

**BEFORE THE WASHINGTON UTILITIES
AND TRANSPORTATION COMMISSION**

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to the Comments of the NW Energy Coalition,
the Northwest Energy Efficiency Council
and the Renewable Northwest Project

July 9, 2007

Renewable Resource Target Forecasting and Compliance Under RNP/NWEC/NEEC Proposed Compliance Rules

Concerns have been raised that the RNP/NWEC/NEEC proposed renewable energy compliance rules (“RNN proposed rules”) result in unmanageable uncertainties that would unduly subject the utilities to penalties mandated in the law, or conversely, to systematically force them to over-comply. This paper explores the nature and magnitude of the forecasting uncertainties utilities face, and shows how the RNN proposed rules allow any utility making good faith efforts to comply with the law.

Three examples were chosen to illustrate application of the RNN proposed rules. The first example explores how the rules are expected to work under adverse conditions within the expected range of uncertainties. The second example shows how a utility complies even under extreme conditions of unexpected load growth (higher than expected target) and severe renewable resource under-performance. The third example shows failure to comply both with the “by January 1” deadline of the target year, and failure to produce the acquired RECs or used generation by the end of the subsequent year. The example shows there is no double counting of penalties under the RNN proposed rules.

The RNN proposed rules require utilities to show in their compliance year reports that, in the prior year (2011 for the initial report), they acquired ownership rights to use sufficient generating resources and acquired RECs “by January 1” to meet the compliance targets.¹ A second look is taken in the June progress report following the subsequent year (June 2014 for the 2012 compliance year) to ensure that sufficient generation and RECs were in fact produced to meet the compliance year target.

Specific concerns were expressed over requiring the utility to show it can meet a target prior to knowing precisely what the target is. The following section demonstrates that the magnitude of the uncertainty in the targets in the years and months leading up to meeting the target is a relatively small percentage of the target itself. The examples show that the uncertainty in the target is not only a small fraction of the target, but is also very small compared with the flexibility allowed under the proposed rules.

Longer Range Forecast Accuracy

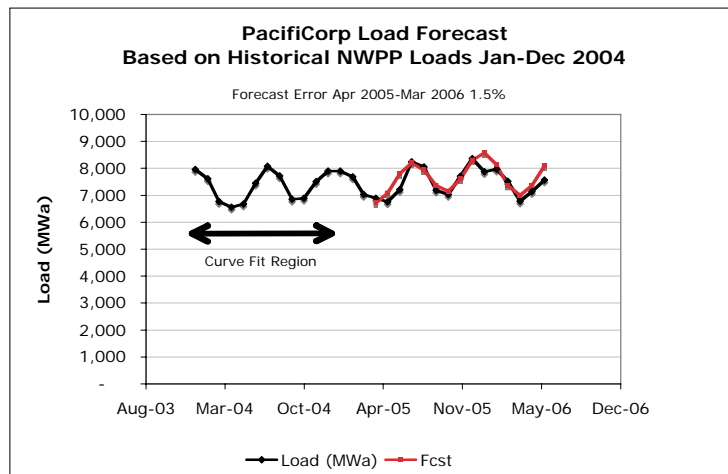
Utilities have doubtless already estimated their responsibilities under the Act, despite the significant uncertainty in 2007 over what the utility loads in 2010-11 will be (for example, see PSE’s 2007 Integrated resource Plan). Under the Act, renewable resource targets are established based on retail load. Load growth is affected by changes in government policies, population demographics, and technology that cannot be precisely assessed in the present time. Utilities often prepare multiple forecasts to capture just that kind of uncertainty.

¹ For example, the June 2012 report will evidence expected use and acquisitions by January 1, 2012.

In the Fifth Power Plan, the Northwest Power and Conservation Council adopted low, medium low, medium, medium high, and high load growth projections. The high annual growth rate is 3.375 times as high as the medium rate.² If a utility's expected load growth is 2%,³ then a high forecast based on the Council's methodology might be 6.75%. Escalating loads from today's values out three and four years to 2010-11, the average 2010-11 load in the high case would be 17% higher than the expected case. The more extreme example below assumes loads are under-forecast by 25%, an extreme and concerning outcome for utilities needing to meet power demand.

For an immediately subsequent year, if the load growth suddenly jumped from 2% per year to 6.75% per year, the council's relation suggests an unexpected jump by 4.75%. The Council's figures are meant to reflect economic conditions, not necessarily weather. In other words, if both economic conditions and weather were to combine to push loads up, a number somewhat greater than 4.75% might be expected. The extreme example below assumes a subsequent year forecast error of 10%.

To illustrate the reality of forecasting subsequent year loads, a forecast of a full year's energy loads was constructed based solely on a curve fit⁴ from the prior year. Thirty months of data were taken from the Northwest Power Pool web site for Avista, PacifiCorp, and PSE. A forecast of the ensuing months was developed by fitting a curve to the first 12 months, and extrapolating. The cumulative error of the forecast ranged from 1.5-2.5%, further evidencing that the assumed 10% load forecast error assumed in the examples is relatively extreme and unlikely in actual practice.



PacifiCorp Power Pool loads

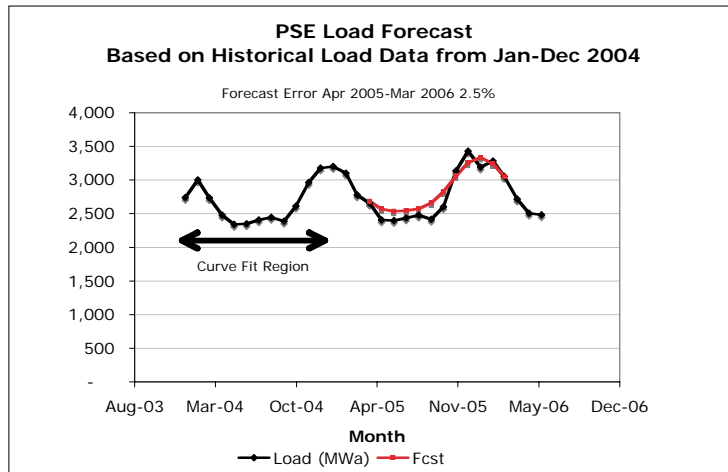
² See Fifth Power Plan page A-2.

³ Some of the faster growing utilities are expecting load growth in the 2% range.

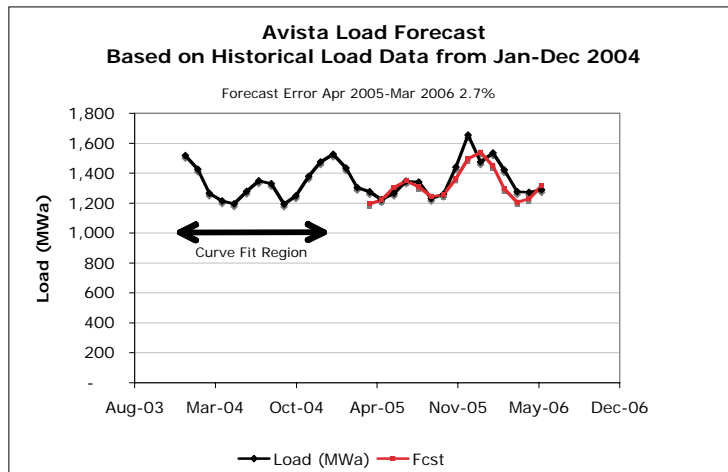
⁴ The Load Forecast model is shown below where t is time expressed in months:

$$Load(t) = A_{ann} \sin(2t\pi/12 + \phi_{ann}) + A_{mon} \sin(2t\pi/6 + \phi_{mon}) + \alpha t + C$$

Parameters: $A_{ann}, \phi_{ann}, A_{mon}, \phi_{mon}, \alpha, C \Rightarrow$ Chosen to minimize sum of square errors



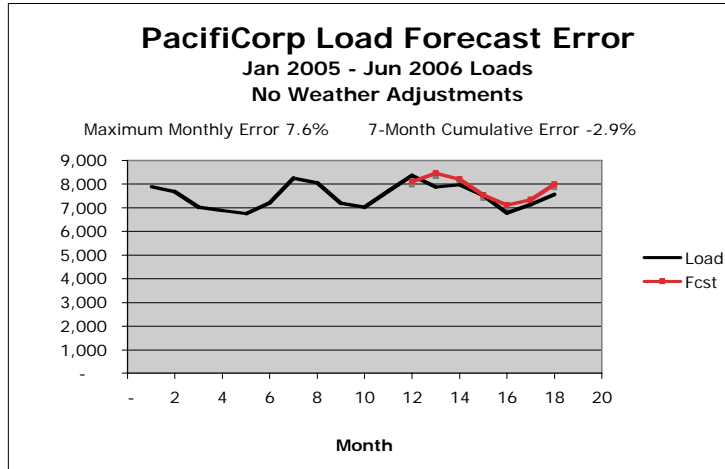
PSE Power Pool loads



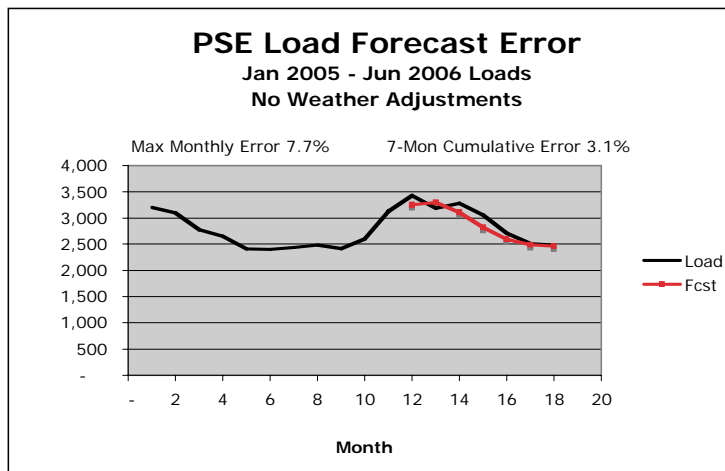
Avista Power Pool loads

Load Forecast Accuracy Months in Advance

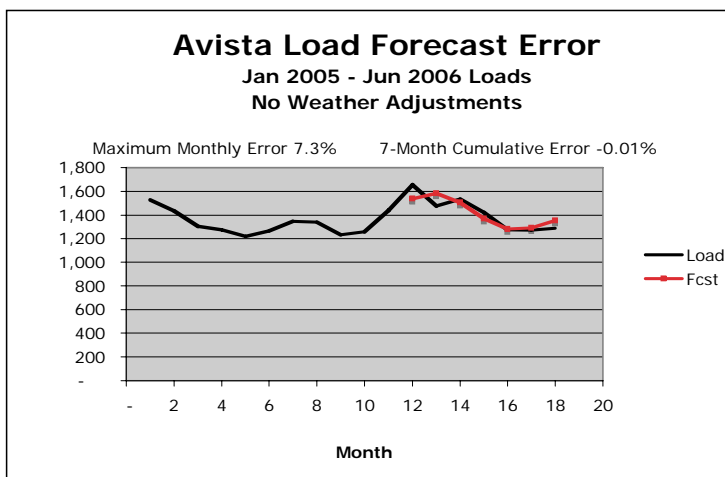
The identical methodology was used to produce load forecasts for an ensuing 6 month period exclusively using the load record of the previous six months. Monthly load data for each of the Washington Investor Owned Utilities for the period January 2005 through June 2006 was available from the NW Power Pool web site. The curve fit was developed to represent those first eleven months and then extrapolated over the remaining seven months. The maximum differences between the forecast monthly load and the actual loads are noted below.



PacifiCorp Power Pool loads



PSE Power Pool loads



Avista Power Pool loads

These charts suggest that reasonably accurate forecasts of loads can be made several months out in time even without the kind of econometric, meteorological, and demographic information available to the utilities for their more accurate forecasts.

By June of 2011, analysts will know precisely what the loads were in the January 2010 through March 2011 period. An estimate of the remaining 9 months of the year will normally have an error of less than about 5%.⁵ Because that 5% represents error on only nine of the 24 months over which the targets are based, the uncertainty in the target itself is less than 2%. For a utility with 3,000 MWa of load, this uncertainty amounts to about 15,000 MWh. As a point of reference, this is the size of REC purchases routinely made by PacifiCorp for its voluntary renewable energy block program.

As time progresses, the uncertainties drop further. By September, the forecast error over the remaining months drops to about 1%, and uncertainty in the target itself is one quarter of that. For a 3,000 MWa utility load, the uncertainty by September is on the order of just 2,000 MWh. The uncertainty in the target continues to decline each month as the end of the two-year period on which the target is based approaches.

⁵ The five percent margin of error for the last 9 months is a conservative estimate based on the “7-Month cumulative error” rates included in the “Load Forecast Error” tables of 2.9% for PacifiCorp, 3.1% for PSE and 0.01% for Avista.

Example: Sinergy Power and Light

Assumptions

Sinergy Power and Light (SPL) forecasts average loads of 3,200 MW in 2011, growing at a rate of 2% per year. As of mid 2007, SPL estimates its 3% compliance target for 2012-14 to be 850,000 MWh (~97 MWa), rising to 900,000 MWh by 2014. It plans to meet this target by acquiring the 200 MW Windy Mountain project, estimated to produce 850,000 MWh on line early in 2011. It will bring on the 25 MW Breezy Butte site by the end of 2012 for another 65,000 MWh. Due to the uncertainty in load growth, SPL retains an option to move up construction on Breezy Butte to 2011 if necessary. SPL elects to register all of the generation and count the RECs toward compliance.

SPL understands that the 2010-2011 load estimate is uncertain and that there is also uncertainty over the resource production as well.

Approaching the Target, December 2009

At the end of 2009, SPL updates its load forecast and finds its average 2010 and 2011 load is 5% higher than originally forecast, raising its new compliance 2012 target estimate to 890,000 MWh, a 40,000 MWh increase. In response, SPL decides to move up its planned on-line date for Breezy Butte to 2011.

Load Growth Fall 2011

In September 2011 SPL has accumulated load data through June 2011 for a revised target estimate. The new estimate is substantially more accurate because three-fourths of the 2010-11 loads are already known. Uncertainty remains over what the load in the last half of 2011 will be. That uncertainty is about 5% of load. Because that 5% represents only about a quarter of the total 2010-11 load, the uncertainty in the compliance target has fallen to 1.25%. The revised 2012 compliance target estimate is 900,000 MWh. It is unlikely that the actual target will end up being more than 1.25% higher than that (11,000 MWh).

Compliance by January 1, 2012

By January 1, 2012 both Windy Mountain and Breezy Butte have come on line and produced a total of 895,000 MWh in 2011 (prior compliance year). Wind Mountain and Breezy Butte are expected to produce 900,000 MWh during 2012 (current compliance year) and 2013 (subsequent compliance year). Because SPL has elected to register all of the generation for these two resources and count the RECs toward compliance, SPL has acquired 2,695,000 MWh of RECs available to satisfy the compliance target as of January 1, 2012.

June 2012 Compliance Report

By March of 2012 the verified loads are available, and it turns out that the average 2010-11 demand pushed the renewable target to 910,000 MWh. SPL's June report cites the RECs produced by the two projects in 2011 and shows its ownership rights to 2012 generation, which is still expected to be a total of 900,000 MWh in each of 2012 and 2013. The total RECs acquired by SPL (895,000 MWh from the prior year and the

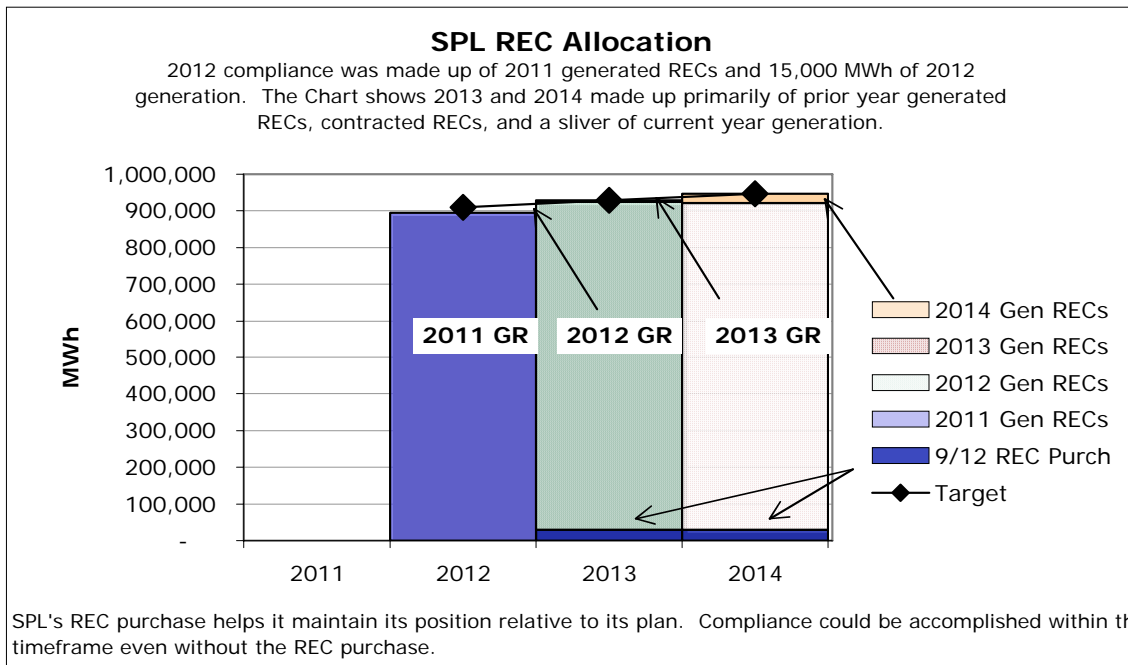
900,000 MWh of expected current year generation) far exceed the 2012 target. SPL's June 2012 report indicates that compliance is demonstrated by 895,000 RECs from 2011 and 15,000 RECs from 2012. The WUTC finds SPL was in compliance with the 3% target by January 1, 2012.

Second Look Check, June 2014 Compliance Report

SPL's 2012 report demonstrated compliance with the January 1, 2012 target by using its 2011 RECs and 15,000 MWh of generation from 2012. In its June 2014 progress report, SPL demonstrates that the 15,000 MWh of 2012 generation it relied upon to demonstrate compliance were actually produced during 2012. The WUTC found that SPL demonstrated final compliance for the 2012 compliance year in its review of SPL's June 2014 report.

What About 2013 and Beyond?

Despite higher than expected targets, and lower than expected resource performance, SPL is in a good position to comply in 2013 and 2014. Having used 15,000 MWh of 2012 RECs for 2012 compliance demonstrated to SPL analysts that the plan for compliance in 2013 and 2014 is falling short by a small amount. A discussion ensues in which SPL management weighs triuing up to its original plan by bringing future units on earlier, making spot purchases in 2012 for 2013 compliance, or making a longer term forward purchase. SPL decides to enter into a contract to purchase 30,000 MWh of RECs in each of 2012 and 2013 for 2013 and 2014 compliance, respectively. The deal is struck in September of 2012, in plenty of time to be applied toward the January 1, 2013 compliance date.



Summary

The SPL example shows how a utility satisfies compliance under normal, albeit generally adverse, conditions of load and resource forecast uncertainty. Reasonable and good faith efforts to comply will succeed under the proposed rules, with a large margin of safety. That SPL was generally shorter than its original plan could be seen from the annual reports. Despite lower than expected resource performance, and a higher than forecast target, SPL was not in danger of falling out of compliance by January 1, 2012. Ultimately, actions to true up to the plan would have to be taken, but falling out of compliance would only take place if SPL takes no action (additional REC purchases, moving up on line dates, or additional resource acquisitions) for a period of roughly 3-5 years. The next example shows compliance under much more severe uncertain conditions than SPL faced.

Example: Mega Corp

Assumptions

Mega Corp (MCorp) forecasts average loads of 3,200 MW in 2011, growing at a rate of 2% per year. As of mid 2007, MCorp estimates its 3% compliance target for 2012 to be 850,000 MWh (~97 MWa), rising to 900,000 MWh by 2014. It plans to meet this target by acquiring two wind projects. The Pleasant Ranch wind site is a 150 MW facility, estimated to produce 400,000 MWh annually. Tumbleweed Turnpike is a 200 MW project estimated to produce 500,000 MWh annually. MCorp elects to register all of the generation and count the RECs toward compliance.

MCorp understands that the 2010-2011 load estimate is uncertain and could be as much as 25% too low. There is also uncertainty over the resource production—any given site could be overestimated by as much as 30%. MCorp analysts have looked at this problem and decided that bringing their projects on line by the beginning of 2011 provides plenty of room for error.

Approaching the Target, December 2009

At the end of 2009, MCorp updates its load forecast and finds its average 2010 and 2011 load is 10% higher than originally forecast, making its new 2012 compliance target estimate 935,000 MWh (~106 MWa). The new estimate could still be low by as much as 15%, given the remaining uncertainties in load growth. MCorp analysts still feel that the risk of under-compliance is low in 2012, but that if this trend continues, they could consider bringing the projects planned for 2016 compliance on line a few months earlier than originally thought necessary.

Load Growth Fall 2011

In September 2011, MCorp has accumulated load data through June 2011 for a revised target estimate. The new estimate is substantially more accurate because three-fourths of the 2010-11 loads are already known. Uncertainty remains over what the load in the last half of 2011 will be. That uncertainty is about 5% of load. Because that 5% represents only about a quarter of the total 2010-11 load, the uncertainty in the compliance target has fallen to 1.25%. Nevertheless, loads have continued to run high and the new target estimate is now a million MWh, nearly 25% higher than originally planned for.

At this point, MCorp analysts advise management that they will need to revise the 2016 target levels and add resources to the plan. They know that bringing the new 75 MW project on line by early 2015 would be best, but on line by 2016 is also sufficient. They have two to four years to get the new project on line. They also know that if they encounter delays in this project they can decide to purchase RECs for 2015, 2016 or 2017 (so long as the purchase is made by January 1, 2016) in order to meet the target.

Compliance by January 1, 2012

By January 1, 2012, MCorp's projects (Windy Mountain and Tumbleweed Turnpike) have come online. Tumbleweed Turnpike produced the expected 500,000 MWh in 2011, but Pleasant Ranch was overly pleasant and underperformed by 30%, generating only 280,000 MWh. MCorp dedicates the full output of both projects as translated into 2011 RECs for 2012 compliance, and will use 2012 generation RECs from these resources to meet the 2012 compliance target. MCorp has available 2,340,000 MWh of past year, current year and subsequent year RECs to satisfy its compliance target.

June 2012 Compliance Report

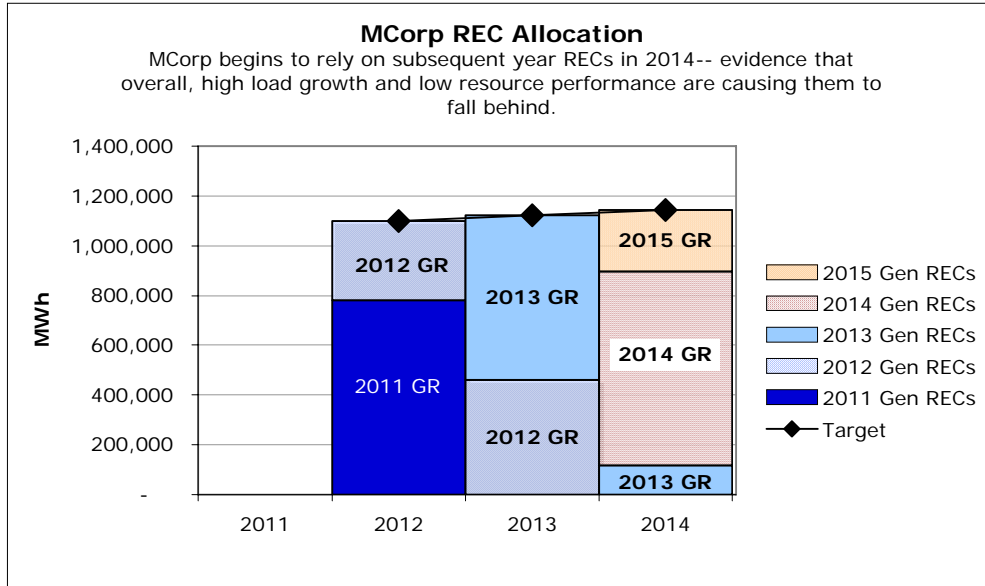
2010-11 loads turned out to be a full 25% higher than the target estimate originally used to size the wind resource back in 2008 when the plans were made. In June, MCorp reports that 3% of the average of 2010-11 loads pushed the 2012 compliance target to 1,100,000 MWh.

Not only is the target higher than expected, but resource performance significantly lower. MCorp dedicates the full output from 2011 (translated into RECs) of both projects to 2012 compliance, and will use 320,000 MWh of 2012 generation to meet the 2012 compliance target. MCorp has acquired⁶ more than enough ownership rights to generation and RECs to meet January 1, 2012 targets and show compliance in its June progress report. The WUTC finds MCorp has indeed acquired sufficient RECs by January 1, 2012 to meet the target.

Second Look Check, June 2014 Compliance Report

Production in 2012 and 2013 was largely similar to the 2011 experience with Pleasant Ranch producing at only 70% of the original estimate, and Tumbleweed Turnpike near its expectation. Although loads were higher than expected, MCorp simply used more of its 2012 generation for 2012 compliance than it had originally planned. MCorp demonstrates to the WUTC that the plants actually produced the amount of generation RECs MCorp applied towards its 2012 annual target. The WUTC finds that MCorp demonstrated final compliance for the 2012 compliance year in its review of MCorp's June 2014 report. MCorp's allocation of RECs is illustrated below.

⁶ Even if Pleasant Ranch continues to under-perform, MCorp expects to produce a total of 1,500,000 MWh of power and RECs in 2012 and 2013—much more than enough to cover the 320,000 MWh needed per the June 2012 report. Compliance in 2013 is virtually assured as well.



Summary

This example shows the enormous value realized by utilities bringing units on line in 2011. Using previous year RECs effectively adds another year of storage capability to cope with the uncertainties and risks presented by load growth and resource performance uncertainties. Even under the extreme conditions examined in this example, it is clear that utilities will have several years to take mitigating actions should they find that they have underestimated targets, or overestimated resource production, before any real threat of non compliance materializes.

Example: Badden Company

Assumptions

Badden Corp (BadCo) forecasts average loads of 3,200 MW in 2011, growing at a rate of 2% per year. As of mid 2007, BadCo estimates its 3% compliance target for 2012 to be 850,000 MWh (~97 MWa), rising to 900,000 MWh by 2014. It plans to meet this target entirely by purchasing RECs from the market.

Acquisitions for 2012 Compliance

BadCo targeted purchasing RECs for 2012 compliance. Prior to January 1, 2012, it contracted for RECs associated with the entire 2011-12 output of the 150 MW Windy Willows site, expected to produce 440,000 MWh of RECs in each of 2011 and 2012.

Compliance by January 1, 2012

Unfortunately, Windy Willows came on later than expected in 2011 and produced only 350,000 MWh that year. BadCo did not purchase replacement RECs. By January 1, 2012, BadCo had acquired the right to 790,000 MWh of RECs (350,000 MWh of 2011 RECs and 440,000 MWh of 2012 RECs).

June 2012 Compliance Report

BadCo found its actual loads were slightly lower than forecast, dropping the target to 800,000 MWh. Although BadCo can show ownership of all of the RECs associated with the entire 2012 output, together with the 2011 RECs, they are only expected to amount to 790,000 MWh RECs. The WUTC finds BadCo out of compliance and levies penalties on 10,000 MWh deficiency in meeting the target.

Second Look Check, 2014 Compliance Report

Windy Willows began 2012 with a bang, but by the end of the year the winds had quieted and the 2012 output tally was 420,000 MWh, putting BadCo another 20,000 MWh behind. Unfortunately, BadCo was not tracking this closely, and took no action in either 2012 or 2013 to make up the difference. In its June 2014 report, its report reflected RECs produced for 420,000 MWh of output from Windy Willows. The WUTC found that BadCo ultimately failed to demonstrate production of RECs relied upon to meet the compliance target by 20,000 MWh and levied another penalty. In all, Windy Willows produced 770,000 MWh, 30,000 MWh short of BadCo's 800,000 MWh target, and BadCo was penalized on those 30,000 MWh—10,000 MWh in 2012, and 20,000 MWh in 2014.

Summary

BadCo could have avoided both these shortfalls by acquiring RECs associated with output through 2013, or by simply buying more RECs—note that they depended on two years of Windy Willow output to serve a single compliance year. The 2012 penalty could have been avoided by purchasing additional RECs by January 1, 2012 when BadCo learned that Windy Willows would not come on-line as expected. The 2014 penalty could have been avoided by purchasing RECs at any time from 2012 through 2013. BadCo failed to meet the target, not because of any uncertainty in the target, or

even uncertainty in project output—they simply failed to plan and act responsibly to meet the target.