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WHAT WORKS

America's First All-Renewable-Energy City

Burlington's decades-long commitment to sustainability has paid off with cheap electricity—and some pretty great homegrown food.

By COLIN WOODARD | November 17, 2016

To understand what makes Burlington unlike almost any other city in America when it comes to the power it consumes, it helps to look inside the train that rolls into town every day. The 24 freight cars that pull up to the city's power plant aren't packed with Appalachian coal or Canadian fuel oil but wood. Each day 1,800 tons of pine and timber slash, sustainably harvested within a 60-mile radius and ground into wood chips, is fed into the

roaring furnaces of the McNeil Generating Station, pumping out nearly half of the city's electricity needs.

Much of the rest of what Burlington's 42,000 citizens need to keep the lights on comes from a combination of hydroelectric power drawn from a plant it built a half mile up Vermont's Winooski River, four wind turbines on nearby Georgia Mountain and a massive array of solar panels at the airport. Together these sources helped secure Burlington the distinction of being the country's first city that draws 100 percent of its power from renewable sources. The net energy costs are cheap enough that the city has not had to raise electric rates for its customers in eight years. And Burlington is not done in its quest for energy conservation. Add in the city's plan for an expansive bike path, a growing network of electric vehicle charging stations and an ambitious plan to pipe the McNeil station's waste heat to warm downtown buildings and City Hall's goal to be a net zero consumer of energy within 10 years starts looking achievable.

The environmental sustainability revolution has spread to other sectors of civic life. Outside the gates, farmers, community gardeners and food-minded social workers tend fields and plots spread out over 300 acres of once-neglected floodplain just two miles from the city's center. Together the agricultural enterprises in the valley—working land controlled by a non-profit that partners with the city—grow $1.3 million in food each year, much of it sold at a massive, member-owned cooperative supermarket, its own origins traced back to City Hall.

How did this former logging port on the shore of Lake Champlain transform itself over the past 40 years from a torpid manufacturing town in the far corner of a backwater state to a global trendsetter in sustainable development and green power? The answer carries particular resonance at a time when the United States' commitment to environmental issues and addressing climate change is suddenly less certain than at any time in a decade. Cities like Burlington, the largest city in a state whose tourism and agriculture dependent economy is vulnerable to climate change, have had to craft their own solutions to address global warming and to insulate themselves from the vagaries of global energy markets. In Burlington, however, these solutions were not spearheaded by civic or corporate leaders, as is now often the case when cities tackle urban issues. Instead, Burlington is achieving its energy independence almost entirely through initiatives developed by its municipal government—a government that has been decidedly left-leaning for decades. In fact, one of the people most responsible for setting in motion the chain of policies and programs that now distinguish Burlington was a ground-breaking social democratic mayor with unruly hair, a thick Brooklyn accent and a message that would many years later carry him deep into the 2016 presidential campaign.

"There's nothing magical about Burlington," says Taylor Ricketts of the University of Vermont's Gund Institute for Ecological Economics. "We don't have a gift from nature of ample sun or mighty winds or powerful rivers, so if we can do it, so can others."

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Founded by the raucous revolutionary bad boy Ethan Allen and his brothers in the 1770s, Burlington grew from village to city in the mid-19th century on the strength of the timber trade,. The forests of Quebec, the Green Mountains and the Adirondacks were close at hand by lake and river, the markets of Montreal and New York City were reachable by canals and the St. Lawrence river. By 1870, the Burlington waterfront was a tangle of lumberyards, warehouses and furniture factories. Dams and woolen mills were popping up along the fast moving Winooski River, attracting waves of immigrants, first from Ireland and later Quebec. Early 20th century Burlington was a working class city of 25,000 with a college on the hill, the future University of Vermont.

But by the middle of the 20th century Burlington's growth had plateaued. That's when an ad campaign that branded the state as "the Beckoning Country" of unspoiled natural and civic beauty began to attract disaffected city dwellers looking for an escape from the turbulence of an era defined by the Vietnam war, political assassinations, urban unrest, Watergate and gas shortages. Some of these newcomers were "back to the landers." Some who were eligible for the draft liked northern Vermont's proximity to Canada. Not a few, lacking the cash to buy one of Vermont's rundown dairy farms, pooled resources with friends and established communes. Thousands more were satisfied with bourgeois life, but wanted to do it in a safer, healthier environment.

"They'd advertised the state as pristine and untouched, and there was a public perception that true democracy still lived in Vermont, with its town meetings," says Amanda Gustin of the Vermont Historical Society. "It didn't necessarily match the reality, but people had the perception that this was a place where people could get away from the problems of wider society and get back to the land." Because many who came were from college-educated middle class and upper middle class backgrounds—and had engaged in social justice organizing before their arrival— they would have an outsized effect on the state's political trajectory generally and its largest city in particular.

One of the tens of thousands who put down roots in Burlington in this era was a struggling 29-year-old Brooklyn native named Bernie Sanders, who'd cut his teeth in social activism fighting

housing discrimination at the University of Chicago. Sanders had first come to Vermont in 1964, spending two summers with his first wife in a converted maple sugar shack near Montpelier. They divorced and he spent the next three years in a hamlet in the state's remote, idyllic Northeast Kingdom with the mother of his only child. In 1971, Sanders was campaigning for one public office after another, living in a bleak Burlington apartment, surviving by writing freelance articles for an alternative newspaper and on electricity he borrowed with an extension cord from his neighbors. He ran for the U.S. Senate and governor in 1972, again for Senate in 1974 and governor in 1976. His message— the same one you heard on the 2016 campaign trail—never got him more than 6 percent of the statewide vote, but at some point Sanders noticed he was doing best in Burlington itself. He decided to run for mayor in 1981 and, buoyed by an 80-percent share of voters under 36, he defeated the five-term conservative Democratic incumbent, Gordon Paquette, by 10 votes. "It was a coalition that included students and professors, but also working class people, neighborhood activists, and environmentalists," recalls Peter Clavelle, who joined Sanders's administration and succeeded him as mayor. "And the fundamental basis of it was that government can better serve our needs and respond to the challenges of our community."

In 1983, voters re-elected Sanders by 22 points in a three-way race and turned many of his council adversaries out of office. That's when planning for what we'd later come to call sustainability got underway through a new government department, the Community and Economic Development Office, which focused on developing the city's assets, from local small businesses to the natural environment. "It's not rocket science," says Bruce Seifer, a founding staffer who moved to Burlington from New York in 1973 and would later help run the department. "We asked the community what they wanted and then we gave it to them."

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Self-sufficiency and environmental protection were key goals, and the Sanders administration came into office with a head start. Under Paquette, the city-owned Burlington Electric Department decided to replace its aging coal-fired power plant on the lakefront with a wood-fired one in the Intervale, a neglected stretch of Winooski River floodplain where the last dairy farmer was surrounded by junkyards. Completed during Sanders' first term, the McNeil biomass plant could use local wood to generate nearly all of the city's needs (though half the power—then and now—is owned by the plant's minority stakeholders and winds up in other towns.) The Burlington Environmental Alliance opposed it with pen-and-ink posters of a clear-cut landscape under the words "The Wood Chip Plant is Coming." But the plant opened with a staff of full-time foresters charged with developing green rules and protocols for their suppliers. "To this day

there are no sustainable harvesting standards in the State of Vermont except for ours," says Burlington Electric's chief forester Betsy Lesnikoski, who has been monitoring harvests at the plant for 33 years. "We invented the wheel."

The city's development office pushed forward on multiple fronts, helping establish a non-profit corporation that promoted energy savings in the city's public and commercial buildings; bike paths along the previously inaccessible waterfront to reduce automobile use; curbside recycling pick-up well ahead of its time; and restoring buildings as business incubators.

"A lot of communities are 'whale hunters,' they think the answer is to business recruitment is to go after the big fish," Seifer says. "Instead we created a loan fund and helped local businesses and non-profits get started, places that would reinvest their time and effort locally, hire from within, serve on boards, and when times are tough not move out of state because they live here." Ironically, much of the money supporting many of these 1980s initiatives came via federal grants awarded under Ronald Reagan's administration.

One day in 1987, an idealistic entrepreneur called on City Hall. Will Raap moved to Burlington from the San Francisco Bay area the week Sanders had been elected and had spent the previous six years building Gardener's Supply, which sold people the things they needed to grow their own food at home. While planting vegetables at his plot in the city-owned community gardens in the Intervale, Raap discovered how remarkable the floodplain soil was and decided to move his business to an abandoned pig slaughterhouse across the road from the new McNeil power station.

"I'd asked myself: Could we be a big catalyst for food being grown in farms in Burlington for Burlington?" recalls Raap, whose company began testing various crops outside their new digs. "There was no demand for local food then—you could grow it but you couldn't sell it—so the question was how could you create a hub that could take this abused land and put it in production to educate and support the next generation of farmers while simultaneously building a market place?" That, he told Sanders's officials, required a partnership with the city. "We gave Bernie three choices: use waste heat from McNeil to heat 100 acres of greenhouses; start a market garden and see if it makes sense financially; or help us make 100,000 tons of compost to restore fertility to the valley," he recalls. "Bernie chose the third one and gave us a $7,000 loan." Tens of thousands of tons of yard and leaf waste started flowing to Intervale fields instead of the landfill.

Two decades on, the non-profit Raap set up presides over 350 acres of reclaimed agricultural

land that's home to a dozen farms, from established growers to novice farmers taking advantage of low-rent farm "incubator" land. There's the community gardens, a 600-member community-supported agriculture operation (the kind where you buy shares and get weekly boxes of harvested food in exchange), a nursery for growing riverfront buffer trees, and the Intervale Food Hub, where b oxes are loaded for delivery to people at their place of work or to 150 families identified by social service agencies as being in need. Together they produce $1.3 million in foodstuffs for the Burlington market annually and provide 30,000 pounds of fresh food to families in need. "If we're going to make the world a better place, if you can get food right, then you can get the environment and economic development and human health right," says executive director Travis Marcotte, who grew up on a dairy farm a few miles south of the city. "Burlington would be very different if we hadn't had this here, creating opportunity and familiarity with sustainable agriculture."

Sanders stepped down in 1989 to run for Congress, and voters replaced him with the development office's head, Peter Clavelle. A native and former city manager of the neighboring mill-town of Winooski, Clavelle's administration would push the sustainability drive to a new level. In his first term the city instituted mandatory recycling, fought off big box stores at a proposed mall, and got an $11.2-million bond passed to pay for insulation and other energy efficiency improvements in homes, businesses and public buildings. This initiative prevented the need to buy power from Hydro Quebec, whose dams were controversial because they flooded tribal lands in Quebec's far north, all with public support. "The beautiful thing is that we do as a general rule see the common good as a fundamental component of life here," observes Jennifer Green, the city's sustainability coordinator. "We all have to give a little for everybody to get some."

But Clavelle got ahead of the electorate on another front—extending benefits to the domestic partners of city employees—and it cost him. "Today it's hard to imagine it was an issue, but in 1993 it was," he recalls. Conservatives turned out to vote in huge numbers; Clavelle's coalition complacently stayed home. "So I lost an election and at the time I said, 'I'm done with politics, I'm done with Burlington.' I packed up my family, and we moved away for a voter-inspired sabbatical," he says. They ended up on Grenada, the Caribbean island nation with a comparable surface area and population to metropolitan Burlington. "When you're on an island, you really see what practices are sustainable and what practices aren't," he says, recalling ships unloading frozen chicken and orange juice while island chickens had little access to the market and citrus fruit rotted in the groves. "That was a transformational moment for me."

He returned to Burlington, got re-elected in 1995, and oversaw the process of developing the Legacy Plan, a citizen-sourced vision for how Burlington could become a sustainable community. "What is sustainable development? Is it the most overused buzzword of the 1990s or is it the most important concept for the survival of our planet and our communities," he says. "I decided a long time ago that its both, and that we need to go beyond the branding and rhetoric and create actual examples that will resonate and make a difference in people's lives." The plan, completed in 2000, created the guiding vision that has been followed since: integrating local business development and farm-to-table efforts, putting New Urbanist solutions ahead of sprawl and prioritizing multi-modal transport over highways. The plan also had a major environmental component that emphasized recycling, energy conservation and investment in non-polluting transportation and renewable power. "This was the visionary document," says Green, who was hired to implement it. "It got the big city departments all focused on taking this on."

And without even quite noticing itself, the city built its way toward a sustainability milestone that would turn heads worldwide.

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Jon Clark has one of the more unusual offices in town. The exterior door is a gasketed bulkhead, the windows are the sort you'd find at a city aquarium and it's underwater for large periods of the spring, submerged by the roaring river falling over the dam barrier outside. Here, at computer terminals nestled above the dam's turbines, but two stories beneath the dam pond, Clark has monitored and maintained the 7.5-megawatt Winooski One hydroelectric plant since it was constructed in 1994. Visitors clamber down a long flight of metal stairs and through the foyer to the humming generator hall to reach the room, , where Clark is often the only person on the scene. These days he can keep atop of the station's vitals with a smart phone app, and there's a guy who covers for him two nights a week and every other weekend. "I probably spend more time here then I do at home, so I treat it as such," Clark says. "I try to keep it as tidy as possible."

Tidy it is, and also financially effective. Built by private developers on Burlington-owned land in neighboring Winooski, the city exercised a onetime option to buy the facility in 2014 via a $12-million voter-approved bond. The plant was, in a sense, free. The bond payments were about the same as the cost of the power the Burlington Electric Department would otherwise have had to purchase elsewhere. The cost of the power was now insulated from the fluctuations in oil and gas markets, prompting the Moody's credit agency to raise the utility's credit rating. And it made the city the first in the nation to obtain all of its power from renewable sources, a distinction that

went almost unnoticed at the time, relegated to the third paragraph of the *Burlington Free Press*'s story on the city finalizing the dam's purchase. "This was the product of a long term vision and a sequence of mayors," says Ricketts at the Gund Institute. "It kind of snuck up on us."

Indeed, because Burlington owns its own utility with its own citywide grid, the city could theoretically close its three connections with the wider world and generate all of its power combining McNeil, Winooski One, wind turbines and solar panels. This led a visiting writer for *Orion* magazine to declare this was where she would move to wait out a zombie apocalypse. This would only be an apocalyptic measure, as half of McNeil's power is actually owned by the plant's minority owners. Burlington makes up for this by buying hydro power from further afield, but it is still able to operate a renewable grid without asking rate payers to pay extra for it. "The conventional wisdom is that you have to pay more for renewables, but it's not true," says Burlington Electric's general manager, Neale Lunderville. "We haven't raised rates in eight years."

One of the reasons rates are low is that the city and its co-owners eight years ago invested $11.5 million in a state-of-the-art air scrubber that qualified the plant to earn the highest value renewable energy credits. They're able to sell those to out-of-state utilities (who need to meet their standards but lack clean generating stations of their own) and then—to meet their own renewable standards—buy back cheaper credits to cover the power. The net profit—$6 to $9 million a year—is used to offset the rates Burlington Electric charges customers. "It's a terrific model for cities across the country," says Sandra Levine, senor attorney at the Conservation Law Foundation's Montpelier office. "With the challenges of climate change, we should be looking to our electricity sector to move away from fossil fuels and this is a good way to do it."

Current mayor Miro Weinberger, a Democrat elected in 2012, was inspired by the international attention Burlington has received since achieving the renewable energy milestone. "It's really pushed us to think hard and big about where we go from here," he says. "That's when we started looking at what net zero would look like."

A city is considered net zero when it generates as much energy as it consumes, not just in the form of electricity, but heat and transportation as well. Achieving such a state, Weinberger argues, would further insulate Burlington from the volatility of fossil fuel markets, saving money and luring more entrepreneurs and businesses with brands linked to sustainability, such as Ben & Jerry's ice cream, green cleaning products maker Seventh Generation and climate change-conscious Burton Snowboards. "We've got our own goals around eliminating our carbon

footprint completely, and being based in a city where that's easily possible is very important to us," says Joey Bergstein, general manager at Seventh Generation, which started in the early 1980s as an off-shoot of Gardener's Supply. "Our history here is very much driven by the fact that the city and the state of Vermont are so aligned with our values."

Proposals to use the waste steam from the McNeil plant to heat buildings and businesses have been kicking around for a quarter century, but ran against an economic obstacle. Building the distribution system is a big upfront cost, but attracting users from existing homes and buildings is a slow undertaking. What was needed was the equivalent of an anchor store at a mall, a big new user ready to buy lots of heat from day one, preferably downtown so that additional users could be easily patched in as their existing boilers reached replacement age. Now it looks like that's happening. On November 9, city voters approved a 14-story, multi-use development that will replace a dying indoor mall, that now cuts off several central streets, with a sidewalk-friendly restaurants and retail and market and affordable apartments.

At the city-owned airport, they've reduced demand for heat and electricity by replacing lighting and air conditioning systems and properly insulating the terminal's roof. There's a 500-kilowatt solar array that's been providing enough power to supply 60 homes and a rain garden on the roof of the parking garage. (A 10-megawatt wind farm from which the city draws power can be seen on a nearby ridge.) "We're a small airport and we don't have a lot of money, but what we try to do is to introduce a greener way whenever we change a bulb, replace a window, or repair our roof in a way that gives us a greater energy savings and return on our investment over time," says city aviation director Gene Richards, who cut electricity usage at the airport by a fifth in three years. Popular local restaurants have taken over the concessions in the terminal as part of the buy local effort. "We're tearing down the walls in this community to leverage our assets and make it work."

Achieving net zero in transportation is thornier than heating and power because there are few big users to focus on and only a handful of users have invested in all-electric vehicles. "There's the range anxiety with electric vehicles—can I go far enough?—so having enough well-placed charging stations is really helpful," says Lunderville of Burlington Electric, which has deployed 10 multiple-outlet charging stations at strategic locations around the city—parking garages, city hall, the co-op grocery store and the University of Vermont campus—and plans to add five to six annually. They're looking at a pilot project for city buses, while Mayor Weinberger's office just released a detailed plan for greatly expanding the bike path network with protected lanes. "The stats show the existence of protected lanes increases usage by 300 to 500 percent because there

are a whole lot of people who don't feel safe co-mingled with vehicles," says Weinberger, who was inspired by a biking weekend in Montreal, which has such a system. "Seeing what they've done convinced me of the value of a more systematic approach."

Burlington Electric is preparing for a challenge of its own: Its grid is expected to shift from a "hub-and-spoke" system of power plants and consumers to a distributed network with thousands of tiny producers and storage sites. "The changes are being driven by the customers, who didn't use to have the option to do their own solar panels or start storing their energy with a Tesla battery pack"—a home battery system that allows users to bank electricity, says Lunderville. He envisions creating a system by which the utility could pay customers to store energy for the network at times when they don't need it banked themselves. To do that requires the grid to collect and process a lot more data to coordinate the cacophony of demands, supplies and storage opportunities. "Suddenly we need to know a lot more about how power is being generated and used than you do today."

The industry expects these changes everywhere, but Burlington is likely to see them early—because of its green ethos and because Vermont offers a variety of incentives for customers to invest in solar. But it's also the perfect sandbox—a small city that owns its own grid, power generation and public fiber-optic data network— and the utility is ready to pioneer the development of the technology and policies to make it all work. "Having the fiber optics in place is really critical to moving toward this bi-directional energy grid," says energy consultant Gabrielle Stebbins, who previously headed the state's renewable energy industry association. "We're a small state and city, so we're not driving the bus. But the little motor car we're driving can tell which roads are possible and feasible."