Webinar Series:
Energy Efficiency and Conservation Loan Program

With Experts from the U.S. Departments of Agriculture and Energy
Webinar #1 of 6: Energy Efficiency and Conservation Loan Program Overview and Cost Effectiveness

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Eric Cutter, Senior Consultant at Energy+ Environmental Economics


Energy Efficiency and Conservation Loan Program (EECLP)

Rural Utilities Service
Electric Program
US Department of Agriculture
The Electric Program

**PRINCIPLES:**

- Low interest funding
- Area coverage
- Cooperative principles - “owned by those we serve”
- Standardized “rural” engineering
The Energy Efficiency and Conservation Loan Program

- Rural Utilities Service published the Final Rule for the Energy Efficiency and Conservation Loan Program on December 5, 2013 which implements Section 6101 of the 2008 Farm Bill.

- Section 6101 expands the ability of the electric program to make loans for energy efficiency activities.

- This regulation is an added subpart to an existing regulation (new “subpart H” to 7 CFR 1710).

- The regulation allows new financing opportunities for RUS borrowers to provide energy efficiency activities to businesses and homeowners in rural America.

- Eligible EE programs can be developed and implemented by an eligible borrower for its service territory.

- Eligible investments and activities include; building weatherization, HVAC upgrades, ground source heat pumps, lighting, small scale renewable generation, energy audits, soft costs, etc.
The Energy Efficiency and Conservation Loan Program – cont...

- A typical borrower’s energy efficiency program might have the utility relending the funds to the consumer for EE upgrades to homes, businesses or industry.

- Utilities may charge an interest rate to the consumer for the EE loan.

- Many EE programs feature on-bill repayment directly to the utility.

- Loans to RUS borrowers may have terms for up to 30 years in some cases.

- RUS will ask potential borrowers for a business plan and quality assurance plan to support the loan application.

- Potential borrowers should reach out to GFRs and/or headquarters personnel for guidance on submitting an application.
Options to Enable Energy Efficiency

- Payment through Electric On-Bill Financing
- This could be a tariff based program or a loan based program
- Loans may be serviced directly by an RUS Borrower or a financial institution
EECLP provisions

- Loan advances shall be on a reimbursement basis
- Start-up costs are possible 5%
- Consumer education and outreach programs may not exceed 5% of the RUS loan amount
EECLP Loan Requirements

- The EECLP loan process closely mirrors our existing loan process

- There are some differences though....

- Business Plans

- Quality assurance plans

- Prudent practice for any EE program
Who can borrow under EECLP?

1-An entity in the **business of providing** direct or indirect **retail electric service to consumers** in rural areas.

2-An entity in the **business of providing wholesale electric supply to distribution entities** providing service to consumers in rural areas.

3-An entity in the business of **providing transmission service to distribution or generation entities** providing services to consumers in rural areas.

*The entity shall provide the applicable service using **self-owned or controlled assets** under a **published tariff** that the entity and any associated regulatory agency may adjust.*
Definition of “rural”

- The “rural area” definition currently in use by the Electric Program was established by Congress in the 2008 Farm Bill, enacted on June 18, 2008. For the Electric Program, a “rural area” is “any area other than a city, town, or unincorporated area that has a population of greater than 20,000 inhabitants.”

- Existing borrower service territories were grandfathered at the time of enactment.

- RUS uses 2010 Census Places as the basis for making it’s determinations as to what is rural and urban.

- Census data indicates **93% of places** (cities, towns and census designated places) were under the 20,000 threshold in 2010.

<table>
<thead>
<tr>
<th>2000 Places</th>
<th>2010 Places</th>
<th>Census Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,944</td>
<td>2,098</td>
<td>&gt;20,000</td>
</tr>
<tr>
<td>23,431</td>
<td>27,416</td>
<td>&lt;=20,000</td>
</tr>
<tr>
<td>25,375</td>
<td>29,514</td>
<td></td>
</tr>
</tbody>
</table>
A, B and C are eligible under EECLP

Basic Structure of the Electric System

Color Key:
Blue: Transmission
Green: Distribution
Black: Generation

Transmission Lines 500, 345, 230, and 138 kV

Subtransmission Customer 25 kV and 69 kV
Primary Customer 13 kV and 4 kV
Secondary Customer 120 V and 240 V

Rural Area in USA = equal or less than 20K inhabitants
Leveraging other RD programs

- The Rural Business Service (RBS) and Rural Housing Service (RHS) have programs that can be leveraged using EE funds

- REAP

- REDLG

- Housing loans for EE

- Let us know your plans and we can get you to the right people...
For Additional Information

Why cost-effectiveness analysis?

Shortcomings of “full IRP” approach

- Complex analysis on broad set of issues from fuel supply, operability, supply technology
- Significant time required (2+ years typically)
- Lack of stakeholder transparency
- Focus on ratepayer cost and risk, subject to minimum standards on reliability, environment

Once you have your ‘preferred plan’

How do you test for a lower cost solution?
+ Calculate avoided costs
+ Input EE program and measure data
+ Transparent analysis of costs and benefits using publicly available data
+ Perform Standard Practice Manual cost tests

Avoided Cost  
Program Impacts  
Cost-effectiveness Results
Avoided Costs (California)

Monthly Average

Peak Days
## Definition of Cost Tests

<table>
<thead>
<tr>
<th>Cost Test</th>
<th>Key Question Answered</th>
<th>Summary Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Resource Cost</td>
<td>Will the total costs of energy in the utility service territory decrease?</td>
<td>Comparison of program administrator and customer costs to utility resource savings</td>
</tr>
<tr>
<td>Participant Cost Test</td>
<td>Will the participants benefit over the measure life?</td>
<td>Comparison of costs and benefits of the customer installing the measure</td>
</tr>
<tr>
<td>Utility/Program Administrator Cost Test</td>
<td>Will utility bills increase?</td>
<td>Comparison of program administrator costs to supply side resource costs</td>
</tr>
<tr>
<td>Ratepayer Impact Measure</td>
<td>Will utility rates increase?</td>
<td>Comparison of administrator costs and utility bill reductions to supply side resource costs</td>
</tr>
<tr>
<td>Societal Cost Test</td>
<td>Is the utility, state, or nation better off as a whole?</td>
<td>Comparison of society’s costs of energy efficiency to resource savings and non-cash costs and benefits</td>
</tr>
</tbody>
</table>
## Summary of Costs and Benefits

<table>
<thead>
<tr>
<th>Component</th>
<th>TRC</th>
<th>PCT</th>
<th>PAC</th>
<th>RIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy and capacity</td>
<td>Benefit</td>
<td></td>
<td>Benefit</td>
<td>Benefit</td>
</tr>
<tr>
<td>Additional resource savings</td>
<td>Benefit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-monetized benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment and install costs</td>
<td>Cost</td>
<td>Cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program overhead costs</td>
<td>Cost</td>
<td></td>
<td>Cost</td>
<td>Cost</td>
</tr>
<tr>
<td>Incentive payments</td>
<td></td>
<td>Benefit</td>
<td>Cost</td>
<td>Cost</td>
</tr>
<tr>
<td>Bill Savings</td>
<td></td>
<td>Benefit</td>
<td></td>
<td>Cost</td>
</tr>
</tbody>
</table>
Defining “Ratepayer Neutral”

Most restrictive cost-test

Benefits

- Energy
- Capacity
- T&D
- GHG
- Losses
- RPS Purchases
- Ramp
- Overgeneration

Costs

- Bill Savings
- Incentives
- Admin & Overhead
- EM&V

RIM

PAC
## Defining Incremental Costs

<table>
<thead>
<tr>
<th>Decision Type</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New</strong></td>
<td>Encourages builders and developers to install energy efficiency measures that go above and beyond building standards at the time of construction</td>
<td>Utility offers certification or award to builder of new homes that meet or exceed targets for the efficient use of energy.</td>
</tr>
<tr>
<td>New construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lost opportunity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Replacement</strong></td>
<td>Customer is in the market for a new appliance because their existing appliance has worn out or otherwise needs replacing. Measure encourages customer to purchase and install efficient instead of standard appliance.</td>
<td>The utility provides a rebate that encourages the customer to purchase a more expensive, but more efficient and longer-lasting CFL bulb instead of an incandescent bulb.</td>
</tr>
<tr>
<td>Failure replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace on burnout</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Retrofit</strong></td>
<td>Customer’s existing appliance is working with several years of useful life remaining. Measure encourages customer to replace and dispose of old appliance with a new, more efficient one.</td>
<td>The utility provides a rebate toward the purchase of a new, more efficient refrigerator upon the removal of an older, but still working refrigerator.</td>
</tr>
<tr>
<td>Early replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Retire</strong></td>
<td>Customer is encouraged to remove, but not replace existing fixture.</td>
<td>The utility pays for the removal and disposal of older but still working “second” refrigerators (e.g., in the garage) that customer can conveniently do without.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Incremental Costs

<table>
<thead>
<tr>
<th>Type of Measure</th>
<th>Measure Cost ($/Unit)</th>
<th>Impact Measurement (kWh/Unit and kW/Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New construction</td>
<td>Cost of efficient device minus cost of standard device (Incremental)</td>
<td>Consumption of standard device minus consumption of efficient device</td>
</tr>
<tr>
<td>Lost opportunity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Replacement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure</td>
<td>Cost of efficient device minus cost of standard device (Incremental)</td>
<td>Consumption of standard device minus consumption of efficient device</td>
</tr>
<tr>
<td>replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>replacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace on burnout</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Retrofit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>Cost of efficient device plus installation costs (Full)</td>
<td>Consumption of old device minus consumption of efficient device</td>
</tr>
<tr>
<td>replacement (Simple)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Retrofit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early</td>
<td>Cost of efficient device minus cost of standard device plus remaining present value</td>
<td>During remaining life of old device: Consumption of old device minus consumption of efficient device&lt;br&gt;After remaining life of old device: Consumption of standard device minus consumption of efficient device</td>
</tr>
<tr>
<td>replacement (Advanced)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Retire</strong></td>
<td>Cost of removing old device</td>
<td>Consumption of old device</td>
</tr>
</tbody>
</table>

*Note: Advanced retrofit may include additional considerations for specific scenarios or technologies.*
Point of cost-effectiveness measurement

- Application at **portfolio level** allows for inclusion of individual programs or measures that do not past cost test
  - Low Income, emerging technologies, market transformation
Discount Rates are a key input

<table>
<thead>
<tr>
<th>Tests and Perspective</th>
<th>Discount Rate Used</th>
<th>Illustrative Value</th>
<th>Present Value of $1/yr for 20 years</th>
<th>Today’s value of the $1 received in Year 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Cost Test (PCT))</td>
<td>Participant’s discount rate</td>
<td>10%</td>
<td>$8.51</td>
<td>$0.15</td>
</tr>
<tr>
<td>Ratepayer Impact Measure (RIM)</td>
<td>Utility WACC</td>
<td>8.5%</td>
<td>$9.46</td>
<td>$0.20</td>
</tr>
<tr>
<td>Utility Cost Test (UCT/PAC)</td>
<td>Utility WACC</td>
<td>8.5%</td>
<td>$9.46</td>
<td>$0.20</td>
</tr>
<tr>
<td>Total Resources Cost Test (TRC)</td>
<td>Utility WACC</td>
<td>8.5%</td>
<td>$9.46</td>
<td>$0.20</td>
</tr>
<tr>
<td>Societal Cost Test</td>
<td>Social discount rate</td>
<td>5%</td>
<td>$12.46</td>
<td>$0.38</td>
</tr>
</tbody>
</table>
Summary

- **Total Resource Cost test is the primary cost-effectiveness test used by most states**
  - Though, there are differing views on if this is right test, how it should be used and calculated

- **Long list of key drivers that can have a meaningful impact on the cost-effectiveness result**
  - Not just energy and capacity savings

- **For States, local governments, other jurisdictions, CE questions may include:**
  - What is the right cost-effectiveness framework?
  - Are we applying the framework correctly?
  - Do we have the right tests?
  - We are going to discuss these questions and others next
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Better Buildings Tool
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Subid Wagley, Department of Energy
Email: Subid.Wagley@EE.Doe.Gov
Phone: 202- 287-1414

www.ethree.com
## EE Reporting Tool (CA)

### Resource Savings Summary

<table>
<thead>
<tr>
<th></th>
<th>Units Installed</th>
<th>Net Demand Savings (kW)</th>
<th>Net Annual Energy Savings (kWh)</th>
<th>Net Lifecycle Energy Savings (kWh)</th>
<th>Net Lifecycle GHG Reductions (Tons)</th>
<th>Utility ($/kWh)</th>
<th>Total Resource ($/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL EE PORTFOLIO</td>
<td>4,500</td>
<td>116</td>
<td>249,925</td>
<td>2,903,653</td>
<td>1,572</td>
<td>0.03</td>
<td>0.09</td>
</tr>
<tr>
<td>Res Smart Appliance</td>
<td>1,000</td>
<td>30</td>
<td>181,500</td>
<td>2,541,000</td>
<td>1,378</td>
<td>0.03</td>
<td>0.10</td>
</tr>
<tr>
<td>Lighting</td>
<td>3,500</td>
<td>86</td>
<td>68,425</td>
<td>362,653</td>
<td>194</td>
<td>0.03</td>
<td>0.06</td>
</tr>
</tbody>
</table>

### Cost of Efficiency

<table>
<thead>
<tr>
<th>Program</th>
<th>Meas.</th>
<th>Avoided</th>
<th>Custom</th>
<th>Cost of Efficiency</th>
<th>Cost Test Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PAC   TRC  PCT   RIM</td>
</tr>
<tr>
<td>B</td>
<td>C</td>
<td>D</td>
<td>V</td>
<td>W</td>
<td>X     Y</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Select Measure</td>
<td>Show All Measures</td>
<td>Measures In Use</td>
<td>Clear Data</td>
</tr>
<tr>
<td>2</td>
<td>Item</td>
<td>Customer</td>
<td>Sector</td>
<td>Measure</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Residential</td>
<td>CFL: T58, Average Wattage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Residential</td>
<td>CFL: Screw-In (&lt;15W), direct install</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Residential</td>
<td>CFL: Screw-In (&lt;15W), downstream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Residential</td>
<td>CFL: Screw-In (&lt;15W), upstream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>Residential</td>
<td>CFL: Screw-In (15-24W), direct install</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>Residential</td>
<td>CFL: Screw-In (15-24W), downstream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>Residential</td>
<td>CFL: Screw-In (15-24W), upstream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>Residential</td>
<td>CFL: Screw-In (25+), direct install</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>9</td>
<td>Residential</td>
<td>CFL: Screw-In (25+), downstream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>Residential</td>
<td>CFL: Screw-In (25+), upstream</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**https://e3.sharefile.com/d/s59ff3b8c54e4be38**
The State and Local Energy Efficiency Action Network (SEE Action) is a state- and local-led effort facilitated by the DOE and the EPA to scale up and achieve all cost-effective energy efficiency by 2020.

Several resource guides are available to support policy makers, regulators, utilities in implementing energy efficiency.

[http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html](http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html)
New DOE Cost-effectiveness Tool

About the DOE CE Tool

+ Excel based tool follows standard CE protocols
+ 5 main cost tests calculated
+ User can build up a program
+ Tool supports measure level and whole-building approaches
+ Tool supports sensitivity analysis on key inputs

Using the DOE CE Tool

+ User enters general inputs (rates, discount rates)
+ Utility specific avoided costs are entered
+ Measure level & program data are defined
+ Report generates results in graphical and tabular form
Results are shown in graphical form and in tables.

Tool facilitates sensitivity analysis, so impacts of different program designs, cost inputs, discount rates, etc. can be explored.
Model structure

- **General inputs**
  Utility rates, discount rate, cost tests of interest etc.

- **Avoided cost inputs**
  Electricity, gas, water, ... 

- **Measure level data**
  kWh and KW savings, costs, Incentives ...

- **Program data**
  Number of homes that will be retrofitted, Admin costs ...

- **Calculations**

- **Report**
  CE results, Sensitivity analysis

- **User enters general inputs (rates, discount rates)**

- **Utility specific avoided costs are entered**

- **Measure level & program data are defined**

- **Report generates results in graphical and tabular form**
### Program builder

- User defines schedule of retrofits over 3 year period
- Program budget is defined by the incentives and administrative costs

#### Example is purely illustrative!
Questions
Thank you!

Join us for the rest of the webinar series:

› **Evaluation, Monitoring & Verification** – Thursday, Dec 4th 3:00pmET
A part of a robust energy efficiency program is evaluation, monitoring and verification. EECLP gives guidance as to what is expected from a borrower.
Register here: [https://www1.gotomeeting.com/register/518263265](https://www1.gotomeeting.com/register/518263265)

› **Residential Energy Efficiency Deep Dive, Part One** – Thursday, Dec 11th 3:00pmET
EECLP can offer eligible borrowers the financial resources to help establish a sustainable energy efficiency program. Register here: [https://www1.gotomeeting.com/register/900957873](https://www1.gotomeeting.com/register/900957873)

› **Residential Energy Efficiency Deep Dive, Part Two** – Thursday, Dec 18th 3:00pmET
EECLP can offer eligible borrowers the financial resources to help establish a sustainable energy efficiency program. Register here: [https://www1.gotomeeting.com/register/244353121](https://www1.gotomeeting.com/register/244353121)

› **On-Bill Financing** – Thursday, Jan 8th 3:00pmET
EECLP recognizes the benefits of on-bill financing and enables this option for eligible borrowers.
Register here: [https://www1.gotomeeting.com/register/230715008](https://www1.gotomeeting.com/register/230715008)

› **Solar Program Overview** – Thursday, Jan 22nd 3:00pmET
EECLP can help enable roof-top solar systems in the service territory of eligible borrowers.
Register here: [https://www1.gotomeeting.com/register/493276257](https://www1.gotomeeting.com/register/493276257)