Social Change Does Happen

Clean Energy Action's
15 Year Commemoration
And "Sneak Peek" at Xcel's Colorado Resource Plan

March 31, 2021
Virtual

Clean Energy Action
CITIZEN POWER


DENNY STONG
AGE: 20
NEVEN STANISIC
AGE: 23
RIKKI OLDS
AGE: 25
TRALONA BARTKOWIAK
AGE: 49
JODY WATERS
AGE: 65
TERI LEIKER
AGE: 51
OFFICER ERIC TALLEY
AGE: 51
KEVIN MAHONEY
AGE: 61
SUZANNE FOUNTAIN
AGE: 59
LYNN MURRAY
AGE: 62
In Memoriam

CEA Co-Founders

Dan Friedlander/Diane Rosenthal and Alison Burchell

Former Board Members/Legal Advisors

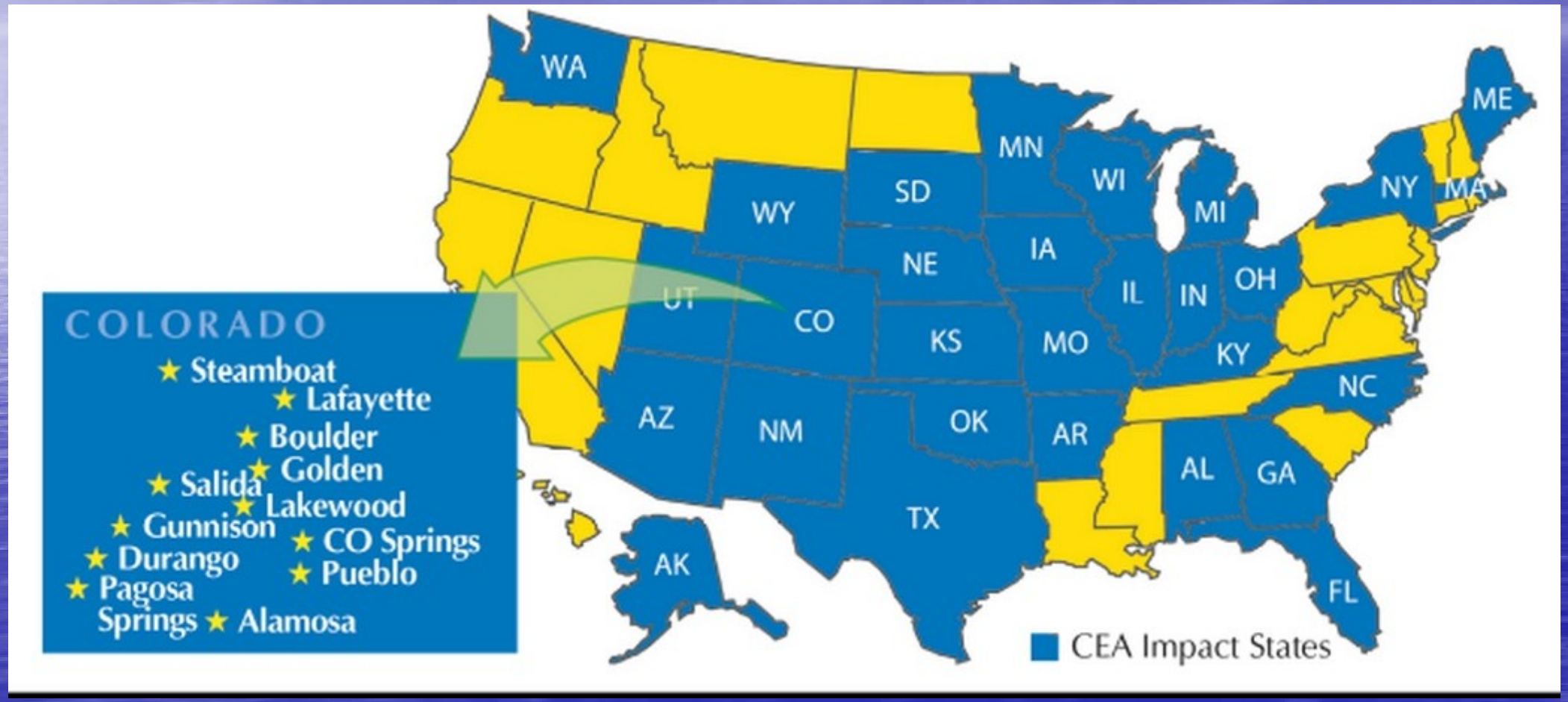
Dan Friedlander
Tom McKinnon
Lili Francklyn
Julie Zahniser
Chris Ludwig
Anne Butterfield
Susan Perkins
Judy Solano
Angie Layton (Attorney)
Gina Hardin (Attorney)
Jon Kofler
Dane Cobble
Steve Mannhard
Sam Weaver
Nate Sloat
Duncan Gilchrist
Karen Conduff
Carolyn Orlando
Devon Reynolds

Former Staff

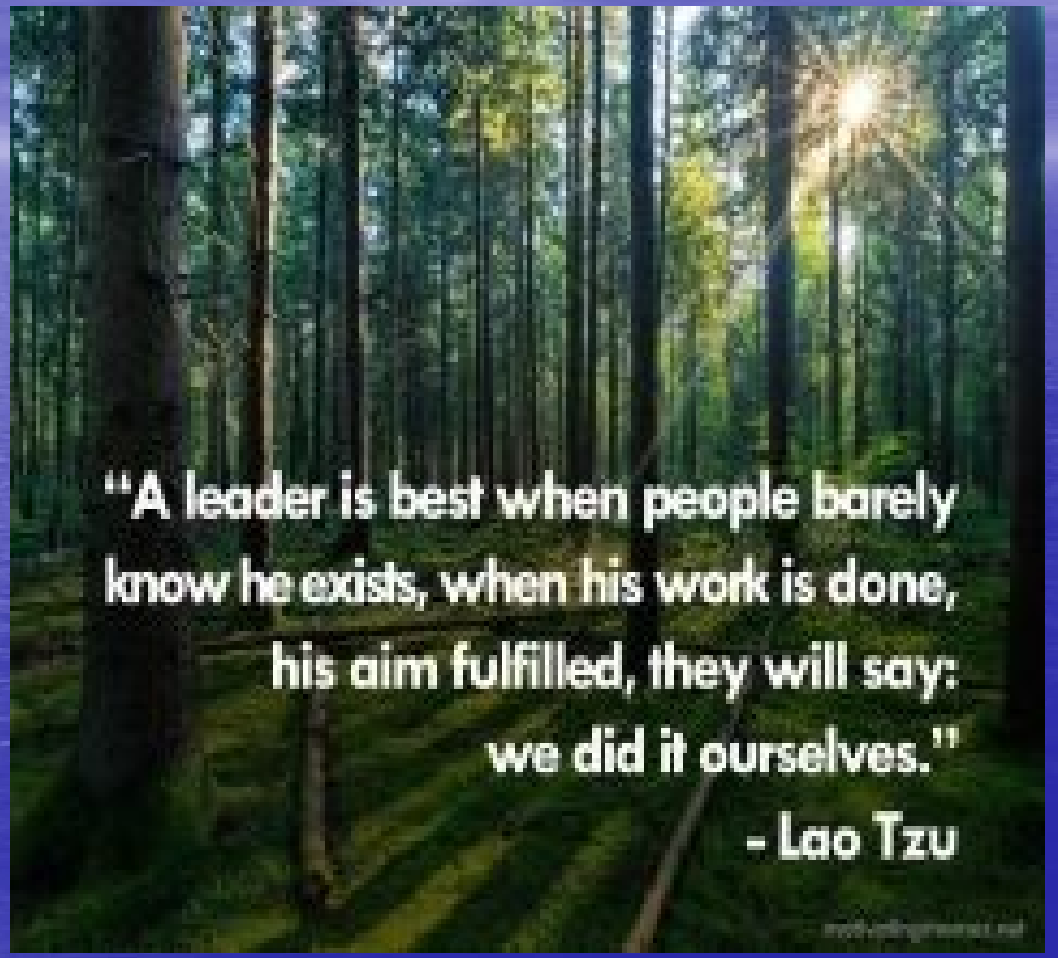
Sarah Lake
Andy Lenec
Amy Guinan
Teresa Foster
RJ Harrington
Zane Selvans
Christina Gosnell
Steven Winter
Molly May
Conor May

Clean Energy Action
CITIZEN POWER

ean Energy Action Works at the Local, State and National Lev
to
Accelerate the Transition to the Post Fossil Fuel World



https://www.cleanenergyaction.org/



https://www.brainyquote.com/quotes/lao_tzu_121709

Strong Allies

-Fossil Free Denver/Resilient Denver)

(Jeff Neuman Lee and all)

-Wild Earth Guardians

(Jeremy Nichols and all)

-350Colorado

(Micah Parkin and all)

-Empower Our Future

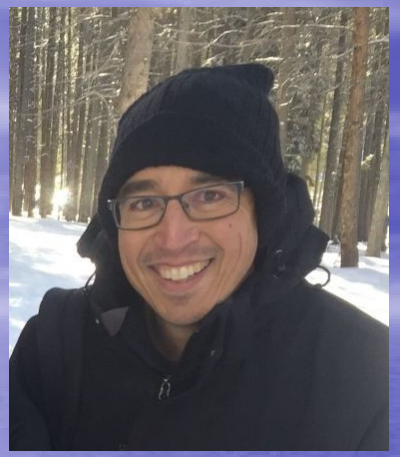
(The Boulder "Team!!")

-Institute for Local Self Reliance

(John Farrell and all)

Many More Going Forward....

Marguerite Behringer



Brian Highland
Chair of the Board

Duncan Gilchrist

Alison Burchell

Conor May

Charlie Haimbaugh

Josie Strutz

Emily Swallow

Mckenzie Brandon

Luke Charbonneau

Chris Warren

https://www.cleanenergyaction.org/board

Dan Friedlander—Circa 2006

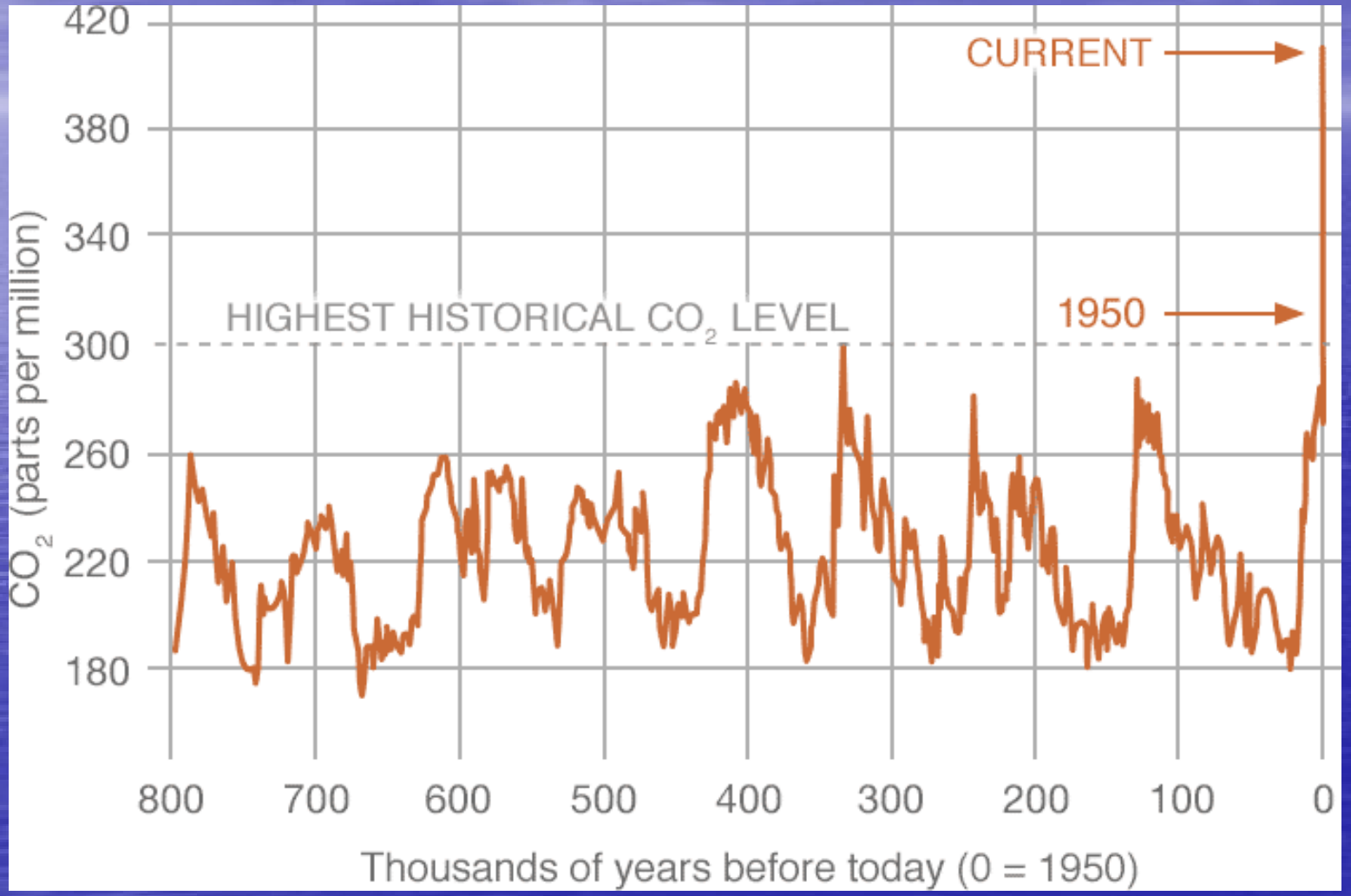
In Memoriam….

Joe McDonald—
Early and Very Generous Supporter

https://www.legacy.com/obituaries/dailycamera/obituary.aspx?pid=189756496

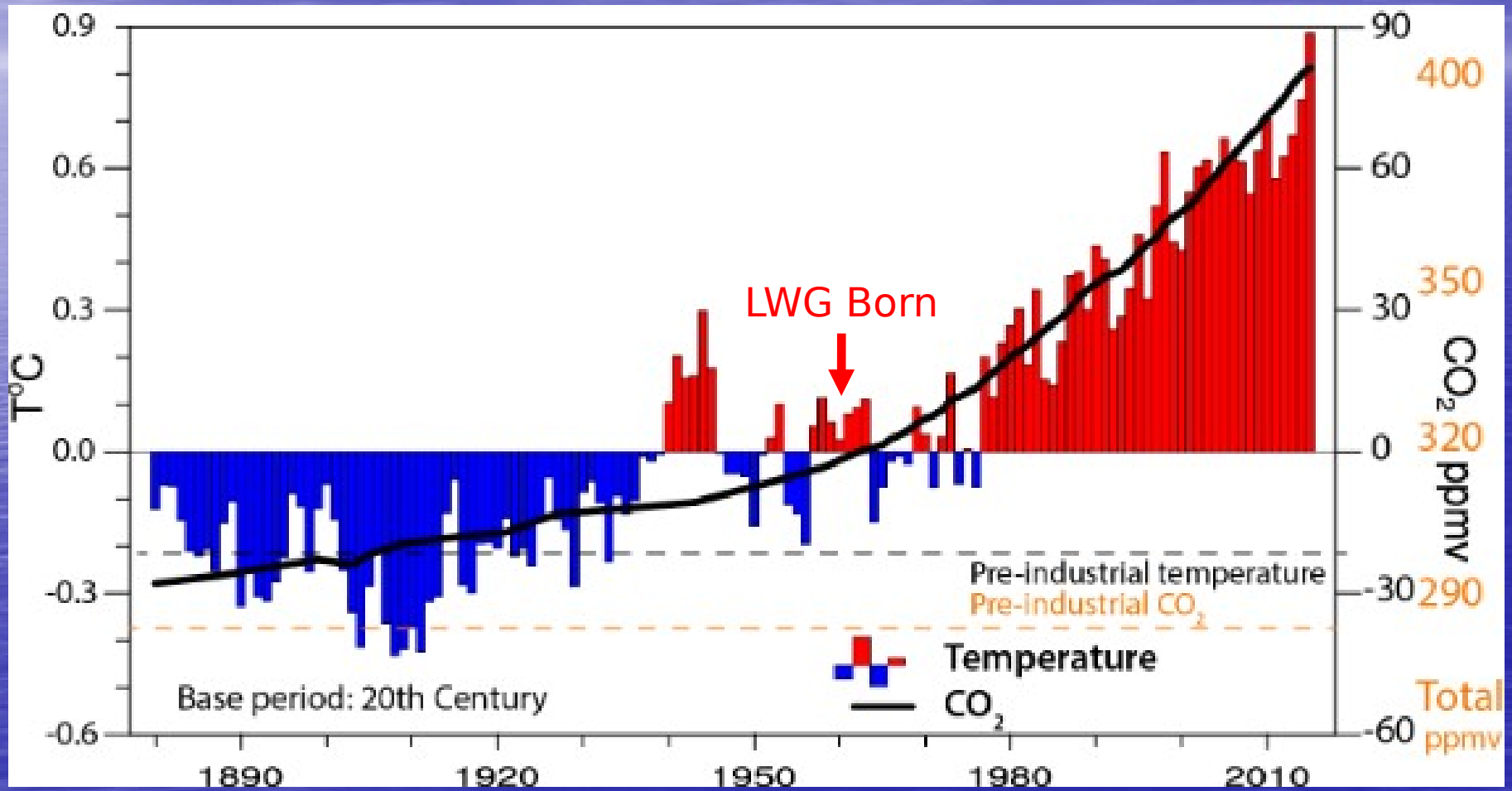
We Only Know of One Planet That Supports Life!!

Carbon Dioxide in the Atmosphere
Last 800,000 years

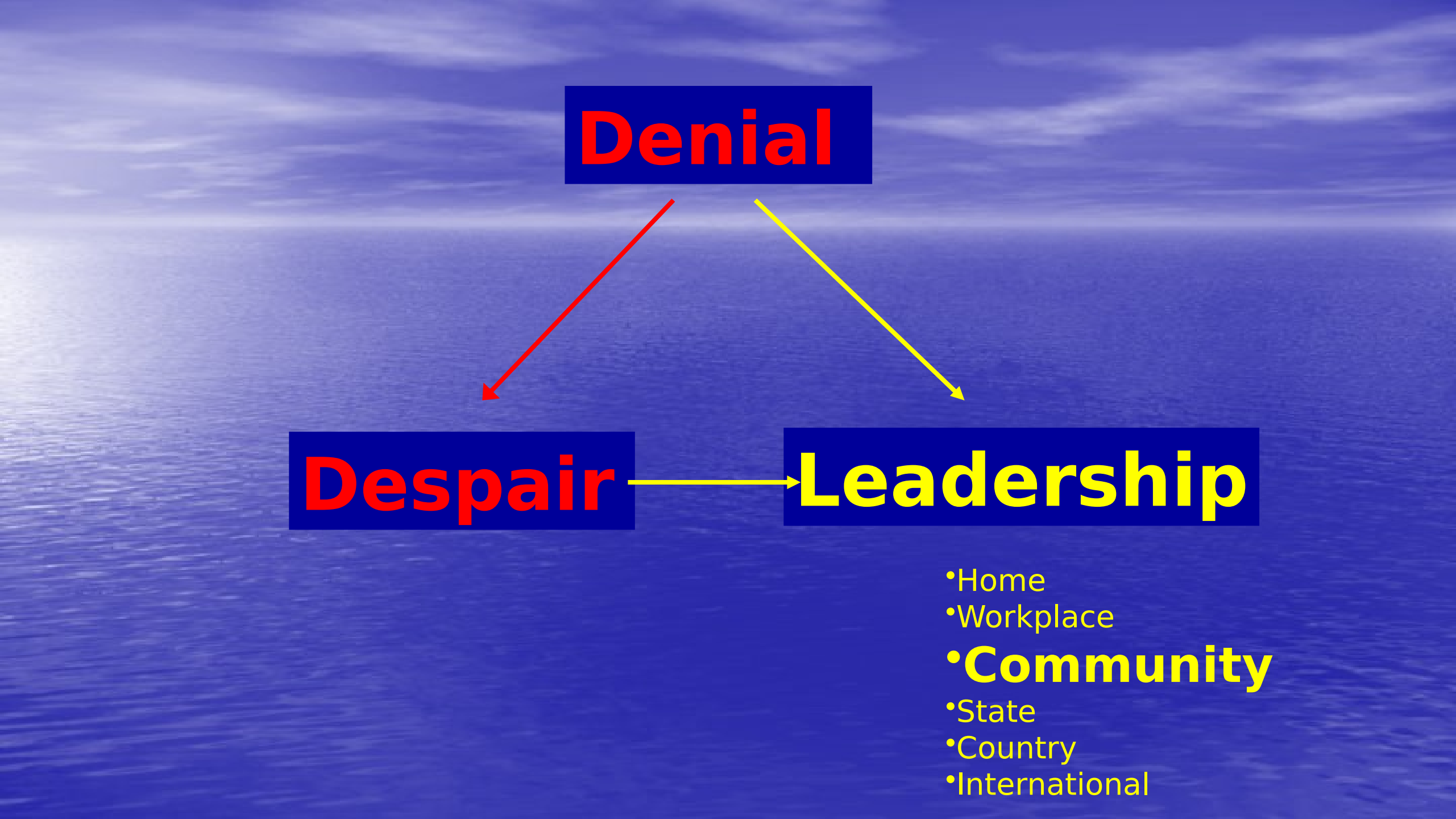


https://climate.nasa.gov/vital-signs/carbon-dioxide/

Global Temperature Anomoly Relative to 20th Century



NOAA—Kevin Trenberth in
http://www.huffingtonpost.com/dr-kevin-e-trenberth/fact-not-opinion-climate-_b_8703012.html


Denial
Despair
Leadership
•Home
•Workplace
•Community
•State
•Country
•International

2003 Climate Change and the West Conference
Boulder, Colorado

2004

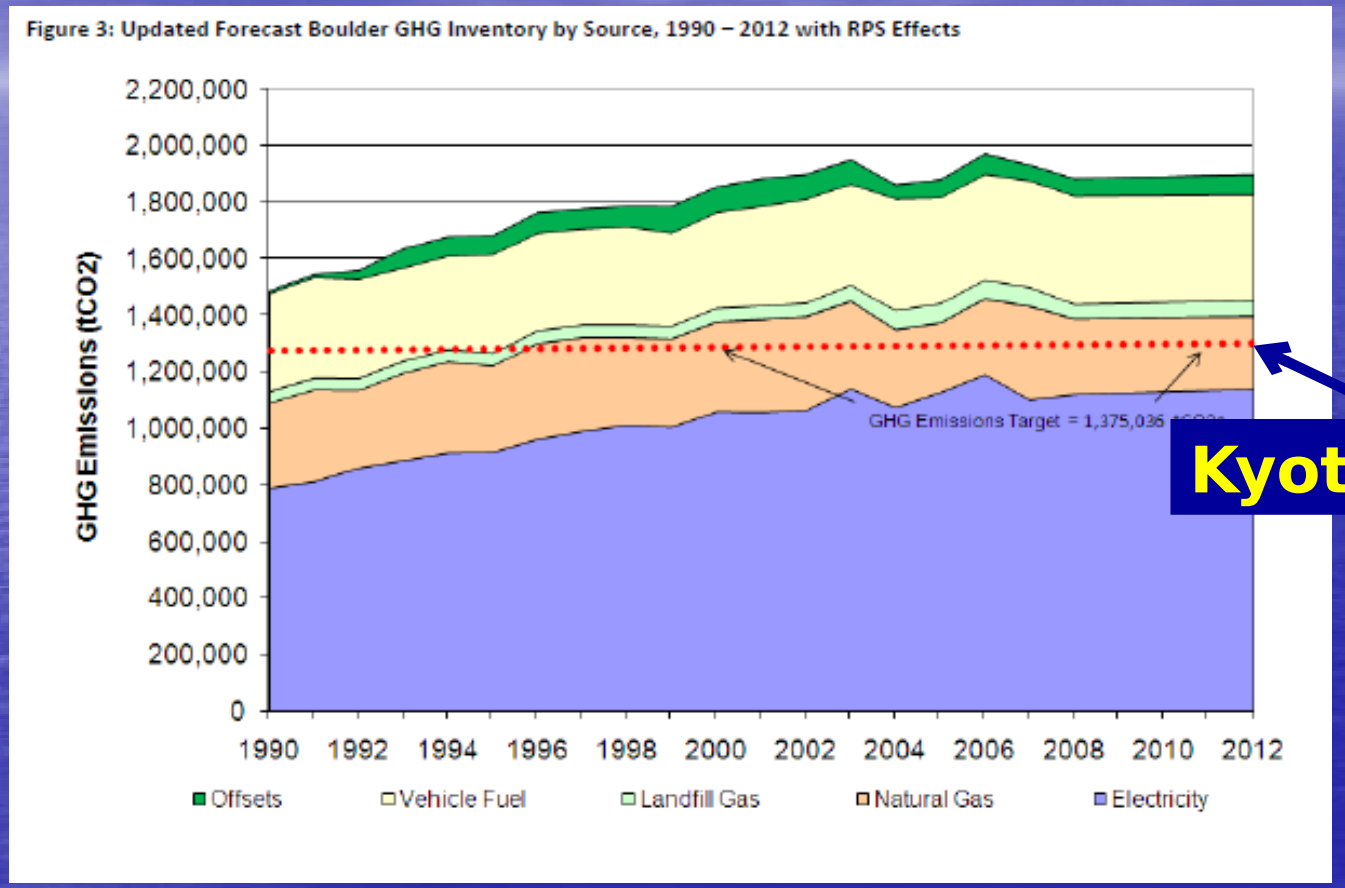
Three Keys to Addressing Climate Change

1)Decarbonize Electricity

2)Decarbonize Transportation

3)Do Everything Else

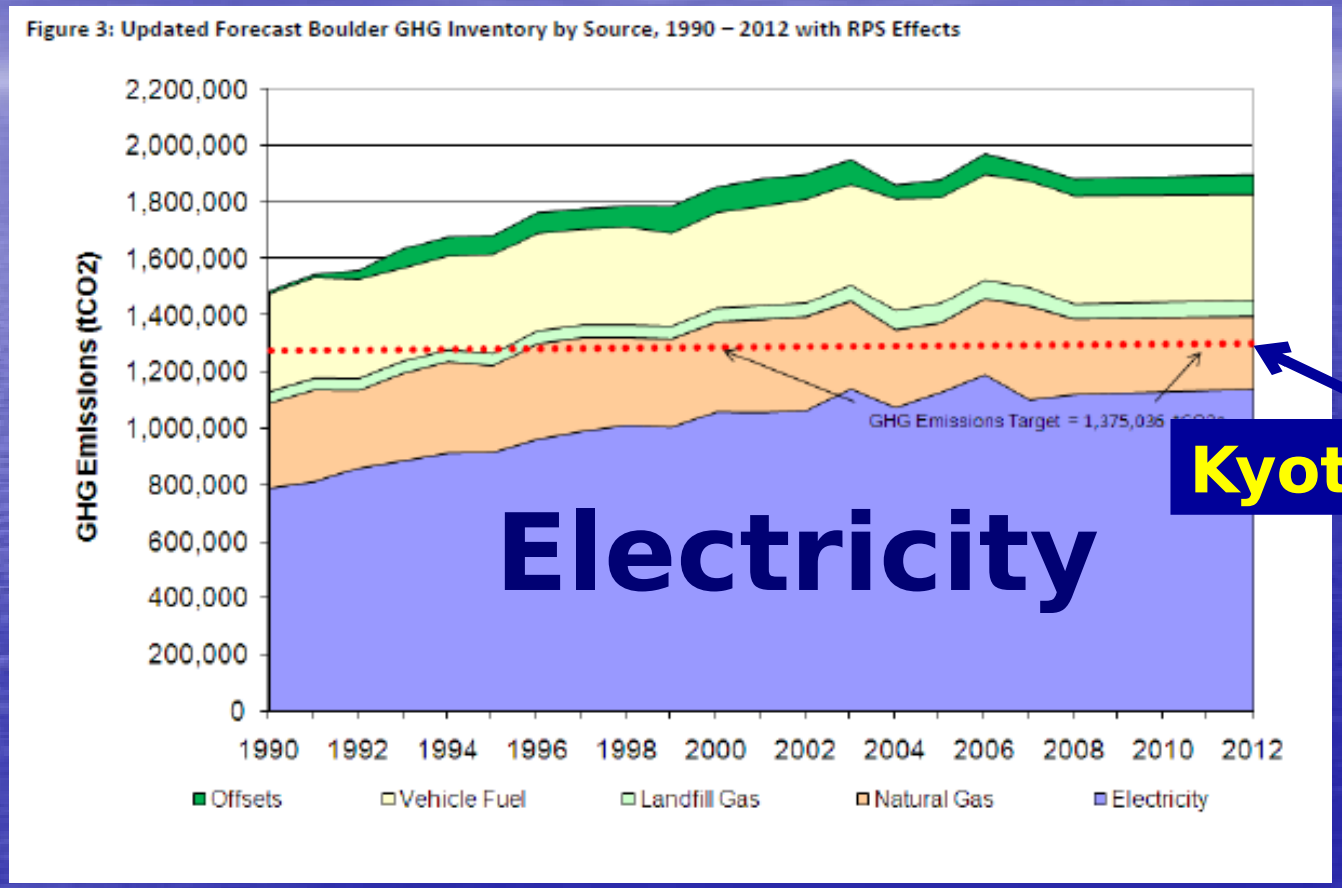
Boulder's Greenhouse Gas Inventory
1990-2012



Kyoto Target

Source: City of Boulder Climate Action Plan Assessment
http://www.bouldercolorado.gov/files/Environmental%20Affairs/climate%20and%20energy/City_of_Boulder_ALL_SECTIONS_FINAL_072809_v9.pdf

Boulder's Greenhouse Gas Inventory
1990-2012

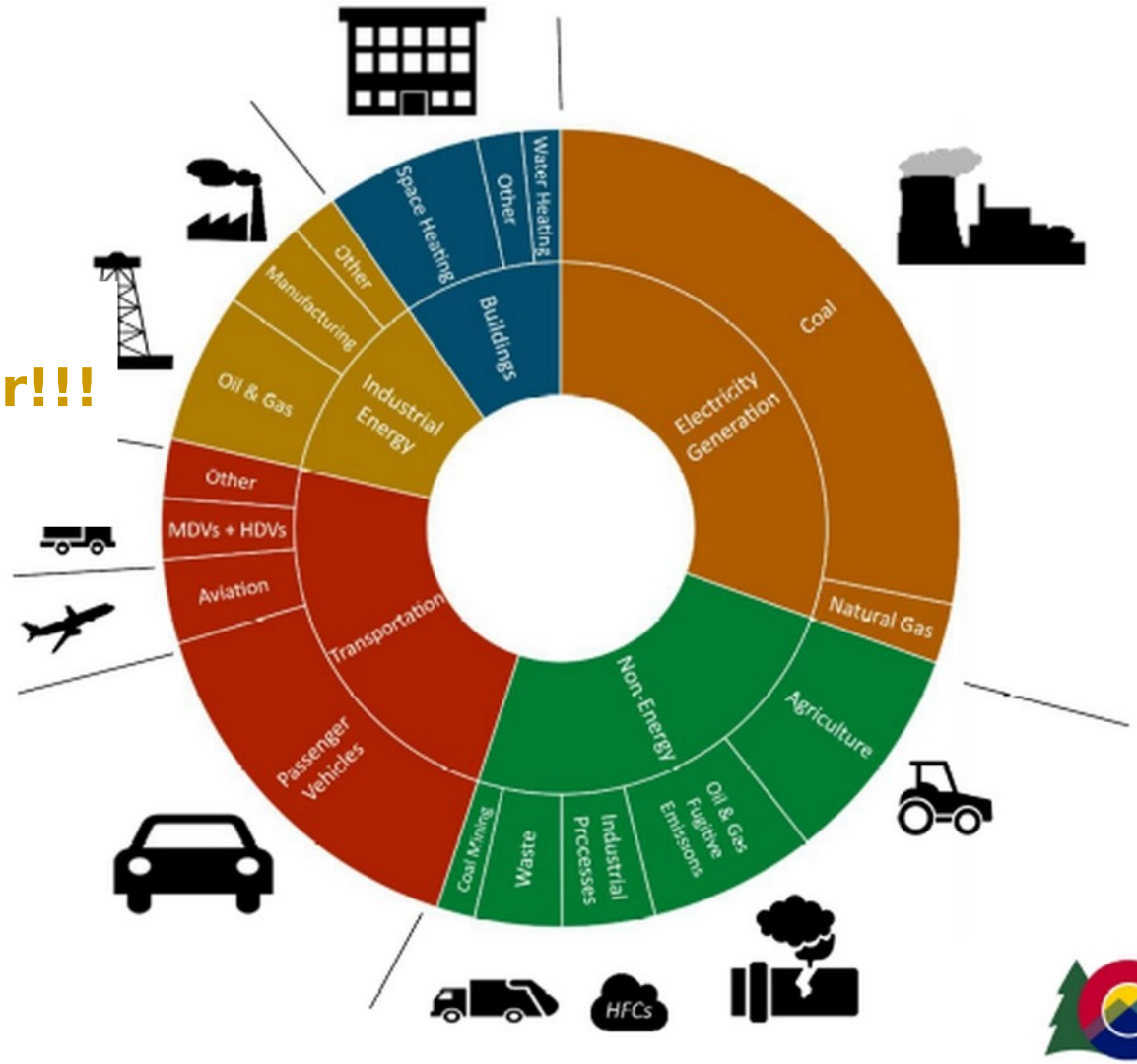


Kyoto Target

Source: City of Boulder Climate Action Plan Assessment
http://www.bouldercolorado.gov/files/Environmental%20Affairs/climate%20and%20energy/City_of_Boulder_ALL_SECTIONS_FINAL_072809_v9.pdf

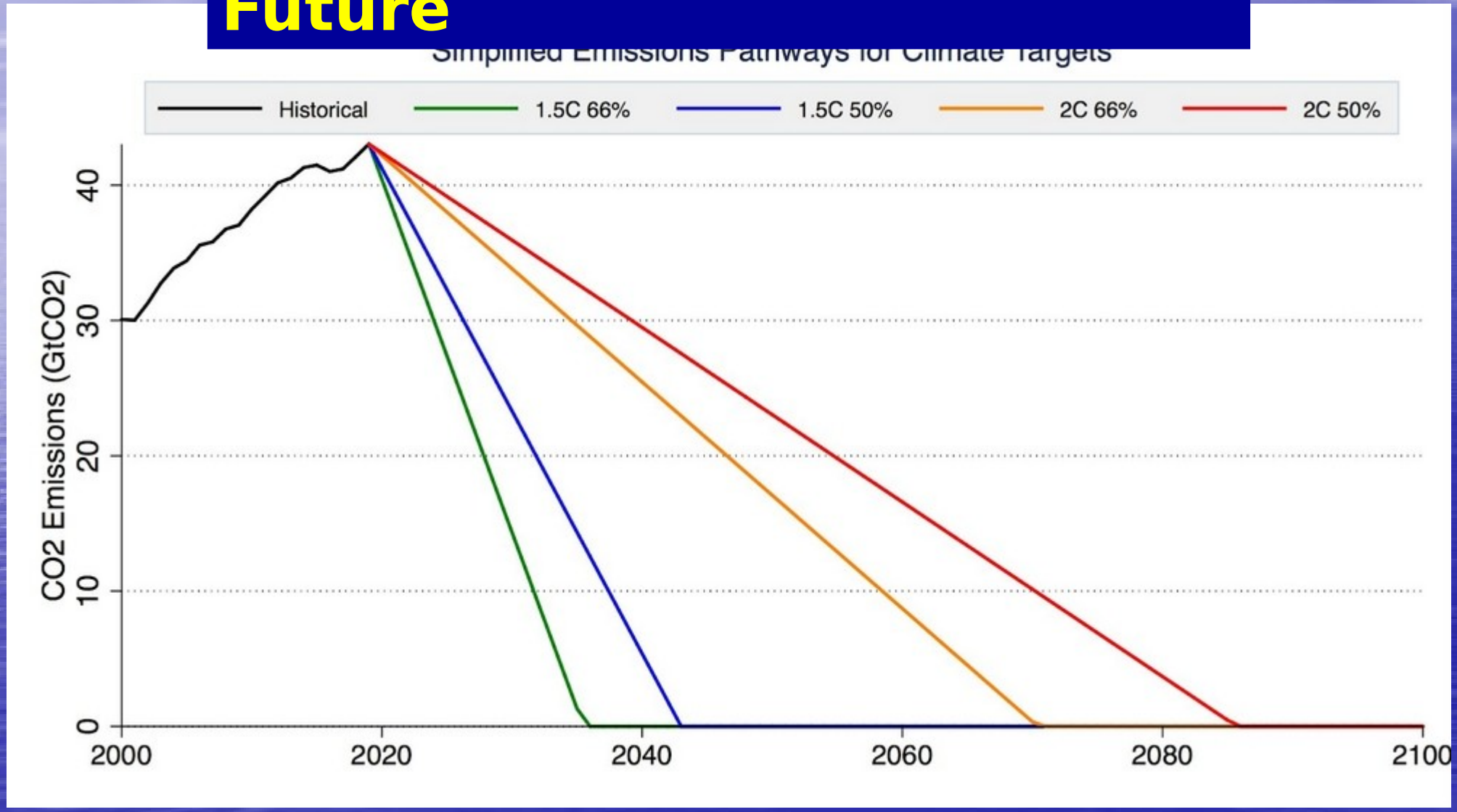
What is driving GHG pollution in Colorado?

roper accounting for methane would nake oil and gas GHG emissions larger!!!
350 Colorado report--Jan 2021)
tps://350colorado.org/press-release-oil-and-gas-report/



Colorado Energy Office, August 2020
https://drive.google.com/file/d/1LsQP9YVuP4bav6gzuM9ytqw4DZr2P3Jc/view

Options for the Planet's Future

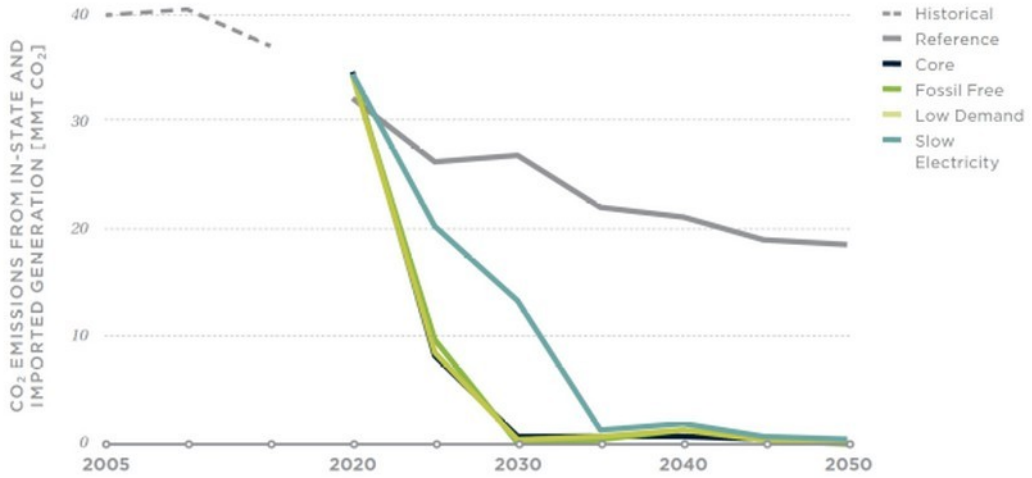


Graph from The Climate Mobilization—
https://www.theclimatemobilization.org/blog/2020/10/09/new-climate-emergency-declarations-and-news-from-the-climate-mobilization/

Grid Lab Study For Colorado September 28,2020

FIGURE 9. CO_2 EMISSIONS FROM THE ELECTRICITY SECTOR FOR ALL MODELED SCENARIOS

All scenarios other than the Reference case reduce CO_2 emissions to meet the state's economy-wide targets, but the Slow Electricity case results in more overall CO_2 emissions along the way.



Conclusions

- **Decarbonize electricity as quickly as possible to well above 90%**
- **Close all coal plants by 2025**
- **Use flexible loads strategically**

DECARBONIZE THE ELECTRIC SECTOR AT LEAST 90 PERCENT AND OPTIMALLY 98 TO 99 PERCENT BY 2030

In our Core decarbonization scenario, the electricity sector almost completely decarbonizes by 2030, and all coal units retire by 2025. Some gas units remain, but they operate very infrequently (generating only 2 percent of electricity in 2030), mostly during sustained periods of low renewable output. The decarbonized electricity system relies on large amounts of wind and solar, new energy storage, strategic use of flexible loads, and coordination with other states in the region. This rapid transition to clean electricity is not only necessary to reduce pollution from the power sector itself but also to enable reductions in emissions from transportation, buildings, and industry through electrification.

In addition to *deeply* decarbonizing, the state should prioritize decarbonizing the electric sector *as quickly as possible*, within reliability and cost constraints. **With existing policies, Colorado is not building renewables and storage fast enough and will not achieve the required electric sector emission reductions to meet its climate goals.**

https://gridlab.org/wp-content/uploads/2020/09/GridLab_Committing-to-Climate-Action-1.pdf

2004 Electricity Paradigm….

Coal to 2070—and Beyond (200 years at least)….

Pueblo Unit 3 by Allen Best Christmas 2014 (By Permission)

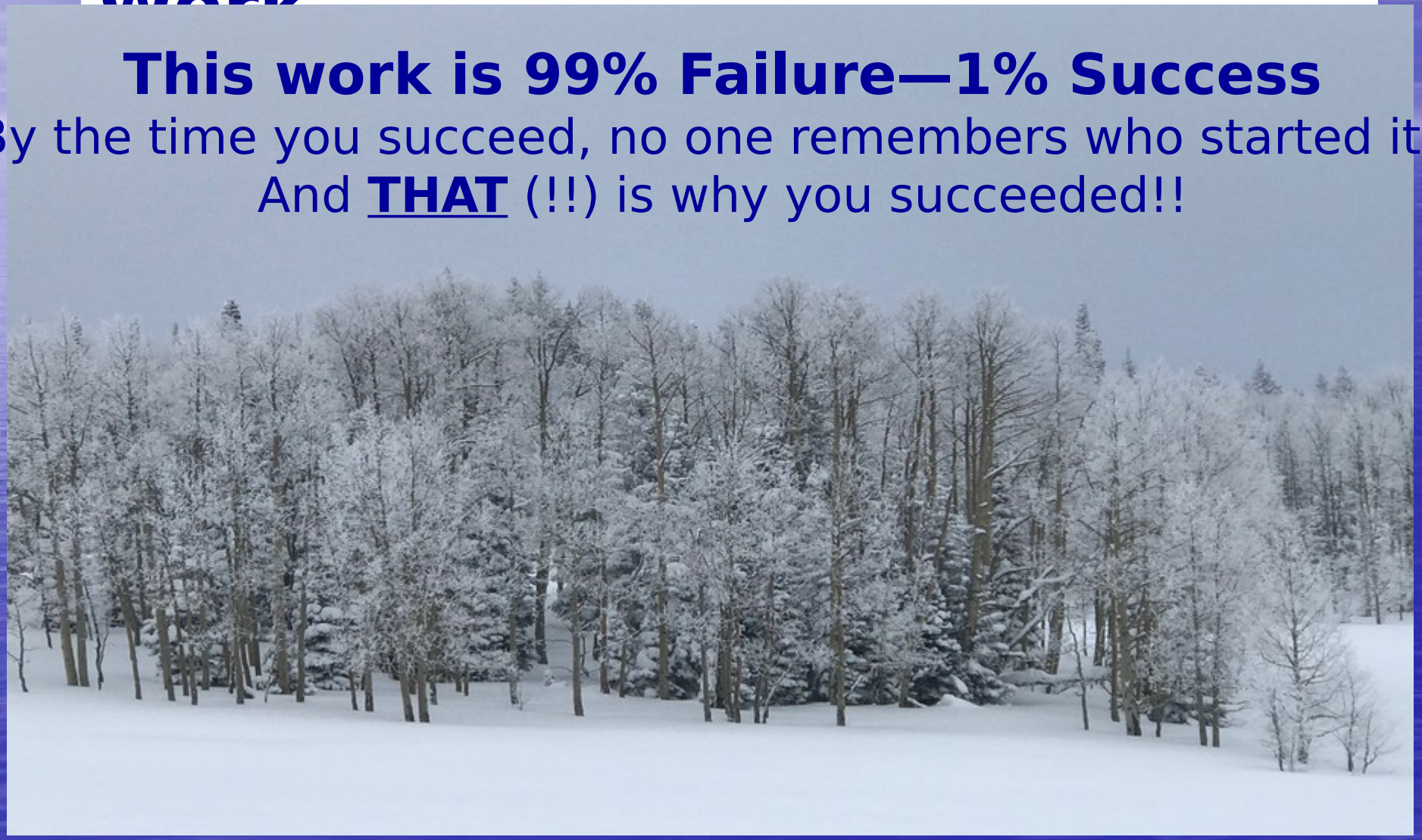
Solar, Wind, Demand Shaping etc

15+ Years of Crazy Hard Work

This work is 99% Failure—1% Success

By the time you succeed, no one remembers who started it…

And **THAT** (!!) is why you succeeded!!



2021 Electricity Paradigm

Solar, Wind, Storage, Demand Shaping etc

Coal to 2040 (not even…)

Pueblo Unit 3 by Allen Best Christmas 2014 (By Permission)

https://inhabitat.com/california-dishes-out-free-solar-panels-to-its-poorest-citizens/

CEA: 15 Years = 180 Months

$100/Month = $18,000

$50/Month = $9,000

$10/Month = $1,800

$5/Month = $900

$1/Month = $180

50 cents/month = $90

Donate through

https://www.cleanenergyaction.org/

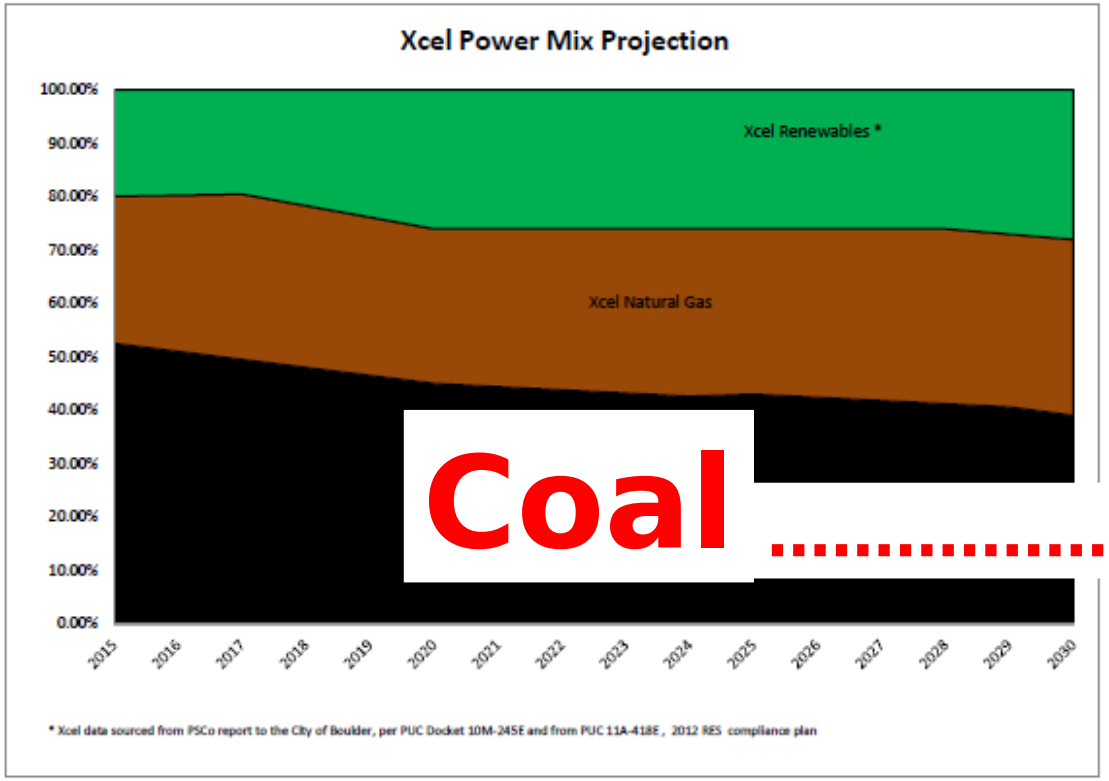
Or

PO Box 1399, Boulder, CO 80306

Recurring Monthly Donations

Are a VERY BIG help!!

Xcel's Colorado Coal Commitments Extended to 2070 (Until Feb 2021)

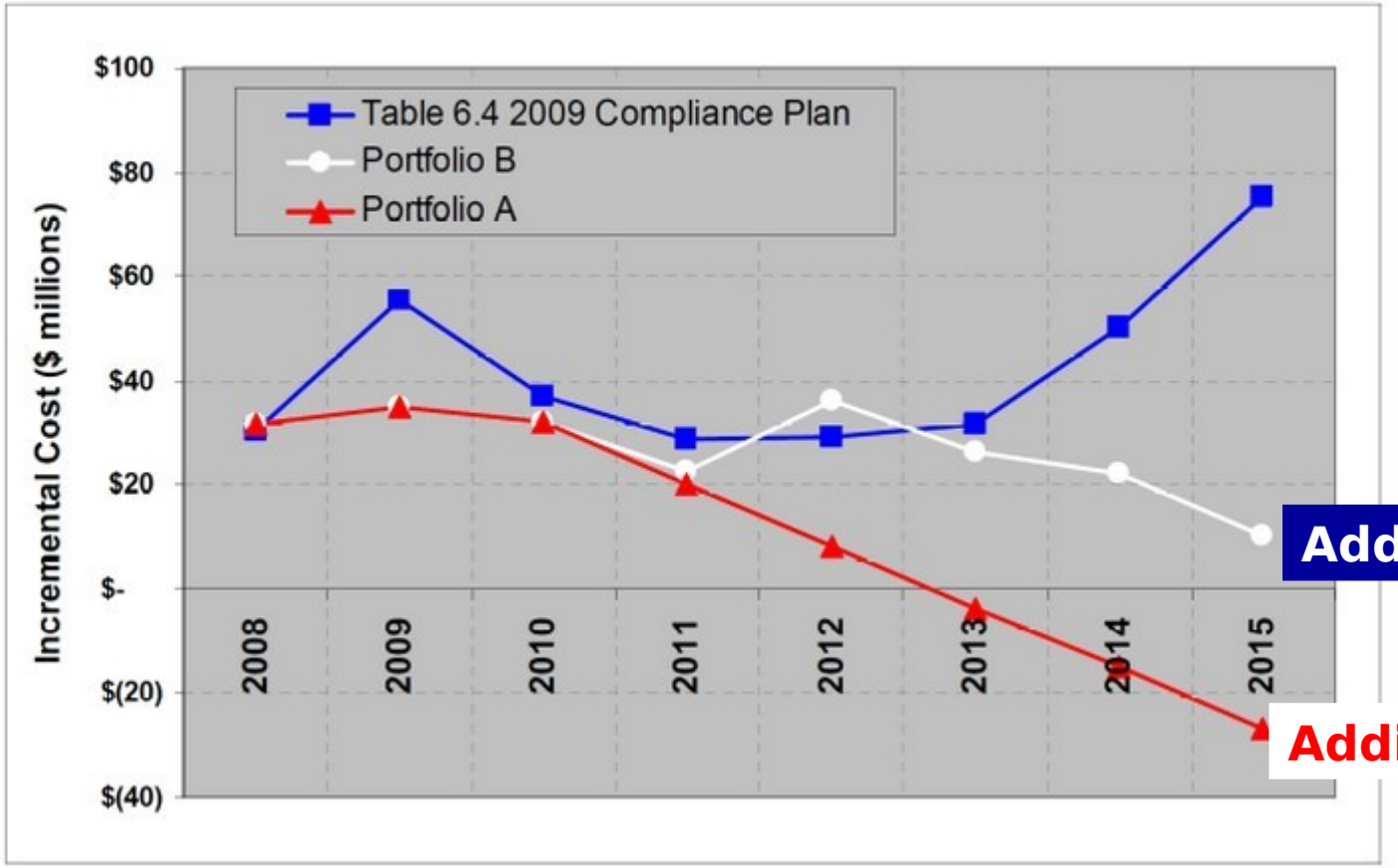


Coal 2070

Coal for Another 50 Years???????????

2009 Cost of Renewable Energy Declining
Xcel-Colorado Analysis 07A-447E “120 Day Report”

Figure 16 Incremental Cost of Renewable Resources



Additional Solar

Additional Wind

Colorado PUC, Docket 07A7-447E (“120 Day Report from PSCo)

Boulder's Climate Elections 2006-2017 (Won 7/8)

2006—Climate Action Plan Tax

2008—Property Assessment for Clean Energy (PACE)

2010—Utility Occupation Tax (UOT) for Franchise Fee

2011—Authorize Exploration of Municipalization

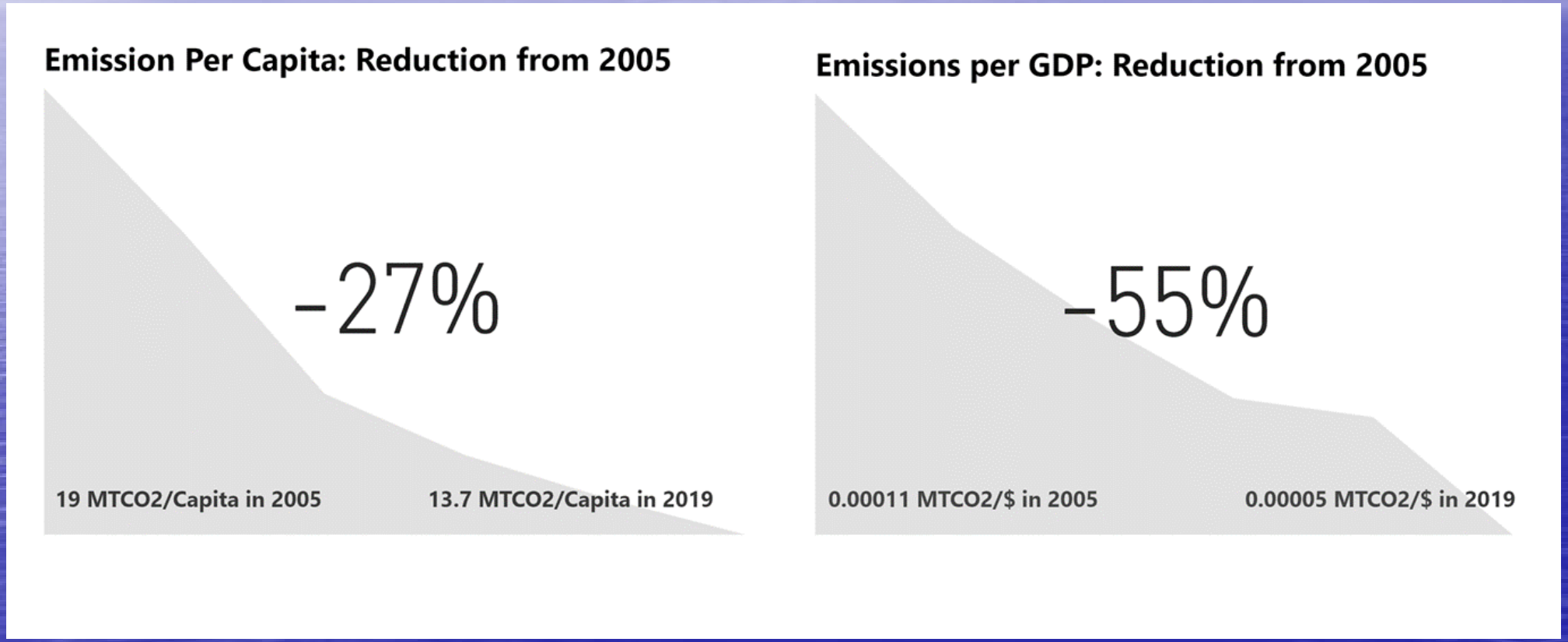
2013—Defeat Xcel "Poison Pill" Plus Add Spending Limits to the Charte

2015—Reauthorize Climate Action Plan Tax

2017—Reauthorize Utility Occupation Tax (UOT) for Municipalization

2020—Boulder Re-Enters Franchise with Xcel with "Opt Outs"

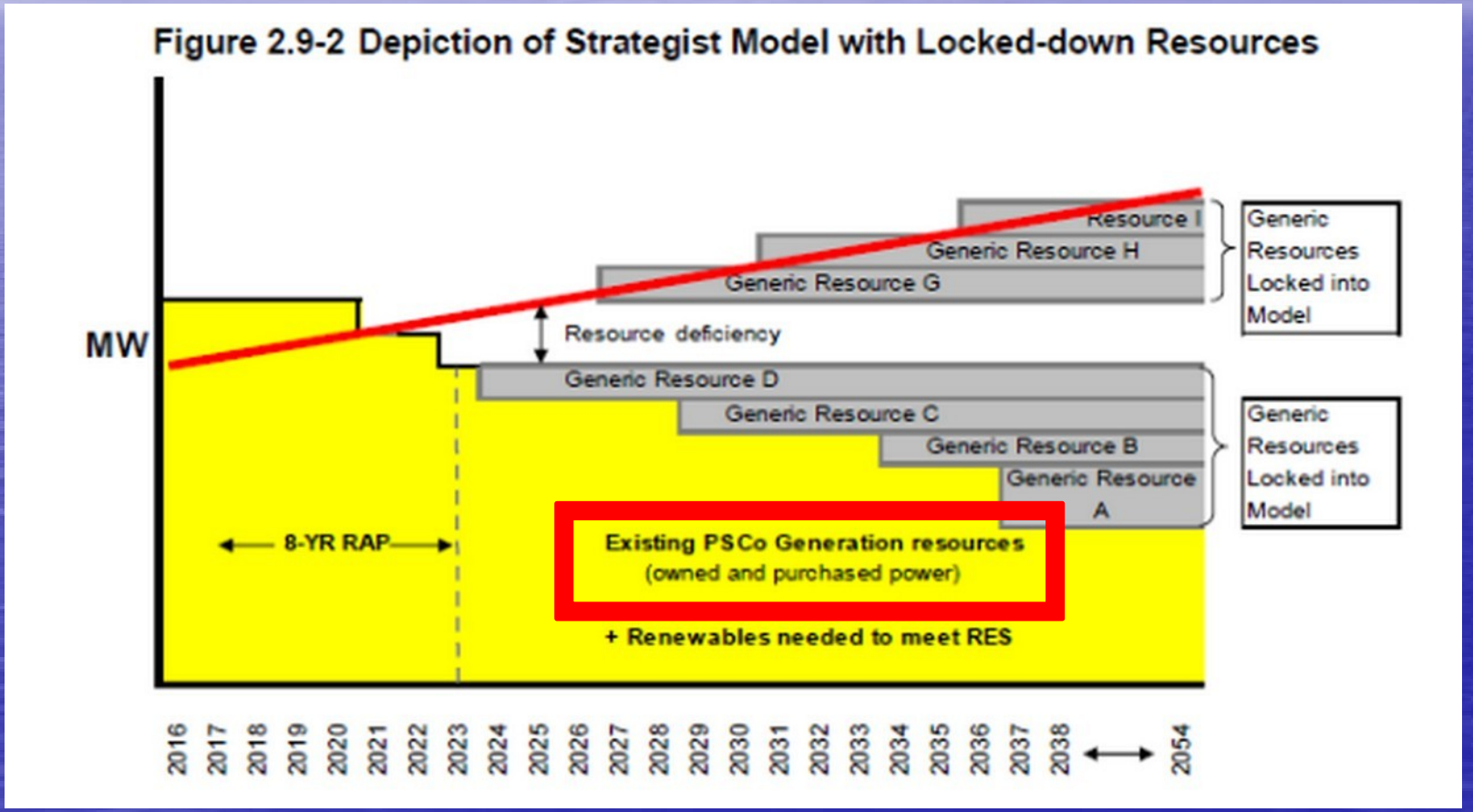
Boulder's Reductions in GHG Emissions 2019 v 2005



https://bouldercolorado.gov/boulder-measures/community-greenhouse-gas-emissions

2017—Turning Point:

Are Existing Resources (In Yellow) Still the Lowest Cost Way to Serve Xcel's Colorado Customers?



Page 2-225, Volume 2, Xcel (Colorado) 2016 Electric Resource Plan—AKJ-2, Docket 16A-0396E, Colorado P
Public Hearing Feb 1, 2021 Colorado PUC

May 2017 Xcel Annual Meeting—Amarillo Texas Speaking Truth to Power (aka Ben Fowke, Xcel, CEO

Julie Zahniser to Ben Fowke

Conor May to Ben Fowke

The Other Road…Swinging Door and $$$

Doug Benevento at CDPHE Approved Air Permit for Pueblo Unit 3…

then Became VP for Public Affairs at Xcel….$$$$

Greg Sopkin Chaired the PUC For Approval of Pueblo Unit 3

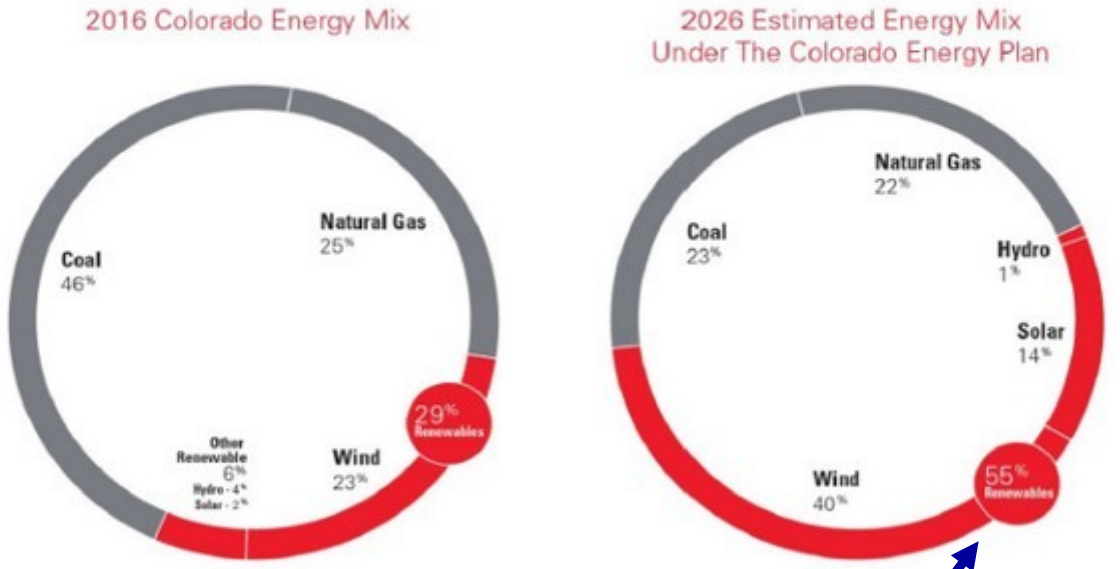
then became outside Counsel for Xcel….$$$$

Both Benevento and Sopkin Became Regional Administrators for EPA Region 8 During the Trump Years (Hdqtrs in Denver…)

https://www.denverpost.com/2017/10/05/trump-colorado-utility-executive-regional-epa-director/
https://www.denverpost.com/2019/04/30/greg-sopkin-epa-region-8-director/

August 29, 2017
Xcel Ready to Move to
55% Renewable Electricity in Colorado….

If proposed and approved, the Colorado Energy Plan Portfolio would continue the growth of renewable energy in the Company's energy mix. As shown in the figure below, the Company's renewables (wind, solar and hydro) could be as much as 55% of our energy mix by 2026, increasing from approximately 30% in 2016:



Xcel Colorado Proposes 55% Renewable Energy by 2026

David Eves, Stipulation Testimony, August 29, 2017 Docket 16A-0396E, Colorado PUC, p6

February 2021—Pueblo Unit 3 (aka “Comanche 3”)
Xcel Proposes to Cut Life in Half…Retire 2040 (Instead of 2070

COLORADO CLEAN ENERGY PLAN

INFORMATION SHEET
COLORADO

A RESPONSIBLE TRANSITION TO CLEAN ENERGY
FOR COMMUNITIES AND WORKERS

Xcel Energy®

Xcel Energy is leading the clean energy transition with its upcoming Colorado 2030 Clean Energy Plan, a proposal to deliver an estimated 85% reduction in carbon dioxide emissions from 2005 levels by 2030 and doubling the renewable energy and battery storage on the system.

The plan, which we will file with state regulators in spring 2021, creates a roadmap to deliver on our vision to provide 100% carbon-free electricity by 2050, while supporting our employees and the communities where we live and work through the transition.

REDUCING EMISSIONS

Achieving our vision requires retiring coal plants that we have relied upon for years and transitioning to cleaner sources of power. With our Clean Energy Plan, we are proposing a timeline for retiring our remaining coal operations in Colorado.

Comanche Generating Station
Coal-fired electric generating facility

- **Location:** Pueblo, CO
- **In-Service Dates:** Unit 1, 1973; Unit 2, 1976; Unit 3, 2010
- **Retirement Dates:** Unit 1, 2022; Unit 2, 2025; Unit [illegible] 2040 proposed)
- **Capacity:** Units 1 & 2 (660 MW); Unit 3 (750 MW)
- **Co-Owners:** Intermountain Rural Electric Association, Holy Cross Electric (for Unit 3)
- **Number of Employees:** 134

Where is This??

Xcel's Changing Commitment to Coal Plants as of Feb 2021

Hayden 1	**2028**	**~~2030~~**
Hayden 2	**2027**	**~~2036~~**
Brush (aka "Pawnee")	**2028**	**~~2041~~**
Pueblo Unit 3 (aka "Comanche 3")	**2040**	**~~2070~~**

Data from Colorado PUC Dockets 10M-245E and 11A-917E and 16A-0396E
as well as Xcel announcement Feb 24,2021

November 2020 PRB Coal Company Announcements

Peabody warns of possible second bankruptcy in five years as ...

ieefa.org/peabody-warns-of-possible-second...

The world’s largest private coal company Peabody Energy Corp. said it is in danger of its second bankruptcy filing in five years on the back of poor performance and worsening market conditions amid the coronavirus pandemic. There is “substantial doubt” the company will be able to meet its outstanding obligations when they are due within 12 months and its ability to continue is a going concern, Peabody Energy said in a Nov. 9 filing, citing the combined risks associated with the company ...

Analyst: Peabody’s financial outlook points to exit from Wyo ...

www.wyofile.com/analyst-peabodys-financial...

Nov 10, 2020 · A quickly deteriorating PRB Last month, Wyoming’s second largest coal producer, Arch Resources, announced it will prepare its remaining Powder River Basin mines for closure as it also seeks a buyer.

Arch to begin 'systematic winding down' of its PRB coal ...

www.gillettenewsrecord.com/news/local/article_e6...

Nov 23, 2020 · Arch Resources is the second-largest coal employer in the basin, behind Peabody, which has 1,299 workers at three mines. Between them, they represent 60% of the PRB workforce. “We have launched an...

Peabody—Stock Price Since Emerging from First Round of Bankruptcy

https://www.reuters.com/companies/BTU.N/charts

Fuel Mix for US Electric Energy Production 1950-2020

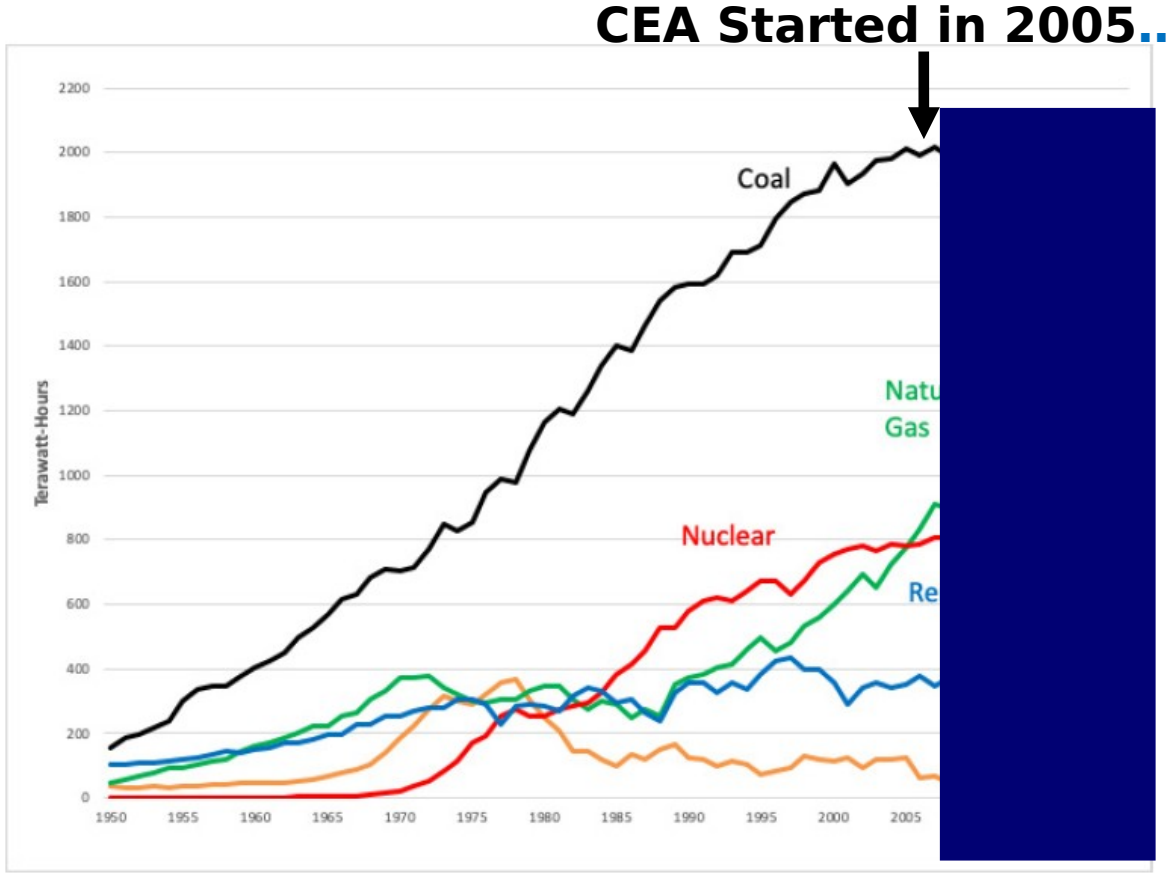


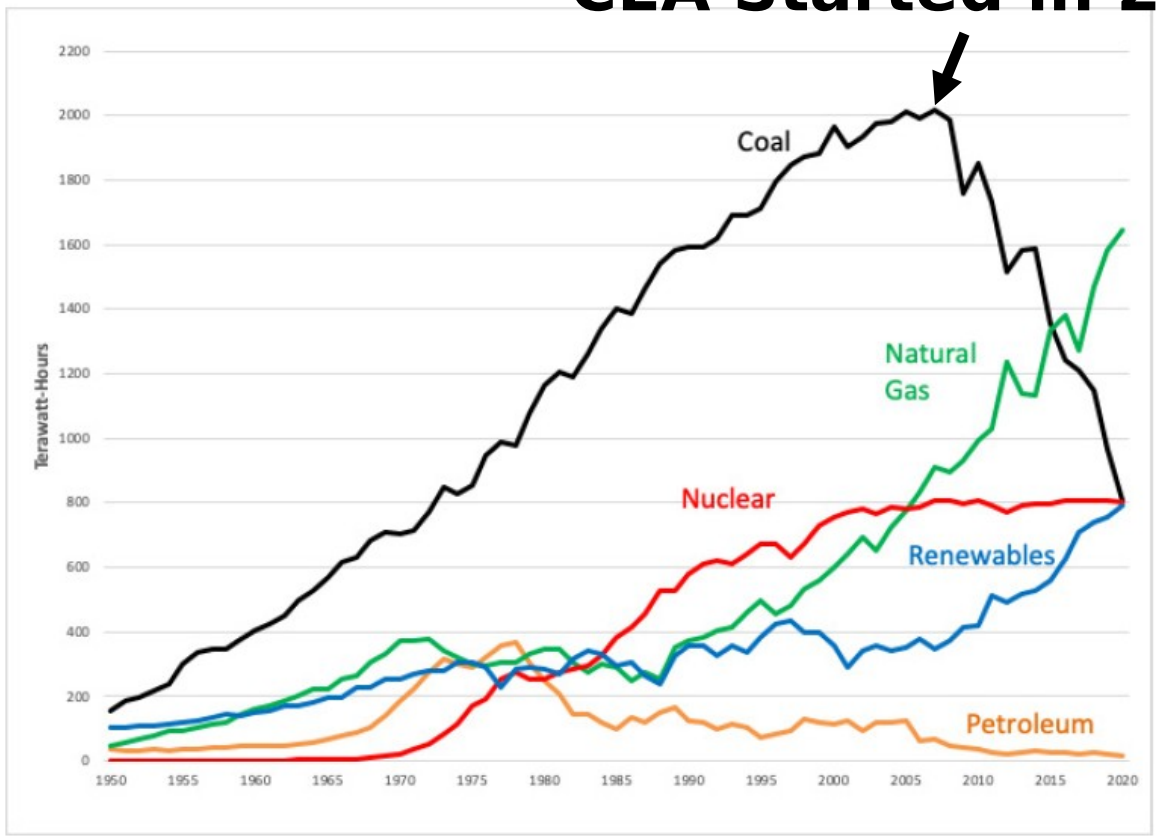
Figure 2.3. Annual US electric energy production by fuel type. As electricity generation by natural gas (green) has surged, coal generation (black) has plummeted. Renewable generation (blue) will likely exceed coal generation for the first time in 2020. (EIA 2020b)

RASEI Accelerating the Clean Energy Transition Dec 2020 (EIA Data)

https://www.colorado.edu/rasei/sites/default/files/attached-files/accelerating_the_us_clean_energy_transformation_final.2.pdf

Fuel Mix for US Electric Energy Production 1950-2020

CEA Started in 2005…



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RASEI Accelerating the Clean Energy Transition Dec 2020 (EIA Data)

https://www.colorado.edu/rasei/sites/default/files/attached-files/accelerating_the_us_clean_energy_transformation_final.2.pdf

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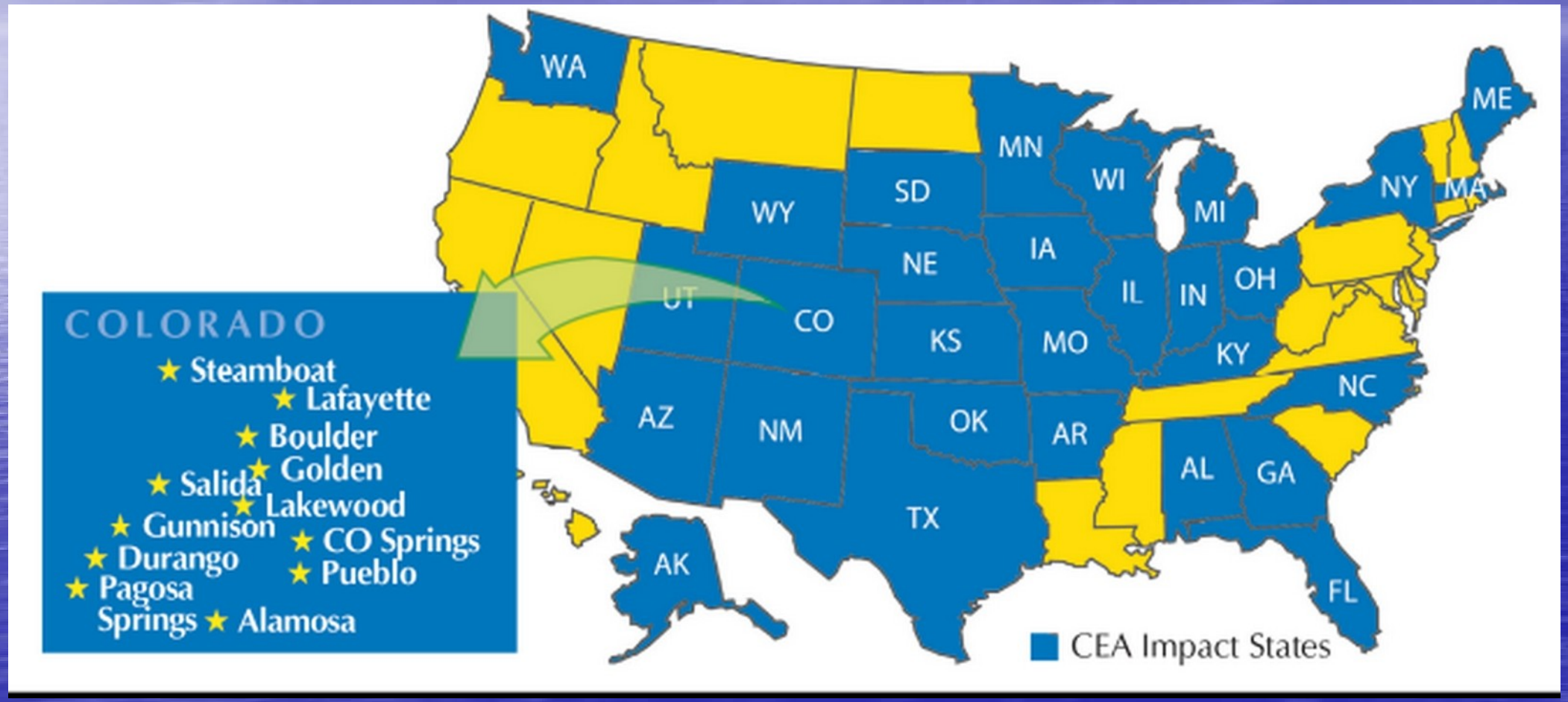
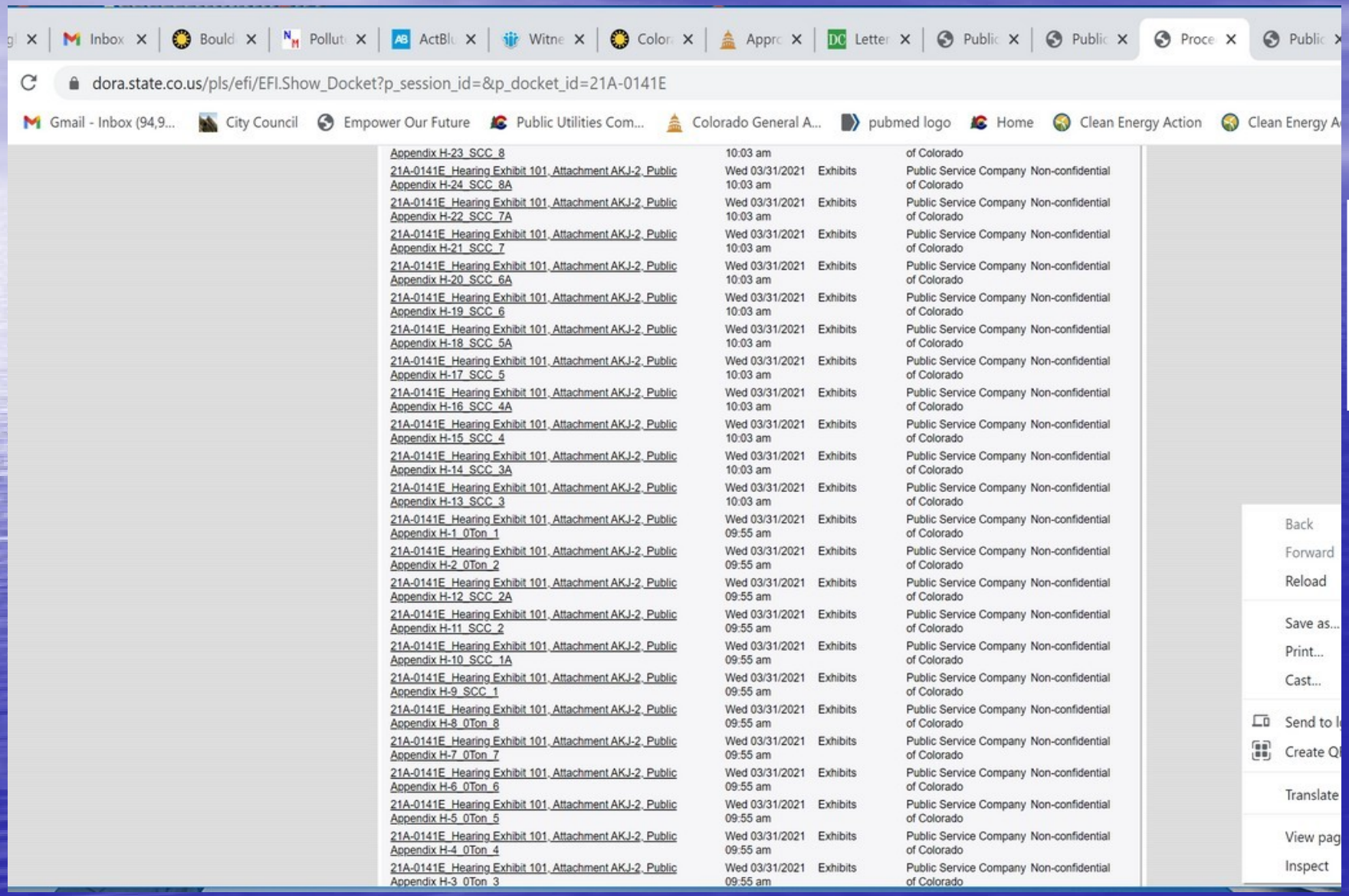
Accelerate the Transition to the Post Fossil Fuel World



https://www.cleanenergyaction.org/

2021 Xcel-Colorado (aka “PSCo”) Electric Resource Pla



Appendix H-23_SCC_8	10:03 am			of Colorado
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-24_SCC_8A	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-22_SCC_7A	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-21_SCC_7	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
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21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-19_SCC_6	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-18_SCC_5A	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
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21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-16_SCC_4A	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-15_SCC_4	Wed 03/31/2021 10:03 am	Exhibits	Public Service Company of Colorado	Non-confidential
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21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-1_0Ton_1	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-2_0Ton_2	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-12_SCC_2A	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-11_SCC_2	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-10_SCC_1A	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-9_SCC_1	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-8_0Ton_8	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-7_0Ton_7	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-6_0Ton_6	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
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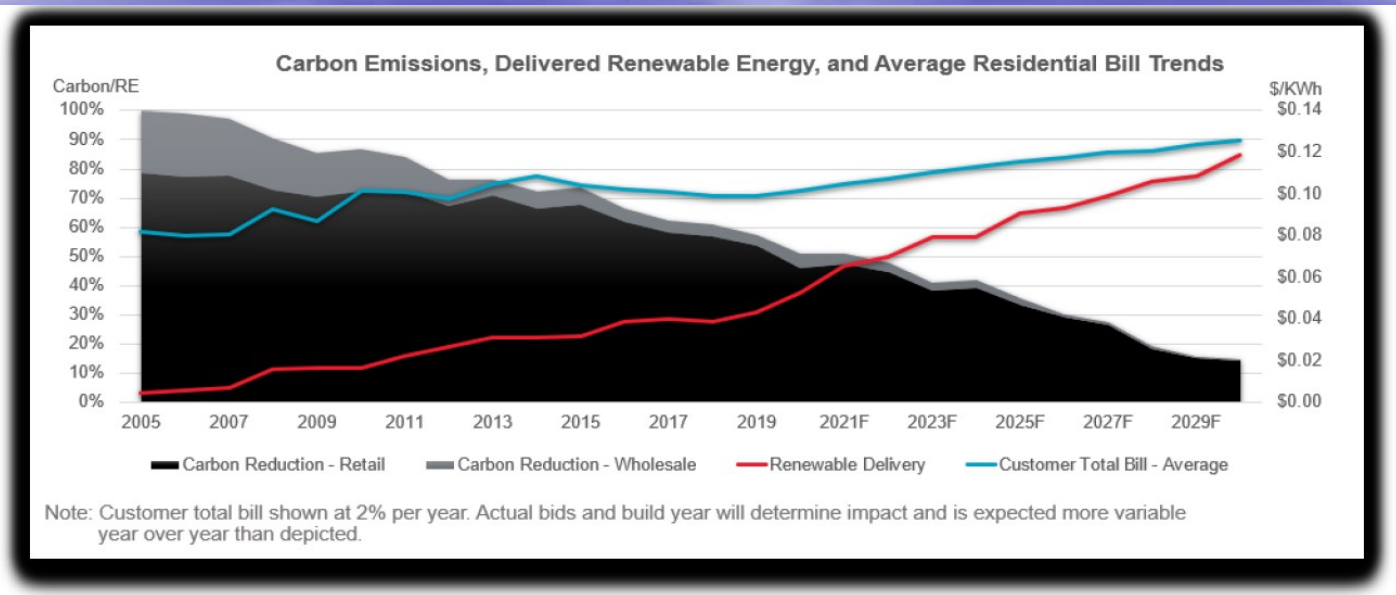
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-4_0Ton_4	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential
21A-0141E_Hearing Exhibit 101_Attachment AKJ-2_Public Appendix H-3_0Ton_3	Wed 03/31/2021 09:55 am	Exhibits	Public Service Company of Colorado	Non-confidential

Proceeding 21A-0141E
March 31, 2021
17 PSCo Witnesses
??? Attachments

021 Xcel-Colorado (aka “PSCo”) Electric Resource Pla

21A-0141E



Red = RE %

Blue = Bill Ave

Black = Retail Carbon

Hearing Exhibit 101, Attachment AKJ-2, Public Appendix H-1_SCC_3
Proceeding No. 21A-____E
Page 2 of 10

Demonstration for 80% CO2 reduction in Retail + Colorado Wholesale sales pursuant to SB19-236

Step 1: Calculate 2005 CO2 baseline

Baseline	2005
Electricity sales CO2 (short tons)	27,268,971

Step 2: Calculate 2030 CO2 forecast

Forecast	2030
Electricity sales CO2 (short tons)	4,187,636

Step 3: Calculate percent CO2 reductions

CO2 Reduction Demonstration	
2005 Baseline CO2	27,268,971
2030 Projected CO2	4,187,636
Percent Reduction	85%

Plans that achieve 80% reduction when filed meet the minimum requirement of the statute.

85% Carbon Reduction by 2030….

To me, Figure AKJ-D-1 shows that we have already made great progress in reducing emissions in an affordable way. Equally as important, it looks to the future and shows how, if done right through this ERP process, we can reduce emissions by approximately 85 percent from 2005 levels and bring delivered renewable energy to nearly 80 percent by 2030—all while keeping total bills low. This is the vision for the 2021 ERP & CEP. The two percent per year trend shown

21A-0141E Direct Testimony of Alice Jackson and AKJ-2 App H-1, SCC_3

2021 Xcel-Colorado (aka "PSCo") Electric Resource Plan

Proceeding 21A-0141E

7

Figure AKJ-D-2

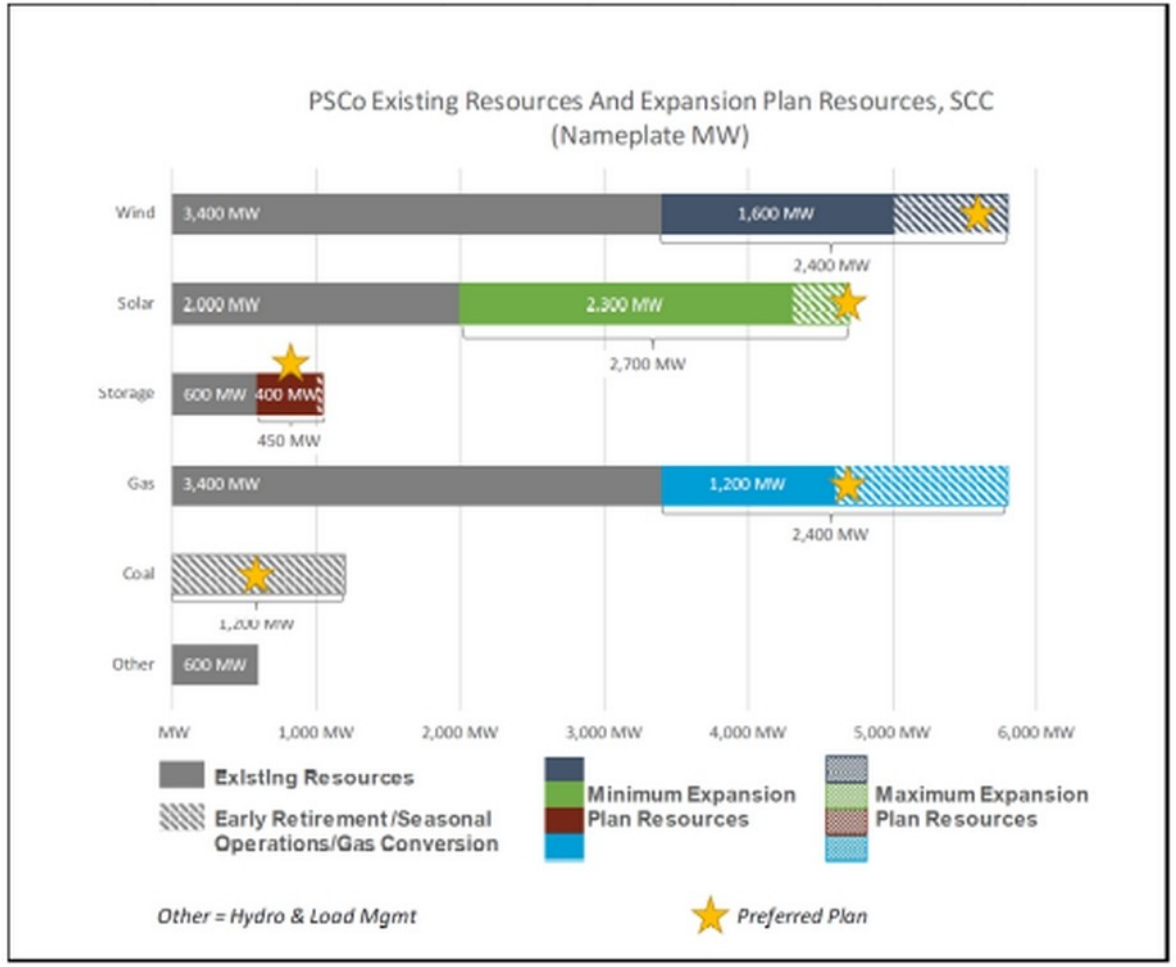


Figure JFH-D-3 SCC ERP and CEP Portfolio
Generic Resource Additions and CO2 Reduction

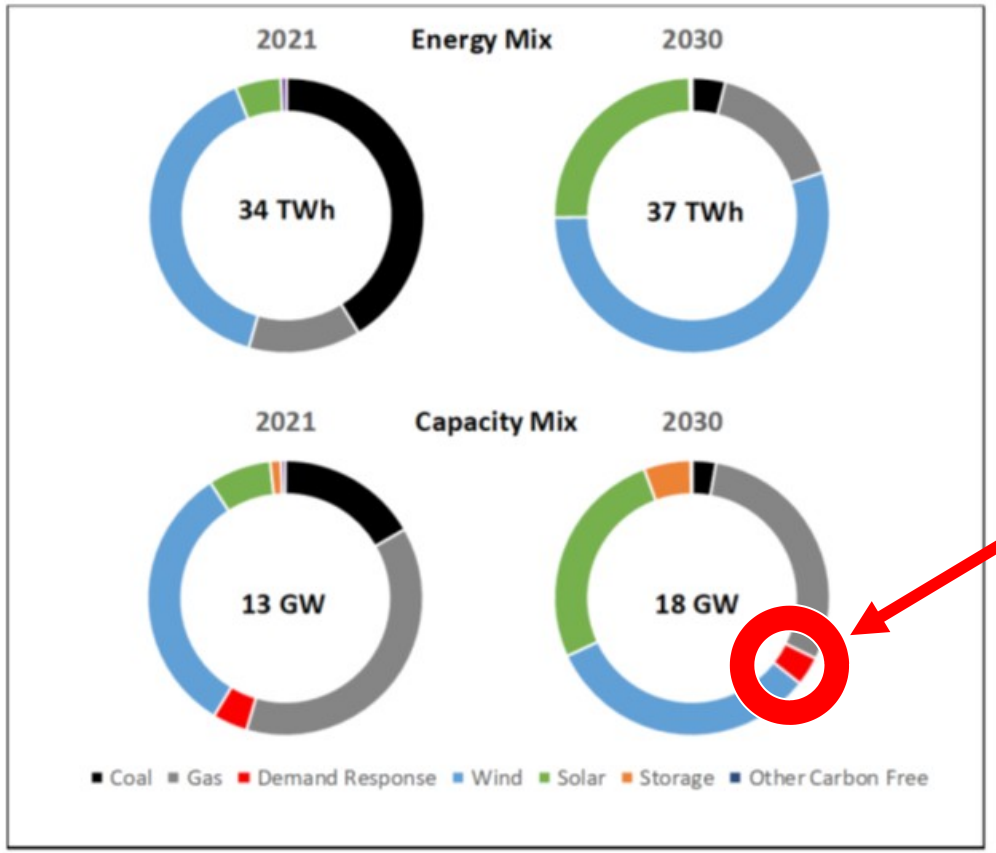
	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
	2030 CO2 % Reduction	-69%	-88%	-85%	-86%	-88%	-81%	-84%	-85%
	Resource Additions 2021-2030 (Nameplate MW)								
1	Wind	1,650	2,350	2,300	2,300	2,300	1,850	2,300	2,350
2	Utility-Scale Solar	1,150	1,550	1,550	1,500	1,550	1,250	1,550	1,550
3	Distributed Solar	1,158	1,158	1,158	1,158	1,158	1,158	1,158	1,158
4	Storage	400	450	400	450	400	400	400	400
5	Firm Dispatchable	1,276	2,352	1,960	1,568	1,764	1,505	1,276	1,233

Direct Testimony of Alice Jackson, page 20

021 Xcel-Colorado (aka “PSCo”) Electric Resource Pla

Proceeding 21A-0141E

The preferred plan will transition our system in a dramatic way from both an energy and capacity mix perspective, as shown below.



Blue = Wind

Green = Solar

Orange = Storage

Red = Demand Response

Black = Coal

Gray = Methane

Direct Testimony Alice Jackson 21A-0141E—Red Circle, Arrow and Color Key Added

PSCo Options Analyzed for Last Big Coal Plants

"Pawnee" =Brush = 505 MW

"Comanche 3"= Pueblo Unit 3=511 MW Total (PSCo Share)

Table JFH-D-2 Pawnee and Comanche 3 Actions

	Pawnee				Comanche 3				
Paired Action	Early Retire EOY 2028	Convert to Gas EOY 2027	Convert to Gas EOY 2024	BAU	Early Retire EOY 2029	Early Retire EOY 2039	Convert to Gas EOY 2027	Early Retire EOY 2039, Reduced Operations starting 2030	BAU
1				X					X
2	X				X				
3	X							X	
4		X					X		
5		X			X				
6		X				X			
7		X						X	
8			X					X	

21A-0141E Direct Testimony of Jim Hill, page 35

Projected Costs (PVRR) of Social Cost of Carbon Portfolios

Figure JFH-D-6: SCC ERP and CEP Portfolio Projected Costs

	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
1	**PVRR Utility Cost 2021-2055 ($M)**	$ 38,814	$ 39,582	$ 39,429	$ 39,373	$ 39,450	$ 39,230	$ 39,306	$ 39,453
	PVRR Utility Cost Delta vs. SCC 1								
2	2021-2030 ($M)	$ -	$ 271	$ 192	$ 284	$ 265	$ 177	$ 206	$ 302
3	2021-2040 ($M)	$ -	$ 951	$ 621	$ 622	$ 786	$ 387	$ 479	$ 591
4	2021-2055 ($M)	$ -	$ 768	$ 616	$ 560	$ 637	$ 417	$ 492	$ 639
5	**NPV CO2 2021-2055 ($M)**	$ 8,625	$ 6,296	$ 6,719	$ 6,295	$ 6,234	$ 6,809	$ 6,646	$ 6,329
6	**PVRR Utility Cost + NPV CO2 2021-2055 ($M)**	$ 47,439	$ 45,877	$ 46,148	$ 45,669	$ 45,684	$ 46,040	$ 45,951	$ 45,782
	PVRR Utility Cost + NPV CO2 Delta vs. SCC 1								
7	2021-2030 ($M)	$ -	$ (124)	$ (77)	$ (271)	$ (226)	$ (153)	$ (158)	$ (370)
8	2021-2040 ($M)	$ -	$ (1,063)	$ (970)	$ (1,410)	$ (1,289)	$ (1,112)	$ (1,185)	$ (1,389)
9	2021-2055 ($M)	$ -	$ (1,561)	$ (1,290)	$ (1,770)	$ (1,755)	$ (1,399)	$ (1,487)	$ (1,657)

2021 Xcel-Colorado (aka “PSCo”) Electric Resource Plan

Proceeding 21A-0141E

The Company’s current discount rate of 7.04% was used for all NPV calculations, and the period included from 2020 to the unit’s Summer Expiration Year. Thermal resources (baseload and intermediate) were given a static capacity factor to level the evaluation since numerous inputs control how often these units run. Renewable resources (solar and wind) used a historical average to determine the capacity factors, given how often these units are run is dependent on location and weather.

21A-0141E, AKJ-2, Volume 2 Electric Resource Plan, page 162

2021 Xcel-Colorado (aka “PSCo”) Electric Resource Plan

Xcel proposes Securitization for Pueblo Unit 3---In 2040…. (i.e. Our Grandchildren Will Pay Off Our Mistakes….)

Table SAW-D-5

($millions)	Original Retirement Date	Early Retirement Date	NBV & Future Decommissioning
Pawnee – Retired Portion	2041	2027	$179.1
Comanche Unit 3	2070	2039	$567.4

Q. WHAT IS THE PROPOSED METHOD TO RECOVER THE REMAINING NBV AND EXPECTED FUTURE DECOMMISSIONING COSTS FOR COMANCHE 3?

A. The Company proposes to securitize the remaining NBV and future decommissioning costs associated with its proposal to early retire Comanche 3. As discussed by Ms. Trammell, the details of the securitization authorization would be brought forward as part of a future financing order application if the Commission agrees that: (1) Comanche 3 should retire in 2040; and (2) the Company should bring forward a future financing order application to effectuate the securitization. Ms. Trammell also discusses the timing of the financing application.

Table SAW-D-6

Comanche 3 $millions	Regulatory Asset	Accelerated Depreciation	Securitization
PVRR	$947	$941	$908
2023-2059 Total Nominal Revenue Requirements	$1,846	$1,364	$1,882

21A-0141E Colorado PUC, Direct Testimony PSCo Witness Scott Watson, Hrg Exh 110, pages 30-32

PSCo Proposes Reserve Margin 0f 18-20%
(Instead of 16.3%)

1

Table KDC-D-1: LOLE Results

Year	2021	2023	2026	2030
0.1 LOLE Reserve Margin	17.4%	19.3%	19.1%	18.0%

PHYSICAL RELIABILITY RESULTS

Physical reliability of the electric power system is the measure of frequency, duration, and severity of firm load shed events. A firm load shed event refers to an instance where the utility must reduce load on the system by turning off the power to firm load customers due to the lack of generation resources. The most common resource adequacy standard in the industry today is the 1-day-in-10 standard. This standard allows for 1 firm load shed event every 10 years and is represented as an LOLE of 0.1 days per year. Figure 8 shows Loss of Load Expectation (LOLE) as a function of reserve margin. A 17.4% reserve margin provides PSCo 1-in-10 reliability for the Base Case in 2021.

Figure 8. LOLE Results

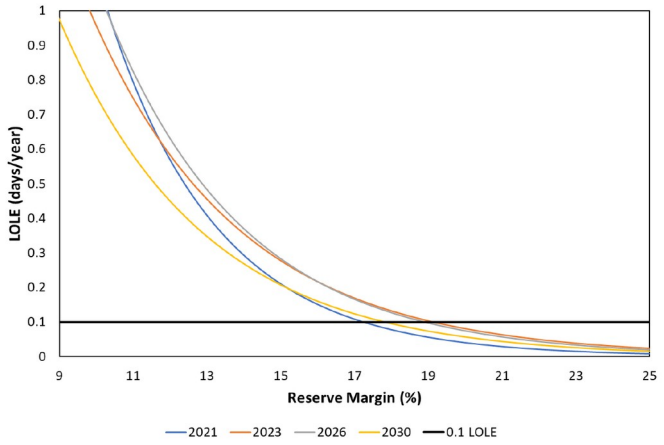


Table 17. Physical Reliability Metrics: Base Case 2021

Reserve Margin (%)	Summer Resources (MW)	LOLE (days per year)	LOLH (hours per year)	EUE (MWh)
8%	7,197	0.86	2.55	542
9%	7,261	0.67	1.95	407
10%	7,324	0.53	1.50	306
11%	7,389	0.41	1.15	229
12%	7,454	0.32	0.88	172
13%	7519	0.25	0.67	129
14%	7,585	0.20	0.52	97
15%	7,652	0.15	0.40	73

28

16%	7,719	0.12	0.30	55
17%	7,787	0.11	0.27	47
18%	7,856	0.08	0.19	33
19%	7,925	0.06	0.13	23
20%	7,994	0.04	0.09	16
21%	8,064	0.03	0.07	11
22%	8,135	0.02	0.05	8
23%	8,207	0.01	0.03	5
24%	8,279	0.01	0.02	4
25%	8,352	0.01	0.02	3

Other Issues…

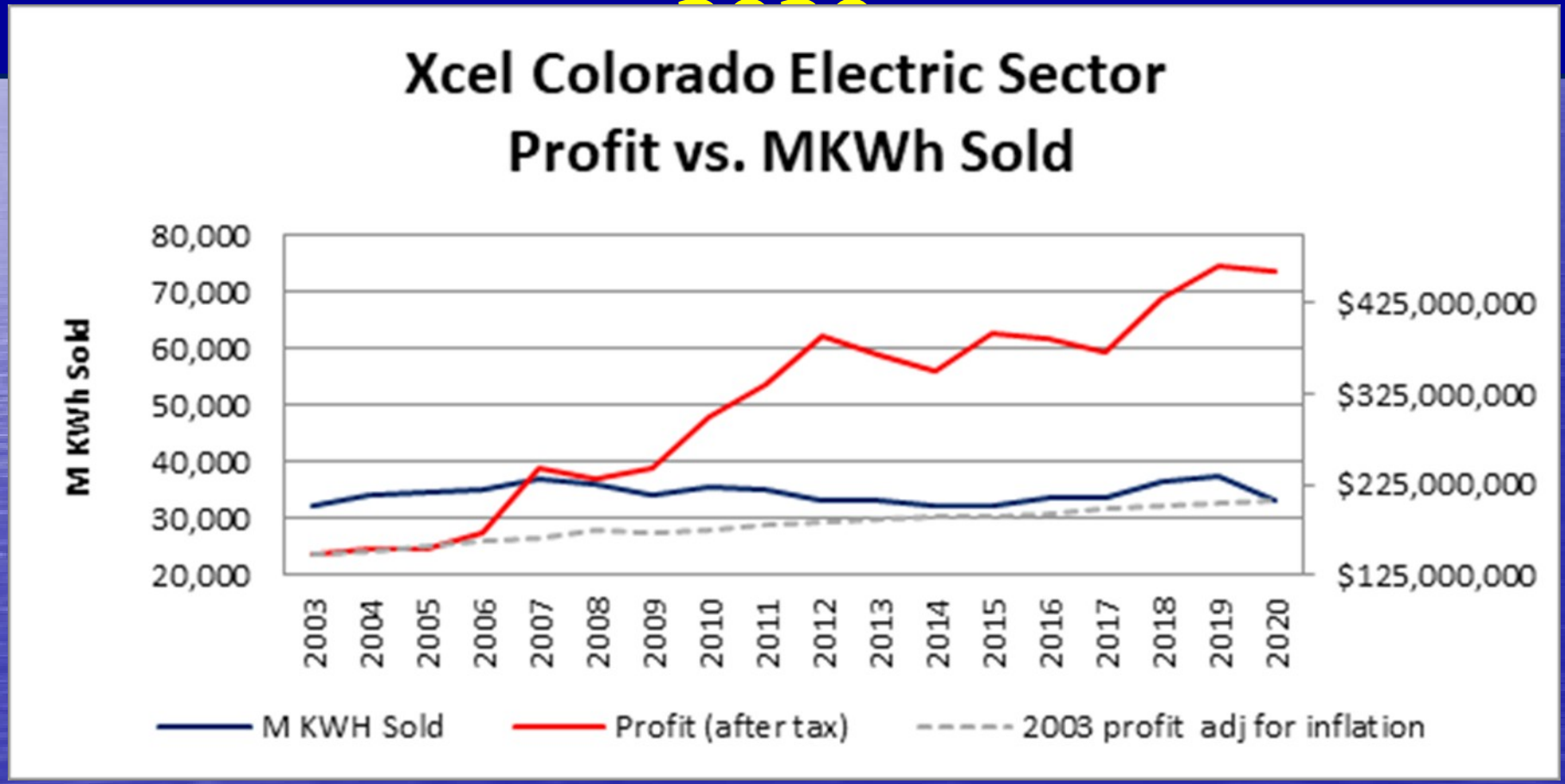
1) Monopoly Profits

2) Methane

3) Transmission v Microgrids

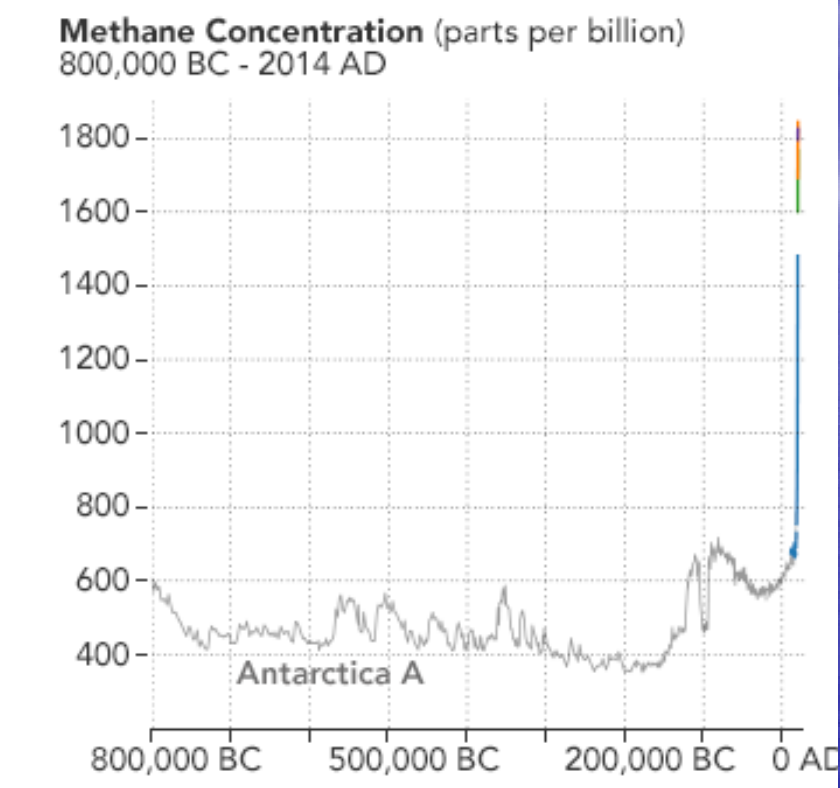
4) Equity of the Energy System

Xcel-Colorado (i.e. "PSCo) Profits Soaring While Electricity Sales Basically Flat…2003-



Graph by Paul Culnan from Empower Our Future with Data from PSCo 10-Ks Available from http://investors.xcelenergy.com/CustomPage/Index?KeyGenPage=1073751307

The Monumental Problem of Methane



Methane makes up just 0.00018 percent of the atmosphere, compared to 0.039 percent for carbon dioxide. (CO_2 is roughly 200 times more abundant.) Yet scientists attribute about one-sixth of recent global warming to methane emissions; what methane lacks in volume it makes up for in potency. Over a 20-year period, one ton of methane has a global warming potential that is 84 to 87 times greater than carbon dioxide. Over a century, that warming potential is 28 to 36 times greater. The difference occurs because methane is mostly scrubbed out of the air by chemical reactions within about ten years, while carbon dioxide persists in the atmosphere for much longer than a century.

"That means the climate effects of methane are front-loaded," explained Drew Shindell, a climate scientist at Duke University. "Part of the reason there is so much interest in methane right now is because reducing those emissions could slow warming over the next few decades. This does not let us off the hook for reducing carbon dioxide, but the benefits of carbon dioxide reductions will come much later."

https://earthobservatory.nasa.gov/Conte

https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

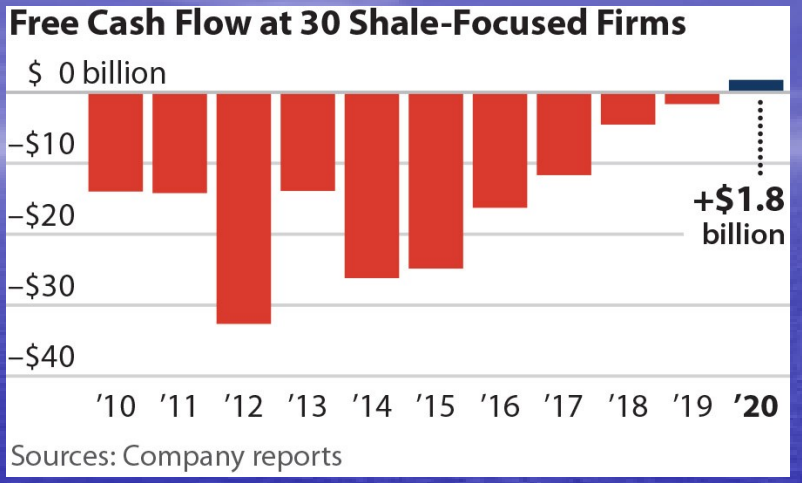
Fracking Often Runs in the Red Unless Cut Capital Expenditures

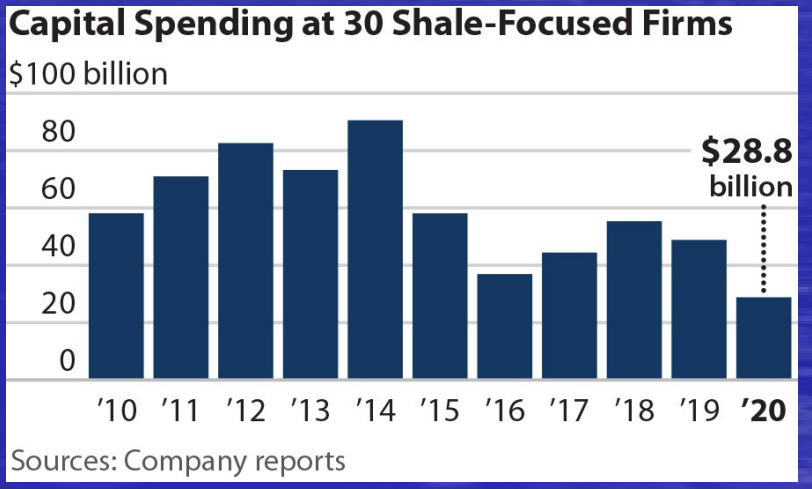
Press Release, Clark Williams-Derry, Trey Cowan and Ashish Solanki | March 25, 2021

IEEFA: Frackers produce positive cash flows in 2020 with deep capital expenditure cuts

Beleaguered fracking sector generates $1.8 billion cash flow, but only after $20 billion cuts in capex

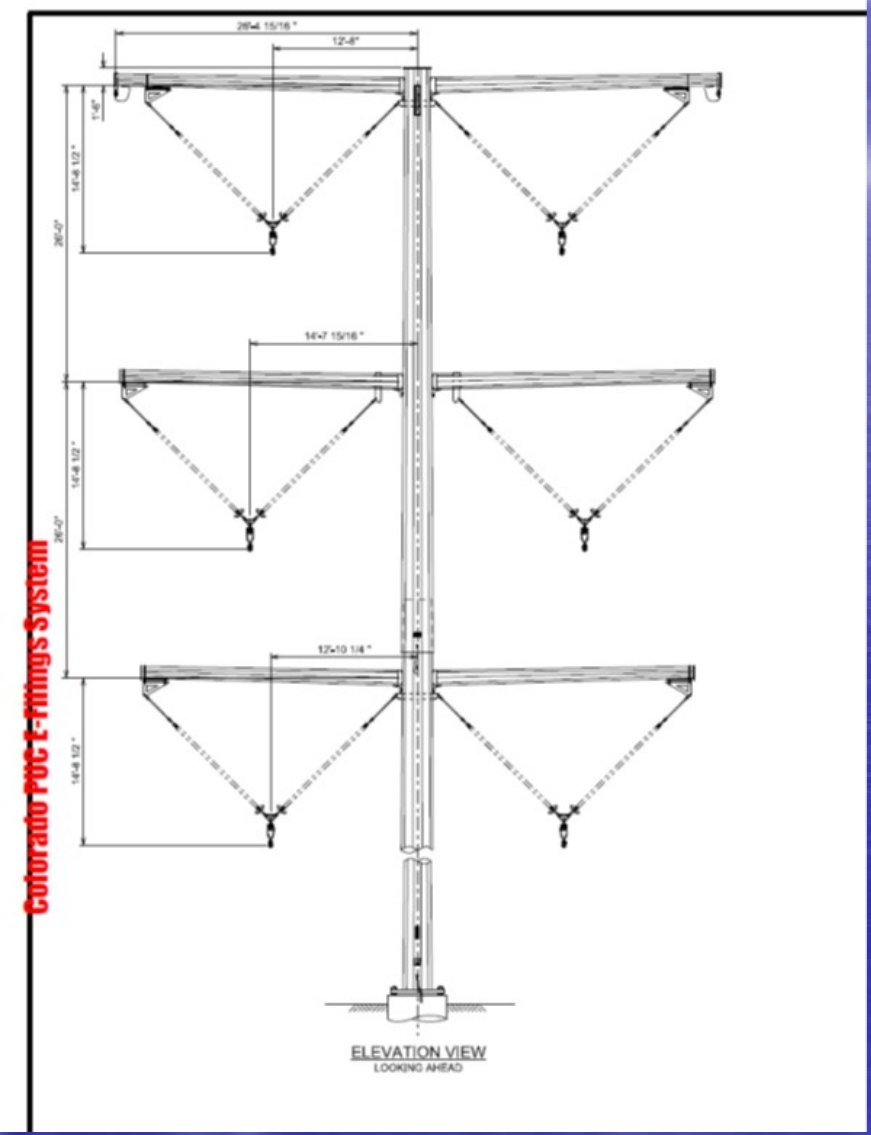
March 24, 2021 (IEEFA)—A cross-section of 30 shale oil and gas producers marked the first full year of positive free cash flows since the fracking boom began—but only after deep cuts to capital expenditures that raise troubling questions about the industry's future.





https://ieefa.org/ieefa-frackers-continue-to-produce-positive-cash-flows-in-q4-2020-with-deep-capital-expenditure-cuts/

Xcel's Proposed $1.7 Billion Colorado Transmission Project ("Power Pathways") Proceeding 21A-0096E



21A-0096E, Att BRC-1, Colorado PUC

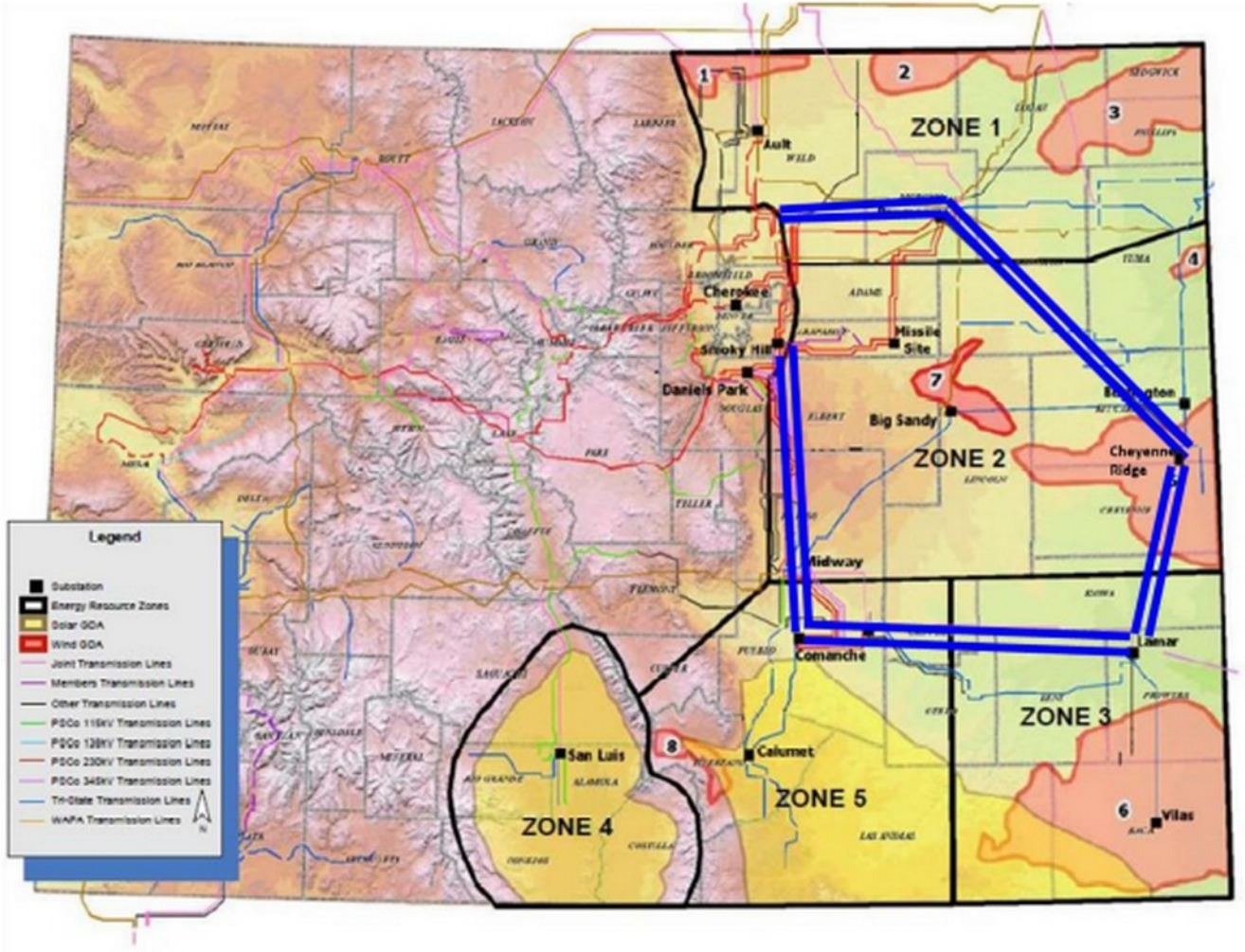


Figure 1: Proposed 345 kV Transmission Project

21A-0096E, CCPG Report, ARK-5, Page 4, Colorado PUC

Should We Spend More on Microgrids and Less on Transmission?? How find the optimal mix on a site-specific basis?

ENERGY

California Reservation's Solar Microgrid Provides Power During Utility Shutoffs

January 11, 2020 · 7:00 AM ET
Heard on Weekend Edition Saturday

ERIK NEUMANN

FROM JPR | Jefferson Public Radio

3-Minute Listen + PLAYLIST

The Blue Lake Rancheria microgrid powers a number of buildings on the reservation and helped provide necessary energy during county-wide power outages.

Courtesy of the Blue Lake Rancheria

Blue Lake Rancheria Microgrid Kept 8 People on Medical Support Alive During the California Shutoffs.

https://www.npr.org/2020/01/11/795248921/california-reservations-solar-microgrid-provides-power-during-utility-shutoffs

15 Years = 180 Months

$100/Month = $18,000

$50/Month = $9,000

$10/Month = $1,800

$5/Month = $900

$1/Month = $180

50 cents/month = $90

Donate through

https://www.cleanenergyaction.org/

Or

PO box 1399, Boulder, CO 80306

Recurring Monthly Donations

Are a VERY BIG help!!

CHANGE!!—

Mint Wash—Prescott National Forest, AZ

January 1990-January 2019

These two pictures on the right
and the one below were
taken in approx the same
location, 30 years apart
fter being protected from grazing by cows

Mint Wash
Prescott National Forest
January 1990

Future Directions for Clean Energy Action and Allies

Local

- Ensure Boulder Keeps Moving Forward on Climate
- Support the Climate Work of Other Communities—Colorado and Elsewhere

State

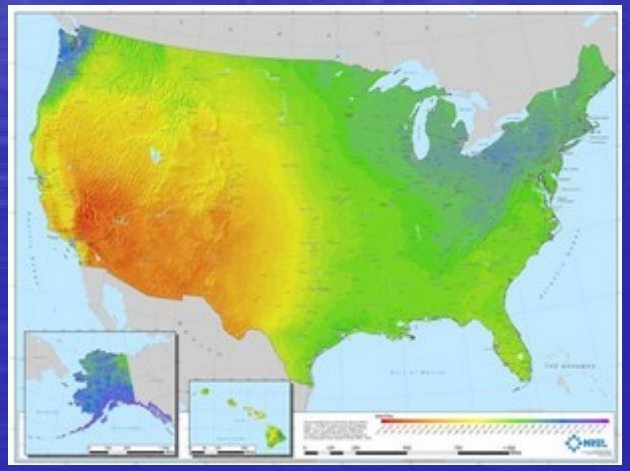
- Address Colorado's Monumental Methane Problem
- Move Beyond the Monopoly in Electricity (No More Monopoly Prices)
- Work for a More Distributed and Democratized System (Microgrids etc)

National

- Support bold action at the national level
- Bring Colorado's Perspective to the National Conversation
- Protect Public Lands and Ecosystems

Work for a More Equitable Energy System

Remember to Smile:
It is the Beginning of the Solar Era!!



Clean Energy Action
CITIZEN POWER

Leslie Glustrom for Clean Energy Action
Lglustrom (at) gmail.com


Thank YOU!!
We Couldn’t Have Gotten This Far
Without You!!

PSCo Social Cost of Carbon (SCC) Scenarios

5

Table AKJ-D-2

	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
	Average Annual Rate Impact								
1	2024-2030 (%)	2.1%	3.1%	2.8%	2.8%	2.9%	2.4%	2.6%	2.5%
2	2024-2040 (%)	1.5%	1.5%	1.6%	1.5%	1.5%	1.6%	1.5%	1.6%
3	2024-2055 (%)	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%

Direct Testimony of Alice Jackson, 21A-0141E, page 33

Figure JFH-D-3 SCC ERP and CEP Portfolio
Generic Resource Additions and CO2 Reduction

	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
	2030 CO2 % Reduction	**-69%**	**-88%**	**-85%**	**-86%**	**-88%**	**-81%**	**-84%**	**-85%**
	Resource Additions 2021-2030 (Nameplate MW)								
1	Wind	1,650	2,350	2,300	2,300	2,300	1,850	2,300	2,350
2	Utility-Scale Solar	1,150	1,550	1,550	1,500	1,550	1,250	1,550	1,550
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5	Firm Dispatchable	1,276	2,352	1,960	1,568	1,764	1,505	1,276	1,233

Figure JFH-D-5 SCC ERP and CEP Portfolio
Infrastructure Investment Potential

Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
Infrastructure Investment Potential ($M)								
Generation 2021-2030 ($M)	$ 4,282	$ 6,223	$ 5,814	$ 5,519	$ 5,650	$ 4,847	$ 5,378	$ 5,360
Transmission 2021-2030 ($M)	$ 1,667	$ 1,667	$ 1,667	$ 1,667	$ 1,667	$ 1,667	$ 1,667	$ 1,667

Projected Costs (PVRR) of Social Cost of Carbon Portfolios

Figure JFH-D-6: SCC ERP and CEP Portfolio Projected Costs

	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
1	**PVRR Utility Cost 2021-2055 ($M)**	$ 38,814	$ 39,582	$ 39,429	$ 39,373	$ 39,450	$ 39,230	$ 39,306	$ 39,453
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PSCo Loads and Resources Table 2021-2030

Table AKJ-D-1

PSCo Summer L&R Table (MW)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Owned Coal	1,980	1,980	1,655	1,655	1,655	1,278	1,278	1,278	1,278	1,278
Purchased Coal	150	150	-	-	-	-	-	-	-	-
Total Coal-Fired Generation	2,130	2,130	1,655	1,655	1,655	1,278	1,278	1,278	1,278	1,278
Owned Gas Steam	310	310	310	310	310	310	310	-	-	-
Owned Gas Combined Cycle	1,855	1,941	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968
Purchased Gas Combined Cycle	370	302	170	51	51	-	-	-	-	-
Owned Gas Combustion Turbine	805	1,067	1,067	1,067	1,067	1,067	896	896	896	896
Purchased Gas Combustion Turbine	1,013	758	758	758	758	733	458	238	238	238
Total Gas-Fired Generation	4,352	4,378	4,273	4,155	4,155	4,078	3,632	3,102	3,102	3,102
Owned Storage	162	243	276	276	276	276	276	276	276	276
Purchased Storage	-	-	199	199	199	199	199	199	199	199
Purchased Biomass	3	3	3	-	-	-	-	-	-	-
Owned Hydro	14	14	14	14	14	14	14	13	13	13
Purchased Hydro	18	18	18	18	17	17	9	-	-	-
Owned Solar	0.9	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Purchased Solar	202	363	673	669	666	663	659	653	650	647
Purchased BTM Solar	172	195	119	119	125	130	136	144	153	164
Purchased Community Solar	71	111	102	103	121	138	155	171	186	201
Owned Wind	131	131	147	147	147	147	147	147	147	147
Purchased Wind	360	360	402	402	402	394	384	316	316	313
Total Renewable/Other Generation	1,134	1,439	1,953	1,948	1,967	1,979	1,980	1,920	1,942	1,961
TOTAL ACCREDITED CAPACITY	7,616	7,947	7,881	7,758	7,777	7,335	6,891	6,300	6,322	6,342
Native Load Forecast - Winter2020	6,856	6,973	6,951	6,978	7,031	6,906	6,986	7,063	7,130	7,219
Demand Response	(527)	(527)	(561)	(561)	(561)	(586)	(586)	(586)	(586)	(605)
FIRM OBLIGATION LOAD	6,329	6,446	6,390	6,417	6,470	6,320	6,400	6,477	6,544	6,614
Target Planning Reserve Margin	1,139	1,160	1,233	1,232	1,242	1,207	1,152	1,166	1,178	1,191
IREA & HCEA Backup Reserves	45	45	48	48	48	11	11	11	11	11
TOTAL PLANNING RESERVE MARGIN TARGET	1,184	1,205	1,281	1,280	1,290	1,219	1,163	1,177	1,189	1,201
Actual Reserve Margin	1,287	1,501	1,492	1,341	1,307	1,016	491	(177)	(222)	(272)
CAPACITY POSITION: LONG/(SHORT)	102	296	210	61	17	(203)	(672)	(1,354)	(1,411)	(1,474)

Announced Early Coal Retirements	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Craig 2									(40)	(40)
Hayden 1									(135)	(135)
Hayden 2								(98)	(98)	(98)
PREFERRED PLAN CAPACITY POSITION: LONG/(SHORT)	102	296	210	61	17	(203)	(672)	(1,452)	(1,684)	(1,747)

Proposed Timing of Additions

Figure AKJ-D-4

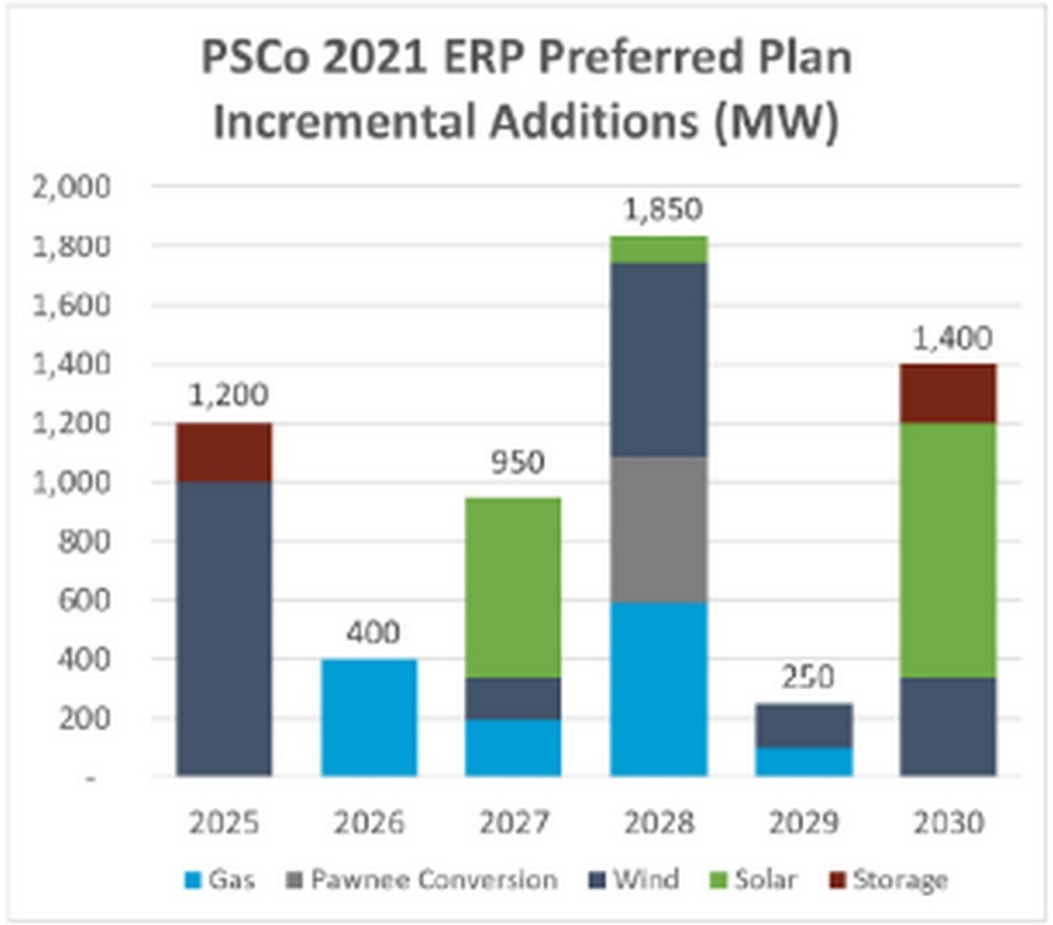

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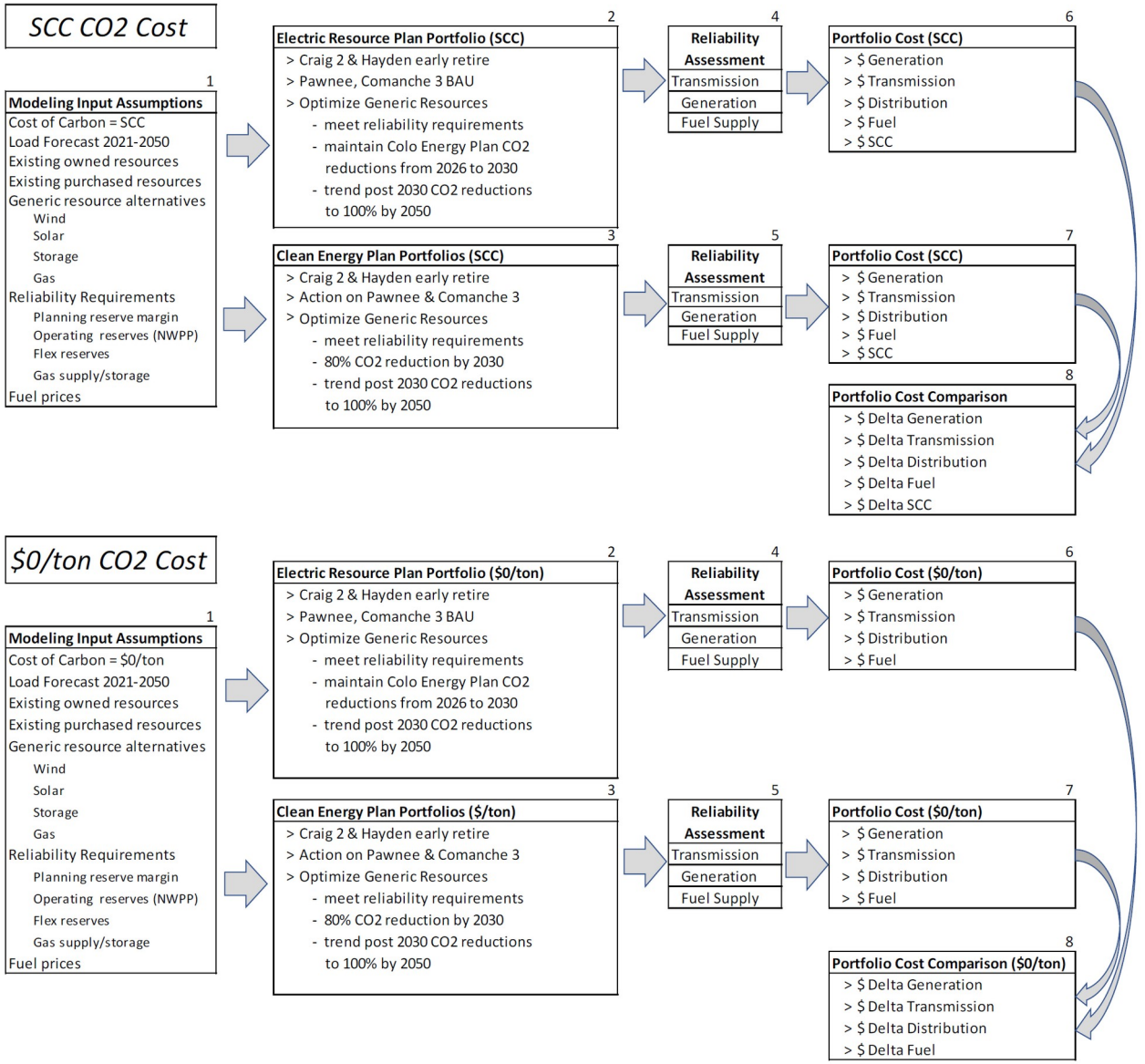
Figure 1.5-1: ERP and CEP Portfolio Analysis



Xcel 2017 Bids by Interconnection Site

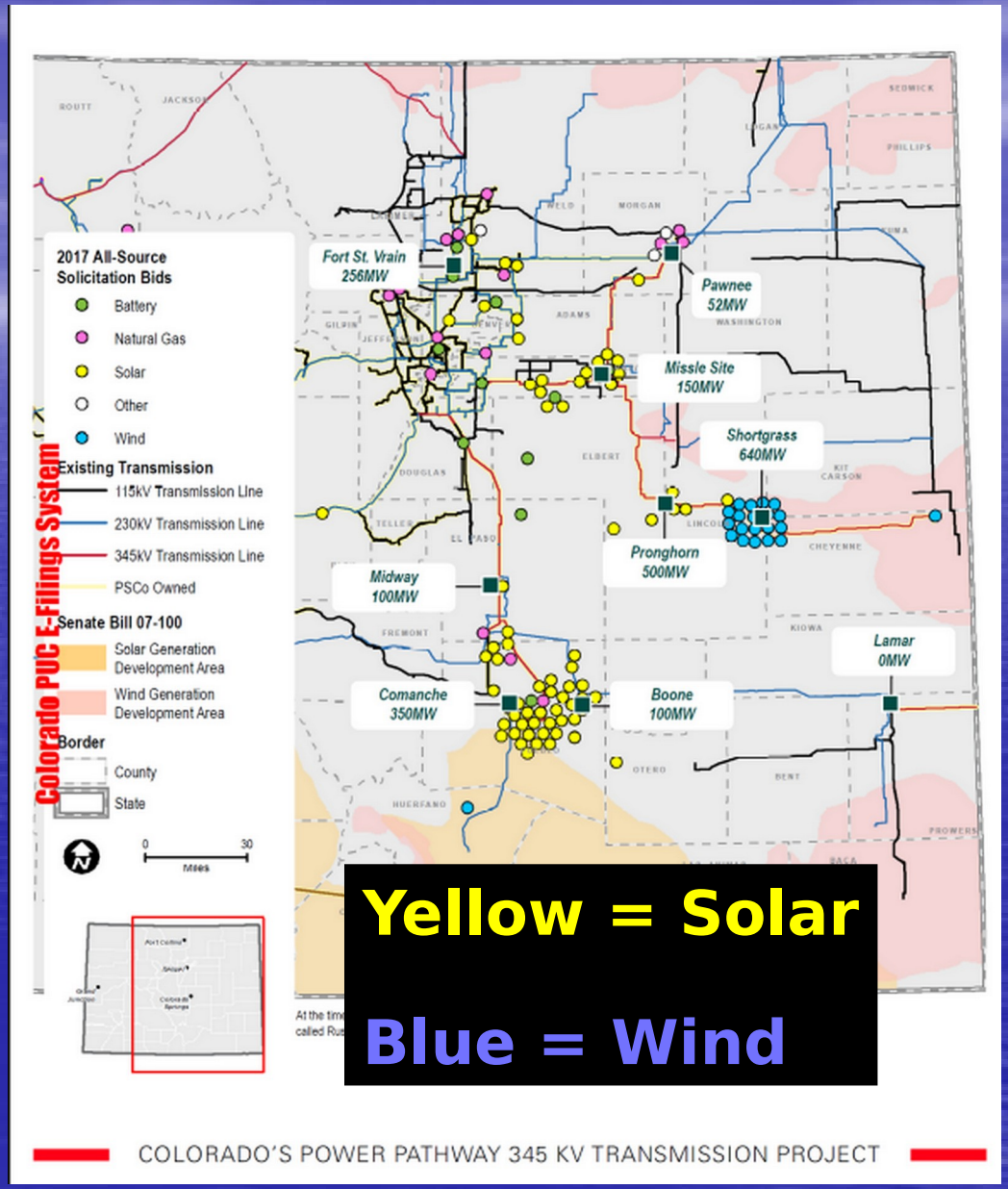


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Figure JFH-D-7: SCC ERP and CEP Portfolio Projected Rate Impacts

	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
	Average Annual Rate Impact								
1	2024-2030 (%)	2.1%	3.1%	2.8%	2.8%	2.9%	2.4%	2.6%	2.5%
2	2024-2040 (%)	1.5%	1.5%	1.6%	1.5%	1.5%	1.6%	1.5%	1.6%
3	2024-2055 (%)	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%

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Figure JFH-D-8: SCC ERP and CEP Portfolio CO2% Reduction Efficiency

	Portfolio	SCC 1	SCC 2	SCC 3	SCC 4	SCC 5	SCC 6	SCC 7	SCC 8
	Resource Need:	ERP	CEP	CEP	CEP	CEP	CEP	CEP Preferred	CEP
	Pawnee Action:	Retire EOY 2041	Retire EOY 2028	Retire EOY 2028	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2027	Convert Nat Gas EOY 2024
	Comanche 3 Action:	Retire EOY 2069	Retire EOY 2029	Retire EOY 2039 Red Ops	Convert Nat Gas EOY 2027	Retire EOY 2029	Retire EOY 2039	Retire EOY 2039 Red Ops	Retire EOY 2039 Red Ops
1	**2030 CO2 % Reduction**	**-69%**	**-88%**	**-85%**	**-86%**	**-88%**	**-81%**	**-84%**	**-85%**
2	**CO2 Reduction Efficiency ($/ton)**	-	$ 46	$ 48	$ 34	$ 36	$ 36	$ 38	$ 28
3	**PVRR Utility Cost Delta vs. SCC 1** 2021-2030 ($M)	$ -	$ 271	$ 192	$ 284	$ 265	$ 177	$ 206	$ 302

Direct Testimony Jim Hill, page 56

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The Company’s current discount rate of 7.04% was used for all NPV calculations, and the period included from 2020 to the unit’s Summer Expiration Year. Thermal resources (baseload and intermediate) were given a static capacity factor to level the evaluation since numerous inputs control how often these units run. Renewable resources (solar and wind) used a historical average to determine the capacity factors, given how often these units are run is dependent on location and weather.

21A-0141E, AKJ-2, Volume 2 Electric Resource Plan, page 162

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To me, Figure AKJ-D-1 shows that we have already made great progress in reducing emissions in an affordable way. Equally as important, it looks to the future and shows how, if done right through this ERP process, we can reduce emissions by approximately 85 percent from 2005 levels and bring delivered renewable energy to nearly 80 percent by 2030—all while keeping total bills low. This is the vision for the 2021 ERP & CEP. The two percent per year trend shown

Direct Testimony of PSCo Witness Alice Jackson, 21A-0141E

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Q. IS THE TARGET RESERVE MARGIN RECOMMENDATION FROM THE STUDY PREPARED BY ASTRAPÉ BASED ON THE SAME INDUSTRY STANDARD AS PUBLIC SERVICE'S MOST RECENT RESERVE MARGIN STUDY PERFORMED IN 2008?

A. No. In Public Service's most recent reserve margin study performed in 2008, the target reserve margin of 16.3 percent was based on an alternate interpretation of the one day in 10-year loss of load reliability standard. Namely, the prior Public Service study planned to 24 hours of load shed in 10 years which could have occurred over multiple days. The 0.1 LOLE interpretation is defined as a single day with one or more hours of firm load shed in 10 years. The planning target of 24 hours of load loss in 10 years is commonly referred to as 2.4 Loss of Load Hours ("LOLH"). The updated Study prepared by Astrapé is based on the interpretation that the one day in 10-year standard is properly represented by 0.1 LOLE.

Direct Testimony PSCo Witness Kevin Carden, Proceeding 21A-0141E

Glustrom Solar Home Prescott Arizona--1996

Personal picture