

# WEC CO-OP CURRENTS

## 2000 Census Reveals Rural Landscape And Rural Co-ops Are Changing

**W**hen Treasurer Donald Douglas of East Orange delivered his annual report at Washington Electric Cooperative's 62nd Membership Meeting in May, he had welcome news for his listeners: the Co-op's revenues in 2000 had exceeded its expenses. In years when that happens the extra earnings, called "margins," are assigned proportionally to the capital credit accounts of WEC's 9,000-plus consumer/owners. Eventually, the money could be returned to the members through capital credit distributions.

The main reason for WEC's year-2000 margins, Douglas explained, was that our co-op is growing. "About 176 new members came onto our lines this past year," he said (the final tally was 179), "and we anticipate continued growth in the Co-op."

As it turns out, Washington Electric's rural service territory was pretty typical in this regard. As the final results of the

2000 census begin to emerge, one of the big demographic stories in the United States is that rural areas, by-and-large,

are becoming less rural. Three-quarters of all rural counties in the U.S. grew in population during the 1990s. That trend is reflected town-by-town, with few exceptions, in Washington,

Orange, Lamoille and Caledonia counties, where WEC serves a portion of the rural residents, farms and businesses.

It also turns out, nationally, that rural growth translates into growth for electric co-ops. That makes sense, considering that rural electric cooperatives were formed with federal assistance in the 1930s and '40s specifically to extend the power lines out from the cities and villages into the countryside, that those lamp-lit areas might share in the luxury and prosperity that attended electric

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*A subdivision in Arizona's high desert. New census information points to a "rural rebound," with dramatic effects particularly in the South and Southwest.*

## U.S. Energy Policy Propping Up A Dying Oil Age

*By Paul G. Hawken*

**T**here is a humorous Sufi story about the Mulla Nasrudin who is crawling on all fours late at night under a streetlight outside his house. A friend wanders by and asks what he is doing and Nasrudin tells him he is looking for his house keys. After joining the fruitless search for some time, his friend turns to him and asks him exactly where he lost them. Nasrudin points to the backyard of the house. His friend is incredulous

and wants to know why they have been searching in the front yard near the street. Nasrudin says, "Because this is where the light is."

The Nasrudin tale reveals how the mind creates illusions which then pass for reasonable behavior. In the U.S., there is the illusion *du jour*: We are running short of energy and need more. Not only has California hit the wall, but there are ominous warnings from New York City right across the country that we may have

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### Inside

**Central Vermont census data, fuel cell technology,** indicate shifting ground for co-ops. Rural Growth series continues on pages 4-6.

**A far cry from California.** New England's power supply is abundant, but vulnerable to price spikes in fossil fuels. Page 2

**Hydro Quebec suit is settled,** stemming from failures in 1998 Ice Storm. But WEC casts symbolic vote 'against.' See Manager's Report, page 3.

**Co-op Board member takes to the woods.** WEC Director Monique Hayden writes about her up-close look at utility work. Page 8.



*Monique Hayden arrives at WEC's operations center for a day of work. (See story, page 8.)*

**Washington Electric Cooperative**  
East Montpelier, VT 05651

# Despite Heat, No Power Emergencies On Horizon For New England

It can get hot in New England in July – even up here in Vermont. With the temperature in the 90s and humidity high as July wended its way toward August, the region set a single-day record for peak energy use. On Tuesday, July 24, the Independent System Operator (ISO) – the nerve center for electric power transmission throughout the region – announced that the demand in New England was almost 24,000 megawatts (MW), the most electricity that the region had ever consumed.

But there were no blackouts, no brownouts. The ISO didn't even issue an emergency alert, even though electric-generation resources capable of producing 2,900 MW of power were out of service that day for repairs.

The reason that this record-setting demand didn't cause so much as a stir among the region's utilities, Stan Faryniarz of La Capra Associates in Boston explained recently, was that New England had added about 4,000 MW of power-generation capacity over the past two years.

"Our power supply is in pretty good shape," said Faryniarz. La Capra Associates serves as WEC's power planning consultant. "The bottom line is that

New England has plenty of capacity at this point. And we're expecting another 5,000 megawatts to come on-line by the end of 2003."

## Natural gas a burr in the saddle?

If that rosy scenario strikes some New Englanders as surprising, it is because the situation was markedly different in recent summers. Then, consumers were warned that sudden power-reduction measures might need to be taken. In June 1999, NEPOOL (the New England Power Pool, precursor to the ISO) instructed utilities in the southern part of the region to dramatically curtail their customers' power consumption, stopping a step short of instituting rolling blackouts. And on May 8, 2000, an early season heat wave caught power-planners off guard, hitting at a time when 8,400 MW of generation capacity – about 45 percent of New England's peak demand – was off-line. Much of that missing capacity, around 50 percent, had been purposely shut down for facility maintenance, but the rest was unplanned.

Naturally, the laws of supply and demand responded accordingly.

"It created a problem such that the spot market price for electricity really skyrocketed," said Faryniarz. "But the story is different this year. The reason we didn't go into an emergency, alert-type situation in July, even with our peak-demand setting a new record, was that we had plenty of generation despite 2,900 megawatts being out of service."

## *'The big picture in New England is that we're adding capacity a lot faster than we're adding load.'*

— Stan Faryniarz

The new power plants that account for New England's abundant generation capacity – in conjunction with established nuclear power plants and other production resources – are primarily natural gas-fired facilities in eastern Massachusetts. And it is on that basis, rather than inadequate generation capacity such as in California, that Faryniarz sees potential

vulnerability.

"If someone were looking for a dark lining, it might be the reliance on natural gas," he said. "We could see fossil fuel prices increase substantially again like they did last year. Right now, though, the futures markets don't show that kind of pressure."

In the latter part of 2000 the price of natural gas increased four-fold, according to Faryniarz, but it was a short-term spike that declined as winter ebbed.

"There are short-term phenomena and longer-term, fundamental phenomena, that affect prices and generation capacity," he said. "The important issue in New England is what happens to fossil fuel prices. But we have plenty of capacity – 3,000 to 4,000 megawatts over our peak demand. And consumption hasn't been too heavy. The ISO-NE Capacity, Energy, Loads & Transmission 2001 Report shows region-wide load growing at about 1.3 percent to 1.4 percent per year. That's not an outstanding rate of growth.

"The big picture in New England is that we're currently adding capacity a lot faster than we're adding load."

Despite the volatility that characterizes fossil fuel markets, that's a ratio that could produce relative stability in electricity costs in Vermont and New England for the foreseeable future – but only so long as fossil fuel prices behave.

## Co-op Currents

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*The Board of Trustees' regularly scheduled meetings are on the last Wednesday of each month, in the evening. Members are welcome to attend. Members who wish to discuss a matter with the Board should contact the President through WEC's office. Meeting dates and times are subject to change. For information about times and/or agenda, contact Management and Programs Administrator Denise Jacques, 802-223-5245.*



*You can hardly squeeze a service truck onto this unmaintained Barre Town road, which is paralleled by WEC utility poles. But it provides easier access than many Co-op locations.*

## Manager's Report

# Hydro Quebec Ice Storm Arbitration Settlement

## WEC Dissents, Upon Principle

by Avram Patt

**B**ecause our Co-op is a participant in the long-term power supply contract with Hydro Quebec, I want to offer some information and comments concerning the settlement of the dispute between the participating Vermont utilities (Vermont Joint Owners or "VJO") and Hydro Quebec that was announced in July and reported in the Vermont press.

The dispute arose after the great ice storm of 1998, during which large parts of HQ's high-voltage transmission system collapsed. The collapse of those huge steel transmission towers resulted in no power being delivered over the Vermont border at Highgate for several weeks. After some investigation, the VJO claimed that not only did we not receive the power we were contracted for, but that the collapse raised serious questions about the contract itself, since claims of superior reliability had been a major selling point of the contract to begin with.

After an extended and expensive arbitration process, the arbitrators ruled that the Vermont utilities were owed only the value of the capacity that was not delivered in the aftermath of the storm. After further negotiations, the amount settled on was \$9 million. WEC has received its share of that, which is about \$73,000.

I participated on WEC's behalf in the VJO's decision to initiate the arbitration and to make the case that we did. I do believe that strong evidence was presented that Hydro Quebec's transmission system had real deficiencies, that HQ knew about those deficiencies, and that those huge towers should not have crumpled, even under the severe conditions of the ice storm. In a contract such as the one with Hydro Quebec, we pay not only for the energy delivered, but for HQ's "capacity" to deliver.

Nevertheless, the arbitration panel decided last spring that the VJO was only owed the value of 66 days worth of

capacity not delivered. After negotiations, the amount both sides agreed to was \$9 million. Unfortunately, that was less than the cost to VJO of making its case.

Although I did feel that the case was worth pursuing, I voted "no" on WEC's behalf when the VJO members decided to accept the settlement. While neither I nor WEC's Board of Directors felt it was worth trying to further appeal the arbitration panel's decision, we were the only utility to vote against the settlement, and we did so out of principle stemming from the unique history of WEC's involvement in the Hydro Quebec contract.



Avram Patt

As has been described a number of times in *Co-op Currents*, the contract between the VJO and Hydro Quebec was approved in 1991, and in our case that approval also involved a vote of the members that spring. Then, just a few months later, WEC's manager and board were seeing wholesale electric prices beginning to change, and we realized that the contract might not be the most economical one for us. However, we

were under certain legal obligations to the other Vermont utilities participating and could not simply walk away.

But in August of 1991, the other Vermont participants voted to "lock-in" the contract with HQ several months before they legally had to. WEC was the only utility to vote "no" on that lock-in decision, as we felt that we (and the other utilities, for that matter) had better options available by then. We were outvoted, but obliged to accept the majority's decision.

So as problems with the above-market costs of the contract arose in the ensuing years, and then when the ice storm controversy arose in 1998, WEC was by necessity, but reluctantly, involved. Had it not been for the premature "lock-in" vote of the other Vermont utilities, it is unlikely that WEC would have had to contend with these HQ contract issues. Therefore, although we knew that all of the other VJO utilities were ready to accept a settlement

***I voted no because WEC shouldn't have been there in the first place.***



The great January ice storm of 1998 wrought havoc in Orange Heights (above). Farther north, it also brought down Hydro Quebec transmission towers, leading Vermont utilities to sue the company.

for an amount less than what the case cost, I voted no because WEC shouldn't have been there in the first place.

### Renewable Energy Opportunities

In previous reports in these pages, and at last May's Annual Meeting, I have discussed our efforts to meet our future energy supply needs, including the replacement of our Vermont Yankee con-

tract at the end of 2002, with energy from renewable sources.

Although it is too soon to provide details, I can tell you that we are making real progress. We are very hopeful that we will be able to meet these future supply needs entirely from renewable sources at prices that are comparable to any other options available to us in the market. The members of WEC's Board of Directors and I are excited about this possibility, and we will definitely keep you posted.

### The National Energy Situation from WEC's View

General Manager Avram Patt recently wrote an article discussing the national and state energy situation from the Co-op's perspective. Topics covered include the California energy crisis, the Bush Administration's energy policies, the future of nuclear power, conserving energy versus new generation, and renewable resources. An edited version was published in the Barre-Montpelier *Times Argus* and the *Rutland Herald* in late June.

For a complete copy of the article, visit WEC's website at: [www.washingtonco-op.com](http://www.washingtonco-op.com). Or call the WEC office and we'd be happy to mail or email you a copy.

### This is your Co-op

As always, if you have any questions or comments about these issues or any other matters relating to WEC, please feel free to contact me or any of the members of your Board of Directors.

### Marketplace

**FOR SALE:** Oak "Hoosier" with flour bin; Left-top pine commode; Old sewing box and other antiques/collectibles. Call 244-1565.

**FOR SALE:** 1996 Saab 900 SE, 75,000 miles, loaded; five-door, silver with black leather interior. Has 6-CD player, sunroof, rimmed snow tires, extended warrantee. Excellent condition; 14,000. Call 244-1565.

## Rural Growth

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power. Now there are some 950 electric co-ops in the United States. As the country's population grows and turns toward rural areas for development, the utilities that are being affected frequently are member-owned co-ops.

### Two-edged sword

Growth can produce new revenues for co-ops, and that translates into capital credit benefits for their members. But growth also presents an array of problems for co-ops and communities.

Opponents of unorganized and unregulated growth call it sprawl, and in Vermont such groups as the Vermont Forum on Sprawl have focused attention on the economic, social and environmental consequences that follow. They note that while population growth certainly provides outward pressure on city and suburban boundaries, sprawl is not always directly proportional to increased population. A 1999 report published by the Vermont Forum described the impact of sprawl.

"Land is being developed in Vermont at about two-and-a-half-times the rate of population growth," the report said. "Between 1982 and 1992, the amount of developed land in Vermont grew by more than 25 percent, while the population grew by only 9.8 percent. This suggests that we are consuming land at excessive rates."

The pattern also holds true in Maine and New Hampshire, but the numbers indicate that Vermont is developing more land in comparison to its population growth than either of its sister Northern New England

states. Of course, in much of the country sprawl is far more rampant and yet less controversial. Vermont is attuned to Yankee

cultural and land-use traditions that very likely will protect most of the state from the paving-over going on in much of the rest of the U.S. (though a subtler form of sprawl – larger lot sizes that take land out of forest or agricultural production – has the effect of fragmenting the environment).

Some rural electric co-ops welcome growth of significant proportions because it brings greater economic strength and diversity – more commercial and manufacturing accounts which provide jobs and swell the co-ops' revenues from power sales. On the other hand, development forces those co-ops to spend a

great deal more for wholesale power.

The June issue of *Rural Electric Magazine*, a publication of the National Rural Electric Cooperative Association, highlights some of the co-ops most affected by population growth and sprawl. Because the increase in rural population during the 1990s reversed a decline that had occurred during the 1980s, the article characterized the latest trend as a "rural rebound."

"Nearly three-fourths of all rural counties gained some population in the 1990s," the article said. "Only 600 counties – half as many as in the 1980s – lost population. Rural growth tends to be concentrated either in counties near metropolitan areas, as suburbs sprawl into virgin country, or in counties with recreational or scenic offerings."

Rural growth is most dramatic in the West and Southwest, where pleasant weather and beautiful scenery lure retirees. A U.S. Department of Agriculture demographer referred to growth in Arizona, Colorado, Nevada and even Idaho as "runaway stuff."

"Those are areas where you find counties that have grown by 30, 40 and 50 percent," he said.

The electric co-ops that serve those counties are therefore undergoing similar transformations. In the past decade Trico Electric Cooperative in Tucson saw its membership double from 13,000 to 26,000. Sawnee EMC was once a traditional rural co-op that served small farmers and country folks in northern Georgia. But nearby Atlanta, urban locus of "the New South," changed all that. Today Sawnee is a growing, suburban utility (still member-owned) with 100,000 members.

Dixie-Escalante Rural Electric in Beryl, Utah – a co-op smaller than Washington Electric, and 120 miles from the nearest metropolitan area (Las Vegas) – started

the '90s with some 3,500 members and doubled in size to 7,000. To get a sense of what that co-op experienced, imagine WEC growing in 10 years from 9,000 to 18,000 members. Imagine, too, your rural neighborhood in Calais, Corinth or Cookville absorbing that kind of population explosion.

The equally difficult flip side of this coin – population shrinkage, and economically stressed rural electric co-ops – can be encompassed in two words: North Dakota. Nationally, 41 non-metropolitan counties experienced population declines of 15 percent or more, and 16 of those counties were in North Dakota. The Plains states in general lagged behind in

population growth. Other rural counties that lost significant population were in the Mississippi Delta and upstate New York.

### Fading farms

The trends reflected in these numbers – more people settling in rural areas, but also people vacating rural areas in certain parts of the country – indicate another demographic change: there are fewer farms these days in the U.S. Originally, farmers were the population that electric co-op primarily served when they were founded 50-60 years ago.

"When the Census Bureau releases its farm population estimates later this year," *Rural Electric Magazine* said, "[the USDA demographer] expects . . . dismal news. He believes the farm population has declined to somewhere between 3 million to 3.6 million, down from 4.6 million in 1992. (The USDA discontinued its own census in 1992.) In a nation of 285 million people... that would put the total farm population at only slightly more than one percent."

These, then, are the realities faced by rural electric co-ops. The impacts have not been as radical in Vermont, though the number of farms on WEC's system has declined from about 2,000 when the Co-op was founded in 1939 to fewer than 100 today. But the two co-ops that operate in Vermont – WEC and the Vermont

Electric Cooperative, based in Johnson – must be prepared to cope with growth. That's not even a matter of choice; the utility laws of the state require such readiness.

"There are co-ops in some places that promote growth," said WEC General Manager Avram Patt. "There's an electric co-op in New York State with a line-

extension policy under which the co-op and all its other members pay the cost [of extending power lines to a new location], rather than the new member, which is not the traditional way that it's done. Their idea is to make it as cheap as

possible for people to hook up and grow the co-op's system.

"That's not our policy," Patt said. "We remain neutral on growth and believe the amount of growth and where it should occur are for our communities to figure out, through zoning and other growth-related laws. When someone asks for service within our territory we have an obligation to supply them, as long as they get the necessary permits to build."

Co-ops cannot govern growth, but growth, in a sense, can govern co-ops. While WEC operates in communities that are unlikely to sprout dense, cookie-cutter subdivisions and other extreme forms of sprawl, Washington Electric must be prepared to accommodate whatever forms of growth occur, and to welcome those new members into the cooperative family.

**"Land is being developed in Vermont at about two-and-a-half-times the rate of population growth. This suggests that we are consuming land at excessive rates."**

— Vermont Forum on Sprawl



50 percent," he said.

**One of the biggest demographic stories in the United States is that rural areas, by-and-large, are becoming less rural.**

## Growth In Co-op Country Follows The Power Lines

### Local census results are in

Let's get this straight. Duxbury is not Vermont's version of Pinal County, Arizona. Pinal County, home to Trico Electric Cooperative, is one of the fastest-growing counties in one of the fastest-growing states in America, and due to that growth Trico Electric Co-op doubled in size during the 1990s, ballooning from 13,000 members to 26,000 in the 10-year span.

In Washington Electric's service territory, results from the 2000 census revealed Duxbury as having experienced more population growth than almost any other town. The 1990 census reported a population of 976 in Duxbury, a town in Washington County. By 2000, the population was 1,289, an increase of 32.07 percent. Twelve hundred people does not a metropolis make, but it's a fact that

Duxbury's growth rate exceeded that of any other town in which a portion of the residents are served by Washington Electric Co-op.

(Actually, there is one exception. The census reported that Fayston grew by 34.87 percent, increasing from 846 people in 1990 to 1,141 in 2000. But the Co-op serves just a handful of residents in Fayston, while it provides electricity to a sizeable proportion of the people in Duxbury.)

A population growth of 32 percent does not mean the Co-op's membership increased by that same percentage in Duxbury. In all 41 towns where WEC has customers (owner/members of the Co-op), it shares retail electric coverage with other utilities – Green Mountain Power Corp., Central Vermont Public Service Corp., and the municipal utilities of





A subdivision on WEC lines in Barre Town — a kinder and gentler style of growth.

Hardwick and Northfield. Generally, those utilities serve residences and businesses in population centers, as well as along major arteries like Routes 2, 12, 14 and 100. Washington Electric provides power to the most rural areas of the towns.

Census information is on a town-wide basis and does not indicate the utility's growth in local membership. But it's interesting to note which Co-op towns grew the most in the 10-year census period. After Fayston and Duxbury, the town with the biggest population increases were Topsham (21 percent) and Corinth (17.4 percent), both in Orange County, and then Moretown (16.82 percent) back in Washington County. Typical were towns that revealed a mid-range population growth, from 7.2 percent (Chelsea) to 11.7 percent (Washington). Co-op Country towns showing the lowest percentage of growth were Calais (0.53 percent, representing an increase of 8 people) and Roxbury, whose reported population mushroomed from 575 people in 1990 to 576 in 2000!

Worcester and Plainfield actually lost population — Worcester declining 0.44 percent (four fewer residents) and Plainfield reporting a decrease of 16 total residents, for a 1.23-percent population decline.

In Vermont, where town populations are often measured in four figures, percentages can be deceiving. One town where the Co-op provides electric service to rural areas is Barre Town. Although Barre Town had one of the lowest percentages of population increase (2.58 percent), that represented a comparatively large increase of 191 residents (which is, interestingly, the same number of people that Barre City lost).

Co-op Country towns with the biggest numerical increases were Williamstown, which grew during the census period by 386 people (to a population of 3,225) and East Montpelier, where the population expanded by 339 people to a total of 2,578.

### Rural infrastructure

The growth in membership of Washington Electric Cooperative does not parallel the population growth in its 41 central Vermont towns — again, because

WEC does not exclusively serve all the inhabitants of any town. But WEC's membership is increasing, as measured by the number of new connections its line crews perform every year. (The Co-op loses very few accounts because in most cases a new occupant moves into the house and replaces the previous Co-op member.)

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### Whether they're running home-based businesses or trading stock on line, the rural infrastructure is their link to the world.

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Steve Hart, WEC's Operations Assistant, said the Co-op experienced a "bump" in 1999, when it added 169 new connections to its system. In the two previous years WEC added 132 connections (1998) and 131 connections (1997). The 1999 bump bumped again in 2000, with 179 new connections. The rate seems to have slowed this year — WEC had added 36 new connections by the end of June, compared to 57 by the same time last year — but Hart said it was too early to tell how 2001 would end up.

"In August and September people make a big push to wrap up construction, and that's when we might hear from them," he said. "[WEC's growth] could end up being fairly consistent with what we had in the last few years."

Whether it comes fast or slow in any given year, rural population growth is inevitable. As WEC Operations Director Dan Weston explained, co-ops set the stage for growth 50 years ago by installing power lines across the countryside.

"The cost of getting electric power is one of the considerations people have when they decide where to build," said Weston. "When we went out and served rural America we didn't build along the roadsides like [investor-owned utilities] had. We crisscrossed the pastures and fields to get power to the farms as directly as we could. In the long run that opened up these acres for sale, because now the power is already there."

"The rural location of our system," said Weston, "is now leading to the develop-

ment of rural America."

The same can be said for other elements of rural infrastructure.

"The County Road (leading north out of Montpelier) isn't just a country road anymore," said Weston. "It's an artery linking Calais and East Montpelier and Maple Corner to jobs in Montpelier and Barre. A lot of people with state-government jobs are locating out of downtown now, and into rural Vermont."

Population growth is not very noticeable in places like Vershire, which are distant from central Vermont's modest cities. But one of WEC's longest line-extension projects this summer is in that community, and Hart speculated that the eastern portions of WEC's service territory could come under development pressure from the Hanover/Lebanon area.

"Property values are going to be less in the small towns on this side of the [Connecticut] river," he said. "And people might find the commute to be acceptable."

Another recent phenomenon is that more people are working out of their homes these days, in Co-op Country as in the rest of the world. Whether they're running home-based businesses and services or trading stock on line, the rural infrastructure is their link to the world. It doesn't matter where they live as long as they can tap into electric, telephone and even cable systems.

As operations director, Weston assigns the new connections to teams of line workers. He therefore has a sense of where the Co-op is experiencing most of its growth.

"We're hitching people up in Barre Town and Williamstown," he said. "In Walden and Cabot we've had quite a few this year. And it's not always newcomers [to Vermont]. A lot of times it's Vermont families, where the kids grow up and buy property and settle in the same area."

For the most part, new homes in Co-op Country conform to the national average for single-family dwellings (about 2,200 square feet). But Weston believes the nature of development is changing, with more new homes falling into the 3,000-5,000 square foot category, and situated on lots of three to five acres.

### Homes for all seasons

Finally, WEC is also experiencing a

kind of growth that is not reflected in a larger membership. Increasingly, people who were part-time, seasonal members are renovating their family camps and moving into them permanently or semi-permanently.

"We're seeing this in some of the lake areas, like Groton Lake," said Hart. "We see them tearing down their camp and building a nice house in its place."

The change appears on WEC's radar screen when the meter reader reports a significant difference in electric usage at someone's property.

"The billing department might notice that over a six-month period (seasonal members pay their bills twice a year, rather than monthly), where they were using perhaps from 300 kilowatt-hours they're now using 3,000. They'll call the member and ask about it, because our meter readers have all these meters to read and might make a mistake once in a while. We need to catch that, or detect if there's a faulty meter; or if someone is using an appliance like a space heater and is unaware of how much energy it consumes, they might want to know about it."

Such a call may reveal that a family has turned its seasonal camp into a home. Hart and Weston agree that it's not uncommon these days. The Co-op then gives the member the choice of paying more-manageable monthly bills.

### Turn, turn, turn

Co-op Country is changing — though not by leaps and bounds as in some places; nor is the Co-op stressed by growth like some electric co-ops that find themselves serving twice as many members as they were a decade ago. But the new patterns reflect meaningful changes — economic, social and demographic — that are occurring in our communities. Our section of Vermont is not the rural enclave it once was, a land of dairy and subsistence farms linked by mile after mile of rough dirt roads.

And it seems fair to say that it's not the central Vermont it is destined to become, either.

*The Central Vermont Regional Planning Commission and the Two Rivers/Ottawaquechee Regional Commission contributed valuable census data for this article.*



## The Times They Are A-Changin' 'Distributed Generation' Opens New Doors For Rural Electrification

It's an image and a maxim made popular by the Iowa-cornfield baseball movie, "Field of Dreams." "If you build it," this new adage says, "[they] will come."

Well, in the 1930s and 1940s, electric cooperatives all over the United States built it – electricity infrastructure that extended poles and power lines far into America's rural heartland. And as Dan Weston, WEC's Director of Engineering and Operations, observed recently, "they" – newcomers to the rural way of life, as well as the offspring of generations of farmers who grow up and need their own places to live – have been coming to the countryside ever since.

"[Co-ops] crisscrossed the pastures and fields to get power to the farms as directly as they could," said Weston. "In the long run that opened up those acres for sale, because the power is already there. The rural location of our system is now leading to the development of rural America."

While Weston's observation is true, the story doesn't stop there. Because WEC's poles and wires don't actually reach into every nook and cranny of our rugged Vermont service territory. (On

account of that terrain, Washington Electric Cooperative is still the most rural utility in Vermont, with an average density of seven and a half members per mile of line.)

But tomorrow's technology will complete that reach, and tomorrow is almost here.

The concept is called distributed generation, and it means that the generation of electricity will be "distributed" across hill and dale, in coun-

try and in city, wherever people wish to produce their own power rather than relying on centralized generation at some distant power plant. It means potential freedom from poles and wires, freedom from dependency on generation technology that some individuals find objectionable, and greater freedom to live wherever you want without paying high costs for a power-line extension from the nearest utility circuit.

"Co-op members, and others as well, can anticipate a viable, ready-for-market, distributed-generation system that's unlike anything that they have considered living off the grid to be," said WEC



One version of a fuel cell. They differ in size and design.

Products and Services Director Bill Powell. "It opens up opportunities for people to spread their wings and live in locations that otherwise would be unfeasible."

One of the biggest deterrents to that freedom now is that WEC, like other utilities, must collect the costs from new members if it needs to set poles and run lines down a long driveway, across a field or through the woods to reach a new home in a remote location. It is an expensive proposition, averaging somewhere around \$9.50 a foot. And while an alternative exists that is highly attractive to many

**Fuel cells could change the nature of growth in Co-op country, and introduce a new form of freedom from the electric grid.**

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people with strong conservation principles, solar technology – with its collection panels, inverters, banks of batteries and other trappings – is prohibitively daunting for others. Solar generation also requires significant capital costs, which arise again every five years or so when you have to replace your storage batteries.

Powell is therefore hopeful that WEC might provide a new service for members in the not-too-distant future – supplying fuel cells, machines about the size and shape of a refrigerator, that people could install behind the house and which produce both electricity and heat.

"Traditionally, people become members of the co-op by hooking onto our distribution system and buying their electricity from us," Powell said. "With fuel cells, we could prospectively provide a new form of service for people in our area, and create a new form of Co-op membership – people who live off-grid but rely on us to supply and maintain the technology that gives them all the electricity they need. And they would reap the benefits of cooperative ownership."

### Rounding out the picture

Fuel cells, in order to operate, need propane or some fossil fuel from which hydrogen can be chemically extracted. For that reason, people opposed to the consumption of fossil fuels might not find them to their liking – although it should be noted that fuel cells do not employ combustion and therefore don't make noise or emit greenhouse gases. Still, those whose priority is "green" power – power generated from renewable resources – might continue to find solar technology preferable.

However, fuel cells can be combined with solar (photovoltaic – or PV) power, for a combined system. And fuel cells reduce a consumer's need for other fossil-fuel purchases, because a byproduct of their electric-generation process is heat, which can be channeled to a homeowner's heating or hot water system.

"This is going to be a residential co-generation system with a lot of promise for people," said Powell. "But we still face challenges before we can go forward. We need to develop a reliable and predictably priced fuel-supply source for our members."

Nationally, some 300 electric co-ops have indicated their intention to sell or lease fuel cells. "But half or more of those 300," said Powell, "are already in the propane business themselves, so it's an easy decision for them."

Still, the day could come when WEC makes this technology, with its many complementary benefits, available. It could change the nature of growth in Co-op country, and introduce a new form of freedom from the electric grid.

Those with questions and an interest in discussing this potential new service of Washington Electric Cooperative are invited to call Bill Powell at the Co-op, and begin drafting plans for a field of dreams of their own.

## U.S. Energy Policy

continued from page 1

entered a new period of energy deficits, with all the suffering that will entail: inflation, economic stagnation and joblessness.

Perish the thought. Let's drill for oil!

The proposals to drill in the Arctic National Wildlife Refuge, though it is one of the world's most climatically hostile locations, seem "reasonable" in this light. If it is scarcity that determines something's value, then what is scarce is not oil or even energy, but the wisdom to use it wisely. If that wisdom could be found in an oil well or vein of coal, America would be the wisest country in the world. Instead, we are the most profligate with respect to energy use.

How wasteful are we?

Imagine a water tank that supplies a growing town in an arid region. The water is filled by a well that draws from an aquifer, but the tank is old and leaky as are the pipes that carry the water into the

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### **What is scarce is not oil or even energy, but the wisdom to use it wisely.**

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hamlet. For every 100 gallons of water that goes into the tank, only two gallons gets to the village's inhabitants. The rest is lost at the tank or on the way. With new houses being built and more families arriving, the town is running out of water. The mayor proudly announces that he is going to dig a new well 1,000 miles away and pump it across the desert to their water tank, and calls on his city council to appropriate the needed funds so that the town does not suffer economically.

Everyone applauds. He is a hero.

This is the way we deal with energy in the U.S. Measurements of energy-calories, BTUs, kilowatt-hours are ways to indicate the amount of work a given amount of oil, gas or electricity can accomplish. In the U.S., for every 100 units of energy that we introduce into our economic system nearly 98 units are wasted.

That's right. We are 2-percent efficient. Building a pipeline in the fragile environment of the Arctic circle to deliver oil that will not arrive until another 10 years from now, and that would supply 180 days of total U.S. consumption, will do only one thing: satisfy the senators of Alaska and the CEOs of oil companies. It will do nothing for U.S. energy security.

If you doubt the 2-percent figure, consider two common energy devices: your car and a light bulb. After a century of engineering, the modern car is still in the Iron Age. Of the energy consumed, about 80 percent is lost, mainly in heat and exhaust. Of the 20 percent that gets to the wheels, only 5 percent moves the

driver.

In the case of incandescent light bulbs, 100 percent of the energy input to the lamp becomes heat; only 8 percent becomes light en route to heat, then the emitted light is absorbed and heats the room too. It is essentially a space heater that glows. When you consider that power plants providing the electricity are, on average, 33 percent efficient and line losses from transmission trim another 7 percent, we are talking about 8 percent of 30.7 percent – or 2.5 percent resource efficiency for our favorite form of illumination.

If you drive 45 minutes to work, are stuck in a traffic jam, or sit with your engine idling, efficiency plunges to zero. Likewise, a light bulb left on in a room with no one in it is 100 percent inefficient. The solution to such gross inefficiency is not more energy, and energy conservation doesn't mean lowering the thermostat and shivering. It means increasing energy productivity.

What President Bush has overlooked are the proven alternatives that greatly increase the productivity with which energy is used. There are now a plethora of innovative productivity techniques that can reduce energy consumption 50-fold greater than the purported supply of oil in ANWR, and they are cheaper, more effective and create more jobs.

If the USGS estimates are correct, ANWR will provide about 292,000 barrels of oil, or about 156,000 barrels of gasoline a day for 30 years, starting in 2011. That would run about 2 percent of the cars in the U.S. for three decades. Improving fleet mileage 0.4 mpg in our light vehicles would accomplish the same objective with the important exception that it would cost consumers less.

These savings are just the tip of the iceberg. U.S. fleet mileage is currently 24 mpg, a 20-year low. Hybrid electric cars now appearing in showrooms will triple

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### **The continued governmental subsidy of coal and oil is a sure-fire way to hobble America's competitiveness.**

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that figure. Current models such as the Toyota Prius get 48 mpg city/highway combined. There are now more than 350,000 on the road here and abroad. VW is already selling a car that gets 78 mpg, and is said to have a 200-mpg car prepared to debut in 2003. The Big Three are testing family sedans that will head for production in the next three years that exceed 70 mpg.

Another way to think about this is that we can create the equivalent of about 30 Arctic Refuge oilfields in Detroit with good engineering. It takes bad politics to exploit only one.

Before we get a drop of ANWR oil, we will be driving electric cars powered by



*Sitting in traffic, an example of zero energy efficiency.*

fuel cells. These cars, whose emissions are hot water vapor and oxygen, have an extraordinary secondary use: they are mobile power plants with five to 10 times the total power output of all our nuclear and coal plants. Parked cars can feed electricity into the grid, thereby forever eliminating the need for dirty, large centralized power plants.

In buildings, manufacturing, processing and construction, similar savings abound. The mindset that made cars with 1-percent energy efficiency created our buildings and cities, too. With relatively low-tech methods including new glazing, proper siting, efficient lighting and passive heating and ventilation, we can create state-of-the-shelf, quiet, thermally comfortable buildings that are a visual delight. These buildings save 30-50 percent over conventionally built structures that are too hot, too cold, too drafty, too noisy and not so great to work in. Integrating green buildings with new urbanist planning and layouts can further reduce traffic, noise, energy and waste by equal amounts.

In industry, huge cost and energy savings can be attained as we shift away from the petro-chemically dependent, reactive chemistry that has permeated our environment with toxins. New enzymatic techniques not only promise safer compounds, but low-temperature manufacturing that can reduce energy costs by 90 percent. The possibilities for energy efficiency in all aspects of industry are almost overwhelming in their potential and diversity.

The good news is that these savings are made of tools, products and services that can be created everywhere in the

U.S. They do not depend on oilfields, large capital outlays or putting critical environments at risk.

President Bush's energy policy will reward a few senators and oil executives but are not what the American people want. People are not clamoring for the destruction of a sensitive Arctic habitat, more greenhouse gases, climatic instability or the wanton disregard of the traditional home of the Gwich'in people. Americans want security, jobs, stable prices, and an intelligent energy policy. Ignoring the leaky water tank on the hill cannot attain this.

No system is 100-percent efficient. That is impossible according to physical laws. But America could have a goal of 10-percent efficiency, an objective that would allow robust economic growth while reducing overall energy use by two-thirds in the next 20 years, leading us away from the oil age, an age whose end is inevitable.

The oil age, including consumption processes that threaten the very stability of life on Earth, is ending, not because we are running out of oil but because we have a better idea. The Stone Age never ran out stones, either. We are on the threshold of a profoundly different economy with respect to energy use. The continued governmental subsidy of coal and oil, whether in Alaska or Virginia or

Kentucky or any other state whose senators have seniority, is a sure-fire way to hobble America's competitiveness.

We can continue to be the most profligate nation

in the world with respect to energy, or we can begin to become the most brilliant and innovative. We lead in so many areas of technology. We can do it with energy, too.

Mark Twain said that you can't see if your imagination is out of focus. To focus the imagination of a nation, a country that is economically strong and environmentally conservative, requires just one quality: leadership out of the oil age, not halting, backward steps into it.

*Paul Hawken, a business leader, environmentalist and author ("The Ecology of Commerce" and "Growing a Business") is one of the leading architects and proponents of corporate reform with respect to ecological practices. He advises major companies on sustainability issues. The above article first appeared in The Boston Globe, and is reprinted here with the author's permission. The opinions and assertions expressed are those of the author. Co-op Currents presents Mr. Hawken's article to provide information and foster discussion among WEC members and other readers. We invite letters and comment in response.*

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### **Before we get a drop of ANWR oil, we will be driving electric cars powered by fuel cells.**

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## WEC Board Member Gets A First-Hand Look

# The Challenges Of Maintaining A Rural Electric System

by Monique Hayden



As an elected member of Washington Electric Cooperative's Board of Directors, I currently serve on the Power and Operations Committee. This committee reviews items relating to the purchase, generation and delivery of electricity to you, the member. We struggle with a whole range of issues, from right-of-way (ROW) maintenance, to long- and short-term power contracts, to various ways to improve system reliability. After fully considering each issue, the committee makes recommendations to the full board.

I wanted to learn more about the actual work of the Co-op to help me make better and more-informed decisions at both the board and committee level. In my opinion, first-hand experience is hard to beat, so I made arrangements to spend some time with some of the line workers and operations personnel.

I spent my first day with linemen Dennis Bador and Phil Poulin and apprentice Raymond Hall. We worked in the Plainfield area that day, doing some maintenance to several sections of line. This work was not in response to any current outages, but rather repairing areas that were either causing intermittent trouble or making repairs to prevent future outages related to the condition of the line. The work involved correcting the tension on the line, and in some cases repairing frayed or downed wire.

Our first stop was in a heavily wooded area on a steep hill along a dirt road. The line was not easily accessible along the roadside because it had been run across the most direct route possible when it was installed, which was up the hill through the wooded area. Many of the Co-op's power lines take a similar route, based on the Co-op's history. The most-affordable way to get power to our early members 50 or more years ago was by building the lines across fields and pastures, which have since grown into woods.

Laden with tools, ropes, pole-climbing gear and a chain saw, the three linemen headed up the hill. I followed behind. At the top of the hill the crew found the broken line that had been called in. The conditions were pretty favorable that day, and yet it took about an hour to splice the line back together and put it back up. I looked around this heavily wooded area and imagined how difficult this might have been at night in a storm. Even in the daylight the trees darkened the area. There

were stumps along the way and brush everywhere. A telephone worker had seen the line down and reported it to the Co-op, so in this case the crew had known exactly where this line was. But I wondered how long would it have taken to find it if they hadn't?

The rest of the day was similar, but each situation presented new challenges. In two situations it was necessary to de-energize the line before making the repair. I learned a great deal that day about teamwork and the importance of quality equipment. I also began to better understand the need to clear under the lines – not only for reliability but also for the safety and efficiency of the crews.

Electric lines in wooded areas pose special challenges to the line crews. They can make locating the lines difficult, slowing the work, and can be hazardous as a downed line, still energized, might become tangled in a tree or brush.

It is also more difficult to make your way through wooded areas with uneven ground, branches at eye level, and stumps of varying height left from previous emergency clearing. During outages it is often necessary to do some rough clearing of the area to make the line accessible and facilitate the repairs. Under the circumstances, this rough clearing is not intended to be, and cannot be, neat and tidy; it is simply meant to clear enough branches and vegetation out of the way to get the job done. When emergency clearing is done during the winter, stumps are left at snow height. After repairing the outage, the line crew notifies other operations staff to schedule future clearing if the ROW is grossly overgrown.

Dennis, Phil, Raymond and other line workers I talked to that day showed, through their work and comments, that they were committed to excellence and to providing good service to Co-op members. They were mindful of safety issues and respectful of the land, cleaning up all stray wires and packaging before leaving a work site. I feel fortunate that WEC has such dedicated employees. I appreciate the time they took to help me understand the work they do.

### Conditions of rights-of-way

I spent the second day in the field with Mike Myers, our Co-op's Right-of-Way Management Coordinator. Mike showed me all varieties of rights-of-way. We looked at well-cleared ROWs and grossly overgrown ROWs and everything in between.

Mike showed me how clearing by flat-cutting with chain saws often results in



Co-op board member Monique Hayden, right, with her hosts from the line crew: from left, Raymond Hall, Dennis Bador and Phil Poulin.

many more saplings sprouting from one stump, and consequently heavier re-growth after cutting. We looked at areas that were mowed or brush-hogged, areas that were cleared with chain saws and areas where a machine called the Brontosaurus™ was used. The Brontosaurus™ pulverizes the stumps and inhibits stump re-growth.

Mike and I also looked at areas that had been cut recently and others that had been cut many years earlier. This was helpful to see, and I was able to apply this to discussions about the proper cutting frequency for certain areas of the system and what clearing methods were most effective. I was able to see trees on and near the lines and better understand some of the problems trees can cause. I was also able to see some creative ROW maintenance methods, such as grazing animals under the lines, encouraging growth of berry bushes and crisscrossing lines back and forth across the road to gain the benefit of the tree-less road beneath.

### All linked together

My third day I spent with WEC's Engineering and Operations Director Dan Weston. We visited some of the substations, examining the equipment and the structures. The newly rebuilt Moretown substation is something to be proud of. This is a metal structure that was built with in-house expertise and contains

state-of-the art equipment. It is another step in our continuing effort to improve system reliability and efficiency. Dan showed me two other substations, both wooden structures with older, less-efficient equipment, and structural designs that make equipment less accessible for maintenance purposes.

**By now I began to see how the lines, ROW maintenance and substations functioned together to the benefit or detriment of system reliability.**

By now I began to see how the lines, ROW maintenance and substations functioned together to the benefit or detriment of system reliability. Poor maintenance of any one of the three can significantly reduce the effectiveness

of good maintenance on the other two areas.

I am glad to have taken the time to see for myself some of the challenges faced by the staff and to become more aware of how certain decisions can have far-reaching impact. At the committee level I try to balance available dollars against reliability, trying not to negatively impact working conditions or compromise safety. Without a doubt my experience in the field will help me in future decisions.

I am proud of the dedication and expertise of the staff, and I am looking forward to spending another day or two observing another line crew as they set some poles for new connections.

Monique Hayden is a Co-op member from Williamstown. She was re-elected to the Board of Directors for a second three-year term in May.