Novogradac
Journal of Tax Credits
News, Analysis and Commentary On Affordable Housing, Community Development and Renewable Energy Tax Credits

November 2015 • Volume VI • Issue XI

Published by Novogradac & Company LLP

HISTORIC TAX CREDIT TOOL BOX

Hydro and Historic: Re-establishing Hydro Technologies in HTC Projects

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Water power is as viable today as ever and is being reconnected to provide electricity on historic tax credit (HTC) projects involving mill buildings large and small, providing opportunities to re-establish historic hydropower technologies as a cost-effective power source in HTC projects.

Image: Courtesy of Courtesy of Heritage Consulting Group
Whitin Mill in Whitnsville, Mass., uses an older 50k turbine with state-of-the-art control systems to generate power.

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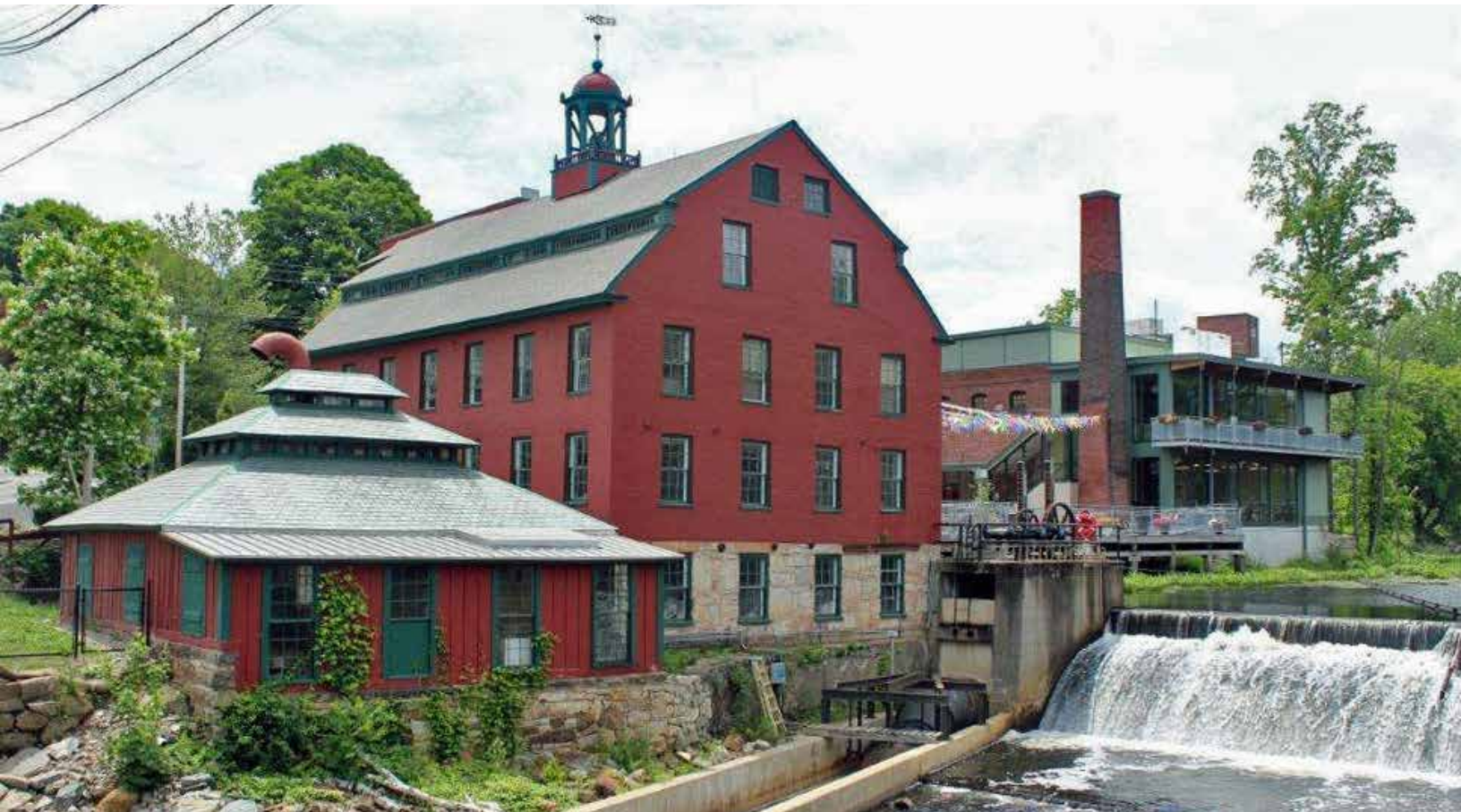

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Background and Geographic Context

The Atlantic Fall line is a geomorphologic boundary between the hard granites, slates and marbles of the interior uplands and the sands and clay beds of the coastal plain. When crossed by a river, this transition forms rapids and waterfalls, and the precipitous change in elevation makes the fall line an ideal location for water-powered commerce. This hydropower phenomenon applies especially well in New England and its application is as viable today as it was nearly 200 years ago when the Industrial Revolution in America was so energized.

As the Appalachian Mountains run northeast from Alabama to New Jersey, the fall line presents a long and leisurely slope to the sea. But the lay of the land changes near the mouth of the Hudson River. The broad southerly piedmont shortens up and disappears, and from that pivot point northward, the distance between the ports on the Atlantic Ocean and hills and mountains of Massachusetts, Vermont, New Hampshire and Maine at this geologic boundary is steeply compressed.

Image: Courtesy of Courtesy of Heritage Consulting Group
Royal Mills is a 500,000-square-foot complex in West Warwick, R.I. that features a renovated hydropower system.

This compression put the fall line and its source of power closer to sea ports, more proximate to the inland timber and the quarried granite slabs upon which the mills were founded and nearer the coastal clay beds and sand pits that provided the brick and mortar for facades that would rise up beside New England rivers.

Initially, the water surging through those water courses turned wheels at small-scale grist and saw mills, and, later, during the Industrial Revolution, hydro power set in motion the belts and gears of the larger facilities that produced cotton and woolen goods. Many of these mill buildings have been repurposed and still grace the river banks, and these bodies of water continue to run powerfully by or, in some instances, through them.

Many of these projects are "Run-of River" operations, and may also be certified as being environmentally responsible by the Low Impact Hydropower Institute. Certifiable "Run-ofRiver" hydro systems capture the kinetic energy embodied in the natural down slope a river's flow. Water enters at a high point, is gravity-fed through a turbine and re-enters the river. The cost of these types of systems is reasonable and the environmental impact is minimal.

Historic Tax Credit Considerations

As importantly and because the reconnection makes use of existing historic fabric that is infrastructural, the impact on the building's appearance is either invisible, or as with exposed canals or sluiceways, an appropriate use

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Image: Courtesy of Courtesy of Heritage Consulting Group
The Mill at Freedom Falls in Freedom, Maine, will install a 50kW turbine this fall that should produce 70,000 kWh or power annually.

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of an ancillary structure. Re-establishing the water power source connection generally has no significant impact on the historic fabric. This reconnection is happening on HTC projects large and small and in situations that are, not only inspired by a desire for inexpensive power, but also in instances where the effort is inspiring because of the elemental, very-human connection we and these rejuvenated places have to water.

The following case studies flow chronologically from the 1980s to the present day, vary in scale, but each shares a motivation that is at the core of their foundation and a key aspect of their continuation.

Simon Pearce, Quechee, Vt.

Some hydroelectric systems are included in HTC projects because the power will continue to provide electricity for manufacturing.

In 1981 the iconic glass blower, Simon Pearce, moved his business from Kilkenny, Ireland, to Quechee, Vt., because he sought independence from what he termed "European business constraints and high energy costs." He purchased a historic woolen mill complex on the banks of the Ottauquechee River, a tributary to the Connecticut River. In the early 1800s, the river powered a grist mill and later the woolen mill. In 1983, as part of the restoration process, Pearce built a modern turbine to energize his enterprise with hydroelectric power.

In August 2011, the surge caused by Hurricane Irene destroyed the Simon Pearce glass-blowing furnace, which has been replaced. The turbine survived and has been recertified. According to the Low Impact Hydropower Institute, this new electrical system has an installed capacity of 645 kW and realizes an annual production of 2 GWh. This level of production means that Simon Pearce is, not only able to power his glass business, but also is selling excess power to the power company.

Royal Mills, West Warwick, R.I.

Another "Run-of-River" project, principally residential with some retail space and at a considerably larger scale, sprawls along the banks of the South Branch of the Pawtuxet River in West Warwick, R.I. Royal Mills is a 500,000-square-foot complex that once produced cloth for the B.B. & R. Knight Company and for their Fruit of the Loom product line. In 2004 a HTC project was started and the mills were converted to 250 apartments. A key part of that renovation process was the reconnection and modernization of the original hydropower system.

The project architect was The Architectural Team of Chelsea, Mass., and according to Nick Kane, the lead architect and project manager, the process of adapting to the existing facility was relatively "streamlined." With design subsidies from the Rhode Island Department of Energy, a new penstock was installed to allow water to flow to the original space that had been outfitted with three large turbines. This spatial circumstance easily accommodated a new single turbine that required less hardware, was more compact and is as productive as the original devices. Kane noted that the practical and symbolic importance of the hydropower component of the project led the design team to preserve one of the old turbines as an on-site museum piece.

Whitin Mill, Whitinsville, Mass.

A little farther up the Blackstone River Valley and abutting the Mumford River in Whitinsville, Mass., is the Whitin Mill. Since 1976, the mill has been owned by Alternatives Unlimited. Alternatives Unlimited is a nonprofit 501(c)(3) corporation that "…provides residential and employment services to adults with developmental or psychiatric disabilities…" According to Philip Ingersoll-Mahoney,

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director of administration and finance, in 2004 "the decision was made to redevelop the mill into an inclusive community cultural center."

In addition to photovoltaic panels and geothermal, a key component of the plans for this LEED Gold-certified project was the restoration hydropower to the facility using brownfields tax incentives. Though deemed important, this was no easy task. Ingersoll-Mahoney says that the existing internal turbine pit turned out to be a hazardous waste site, so they had to "construct hydro outside using the existing dam and gates." They ended up using an "older 50K turbine with state the art control systems."

The hydro system has generated 170,000kw during the past several years, but because of increased water use by the town and by a golf course upstream, production, though worthwhile, has been disappointing. Those diminished returns do not deter from Alternative's achieved goal to turn the mill into "an inclusive community cultural center."

Freedom Falls, Freedom, Maine

"Down east" of Whitinsville, Tony Grassi has the same sort of communal aspirations for the Mill at Freedom Falls in Freedom, Maine. Grassi said he fervently believes that Freedom was a "bustling community…" that grew and thrived around its power source, the river, and that the river is meant "to serve its environment and mankind through the generation of power."

In addition to the available federal and state HTCs, the project qualified for a USDA Rural Energy for America Program grant that helped to underwrite the hydroelectric part of the package.

The mill originally was a grist mill and three tub wheels powered the grinding stones. As local commerce grew, the facility was converted to a "turning mill" that produced dowels, and handles for brooms and tools. As a former chairman of the Nature Conservancy and American Rivers, Grassi knew from the lay of the land that it was unlikely that there was any history of Atlantic salmon or alewife runs on Sandy Stream. With three town-owned dams in place, the installation of a Run-of-River hydro system would have no negative natural impact.

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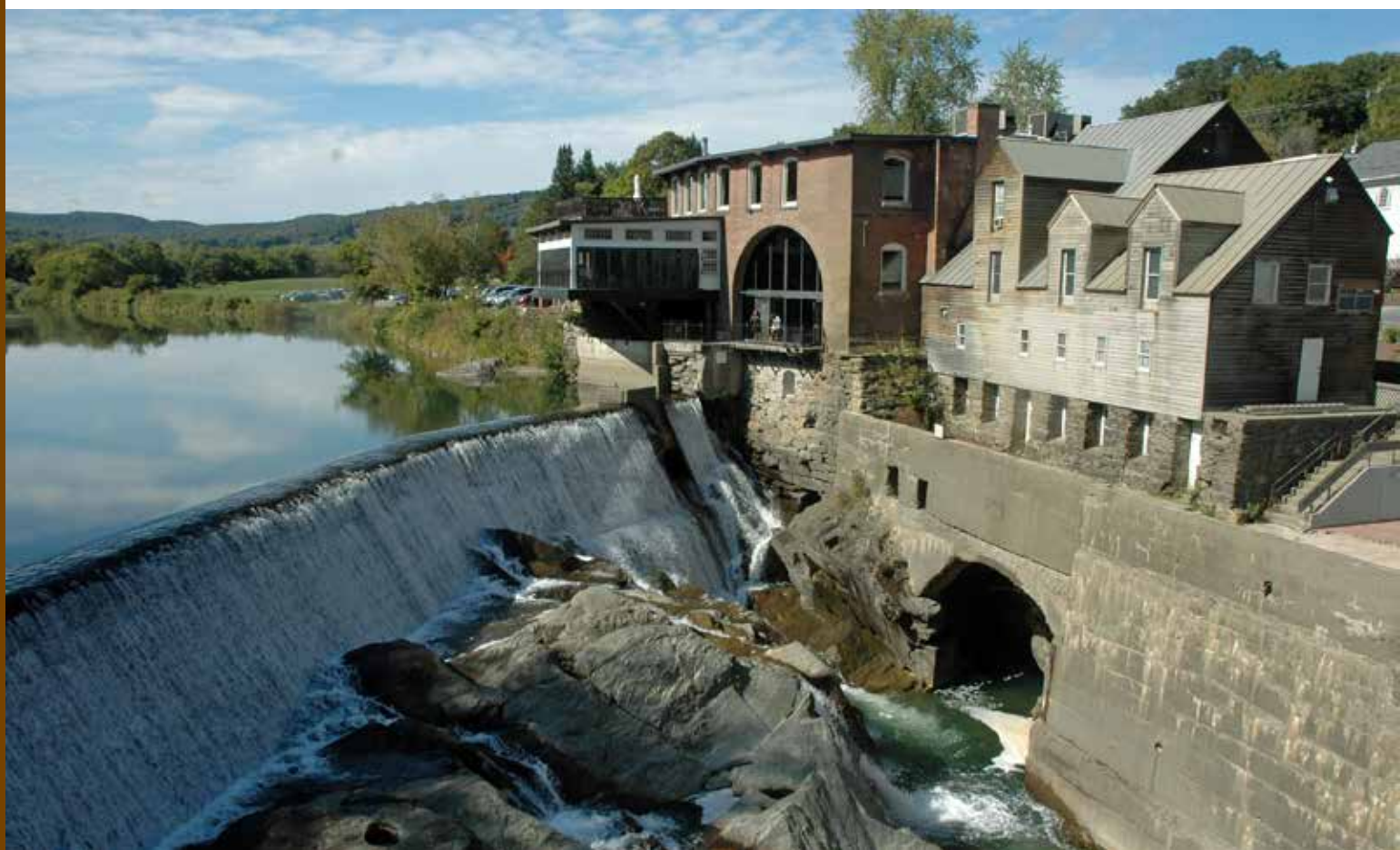
Image: Courtesy of Courtesy of Heritage Consulting Group
A new electrical system in Quechee, Vt., gives glass blower Simon Pearce an annual production of 2 GWh, allowing the company to sell excess power.



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A 50kW turbine will be installed this fall and should produce 70,000kWh of power annually. That should be more than enough energy to power the building's tenancy–Laurie Grassi Redmond's "space based" one-room school; "The Lost Kitchen," a restaurant supplied by local farms; and the offices of the Maine Federation of Farmers Markets.

Grassi is harnessing the power of the stream and through the primal communal power of family and the support of the broader agricultural community, hopes that "maybe this will spread and Freedom as a Village can come back to life and be a vibrant place."

Conclusion

Maintaining the power of, within and through historic buildings may be what preservation is all about. There is an opportunity for such meaningful maintenance at the river side. It is current and the current is strong.

Re-establishing original water power technologies is a viable option for many historic mill sites undergoing HTC rehabilitation and can provide an efficient and cost-effective power source. ❖

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This article first appeared in the November 2015 issue of the Novogradac Journal of Tax Credits.

Novogradac
Journal of Tax Credits

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ISSN 2152-646X