David Nahai – *Partner, Lewis Brisbois Bisgaard & Smith LL; President, David Nahai Consulting Services LLC*

- Six challenges to the adoption of clean and efficient energy generation:
    - Speculation – Large up-front cost can deter small companies
    - Transmission – Differences between public vs. investor owned utilities and how to reconcile them effectively
    - Reversal of mission – Integration issue of intermittent sources, feed-in tariff programs
    - Rate revision – How we design rates affects our energy efficiency
    - Cap and trade – The first cap and trade auction in the fall will be experimental
    - Local opposition – Influence of taxes

Katie Sloan – *Manager, Regulatory & Legislative Matters, Renewable and Alternative Power, Southern California Edison*

- California has robust and highly competitive renewable portfolio standards (RPS)
- SCE looks to competitive markets as the primary means for renewables procurement, barriers and challenges, and how they will be overcome
- In order to meet standards, clear policies must be in place
- Transmission is the main barrier for energy efficiency
- SCE procures renewable energy through feed-in tariffs, bilaterals, RPS solicitations, and PURPA
- Key to successful implementation of RPS goals
    - Broad market – include market and sources outside California
    - Flexible compliance – Circumstances can become outside our control and we need to adapt
    - Equal rules – Other small companies must follow the rules that SCE is subject to
    - Cost containment – Include cost of transmission and other costs that may be hidden in cost calculation and consider effect on customer
- Barriers to renewable energy
    - Permitting, siting, approval, and construction of transmission
    - Confusion about tax credits at the federal level
    - Exponential growth
    - Developer experience and performance
    - Too much power generated at one time
    - Lack of flexibility in regulatory process
    - Significant concerns about California's ability to integrate these resources reliably, as most of the generation from these resources is intermittent
- Flexible resources must be part of the solution to balance variable output to better match generation to demand

Paul Thomas – *Director of Energy Efficiency Programs, GEI Consultants, Inc.*

- Adapt, collaborate, integrate
- Future and present challenges
    - Increased energy demands (negative and positive implications)
    - Water supply/distribution
    - Reduced generation capacity
- Strategies
    - Conservation – using less by forgoing an activity
    - Efficiency – using less but still performing activity
    - Demand response – using less temporarily
- How do we adapt?
    - Solutions are interactive
    - Education and public awareness needs to increase
    - Conservation and efficiency must become part of our culture, education and policy
    - Technology development and then introduction to mainstream
    - Distributed systems – where and how energy is used
    - Pricing – efficient use at appropriate times to maximize energy efficiency
    - Policy – integrated decision-making at the appropriate level (both local and statewide)
    - Reliable and affordable business models – balance between maximum profit for business and maximum benefit for customers

Max Gomberg – *Climate Change Staff Specialist, California State Water Resources Control Board*

- There cannot be an effective energy adaptation strategy without a strong focus on water policy
- Climate change is reducing groundwater so we must adapt by using less water
- WET CAT – government action team focused on climate change mitigation and adaptation through water and energy efficiency
- Effective adaptation requires investment now to minimize harmful effects later
    - Must pay more to ensure our responses are made with the best available data and knowledge
    - Best way to reduce cost is through reducing consumption
- Must make processes more efficient at each step of production
- Need calculators to model and track conservation
- Policy options
    - Change funding programs to gain benefits from water and energy projects
    - Need to reevaluate our policies as supply and demand change
    - Consider water and energy as one project, rather than two separate subjects
    - Prioritize demand management and less energy intensive supply development
- Possible solutions
    - Must consider trade-offs between normal water system pressure for everyday use and fire system requirements

    - Decentralized infrastructure for water and energy savings

Don Von Dollen – *Program Manager, IntelliGrid Power Delivery and Utilization, Electric Power Research Institute (EPRI)*

- Smart Grid
    - Individualized solutions for different regions – what works in one region is not necessarily the optimal solution for another
    - We will operate our power system closer to the edge of electrical system instability as the grid becomes more complex, variable generation increases, and demand-side resources become more unpredictable
    - Location plays a large role in navigating these uncertainties
- Supply must equal demand
    - Challenges:
        - Accommodating high energy needs of electric vehicles
        - Demand response & efficiency – Smart metering systems and feedback devices make responses more automated to reduce energy use
        - Renewable energy – Current paradigm is that power goes from grid to consumers. Now power can go back into the grid as well but we are still trying to figure out how to do so
        - Energy storage – Variability due to intermittency issues for renewable sources. Technology is more effective and cheaper, but still not enough. We also must reduce demand
        - Sensors and control – Monitoring points, data analysis
        - Cyber security
- Current projects
    - Smart Grid demonstration initiative: virtual power plant. How customers respond to information about their personal energy use
    - South of France: demonstration project involving commercial, residential, public buildings. Thermal storage, load shedding, and other technologies integrated into power system
    - New Mexico: housing development (industrial, commercial, residential) with solar, energy storage, feedback devices in each home. Incorporating distributed resources and bidirectional flow

Linda LeZotte – *Chair, Board of Directors, Santa Clara Valley Water District*

- Climate change impacts on water supply and energy use
    - Less available water and severe weather leading to drought
    - Need to rely on other renewable energy sources besides hydroelectric energy
    - Can result in a return of land subsidence, infrastructure impacts and sea water intrusion
- Economic considerations
    - Energy intensity

    - Energy cost is not proportional to energy use
    - Progressive approach to energy management
    - Drawing water from different sources allows the district to avoid dependence on a single energy intensive source and provides opportunities for optimization
    - Producing renewable energy is affected by climate change
- Adapting to climate change
    - Maintain current energy savings practices
    - Energy Optimization Plan
    - Improve renewable energy generation (input back into the grid)
    - Recycled water
    - Conservation

Kurt Malchow – *Climate Adaptation Coordinator, California Natural Resources Agency*

- Governor's Executive Order: assess climate risks and coordinate state responses, initiate dialogue and action; establish adaptation as a co-equal goal to mitigation
    - Coordinate climate adaptation with mitigation
    - Make technical research findings useful/readable for general public to develop responses (Adaptation Policy Guide)
    - Recognize secondary effects such as drought
    - Interagency coordination
    - New Climate Adaptation Strategy for 2012: protect public health and safety, economy, and natural environment
- Climate adaptation aspects
    - Easy access to information – diversity necessitates this
    - Cities and counties do most of their work in changing infrastructure
    - Uncertainty related to federal policy
    - Layer recommendations on familiar, existing procedures
    - Coordinate along organizations using resources that are already in place
    - Funding
        - Difficult to make water reclamation cost-effective. Instead need funding for planning and implementation

Miriam Fischlein – *Ph.D., Postdoctoral Scholar, UCLA Institute of the Environment and Sustainability*

- Individual behavior and climate change adaptation
    - Private consumption is the root challenge
    - Strategies to adapt
        - Demand response and conservation
            - Change in behavior can be low cost and fast, and technology enabled
        - Adopt new technologies – we tend to focus on this too much
        - Smart grid

- ENGAGE study
    - Participant receives weekly email showing percent increase of energy use and breakdown of how it was used
    - Results: people incorrectly estimated how they use energy (plug in appliances actually used the most). People who received health message reduced their consumption more than those who received financial message. Those without children reduced more than those with children. Load shifting at the appliance level since that is the biggest use of energy
- Information can be effective but must be immediate, attractive, from a trustworthy source, connecting information to local community
- Encouraging behavioral change
    - Move from information to communication
    - Account for decision-making constraints
    - Harness the power of social norms
- Question: With respect to constraints, would recommendations be more effective than just giving information and allowing them to make their own responses?
    - Answer: Yes. This is just a study but if carried out in a real situation, customers would likely respond to personalized savings tips. A questionnaire that leads you to personalized tips can also be very beneficial.

Ivor John – *Ph.D., General Manager, LRQA Americas Sustainability, Inc.*

- Adaptation strategies for energy supply
    - Include Climate Action Plans for resilient communities that can be adapted over time
    - Carbon management policies
- Adaptation strategies for energy demand
    - Growth in cities
    - Electric vehicles
    - Energy efficiency and demand management
    - Technology
    - Behavior change
    - Stakeholder engagement
    - Management system integrated with environment, quality needs, etc.
- Management systems overview
    - Establish policy and objectives, procedures to do so, can be adapted if needed
    - Feedback loop based on planning first, then implementation, then checking/management review using audits, back to planning
        - An active cycle means there is continual improvement (Good when you consider outside inputs such as climate change)
    - Superior Energy Performance: certification program that facilitates continual improvement
- Track changes over time, normalize production
- World energy use in descending order
    - Industrial, transportation, residential, commercial
    - Implication: cities have potential to impact energy efficiency. Electric cars and behavior can increase impact of transportation.

- Assurance based on principles including
    - Credibility, ensures money is well spent
    - Business assurance: improving performance, reducing risk
        - Pillars for success: isolate problems, risk-based methodology, continual improvement

William Steele – *Area Manager, Southern California Office, U.S. Bureau of Reclamation*

- Bureau of Reclamation – moving water to where the people are. Manage, develop, and protect water
- West-wide climate risk assessments
- Basin studies – drought maps updated weekly. Project supply and demand including impacts of climate change
- Santa Ana River Basin Watershed Initiative
- Landscape Conservation cooperatives
    - Information to address climate change and other stressors
- WaterSMART Program: Grants, conservation services, studies. Work with people to help them solve their problems
- System Optimization Reviews – broad study of system to determine efficiency problems
- Advanced water treatment and demonstration projects – helping third world get water
- Urban Waters Federal Partnership: LA River Watershed Pilot
    - Coordinate Federal actions and support local watershed efforts

Jack Sahl – *Ph.D., Director, Environment and Resource Sustainability, Southern California Edison*

- Must adapt to a new normal with respect to electricity systems
    - Renewable resources, Smart Grid, distributed generation on rooftops
- Energy Policy and Partnerships: Key Adaptation elements
    - An integrated systems approach – different kind of participation from customers
        - *Empower customers*: New technology costs more. Cost per unit goes up but bills can stay the same if we reduce our energy use by changing behavior and choosing more efficient products
        - *Upgrade Systems*: All systems must be improved (capital investment and technology improvements)
        - *Deliver clean energy* (transmission systems)
        - *Communication* between sectors. More integration. “Horizontal rather than vertical world”
    - Changes we need to make
        - *Energy efficiency* is key. Conserve energy!
        - Cleaner energy (i.e. renewable)
        - *Clean Transportation*
        - Resource efficiency (material replacement and green chemistry)
        - Habitat protection
    - Prioritize: Life-cycle assessment
    - Importance of assurance on a global level for sustainability programs

- Integrated management system approach
- Use performance metrics

Catherine Hollinger – *CID; CLIA; EPA WaterSense Partner; Owner and President, Hollinger & Associates, Inc.*

- Consulting on the local level
  - Companies, corporations, agencies – how are they dealing with sustainability and energy programs? How do we coordinate our efforts?
  - Bring in technology, education, management to project
  - Define the goals of the project (including business units that may not have the environment as their priority)
  - Define the scope of the project
- Issues
  - Lack of infrastructure
  - Cost – there are incentives but not enough to completely offset
  - Environmental issues – dealing with unforeseen problems like floods
- Adaptation on a local level: all elements are dependent on the others and affect each other

Open Discussions

- Question: Is there a possibility of using infrared technology to cut back on use on non-revenue water leaking (due to evaporation, dousing fires, inefficient care of infrastructure)? Or other technologies for leak detection?
  - Answer: We need to make cultural changes to shift times of peak usage to correspond with peak generation (i.e. charging devices during the day). This would solve the issue of needing to store power
- When heat waves occur, the energy system is at its most vulnerable. Climate change can increase the number of heat waves and therefore can have an important negative affect on populations.
- Question: Each solution to reduce energy use has a downside. What should we do?
  - Answer:
    - Conservation and funding for infrastructure management
    - Need a political push to motivate people to conserve more
    - Repair systems that are in place
    - Need a system to fund repairs to system that doesn't depend on bond cycles
    - Integrate renewable and energy efficiency
- Question: How long will it be before storage technology (large and small scale) becomes viable?
  - Answer: In CA, investor owned utilities have projects in progress for example, to determine optimal size and location. Community energy storage seems to be the most realistic. Costs are decreasing but are not yet close to becoming widespread.

- Communication is becoming increasingly important. Social media will play a central role. We must ensure that our messages are correct and sent/phrased in the right way
- Need immediate feedback, knowing how and when we are wasting energy
- Education is essential and determining how to interpret information
- Incentives can be useful motivators, especially for the younger generation
- Need short-term, intermediate-term, and long-term strategies for regulations
- Economic issues and prioritization
    - All these projects will be costly, and we can't do it all. How are we distributing the available money (different sources of funding from private and government investment)?
    - How do we prioritize?
    - Will our priorities change over time?
    - We need a systems approach and unified overall strategy.
    - We can't simply react immediately to supply and demand because we need to have the infrastructure first. We must remake our regulatory process to allow faster construction in order to receive full benefits
- "Technology solution set" – distribution and transmission of energy allows people to make choices such as using electric cars
    - However, we shouldn't invest all our money in today's technology, because there will be even better technology available quickly (i.e. phones become outdated after 5-10 years)
    - We need to consider the timescales
    - We need information about how people are using energy in addition to how it is distributed and generated