Resource Adequacy Briefing Paper

Westwide Resource Assessment Team

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I. Introduction

The Westwide Resource Assessment Team's (WRAT) *January 15 Report to CREPC* highlighted western energy system assessment needs and introduced the subject of resource adequacy. This Briefing Paper provides additional background information on resource adequacy. It describes resource adequacy challenges; approaches that can be considered to ensure the WI has an adequate load/resource balance; highlights of selected WI activities underway to address adequacy; and potential next steps for CREPC and other regional entities. The four approaches reviewed in Section III are:

- transparent information;
- enhanced assessment and consistent metrics;
- voluntary targets; and
- enforceable standards.

Because controversy increases as we move along the continuum from information to enforceable standards, it is important that a cautious and methodical evaluation of these or other possible approaches be undertaken. Since meaningful metrics/targets/standards all require transparent information and enhanced assessment, these remain of highest priority. WRAT, WECC and others are making progress on these essential first steps, but significant work remains to be accomplished.

Questions related to adequacy are being explored by FERC, NERC, WECC, the Northwest Power Planning and Conservation Council, the Northwest Power Pool, Bonneville Power Administration (BPA), PacifiCorp, selected states and others. These activities will collectively include a review of historical and alternative metrics and analytic tools available to measure adequacy, which will contribute to further discussions of preferred metrics and potential targets. Highlights of key activities are presented in Section IV.

The paper does not seek to answer the organizational questions about what institution(s) should be responsible for implementing resource adequacy processes. With improved understanding of adequacy challenges, approaches to achieving adequacy, and the work underway to elucidate or apply them, discussion of institutional roles can be better informed as it occurs over the course of 2004. Included among the next steps suggested in Section V is development of closer and more transparent coordination among CREPC, WIEB and WECC regarding overarching questions related to adequacy.

II. Resource Adequacy Challenges

To enable the reader to understand why a resource adequacy challenge exists, it is first useful to explore what problems we are attempting to solve. In the following sub-sections we focus particularly on the incentive problems and conflicts that exist today and that have the potential to contribute to inadequate resource development.

II.A The WI Lacks a Common Understanding or Definition of Resource Adequacy

The region does not have a common understanding or agreement on definition(s) of adequacy.[1] While we do agree it is one key element of overall system reliability, its relationship to other components of reliability such as system operation or transmission development is not well recognized. Even the term 'reliability' itself means different things to different people, and we therefore do not have good measurements of it or the costs associated with achieving, or failing to achieve, varying levels of it. In the absence of a common understanding of terms or goals it is difficult to have an informed discussion, or to approach the challenge of achieving consensus.

The CREPC Reliability Working Group's *January 15 Report* makes an important initial contribution by its discussion of various concepts of reliability. It emphasizes that most people perceive "reliability" as the absence of power failures, and it notes that there are at least three kinds of failures:

> (1) Localized failures due to problems in the distribution system.
> (2) Cascading outages caused by operational problems or system element failures in the interconnected transmission system.
> (3) Power failures from not having adequate generating capacity available or the inability to fuel generators under extreme conditions.

It is the third of these reliability challenges that the WRAT discusses in this paper: generation resource availability and its balance with load and demand reduction/response needs.[2] Power failures associated with lack of adequacy of the capacity of the system are currently the responsibility of individual load serving entities and their regulators, but system operators such as the ISO or any future RTOs can also be greatly affected by, or considered responsible for, outages and their impacts. Finally, inevitably, it is the elected officials who answer to the voters for availability and cost of electricity

A more detailed definition of resource adequacy can be found in the CREPC survey of member organizations conducted in March 2003:

[1] For the purposes of this paper, the region is defined as the geographic footprint of the WI.
[2] Resource planning /adequacy must include demand options explicitly and cannot be done in isolation from WECC operating reserve levels or transmission system planning/operation.

"For purposes of this survey, resource adequacy is defined to mean a condition in which a utility or other load serving entity (LSE) has demonstrated that it has acquired sufficient resources to satisfy a forecast of future loads reliably. A formal resource adequacy requirement would establish a specific standard defining "sufficient," it would include guidelines for counting resources toward this standard, and it would specify to whom reporting requirements would be submitted for evaluation. An acceptable procedure would also enable flexible compliance so that each entity could choose the degree of reliance upon types of resources, such as demand response capability, that it wished to pursue to minimize expected costs of compliance. In general, a resource adequacy requirement encompasses, but is broader than integrated resource planning and resource procurement."

II.B Hybrid Markets/Regulatory Structures Lack Explicit Regulatory Compacts and Create Uncertainty

A second underlying source of the resource adequacy dilemma is reliance upon implicit rather than explicit statements of the regulatory compact. Where there is vertical integration, it is generally understood that in return for the utility obligation to serve load, the utility's prudent costs will be recovered from ratepayers. In the relationship between a utility and its regulator, the details of this arrangement need not be spelled out because the two entities have an understanding about their long term relationship. They both need each other. In a competitive or hybrid market structure where there are additional entities that either serve load or provide resources, more concrete statements of responsibility to serve load and assurance of cost recovery are needed.

A similar absence of explicit obligation to serve regulatory compacts may exist for municipal utilities in California and perhaps for other public-owned utilities (POUs).[3] In the Northwest and perhaps for other federal power marketing entities, a related but unique complexity exists. At the present time, BPA has not resolved who is responsible for meeting load growth by POUs beyond the firm capability of BPA's existing resources (BPA has statutory responsibility to meet load placed on it; thus BPA may be responsible for resource acquisition to serve all POU loads or it could be each POU's responsibility; or some variation of these two scenarios). This Pacific NW situation is a particular variant of a larger question of "who is responsible?" for resource acquisition that needs be addressed in parallel with questions of "how much?" is needed to achieve "what level of desired reliability?"

[3]The 2003 Joint CEC Staff-California Municipal Utilities Association (CMUA) *Working Paper on Resource Adequacy* suggests that California municipal utilities rarely have explicit statements of obligation to serve or definitive declarations that resources will be developed to serve such loads. Despite the absence of formal obligations, municipal utilities have met loads though for some at high cost due to spot market exposure.

The ambiguities that could be tolerated when utilities provided equity funding for resources they owned become problematic in circumstances where merchant generators are borrowing money to build speculative merchant power plants for spot markets. The uncertainty of responsibility to serve load and of cost recovery for good faith power purchases stemming from competitive or hybrid market forms are an anathema to financial markets. One way that these uncertainties can be reduced is by creating explicit resource adequacy requirements that restate the obligation of LSEs to make forward power purchase commitments. They can also be reduced, particularly in a retail access environment, by requirements that potential LSEs need to have sufficient financial resources to honor bilateral contracts. This is particularly important in a retail access environment.

It is not clear that building for spot markets will be the dominant activity of merchant generators in the future, because of the significant uncertainties about the overall level and timing of cost recovery, even in the absence of price caps (more on this issue below). However, whether or not merchant generators build, potential incentive problems can exist in a hybrid market structure. When responsibility to provide the resources to serve the load of specific classes of end-users is not clearly established and information about the expected state of the market is poor or lacking, there are incentives for LSEs to hold back from revealing the extent of their needs and from being aggressive about forward contracting, in hopes that their competitive position will be maximized.

Similarly, there are incentives for merchant generators to hold back on revealing their plans for construction in order to enhance their negotiating position. The combination of these two sets of incentives can lead to, or exacerbate, boom and bust cycles in the generation market, which can lead, in turn, to high spot prices and high spot market exposure.

Merchant generators also have different incentives than regulated generators to hold marginally uneconomic plants available for emergency operation. A plant owned by and in the rate base of a regulated utility can be held for emergency purposes even if it is extremely inefficient and costly to operate, if the regulator agrees that keeping the plant in service is prudent. The financial risk to the owner of such a plant is minimal, particularly if it is also covered by some sort of fuel cost adjustment clause. Merchant generators, on the other hand, have to recover all their costs through market operations, either forward contracts or spot market sales. If they have no expectation of profitably running an aging generator, under these conditions, they have no incentive to keep the plant available. The site itself may be more valuable than the plant. This generally makes forecasting plant availability more difficult and uncertain; it could also lead to unplanned shortfalls that do not allow replacement capacity to be brought on line in time to maintain even operating reserve requirements.

II.C Retail Access Reduces Clarity of Adequacy Assessment and Responsibility

In hybrid market situations where retail access components exist, particular problems arise. An increasing scope of direct access (or retail choice) compared to traditional monopoly

service in any sub-region state or province creates increasing difficulty for assessing and maintaining adequacy. Even for physical assessments, the expansion of the number of load serving entities (LSE) in the form of energy service providers and community aggregators makes preparation of improved assessments more difficult. If there is extensive retail access, then it is more difficult to ensure that service providers have taken responsibility to ensure adequate service to their customers than if most service is provided under monopoly service provisions.[4]

This is especially true if these ESPs can easily return their customers to the original utility. Under these conditions, ESPs will be reluctant to make the forward commitments that would otherwise be considered prudent if expected loads they were serving were more predictable. The more extensive retail access becomes, then the stronger the argument for some sort of mandatory standards or collective backstop becomes. An alternative solution for this particular problem may focus on enhancing the financial strength and reporting requirements states impose on LSEs serving retail access markets. This would allow traditional court mechanisms that support contract performance to be more effective.

II.D Price Controls Can Distort Incentives on Both the Supply and Demand Sides

Price controls generally distort incentives for market participants on both sides of the market, and the more markets they are applied to, the more distortion results.[5] This section focuses only on the effects of price controls for spot markets, where they have already been applied, but the general conclusion holds for both spot and forward markets. The importance of these incentive distortions depends upon the degree to which LSEs depend upon spot markets to serve their loads. During the 2000-2001crisis, California IOUs and some other utilities across the West were highly exposed to the spot market, and thus the financial impacts were devastating. When LSEs cover load largely through forward commitments, spot market price caps have fewer benefits but continue to produce distortions in markets.

There are several important caveats to the following discussion. The first is that the level of the price control is inversely related to its incentive effect. Incentive effects that can be large at low price control levels, can be minor at higher, "safety net" levels. The second is that the discussion is directed to the broad market, not to specific instances where there might be temporary local market power. In the latter circumstance, more constraining price controls or other mitigation mechanisms might be appropriate. The third is that the discussion is directed at the entire western interconnection, not just locations where there may be formally structured markets.

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[4] These problems are exacerbated when physical limitations in the power delivery system constrain the ability to ensure that those who choose a particular way of meeting their needs are the ones who suffer the consequences of failure if the resources they acquired become unavailable.

[5] The term includes price caps, bid caps and automatic mitigation measures that limit market prices, but not must-offer requirements that affect quantities but not prices.

Price controls on spot markets can have effects in both the spot and forward markets, because these markets are substitutes for each other. The controls mute incentives to invest and to forward contract for supply, by reducing the rewards and penalties from participation in the spot market. For a generator, participation in spot markets makes sense when the periods in which they would expect to receive high prices are adequate (high enough prices or long enough duration) to recover their investment. These are the periods that offset low priced periods when only variable costs can be recovered. Price caps significantly limit their incentive to invest for those markets. For an LSE, on the other hand, participation in price-capped markets is significantly more attractive than in non-capped markets, since the upside (low prices) is not limited but the downside (high prices) is.

But when LSEs shift their future demand into spot markets (which they effectively do by not forward contracting for resources, creating a perception of an adequacy problem), they reduce demand in the forward markets, which are left as the only markets in which merchant generators can expect to invest and earn competitive returns. The reduced demand can lead to reduced investment, which can lead to a real adequacy problem.

Spot market price controls can also mute or eliminate incentives for price-responsive load. Customers that are willing to curtail usage in response to very high prices have the potential to increase the efficiency of overall investment. Moreover, price responsive demand, even for small percentages of the total load, has been pointed to as one of the primary mechanisms that could act to mitigate spot price levels, without resorting to administratively determined price controls or other market power mitigation mechanisms. However, these kinds of programs depend upon being able to pay customers to cut back on usage or on tariffs that flow market prices through to customers. The value that can be shared between the LSE's customers as a whole and the customers participating in an "economic" demand response program is a function of the level of the spot prices (or non-price rationing in the alternative) that can be avoided by the program. The ability to attract participants into "economic" DR programs or RTP tariffs is also limited if price or bid caps are set at relatively low levels.

Finally, price controls on spot markets also increase incentives for LSEs to be free riders on the actions of other LSEs. In the presence of inadequate overall investment, those who have not taken steps to mitigate power supply risks down to acceptable levels will end up betting that bad but uncertain events will not happen. If they do happen, these LSEs will be the first to call on others to share, in the expectation that policy makers will respond to the plight of the customers on whose behalf the LSEs made the decisions.

Even in those periods when supplies are generally considered adequate on a region-wide basis, the costs for supporting the availability of these supplies may not be equitably shared among all LSEs. Those entities making long term commitments to provide reliability for their loads could essentially have other LSEs acting as free riders betting that uncertain events will not happen, and thus enjoying reliability at reduced cost. These incentive problems might also

result in a "Tragedy of the Commons" effect, which could eventually lead to reductions in firm forward commitments and threats to reliability as reserves diminished compared to actual needs.

II.E The Ability to Waive Natural Resource Protections Limits Incentives to Provide Adequate Resources

In the Pacific Northwest there is a unique issue relating to BPA's dual responsibility to provide electricity and to protect fisheries. If there is a shortage, BPA could declare a power emergency and "lean on the river" during shortages. This could include violating river operation constraints designed to protect fish. This happened in 2000 and 2001.[6] Similarly, in California during the crisis it was necessary to modify regulations limiting air emissions from existing plants and to create emergency siting procedures for new projects. Waiving environmental requirements can serve to limit incentives to provide adequate resources and could have the associated impact of undermining environmental protection goals.

III. Approaches to Resource Adequacy

The WRAT has identified four approaches that highlight ways to increase the likelihood that adequate generating and demand response resources will be developed. The approaches have increasing levels of controversy and data requirements associated with them and different implications for the need for more formal state, regional and federal collaboration.[7] The following sub-sections provide a preliminary description of each approach and identify analytic and coordination requirements each could entail. Attachment A contains a summary table describing adequacy approaches and requirements in place elsewhere in the U.S.

III.A Transparent Information

> *Develop and maintain transparent information regarding load forecasts, generation, demand resource commitments, transmission, and fuel availability; review this information in a public forum; and, maintain the information in a portable, accessible data base that provides a basis for consistent analyses. ("transparent information and consistent analyses").*

The first approach, which would provide a foundation for any of the other approaches, is continuing development of information about the elements of expected loads and resources in

[6] After 2001, BPA formulated a "Draft guide to the Tools and Principles for a Dry Year Strategy" to ensure the availability of sufficient tools to allow BPA to meet its load serving obligations without having to declare a power emergency.

[7] In practice, there could be multiple variations of the approaches described here. We select these primarily for the purpose of framing the discussion for the CREPC spring meeting.

the interconnection and sub-regions, and making this information transparent and widely available. This should include information such as expected plant construction, outages, forecast loads, demand response, power flows, renewable and hydro resource availability, and potential transmission and fuel supply constraints.

Three key components of information and transparency needed for adequacy are highlighted below.

- **Load Forecasts.** The rigorous and transparent assessment of the WI electricity system must begin with a well-understood, robust, documented transparent set of LSE demand forecasts. These do not exist or are not documented and readily available. At the present time, WECC is the only regional entity gathering data from all control areas on electricity loads and forecasts. The FERC requires all entities serving loads > 200 megawatts to file load information and forecasts annually, but this data is not timely, has apparent errors and lacks documentation. The forecasts that WECC reports are summarized at the level of four major WI sub-regions. WECC does not receive forecasts of individual LSEs unless these also happen to be control areas. Thus, WECC obtains the same level of detail from the 45,000 MW CAISO as it does from the 600 MW Imperial Irrigation District. There is virtually no supporting explanation provided to WECC, much less the public, of the forecast assumptions submitted to WECC. Thus one control area's forecast may be based on bullish forecasts of economic activity and population growth while another's may be very conservative in projecting these factors. The WECC forecasts also do not provide estimates of loads under alternative scenarios (e.g. higher than average peak summer temperature conditions, colder than average winter peak temperature conditions, adverse hydrological conditions over two or more years).

- **Generation Facility Availability.** In order to evaluate the ability of the region, sub-regions and LSEs to meet load it is necessary to have a reasonably detailed understanding of the available generation resources and the energy generation expected from operations. WECC maintains a detailed public data base of existing generation and potential additions. Beyond this static information, analysts need to better understand how the generation resources perform under different system conditions (drought, heat spells, etc.) Data needs also include forced and planned outages. From an adequacy perspective, it is important to note information is most needed on a prospective, planning basis, not an historic, after-the-fact basis as emerging renewable generation tracking mechanisms being developed are designed to collect.

- **Transmission System Constraints and Expansion.** A third critical component of the data needs for adequacy is to have an accurate portrayal of the transmission system,

with particular emphasis on the ability to transfer power among sub-regions.[8] This is critical to an evaluation of adequacy on an interconnection basis, since there is intraregional sharing of resources. This sharing is limited by transfer capabilities, congestion on key lines, and potential outages that could occur at points of exchange between sub-regions, such as the Interties between the NW and California. Transparent and consistent data and assumptions about simultaneous transfer limits under adverse conditions are particularly needed.

The transparent information approach overall would provide an improved basis for a range of analyses conducted by various entities in the interconnection. It would seek to develop consistent information for decision-makers, such as state regulators, resource developers, LSEs, and direct access customers for assessing future system needs, reliability, investments or contracts. It requires some central entity to collect and publish data that adheres to uniform standards responsive to public policy needs. Significant progress has been made in the past year in building a data base, primarily through the efforts of PacifiCorp and SSG-WI, relying on WECC data where available and not confidential. It is critical that more information be made transparent, available and portable. One next step for this effort will be release of the SSG-WI RFP for maintenance and enhancement of the existing data base.

III.B Enhanced Assessment with Explicit Metrics

Identify, quantify and review explicit metrics of supply and demand balance for the regional and sub-regional levels considering appropriate timeframes and including elements of risk associated with weather and fuel supplies ("assessment with explicit metrics");

This approach builds on transparent information by conducting enhanced assessment and developing one or more explicit metrics that measure whether available resources are likely to serve load under conditions that can be encountered.[9] Specific considerations of uncertain weather and availability of adequate fuel supplies would also be introduced. The results would provide regulators, WECC, LSEs and others with a consistent regional forecast of how resources in the entire interconnection or its major sub-regions compared to loads and operating reserve requirements, from both a capacity and energy perspective.

A central element and underlying goal of these enhanced assessments would include development, quantification and public review of explicit metrics of system performance

[8] In this paper the term sub-region is used to refer to a range of discrete geographic components smaller than the WI region. In some instances these may be the six sub-regions used in the WECC Power Supply Assessments, in others they refer to the proposed RTO footprints, the sub-regional transmission planning group areas or the 24 transmission zones evaluated in the Supply Assessment Model (SAM).

[9] "Metric" is used here as "a standard of measurement."

Assessment would be done consistently and on an annual basis. What metric(s) and timeframes to be applied are important questions to be addressed.

Implementation of this approach would include completion of two unmet enhanced assessment needs described in the WRAT *January 15 Report*: "Energy (kWh) Assessment" and "Assessment of Integrated Western Electricity/Natural Gas System". The goal of both of these proposed assessments is to develop transparent information about basic WI energy systems to better understand system performance and develop appropriate metrics for summer and winter, capacity and energy.

- **Energy (kWh) Assessment.** An energy assessment is central to illuminating key resource adequacy and reliability considerations. Some sub-regions of the West are energy (not capacity) limited. One contributing cause to the shortages in 2000-01 was multiple states/entities relying upon importing the same Pacific Northwest hydro exports, which were unavailable due to low Columbia River Basin flows. Potential high prices due to scarcity is another central reason for doing an energy assessment for the West, to complement the peak capacity assessment that is aimed primarily at physical reliability (though it has price implications as well). From the WI perspective the primary issues should be uncertain water supply, non-hydro fuel limitations such as air-quality limits or gas-supply constraints on the total annual mWh output of fossil-generation, and unexpected shutdown or retirement of plants (particularly in California). The effects of these supply limitations may be critical when there are extremely hot summers or cold winters.

- **Assessment of the Integrated WI Electricity and Natural Gas System.** As recognized in the WGA annual meeting in September '03, there is no west wide assessment of natural gas fuel supply and infrastructure and western gas needs, including power generation. Natural gas prices set wholesale electric prices whenever the most expensive generation unit is gas-fired. This is now about 75 to 90 percent of the hours of the year. Absolute shortages or inability to meet all end-use demands from inadequate gas supplies are also possible. This is a more complex assessment than the energy assessment discussed above. It should include an analysis of the effect of increased gas demand (generation and non-generation) on western gas prices in the short run and should bound a reasonable range of risks that Governors and western officials consider relevant.

A single metric is unlikely to address sub-regions facing different problems. For example, we know that the southwestern portions of WECC are driven by summer peak demand due to hot weather and resulting air conditioning loads. We know that the Pacific Northwest, as a hydro-electric generating dominated region, has plenty of generating capacity but could experience energy shortages under multi-year droughts. How these two regions interact with one another is less well understood, and such relationships might be changing through time as the Pacific Northwest summer peak loads grow more quickly than annual energy growth and the ability

of the Pacific Southwest to export energy to the Pacific Northwest in the winter diminishes. With the additional dynamic of California loads and resources and the integrated transmission system, these relationships must be explored with interconnection-wide tools and consistent assumptions.

A technical review of historical and alternative methods to measure adequacy is currently underway by Lawrence Berkeley Labs (LBL), in a partnership with the WRAT, funded by DOE and WGA.[10] The WECC Reliability Subcommittee will be exploring similar questions at its meeting in April, 2004.

III.C Voluntary Adequacy Targets

> *Select regional/sub-regional metrics and agree on voluntary adequacy targets for each metric; quantify system performance relative to selected metrics using consistent, transparent information; and, convene periodic summits of regional and state entities to review region and sub-region success in meeting targets ("voluntary targets");*

A third approach would build on some elements of the proceeding two, and additionally would entail regional and sub-regional entities and stakeholders reaching consensus on appropriate metrics and identifying voluntary adequacy targets for those metrics. In addition to agreement on target(s), this approach would be coupled with periodic summits at the regional level to assess success at meeting the targets, based on assessment of metrics at the regional level on a consistent, annual basis (approach II.B).

The main element of this approach would be a commitment by regional and sub-regional entities to informally agree on applicable metrics and associated targets for a reasonable level of adequacy. These would not be "standards" in the conventional sense described in the fourth approach below, but they would represent the region's decision makers' and stakeholders' best judgment of acceptable system performance requirements. For example, a summer adequacy metric could be system performance (the balance of demand and supply) measured in megawatts of capacity at a peak hour in August. An illustrative target for this metric could require a 15% margin, derived by expected summer peak demand under 1:2 or under 1:10 weather multiplied by 1.15.

A critical challenge for this approach would be establishing a robust process to propose and reach consensus on targets. While it is obvious that a public process is needed, establishing such a target requires evaluation of the tradeoff between cost and reliability. Since all of the LSEs in the WI will not shift to dynamic, market-based rates that allow consumers to choose their desired level of reliability, the choice of an aggregate level is a key decision that

[10] There are other issues such as how intermittent renewable resources contribute to adequacy, the extent to which programmatic activities like energy efficiency programs and demand response are accounted for, and how various risk preferences are measured.

regulators must make. As a part of this public process, questions regarding timeframes, target levels and to whom the targets would apply would be debated. Successful application of this approach would require that the targets be applied and evaluated at a meaningful level of WI geography. "Meaningful" refers to a level of granularity within the interconnection that allows regional, state and local regulators to focus attention on entities that are capable of taking actions to affect adequacy.

Finally, regional entities and states would agree to a common, public forum to annually review success in meeting the targets. While no authority to enforce targets would exist, the knowledge acquired through the annual review would allow individual states/provinces, control areas and LSEs to achieve outcomes through their existing market roles, authorities and mandates. It is not unreasonable to believe that the precise tradeoff each jurisdiction might make could be different, which would be acceptable if each jurisdiction were truly prepared to accept the full consequences of their decision.

III.D Enforceable Standards

> *Establish standards on an interconnection-wide basis that reflect intra-regional diversity and provide for sanctions, such as monetary penalties; require LSEs to meet appropriate regional/sub-regional standards ("enforceable standards").*

This approach builds on elements of the previous three by adding a forward commitment obligation and an enforcement mechanism for the consensus target(s) developed under approach C above, e.g., a planning reserve margin of 15% at the time of summer peak loads. These would be akin to the operating reserve requirements of NERC and WECC,[11] but would be requirements to demonstrate sufficient resource commitments over some planning horizon. It could also be similar to provisions contained in the WSCC's "power supply design criteria" (described in Section IV and Attachment C), though these were not associated with sanctions. NERC through its RTATF will soon release a study of what the member reliability councils currently require as a resource adequacy requirement, and WECC may be one of the councils required to develop explicit requirements.[12]

Compared to voluntary targets, an enforceable adequacy standard, rather than merely imposing additional planning costs, creates financial consequences for those LSEs who were not already covering future load with resource commitments. An enforceable standard converts the targets into an obligation to make resource commitments to serve future load and needed reserves. For this to be made functional, a decision is needed about whom the enforceable standard will apply to. If applied at the utility or load level, each LSE could be required, for example, to secure 90% of the resources required to serve forecasted requirement

[11] WECC's operating reserve requirements are currently only enforceable against signers of the RMS agreement in WECC, though they are widely accepted as requirements.
[12] NERC Resource and Transmission Adequacy Task Force.

four years into the future. Thus a planning reserve target projected into the future would result in a forward commitment obligation for the LSE. Of course any sensible requirement would allow the LSE (guided by its regulator) to choose how to satisfy this obligation.

This approach would require overcoming technical challenges and policy questions involved in setting voluntary target(s), but they would be more consequential, and thus, probably more controversial. Standards ideally would be enforced on all jurisdictional LSEs (either on direct access customers or their suppliers), and would affect independent resource developers by creating a contract market for their projects. Affected LSEs could resist standards development in order to limit their financial exposure. On the other hand, to the extent that they are in competition, they may see the standards as a fair way to require their competitors to compete fairly with them.[13]

Implementation would make necessary reporting requirements LSE-specific. Such reporting requirements would most likely be significantly more extensive than for a regional/sub-regional or control area assessment or target. Projections of the future and actual load/resource tabulations might be required to support various penalty formulations. Once a target is used in this fashion as an obligation, there are numerous issues about the development of load forecasting protocols, resource eligibility, and resource counting conventions that will be treated more seriously than they would for an assessment of metrics or a voluntary target process.

Another implementation complexity introduced by an enforceable standard approach is the institution of a mechanism to impose penalties upon those LSEs failing to satisfy the standards. Financial penalties scaled to the severity of the violation and the nature of any reliability impacts have been proposed, as well as explicit load curtailment sanctions. Clearly the development of such penalty mechanisms is a facet of enforcement that one hopes to use to induce compliance as opposed to a regular feature of interactions among LSEs and entities with this enforcement authority. The success of WECC's Reliability Management System in providing incentives for compliance with a set of operating criteria suggests that there is reason for optimism that such systems can work.

To sum up, long-term resource adequacy obligations, such as multi-year ahead forward commitment obligations, are intended to be explicit about what each LSE needs to do to acquire the resources it will eventually need to serve load. A sufficiently far-into-the-future benchmark will induce resource development. Short-term resource adequacy requirements,

[13] The point is that while some LSEs may object to any proposed standard as being too stringent, others may feel that some form of mandate is appropriate and necessary to allow those within their organization who are responsible for complying to have a compelling reason accepted by regulators. It is this thinking that is behind the RMS program that WECC has today. Though that program does not involve huge financial exposure, it is not fair to assume that LSEs will always oppose standards because they represent financial risk. They have shown through the RMS that they have reason to accept that risk if everyone else does too.

such as LSE and generator reporting obligations, combat possible market power abuses and provide necessary information so that an independent ISO and RTO can operate the system reliably.[14] The point of enforceable resource adequacy requirements is to create explicit and clear expectations to overcome perceived problems of regulatory and market forces. Imposition of standards will move toward eliminating scarcity from the market, and will reduce the "scarcity rents" that theoretically were to have provided an incentive for private investors to build new capacity. In lieu of this suppliers will compete to provide the forward commitments that will allow the LSEs to comply with adequacy standards.

IV. Western Region Resource Adequacy Highlights

In this section we briefly review highlights of various actions that are being considered or taken that could affect the future adequacy of resources in the West. Those highlighted include FERC, NERC, selected states, BPA, NWPCC, NWPP, and WECC. This description does not yet cover all activities and should be considered a work-in-progress, since the field of activity is on the increase and unfolding rapidly.

IV.A FERC

Although there is uncertainty about FERC's current statutory authority to regulate reliability, they have engaged in the state-federal dialogue on resource adequacy and have discussed key issues in their "Regional Choices" staff paper issued in July 2003.[15] This paper noted the importance of each region developing a regional resource adequacy plan. It further noted that to meet a region's resource adequacy requirement, "….each state could rely on its own state authority to ensure that each utility or other LSE owns or contracts for enough reserves, whether generation or demand response, to satisfy its share of the regional need."

In January of this year the FERC Chair Pat Wood described reliability as the "top item" for the Commission after the August '03 blackout. Fifteen million dollars has been appropriated for FERC activities related to reliability in the Energy and Water Appropriations bill. Wood also confirmed that FERC is in the process of setting up a new reliability division within the Office of Markets, Tariffs, and Rates, which will be staffed by up to 30 engineers and technicians.

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[14] Even this scope of enforceable standards is not considered sufficient by some. Because of concerns that participants will schedule inaccurately, given CAISO responsibility to dispatch resources to maintain minimum operating reserves or serve load, the CAISO has proposed to California regulators that any resources nominated as part of an LSE resource adequacy demonstration would be subject to CAISO dispatch instructions.[14] Many parties are not willing to have the CAISO dispatch their resources. In particular, LSEs with energy limited generation and demand response resources are extremely reluctant to allow these resources, planned for use to minimize LSE-specific costs of serving loads, to be used for the benefit of the overall control area. D.04-01-050 does not accept the CAISO proposal.

[15] Federal Energy Regulatory Commission Staff Paper on Regional Choices, July 7, 2003 pages 24-25.

One focus of the new division would be to work with NERC to develop tougher audit programs to determine whether reliability coordinators and control area operators are complying with NERC standards. While operational readiness for Summer, '05 is the most immediate short-term issue, FERC will also look at long-term strategic issues.[16]

IV.B NERC Review of Reliability Council Resource Adequacy Requirements

NERC's Planning Committee initiated a Resource and Transmission Adequacy Task Force (RTATF) in August, 2003. The charge of the task force indicates that RTATF is responsible for reviewing NERC's role in the determination of resource adequacy and transmission adequacy for the North American interconnected bulk electric systems, and to make recommendations for future actions. RTATF is currently reviewing the state of adequacy assessments and processes and could potentially recommend resource adequacy/transmission adequacy standards, especially in the wake of the blackout on the East Coast. A draft report of the group is expected in April. NERC's efforts on this front may foster increased activity in the west to address resource adequacy on a regional/state level rather than have a standard imposed from a national level.

IV.C Selected State Adequacy and IRP Proceedings

California. In March of this year the PUC adopted a long-term procurement decision that includes, among other things, planning reserve requirements and resource adequacy.[17] This decision does not apply to municipal utilities.[18] Key elements of the framework for achieving adequacy include:

- All LSEs (IOUs, ESPs and community aggregators) are required to acquire reserves for the load they expect to serve.
- 15-17% planning reserve margin to be achieved by 2008 and maintained thereafter.
- IOUs are required to cover 90% of peak demand plus reserves through forward commitment made one year in advance for the five summer months beginning in 2005, but IOUs can seek permission to opt-out on a case by case basis.

[16] Memorandum January 7, 2004; Report on Press Conference on FERC's Activities in the Reliability Area.
[17] D.04-01-050 CPUC decisions are available at – www.cpuc.ca.gov
[18] The municipal utilities within the CAISO control area and those large municipalities with their own control areas (LADWP, SMUD, and IID) are not under the jurisdiction of the CPUC. The CEC has examined resource adequacy for municipal utilities, but no requirement comparable to those established for IOUs has been enacted for them.

- IOU reliance upon spot markets to acquire capacity is restricted to the 5% level, but IOUs can go beyond this for energy if market prices are below capacity contract call options.

A series of workshops are underway to flesh out this framework into a complete resource adequacy requirement for the major investor-owned utilities under CPUC jurisdiction. California may be the first western state to explicitly adopt the enforceable standards approach discussed in Section III. Attachment B contains a two page summary of the provisions.

Oregon. PacifiCorp's recent integrated resource plan filing put forward several planning reserve criteria that strongly suggest a resource adequacy basis for making long term procurement decisions. The PacifiCorp process for constructing its portfolios required all three conditions described below to be met:

No more than 500 MW of market purchases from each of the two market hubs

No more than 438 hours of exposure to the market (5 percent hours/year).

15 percent planning reserve margin (planned peak generation capacity and market purchases over expected peak hour load).[19]

The Oregon Public Utility Commission did not specifically endorse these three conditions. Similarly, it has not endorsed a specific adequacy standard for Portland General Electric (PGE). PGE's final action plan will be before the Commission in the spring of 2004.

Nevada: [to be added]
Utah: [to be added]
Others –will be updated as processes emerge

IV.D BPA with NWPCC and NWPP

Consistent with BPA's Strategic Plan Objective S1, "*Our policies encourage regional actions that ensure adequate, efficient, and reliable transmission and power service,"* BPA is working with the Northwest Power and Conservation Council (NWPCC), the Northwest Power Pool (NWPP) and other stakeholders to encourage the adoption of a Resource Adequacy Metric/Standard for the Northwest to help accomplish the following:

- Clarify the load-serving obligation of BPA and the other Load Serving Entities (LSE's) in the Northwest in coordination with the Regional Dialogue Process.

[19]See page 61 of the Jan 24 2003 IRP for Numbers 2 and 3. Sensitivity showed a 10 percent planning reserve margin saved between $100 and $325 PVRR, see page 138.

- Ensure the Northwest is planning and building sufficient generation/demand-side management (DSM) resources to "keep the lights on," for at least a three-year time horizon.
- Confirm that such planning does not involve BPA planning to violate biological opinion hydro operations in order to "keep the lights on."
- Ensure that sufficient infrastructure investments are made in generation to stabilize electricity market prices at reasonable levels.

IV.E Northwest Power Council Adequacy Forum and LOLP Modeling

The Council, working with PacifiCorp, BPA, NWPP and PNUCC, has initiated a Power Supply Adequacy Forum; documents pertinent to the forum can be found on their website: http://www.nwcouncil.org/. The Council has held several meetings thus far.

The purposes of the first meeting held in January 2003 were to introduce the concept of a Regional Resource Adequacy Standard, to describe ongoing regional efforts that attempt to measure resource adequacy, to discuss the motivations for a standard and to gauge through a couple of roundtable discussions the interest of the various regional stakeholders in proceeding with a standard. A follow-on meeting brought regional LSEs and regulators together to discuss approaches to integrated resource planning and the intersection of IRP and concerns about adequacy. There was no consensus in either of the two meetings regarding the best approach to resource adequacy in the Northwest. Several later meetings have focused on developing a possible voluntary target for evaluating resource adequacy efforts in the Northwest, given the large variability of water (and thus, energy, supply) from year to year. This work is being coordinated with the parallel work of the Northwest Power Pool..

IV.F Northwest Power Pool (NWPP)

On June 12, 2003 the NWPP's Operating Committee voted to initiate a new Load and Resource Adequacy effort to:

- Develop common data definitions
- Determine an appropriate methodology for determining what constitutes adverse hydro
- Develop an appropriate metric for assessing resource adequacy in the Northwest.

The NWPP staff has been working through the WECC Reliability Subcommittee (RS) Energy Assessment Subgroup to develop common data definitions and an energy assessment.

IV.G WECC Resource Adequacy Criteria Goal and WSCC Power Supply Criteria

Prior to the formation of the WECC, the WSCC had "Power Supply Design Criteria" that applied to member systems. These contained **"recommended minimum levels of installed**

and planned generation for systems and areas within the WSCC in order to permit evaluation, upon a common basis, of the relative reliability of the interconnected bulk power systems" (described in Attachment C.) While it was recognized that it is impossible to provide 100% reliability of power supply, it stated that each member would insofar as practical, protect its customers against loss of service. Toward this end, the WSCC power supply criteria had two stated purposes:

1) Recommended minimum standards and a uniform method for assessing the adequacy of installed and planned generation within the WSCC for the purposes of reporting to the council and to outside agencies.

2) A means for evaluating the possible effect of one system or area on other systems/areas.

The criteria further provided that the WSCC members will assess resource adequacy in accordance with *North American Electricity Reliability Council (NERC) Planning Policies and Principles* or the WSCC Power Supply Design Criteria, whichever is more specific or stringent. With the changes in the industry, which eliminated the obligation to maintain generation resources by some traditional utilities, these provisions were suspended.

Since then, in 2002-03, the Board of WECC has revisited questions related to resource adequacy. In late 2002, the Board concluded that it could not assess the adequacy of resource supply in the absence of adequacy assessment criteria and directed staff to prepare an assessment of power supply twice annually to use more current information. In mid-2003, the Board approved a more realistic assessment, but directed that any reference to system adequacy be removed from the assessments, again due to not having adequacy assessment criteria. At the present time the bi-annual staff reports are titled "Power Supply Assessment" and do not contain references to system adequacy in term or analysis.

In December, 2003, the Board adopted its mission and goals statements for 2003-04. Its first of two missions is to "Maintain a reliable electric power system in the WI that supports efficient, competitive power markets." Priority goals for 2003-2004 include Goal #3:

> "Improve WECC's power supply assessments so that they are comprehensive, sound and respected. *Develop and publish resource adequacy criteria" (*emphasis added*).*

The responsibility for developing adequacy criteria has been delegated by the Board to WECC's Planning Coordination Committee (PCC). PCC's Reliability Subcommittee (RS) has recognized the need to improve their biannual Power Supply Assessments, and working with WECC staff and members and the WRAT, is making progress in doing so. Discussion of resource adequacy criteria was also included in its February report to PCC. In summary, this report noted that RS will use the RTATF report mentioned above as a reference in guiding the development of a WECC standard. The report also notes that in developing a new standard, a variety of issues will need to be addressed, including the following:

Issue 1: Metric Used What type of measure that will be used as the basis for the standard;
Issue 2: Coordination with NERC NERC is currently determining whether the regional councils or sub-regions should have their own resources adequacy requirements or whether there should just be an overall NERC standard;
Issue 3: Should the standard apply to interconnection-wide adequacy or individual WECC member system adequacy or both? In developing the WECC resource adequacy standard, the RS is currently focusing the standard towards measuring the resource adequacy of the overall interconnection.

V. Resource Assessment & Adequacy in the West: Next Steps

(Approved by CREPC March 26, 2004)

Resources Needed for Enhanced Assessment

- Pursue development of options for a consistent funding source to support critical assessment and tracking functions for the WI, as recommended by the CREPC Regional Decision-Making Work Group.

- Provide resources for the WRAT to increase their efforts to work with SSG-WI and WECC sub-regions on improving the usefulness and effectiveness of regional data collection, modeling and analysis.

- Develop resources needed to enable WRAT to develop illustrative model state RA provisions, e.g., a voluntary target and an enforceable standard approach, applied at either a statewide or LSE level.

Action Needed by WECC and SSG-WI

- Continue to support the SSG-WI and PacifiCorp efforts to develop a public, well-maintained, multi-purpose database for use in all major WI system assessments.

- Send a formal request to WECC urging that control area load forecasts be made transparent and that WECC staff resource be augmented for assessment.

- Urge the WECC RS and PCC to support WECC staff so they can complete an effective initial energy (kWh) assessment for the WI in 2004.

- Support WECC efforts to develop, publish and adopt resource adequacy criteria, including a collaborative process with CREPC and outreach to state regulatory commissions.

Action Needed by CREPC/States

- Encourage CREPC members to develop the internal capabilities to assess and implement resource adequacy for LSEs.

- Enforceable adequacy standards should only be adopted after explicitly evaluating the tradeoffs between cost and reliability.

- Cooperate with NERC, WECC and other regional/sub-regional efforts to allow the West to chart its own path with respect to adequacy rather than having a uniform national approach imposed on the West.

- Engage California and/or the NWPCC in their efforts to develop resource adequacy requirements.

Attachments Provided Under Separate Cover:

Attachment 1: Adequacy Approaches in Other NERC Regions
Attachment 2: Summary of California Resource Adequacy Framework
Attachment 3: WSCC Power Supply Design Criteria