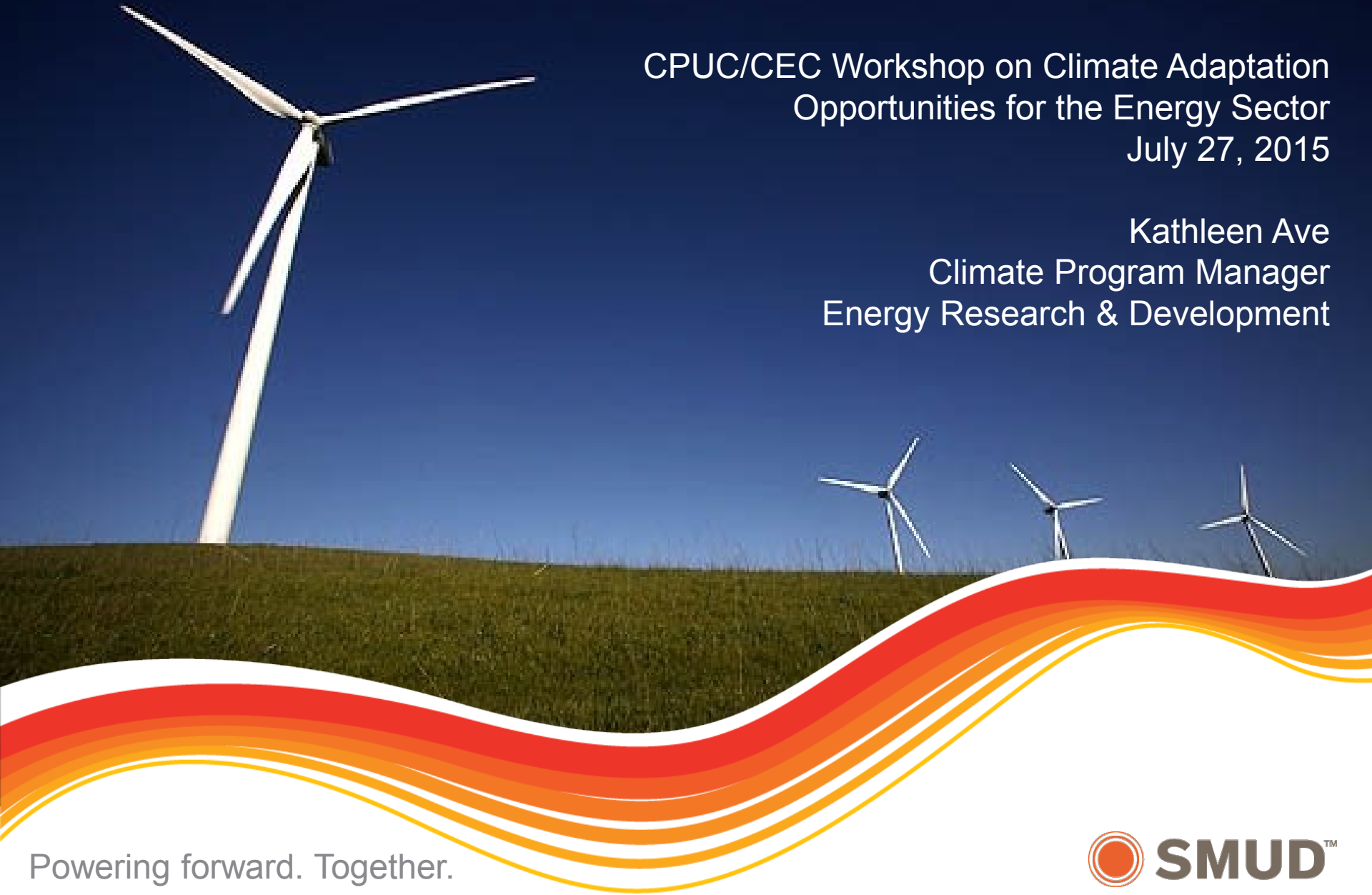
Regional Collaboration & Climate Readiness



CPUC/CEC Workshop on Climate Adaptation
Opportunities for the Energy Sector
July 27, 2015

Kathleen Ave
Climate Program Manager
Energy Research & Development

Powering forward. Together.

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Overview

- SMUD's Climate Readiness Effort
- Regional and Industry Collaboration
- Capital Region Climate Readiness Collaborative
- Projects & Funding
- Needs

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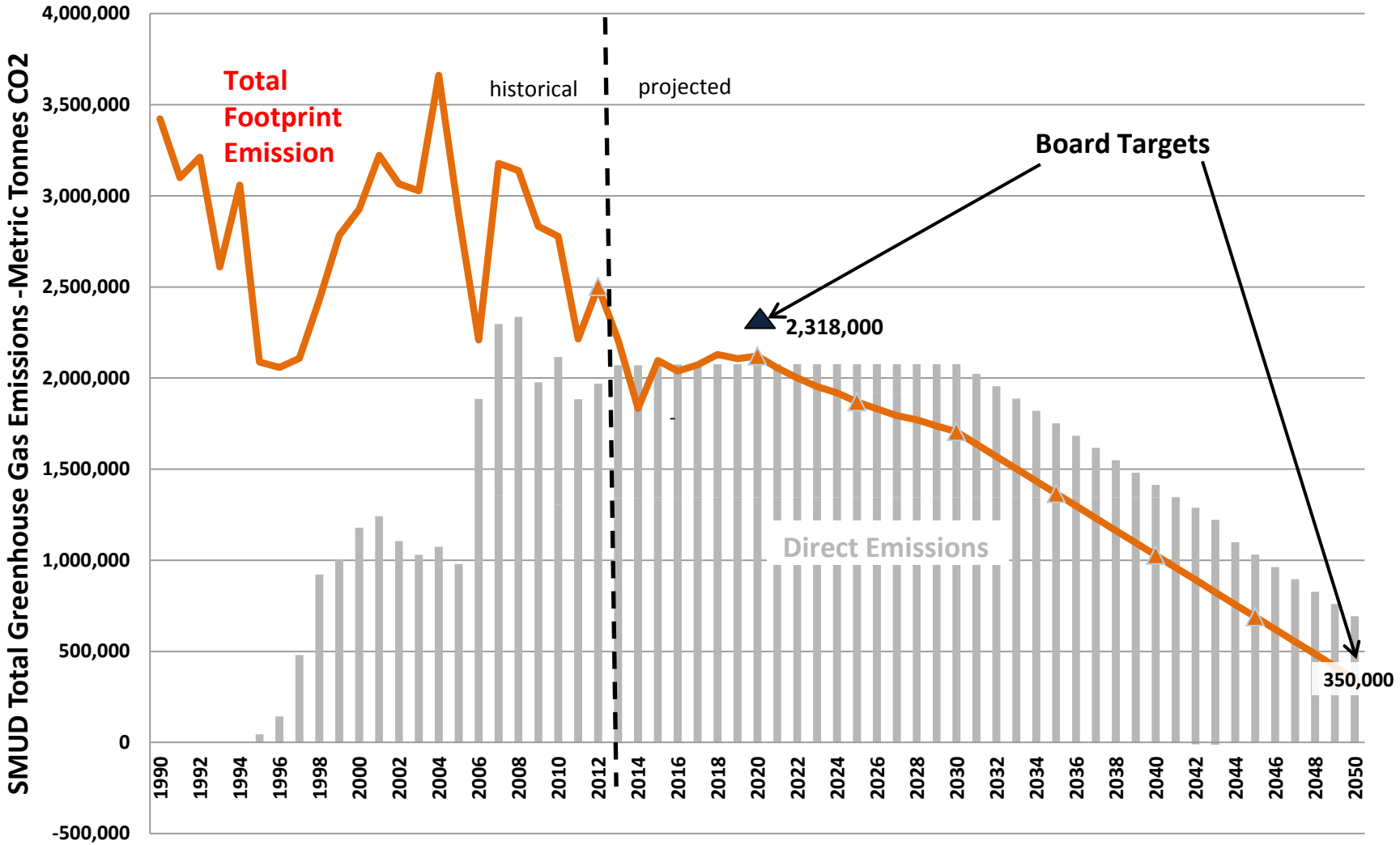
SMUD Board Greenhouse Gas Emissions Targets for SMUD Retail Load through 2050 - 90% below 1990 levels



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"…the way that I lost my health over time, that I became weaker with each battle, made me rely more on my skill than on any silly piece of armour or potion… the levelling up must come from within the player, skill is not a matter of more ***loot***, but of ***patience and smarts***."

Emergency Response and Disaster Relief & Recovery cannot address long-term planning and infrastructure needs

Source: Daniel Neville http://nevolution.typepad.com/theories/ludofication/
Image: Superbrothers Sword & Sworcery

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Understanding Risks & Informing Decisions

Track as Enterprise Risk
Use in all long term planning (> 5 yrs)
Conduct additional R&D
Participate in community collaborative
4 year update cycle

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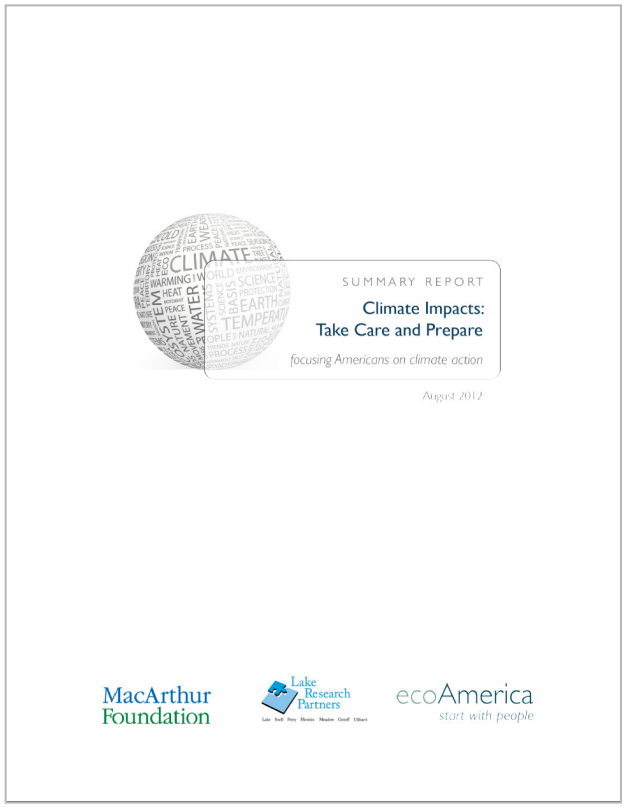
Why “Readiness”?



- Adaptation not well understood among general public
- “Readiness” better conveys the desired end state and that action is required (“Preparedness” is best)

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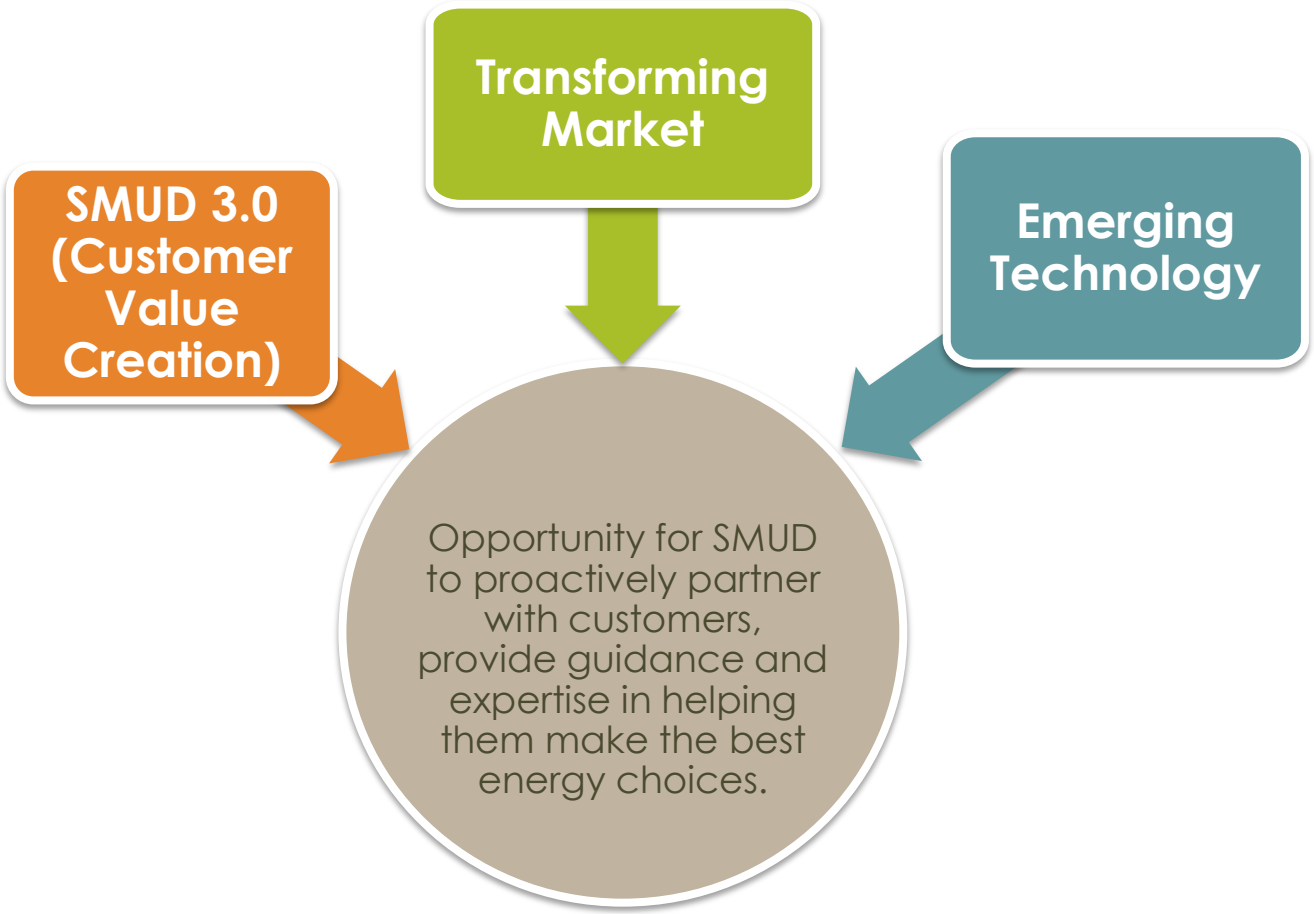
Why Prepare? Objectives

- To assist SMUD's workforce *and our community of customer owners* to prepare for changes in climate and weather in our region, some of which are already happening.
- To enable SMUD to manage many of these changes and prepare for those beyond our control, helping to prevent unnecessary risks.

Transitioning to a Future-Ready Utility



Sustainable Power Supply…RPS…EE…EV…DER…More than Smart

Climate Readiness

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From Community Partners:

We have a strong reputation

But opportunities exist

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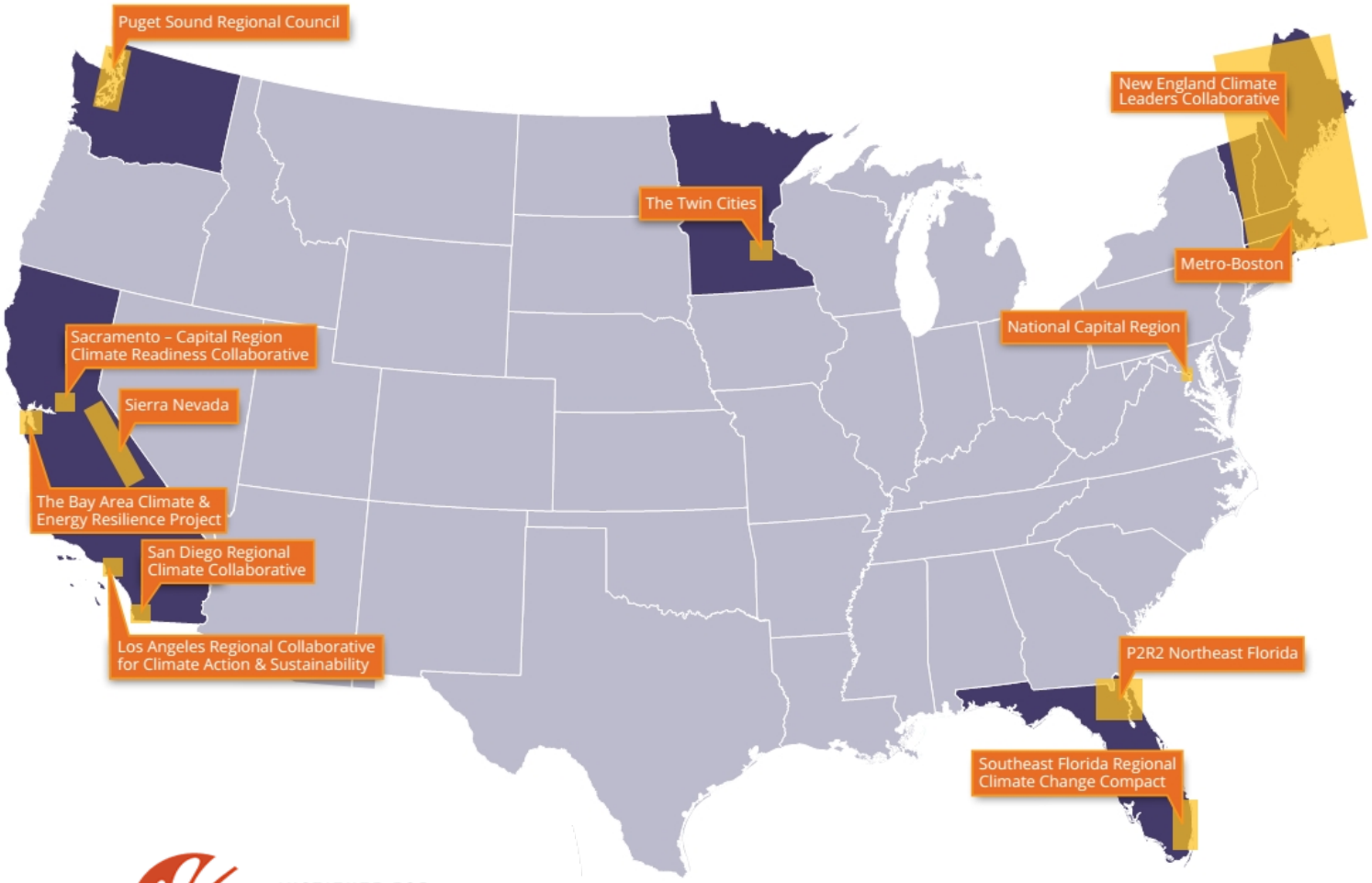
“Think Resiliently, Act Regionally” October 2014



INSTITUTE FOR Sustainable Communities

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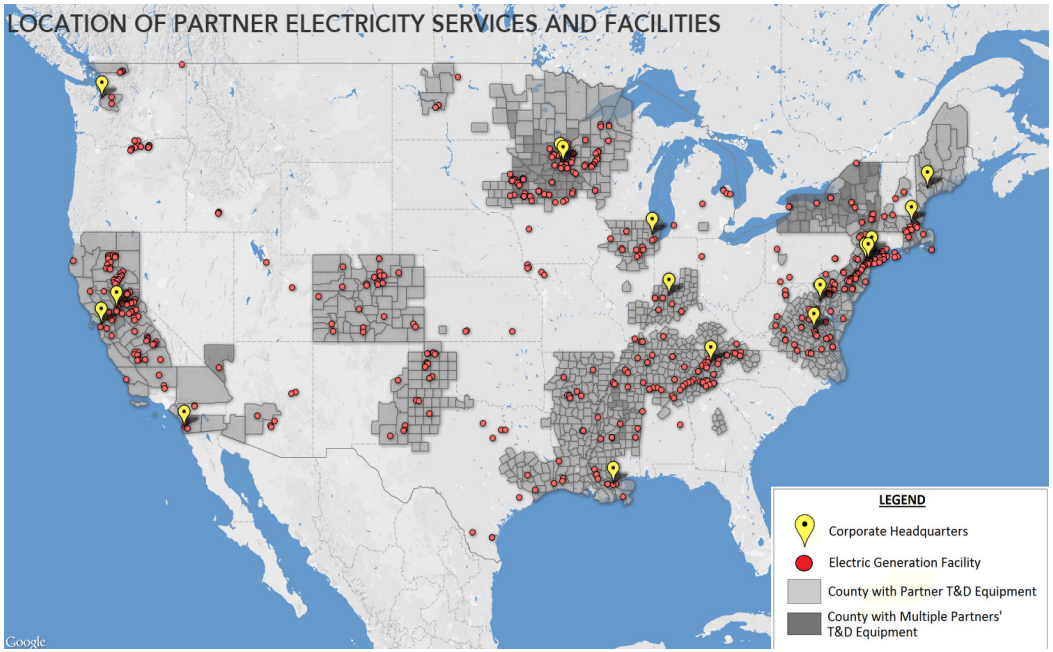

DOE Partnership for Energy Sector Climate Resilience

Health Care Climate Council

Healthcare Without Harm

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CAPITAL REGION
CLIMATE READINESS
COLLABORATIVE

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Local Government Commission

UCDAVIS
POLICY INSTITUTE FOR ENERGY, ENVIRONMENT AND THE ECONOMY
Leveraging university expertise to inform better policy

City of SACRAMENTO

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SACRAMENTO TREE FOUNDATION

VALLEY VISION
Connect. Partner. Impact.

Davis *California*

PG&E *Pacific Gas and Electric Company®*

in progress:

ASCENT ENVIRONMENTAL

SACRAMENTO COUNTY

SACOG

CAPITAL REGION
CLIMATE READINESS
COLLABORATIVE

Goals

- **Protect and strengthen** the Capital Region's people, economy, resources, and heritage.
- **Build a network** for regional cooperation across sector and jurisdictional boundaries to share information and ideas

- **Amplify the voice** of the Capital Region at the state and national level in emerging and ongoing discussions and planning
- **Help members** identify, apply for and access funding for important regional priorities.

CAPITAL REGION
CLIMATE READINESS
COLLABORATIVE

Projects

The Capital Region Business Resiliency Initiative

Disaster Preparedness Toolkit

40% to 60% of small businesses **never reopen** after a major disaster

…and 57% of businesses have **no disaster recovery plan**

resilientbusiness.org

VALLEY VISION
Connect. Partner. Impact.

CivicSpark

Climate Ready Region: Cool Roof KickStart

For Discussion with the
Capital Region Climate Readiness Collaborative
July 9, 2015

Powering forward. Together.
Photo credit: carbonboy

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Addressing Climate Change Adaptation in Water Resource Management: A Case Study of the Sacramento Region

Sacramento River (top); Folsom Dam and American River Watershed (bottom)
Google Earth imagery (2014). SIO, NOAA, U.S. Navy, GNA, GEBCO, Landsat, Google, Map data. [April 28, 2014].

Advanced Policy Analysis

A study conducted for the Capital Region Climate Readiness Collaborative, Sacramento, California

Rapichan Phurisamban
Goldman School of Public Policy
University of California, Berkeley
May 2014

UCDAVIS POLICY INSTITUTE FOR ENERGY, ENVIRONMENT AND THE ECONOMY

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

CAPITAL REGION CLIMATE READINESS COLLABORATIVE

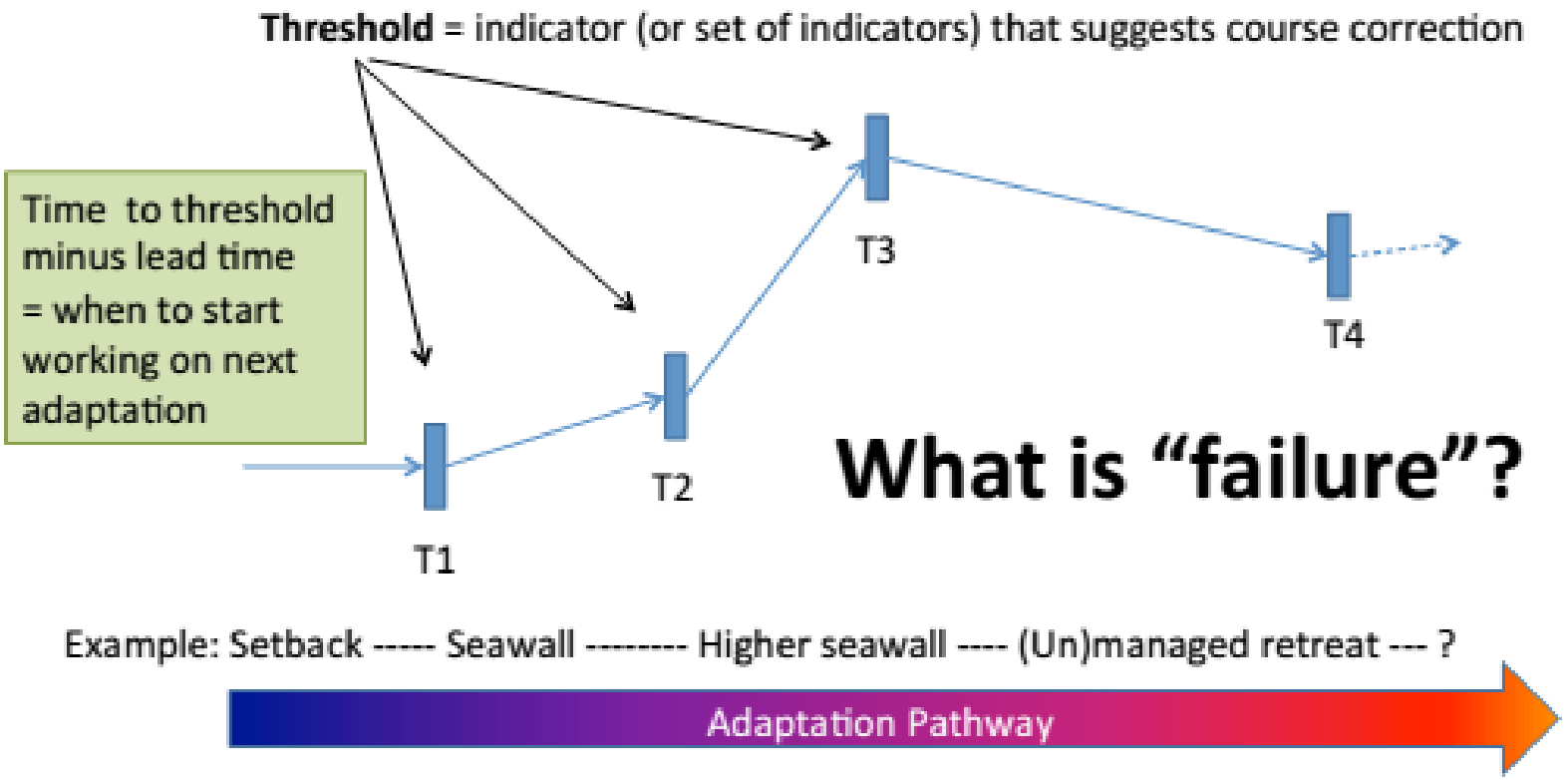
CAPITAL REGION
CLIMATE READINESS
COLLABORATIVE

Questions for the region to answer together

- What are best practices for addressing climate challenges ?
- How will we deal with storms of increased strength?
- Where should we plan for growth and development?
- What is the value of improved stormwater systems and other resilient infrastructure?
- How will we ensure all communities stay safe and healthy?

What does success look like?

Coping? Protection? Bounce back? Expansion of health?



Source: Suzanne Moser

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Organizational Culture:

What people do when no one tells them what to do

- Geoff Colvin

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Integration must be engineered…

Energy

Public Health

Food & Ag

Water Supply & Flood

Trans-port

Waste H2O & Solid Waste

It is not the norm

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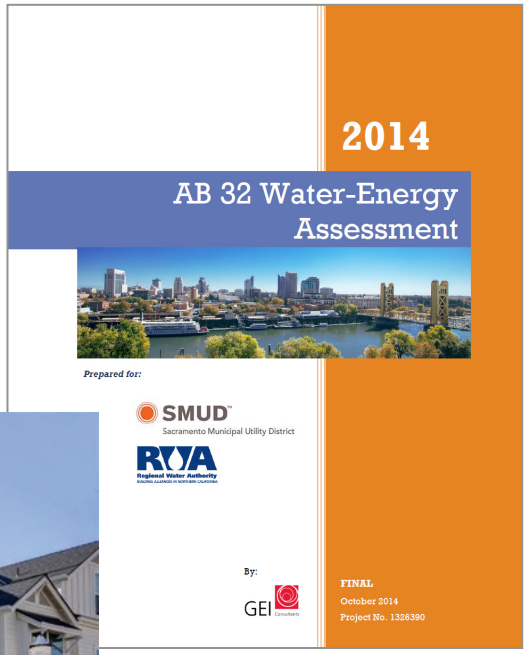

Contemporary Power Associates & P4P Energy

"opportunities to leverage SMUD capital investments to achieve broader community resilience, placemaking and infrastructure objectives"

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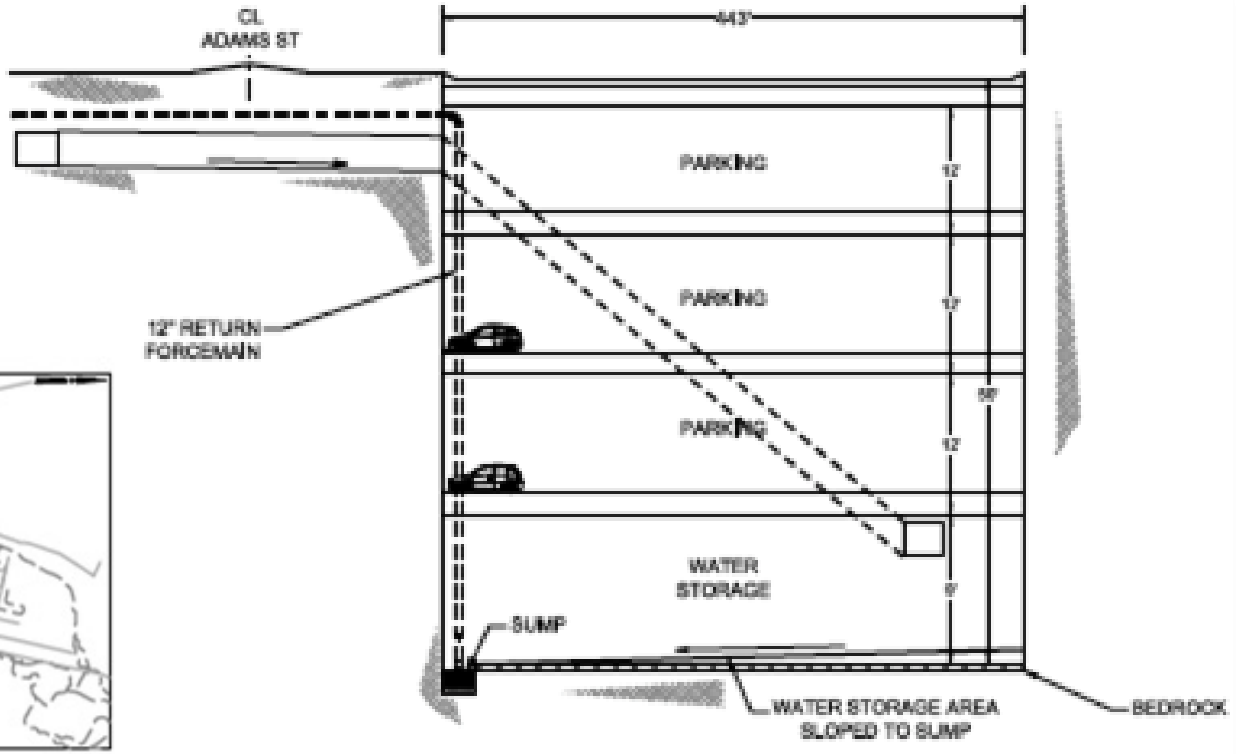
HOBOKEN, NJ

re:FOCUS PARTNERS

STORMWATER STORAGE + PARKING + GREEN INFRASTRUCTURE

VICINITY MAP
NTS



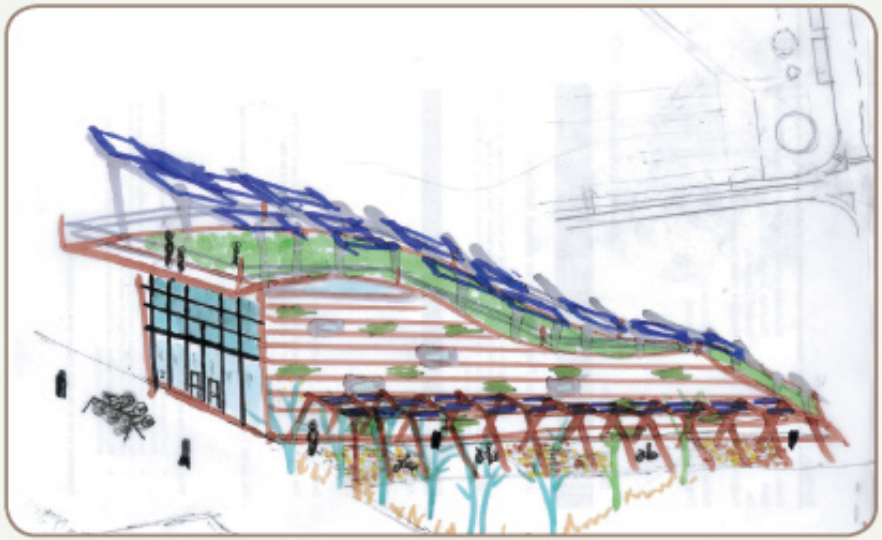
SECTION
UNDERGROUND STORM WATER
MANAGEMENT DETENTION
B
NTS

RE invest investing in resilience. reinvesting in communities.

www.reinvestinitiative.org

"COSMO" by architect andrés jaque is engineered to filter and purify 3,000 gallons of water over a four-day cycle and demonstrate that previously "hidden" infrastructure can be interesting and even beautiful. Installed at MOMA PS1 June 2015

El Paso, TX Innovation District, co-located with El Paso Water Utilities Desalination Plant and powered by solar



Texas Tech University College of Architecture
Innovation Park Design Charrette Drawings

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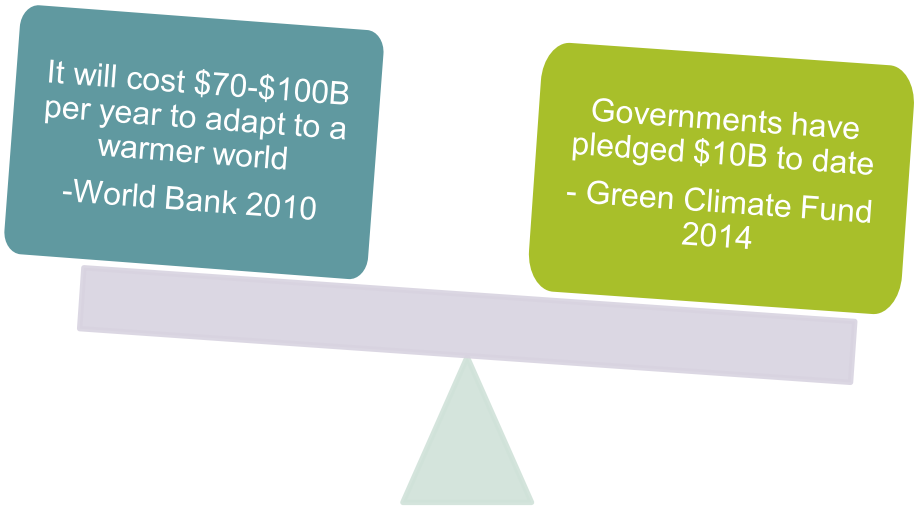
Funding



- Mobilizing private capital is critical, but distributed and networked solutions are not well understood
- Multiple benefits can generate multiple revenue streams
- “Co-benefits” and risk avoidance represent value to be aggregated and monetized

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The Challenge

- Property Assessed Clean Energy (PACE)
- Community Choice Aggregation (CCA)
- Energy Performance Districts
- ARRA-revolving loan funds
- Municipal Water Districts/Agencies
- Streetlight Districts/Agencies
- IOU's Local Capacity Reqs Requests for Offerings

- Air Resources Board
  - '15-16 $230M
- Caltrans (Dept of Transportation)
  - $25M Transit Operation '15-16
  - $9.8 million
  - Planning Grants '15-16
- Strategic Growth Council
  - AHSC '15-16 $125M
- CA Public Utilities Commission
  - LGPs '13-14 $154,207,233
- Dept of Water Resources
  - $30M '15-16 Water & Energy Efficiency Cap and Trade funding
- CA Energy Commission
  - ARRA '12 $52M
  - Energy Challenge $13M '16
  - ECAA loans $367M '79-'15

We need:

- Smarts:
  - Expanded utility participation in regional climate collaboratives
  - New models for interagency coordination that address shared risks and benefit common customers
- Patience:
  - Significant learning curves
  - Organizational culture shifts to expand focus beyond energy
  - Recognition that “failure” will happen
- Loot:
  - Coordinated funding sources that incentivize collaboration
  - New funding streams and financing options (monetization of natural capital and risk avoidance)
  - Mobilization of private capital for distributed & networked solutions

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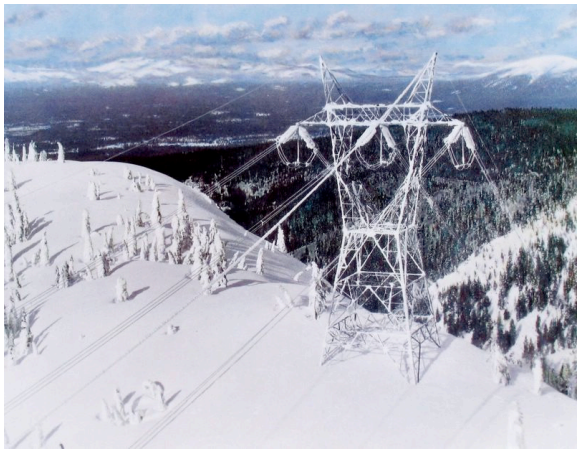
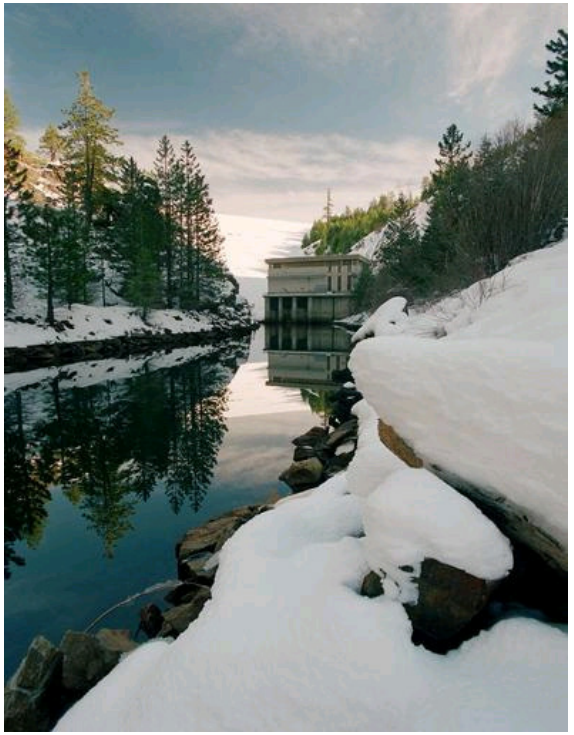
Thank you
kathleen.ave@smud.org
@AveKathleen

SMUD Energy Resources

Distributed Solar – 50MW rooftop, 100 MW groundmount



COTP Transmission to NW – 1600 MW



Upper American River Hydro Project – 688 MW

Biomass -203 MW

Solano Wind – 230 MW

Natural Gas Combined Cycle – 850 MW at 4 locations, NG Peakers 150 MW at 3 loc's

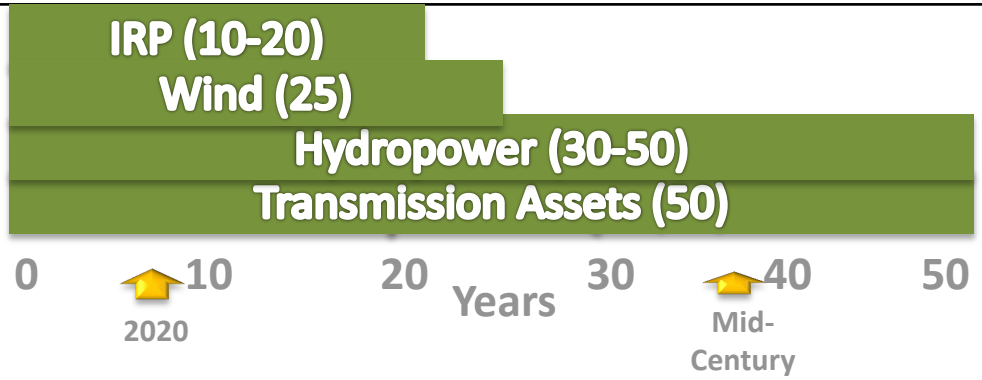
- 900 square mile service territory
- 477 miles of transmission lines
- 9736 miles of distribution lines

Potential Climate Impacts to SMUD Infrastructure and Operations

Ambient Temperatures	• More extreme summertime high temperature events, including daytime and nighttime heat waves • Increased warm season electrical load and peak demand • Reduced thermal and hydroelectric generation • Extreme temperature and variability impacts on system reliability • Increasingly severe "one-in-ten" heat storms effects on overall system reliability • Less efficient operation of transmission and distribution systems, including decreases in facility ratings and loss of operating life
Wildfires	• Projected increase in wildfire frequency and intensity • Potential wildfire impacts to transmission and out-of-district generation sources
Wind Patterns	• Increases or decreases in wind energy production and timing • Increases or decreases in delta breeze cooling capacity
Regional Hydrology	• Effects of changes in temperature and precipitation on snowpack in the Sierra Nevada mountains • Changes in timing and volumes of streamflow and impacts on hydroelectric capacity
Flooding	• Sacramento flood threats • Localized impacts on electricity infrastructure • Indirect impacts on gas transmission infrastructure in the San Francisco Bay Delta region

Climate Region 2

Climate Region 5



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US DOE Partnership for Energy Sector Climate Resilience
http://www.energy.gov/epsa/partnership-energy-sector-climate-resilience

Institute for Sustainable Communities – Regional Climate Collaboratives
Link to participants in the Think Resiliently, Act Locally Leadership Training (October 2014)
http://www.sustainablecommunitiesleadershipacademy.org/resource_files/documents/Think%20Resiliently,%20Act%20Regionally%20(web)%20NO%20BIOS.pdf

Water Utility Climate Alliance
http://www.wucaonline.org/html/

Health Care Without Harm
Leading the newly formed Health Care Climate Council
https://noharm-uscanada.org/

US DOE Climate Champion Cities
http://energy.gov/epsa/climate-action-champions

Western Adaptation Alliance
http://www.iscvt.org/program/western-adaptation-alliance-waa/

Great Lakes Forest Alliance
http://www.forestadaptation.org/node/90

Urban Sustainability Directors Network Regional Collaboratives
http://usdn.org/public/about-us.html

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