Northwest Wind Integration Forum

Recommended Follow-on Actions to the Wind Integration Action Plan

January 16, 2009

The December 2 meeting of the Northwest Wind Integration Forum Policy Steering Committee provided an opportunity to revisit the Wind Integration Action Plan with the benefit of experience integrating wind resources approaching 3000 MW. Needed additional work has become clearer, new initiatives have begun, and new policy issues have arisen. At that meeting, the Steering Committee made clear its desire to continue the work of the Wind Integration Action Plan. The purpose of this report is to compile the discussions of that meeting into clearly defined follow-on actions. In describing these actions we have tried to be clear about what needs to be done, and who can do it. This is a draft, and we welcome your corrections, clarifications, and additions. For brevity, we have not repeated completed actions or actions well underway and not appearing to need modification such as implementation of Area Control Error (ACE) sharing.

Maximizing the Integration Capability of the Existing System

Several actions, largely institutional in character, have potentially high payoff in increasing the supply and reducing the demand for system flexibility. Because of their expected low cost and effectiveness, these items are of the highest priority.

Sub-hourly Transmission Scheduling: ColumbiaGrid, NTTG, and WestConnect should complete and implement the Joint Initiative effort focused on enabling sub-hourly transmission scheduling. This effort has great potential but needs the participation of experienced technical staff from the region's utilities to succeed. The Steering Committee urges involved entities to adequately staff this effort, and requests a quarterly progress report from the project leads, including identification of any needed assistance.

Dynamic Scheduling Capability - Within Region: ColumbiaGrid, NTTG, and WestConnect should establish a dynamic scheduling subcommittee to assess the voltage stability, transfer capacity and other operational impacts as well as the cost effectiveness of increased dynamic scheduling across key balancing authority interfaces.

Dynamic Scheduling Capability - Northern Intertie: BPA and BCTC, in collaboration with Puget Sound Energy and Seattle City Light should complete analysis of the cost effectiveness of implementing upgrades of Northern Intertie dynamic scheduling capability.

Dynamic Scheduling Capability - Southern Intertie: Southern Intertie owners, in collaboration with CAISO should analyze the cost effectiveness of implementing upgrades to the dynamic scheduling capability of the Southern Interties.

Wind Forecasting: BPA and affected utilities in cooperation with wind project operators should jointly develop and implement state-of-the-art wind forecasting and situational awareness tools. The Technical Work Group in collaboration with grid entities should develop a work plan for this action.

Notes: The Joint Initiative, as recognized at the December meeting, offers great potential to expand and extend the ability to integrate wind, and to mitigate integration costs. Steering Committee members were strongly supportive of the Joint Initiative and encourage continuation of the efforts.

The dynamic scheduling efforts are already underway, at least in part, on specific balancing authority interfaces. The grid entities seem a logical choice for cataloging the various efforts and assisting with prioritization and analytical resources. The Northern and Southern Interties are discrete and complex enough to warrant separate assessment.

Regional Flexibility Adequacy

Regional Flexibility Adequacy: The Northwest Resource Adequacy Forum, working with the Technical Work Group should assess the feasibility and need for a flexibility adequacy framework for the Pacific Northwest. The purpose of this framework would be to provide a consistent and unambiguous means of assessing whether the region has sufficient system flexibility to economically operate the regional electric power system under forecast changes in load, additions of variable generating resources and additions of new sources of system flexibility. If found to be feasible and needed, this work will include the development of a metric to quantify system flexibility, a flexibility economic adequacy standard and tools for assessing the regional supply of and demand for flexibility. The supply assessment will evaluate the extent to which sub-hourly transmission scheduling and the other actions described earlier will extend the integration capability of the existing system.

Note: While several Northwest utilities have assessed their native supply of balancing reserves, there is currently no regional assessment of system flexibility beyond the preliminary estimate prepared for the original Wind Integration Action Plan. While the actions described in the previous section are expected to free up the underutilized flexibility of the existing system, there currently is a poor understanding of the inherent capability of the existing system, implications of changing loads, nor implications of continuing addition of wind or other variable resources. This action will establish a better understanding of these capabilities and needs and provide guidance as to when additional flexibility will be needed to maintain an economically optimal power system.

Long-term planning for Optimal Wind Power Development

Resource Options for Augmenting System Flexibility: The Northwest Power and Conservation Council will lead an effort to identify the best demand and supply resources for augmenting the existing balancing capability of the power system. Priority in this effort will be given to resources or combinations of resources that can jointly satisfy peak load and system flexibility requirements. This effort will consider state-of-the art responsive combined-cycle plants, gas turbine generators[1]

[1] a.k.a. Simple-cycle Combustion Turbines

and reciprocating engines, pumped storage hydro, and use of wind "feathering" and demand-side options. Working with the Northwest Resource Adequacy Forum, an appropriate metric should be developed to measure and compare the various flexibility solutions.

Optimal Development of the Power System: The Technical Work Group should assemble a Northwest Wind Integration Study Team to assess the tradeoffs between transmission investment and investment in new system balancing capability. The work will consider the diversity value and possible greater productivity of wind as it is developed on a broader geographic basis, the cost of transmission and the cost of new balancing reserves. The work should also examine the tradeoff between conditionall firm transmission service and the value of delivered wind energy and the potential effects of adding other variable resources such as solar and wave energy. This work will draw upon the work of the flexibility augmentation workgroup of the previous action for estimates of the availability, cost and performance of new sources of system flexibility including various supply and demand-side storage options.

Synthetic Hourly Wind Data Series: The Resource Adequacy Forum should complete development of a long-term synthetic hourly wind data series. This work is needed to further refine estimates of the sustained peaking value of wind, and to implement NPCC analytic capability to evaluate tradeoffs between hydrosystem operational constraints and the availability of flexibility.

Notes: Assessment of options for providing additional flexibility above can support individual utility IRP efforts to help utilities make an informed assessment of capacity additions that can satisfy both peak load and system flexibility requirements on a regional basis. To perform this work it is necessary to understand the integration capability of the existing system as well as the regulation and load following capability of resource additions taken to maintain adequate planning/sustained peaking capacity reserve. Demand side management was viewed to be a priority by the Steering Committee. Pumped storage is receiving substantial attention. Regional utilities are also giving priority to combustion turbines and reciprocating engines as sources of system flexibility.

The Power and Conservation Council plans to include in its Sixth Power Plan a framework for assessing the various tradeoffs between transmission expansion and flexibility augmentation. However, accomplishment of this work will require data, resources and time beyond that available prior to completion of the Sixth Plan. The Steering Committee and its Technical Work Group can bring the necessary data and resources to the proposed follow-on effort. Other organizations including the National Renewable Energy Laboratory and the Pacific Northwest National Laboratory have expressed interest in participating in this effort.

The synthetic hourly wind dataset is necessary to evaluate the tradeoffs between environmental constraints on the hydro system, and its ability to provide needed integration products. The computer modeling capability for performing these evaluations is established and can be tested when the hourly data becomes available.

<u>Emerging Policy Issues</u>

Renewable Energy Credit (REC) Trading: The Northwest Power and Conservation Council should develop a report on the current nature and extent of the REC market in the west with focus on

the prevalence and issues associated with REC "stripping". If there are concerns about REC stripping, suggest appropriate actions to the Western Governors Association and Regulatory Commissions

Operational Impacts of Renewable Energy Development Incentives: The Northwest Power and Conservation council should examine the impact of current renewable production incentives on resource dispatch order and system reliability events. This work should identify alternative incentives that would stimulate renewable development without creating an inappropriate dispatch order for resources. The objective would be to avoid penalizing renewable generation or creating other inappropriate cost shifts renewable generation is displaced for environmentally preferable resource operation (e.g. avoiding harmful levels of spill).

BPA Borrowing Authority: Steering Committee members should support and advocate increases to BPA borrowing authority and other measures that would increase the access of Northwest transmission providers to capital for projects necessary to integrate renewable resources.

Notes: Concern was expressed about REC "stripping" – a practice where renewable energy projects are developed without transfer capacity to a utility customer. The renewable or CO_2 credits produced by the project, but not the energy are delivered to the customer. The addition of the resulting "brown" energy to the local market may depress energy prices and financially burden the interconnecting balancing authority if integration costs are not correctly assessed and allocated. As a first step it is suggested that a report be developed on the current nature and extent of this market, including descriptions of problems that might be presented by proposed wind power developments.

Concerns were expressed that the federal renewable energy production tax credit can lead to inefficient operation of the Northwest power system in some circumstances (for example, resistance to curtailing wind production to avoid hydro spill that increased total dissolved gasses above levels safe for fish). An assessment of the potential for this problem and identification of means of resolution are needed.

Several Steering Committee members suggested that emphasis be put on measures that would increase the availability of capital for transmission projects needed for wind integration. This topic is currently receiving substantial attention in Washington D.C., including discussion as part of the proposed federal economic stimulus package.

<u>Wind Integration Forum and Technical Work Group</u>

Wind Integration Forum Charter: The Northwest Power and Conservation Council should renew the charter of the Northwest Wind Integration Forum.

Technical Work Group: Members of the Policy Steering Committee should provide personnel and other resources as necessary to support continuation of the Technical Work Group. A reinvigorated Technical Work Group will serve as a primary means for planning and monitoring implementation of the action items and reporting on progress and findings.

Note: The Wind Integration forum charter expires in April. It will need to be extended if we want the Forum to continue operating under the Council auspices. As a companion to this effort, the Technical Work Group would continue its efforts. We anticipate quarterly meetings of the Technical Work Group, quarterly progress reports to the Steering Committee and Steering Committee meetings on roughly a semi-annual basis.