

2012 Adaptation Strategy: Energy Section

Guido Franco, David Stoms
California Energy Commission

August 6, 2012

Team

- Dennis Peters (California ISO)
- Mike Tollstrup (ARB)
- Cyndi Truelove* (CPUC)
- Julia Levin (Resources Agency)
- Ashley Conrad-Saydah (Cal/EPA)
- Sekita Grant (CEC)
- Guido Franco (CEC)

- Internal CEC Team
 - Heather Raitt, David Stoms, Dave Ashuckian, Matthew Layton, Pamela Doughman, Linda Kelly, Al Alvarado, Joe O’Hagan, David Michel, Bill Pfanner, Nick Fugate

* Now with Stanford University

Schedule

- Overall schedule
 - July: preparation of draft outline
 - August: provide opportunity for public participation
 - August 24th: submit first draft to the Resources Agency
 - Sept- Nov: first full draft 2012 Strategy. Public participation coordinated by the Resources Agency,
 - December: release 2012 Strategy

Outline for the 2012 Adaptation Strategy Report

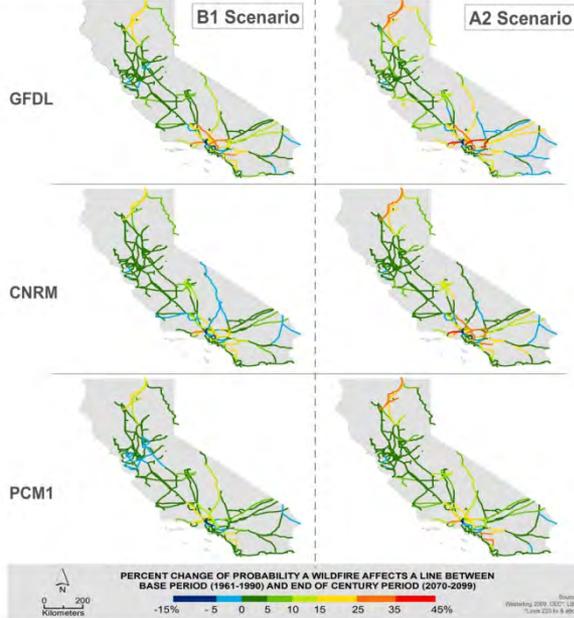
- This will be a brief report with high-level discussion of issues
- The outline of the report is as follows:
 - I. Executive Summary
 - II. California's changing climate
 - III. Risk reduction/investment in a climate safe California
 - IV. The benefits of action
 - V. Regional and local strategies
 - VI. Sector specific strategies** (here is where the energy section belongs)
 - VII. Adaptation Strategy chart

Draft Outline for the Energy Section in Chapter VI

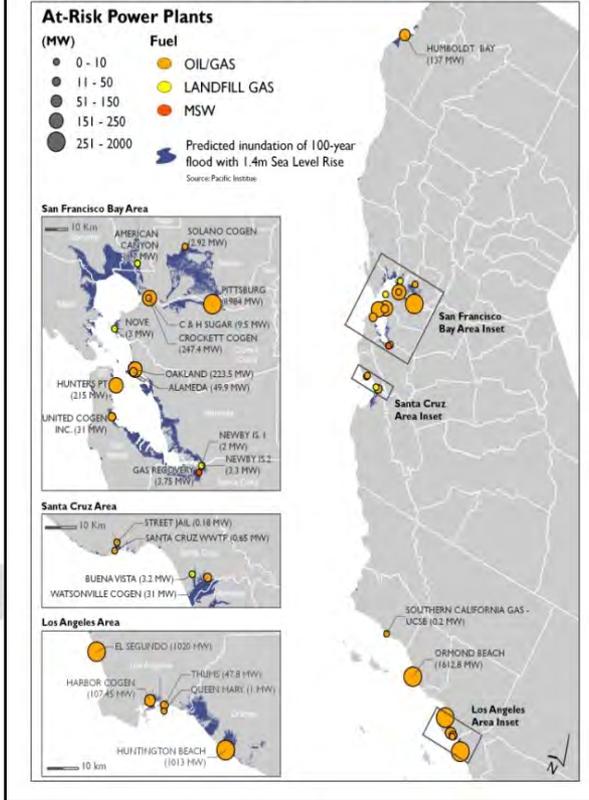
- This chapter/section should be ~ 8 pages long and would include the following:
 1. Energy sector vulnerability
 2. Highlights of steps taken to date and success stories
 - 3. Adaptation strategies going forward**
 1. Locate new facilities in climate-safe areas
 2. Protect existing energy facilities
 3. Diversify energy supply
 4. Promote demand side measures
 4. Related planning, investment and regulatory processes
 5. Adaptation research needs in the energy sector

The Energy Sector is Vulnerable

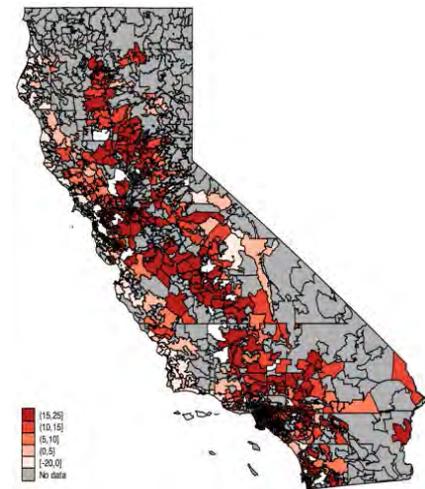
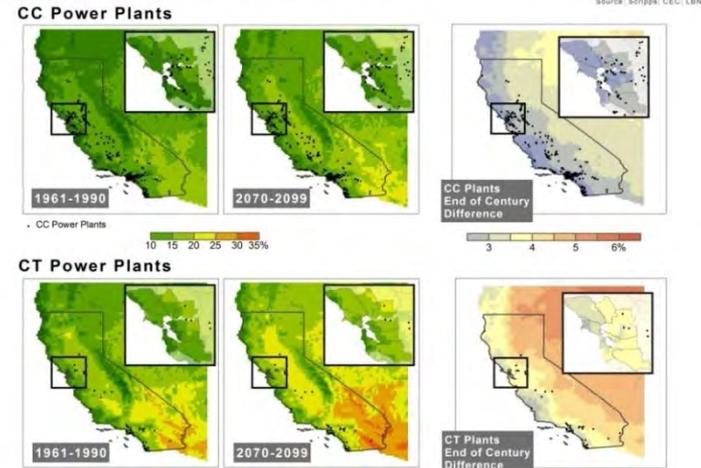
End of century change in the probability a wildfire affects a transmission line



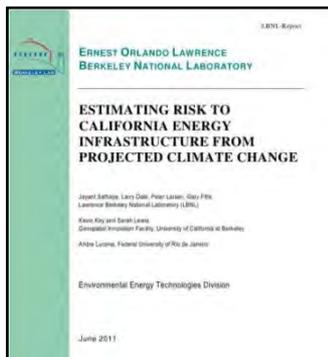
Power Plants Potentially at Risk from Sea Level Rise



A2 Scenario, Three AOGCMs Average Peak Capacity Loss in August



June 2011



April 30, 2012

Locate New Energy Facilities in Climate-Safe Areas

Mandate the addition of a climate change risk assessment section in the environmental analyses of new power plants licensed by the Energy Commission and coordinate with CPUC and OPR for other energy facilities not covered by the CEC CEQA equivalent process.

Protect Existing Energy Facilities (and services)

- Explore the use of seasonal (a few months in advance) probabilistic forecast of summer temperatures to determine the adequacy of electricity generation.
- Commission near- and mid-term vulnerability and adaptation engineering studies for the energy sector: Cal-Adapt.

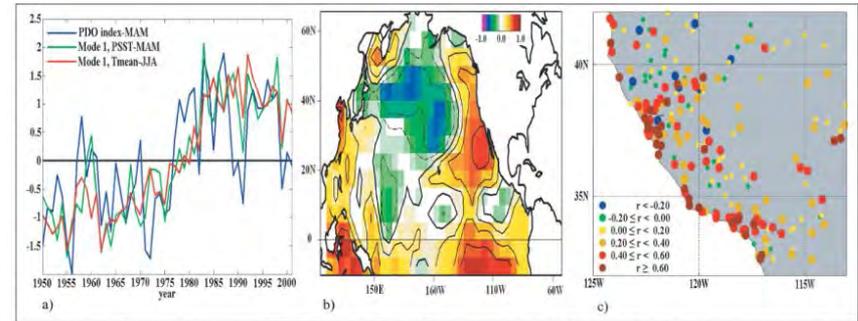
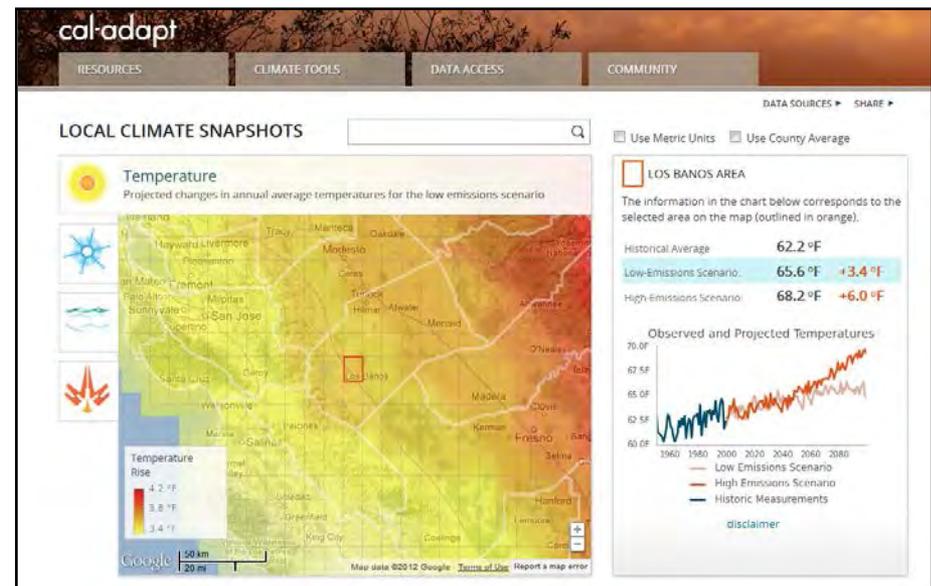
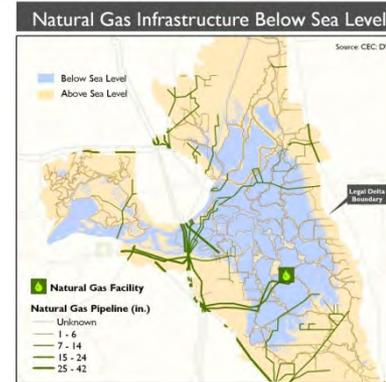
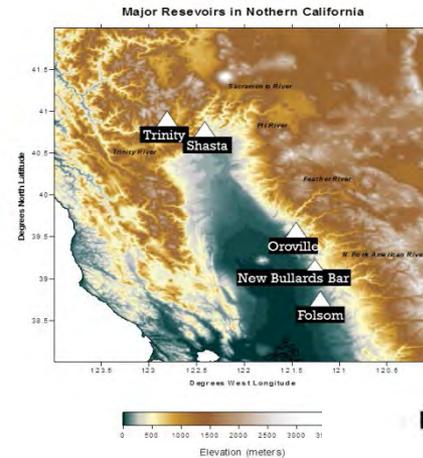


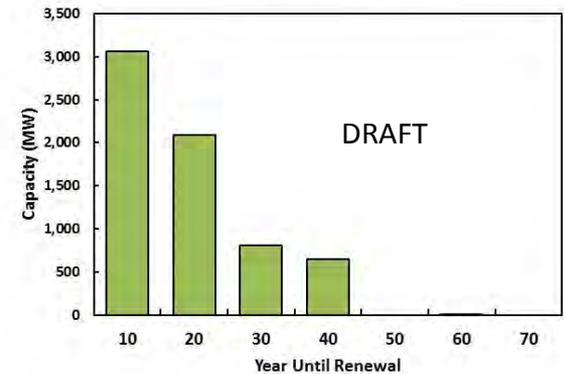
Fig. 1. (a) Coupled CCA mode 1 of HA T₁ (red line) related with MAM SST (green line), the MAM SST index is also plotted for comparison.



- Continue support of the INFORM project*.
- Initiate Climate change and the FERC relicensing process**
- Expand the CaLEAP (California Local Energy Assurance Planning)***



FERC relicensing of hydropower units in California



California Local Energy Assurance Planning

Home About Participation Events Library Contacts



What is Energy Assurance? Energy Assurance is about becoming more resilient to interruptions to your energy supplies during an emergency.

Energy Assurance ensures that key assets within the community are able to function, protecting safety and public health and minimizing economic loss, after all types of disaster events.

What is CaLEAP? CaLEAP (California Local Energy Assurance Planning) is a California Energy Commission (CEC) sponsored project to assist local governments throughout the State in ensuring that key assets are resilient to disaster events that impact energy.

The process considers all aspects of Emergency Management (prepare for, respond to, recover from, mitigate against).

Purpose of the website This website was created to provide local governments with CaLEAP information, present Energy Assurance material, and outline what is required to start the Energy Assurance Planning process.

Local governments are encouraged to [contact the CaLEAP team](#) to further discuss the value of planning for Energy Assurance.

Strong coordination with:

* DWR's re-operation program

** Water Quality Control Board and DWR

*** OPR

- Through the Integrated Energy Policy Report (IEPR) process investigate the best ways to address the following items:
 - Increase the use of woody biomass harvesting and power generation to reduce fire risks to transmission lines, hydropower, etc. Coordination with CalFire.
 - Accelerate installation of **smart grid and microgrid** technologies to better protect operation of the grid during **extreme climate-related events**.
 - Adopt measures to maintain output of natural gas, base and peak load plants during heat waves or other extreme climate-related events.
 - Evaluate hydropower adaptation options to accommodate reduced or increased runoff and storage.
 - Work with DWR's System Reoperation Program to minimize, if possible, the impacts on hydropower generation and investigate as part of this work the feasibility of state water project facilities for pumped storage.
 - Investigate if an orderly upgrade of transmission lines in California is warranted as measure to deal with wildfires.

California Energy Commission
Public Interest Energy Research (PIER) Program
Energy Systems Research Office

Research Powers the Future
PIER Smart Grid Research
<http://www.energy.ca.gov/research/integratedtransmission.html>

Synchrophasor Research Enables Renewables and Improves Grid Reliability

October 2011

Fact Sheet

The Issue
Increasing amounts of fluctuating, and often remotely located, renewable electricity pose a challenge to power grid reliability. Until PIER research put synchrophasor applications in the control room, grid operators and engineers lacked the clear and comprehensive power grid monitoring technology needed to meet the challenge. Synchrophasor systems now provide a new tool for power system operation by providing real-time, accurate, time-stamped measurements from across the system.

Project Description
Since 1998, the California Energy Commission's Public Interest Energy Research Program (PIER) has funded research to develop and demonstrate applications—including synchrophasor technologies—for the California grid. Synchrophasors are a completely new method of electrical wave measurements, taken at two or more places on the grid to determine stability. (They measure phase angles.) Synchrophasors promise to revolutionize the analysis of comparative power flow throughout an electrical grid. They can be used to take action rapidly in a changing grid system.

PIER has developed synchrophasor applications to monitor power attributes and present the information to grid operators in ways that enable them to take corrective actions long before potential problems develop. Using these applications sharply reduces the risk of major blackouts. In addition, they will lower the cost of electricity by enabling grid operators to reliably use renewable and transmission resources.



RTDMS Situational Awareness Dashboard
Courtesy of the Consortium for Electric Reliability Technology Solutions

Synchrophasors in the Grid Control Room — PIER funded the development of the Real Time Dynamics Monitoring System (RTDMS) used by the California Independent System Operator. RTDMS is the first commercially available software tool to let operators visualize (and take actions based on) high quality information from synchrophasors about system operations across the entire West in real time.

"PIER's research program has resulted in the CAISO installing the most advanced synchrophasor application in the country relative to phase angle detection and oscillation detection. This is the most significant improvement in control room technology in my career."
Jim McIntosh, Director of Grid Operations,
California Independent System Operator (CAISO)

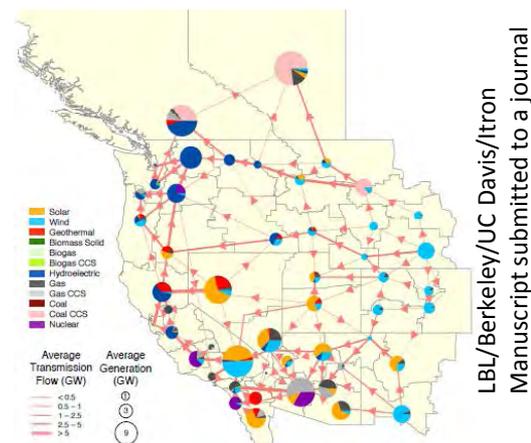
"PIER's research program has resulted in the CAISO installing the most advanced synchrophasor application in the country relative to phase angle detection and oscillation detection. This is the most significant improvement in control room technology in my career."

*Jim McIntosh, Director of Grid Operations,
California Independent System Operator
(CAISO)*

Diversify Energy Supply

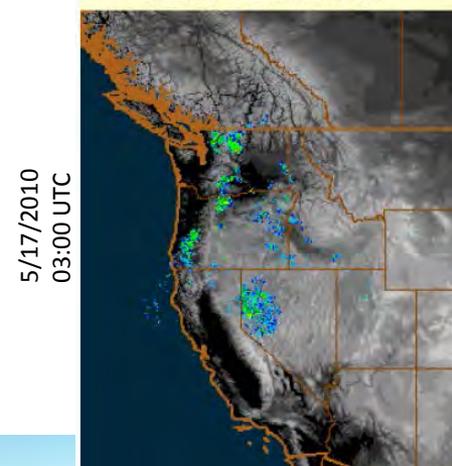
The energy system is experiencing a rapid transformation and this trend will continue. This presents an excellent **opportunity** to engineer a system more resilient to climate impacts

- Use the IEPR proceedings to investigate specific actions for potential post 2020 GHG targets **taking into account, for the first time, climate change**. The CPUC, CA ISO, ARB, and CEC will work together to address this important topic. Multiple studies are now available that could inform these deliberations.
- Continue to support studies on the environmental implication of potential energy scenarios for California to avoid unintended consequences (e.g., ecological impacts) and to maximize co-benefits (e.g., air quality improvements).
- Commission a study to investigate what would constitute extreme conditions for the electricity system in the future.
- Continue supporting applied research on issues dealing with the performance of thermal power plants on extremely hot days such as improving performance of dry cooling with water spray technologies that are used only during extremely hot days.



LBL/Berkeley/UC Davis/Itron
Manuscript submitted to a journal

Composite Reflectivity
Derived From Mosaic3D

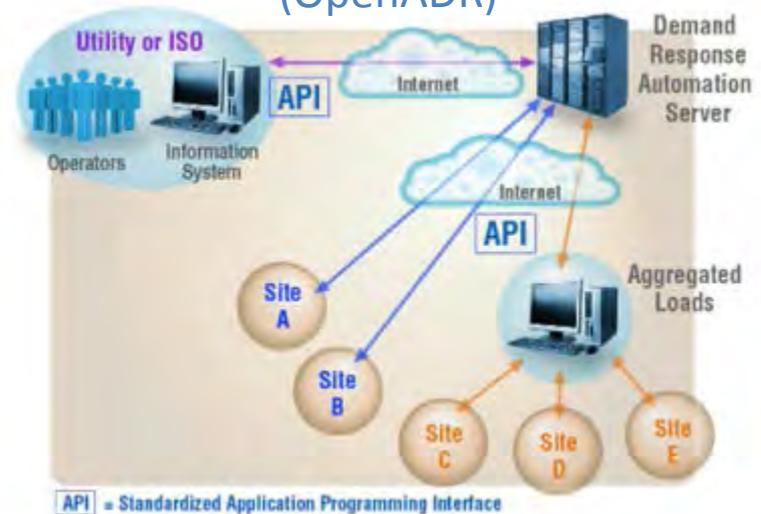


Promote Demand Side Measures

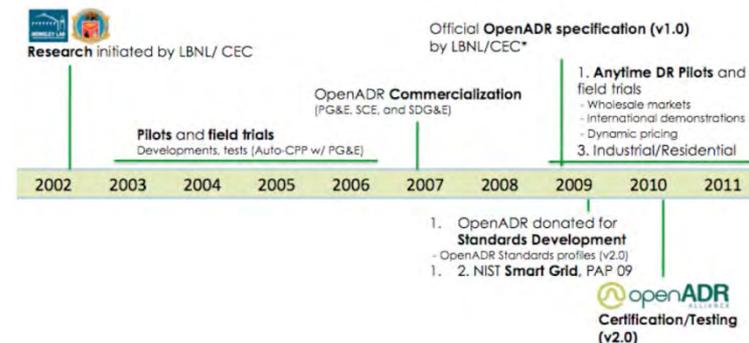
Investigate all the measures available that will allow the delivery of high quality energy services at the lowest cost and with the minimum amount of energy feasible. The measures to be considered include:

- Implementation of **deep energy efficiency programs** with an **integrated** regulatory paradigm across **water, electricity, and natural gas**.
- Increased penetration of green buildings, cool roofs, cool pavement, cool vehicles, urban greening, demand-side management and demand response, smart grid, permanent load shifting (from peak to off-peak), energy conserving land use practices, ZEV vehicles, and zero net energy homes.

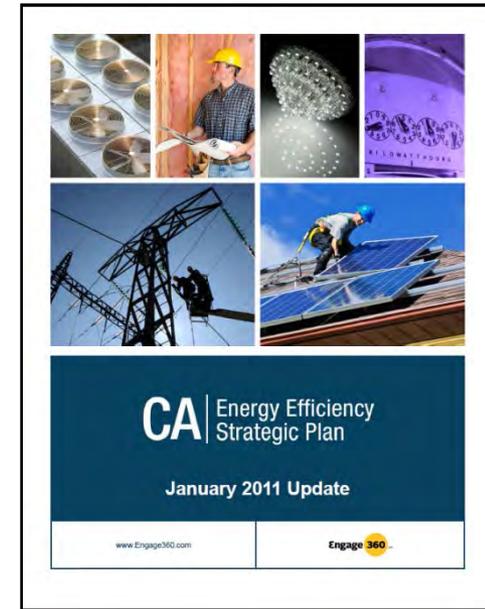
Open Automated Demand Response (OpenADR)



Source: LBNL



- Use and enhance the CPUC's *California Energy Efficiency Strategic Plan* to accomplish the above goals*
- The CEC will also be key in meeting these goals via its energy efficiency standards.
- The CEC should consider climate change in its cost-benefit analyses of standards for buildings (Title 24) and appliances. For example, it should **consider increased ambient temperatures in the 16 climatic zones used to set building standards.**



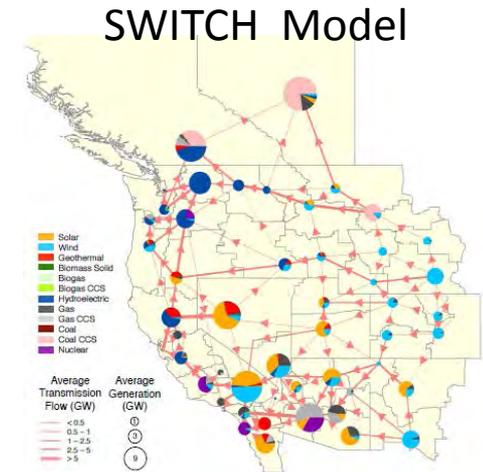
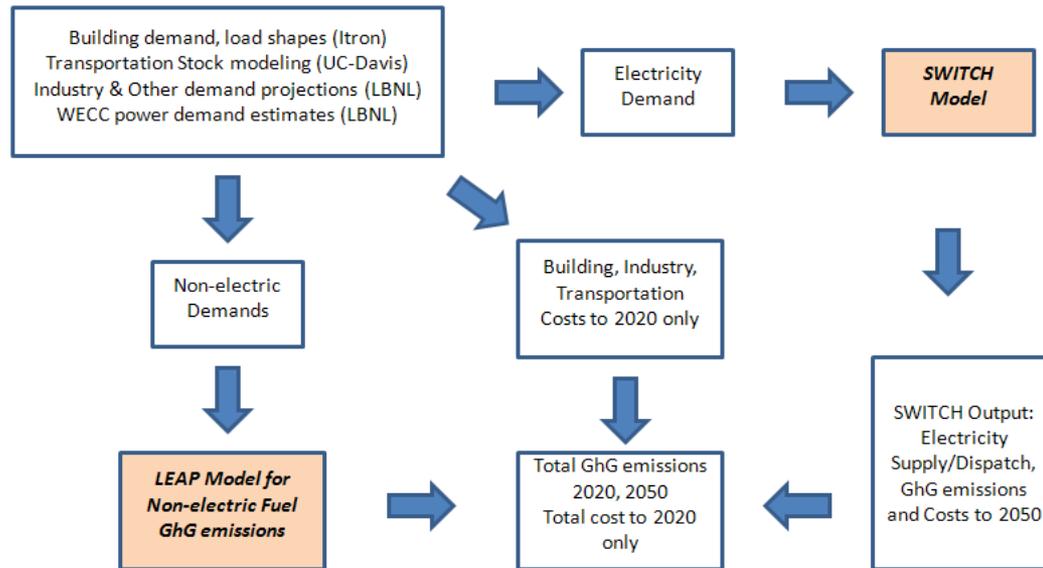
* Strong coordination with the WET-CAT Team



“We build our homes and buildings for the future not the past”

Chris Scruton

Diversify Energy Supply + Demand Side Measures



Source: LBNL/UC Berkeley – Forthcoming PIER Report

Discussion