

On the Path by 2025 to a Climate-Safe California. We can do it!

Ellie Cohen, The Climate Center February 6, 2020 Rae Dorough Speaker Series www.theclimatecenter.org/rapid-decarbonization





Australian pyrocumulus fire clouds that created dry lighting, igniting more fires

UN IPCC 1.5C Report- Oct 2018 Consensus = most conservative view

- Emissions must decline by 45% by 2030 to meet 1.5C (2.7°F) limit
- Up to 1000 Gt CO2e must be removed from atmosphere over the decades ahead





ABRUPT PERMAFROST THAW Doubles previous estimates of CO2/methane emissions Not in any climate models including IPCC 1.5C report Must act in next decade to stave off worst consequences

Turetsky et al. Nature Geoscience | VOL 13 | February 2020 https://www.sciencedaily.com/releases/2020/02/200203151152.htm https://www.nationalgeographic.com/science/2020/02/arctic-thawing-ground-releasing-shockingamount-dangerous-gases/

76% of world's oceans speeding up Wasn't expected until 2100; Earth more sensitive to climate change? Faster winds=> faster currents => i wildlife impacts & weather extremes



Hu et al. Science Advances. 05 Feb 2020

After assessing 5 million climate pathways: "We must aggressively pursue carbon neutral energy by 2030 & hope for 'some luck' for tolerable climate future"



Lamontagne et al. Robust abatement pathways to tolerable climate futures require immediate global action. Nature Climate Change, March 2019 https://www.sciencedaily.com/releases/2019/03/190311125353.htm

11,000 scientists' warn: climate emergency

... To secure a sustainable future...decisionmakers and all of humanity [must] promptly respond to [the] climate emergency and act to sustain life on planet Earth, our only home."



Smoke from fires burning in California from satellite photos, Oct. 2017

-Ripple et. al. <u>World Scientists' Warning of a Climate Emergency</u>, Bioscience, November 2019



RAISING THE ALARM

Evidence that tipping points are under way has mounted in the past decade. Domino effects have also been proposed.



9 of 15 global tipping points underway now... domino effect to uninhabitable 'hothouse' climate if we don't act soon

A. Amazon rainforest Frequent droughts

B. Arctic sea ice Reduction in area

C. Atlantic circulation In slowdown since 1950s **D. Boreal forest** Fires and pests changing

F. Coral reefs Large-scale die-offs

G. Greenland ice sheet Ice loss accelerating H. Permafrost Thawing

I. West Antarctic ice sheet Ice loss accelerating

J. Wilkes Basin, East Antarctica Ice loss accelerating Lenton, Rockstrom, Gaffney, Rahmstorf, Richardson, Steffen, Schyellnhuber. **Nature**, Nov 27 2019 <u>https://www.nature.com/articles/d41</u> <u>586-019-03595-0</u>



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"We don't want to push the 'on' buttons of runaway global warming. The next decade is our window...with consequences for all future generations."

ENVIRONMENTAL S O L U T I O N S I N I T I A T I V E

- Johan Rockström, Director, Potsdam Institute for Climate Impacts Research, December, 2019

https://sverigesradio.se/avsnitt/1425542 https://medium.com/@rchrdhy/johanrockstr%C3%B6ms-10-point-agenda-for-saving-theworld-unofficial-transcript-431261f885c6



Are net zero CO2e emissions enough?

Balance carbon emissions with carbon removal

(transition to a "post-carbon economy").





https://twitter.com/KHayhoe/status/1104835726246592513

GOAL: Net negative emissions

Bring atmospheric GHGs back down to reverse some (not all) of the impacts

(e.g. CO2 at least below 350 ppm); "overshoot" pathway- the faster we do this, the more impacts we can avoid.)

H 🗲 🗎 🛧 🖶 SCIENCES - ENGINEERING - MEDICINE CONSENSUS STUDY REPORT NEGATIVE EMISSIONS TECHNOLOGIES AND RELIABLE SEQUESTRATION GETTING

https://www.llnl.gov/news/new-lab-report-outlines-ways-california-could-reach-goal-becoming-carbon-neutral-2045 January 2020 https://www.rmi.org/wp-content/uploads/2018/11/RMI_Negative_Emissions_Scenarios_Report_2018.pdf https://www.nap.edu/catalog/25259/negative-emissions-technologies-and-reliable-sequestration-aresearch-agenda



E.g.: Croplands could sequester ~1/5 of current annual emissions globally

Healthy ag soils could sequester 5+ Gt/yr or 50% of 2050 UN goal



Vermeulen et al<u>, A Global Agenda for Action on Soil Carbon</u>. Nature Sustainability, Jan 2019 Bronson, Griscom, et al. <u>Natural Climate Solutions</u>. PNAS October 2017 doi: 10.1073/pnas.1710465114 Zomer et al (TNC). <u>Global Sequestration Potential of Increased Organic Carbon in Cropland Soils</u>. *Scientific Reports* Nov 2017.



Global Climate Action Leaders

Finland: Carbon neutrality by 2035 w/o carbon offsets **Uruguay:** Carbon neutrality by 2030– major investments in wind and increased forest cover

Norway: Banning new Internal Combustion Engine (ICE) car sales in 2025

Denmark: Reduce GHGs to 70% below 1990 by 2030 Copenhagen: Carbon neutral by 2025 with econ growth Rhode Island: 100% renewable energy by 2030 Santa Monica:

- 80% below 1990 carbon emissions by 2030
- Converting 50% ICE vehicle trips to walking or bikes/scooters/skateboard by 2030
- Water self-sufficiency by 2023; Zero waste by 2030



State of California- some key climate policies

- SB 32 (2016): Reduce GHG emissions to 40% below 1990 levels by 2030
- SB 100 (2018): Achieve 60% renewable energy by 2030 and 100% by 2045
- Executive Order B-55-18 (2018): Achieve carbon neutrality by 2045 and maintain net-negative emissions after

Is this enough per the science and climate reality?

California Measured Emissions 2017



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https://ww2.arb.ca.gov/ghg-inventory-data

SUVs: 2nd biggest cause of emissions rise (2010-2018)

SUV sales doubled over past decade; SUV drivers rank 7th in world for CO2 emissions, more than UK & Netherlands combined



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https://www.iea.org/newsroom/news/2019/october/growing-preference-for-suvschallenges-emissions-reductions-in-passenger-car-mark.html Emissions we don't count

Consumption-based, out-of-boundary emissions from embedded goods & services

- Product & food manufacturing & disposal (waste) outside boundary
- Air travel & other transportation outside boundary
- Emissions from production of natural gas and fuels; foreign fuels refined in California
- Other emissions away from home (e.g. energy)

Example: Marin consumption-based emissions are ~3x measured emissions

~4,324,920 MT CO2e (2017)

Out-of-boundary emissions 67%

Need more aggressive policies and accelerated timelines now!

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Climate-Safe California climate center **Campaign for Rapid Decarbonization**

www.theclimatecenter.org

GOAL: By 2025, CA will enact the policies required by science to put us on track for a safe climate, through net-zero emissions, carbon sequestration, and resilient communities

Ensure a secure transition for workers and their families

- Support workers and communities dependent on fossil fuel enterprises
- Prioritize lower income communities

post/investing-just-transitic https://www.iddri.org/en/publications-and-events/blog

Overarching goal: CA commits ASAP to accelerated decarbonization timeline & \$\$\$

- 80% below 1990 levels by 2030
- Net zero emissions by 2030
- Net negative emissions by 2035

1-100% Clean Power

- 100% clean, distributed electricity and storage by 2030
- Phase out oil/gas production and subsidies by 2030
- 100% building electrification & efficiency by 2030

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Community Choice Energy -- accelerating adoption of clean energy in CA

ELECTRICITY

DELIVERY

CCA procures clean energy sources IOU delivers energy and maintains the grid

CUSTOMER

Cleaner energy, local control and competitive rates!

20 CCAs serving 11 million Californians- ¼ of state- with 88% clean energy today!

https://theclimatecenter.org/our-work/community-choice/ https://cal-cca.org/cca-impact/

Building electrification

- Buildings account for 40% of global GHG emissions
- Embodied carbon (concrete, steel, aluminum, iron) are 11 % of global GHG emissions
- 20+ California cities have enacted methane gas bans for new buildings
- Moving to zero-emission building codes by 2025

Electric Induction Stove-Shutterstock

https://www.curbed.com/platform/amp/2020/2/4/21112234 /home-power-range-stove-electrification-natural-gas

Embodied Carbon in Construction Calculatorhttps://www.buildingtransparency.org/en/

https://www.forbes.com/sites/pikeresearch/2020/02/06/ new-solutions-emerge-for-embodied-carbon-inbuildings/#4e65204e5c88

2- Sustainable Mobility

- Phase out fossil fuel powered vehicles starting no later than 2025
- 80%+ of Caltrans \$ to sustainable modes of transportation, not freeways, by 2025

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https://www.climateresolve.org/wp-content/uploads/2019/06/CR-Transpo-Doc.pdf

Zero Emissions Vehicles & charging stations growing-- but need much more!

- ZEVs =5% (655k) of CA cars (14.5m)
- 33.4% increase from Oct 2018 to Oct 2019
- Must double current CA goal to reach 10 million ZEVs by 2030

https://www.latimes.com/business/story/2019-12-01/electric-vehicle-salesin-california-on-the-rise-but-is-it-enough-to-reach-the-5-million-goal-by-2030

Nationally: more people getting out of cars Shared micromobility doubled from 2017 to 2018

BARED MICROMOBILITY TRIPS IN 2018

https://nacto.org/2019/04/17/84-million-trips-on-shared-bikes-and-scooters/

3- Healthy Lands and Waters

- Sequester 100+ MMT CO2e annually in healthy soils and vegetation annually by 2030-starting by 2021
 - Carbon farming, ranching & gardening
 - Habitat restoration on land and coast

Carbon Farming, Marin

Kelp forests

https://www.marincarbonproject.org/carbon-farming https://www.carboncycle.org/carbon-farming/ https://www.pointblue.org/our-work/restoration/

Point Blue STRAW project

Carbon farming potential sequestration at scale Example: 21m acres = 20+ MMT/year CO2e for 20 years

CARBON FARM PLANNING in Marin

Assistance is available for We have put too much CO2 SUNLIGHT farmers and ranchers! into the atmoshphere! CARBON Plan for carbon sequestration and CYCLE climate adaptation conservation practices with Marin RCD! PHOTOSYNTHESIS BIOSPHERE Potential List of Conservation CO2 enters the leaf Practice(s)* in a Carbon Farm Plan: Soil Respiration, CO2 is released into atmosphere Compost Application • Anaerobic Digester Silvopasture/ Shrub & Tree Establishment Windbreak/ Shelterbelt/ Hedgerow Riparian and Wetland Restoration Filter Strips • Grassed Waterways Forage & Biomass Planting Rangeland Management Prescribed Grazing and Range Planting he soil to feed soil life! Decaying Organisms are made of carbon. Nutrient Management SOIL ORGANIC Residue & Tillage Management, No-Till MATTER Cover Crops as CO2 is causin acidification and sting shellfish from *NRCS Standard Conservation Practices LITHOSPHERE Fosail Carbon

MARIN CARBON PROJECT Carbon Cycle Institute

Auto &

Power Plant

Marin est cost of roughly \$500/acre-- \$10.5 billion for 21M acres over 10 years with multiple co-benefits for resilience, water, biodiversity and more

Riparian restoration potential at scale Example: 2000 miles (1.5% of CA rivers) => 50 MMT CO2e?

Photo: Point Blue's STRAW program; Lewis, D.J., et al. 2015. Creek carbon: Mitigating greenhouse gas emissions through riparian restoration. UC Coop Ext, Marin County. Novato, CA. 26 pgs. <u>http://ucanr.edu/sites/Grown_in_Marin/files/224684.pdf</u>; \$1 billion at cost of \$20/ton CO2e; 1 mile=25,947 tons CO2e

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4- Climate–Safe Communities

- Fund implementation of resilience plans in all California counties and cities by 2025
- Implement *clean* energy community microgrids with EV storage, starting with critical facilities in lower income communities by 2021

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https://microgridknowledge.com/tribal-microgrid/

PG&E planned new methane gas back-up generators

Land Info (Sg ft.)					
		Potential Land/Site	Outside		
Substation	Peak Load	Identified	Substation Fence	Latitude	Longitude
SAN RAFAEL	69.9	Y	62,000	37.9706527	-122.5272077
HIGHWAY	50.0	Y	85,000	38.16608965	-122.2535906
MOLINO	33.8	N		38.42533288	-122.8322634
ALTO	31.8	Y	96,500	37.89839799	-122.5249516
LAS GALLINAS A	33.4	N		38.02238116	-122.5381475
FORT BRAGG A	13.8	Y	15,000	39.43477268	-123.7994643
IGNACIO	30.5	Y	1,260,000	38.07665096	-122.5404603
WILLITS	15.2	Y	46,772	39.40556241	-123.3270646
CARQUINEZ	11.9	Y	63,600	38.09103762	-122.2483861
GREENBRAE	23.5	Y	50,000	37.93799601	-122.5143516
WINDSOR	22.3	Y	130,000	38.565927	-122.832315
KONOCTI	14.5	Y	61,570	38.93235913	-122.741004
BRUNSWICK	60.3	Y	71,330	39.23103074	-121.0349999
UKIAH	17.5	Y	73,181	39.14314429	-123.1918136
CLEAR LAKE	14.1	N		39.00783962	-122.8939866
TYLER	15.3	Y		40.13838296	-122.20884
CLOVERDALE	16.5	Y		38.79725991	-123.0103812
HIGHLANDS	24.7	Y	30,000	38.93702324	-122.6089758
MIDDLETOWN	15.5	Y	36,189	38.75277959	-122.6087491
BIG RIVER	4.0	N		39.31138519	-123.7865885

PG&E Substations for DGEMS Phase

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Instead of perpetuating a 100-year old grid architecture...

...Vulnerable transmission network prone to failure and likely to start wildfires...

...let's build a new integrated, decentralized grid

Clean, Affordable, Resilient, Equitable and Safe

...starting with critical facilities serving lower income communities and homes for medically dependent

49 major state government buildings 92 refrigerated food warehouses 147 digital TV transmitters 225 local emergency operational centers 273 AM towers 535 urgent care facilities 570 hospitals 728 colleges and universities 1,013 law enforcement facilities 1,751 passenger transportation terminals 1,193 cell towers 3,182 nursing homes 3,139 emergency medical service facilities 3,209 fire stations & equipment depots 10,465 public schools 12,388 child care centers

5- Green Finance

- New progressive financing mechanisms to produce additional \$20+ billion/year specifically for climate action
 - Frequent flyer fee e.g., \$2.4 billion from \$10 per passenger x 240 million (in CA in 2018)
 - Green bonds
 - Progressive carbon taxes (e.g., fee and dividend)

Carbon Fee & Dividend: Charge for Pollution, Return Funds to Economy

A carbon fee & dividend policy

From Citizens Climate Lobby/Jerry Hinkle

Good For The Economy/Society

Economists' Statement on Carbon Dividends:

- Polluting Cannot Be Free!
- Climate, health and regulatory benefits greatly exceed any costs.

From Citizens Climate Lobby/Jerry Hinkle

Economists' Statement on Carbon Dividends

Global chinate change is a serious problem calling for immediate national action. Guided by sound economic principles, we are united in the following policy recommendations.

L. A carbon tax offers the most cost-effective lewer to reduce carbon emissions at the scale and speed that is necessary. By correcting a well-known market failure, a carbon tax will send a powerful price signal that harnesses the invisible hand of the marketplace to steer economic actors towards a low-carbon future.

II. A carbon tax should increase every year until emissions reductions goals are net and be revenue neutral to avoid debates over the size of government. A consistently using carbon price will encourage technological innovation and large-scale infrastructure development. If well also accelerate the diffusion of carbon-efficient goods and services.

III. A sufficiently robust and gradually rising carbon tax will replace the need for various carbon regulations that are less ethicient. Substituting a price signal for combensome regulations will promote economic growth and provide the regulatory certainty companies need for long- term investment in clean-energy alternatives.

IV, To prevent earbon leakage and to carbon adjustment system should be established This system would enhance the competitiveness of American firms that are more energy-efficient than their global competitors. It would also create an incentive for other nations to adopt similar earbon priving.

V. To maximize the farmess and political viability of a rising carbon tax, all the revenue should be returned directly to U.S. eithems through equal lump-sum rebates. The majority of American families, including the most vulnerable, will benefit financially by receiving more in "carbon dividends" than they pay in increased energy prices.

Climate-Safe California Clean, Healthy, Equitable, Resilient and Affordable

HOW will we ensure California becomes a global leader in rapid decarbonization?

The Climate Center's Theory of Change

ACTIVISTS \rightarrow POLICY CHANGE \rightarrow MARKET FORCES \rightarrow BEHAVIOR CHANGE \rightarrow IMPACT

Build an unprecedented cross-sectoral coalition of climate advocates demanding accelerated, equitable climate policies to unleash market forces and change behaviors for speed & scale GHG reductions

Raising \$25 million over the next 5 years including \$2m by summer 2020 to:

- Establish and support a diverse statewide Rapid Decarbonization Partnership
- Develop science-based pathways & policies
- Establish legislative advocacy presence in Sacramento
- Identify climate opinion leaders and other influencers
- Mobilize target communities through NGOs, house meetings and social media
- Launch a strategic communications effort

We can- and are- making a difference!

Be bold, take risks and innovate for a healthy, equitable future

Demand that California commit to 80% below 1990 levels & net zero emissions by 2030, and net negative emissions by 2035

Support AB 345: Environmental Justice – regulating oil & gas operations

Contact Governor Newsom at: https://govapps.gov.ca.gov/gov40mail/

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Ask your state legislators to support Community Energy Resilience

Fund Community Energy Resilience Planning

- New effort to provide funding and expert support to all California local governments to plan and implement local energy resilience
- Prioritize lower income communities

Enact Utility Reform: Transition to Open Access Distribution System Operator Model

- Transition to a distribution "wires-only" utility that provides a platform for decentralized energy and independent clean energy sales
- Make electric distribution utilities a more resilient, decentralized future grid

Other actions you can take:

- Get involved in local government & speak out to your elected officials
- Divest and invest for a climate-safe future gofossilfree.org & fossilfreefunds.org
- Make energy efficiency/electrical improvements to your home, including wiring for EV charging
- Ditch the SUV and your next car an EV, plan to use it as back-up power source
- Ask your Town Council to develop, implement and fund a Community Energy Resilience Plan and Climate Action Plan
 - Amend General Plan to streamline solar, storage and EV charging on public streets

Other actions you can take:

- Reduce airplane travel and enjoy staycations
- Purchase/lease solar, wind or 100% green power
- Use mass transit, shared transit, e-bikes and other micromobility
- Insulate home, install insulating windows & doors
- Switch to electric appliances & hot water heaters, heat pumps
- Engage young people in education, restoration
- Refuse, reduce, reuse, take action!

VISIT: https://theclimatecenter.org/what-youcan-do-to-reverse-the-climate-crisis/

One person can make a difference!

SKOLSTREJK FOR KLIMATET

Renewable energy now doubling every 5.5 years globally; 4x more than 10 years ago

- Solar 26x more than 10 yrs ago
- Clean energy w/ hydropower = 26.3% of total electricity produced globally

Global Trends in Renewable Investment 2019 <u>http://fs-unep-centre.org/research/report</u> Johan Rockström et al. **A roadmap for rapid decarbonization**. *Science*, 2017; 355 (6331): 1269 DOI: <u>10.1126/science.aah3443</u>

30 major cities globally have peaked their GHG emissions

Oct 2019: Global GHGs must peak by 2020 in order to limit global temperature rise to 1.5°C. <u>https://www.businessgreen.com/news/3082404/c40-30-major-cities-have-already-peaked-their-emissions</u>

CA first state to reach net negative emissions

Kickstarts nation & world into speed & scale climate action

February 2030

Che New Hork Eimes **Global Climate Union** Authorizes \$420 Trillion in Healthy Planet Accords; On Track to 350 PPM and a Safe Climate

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VOL. CLXV ... No. 57.345

By MARK LANDLER and JANE PERLEY Sunrise party wins presidency the world's two largest economies those who want to build more a

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Ecosystems and Communities Healthy & Resilient, Soils and Vegetation Sequestering Carbon at Scale; Wildlife Populations Recovering

By JUSTIN GILLIS

NORFOLK, Va. - Hage vertical rulers. are aproximg beaule low spore in the structs have, so people can judge if the milof floods that percentrally incredute their roads are too doop to drive through

Fire baseled males down the Atlantic Count, the only road to Types Island, Ga. is disappearing beneath the soa several ternes a year, statting the town off from that

And another 500 miles on, in Fort Lauderidate, Fig., increased radal flooding in invited the cars on stand of an

Tuesday, November 6, 2040

Now, those stamings are no inerger theoretical: The insenduction of the coast has begun. The sea has crept up to the point that a high tide and a brink wind are all it. tukes to send woter pouring into streets.

Federal scientists have documented a sharp samp in this muisance flooding - often called "summy-day flooding" -- along both the East Coast and the Gulf Coast in recent years. The sea is now so near the bran in many places that they believe the problem is likely to worsen

PARTY DESIGNATION CONTRACTOR

recently caused extensive flowling Louistana. Scientiers say these raises as also a consequence of human grow CTURE BARRIES

"Once impacts become noticesh they're going to be upon you quickly," na-William V. Steenst, a scientist with the N tional Oceanic and Atmospheric Admin tration in Silver Spring, Md, who is

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Northern California: Constal Jaw

through to start. Namedance other wines Marks in the reid-film on the count in

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⁴Look again at that dot. That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives.... To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we've ever known."

Carl Sagan, Pale Blue Dot: A Vision of the Human Future in Space

Thank you!

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