

Toward a Well-Functioning Western Electricity System



Western Resource Adequacy Shaping a Region/State Partnership

Grace Anderson

(Asst. Executive Director, California Energy Commission)

Westwide Resource Assessment Team

WESTERN POWER SUPPLY

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Presentation Overview



- I. Adequacy Context and Institutional Landscape**
- II. Conceptual Approaches to Western RA**
- III. Milestones and Emerging Consensus**
- IV. RA “Strawman”: A Framework for Discussion**
- V. Highlights: Western IRPs and CA Summer '05**
- VI. Review and Conclusion**

I. Adequacy Context—



Reliability includes two components—

- **Operating reserves/standards**
- **Planning reserves (adequacy)**

Industry structure and regulation evolves--

- **1970-2000 (or so)**
Vertically integrated companies
WSCC Power Supply Design Criteria (PSDC)
- **2000 till ?**
Mixed restructuring; hybrid markets
PSDC suspended

I. Adequacy Context—



Western situation characterized by uncertainty

- Lack of a common understanding or definition of adequacy
- Hybrid markets/regulatory structures lack explicit regulatory compacts; uncertainty of responsibility/ability to provide resources and reserves
- Retail access reduces clarity of adequacy assessment
- Price controls distort incentives on both supply/demand
- Ability to waive natural resource protections limits incentives to provide adequate resources

I. Institutional Landscape: National Entities—NERC and FERC



NERC: Resource adequacy framework and draft standard

FERC: Beginning to reference NERC standards in tariffs

RA Framework approved by NERC in 2004 includes:

- Each Region should establish RA Criteria taking into consideration established state/provincial adequacy reqmts.
- Region or sub-regions should be accountable and/or hold the control areas, individual systems, or other(s) accountable for compliance....

I. Institutional Landscape:

National Entities—NERC and FERC



- Results of all Regional RA assessments are to be public though confidential data may support the assessment...
- NERC to perform audits to validate compliance....
- NERC and regions to encourage greater state/provincial regulatory participation throughout the planning and assessment processes....”

Draft NERC standard posted February 2005

Comments on proposed standard filed March 21, 2005

www.nerc.com/~filez/standards/Resource_Adequacy.html

I. Institutional Landscape: Who are the Regional Entities?



WECC

Western Electricity Coordinating Council

- Reliability Council for Western Interconnection (WI)
- Voluntary membership from five classes
- Regional institution with by-laws and voting protocols

WIEB

Western Interstate Energy Board

- Energy arm of Western Governors' Association (WGA)
- Governor's Energy Advisors (gubernatorial appointees)

I. Institutional Landscape: Who are the Regional Entities? (cont.)



CREPC

Committee Regional Electric Power Cooperation

- Committee of WIEB
- Includes PUCs, env/siting agencies, consumer, energy offices
- 11 states + 3 provinces in western interconnection .
- Formed mid 1980s; meets spring and fall each year
- State entities' communication and information exchange
- Acts by consensus-- adopted 3 sets of RA recommendations

I. Institutional Landscape: Who are the Regional Entities? (cont.)



WRAT

Westwide Resource Assessment Team

- Work Group of CREPC
- Covers majority of WI in geography and loads.
- Formed November '02;
- 20 technical staff of 9 states (AZ CA ID WA MT OR UT WY NV) NW Council and B.C.
- Explores how the West can develop information and mechanisms to address resource assessment and adequacy.
- Focuses on coordination, integration, synthesis west-wide; receives technical support from Lawrence Berkeley Lab

II. Conceptual Approaches to Western RA



WRAT Resource Adequacy Briefing Paper (April, 2004)
identifies four conceptual approaches:

- transparent information/consistent analyses
- enhanced assessment with explicit metrics
- voluntary targets
- enforceable standards

II. Four Conceptual Approaches



1. Transparent Information/Consistent Analyses

- Develop and maintain transparent database (load forecasts, generation, DSM/DR, transmission, fuel availability)
- Review information in a public forum; conduct consistent analyses

2. Enhanced Assessment with Explicit Metrics

- Identify and quantify explicit metrics of supply and demand balance at sub-regional levels
- Assess risk associated with weather and fuel supplies

II. Four Conceptual Approaches (cont.)



3. Voluntary Guidelines/Targets

- Select regional/sub-regional metrics (energy and capacity)
- Agree on voluntary adequacy guidelines/targets for metric(s)
- Quantify system performance relative to metrics (consistent, transparent)
- Report results of RA evaluations at meaningful geographic level
- Document results
- Rely on WECC/state partnership to implement (annual review)

II. Four Conceptual Approaches (cont.)



4. Enforceable Standards

- Establish standards on an interconnection-wide basis
- Reflect intra-regional diversity
- Provide for sanctions, such as monetary penalties
- Require LSEs to meet appropriate regional/sub-regional standards
- Track LSE level contracts and delivered resources
- Implement WI tagging for all energy types

II. Four Conceptual Approaches (cont.)



Guidelines/Targets Conceptual Approach Most Workable:

- Builds on the existing WECC load and resource assessment process
- Recognizes WECC lacks authority to impose mandatory requirements at this time but Board wants RA criteria
- Acknowledges states have a central interest in generation adequacy
- Fashions an explicit partnership between WECC, states and industry that can result in successful implementation of effective, workable adequacy provisions
- Addresses adequacy explicitly and quantitatively

III. Western Adequacy Milestones and Emerging Consensus



2003

- WRAT forms and briefs CREPC on WI assessment challenges
- WGA adopts resolution directs regional entities to perform RA study
- WECC adopts goal to “develop and publish” RA criteria

2004

- WECC member committee (PCC) forms RA Workgroup (RAWG)(3/04)
- WRAT develops and CREPC endorses RA “strawman” using guideline/targets approach with seven key elements (10/04)
- WECC readopts goal, directing implementation in calendar year 2005
- RAWG agrees on consensus recommendations (12/04)

III. Western Adequacy Milestones and Emerging Consensus (cont.)



2005

- WECC Planning Coordination Committee adopts RA motion March 2005
- WECC Board approves use of PSDC as adequacy assessment criteria
- CREPC approves RA recommendations April 2005

PCC RA motion adopted unanimously

- Validated importance of RA Criteria development w/i WECC
- Raised visibility of RA in WECC Committee process
- Established new group responsible for RA + more
- Directed future RA criteria development to be guided by RAWG recommendations and “Alternative Proposal”

III. Western Adequacy Milestones and Emerging Consensus (cont.)



Seven workgroup (RAWG) consensus recommendations:

1. Recommended conceptual approach and elements
 - Support development of RA requirements using the “voluntary targets” approach that embody the 7 elements in the WRAT RA “Strawman”
 - Include improved assessment processes as part of any RA requirements..
2. Protocols for load and resource counting/deliverability
 - Build on existing WECC L&R data submission processes; include more specificity in defining terms to assure the use of common definitions...
3. Assess the capacity and energy (gWh) adequacy of the overall WI and sub-areas within the WI...

III. Western Adequacy Milestones and Emerging Consensus (cont.)



4. Employ and possibly develop WI-wide models to study extreme weather..... and fuel supply scenarios
5. Facilitate further refinement of WI-wide common data standards and assumptions for load, resource and transmission data...
6. Provide transparent information to allow for more detailed analyses by states, LSEs and others.
7. Recommendations should be implemented collaboratively with other WI entities.

RAWG recommendations not yet approved by WECC standing committee.

II. Western Adequacy Milestones and Emerging Consensus (cont.)



“Alternative Proposal” Recommendations:

- “Establish means for comprehensive, consistent, open reporting of data for all load-serving entities within the Western Interconnection;
- Limit the scope of any policy guidance to establishing guidelines/targets or a benchmark minimum....
- Support the development of RA guidelines/targets that embody the seven (7) elements described in the West-wide Resource Assessment Team straw-man;

III. Western Adequacy Milestones and Emerging Consensus (cont.)



- Initiate limited assessment of the overall Western Interconnection capacity and energy adequacy using relative simple, transparent, methodologies;
- Collaboratively implement recommendations and adequacy guidelines with local, state, and provincial regulators, as well as control area operators and LSEs
- Explicitly address legitimate concerns about confidentiality of commercially sensitive data while still reporting and documenting the results of assessments at meaningful levels of WI geography.

IV. WRAT RA “Strawman”: Guidelines/Targets Approach--RA Framework



RA “Strawman” provides an RA framework consisting of

- Recommended conceptual approach
- Seven elements required to implement approach
- Illustrative provisions proposed for each element

Strawman endorsed by CREPC Oct 2004 to provide a basis for building consensus w/ regional stakeholders/entities

Framework and terminology of strawman allows focus for identification of agreement/disagreement

IV. RA Strawman: Guidelines/Targets Approach-- Seven Elements



1. Data/Information Standardization

- Load forecasting protocols
- Resource counting conventions
- Deliverability constraints

2. Level of Geographic Detail

- WECC evaluates 26 generation bubbles defined by transmission constraints but **reports results** for only six sub-areas
- Questions exist regarding what level of geographic granularity is appropriate, but assessment more valuable to all if more detailed

3. Submission of Information

- Rely on current WECC process, but consider new sources; strive to limit new data requests

IV. RA Strawman: Seven Elements (cont.)



4. Assessment Metrics

- Multiple metrics are needed to cover load forecast and resource performance uncertainties
- WECC already uses a capacity margin over summer peak loads, but must standardize temperature/load assumptions
- Winter cold/dry weather incidents could create an energy shortage, but no WECC-wide metric describing winter energy risks
- Natural gas use in power production is increasing winter risks

IV. RA Strawman: Seven Elements (cont.)



5. Adequacy Guidelines/Targets

- Guidelines/targets provide the basis for judgments about “enough” resources to cover load and resource uncertainties
- Not yet clear what analyses or methods to set quantitative values
- Demand response does not easily fit the historical framework
- Interest in cost vs. reliability tradeoffs, but current focus is on physical reliability

IV. Strawman: Seven Elements (cont.)



6. Timelines

- Annual assessments looking out 10 years

7. Oversight and Uses for RA Evaluations

- WECC would prepare a single PSA each year
- Regulators direct LSEs to compare and contrast IRP versus WECC differences
- Regulators use WECC guidelines/targets and supply assessment results to guide their own actions
- Annual WECC/CREPC meetings to review adequacy evaluation; increased WECC/regulator interaction needed for approach to become a credible basis for judging adequacy.

V. Adequacy Case Study Highlights



WGA has used DOE funding to support Lawrence Berkeley Lab

- **Review of 12 western IOU integrated resource plans (IRP)**

California Energy Commission with CPUC and CalSO:

- **Summer 2005 assessment**

Results illustrate importance of accurate and consistent assessment (capacity and energy) at effective level of geographic granularity

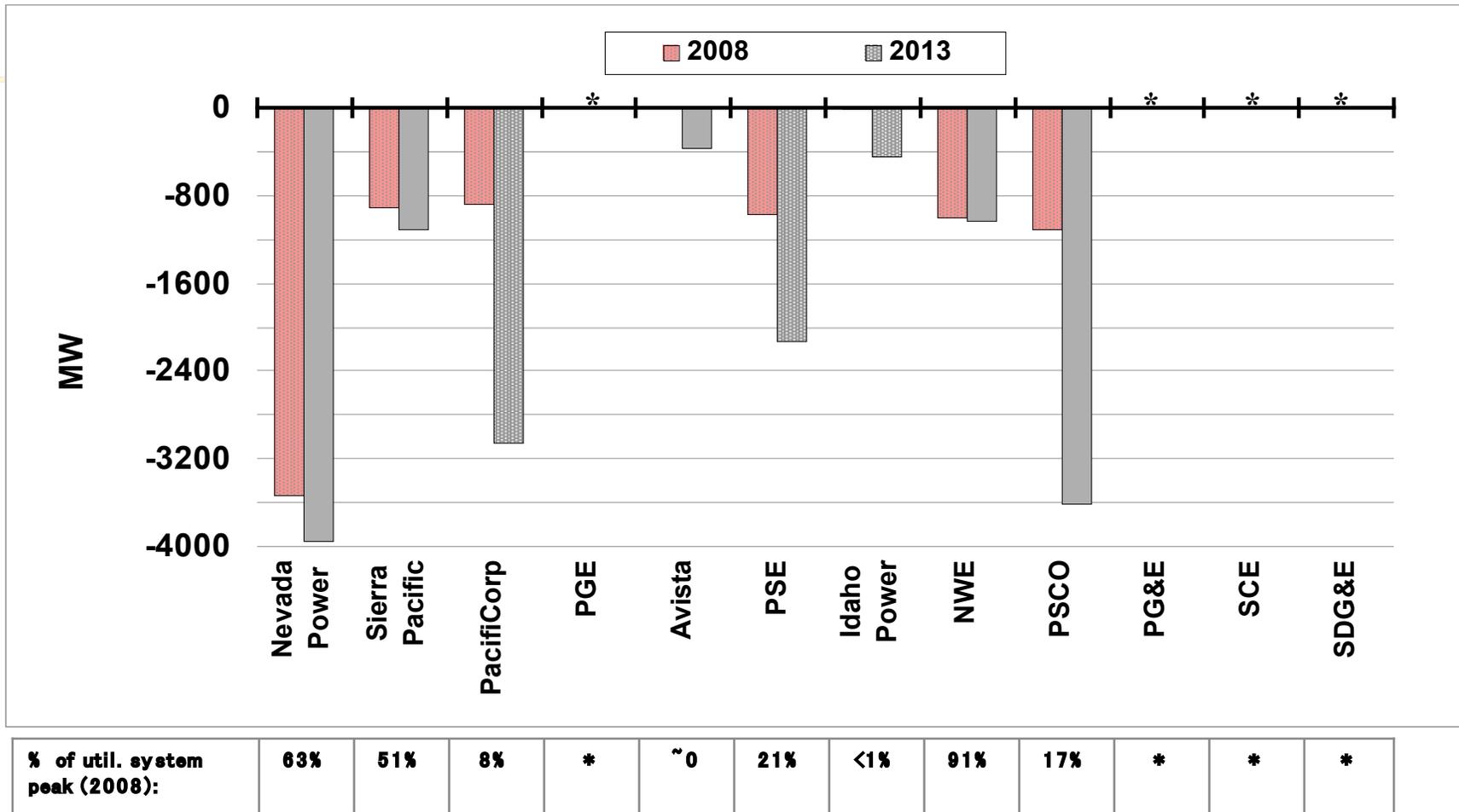
V. Case Study Highlights--IRP Approaches to Determining *Capacity* Resource Sufficiency

Approach to RA	Metric	Utility	Reserve Margin
WECC " Minimum Design Performance"	Greater of R, or the Largest Risk + 5% of Load Responsibility	Sierra Pacific	No numeric planning margin is specified.
	Two Largest Risks	Idaho Power	Reserves to cover loss of Idaho Power's share of two Bridger units equates to a 12% margin.
	1-in-10 Year LOLP	Nevada Power PSCO	Maintain 12% and 17% reserves, respectively.
State RA Requirements	Minimum Requirement	PG & E SCE SDG & E	Maintain resources to meet a planning reserve margin of 15-17%
Alternative Approaches	Temperature	PSE	Maintain resources to meet peak load plus operating reserves for a 16° F hour, or ~ 14.5-15% reserves.
	No Specified Metric Stated in Resource Plan	Avista	Planning margins are 10% of the peak hour load plus 90 MW, a reserve margin of ~ 15%
		NWE	Quantity of long vs. short-term capacity resources is optimized as part of the portfolio analysis.
		PacificCorp	Maintain sufficient capacity resources to meet a reserve margin of 15%
		PGE	Maintain a 6% planning margin on top of 6% operating reserve, for a 12% margin.

V. Highlights: IRP Approaches to Determining Energy (gWh) Resources Sufficiency

Utility	Reserve Margin
Sierra Pacific	Does not have an energy metric or target
Idaho Power	Maintains resources to meet energy demand each month at 70th percentile load and hydro conditions
Nevada Power	Does not have an energy metric or target
PSCO	Does not have an energy metric or target
PG & E	Not specified
SCE	Not specified
SDG & E	Not specified
PSE	Maintains sufficient resources to meet monthly energy needs in the highest deficit month, assuming expected weather and average water conditions
Avista	Maintains adequate resources such that, given historical variability in monthly loads and hydro availability, there is no more than a 1-in-10 probability that loads will exceed resources.
NWE	Does not have a reserve for energy; the quantity of long-vs. short-term energy resources is optimized as part of portfolio analysis.
PacifiCorp	Identifies resource needs based on the objective of limiting spot market purchases to no more than 5% of all hours in a year, based on average water conditions.
PGE	Maintains sufficient resources to meet expected annual energy needs at critical water conditions.

V. Highlights: IRP Estimates of 12 Utilities' Resource Need



Note: Asterix indicates insufficient data. Avista has a slight surplus position in 2008. PSE has recently released a draft 2005 plan, which is not included in this presentation.

- Projected difference between existing and planned supply and forecasted peak demand

Progress Toward Resource Adequacy Partnership

V. Case Study Highlights--California Summer 2005

Outlook CA ISO Control Area

Line		June	July	August	September
1	Existing Generation ¹	45,969	45,457	46,512	46,641
2	Retirements (Known)	-530			
3	Retirements (High Risk)	-1,192			
4	High Probability CA Additions	1,210	1,055	129	1
5	Forced Outages	-2,800	-2,800	-2,800	-2,800
6	Zonal Transmission Limitation ²	-800	-800	-800	-800
7	Net Interchange ³	9,303	9,303	9,303	9,303
8	Total Supply (MW)	51,160	52,215	52,344	52,345
9	1-in-2 Summer Temperature Demand (Normal)	45,085	47,004	47,134	46,679
10	Projected Resource Margin (1-in-2)*	16.5%	13.5%	13.4%	14.8%
11	1-in-10 Summer Temperature Demand (Hot)	48,323	50,384	50,526	50,043
12	Projected Resource Margin (1-in-10)*	7.1%	4.4%	4.3%	5.5%
13	MW needed to meet 7.0% Reserve	0	1,115	1,138	621
14	Surplus MW above 7.0% Reserve	35	0	0	0

¹ Dependable capacity by station includes 1,080 MW of stations located South of Miguel

² Values provided by CA ISO.

³ 2004 CA ISO estimates **DC imports of 1,500 MW**, Path 26 2,700 MW, **SW imports 2,500 MW**, Dynamic 1,003 MW and CEC estimate of **LADWP imports of 1,000 MW**. 2005 estimate increases **DC transfer capability by 500 MW**, Path 26 by 300 MW, **North of Miguel by 400 MW** and **Northwest (minus SMUD) 2400 MW**. Imports supplying own reserves are in bold text.

* Does not reflect uncertainty for "Net Interchange" or "Forced Outages" which can result in significant variation in Resource Margin. Calculated as ((Supply - **Imports with own reserves**) / (Demand - **Imports with own reserves**)) - 1

V. Highlights--California Summer 2005 Outlook

CA ISO Northern Region (NP26)

Line		<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
1	Existing Generation	25,883	25,086	25,661	25,661
2	Retirements (Known)				
3	Retirements (High Risk)	-1,046			
4	High Probability CA Additions	249	575		
5	Forced Outages	-1,600	-1,600	-1,600	-1,600
6	Zonal Transmission Limitation ¹	0	0	0	0
7	Net Interchange ²	2,400	2,400	2,400	2,400
8	Total Supply (MW)	25,886	26,461	26,461	26,461
9	1-in-2 Summer Temperature Demand (Normal)	20,839	21,289	21,003	20,233
10	Projected Resource Margin (1-in-2)*	27.4%	27.4%	29.3%	34.9%
11	1-in-10 Summer Temperature Demand (Hot)	22,230	22,710	22,405	21,584
12	Projected Resource Margin (1-in-10)*	18.4%	18.5%	20.3%	25.4%
13	MW needed to meet 7.0% Reserve in NP26	0	0	0	0
14	Surplus MW above 7.0% Reserve in NP26	2,267	2,329	2,655	3,534

¹ Values provided by CA ISO.

² 2004 estimates based on CA ISO provided levels of NW and SMUD interchange values during June-July 2004 and assuming flows are S-N on Path 26.

* Does not reflect uncertainty for "Net Interchange" or "Forced Outages" which can result in significant variation in Resource Margin. Calculated as $((\text{Supply} - \text{Imports with own reserves}) / (\text{Demand} - \text{Imports with own reserves})) - 1$

V. Highlights--California Summer 2005 Outlook

CA ISO Southern Region (SP26)

Line		<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
1	Existing Generation ¹	20,086	20,371	20,851	20,980
2	Retirements (Known)	-530			
3	Retirements (High Risk)	-146			
4	High Probability CA Additions	961	480	129	1
5	Forced Outages	-1,200	-1,200	-1,200	-1,200
6	Zonal Transmission Limitation ²	-800	-800	-800	-800
7	Net Interchange ³	9,903	9,903	9,903	9,903
8	Total Supply (MW)	28,274	28,754	28,883	28,884
9	1-in-2 Summer Temperature Demand (Normal)	24,782	26,275	26,691	27,001
10	Projected Resource Margin (1-in-2)*	18.5%	12.2%	10.5%	8.9%
11	1-in-10 Summer Temperature Demand (Hot)	26,667	28,273	28,721	29,054
12	Projected Resource Margin (1-in-10)*	7.7%	2.1%	0.7%	-0.7%
13	MW needed/(Excess) to meet 7.0% Reserve in SP26	0	1,085	1,435	1,791
14	Surplus MW above 7.0% Reserve in SP26	153	0	0	0

¹ Dependable capacity by station includes 1,080 MW of stations located South of Miguel

² Values provided by CA ISO.

³ 2004 CA ISO estimates **DC imports of 1,500 MW**, Path 26 2,700 MW, **SW imports 2,500 MW**, Dynamic 1,003 MW and CEC estimate of **LADWP imports of 1,000 MW**. 2005 estimate increases **DC transfer capability by 500 MW**, Path 26 by 300 MW and **North of Miguel by 400 MW**. Imports supplying own reserves are in bold text.

* Does not reflect uncertainty for "Net Interchange" or "Forced Outages" which can result in significant variation in Resource Margin. Calculated as $((\text{Supply} - \text{Imports with own reserves}) / (\text{Demand} - \text{Imports with own reserves})) - 1$

VI. Review and Conclusion: Key Take-away Points



Section I—

- Markets and regulation continuing to evolve creating uncertainty
Institutional landscape is complex; NERC/FERC standard in process;
western entities working reasonably well together but not done yet

Section II—

- Of the four conceptual approaches, there is agreement on
guidelines/targets approach

Section III—

- Consensus emerging on key themes including “Strawman” 7 elements
- WECC’s general response to WGA/CREPC initiatives is positive;
- Board determination to develop RA framework clear

VI. Review and Conclusion: Key Take-away Points

Section IV—

- Framework and terminology of Strawman allows focus for identification of agreement/disagreement
- PCC is forum and all WECC members have a vote
- Much work remaining

Section V—

- Important to distinguish between one in two vs. one in ten
- Clarity of assumptions regarding loads and efficiency is needed
- More detail re status of plants under construction/planned
- Become clear on role of interruptible programs
- Transparent, consistent accounting across sub-areas is critical
- Energy (gWh) metrics not consistent; planning for average water?

VI. Review and Conclusion:

CREPC Recommendations April 21, 2005



- Direct WRAT to Participate in WECC's RA process to develop guidelines/targets compatible with Strawman elements
- Direct WRAT to advocate for changes to the Power Supply Assessment
- Request WECC staff to review all venues/products where adequacy determinations are reported
- Request future year load forecasts be made public
- Respond to WECC Effectiveness survey (Bylaws section 4.9)
- Ask state commissions to increase technical levels re planning/adequacy
- Achieve closer linkage between state IRP and WECC processes
- Seek better link to non-jurisdictional entities
- Advise WGA that adequacy resolution will require increased resources, sophisticated assessment and industry participation.