

Western Grid 2050

A Product of the WGG Clean Energy Vision Project

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Aspen Environmental Group



www.westerngrid.net

Agenda

- Purpose of the Report
- Two Different Paths: Business as Usual (BAU) and Clean Energy Vision (CEV)
- Contrasting Fortunes: BAU and CEV Performance Differences

Purpose of the Report

- The West faces a \$200 billion decision
 - More than \$200 billion to be invested in the next 20 years
 - Choices made in the next 20 years affect the West to 2050 and beyond
 - Business as Usual (BAU) and Clean Energy Vision (CEV) paths are very different
- Now is the time to consider what kind of 2050 grid the West wants

This Report Complements Others

- Western States studying grid expansion
 - WECC, WREZ, WCI, SPSC and SPSG
- State, national and international studies look to 2050 and beyond
- Western Grid 2050 complements others by
 - Focusing on the Western Interconnection
 - Taking a longer term view
 - Examining economic, energy security, environmental and public health performance

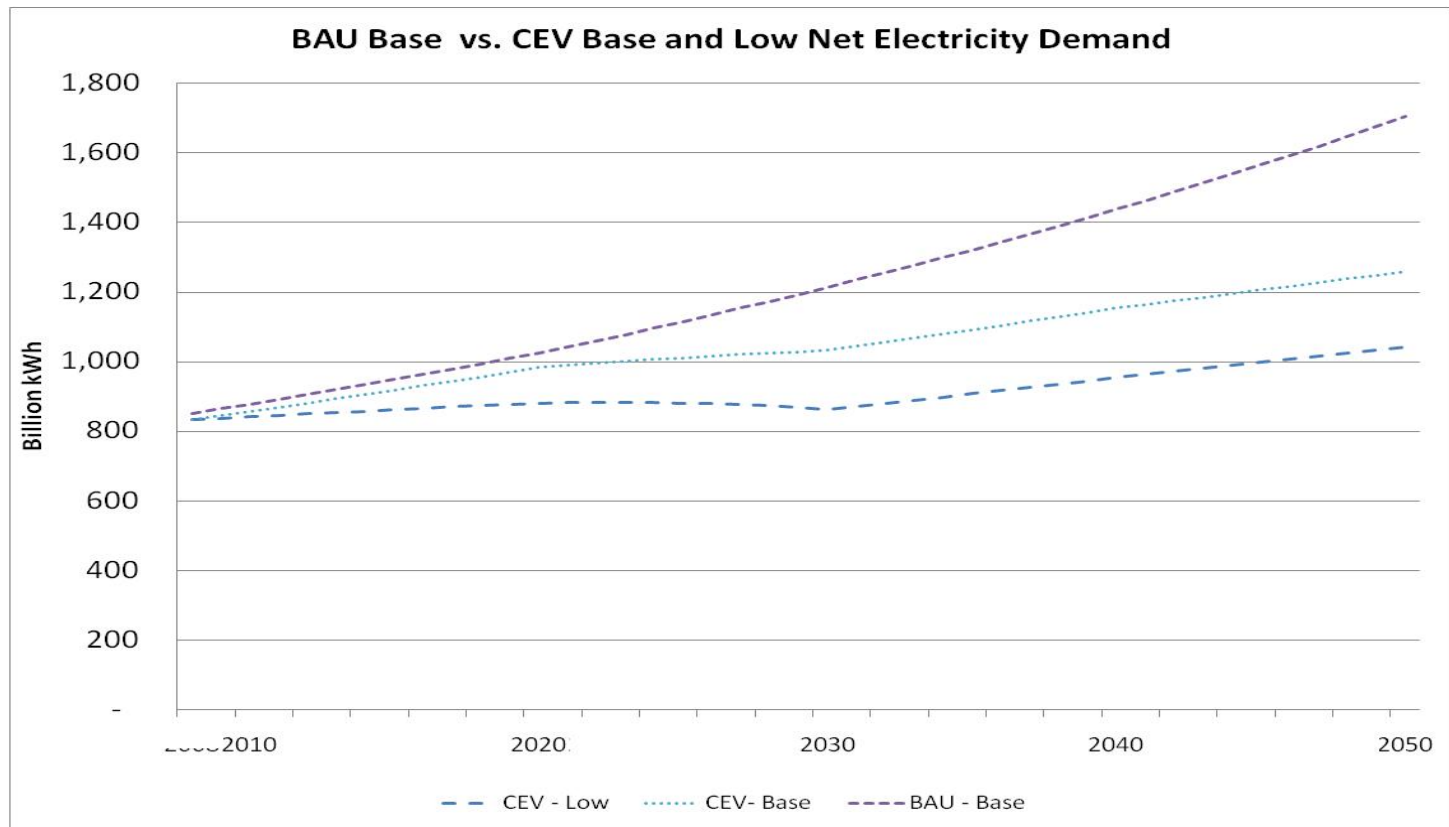
Two Different Trajectories

- BAU uses utility data submitted to the Western Electric Coordinating Council (WECC) and extrapolates beyond 2020
- CEV starts with WECC data but includes State and Provincial Steering Committee (SPSC) adjustments and implements CEV guiding principles

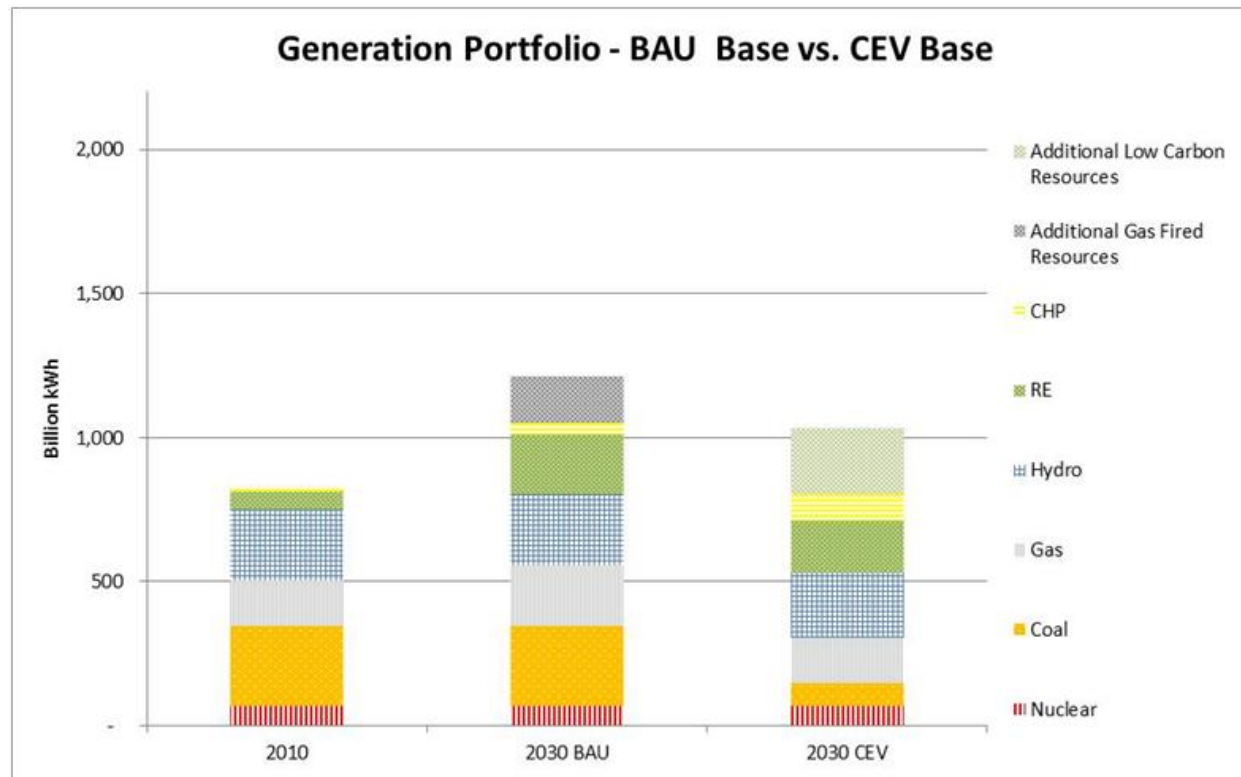
CEV Guiding Principles include

- Maximize demand reduction and distributed generation
- Choose generation to meet IPCC goals
 - Transition away from high CO₂ resources
- Ensure reliability by maximizing use of the existing system with advanced technologies and regional coordination
- Plan new generation & transmission smart from the start

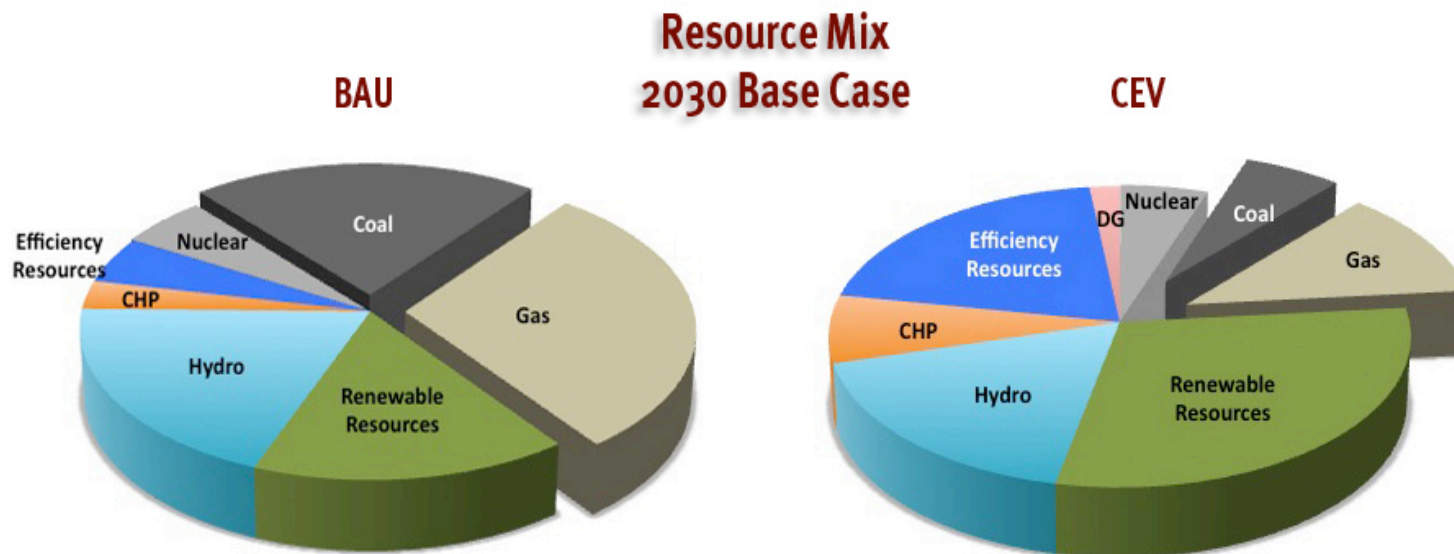
BAU v CEV: Net Demand



BAU v CEV: 2030 Generation Portfolios



BAU v CEV: 2030 Generation Portfolios



From Table 33. Western Grid 2050: Contrasting Futures, Contrasting Fortunes

Comparing BAU v CEV Performance

- Jobs
- Cost
- Energy Security
- Environment & Public Health

Competitiveness Means Jobs



“China was asleep during the Industrial Revolution. She was just waking during the Information Technology Revolution. She intends to participate fully in the Green Revolution.”


– C.H. Tung, former Chief Executive of Hong Kong

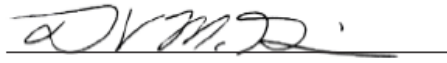
Aggressive Demand Reduction means that CEV can reduce consumer bills

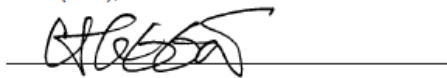
- BAU trajectories include far higher fuel and carbon costs
- Transitioning away from BAU toward CEV requires significant capital investment
- BAU is between \$12 billion less expensive to \$46 billion more expensive


Energy Security Benefits From Reduced Fossil Dependence


“The nation’s heavy use of fossil energy leaves American unacceptably vulnerable to hostile nations and is detrimental to foreign policy.” CNA Military Advisory Board



General Gordon R. Sullivan,
USA (Ret.); CNA MAB Chairman



Vice Admiral Dennis V. McGinn,
USN (Ret.); CNA MAB Vice Chairman

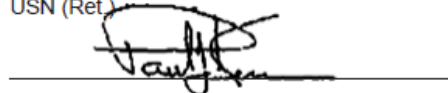

Admiral Steve Abbot,
USN (Ret.)



Admiral Frank L. "Skip" Bowman,
USN (Ret.)

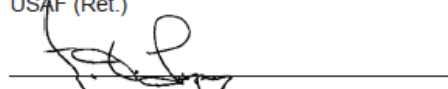

Major General Russell Fuhrman,
USA (Ret.)

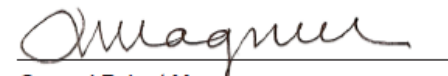

Brigadier General Gerald E. Galloway, Jr.,
USA (Ret.)



Vice Admiral Lee F. Gunn,
USN (Ret.)

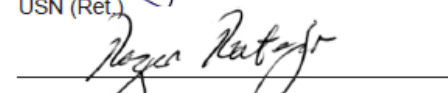

General Paul J. Kern,
USA (Ret.)

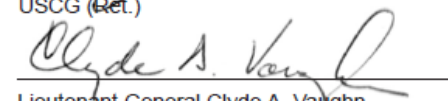

General Ronald E. Keys,
USAF (Ret.)

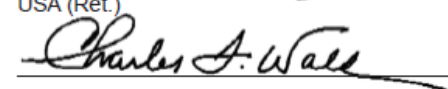

Admiral T. Joseph Lopez,
USN (Ret.)


General Robert Magnus,
USMC (Ret.)

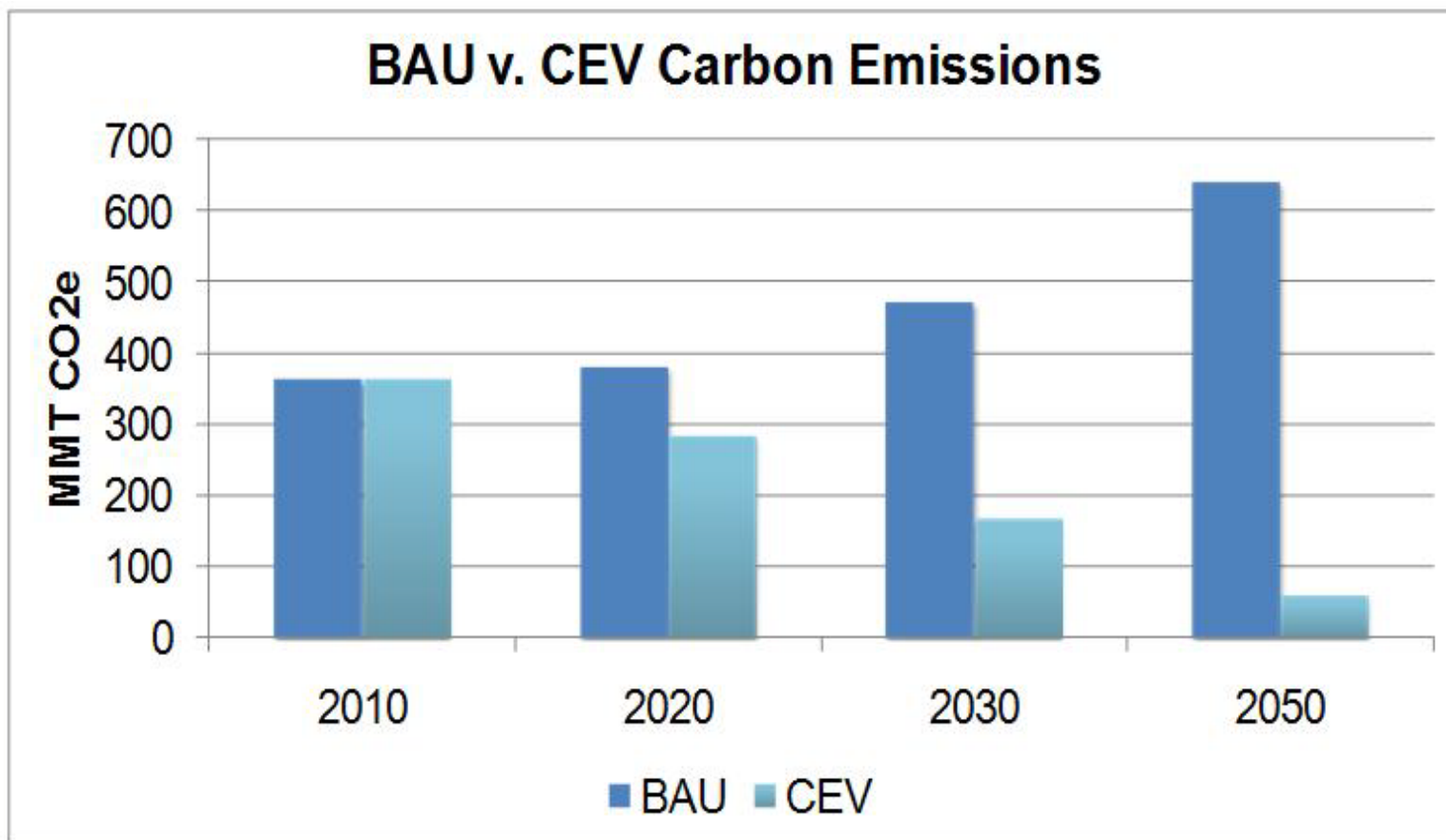

Admiral John B. Nathman,
USN (Ret.)


Vice Admiral Roger T. Ruffe,
USCG (Ret.)


Lieutenant General Clyde A. Vaughn,
USA (Ret.)


General Charles F. "Chuck" Wald,
USAF (Ret.)

BAU and CEV Have Contrasting Carbon Risk Exposure



Transitioning Toward a Clean Energy Future

- The West faces a \$200 billion decision
- Choices made in the next 20 years set the stage for the West's electricity system to 2050 and beyond
- Clean Energy Vision development trajectory demonstrates economic, energy security, environmental and public health advantages

Acronyms

BAU: Business as Usual

CEV: Clean Energy Vision

IPCC: Intergovernmental Panel on Climate Change

SPSC: State and Provincial Steering Committee
(Participant in WECC planning activities)

SPSG: Scenario Planning Steering Group
(Participant in WECC planning activities with a
focus on the 20 year time frame)

WCI: Western Climate Initiative

WECC: Western Electric Coordinating Council

WREZ: Western Renewable Energy Zone Initiative