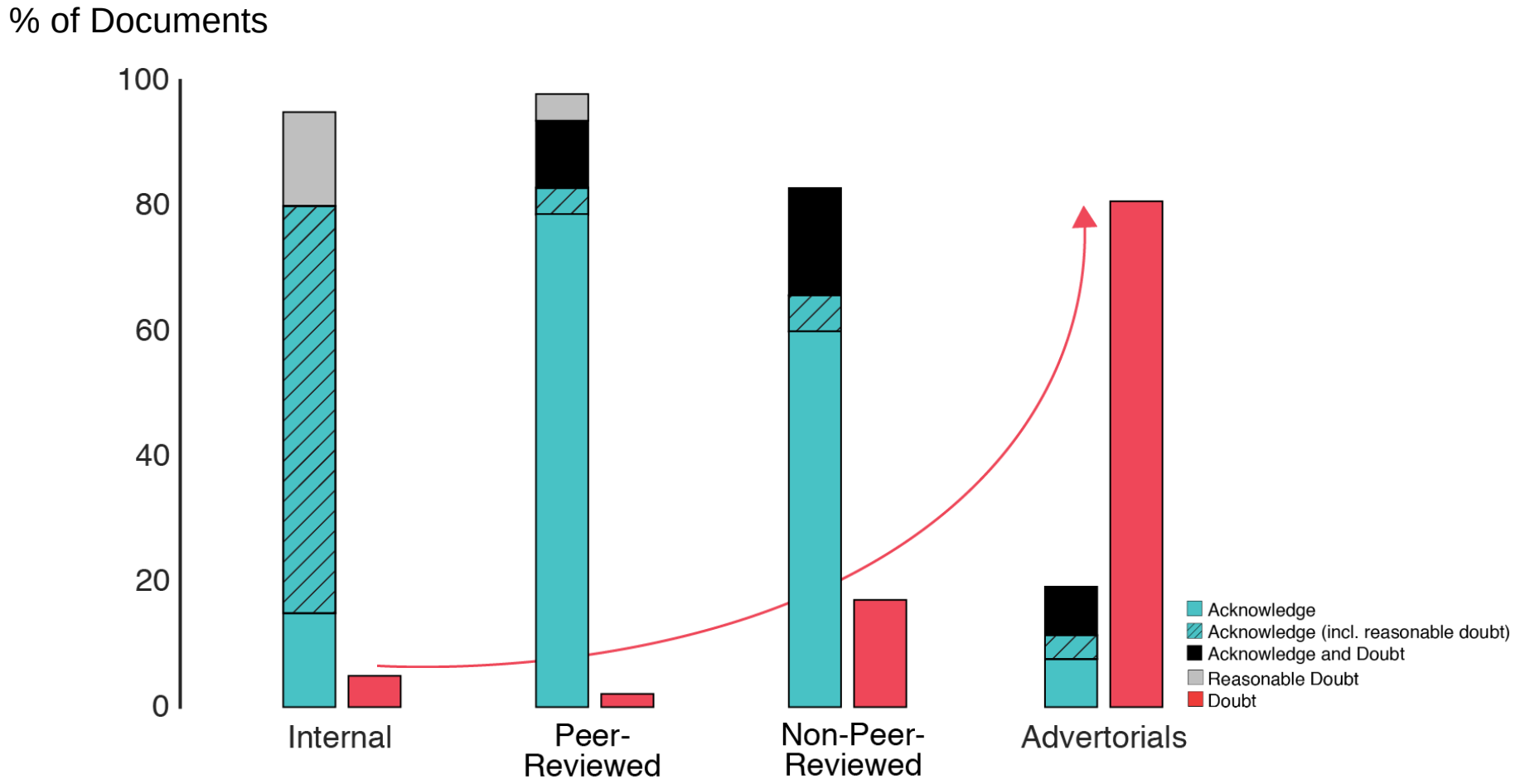

Have climate communications from ExxonMobil (Exxon/Mobil/ExxonMobil) *misled* customers, shareholders, or the public?

Yes.

Misleading #1: Exxon and ExxonMobil Corp misled with *discrepant communications* (statistical and document-to-document).

Science: ~80% Acknowledge

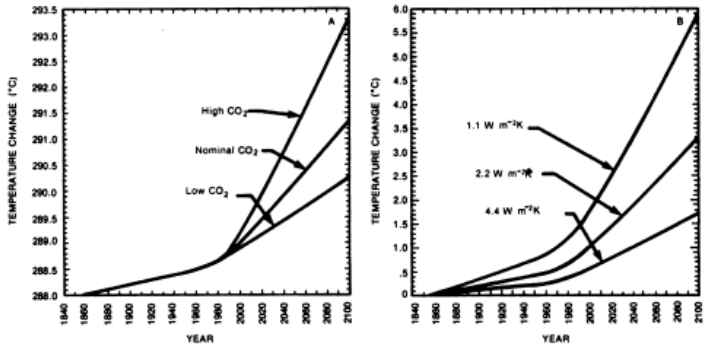

Figure 5.16. Transient temperature response to CO_2 forcing. Global surface temperature for CO_2 scenarios of Wuebbles et al. (1984) computed with transient upwelling-diffusion (UD) ocean model of Hoffert et al. (1980) with $\kappa = 2000$ m^2 y^{-1}, $w = 4$ m y^{-1} and $\sigma = 0$. (A) $T_s(t)$ from 1850 to 2100 with the nominal damping $\lambda = 2.2$ W m^{-2} K^{-1} and three post-1985 CO_2 emission scenarios. (B) $\Delta T_s(t)$ over the same period with the nominal emission scenario, but three different damping coefficients (sensitivities); $\lambda = 1.1$, 2.2, and 4.4 W m^{-2} K^{-1}.

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The foregoing results, with all their caveats, can be construed as an approximate bracketing of the consensus of transient model predictions for the next century's CO_2 greenhouse effect. In this restricted sense, they are consistent with the EPA's estimate of a 2°C warming from fossil fuel CO_2 and other greenhouse gases by the middle of the next century (Seidel and Keyes 1983). More complex scenarios than the reference one of Wuebbles et al. (1984) can be envisioned in which fossil fuel use is rapidly phased out by taxing or other policies, or in which fossil fuel use is decreased by societal feedbacks based on observations of global warming (Michael et al. 1981). Consider, for example, the finding by the Strategic Studies Staff of the EPA that:

> Worldwide taxes of up to 300% of the cost of fossil fuels (applied proportionately based on CO_2 emissions from each fuel) would delay a global 2°C warming only about 5 years beyond 2040 (Seidel and Keyes 1983, p. v).

Although this, and related, conclusions of various policy-oriented studies have important implications for the appropriate societal response to the carbon dioxide climate problem, the robustness of this type of statement is unclear at present, and should be established as an independent goal in itself. The implications of models would be more clear if it could be shown that specific predictions based on transient climate models were sufficiently robust, that is, insensitive to identified uncertainties.

A final point is that although most of the horizontally averaged transient models discussed here could be adapted to multiple climatic forcing, from

Advertorials: ~80% Doubt

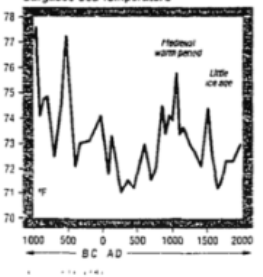
Unsettled Science

Knowing that weather forecasts are reliable for a few days at best, we should recognize the enormous challenge facing scientists seeking to predict climate change and its impact over the next century. In spite of everyone's desire for clear answers, it is not surprising that fundamental gaps in knowledge leave scientists unable to make reliable predictions about future changes.

A recent report from the National Research Council (NRC) raises important issues, including these still-unanswered questions: (1) How human activity already begun to change temperature and the climate, and (2) How significant will future change be?

The NRC report confirms that Earth's surface temperature has risen by about 1 degree Fahrenheit over the past 150 years. Some use this result to claim that humans are causing global warming, and they point to storms or floods to say that dangerous impacts are already under way. Yet scientists remain unable to confirm either contention.

Sargasso Sea Temperature



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Moreover, computer models relied upon by climate scientists predict that lower atmospheric temperatures will rise as fast as or faster than temperatures at the surface. However, only within the last 20 years have reliable global measurements of temperatures in the lower atmosphere been available through the use of satellite technology. These measurements show little if any warming.

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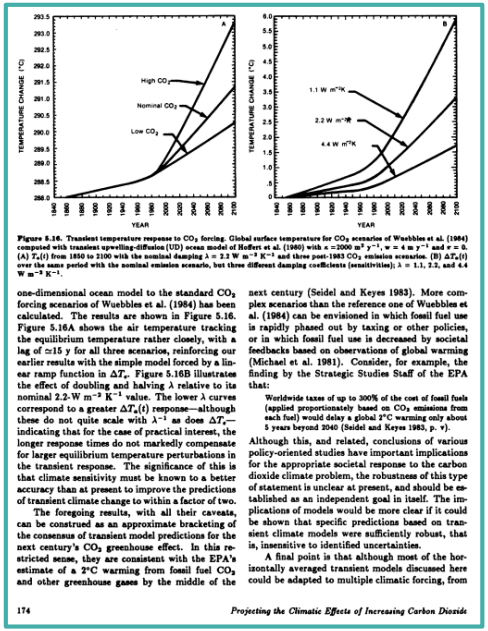
One essential step is to encourage development of lower-emission technologies to meet our future needs for energy. We'll next look at the promise of technology and what is being done today.

ExxonMobil

ExxonMobil contributed quietly to the science yet loudly to raising doubts about it.



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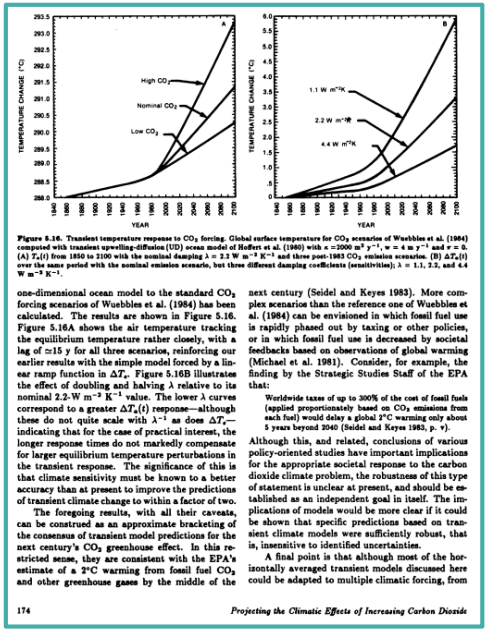

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ExxonMobil

- <citations> = 21 (peer-reviewed)
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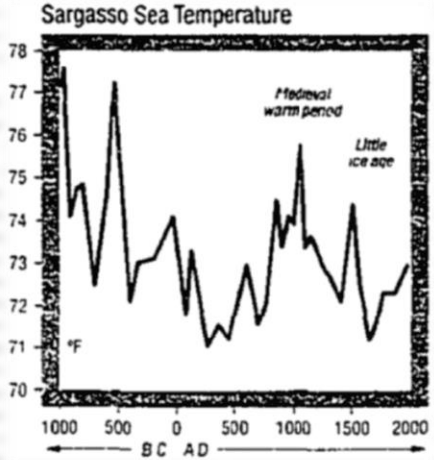
- Intellectually & physically inaccessible

- Let "the public to know where we stand"
- Readership of millions
- "Every Thursday" 1972-2001, $31,000 each
- "Advertorials substantially affect levels of individual issue salience" (Cooper *et al.* 2004)

Misleading #1: Exxon and ExxonMobil Corp misled with *discrepant communications* (statistical and document-to-document).

Misleading #2: Mobil, Exxon, and ExxonMobil Corp misled with *misinforming advertorials and non-peer-reviewed publications*, which conflicted with mainstream science.

Unsettled Science

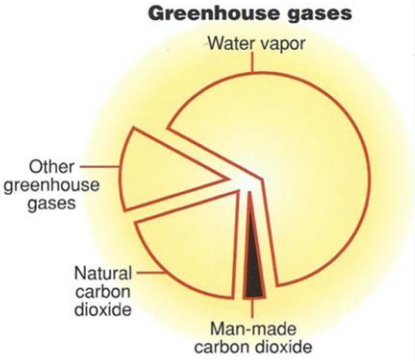


ExxonMobil

"very misleading"

DR. LLOYD KEIGWIN
Woods hole Oceanographic Institution

Keigwin L D to Altman P. 11 Dec 2000



Sources of greenhouse gases

The vast majority of the greenhouse effect is created by water vapor, over which we have little or no control. The second leading cause is carbon dioxide, or CO_2. Every living human and animal continuously breathes in oxygen and breathes out CO_2.

Nearly all CO_2 emissions come from natural sources. Only a small amount comes from burning fossil fuels.

Fossil fuels and the climate

Does the tiny portion of greenhouse gases caused by burning fossil fuels have a measurable effect on worldwide climate? No one knows for sure. That's the crux of the debate.

In 1995, a special United Nations panel set up to study global climate change issued an extensive report on the issue. In keeping with the practice of publishing research findings, peers in the scientific community reviewed the report before it was released. The scientists were careful not to make any firm conclusions about the connection between burning fossil fuels and global warming.

However, the executive summary of the report, the part most people read, was heavily influenced by participants who are not scientists. The summary, which was not peer-reviewed, states that the balance of evidence suggests a discernible human influence on climate. But many scientists say that a great deal of uncertainty still needs to be resolved.

Scientific uncertainties

One cause of the uncertainty stems from the fact that much of the

Exxon. *Global climate change, everyone's debate* (1998)

Misleading #1: Mobil, Exxon, and ExxonMobil Corp misled with *misinforming advertorials and non-peer-reviewed publications*, which conflicted with mainstream science.

Misleading #2: Exxon and ExxonMobil Corp misled with *discrepant communications* (statistical and document-to-document).

Misleading #3: Exxon and ExxonMobil Corp misled by *funding climate denial* inconsistent with what the company knew.

"Even though we were writing all these papers [with Exxon scientists] which were basically supporting the idea that climate change from CO_2 emissions was going to change the climate of the earth according to our best scientific understanding, the front office...of the company was also supporting people that we call climate change deniers…they were giving millions of dollars to other entities to support the idea that the CO_2 greenhouse was a hoax."

DR. MARTIN HOFFERT
Professor, New York University
Research collaborator with Exxon scientists in the 1980s
Interviewed 2018

THE ROYAL SOCIETY

Nick Thomas
Director, Corporate Affairs
Esso UK Limited
UK Public Affairs
ExxonMobil House, Mailpoint 8
Ermyn Bay
Leatherhead
Surrey
KT22 8UX

6–9 Carlton House Terrace
London SW1Y 5AG
tel +44 020 7451 2516
fax +44 020 7451 2615
mob +44 07811 320346

www.royalsoc.ac.uk

4 September 2006
Our ref: BW/NT/CC

Dear Nick

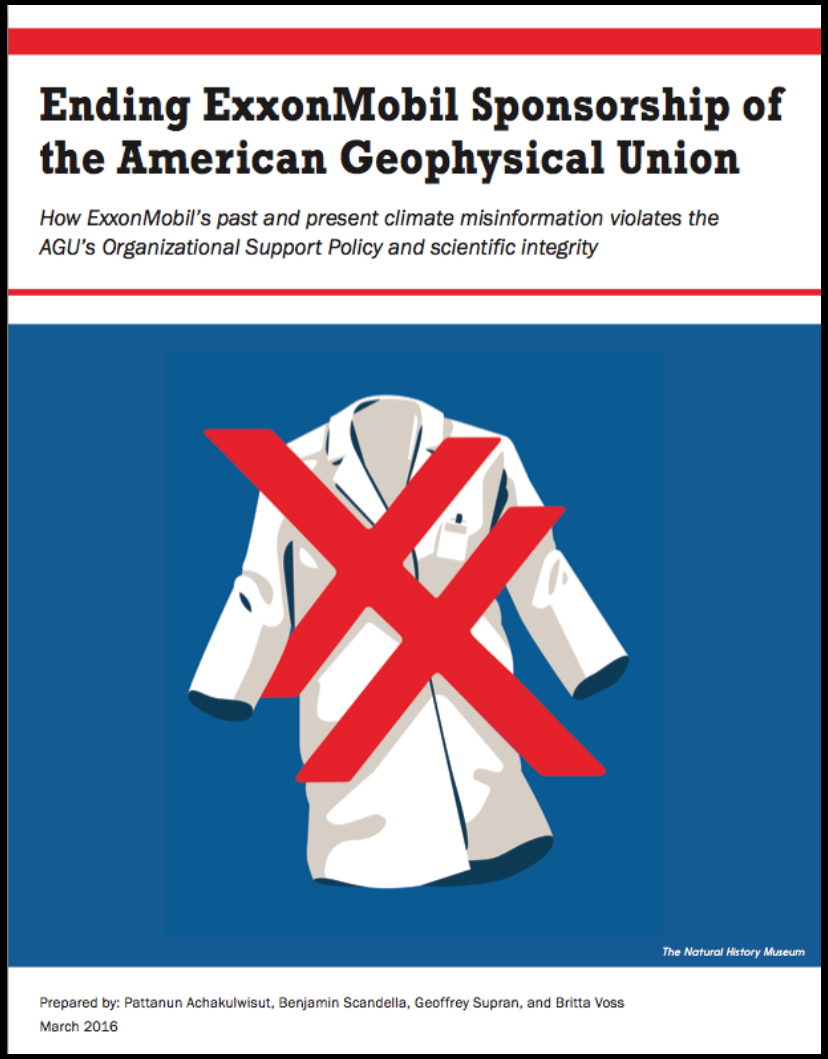
Thank-you for your recent letter and accompanying copies of the 2005 ExxonMobil 'Corporate Citizenship Report' and the 'UK and Ireland Corporate Citizenship' brochure. I have read both with interest, but I am writing to express my disappointment at the inaccurate and misleading view of the science of climate change that these documents present.

In particular, I was very surprised to read the following passage from the section on Environmental performance under the sub-heading of 'Uncertainty and risk' (p.23) in the 'Corporate Citizenship Report':

"While assessments such as those of the IPCC have expressed growing confidence that recent warming can be attributed to increases in greenhouse gases, these conclusions rely on expert judgment rather than objective, reproducible statistical methods. Taken together, gaps in the scientific basis for theoretical climate models and the interplay of significant natural variability make it very difficult to determine objectively the extent to which recent climate changes might be the result of human actions."

These statements also appear, of course, in the ExxonMobil document on 'Tomorrow's Energy', which was published in February. As I mentioned during our meeting in July, these statements are very misleading. The "expert judgment" of the Intergovernmental Panel on Climate Change was actually based on objective and quantitative analyses and methods, including advanced statistical appraisals, which carefully accounted for the interplay of natural variability, and which have been independently reproduced.

Furthermore, these statements in your documents are not consistent with the scientific literature that has been published on this issue. For instance, Chapter 12 of the contribution of IPCC working group 1 to the Third Assessment Report provided an overview of scientific papers relating to the 'Detection of climate change and attribution of causes' that had been published up to the end of 2000. The chapter concluded: "In the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas



Exxon/ExxonMobil's past & present climate denial:

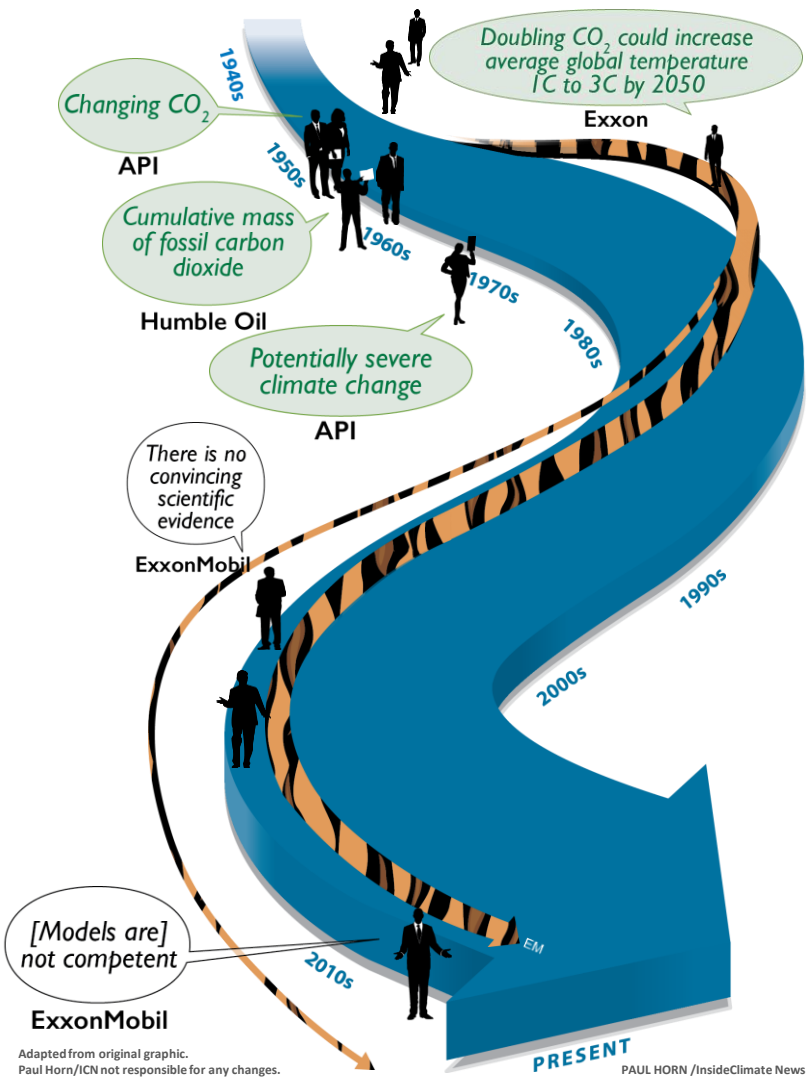
The Company

Contrarian scientists

Third-party organizations

Climate-denying politicians

Online at
bit.ly/ExxonReport



Petition

We urge the United States government to reject the global warming agreement that was written in Kyoto, Japan in December, 1997, and any other similar proposals. The proposed limits on greenhouse gases would harm the environment, hinder the advance of science and technology, and damage the health and welfare of mankind.

There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon the natural plant and animal environments of the Earth.

Edward Teller
Please sign here

☒ Please send more petition cards for me to distribute.

My academic degree is B.S. ☐ M.S. ☐ Ph.D. ☒ in the field of PHYSICS

This is a petition signed by 17,000 scientists…
'There is no convincing scientific evidence…'

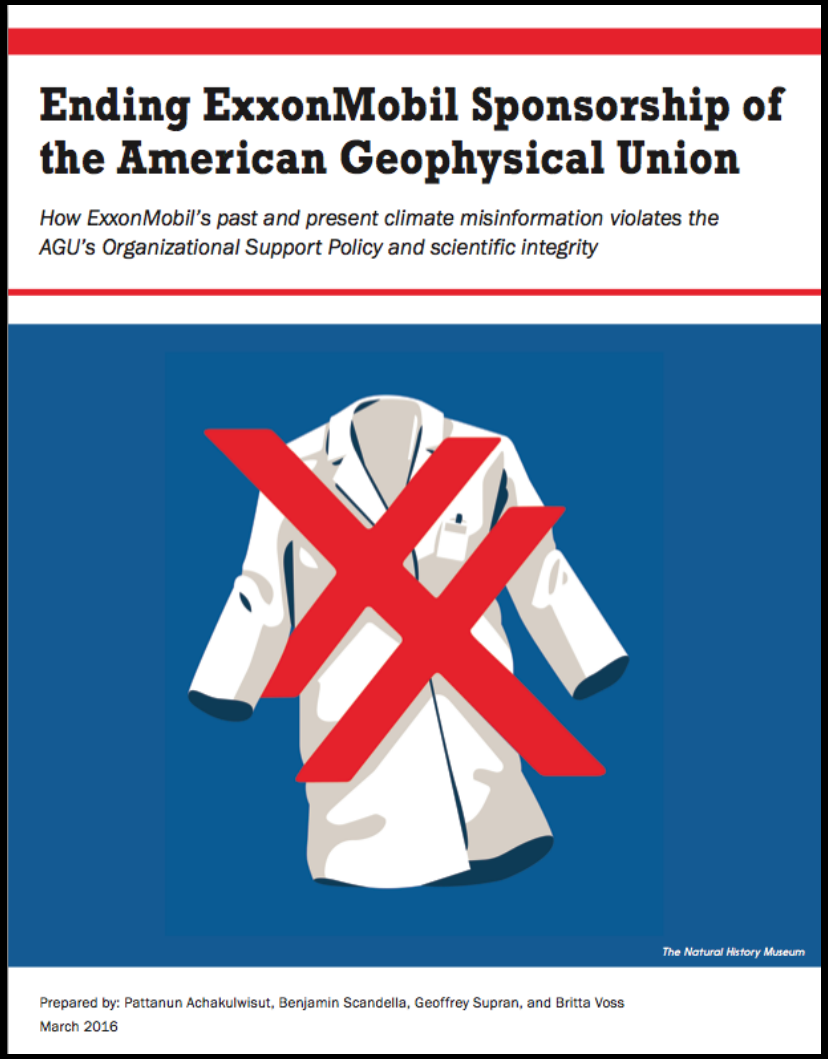
2000 EXXONMOBIL SHAREHOLDER MEETING

We in ExxonMobil do not believe that the science required to establish this linkage between fossil fuels and warming has been demonstrated - and many scientists agree

2002 ASIA OIL & GAS CONFERENCE

Our ability to project with any degree of certainty the future Is continuing to be very limited…our examination about the models are [*sic*] that they're not competent.

2013 EXXONMOBIL SHAREHOLDER MEETING



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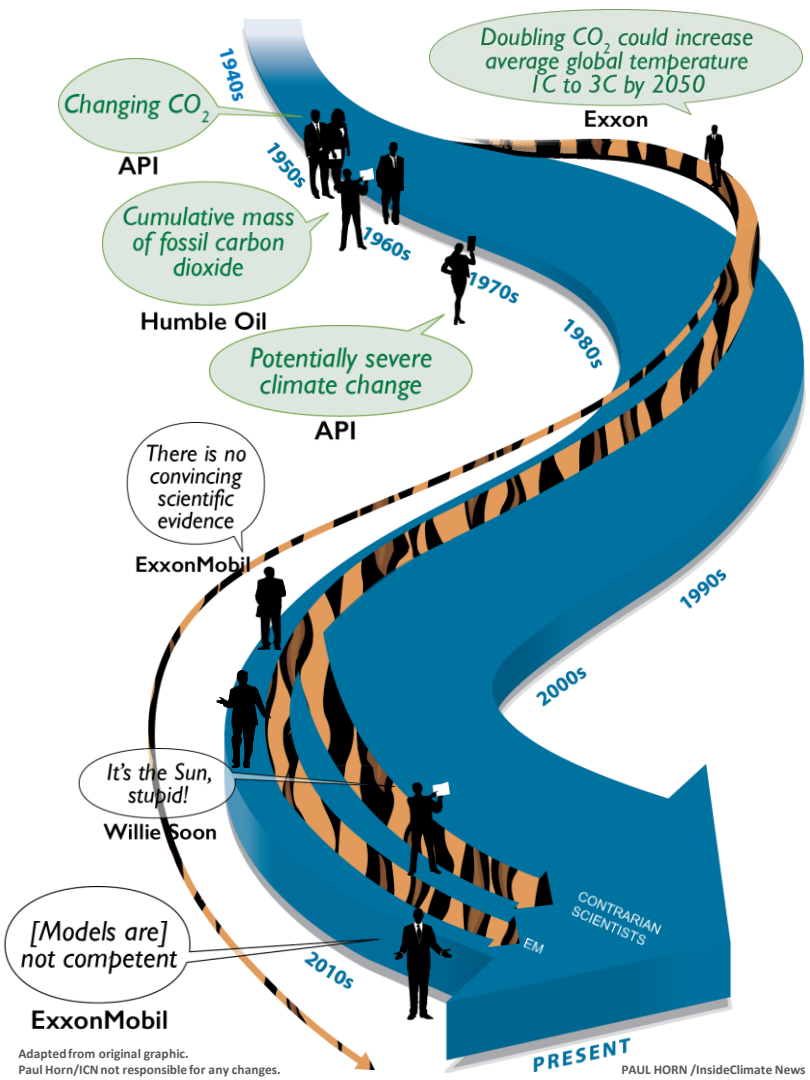


Willie Soon's "deliverables"

- $1.25 million from fossil fuel companies
- Funding frequently undisclosed in papers
- $335,000 from ExxonMobil Foundation (2005-10)

2003 — The 20th century is likely not the warmest nor a uniquely extreme climatic period of the last millennium.

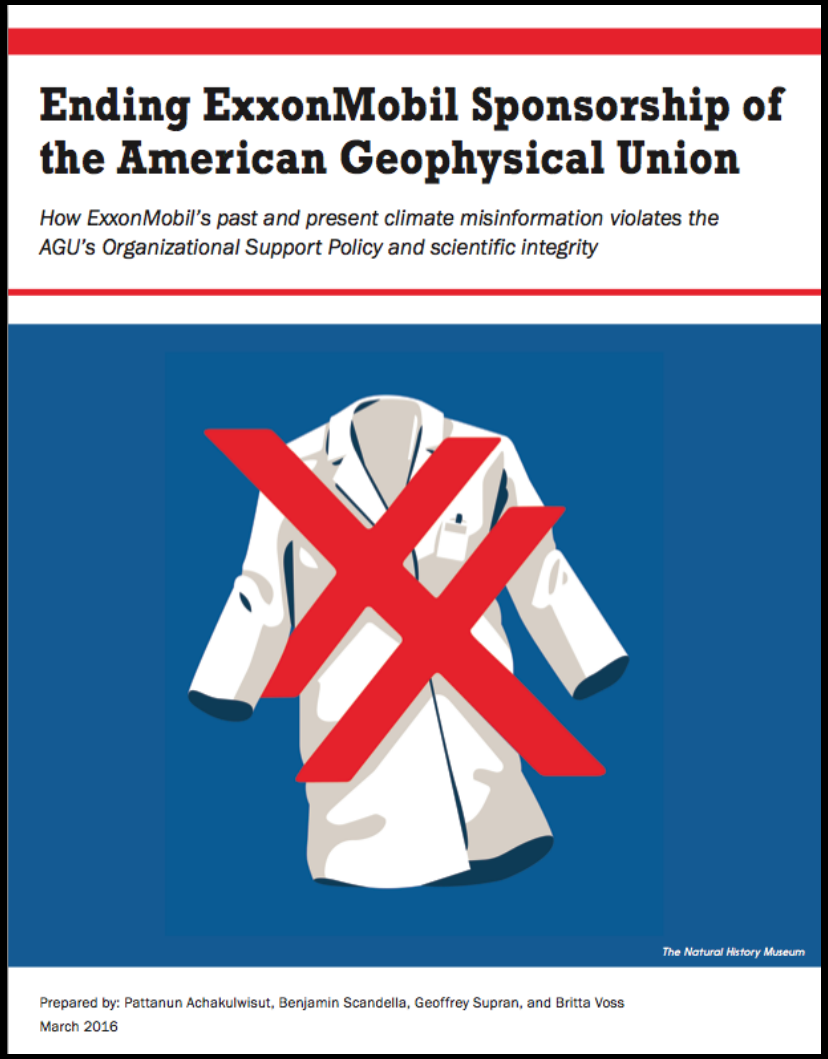
2005 — …the hypothesis of a CO2-dominated warming of the Arctic is not likely consistent…

2009 — It's the Sun, stupid!

2010 — …flawed notion…that increasing atmospheric carbon dioxide (CO_2) concentrations will change climate dramatically…

2008 — Too much ice is really bad for polar bears

Greenpeace. Dr. Willie Soon (Feb 2015, bit.ly/PCHR1)
Soon W, *et al.* 2003 *Energy & Environment* 14, 233
Soon W W-H 2005 *Geophys. Res. Lett.* 32 L16712
Soon W 2009 *It's the Sun, stupid!*
Soon W, Legates D R 2010 *Ecol. Law. Curr.* 37
Soon W 2007 *Phys. Geog.* 28, 97
Green K C, Armstrong J S, Soon W 2009 *Int. J. of Forecasting* 25, 826
Song L *InsideClimate News* (23 Feb 2015)
Bagley K *InsideClimate News* (11 Mar 2015)



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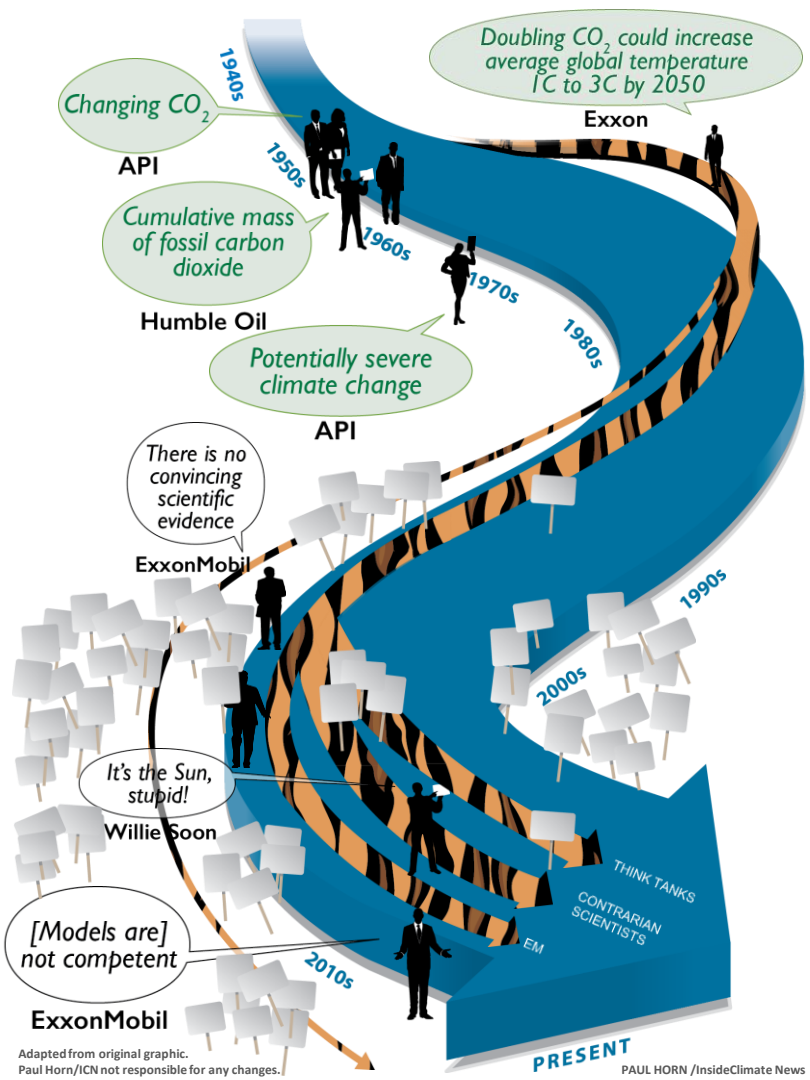
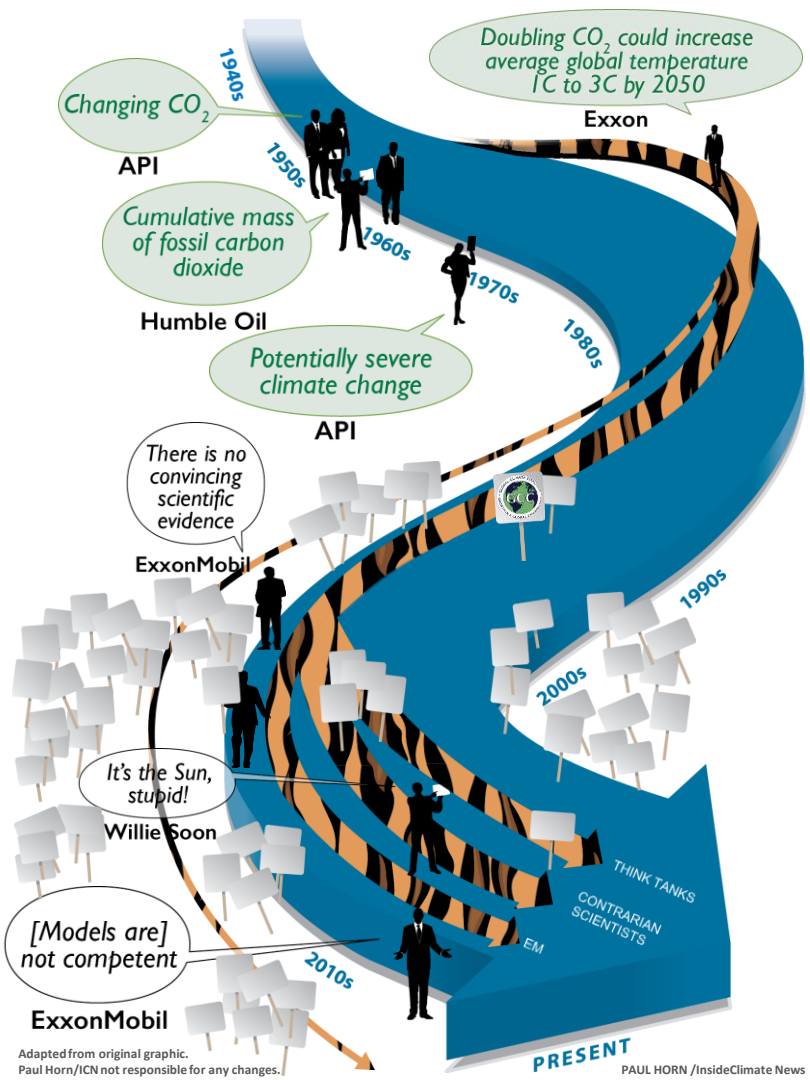


$38.7 million+ to 73 climate-denying organizations (1992-2017)*

**Does not include ~$1 billion to PR and Advertising firms from fossil fuel industry over the last decade alone.*

ExxonSecrets.org
Climate Investigations Center (2019) *Trade Associations and the Public Relations Industry*

Acton Institute	$365,000
Advancement of Sound Science Center, Inc.	$50,000
AEI American Enterprise Institute	$5,014,000
Africa Fighting Malaria	$30,000
ALEC American Legislative Exchange Council	$1,987,900
American Conservative Union Foundation	$80,000
Independence Institute	$83,000
American Council for Capital Formation - Center for	$75,000
Independent Women's Forum	$1,824,523
Policy Research	$337,000
Institute for Energy Research	$165,000
American Council on Science and Health	$15,000
Institute for Policy Innovation	$50,000
American Friends of the Institute of Economic Affairs	$30,000
Institute for Senior Studies	$115,000
American Spectator Foundation	$93,500
Institute for Study of Earth and Man	$1,268,500
Annapolis Center	$390,000
International Policy Network - North America	$48,500
Arizona State University	$115,000
International Republican Institute	$1,082,500
Atlas Economic Research Foundation	$166,000
Landmark Legal Foundation	$265,000
Capital Research Center (Greenwatch)	$10,000
Lexington Institute	$155,000
Cato Institute	$40,000
Lindenwood University, St. Charles, Missouri	$2,40,000



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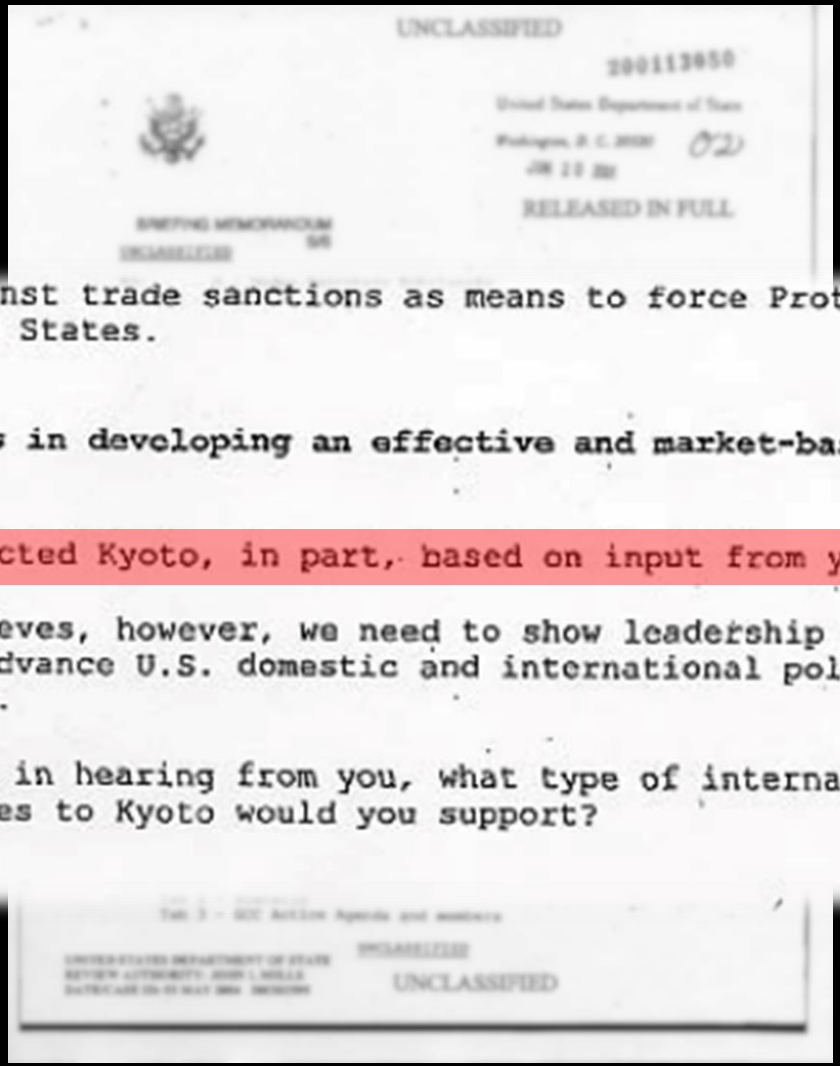
GLOBAL CLIMATE COALITION
GCC
GROWTH IN A GLOBAL ENVIRONMENT

- "Role of greenhouse gases in climate change is not well understood"
- $13M in 1997 anti-Kyoto ad campaign
- $63M in political contributions (1989-99)
- 1996: *'The IPCC: Institutionalized Scientific Cleansing?'*

Supran G et al. Fossil Free MIT (2015, bit.ly/PCHR2)
Achakulwisut P et al. Ending ExxonMobil Sponsorship of the American Geophysical Union (2016), bit.ly/ExxonReport)
Frumhoff P, Heede R, Oreskes N. Climatic Change 132, 157 (2015)
ExxonSecrets.org

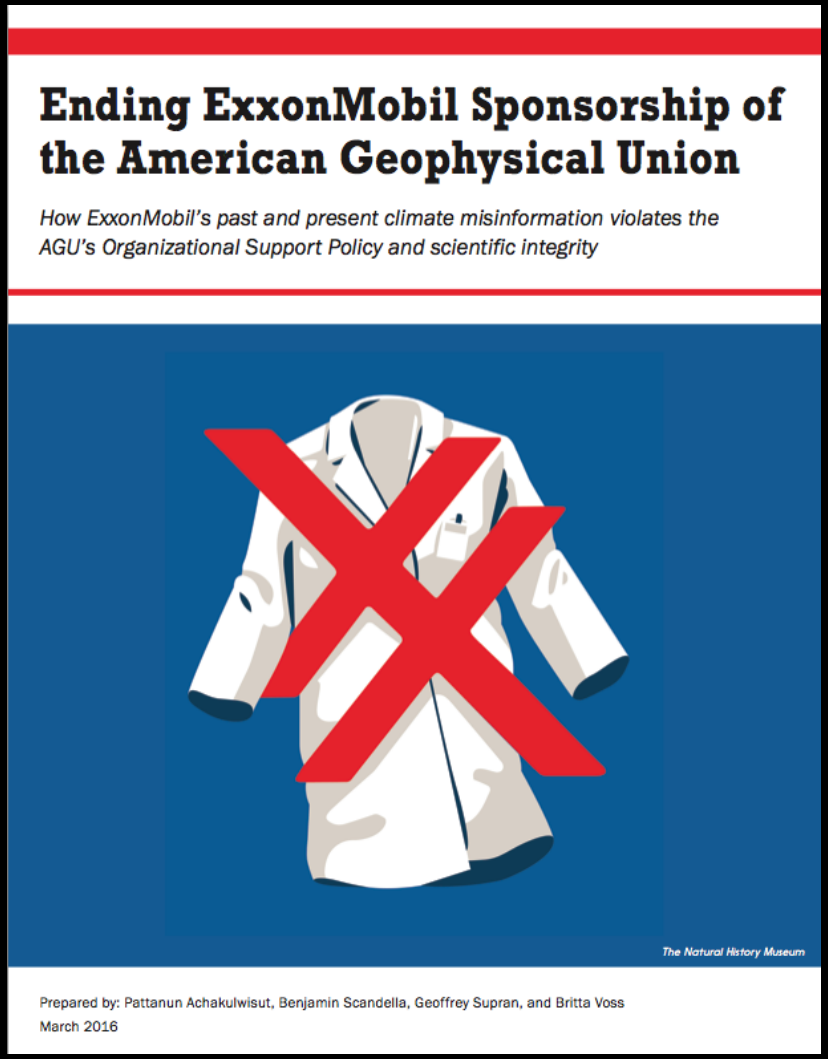


- Guard against trade sanctions as means to force Protocol upon the United States.

Solicit views in developing an effective and market-based response:

- POTUS rejected Kyoto, in part, based on input from you.
- POTUS believes, however, we need to show leadership on this issue to advance U.S. domestic and international policy objectives.
- Interested in hearing from you, what type of international alternatives to Kyoto would you support?

Brill K (2001) Letter to Dobriansky P



Exxon/ExxonMobil's past & present climate denial:

The Company

Contrarian scientists

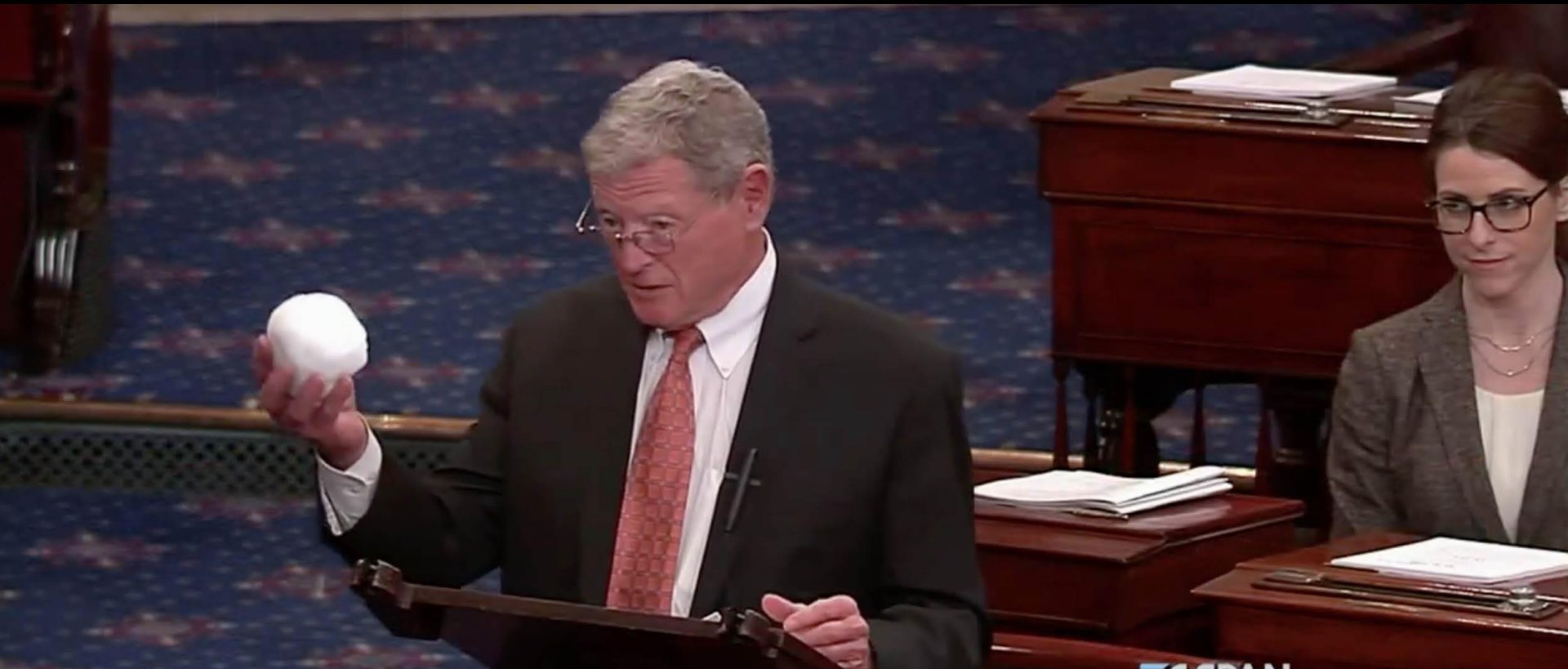
Third-party organizations

Climate-denying politicians

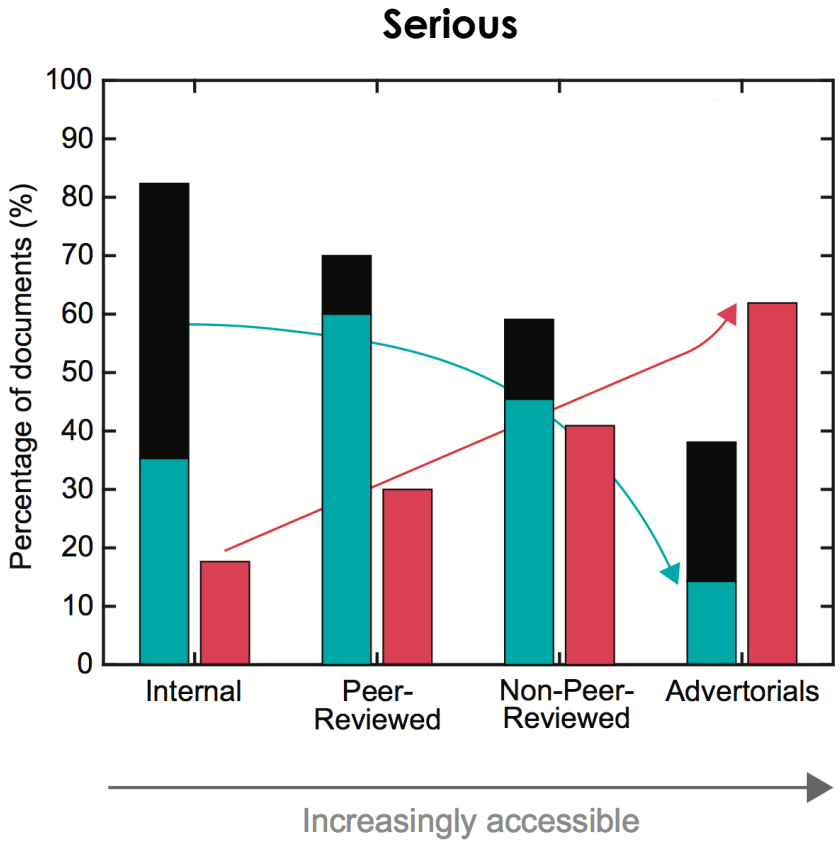
Online at
bit.ly/ExxonReport

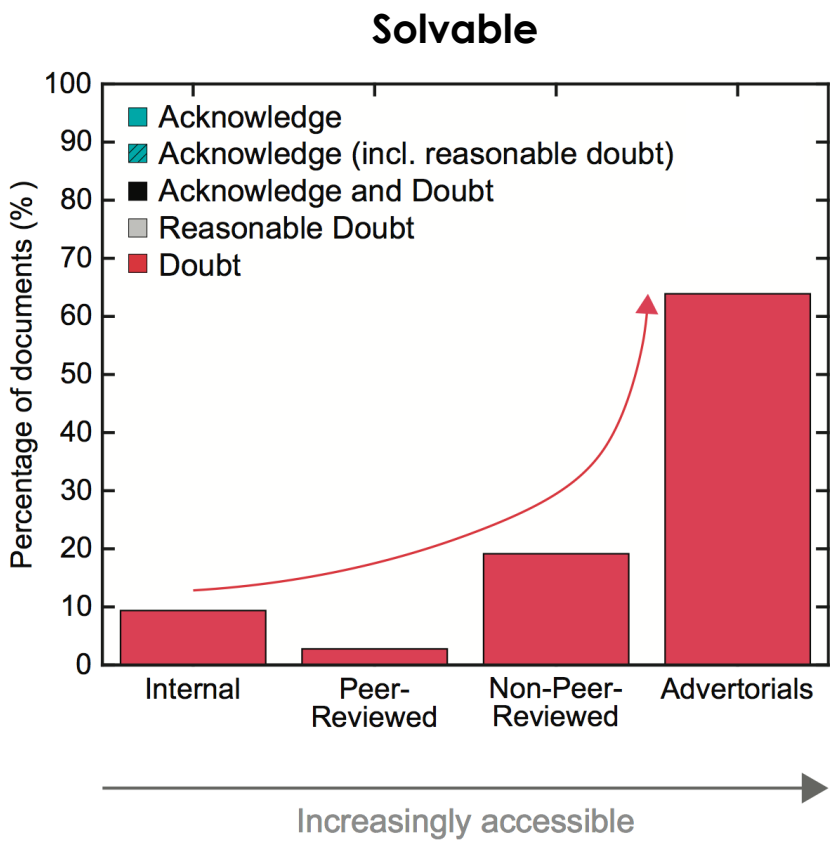
"The idea that manmade gases, CO_2, are causing catastrophic global warming is the greatest hoax ever perpetrated on the American people"

SENATOR JAMES INHOFE



ExxonMobil also misled about climate change as *serious* & *solvable*



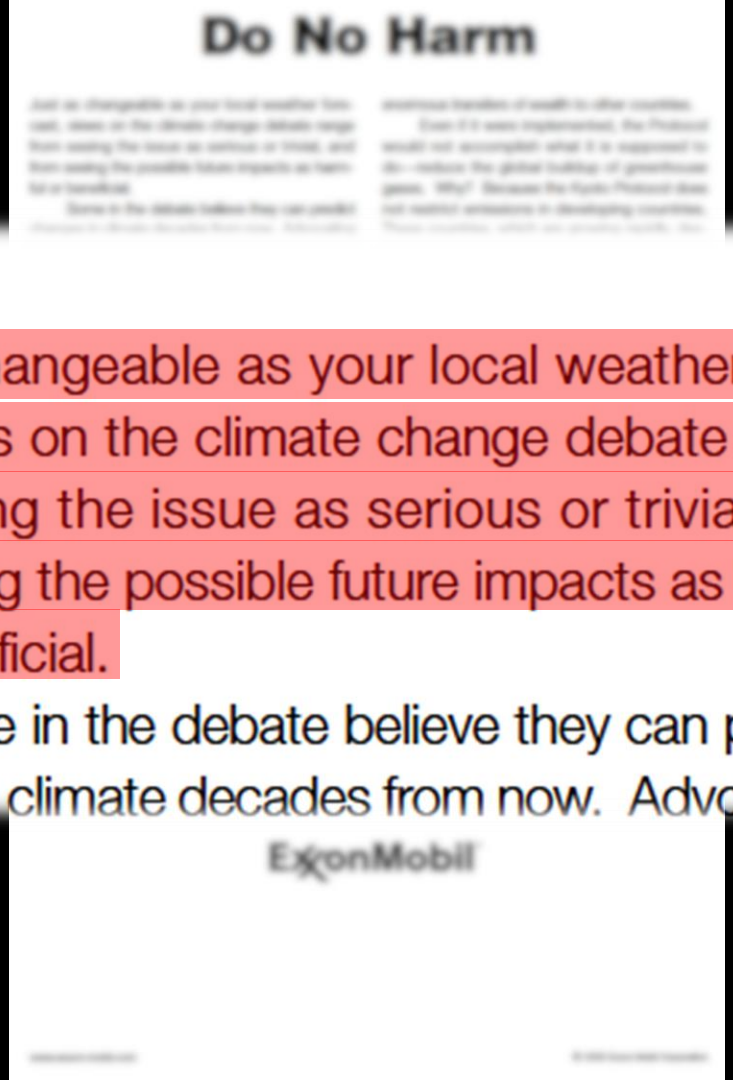


2. Effects of a doubling of the 1860 CO_2 concentration. (580 ppm)

- Global temperatures would be 9°F above 1950 levels.
- Most areas would get more rainfall, and snow would be rare in the contiguous states, except on higher mountains.
- Ocean levels would rise four feet.
- The melting of the polar ice caps could cause tremendous redistribution of weight and pressure exerted on the earth's crust. This could trigger major increases in earthquakes and volcanic activity resulting in even more atmospheric CO_2 and violent storms.
- The Arctic Ocean would be ice free for at least six months each year, causing major shifts in weather patterns in the northern hemisphere.

- The present tropics would be hotter, more humid, and less habitable, but the present temperature latitude would be warmer and more habitable.

Mastracchio R L 1979
Controlling Atmospheric CO_2



Do No Harm

Just as changeable as your local weather forecast, views on the climate change debate range from seeing the issue as serious or trivial, and from seeing the possible future impacts as harmful or beneficial.

Some in the debate believe they can predict changes in climate decades from now. Advocating

ExxonMobil

ExxonMobil. Do No Harm
The New York Times (2000)

Misleading on stranded fossil fuel assets: 24 documents allude to stranded assets, but no advertorials do so

developing.

Mitigation of the "greenhouse effect" would require major reductions in fossil fuel combustion. Shifting between fossil fuels is not a feasible alternative because of limited long-term supply availability for certain fuels although oil does produce about 18% less carbon dioxide per Btu of heat released than

Glaser M B 1982 CO_2 'Greenhouse' Effect

Misleading on stranded assets: 24 documents allude to stranded fossil fuel assets, but no advertorials do so

TABLE 4

ESTIMATED ATMOSPHERIC CO_2 CONCENTRATION AND AVERAGE TEMPERATURE INCREASE 21st CENTURY STUDY--HIGH CASE

Year	Emitted, GtC Incremental	Emitted, GtC Cummulative	Stored in Atmosphere, GtC Incremental	Stored in Atmosphere, GtC Cummulative	Atmospheric Concentration, ppm Incremental	Atmospheric Concentration, ppm Cummulative	Average Temperature Increase, °C
1979	--	--	--	715	--	337	0
1990	69.3	69.3	37.1	752	17.5	355	0.22
2000	77.2	146.5	41.3	793	19.5	374	0.45
2015	137.5	284.0	73.6	867	34.7	409	0.84
2030	163.3	447.3	87.4	954	41.2	450	1.25
2050	263.5	710.8	141.0	1095	66.5	516	1.84
2080	490.6	1201.4	262.5	1358	123.7	640	2.78
2090	191.3	1392.7	102.3	1160	48.2	688	3.09

-27-

2015–2100 CO_2 budgets:

(<2°C and/or [CO_2] < 550 ppm)

ExxonMobil: 251–716 GtC

IPCC: 442–651 GtC

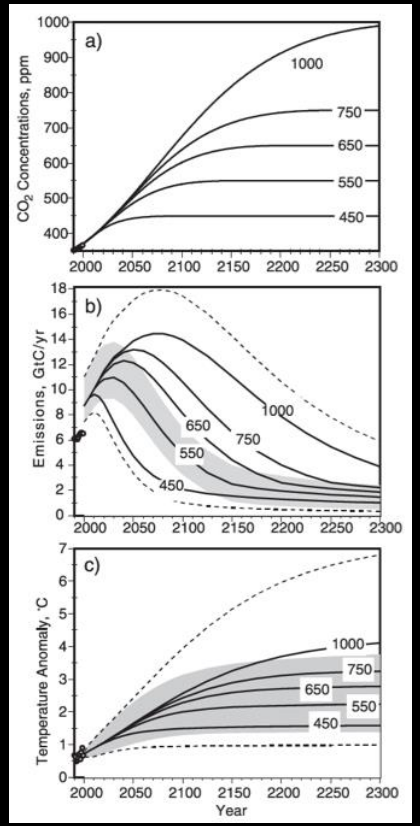


Table 3. Carbon Budgets Over the Next Three Centuries for CO_2 Stabilization

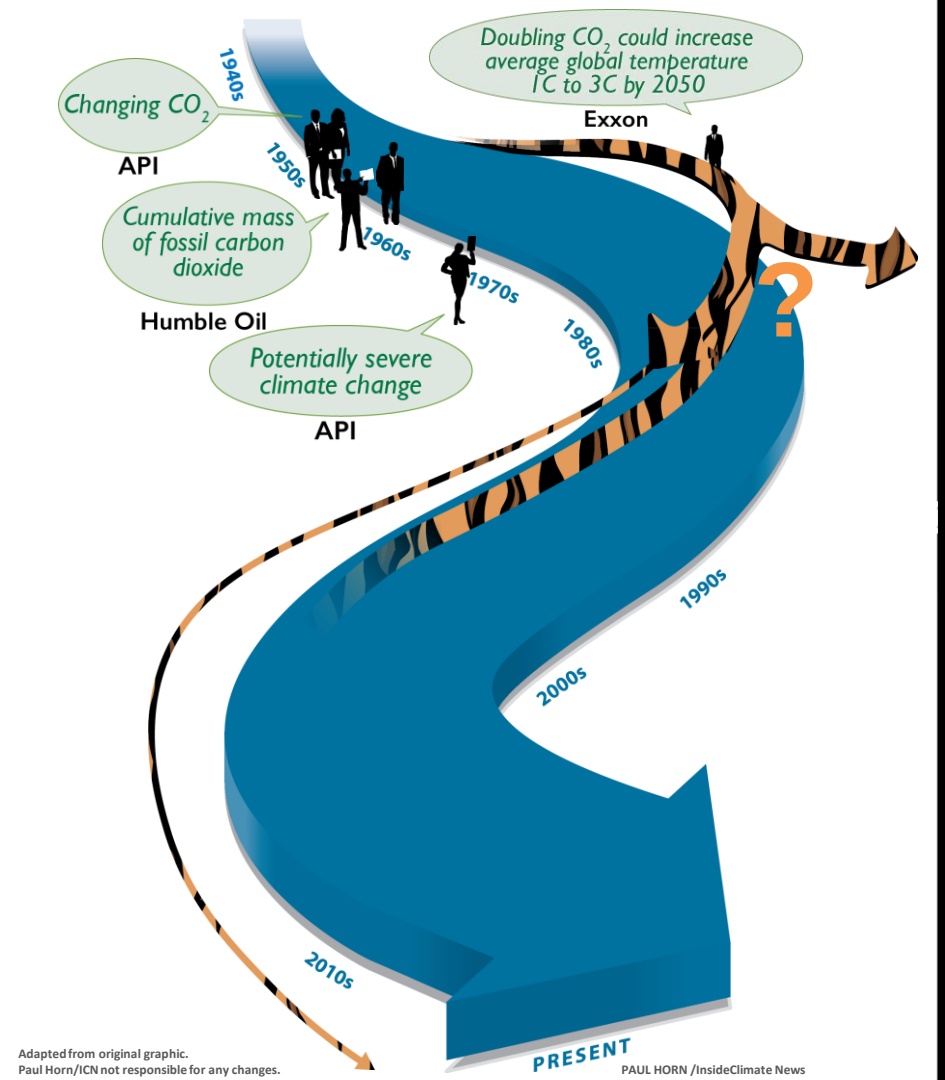
Budget Period		Stabilization Level, ppm	Atm.		Carbon Stock Change Over Budget Period, Gt C: Ocean	Plants and Soils[a]	Fossil[b]
2000	2099	450	176.2	ref.	222.0	86.8	485.0
				low	274.5	230.9	681.7
				high	157.0	18.5	351.7
		550	367.6	ref.	297.7	154.7	820.0
				low	360.1	350.4	1078.2
				high	220.7	63.8	652.2
		650	497.1	ref.	334.9	188.8	1020.8
				low	401.5	409.7	1308.3
				high	252.7	87.2	837.1
		750	573.2	ref.	353.1	205.8	1132.2
				low	421.8	438.9	1433.9
				high	268.7	99.0	940.9
		1000	650.4	ref.	368.5	220.2	1239.1
				low	438.5	463.3	1552.3
				high	264.8	126.6	1041.9
2100	2199	450	0.0	ref.	130.4	29.2	159.6
				low	183.1	73.5	256.6
				high	67.1	0.5	66.6
		550	20.8	ref.	202.6	62.4	285.8
				low	276.5	144.1	441.4
				high	113.4	11.5	145.7
		650	103.6	ref.	269.2	104.8	477.6
				low	358.5	226.4	688.6
				high	161.3	33.2	298.0
		750	225.8	ref.	321.5	143.3	690.5
				low	421.1	298.0	944.9
				high	201.2	55.1	482.1
		1000	504.0	ref.	397.5	205.3	1106.8
				low	509.9	409.9	1423.8
				high	158.3	0.4	662.0
2200	2299	450	0.0	ref.	101.4	13.5	114.9
				low	150.0	36.6	186.6
				high	44.4	3.3	41.1
		550	0.0	ref.	148.5	20.5	169.0
				low	217.3	56.9	274.3
				high	67.7	5.8	61.9
		650	0.0	ref.	189.8	28.1	217.9
				low	274.8	78.9	353.8
				high	89.6	8.0	81.6
		750	14.0	ref.	229.5	40.7	284.2
				low	327.9	109.2	451.1
				high	113.4	6.6	120.8
		1000	167.8	ref.	313.2	82.7	563.7
				low	433.7	196.8	798.3
				high	170.7	9.4	347.9

Glaser M B 1982 CO_2 'Greenhouse' Effect

Kheshgi H S, Jain A K Glob Biogeochem Cycl **17**, 1047 (2003)

Have climate communications from ExxonMobil (Exxon/Mobil/ExxonMobil) *misled* customers, shareholders, or the public?

Yes.



(1) Climate science research

- "Highly visible programs" (1978)
- "Establish a scientific presence"
- "Maintain awareness of new scientific developments" (1984)
- "Credentials required to speak with authority in this area" (1980)
- "Detailed understanding of the total Federal atmospheric CO_2 program which the Corporation needs for its own planning" (1981)

(2) Public relations campaign

- "Great public relations value" (1978)
- 'CO_2 Greenhouse Communications Plan' to target "opinion leaders who are not scientists" (1980)

Shaw H Untitled (request for a credible scientific team) (1978)
Werthamer N R CO2 Greenhouse Communications Plan (1980)
Carlson J M The Greenhouse Effect (1988)

Werthamer N R CO2 Greenhouse Communications Plan (1980)
Levine D G Potential Enhanced Greenhouse Effects Status and Outlook (1989)

1980s: Exxon develops "CO_2 Greenhouse Communications Plan" to "emphasize the uncertainty"

EXXON'S POSITION

- IMPROVE UNDERSTANDING
  - Extend the Science
  - Include the Costs/Economics
  - Face the Socio-Political Realities

EXXON POSITION

o EMPHASIZE THE UNCERTAINTY IN SCIENTIFIC CONCLUSIONS REGARDING THE POTENTIAL ENHANCED GREENHOUSE EFFECT.

Levine D G 1989 Potential Enhanced Greenhouse Effects Status and Outlook
Carlson J M 1988 The Greenhouse Effect

1990s: Oil industry develops “uncertainty” strategy

Victory Will Be Achieved When

- Average citizens "understand" (recognize) uncertainties in climate science; recognition of uncertainties becomes part of the "conventional wisdom"
- Media "understands" (recognizes) uncertainties in climate science.

GCSCT members who contributed to the development of the plan are A. John Adams, John Adams Associates; Candace Crandall, Science and Environmental Policy Project; David Rothbard, Committee For A Constructive Tomorrow; Jeffrey Salmon, The Marshall Institute; Lee Garrigan, Environmental Issues Council; Lynn Bouchey and Myron Ebell, Frontiers of Freedom; Peter Cleary, Americans for Tax Reform; Randy Randol, Exxon Corp.; Robert Gehri, The Southern Company; Sharon Kneiss, Chevron Corp; Steve Milloy, The Advancement of Sound Science Coalition; and Joseph Walker, American Petroleum Institute.

Global Climate Science Communications Team (1998) *Global Climate Science Communications Plan*

1990s: Coal industry & electric utilities develop "theory (not fact)" strategy

Strategies

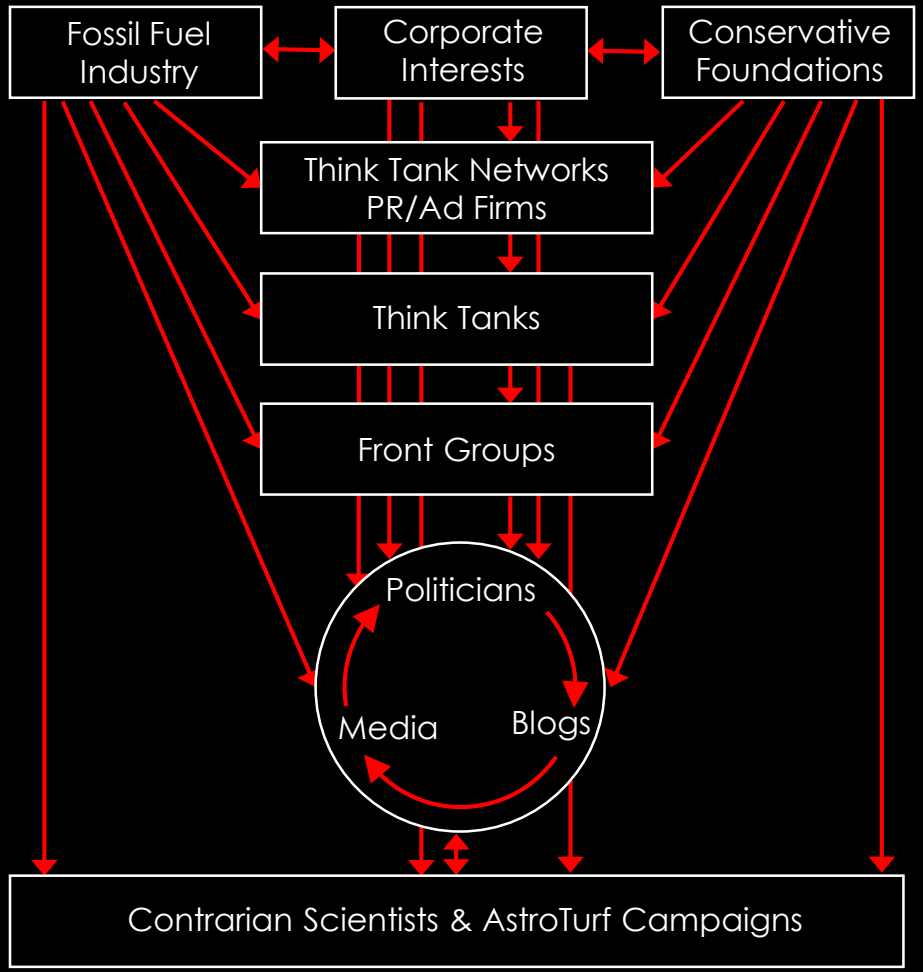
1. Reposition global warming as theory (not fact).
2. Target print and radio media for maximum effectiveness.
3. Achieve broad participation across the entire electric utility industry.

Informed Citizens For the Environment (1991) *Mission*

Big Oil is the new Big Tobacco

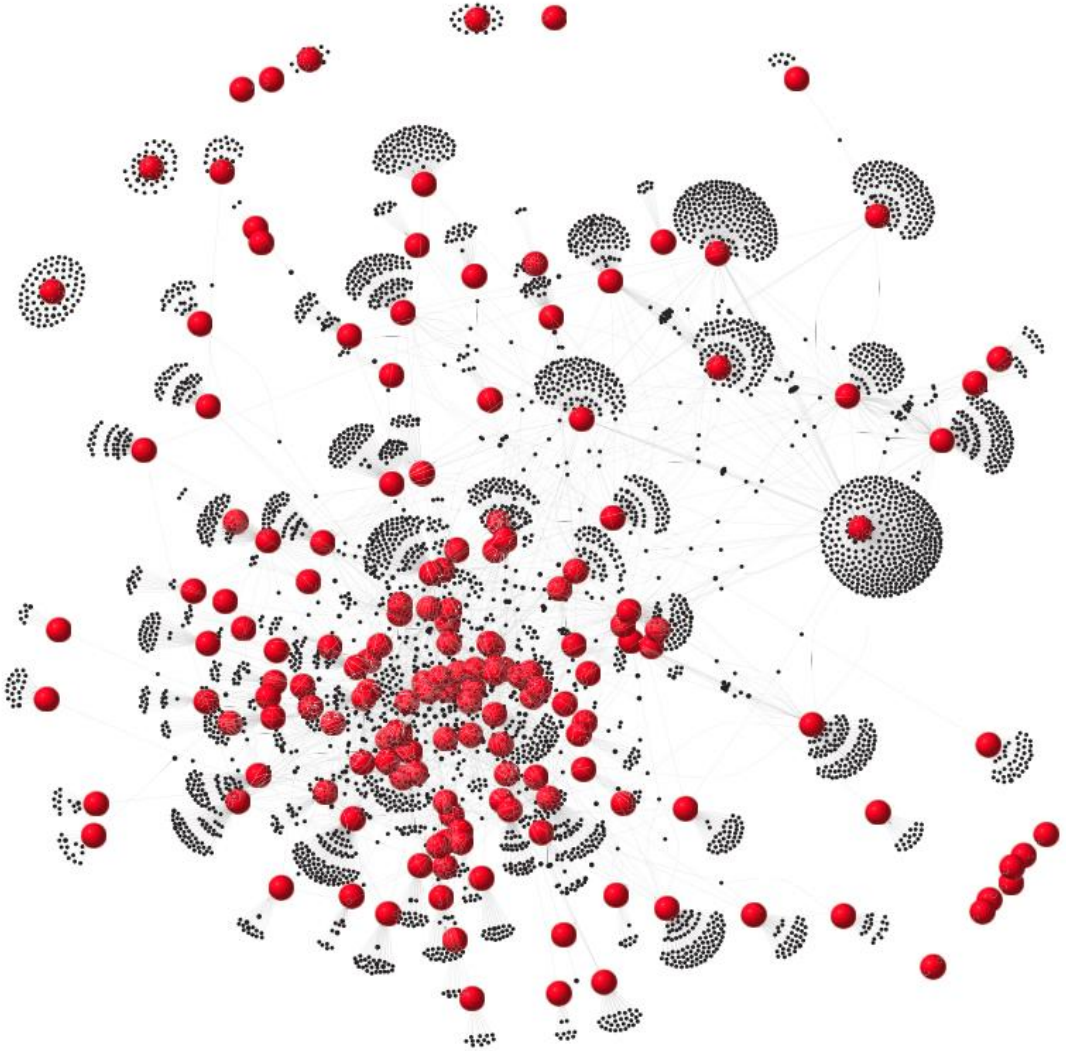
		TOBACCO	FOSSIL FUELS
STRATEGY	Develop detailed understanding of products' dangers		
	Denial of consensus – including internal – science		
	Subvert evidence in policymaking		
	Reshape media		
	Preempt litigation & regulation	✓	✓
TACTICS & INFRASTRUCTURE	Internal research to inform decision-making and PR		
	Direct denial		
	Shift to indirect denial & lobbying ('think tanks', AstroTurf groups, PR firms, lobby groups, trade associations, politicians)		
	Contrarian scientists and talking heads		
	Colonization of academia		
	Aggressive, predatory marketing at unprecedented scale	✓	✓
RHETORIC	Doubt mongering		
	Shift from explicit doubt to "risk" rhetoric		
	Appeal to techno-fixes & solutions misinformation		
	Consumer risk and choice versus industry responsibility		
	Appeal to libertarian and free-market conservative ideologies		
	Never acknowledge deception	✓	✓

Climate denial machine



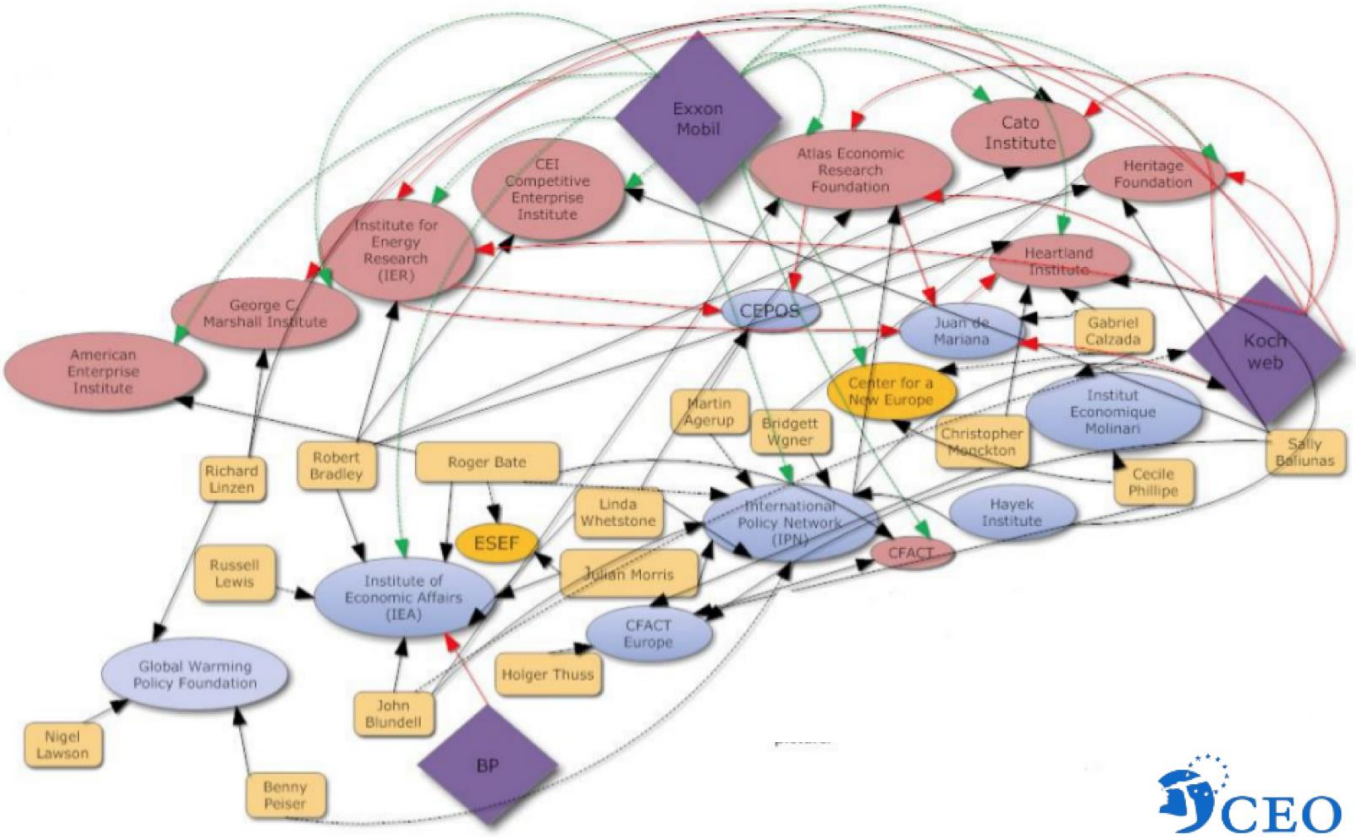
Adapted from Dunlap R E & McCright A M (2011)
The Oxford Handbook of Climate Change and Society, Ch 10

4,556 individuals
164 organizations



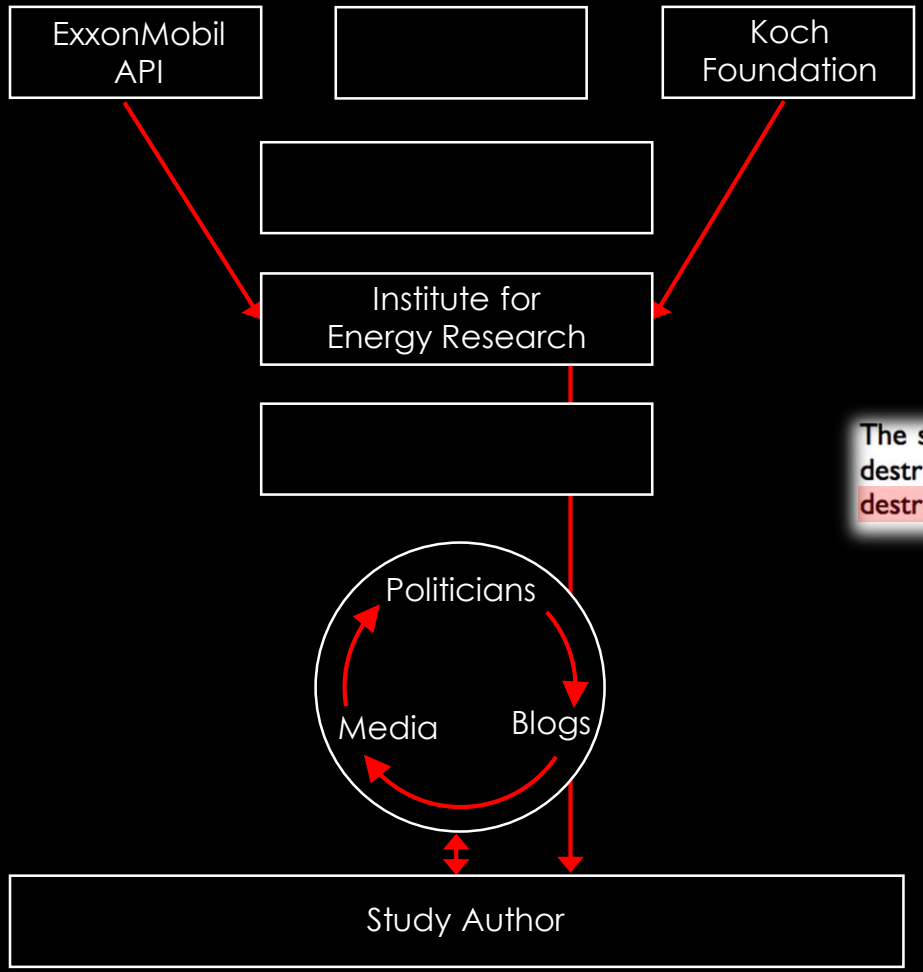
Farrell, J. Nat Clim Chg. **6**, 370 (2015)
Farrell, J. PNAS. **113**, 92 (2015)

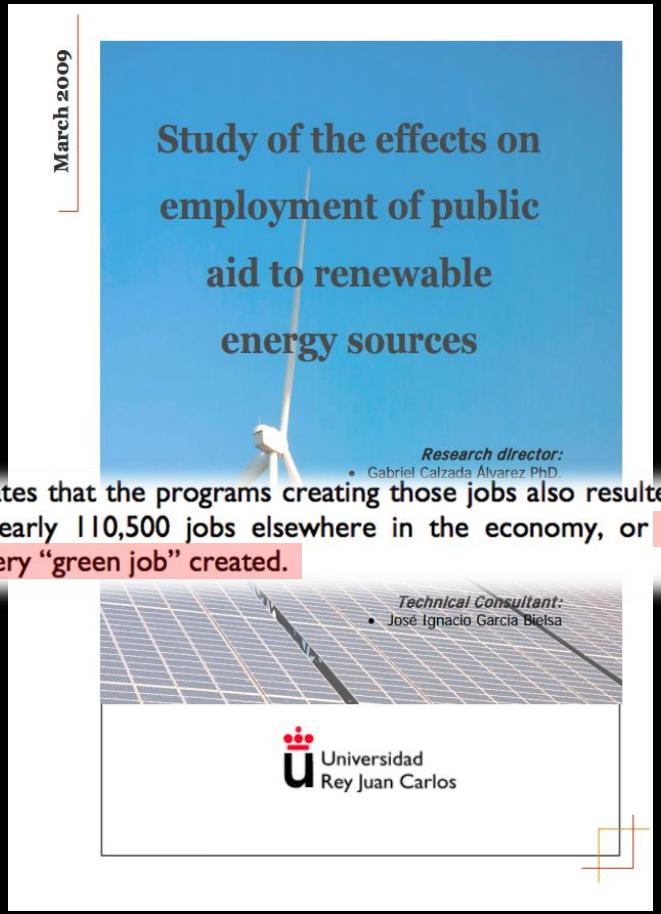
Europe's Web of Denial



Corporate Europe Observatory (Dec 2010)
Concealing their sources – who funds Europe's climate change deniers?

Climate denial machine

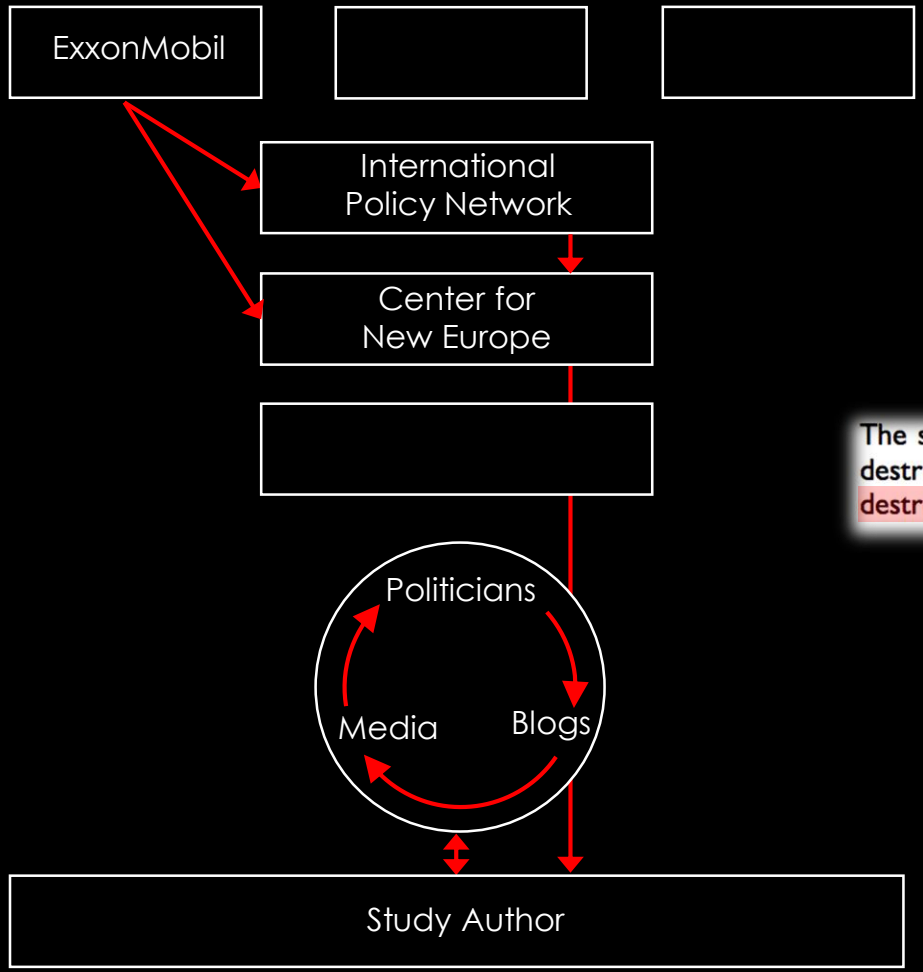


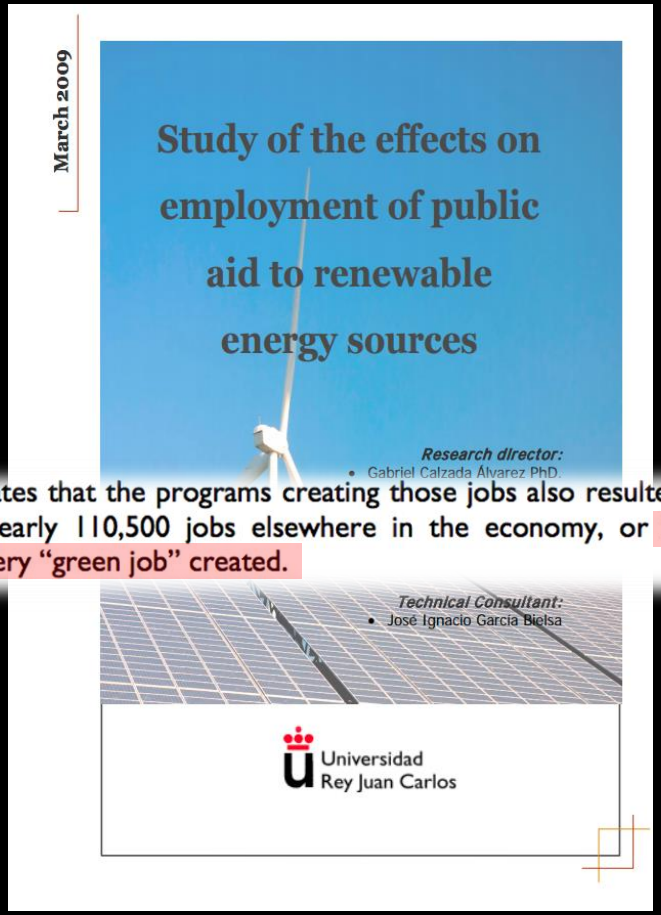


The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,500 jobs elsewhere in the economy, or 2.2 jobs destroyed for every "green job" created.

Alvarez G C (2010) Procesos De Mercado VII, 1
bit.ly/2UA01Ma; bit.ly/2HvFGoD; bit.ly/2HmleoI

Climate denial machine

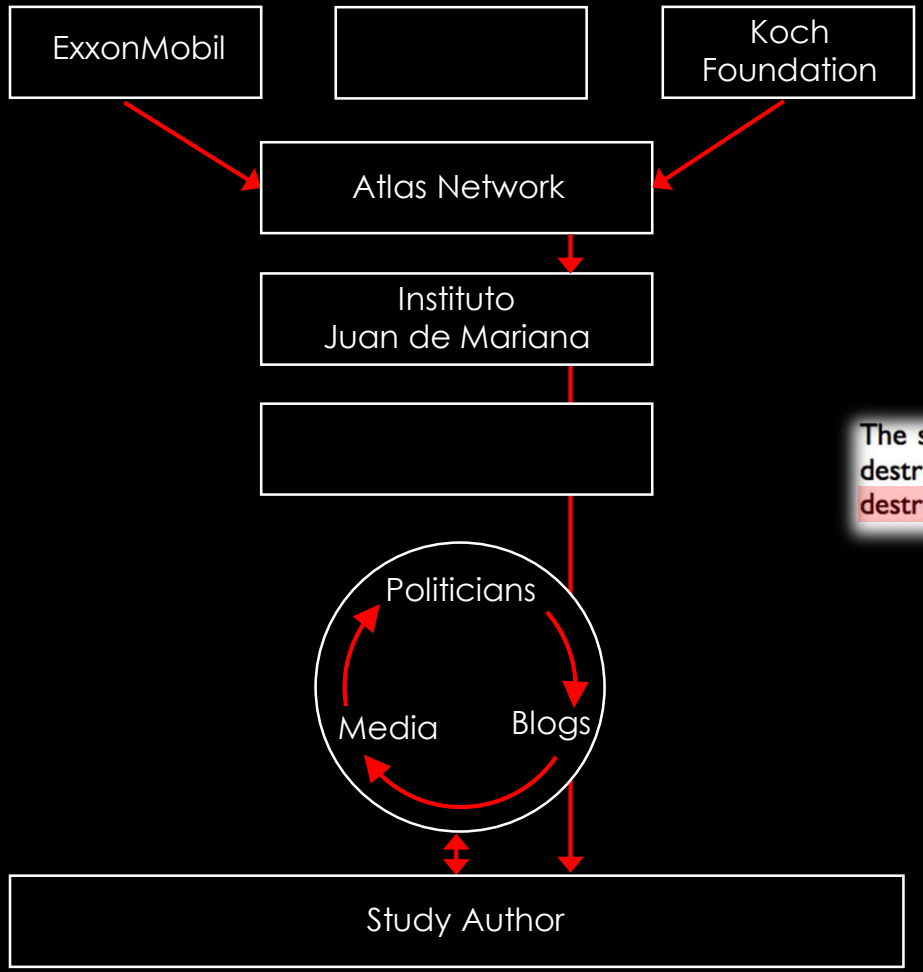


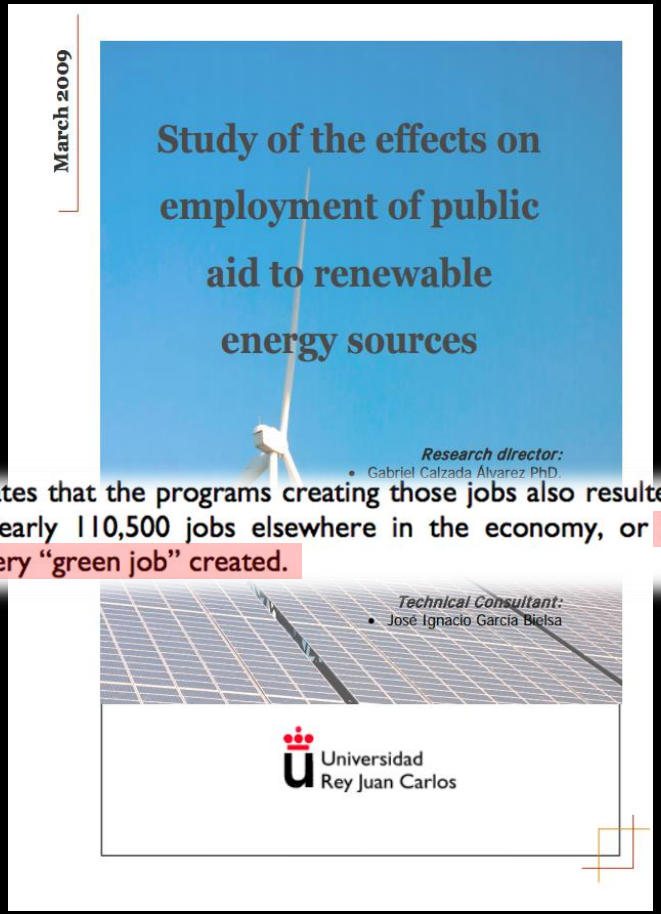


The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,500 jobs elsewhere in the economy, or 2.2 jobs destroyed for every "green job" created.

bit.ly/2O76agz

Climate denial machine

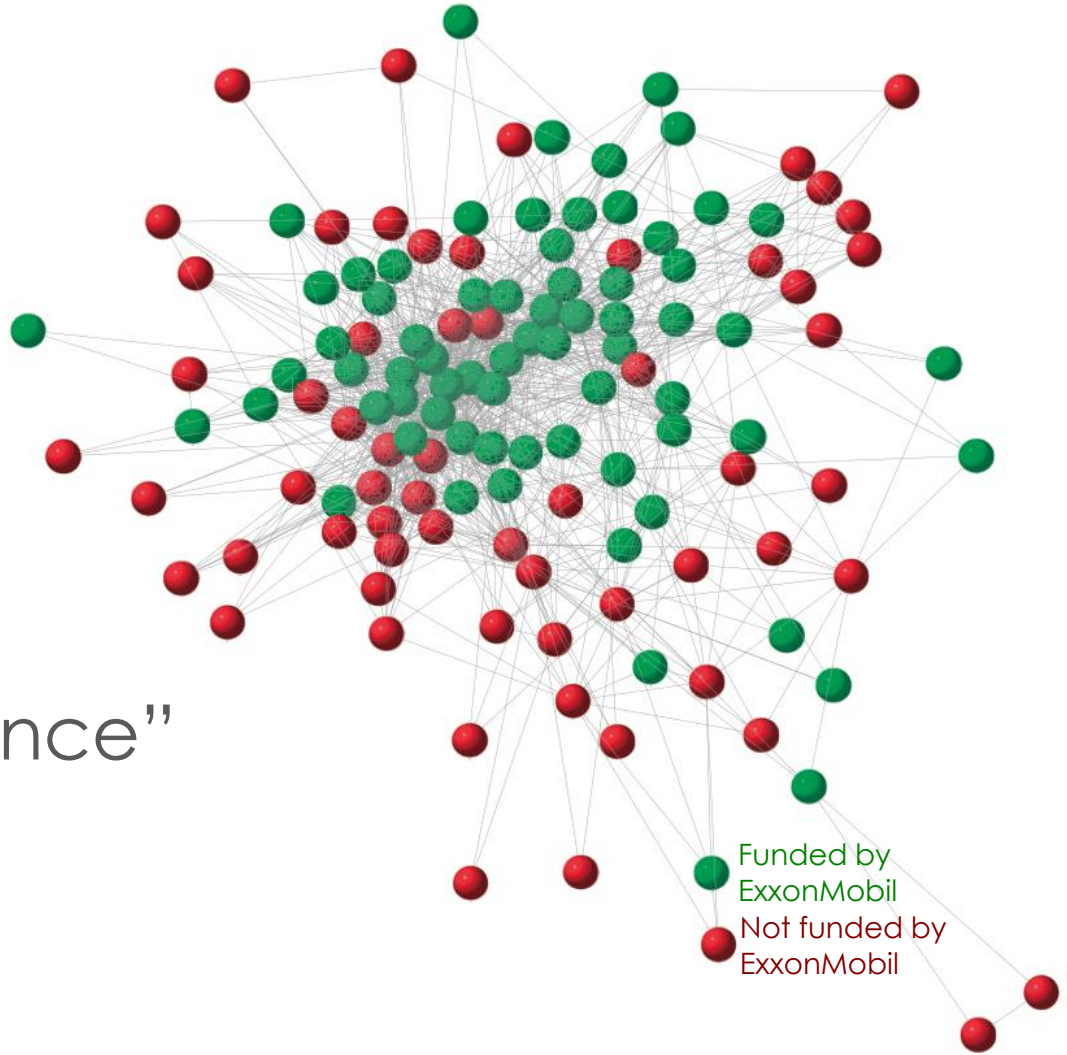




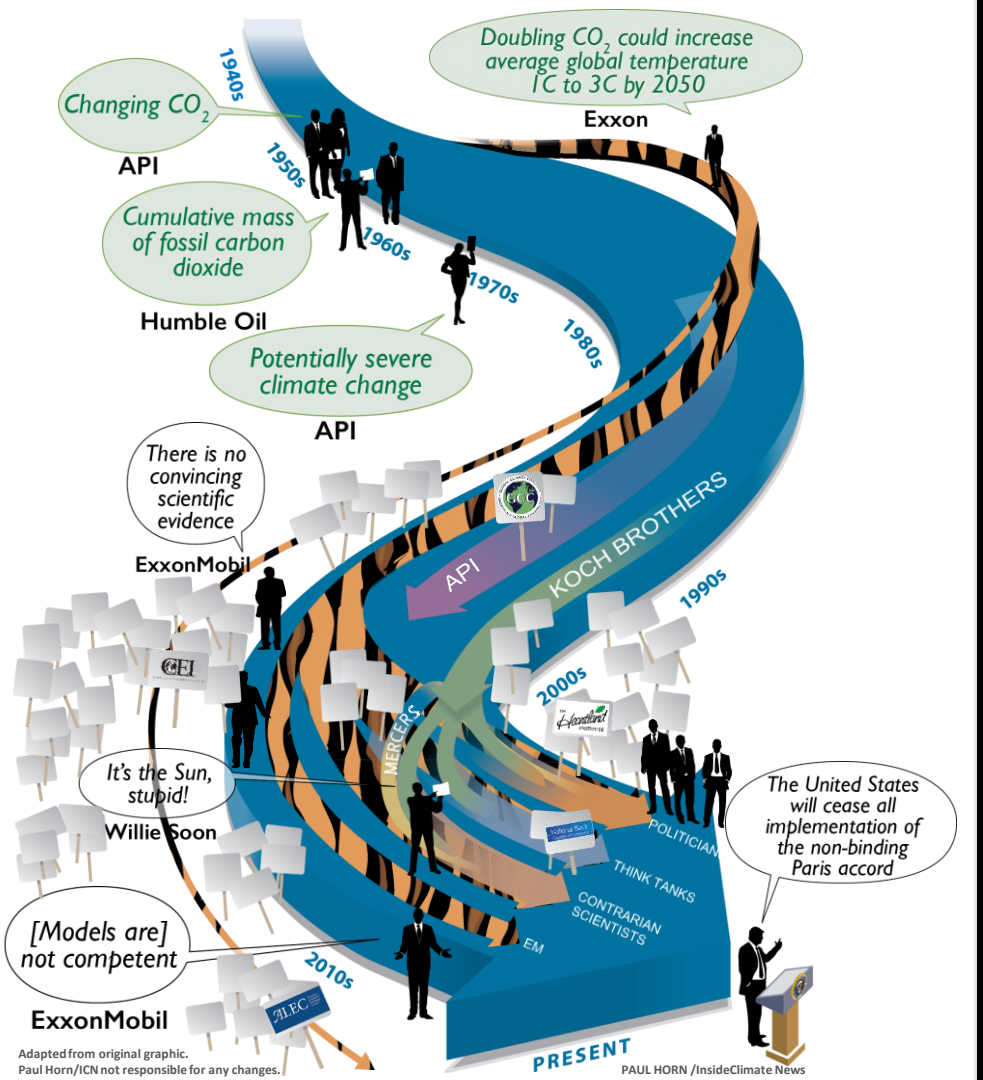
The study calculates that the programs creating those jobs also resulted in the destruction of nearly 110,500 jobs elsewhere in the economy, or 2.2 jobs destroyed for every "green job" created.

bit.ly/2Hqmubw
Harkinson J (22 Dec 2009) *Mother jones*

"ecosystem of influence"



Farrell, J. Nat Clim Chg. **6**, 370 (2015)
Farrell, J. PNAS. **113**, 92 (2015)

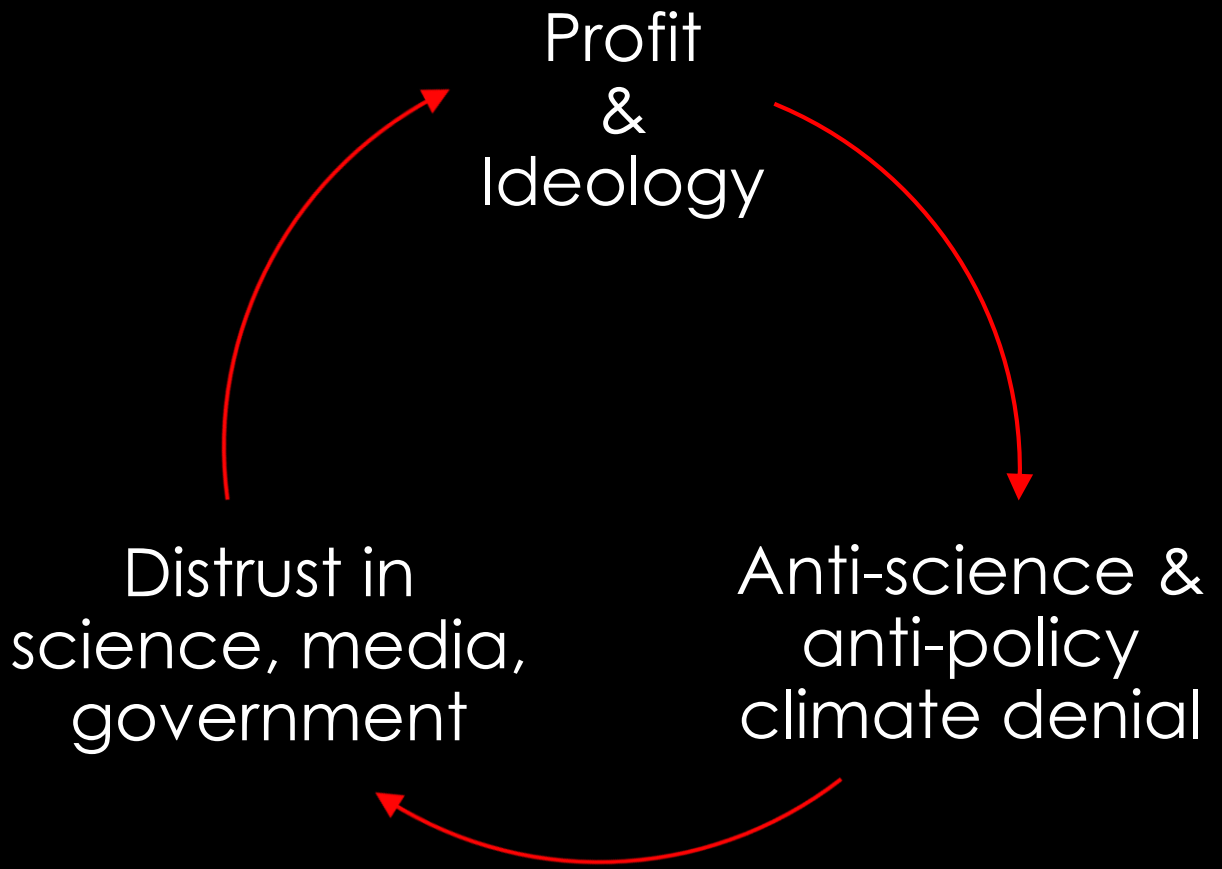


"It is reasonable to conclude that climate change denial campaigns in the US have played a crucial role in blocking domestic legislation and contributing to the US becoming an impediment to international policy making."

Dunlap R E & McCright A M (2011)
The Oxford Handbook of Climate Change and Society, Ch 10

"Arguments emphasising scientific uncertainty have achieved political traction in the United Kingdom, creating a 'fog of distrust' instrumental in draining political capital from the active implementation of climate policy."

Sharman A & Perkins R (2017) *Environment and Planning A* **49** 2281



Brown M B (2014) *Culture, Politics and Climate Change: How Information Shapes our Common Future*, Ch 6
Dunlap R E & McCright A M (2011) *The Oxford Handbook of Climate Change and Society*, Ch 10
Farand C, Hope M (18 Nov 2018) *DeSmogUK*

Our results do not stand in isolation.

Fossil fuel companies and trade associations, including ExxonMobil, have variously orchestrated, funded, and perpetuated direct and indirect climate change misinformation.

Fossil fuel companies and trade associations, including ExxonMobil, have variously known about the basics of climate science and its implications for decades.

Put together, the evidence points to a singular conclusion: Fossil fuel companies and trade associations, including ExxonMobil, have variously promoted disinformation about climate change so as to stifle action by misleading the public and policymakers.

Quantitative and qualitative analyses suggest that they have succeeded.