

Selected Excerpts Relating to
Wind Energy Resources
from the

**Washington Electric Cooperative, Inc.
2003 Integrated Resource Plan**

2004 – 2023

**Approved by Vermont Public Service Board
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Prepared By:

LaCapra Associates

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**Principal Authors
Stan Faryniarz, Senior Consultant
Bill Powell, Director WEC Products & Services**

Baseload & Dispatchable Needs Identified

A substantial baseload resource, approximately 3 MW of Vermont Yankee, terminated early in 2002. The approximately 2 MW New Milford (CT) landfill-gas generator contract, a renewable baseload resource acquired in 2001 to replace most of WEC's Vermont Yankee entitlement, is scheduled to expire at the end of 2004. It is potentially extendable for a year or more, but energy from that resource is already phasing out, and the generation will likely be unavailable after 2005. This will open up a significant hole in WEC's baseload resource mix that could be exacerbated by a loss of some NYPA power this year. If WEC did not replace the New Milford contract energy, by 2006 its projected net short energy position rises to about 55%.

WEC's McNeil contract expires in May 2008, adding to an existing need for dispatchable resources. WEC currently has little dispatchability in its mix, and herein has identified a need to boost this element of the overall supply portfolio. Currently, WEC meets its intermediate and peaking requirements primarily through spot and bilateral forward energy purchases. WEC's plans for adding wind energy and diesel peaking capacity, together with continued forward purchases and other hedging tools, will be used to address these needs.

Finally, purchases from VEPPI and the ultimate replacement of Hydro-Quebec Schedule B present some longer-term attrition opportunities.

WEC has responded to these developments in a number of ways. As stated above, WEC currently hedges a substantial portion of its net short position price risk through strategic forward energy purchases and a developing hedging & risk management policy.

At the same time, WEC is progressing on and planning the development of a number of additional supply resources, including the 4 MW Coventry Landfill Gas Project (Coventry), and in the coming years, a Vermont-based wind energy resource and a diesel peaking resource likely to be sited in WEC's service territory.

Other Renewable Resources

There is likely some room for additional renewables, particularly wind power, in the WEC supply portfolio. While the intermittent nature of wind output reduces its ability to hedge WEC against wholesale market price spikes in particular hours, the seasonal output profile of wind resources in New England (with greater production during winter months) fits well with the shape of WEC's net short position. Wind therefore appears fairly well-suited to insulate WEC from secular price trends (particularly fossil fuel prices) that would otherwise drive its power costs in the long-term, particularly if WEC's power supply is supplemented with additional dispatchable resources.

WEC is the recipient of a \$1 million grant from the U.S. Department of Energy, which can be used to defray the cost of a new, Vermont-based long-term wind resource to be developed or purchased

by WEC. While WEC has yet to decide the specific size and location of the wind resource it will pursue, much less a specific project, it will do so in the next 1-2 years.

Using the \$1 million grant to “buy-down” the cost of a latest technology wind project to a net cost that is competitive with other market alternatives, and after review of WEC’s remaining uncommitted requirements, this Plan assumes the addition of 1.5 MW of wind capacity by 2006.

Implementation of WEC IRP Results

WEC intends to implement the conclusions described above through an action plan that focuses on meeting its baseload requirements first, and then concentrating on additional dispatchable and renewable resource additions.

The following table describes the timeline for these activities:

Timeline for WEC Power Supply Procurement Activities

10/2003	File for PSB Ss 248 Approval for the Coventry Project
4th Qtr 2003	Refine Coventry Project interconnection/wheeling plans Refine WEC net short position hedging program File for Rural Utilities Service (RUS) \$6.3 million debt financing for the Coventry Project
2004	PSB, RUS & WEC member approvals for the Coventry Project Construction of Coventry Project If possible, exercise 1-year extension option for New Milford LFG contract; If not, lay in forward hedge purchase for some of 2005 needs until Coventry Project comes on-line Pursue development/financing for, or purchase of, WEC diesel peaker plant, and <u>refine purchase or ownership options for VT-based wind project</u>
12/2004	New Milford LFG contract expires
2nd Qtr 2005	Coventry Project on-line
2005	Acquire (develop or purchase from) WEC peaking plant
2006	<u>Acquire (purchase from) VT-based wind project</u>
2006-08	Optimize portfolio, acquire additional resources as needed, file next IRP?
5/2008	McNeil contract expires
2008-15	Exercise expansion opportunities for Coventry Project Plan for replacement of HQ Schedule B
10/2015	HQ Schedule B contract terminates
Post-2015	Replace and add contracts/purchases as needed.

Long-Term Portfolio Preferences

In March of 2001, WEC's Power and Operations Committee recommended, and the full Board of Directors adopted the following concerning long-term resource additions, including replacement supply for the looming attrition of Vermont Yankee:

Based on the analysis thus far, the Power and Operations Committee has developed some strategies and parameters which they are recommending that the board adopt at this time. This will instruct the Co-op staff, La Capra and others we may work with in actually procuring future power supply.

RECOMMENDATION:

In procuring future power supply, Washington Electric Co-op adopts the following preferences and strategies:

- 1. WEC will use its ability to obtain low-cost, long term financing of up to 25 years to make investments in new renewable energy projects that can supply us with output at a reasonable cost.*
- 2. WEC will explore the viability of local landfill gas projects.*
- 3. WEC will explore the availability of power from in-state hydro facilities, including the viability of ownership of such facilities.*
- 4. WEC expresses a preference for procuring power supply from facilities that are "close to home," both as a means of avoiding potential transmission costs, as well as to provide additional economic benefit to our communities and state.*

New Vermont Wind Purchase

Wind generation has a number of potential advantages, including:

- A renewable fuel source, with zero air emissions.
- Wind generation is eligible to supply RPS requirements in Massachusetts and Connecticut, which means that a project's GIS RECs could have substantial market value.
- Some wind projects are of a size consistent with WEC's future power needs. From a financial perspective, it would be realistic for WEC to either take full ownership in a smaller project (or a substantial share in a larger project). WEC's participation, including a commitment to a long-term contract, could allow a project to go forward without having to seek substantial additional funding or power purchasers.
- New wind projects are potentially available in Vermont, and certainly in neighboring states, and are being actively explored in response to RPS requirements in neighboring states.
- Ownership in a wind project would enable WEC to take advantage of its relatively low cost of capital, providing a cost advantage over purchasing wind output from wind projects constructed by private developers.

- Regardless, WEC has been the recipient of a grant from the U.S. Department of Energy to develop a Vermont-based wind project of its own. Discussions with DOE indicate that WEC will be able to use the grant proceeds to purchase from another, larger Vermont (merchant) wind facility and “buy-down” the purchase cost – which the base case and alternative portfolios explored in this Plan both assume.

A drawback of wind generation is that it tends to be intermittent, with potential for significant variance in total output from month to month and year to year. On one hand, wind’s variance should not greatly hamper its ability to serve as a hedge against some key factors (e.g., natural gas prices, regional supply/demand balance) that affect electricity market prices across many hours of the year. The hedge value of wind for WEC may also be enhanced by the fact that projects in the Northeast tend to produce more output during winter months, when WEC’s load and its net short position are the greatest. On the other hand, the intermittence of wind makes it a relatively poor hedge against extreme price “spike” events that may occur during a limited number of particular days and hours. This is a more significant issue in the context of a WEC power supply that presently contains very little dispatchable capacity that could be adjusted in response to variations in the wind output. If wind is to be a significant portion of WEC’s supply, the amount of dispatchable power will likely need to be increased significantly as well.

Wind projects could potentially be pursued through ownership or through purchased power agreements; WEC believes that each option could be viable. On one hand, purchasing wind output on a delivered basis (i.e., paying a \$/MWh price for actual energy produced) would insulate WEC from unit performance risk, and would give the owner a strong incentive to maximize production. WEC’S DOE grant appears to allow for a purchase from a facility not owned by WEC, and if so, it affords a buy down of the capital cost of wind capacity to a level that makes its all-in cost of power to WEC competitive with the Cooperative’s non-renewable power supply options. On the other hand, as discussed previously, WEC’s cost of capital advantage relative to merchant developers weighs in favor of WEC ownership.

WEC has not yet fully explored the tradeoffs between ownership and purchasing, but expects to do so in the future the context of evaluating particular project opportunities. Given the rate of growth in the wind industry, and the large expected demand for wind capacity in the Northeast to meet RPS demand in neighboring states, there are likely to be opportunities to pursue either option.

As a result of the foregoing analysis, WEC recognized a need for additional peaking capacity, and tested, using 8760-hour dispatch simulation, the economics of the 2 MW peaking unit assumed to located in WEC service territory. This option screened as well, along with the use of additional market energy purchases (some combination of spot and block forward energy), to meet WEC’s dispatchable needs.

The following graphs reveal the final 2008 “fit” of WEC’s Base Case Portfolio under the reference scenario 2008 load forecast.

