# Under 2 Degrees Celsius:
# Fast Action Policies to Protect People and the Planet from Extreme Climate Changes

**Chair:**

- Helena Molin Valdés, Head of the Climate & Clean Air Coalition (CCAC) Secretariat

**Panelists:**

- V. Ramanathan, Chair of the Committee & Distinguished Professor at Scripps
- Durwood Zaelke, Chair of the Committee & IGSD President
- Daniel Kammen, Distinguished Professor of Energy, University of California Berkeley
- Ken Alex, Office of California Governor Jerry Brown
- Jacqueline MacGlade, UN Environment Chief Scientist
- Maria Neira, World Health Organization Director

V. Ramanathan

Chair of the Committee & Distinguished Professor at Scripps

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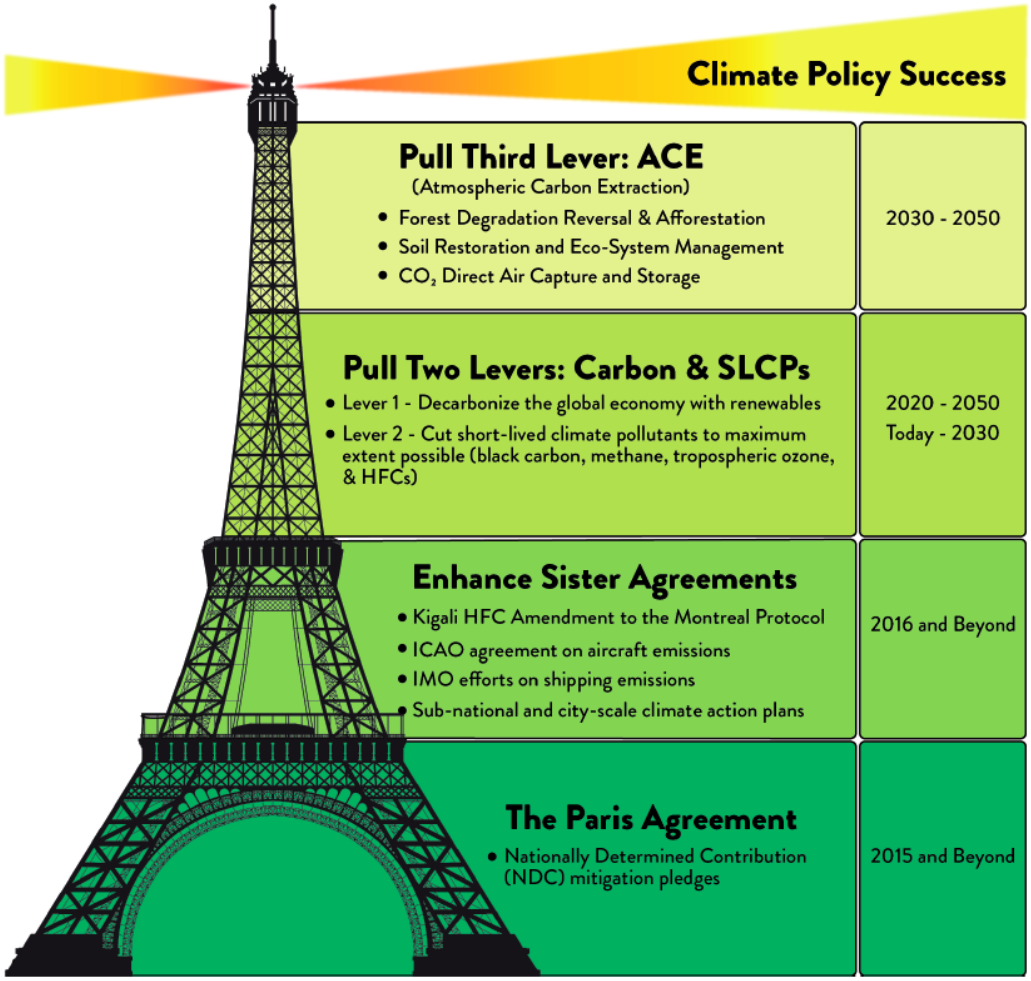
# Fast Action Policies to Protect People and the Planet from Extreme Climate Changes

Report from the Committee to Prevent Extreme Climate Change
Chairs: V. Ramanathan, M. J. Molina and D. Zaelke

Released at COP22 Summit at Marrakech, 14 November 2016



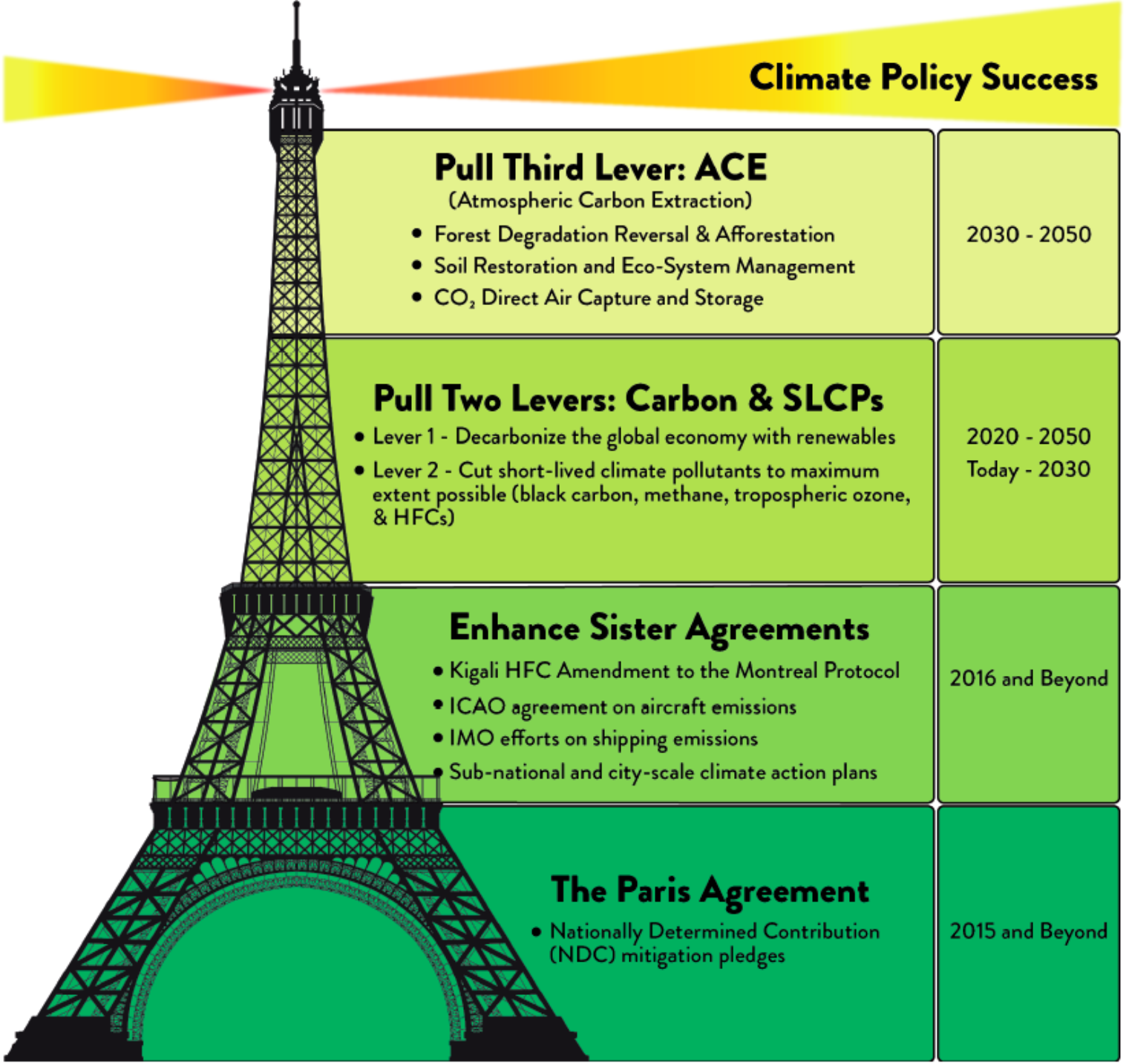
# The Committee to Prevent Extreme Climate Change (CPECC)

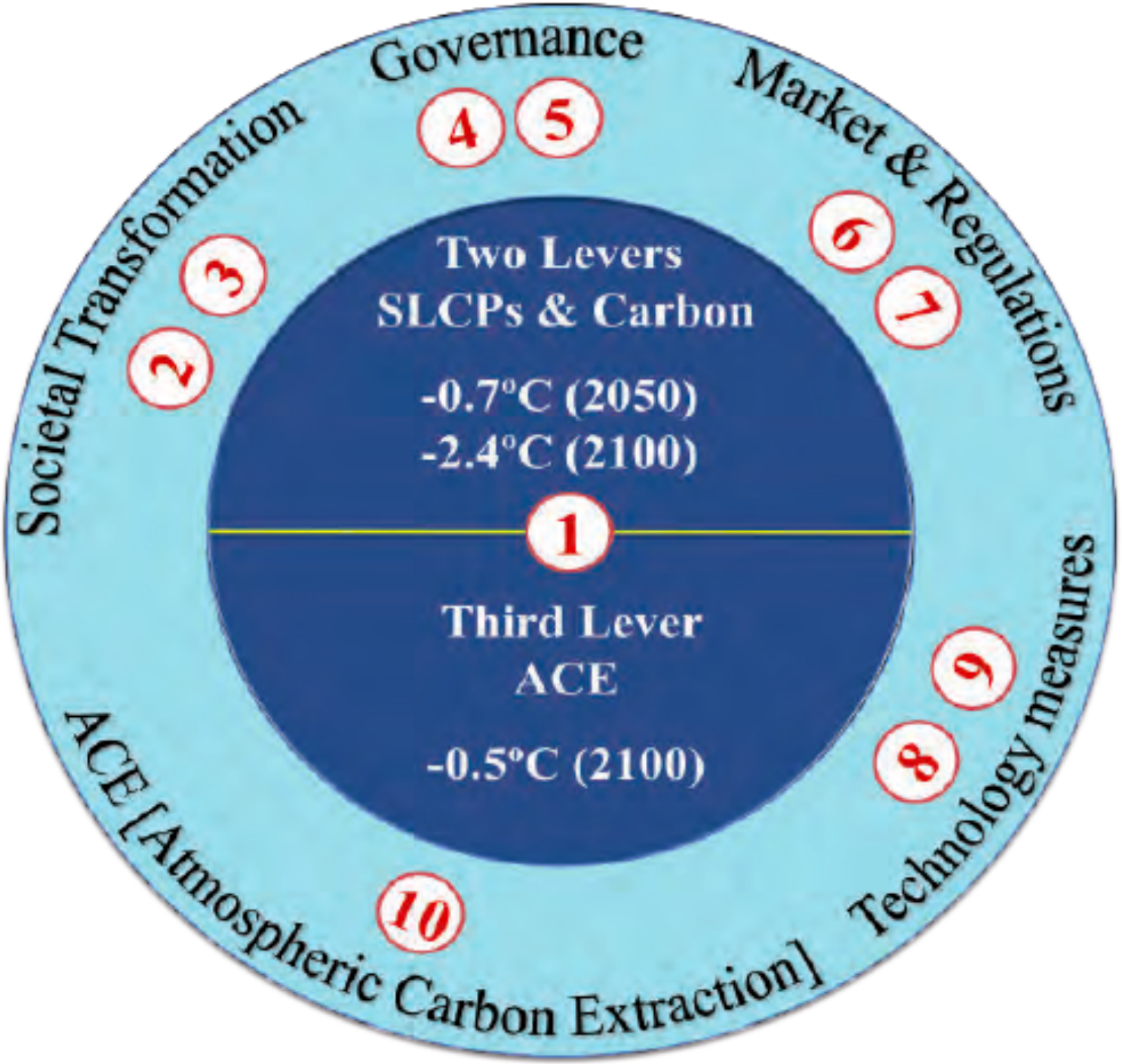
## Co-Chairs:

V. Ramanathan, M.J. Molina, D. Zaelke

## Task Force Members:

1. Ken Alex, California Governor's Office
2. Max Auffhammer, UC Berkeley
3. Paul Bledsoe, Bledsoe & Associates
4. Nathan Borgford-Parnell, IGSD
5. William Collins, UC Berkeley
6. Bart Croes, California Air Resources Board
7. Fonna Forman, UC San Diego
8. Örjan Gustafsson, Stockholm University
9. Andy Haines, London School of Hygiene & Tropical Medicine
10. Reno Harnish, UC San Diego
11. Mark Jacobson, Stanford University
12. Shichang Kang, Chinese Academy of Sciences
13. Mark Lawrence, IASS Potsdam
14. Damien Leloup, Scripps
15. Tim Lenton, University of Exeter
16. Tom Morehouse, National Renewable Energy Laboratory
17. Walter Munk, Scripps Institution of Oceanography
18. Romina Picolotti, CEDHA
19. Kim Prather, UC San Diego
20. Graciela Raga, National Autonomous University of Mexico
21. Eric Rignot, UC Irvine
22. Drew Shindell, Duke University
23. AK Singh, Retired Air Marshal & Former Commander in Chief of Indian Air Force
24. Achim Steiner, Oxford University
25. Mark Thiemens, UC San Diego
26. David W. Titley, Retired Rear Admiral United States Navy
27. Mary Evelyn Tucker, Yale University
28. Sachi Tripathi, IIT Kanpur
29. David Victor, UC San Diego
30. Yangyang Xu, Texas A&M


Climate Policy Success
Pull Third Lever: ACE
(Atmospheric Carbon Extraction)
• Forest Degradation Reversal & Afforestation
• Soil Restoration and Eco-System Management
• $CO_2$ Direct Air Capture and Storage
2030 - 2050
Pull Two Levers: Carbon & SLCPs
• Lever 1 - Decarbonize the global economy with renewables
• Lever 2 - Cut short-lived climate pollutants to maximum extent possible (black carbon, methane, tropospheric ozone, & HFCs)
2020 - 2050
Today - 2030
Enhance Sister Agreements
• Kigali HFC Amendment to the Montreal Protocol
• ICAO agreement on aircraft emissions
• IMO efforts on shipping emissions
• Sub-national and city-scale climate action plans
2016 and Beyond
The Paris Agreement
• Nationally Determined Contribution (NDC) mitigation pledges
2015 and Beyond


Governance
Market & Regulations
Technology measures
ACE [Atmospheric Carbon Extraction]
Societal Transformation
4
5
6
7
8
9
10
2
3
Two Levers
SLCPs & Carbon
-0.7°C (2050)
-2.4°C (2100)
1
Third Lever
ACE
-0.5°C (2100)

# ***Next Steps***

1) ***High- Level summary is based on data presented in 2 documents***
   a) ***Policy's makers summary (about 30 Pages).***
   ***Will be online for public's comments [December 10, 2016]***
   ***b) Technical Report (About 200 pages)***

2) ***We are using Marrakech- COP 22 to get public's (includes Media) comments on what is important for the public, so we can improve the report.***

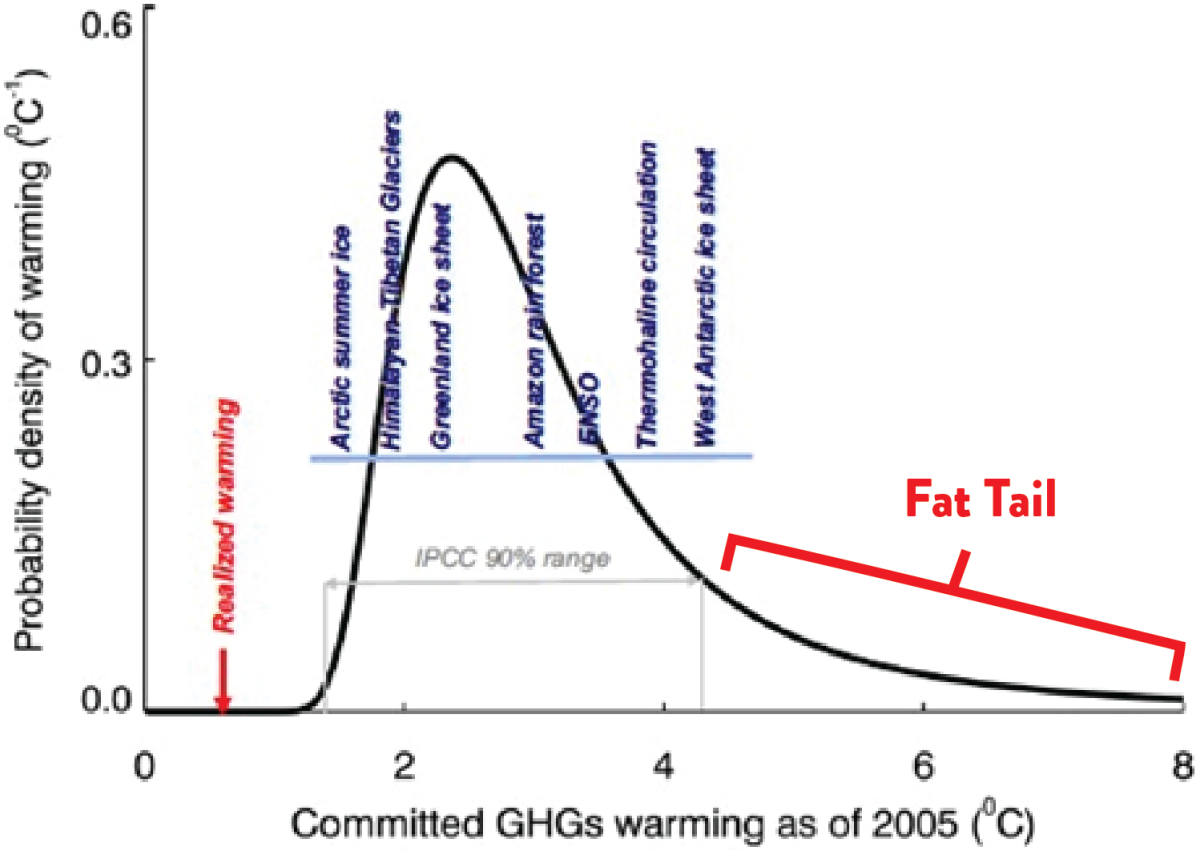
3) ***The finalized full summary, consisting of High Level Summary and Policy Makers summary will be online after Jan 15.***

***4) The summary and the technical report are living documents to be updated as required.***


Institute for Governance & Sustainable Development

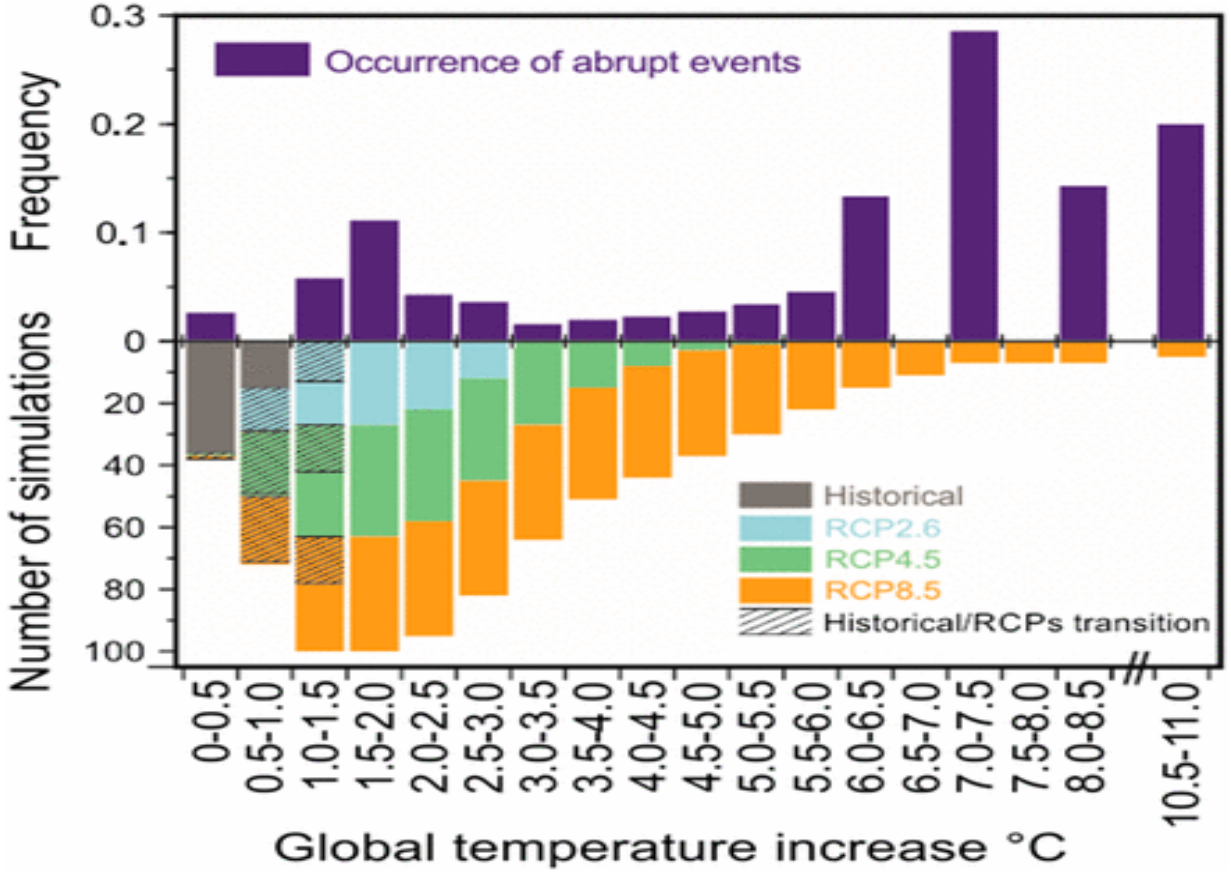
Durwood Zaelke

Chair of the Committee & IGSD President




Ramanathan V. and Feng Y. (2008). On avoiding dangerous anthropogenic interference with the climate system: formidable challenges ahead. Proc. Nat'l Acad. Sci. USA 105(38):14245–14250.

The difference between 1.5C and 2C is profound. We are reasonably safe at 1.5 but as we go past that there is a cluster of 18 tipping that will both accelerate warming and cause huge climate impacts and human suffering.




Drijfhout S., et al. (2015). Catalogue of abrupt shifts in Intergovernmental Panel on Climate Change climate models. Proc. Nat'l Acad. Sci. USA. 112:E5777–E5786.

Renewable & Appropriate Energy Laboratory
RAEL

# Under 2 Degrees Celsius: The Third Lever (2030 – 2050)


## Professor Daniel Kammen

**Energy and Resources Group | Goldman School of Public Policy**
**Director, Renewable and Appropriate Energy Laboratory**
**University of California, Berkeley**

**Science Envoy for the U. S. State Department**


Berkeley
UNIVERSITY OF CALIFORNIA

http://rael.berkeley.edu

http://rael.berkeley.edu


Emphasize lever 2:
We now have the technology base & emerging policy know-how to implement whole-system transformation of electricity systems worldwide.
rael.berkeley.edu/project/SWITCH

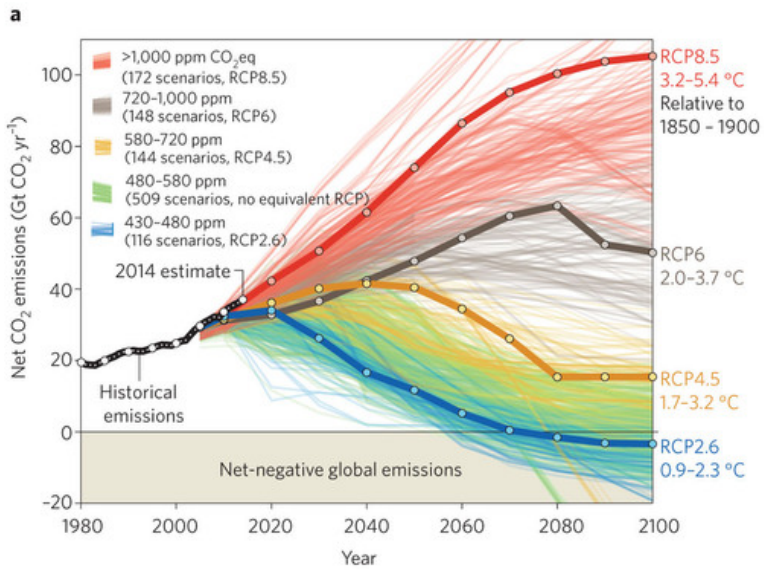
1. Reversal of Forest Degradation

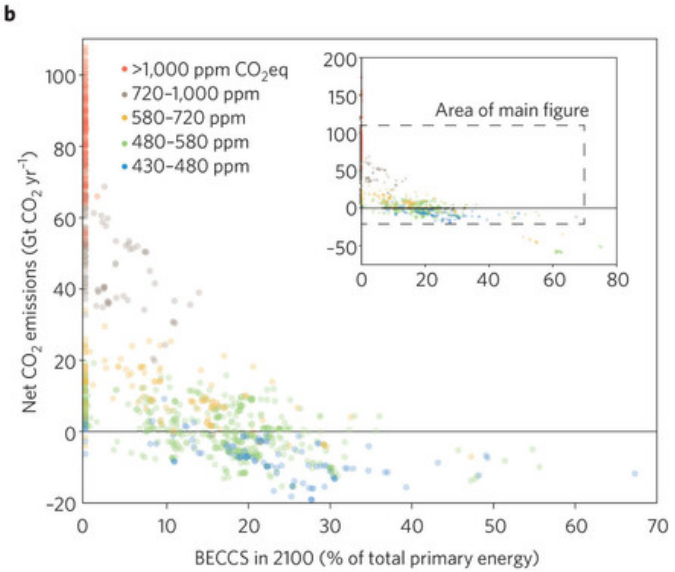
Is a human rights and a development issue;

We must invest in sustainable land use by empowering

Charcoal production from illegally harvested trees, Kenya

# 3. Carbon Extraction to be Studied

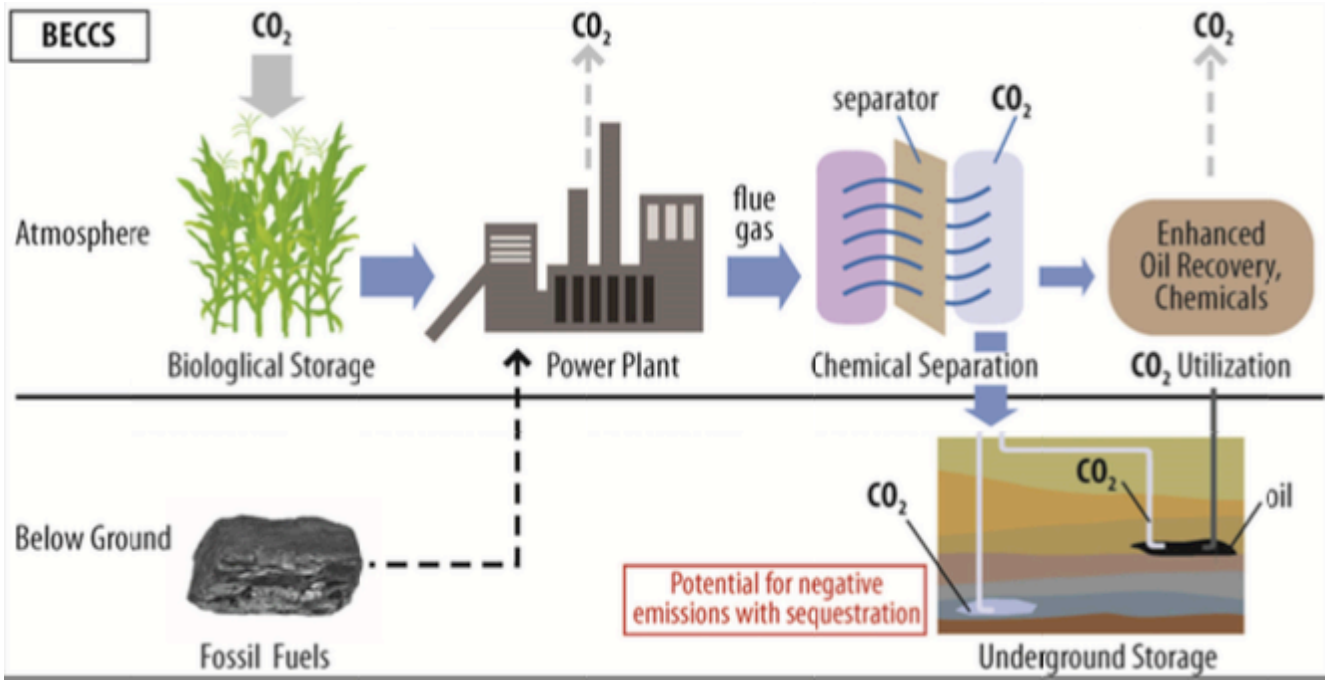



Fuss et al. (2014)

**rael.berkeley.edu/project/SWITCH**

# One Carbon-Negative Pathway: for Study




Sanchez and Kammen, 2016