Energy Strategies for Rural Communities
Speakers

• Pam Mendelson, Team Lead Strategic and Intergovernmental Initiatives, WIP, EERE, DOE

• Tammy Agard, Eetility

• Lisa J. Smith, Governor’s Energy Office, State of Maine

• Ryan Young, Iowa Economic Development Authority

• Jessica Lin Fellow, DOE Office of Policy
Metropolitan Areas, Nonmetropolitan Areas, and Census Divisions in the United States

Note: Alaska and Hawaii are both in the Pacific Division

Sources: Urban Institute map; 2013 boundaries and 2013 USDA rural-urban continuum classifications.
Rural Energy Landscape

• Approximately 70% of the U.S. total rural population is served by rural electric cooperatives (co-ops).
  • Co-ops serve 12% of the nation’s electric consumers, with a total membership of approximately 18.5 million businesses, homes, schools, churches, farms, irrigation systems, and other establishments OR 42 million people.

• The fuel mix of rural co-ops is dominated by coal (58%), followed by natural gas (17%), nuclear (12%), hydro (10%), and renewables (3%).
  • Renewable energy is growing; 352 of the 900 co-ops utilize solar as a power source
  • 95% of co-ops offer renewable energy options to their members
  • 98% of co-ops run some kind of energy education program; 88% offer an LED program; 80% offer residential audits

• Home heating in rural areas is electricity dominated (37.5%) with an even split between natural gas and delivered fuels (25.8% each)

• Rural communities have a greater proportion of low-to-moderate-income families who may have problems financing energy efficiency investments.
Breaking Down Rural Energy Users

Sector breakdown
- Unique sectors for rural:
  - agriculture, forestry
- Ubiquitous sectors for rural:
  - hospitals, K-12 schools, homes

Key opportunities to consider in rural energy work:
- Hospitals
- Schools
- Residential – manufactured homes and electricity use
- Agriculture

No overarching data available on rural energy profiles so other proxy metrics were needed.
Key Characteristics of Rural & Small Hospitals

- Health care is the second most energy-intensive building sector in the U.S. Health care facilities use roughly double the energy of office buildings of comparable size.
- Older existing buildings--Many small rural hospitals were built in the 1940s.
- Rural hospitals are much smaller than urban hospitals, with lower utilization rates.
- On average, the health sector - 14% of total employment in rural communities, with rural hospitals typically being one of the largest employers in the area.
Key Characteristics of Rural School Districts

- Energy accounts for about 2.2 percent of a school’s expenditure
- NCES study results (2002) - Rural districts spent more per pupil on energy in FY 01 ($190) than urban or suburban districts ($154 and $164)
- Local districts pay for their facilities’ capital investments. Little capacity to borrow funds for improvements.
Key Characteristics of Rural Residential

• The median household income for rural households was $52,386 in 2015, which happens to be about four percent lower than the median for urban households.

• Home ownership in rural America is 81%, compared with 59.8% in urban America.

• Rural households spend about $400 more than the average energy-related annual expenditure of American households.
  • On average, rural homes are 30 percent larger than urban homes, and they are typically detached houses.
  • Conflicting data on age of housing stock in rural vs. urban.
  • Residential per household energy consumption in rural areas is about 10 percent higher compared to urban areas, with electricity 50 percent higher (15,258 kWh/yr compared to 10,290 kWh/yr).
Spotlight on Manufactured Housing

- Manufactured homes make up 16% of all occupied non-metropolitan housing units.
- 59% of all manufactured homes are located in non-metropolitan areas.
- Per capita, manufactured homes use an average of 35% less energy than detached single-family homes. However, after accounting for their smaller size, residents of manufactured homes spend nearly twice as much on energy per square foot of home ($1.38/s.f. each year vs. $0.74/s.f. for site-built) (EIA 2008).
- 55 percent of households who live in manufactured homes built before 1980 have income below 150% of the poverty level.

U.S. states (10) with highest proportion of mobile homes

- South Carolina
- New Mexico
- West Virginia
- Mississippi
- Alabama
- N Carolina
- Louisiana
- Arkansas
- Wyoming
- Kentucky

U.S. states with largest numbers (>200K) of manufactured homes:

1. FL
2. TX
3. CA
4. NC
5. GA
6. SC
7. TN
8. LA
9. MI
10. PA
11. KY
12. WA

Source: US Census
Agriculture – Small Farms

• Energy use per unit of output in the agricultural sector declining due to energy efficiency gains and changes in commodities produced.
• Agriculture consumes significant amounts of energy
  • refined petroleum for farm machinery
  • electricity for irrigation and other equipment
  • natural gas indirectly through nitrogen fertilizer
• Energy-related production expenses vary significantly for different crops and livestock producers
• Irrigation-related energy expenditures are dominated by electricity use (50%), followed by natural gas (29%), and diesel (12%).
• In 2008, energy costs for irrigation pumping for agriculture were over $2.6 billion, mostly in 17 Western States.
PAYS Q and A

All Inclusive

Energy Strategies for Rural Communities

Better Buildings Summit – August 23rd, 2018

Tammy Agard-President/CEO EEtility
Basics of PAYS ("Pay As You Save"):

- PAYS is NOT financed as a loan – it’s a tariff charge (and is considered an essential Utility service)
- PAYS is great for everyone but unlike most EE programs- PAYS is particularly helpful for lower income populations (Rural and Urban)
- The tariff charge on the bill is less than the estimated savings at a 80/20 split so people save money from day one
- The tariff charge is associated with the meter and survives homeownership/tenant changes
- PAYS requires no personal debt obligation; no credit check; no homeownership requirement!
Does PAYS either (a) guarantee savings or (b) guarantee the upgrades will work through the cost recovery period?

Guarantee Savings?
- The margin between savings estimates and tariff charges (i.e. the 20% immediate net savings allocated to participants) assures participants that they will save more than they pay. PAYS does not guarantee the amount of savings.

Guarantee Upgrades will last?
- Cost recovery charges stop if the upgrade fails or cost recovery is complete - whichever comes first.
- If upgrades do stop working (due to no fault of participant) the Operator will arrange for repair or may extend the term of the tariff to pay for additional costs.
How are the interests of a successor customer taken into account when a utility invests in EE upgrades at a metered location which may change hands during the Utility’s cost recovery period?

**Cost Effectiveness is key!**
- Significant Net Savings requirement (80/20 rule) ensures cost effectiveness of upgrades
- Fixed Tariff charge is less than savings on an annual basis

**Mitigates rate increases!**
- Tariff charge does not increase when rates increase- adding additional value
- New customer gets benefits of improved building while getting a lower bill than they would have if nothing was done
What happens during a prolonged vacancy?

**Vacancy - meter off**
- Tariff charge stops (along with bill)
- Tariff charge resumes when customer signs up for new account
- Disclosure of tariff charge a requirement per participants contract

**Prolonged inactivity**
- Utility may extend cost recovery period to collect missed cycles
- If vacancy extends beyond useful life of upgrade, Utility may elect to charge off as uncollectable (or loss reserve if available)
Do the terms of the tariff hold if a change in occupant behavior at an upgraded site cause energy use to rise?

YES!

- Tariff charge is not effective by change in occupancy or behavior
- Likewise, the tariff charge does not rise over time as energy prices rise over time
- Still, tariff charge is lower than bill would have been without upgrades

Consumer Protection

- Tariff charge does not preclude occupants from using whatever amount of energy they choose
What are the benefits to the Utilities that offer PAYS?

- Lower cost of wholesale supply
- Deferred investment in peak power
- Address hot spots and service to areas constrained by delivery capacity
- Reach underserved market segments including renters and low income households
- Improved customer satisfaction
- More productive local economy with less resource waste
- Low cost market based option to attain clean energy and carbon pollution targets
What are the benefits of PAYS to customers?

- Immediate net savings (20% of estimated savings immediately accrue to participants)
- 100% of savings accrue to participant when Utility cost recovery is complete
- More comfortable and healthier homes/buildings
- No upfront cost for cost effective upgrades
- Mitigates exposure to future rate increases
Does PAYS opt in tariff charge include disconnection for non payment of tariff charge

Yes
- Once approved as a tariff, the PAYS tariff charge will be covering costs for an essential utility service and is subject to the SAME disconnection rules as a regular bill.

Happened yet?
- NOT Yet (10 years)
- While possible, disconnection is unlikely as the bill is lower at that site than it would have been if the upgrades never happened.
THANK YOU!!

Questions?
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(501) 351-5212
Bridging the Rural Efficiency Gap

Expanding Access to Energy Efficiency in Rural and High Energy Cost Communities

U.S. DOE Better Buildings Summit

August 2018
Why Rural Matters:
It’s part of what defines our region.

“You can’t get theya from heeya!”
Rural and Remote: Some Statistics

- Maine has the largest percentage (61%) of its population living in rural areas than any other state in the country¹

- There are also 15 Maine islands with year-round communities only accessible by boat or plane
  - Populations range from 50 – 1,200 year-round

- **Energy is expensive, due to small customer base, local ownership, logistical delivery challenges**
  - Electric rates up to $0.70/kWh (on the islands)
  - Heating oil can be more than a dollar more per gallon on the islands
  - Limited number of fuel options (non-utility) and lack of competition in rural communities

¹Bureau of Census, American Community Survey
Island Institute

Non Profit working to sustain Maine's island and coastal communities, and exchange ideas and experiences to further the sustainability of communities here and elsewhere.
About the Project

**Bridging the Rural Efficiency Gap** is connecting rural communities in heating oil-dependent states like Maine, Alaska, New Hampshire, and Vermont with financial assistance for home energy efficiency.

- **Participating States:** Maine, Alaska, New Hampshire, Vermont
- **Project Leads:** Maine Governor’s Energy Office, Island Institute
- **Project Advisors:** Efficiency Maine, Maine Office of the Public Advocate, Alaska Energy Authority, Renewable Energy Alaska Project, Vital Communities, Efficiency Vermont, New Hampshire Office of Strategic Initiatives
- **Target Audience:** Efficiency program administrators and implementers; rural community leaders
- **Funding:** U.S. Department of Energy State Energy Program (SEP) Competitive Award and private foundations
Project Goals

• Expand access to clean energy programs in rural and remote communities
• Drive participation in home energy efficiency upgrades in underserved areas
• Develop and share replicable models that close the gap
Mapping the Rural Efficiency Gap
Shared Challenge: Heating oil dependence

Shared Challenge: Lower incomes in rural areas

Source: US Census
Shared Challenges:

High Energy Burden

Old Housing Stock

PERCENT OF MEDIAN HOUSEHOLD INCOME THAT GOES TO HOME HEATING AND ELECTRICITY

3% 8.8% 16-18%
U.S. MAINE UNBRIDGED ISLANDS

Waypoints, 2017

Governor’s Energy Office

Island Institute
Shared Challenge: Workforce availability

Contractors providing energy assessment & air sealing services in ME. Source: www.efficiencymaine.com

Geographic distribution of businesses participating in the NHSaves program. Source: NHSaves
Summary: Shared Challenges

- Rural populations
- Oil dependence
- Old (or inefficient) buildings
- High energy cost, burden
- Lower incomes in rural areas
- Lack of EE contractors

<table>
<thead>
<tr>
<th></th>
<th>Maine</th>
<th>Alaska</th>
<th>New Hampshire</th>
<th>Vermont</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Households (rank)</td>
<td>553,823 (39th)</td>
<td>251,899 (49th)</td>
<td>518,245 (40th)</td>
<td>257,004 (48th)</td>
</tr>
<tr>
<td>Approximate Median Household Income (rank)</td>
<td>$46,033 (33rd)</td>
<td>$67,825 (2nd)</td>
<td>$62,647 (7th)</td>
<td>$52,776 (20th)</td>
</tr>
<tr>
<td>US Avg: $50,502</td>
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</tr>
<tr>
<td>Percent Population in Rural Areas (rank)</td>
<td>61.3% (1st)</td>
<td>33.9% (14th)</td>
<td>39.7% (11th)</td>
<td>61.1% (2nd)</td>
</tr>
<tr>
<td>Median Population Age (rank)</td>
<td>44.5 (1st)</td>
<td>33.5 (50th)</td>
<td>42.7 (3rd)</td>
<td>43.1 (2nd)</td>
</tr>
<tr>
<td>Percent of Homes Built Before 1940 (rank)</td>
<td>23% (8th)</td>
<td>1% (51st)</td>
<td>21% (12th)</td>
<td>24% (7th)</td>
</tr>
<tr>
<td>Heating Oil Consumption Per Capita (rank)</td>
<td>1st</td>
<td>7th</td>
<td>5th</td>
<td>2nd</td>
</tr>
<tr>
<td>Energy Expenditures Per Capita (rank)</td>
<td>$4,565 (5th)</td>
<td>$7,487 (1st)</td>
<td>$3,934 (19th)</td>
<td>$4,273 (9th)</td>
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</tbody>
</table>
Models for Bridging the Gap
Bridging Model: Weatherization Weeks

• Bundling jobs over the course of one week
• Energy Assessment + air sealing
• Affordable for homeowners - $200
  • 75% discount
  • Payback in first heating season
• Coordinated logistics – make it easy to say yes!
• Creates a buzz – Comparing blower door scores at the post office
• Includes community buildings

A barge unloads an insulation truck on Monhegan Island, Maine. Photo credit: Portland Press Herald
Weatherization Week Impacts

• 400 island homes air sealed on 14 islands
  • ~20% of year-round homes
  • Total rebates distributed = >$272,000
  • Significant increase in participation since 2012
    • 13 homes before → 400+ since

• Other collective purchase strategies
  • >8,500 LEDs delivered
  • >1,600 interior storm window inserts built
  • >75 heat pumps installed

“Getting a spray foam truck out here is a dream come true!”
Doug Boynton, lobster fisherman and Monhegan Island resident
Bridging Model: “Weatherize” Campaigns
About the “Weatherize” Model

• Request for Proposals to identify contractors
• Group discounts from pre-approved contractors
  • Willing to work in rural areas & low-income homes
• Outreach from local volunteers
  • Energy fair or other public event
  • Advertising in local media
  • Door-to-door outreach
  • Social media
• Free energy consult (not a full audit)
• Services include air sealing, insulation, heating systems
“Weatherize” Impacts

Photo credit: Vital Communities
Bridging Model: Energy Fairs and “Booth in a Bucket”

• Laying the foundation for energy efficiency with education
• Locally relevant information
• Modular, replicable tools
Lessons Learned

• Aggregate demand in remote communities
• Address EE at community scale
• Build partnerships between community, contractors, and administrators
• Incorporate energy education (energy fairs)
• Work across sectors and building types
  ▪ Connect energy efficiency to other community priorities
# Iowa Energy Plan

In total, 45 strategies make up the Energy Plan.

Further, 7 key focus areas were identified:

<table>
<thead>
<tr>
<th>Economic Development and Energy Careers</th>
<th>Iowa’s Energy Resources</th>
<th>Transportation and Infrastructure</th>
<th>Energy Efficiency and Conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Energy Workforce Development</td>
<td>✓ Biomass Conversion</td>
<td>✓ Natural Gas Expansion in Underserved Areas</td>
<td>✓ Support for Rural and Underserved Areas</td>
</tr>
<tr>
<td>✓ Technology-Based Energy R &amp; D (e.g. energy storage pilot projects)</td>
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<td>✓ Electric Grid Modernization</td>
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<td></td>
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<td>✓ Alternative Fuel Vehicles</td>
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</table>
Rural Iowa Initiatives

• Natural gas expansion
• Energy efficiency to rural and underserved
• Biomass conversion potential
Ryan Young
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Iowa Energy Office

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Jessica Lin Fellow, DOE Office of Policy
A Story Map

Energy Affordability and Access in Focus: Metrics and Tools of Relative Energy Vulnerability

To begin, right click and open hyperlink