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Policies, Program Design, and Advocacy to Scale Up Low-Income Energy Efficiency Programs

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APPRISE

Nonprofit Research Institute

- Established in 2002
- Princeton, NJ

Mission

- Analyze data and information to assess and improve public programs

Research Areas

- Energy Efficiency
- Energy Affordability

Clients

- Federal Government (DOE, HHS)
- State Governments
- Utility Companies
- Nonprofits

Presentation Overview

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- LIEE Program Objectives
- Regulatory Background & Program Structure
- Low-Income Energy Burden
- LIEE Funding & Opportunities
- LIEE Barriers
- Policies & Financing Mechanisms
- LIEE Program Evaluation
- Findings & Recommendations

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LIEE PROGRAM OBJECTIVES

LIEE Program Objectives

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Energy Savings	• Treat high users • Install cost-effective major measures • Ensure high quality work is delivered
Peak Demand	• Contribute to peak demand reduction goals • Defer new generation or transmission upgrades • Other programs may be more effective
Cost-Effective Delivery	• Portfolio, sector, program, or measure • Which test: TRC, UCT, SCT, RIM, PCT • Discount, avoided costs, baseline, measure life
Households Served	• Total number • Vulnerable, rural • Environmental justice, climate change vulnerable

LIEE Program Objectives

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Health & Safety	• Direct: mold, venting, CO, gas leaks • Indirect: temperature, affordability
Energy Affordability	• Reduce energy bills for high usage • Energy burden statistics
Environmental Impact	• Target dirty fuels, urban areas • Electricity usage
Economic Development	• Create local jobs • Increase output
Innovative Methods	• Test new measures or systems • Pilot test, longer term improvements

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REGULATORY BACKGROUND AND PROGRAM STRUCTURE

Regulatory Background & Program Structure

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Colorado	Illinois	New Jersey	Pennsylvania
• LIEE required, EOC administration • Community Solar Gardens, 5% LI • Eligibility: 80% AMI • Projected savings • TRC, 25% adder for NEBs • Coordination between utility and WAP	• 1/2018: FEJA LIEE Funding utility admin • Solar for All LI included, job training • Eligibility: 80% AMI • Projected savings • Cost-effectiveness not required for LIEE • Coordination uncertain	• Utility collaborative • Eligibility: 225% FPL • Periodic billing analysis • Cost-effectiveness not required for LIEE • Coordination between electric & gas utilities, working to improve WAP coordination	• LIURP & Act 129 • Low-income requirements • Eligibility: 150%/200% FPL • LIURP: Annual billing analysis • Act 129: Projected savings • Cost-effectiveness not required for LIEE • Little coordination

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LOW-INCOME ENERGY BURDEN

Energy Burden

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2014 Residential Energy Burden

Main Heat Fuel	All Households		Non-Low-Income		Low-Income		LIHEAP-Recipient	
	Individual	Group	Individual	Group	Individual	Group	Individual	Group
Electric	9.0%	2.6%	3.2%	2.2%	18.4%	8.6%	17.5%	10.2%
Gas	7.5%	2.9%	2.9%	2.3%	17.3%	9.8%	17.7%	12.1%
All Fuels	8.6%	3.0%	3.3%	2.4%	18.4%	10.0%	18.8%	13.1%

Source: LIHEAP Home Energy Notebook, FY 2014.

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LIEE FUNDING & OPPORTUNITIES

LIEE Funding Sources

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Ratepayer Funding

Department of Energy Weatherization Assistance Program

- Annual appropriations provided by Congress

LIHEAP

- Up to 15% of block grants can be used to fund WAP
- Up to 25% can be used to fund WAP with a waiver
- 48 states transferred funds to WAP in 2015

LIEE Funding

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2015 LIEE Expenditures

State	Electric Utility	Gas Utility	WAP Funding			Total
			DOE	LIHEAP	Other	
CO	$3,538,787	$4,380,461	$4,590,704	$6,611,666	$6,500,000	$25,621,618
IL	$13,100,000	$5,200,000	$3,462,275	$7,181,815	$1,008,370	$29,952,460
NJ	$11,302,113	$18,697,887	$4,308,921	$12,260,374	$0	$46,569,295
PA	$62,952,299	$19,652,964	$12,320,702	$30,371,473	$0	$125,297,438

LIEE Funding

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2015 LIEE Expenditures per Household

State	Total Spending	LIHEAP-Eligible		Under 150% FPL		Under 80% SMI	
		#	$ Per	#	$ Per	#	$ Per
CO	$25,621,618	377,050	$68	345,372	$74	803,528	$32
IL	$29,952,460	1,015,201	$30	964,552	$31	1,969,925	$15
NJ	$46,569,295	761,203	$61	537,445	$87	1,398,300	$33
PA	$125,297,438	1,050,059	$119	988,130	$127	2,097,807	$60

LIEE Opportunities Assumptions

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Potential Savings and Cost-Effective Spending On High-Use Electric Heat Homes

	Value	Notes
Pre-Treatment Usage	20,000; 22,000; 25,000 kWh	30% use this amount or more 2010 WAP: 44% electric heaters >20,000
Avoided cost	$0.08/kWh	Lazard's Levelized Cost of Energy (12/2016)
Measure Life	15 years; 20 years	Mean life expectancy
Discount Rate	5%	LBNL 2017
Electric Reduction	20%	LIEE evaluation research
NEB Adder	None, 25%	25% NEB adder used in Colorado

LIEE Opportunities Calculation

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Potential Savings and Cost-Effective Spending On High-Use Electric Heat Homes

	Scenario								
	1	2	3	4	5	6	7	8	9
Assumptions									
Pre-Treat kWh	20,000			22,000			25,000		
Avoided Cost	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Measure Life	15	20	20	15	20	20	15	20	20
Discount Rate	5%	5%	5%	5%	5%	5%	5%	5%	5%
Savings	20%	20%	20%	20%	20%	20%	20%	20%	20%
NEB Adder	0	0	25%	0	0	25%	0	0	25%
Calculations									
kWh Saved/yr	4,000	4,000	4,000	4,400	4,400	4,400	5,000	5,000	5,000
kWh Saved/life	41519	49849	49849	45670	54834	54834	51898	62311	62311
Max spending	$3,321	$3,988	$4,985	$3,654	$4,387	$5,483	$4,152	$4,985	$6,231

LIEE Opportunities Calculation

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Annual Number of Electric Heating LIEE Jobs
With Average Spending of $5,000 per Home

State	Total Electric Spending	Potential Jobs with Current Budget	Budget Needed to Serve 10% Of High-Use Electric Heaters			
			150% FPL		80% SMI	
			Budget Needed	% of Current	Budget Needed	% of Current
CO	$8,849,498	1,770	$15,887,850	180%	$33,622,350	380%
IL	$16,595,738	3,319	$32,410,200	195%	$59,173,350	357%
NJ	$16,272,902	3,255	$13,975,650	86%	$31,374,300	193%
PA	$75,759,952	15,152	$39,531,600	52%	$77,032,800	102%

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LIEE BARRIERS

LIEE Barriers

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Economic

- Up-front investment
- Landlord/ tenant split incentive
- Asymmetric cost-effectiveness testing
- Low-income baseline
- Utility disincentives
- Raided funds

Transactions Costs

- Application
- Landlord permission
- Readying the home

Social Costs

- Home tenure
- Trust
- Scheduling
- Language barriers
- Literacy
- Immigration status
- Neighborhoods
- Recruiting/training employees

Health & Safety

- Mold & moisture
- Asbestos
- Knob & tube wiring
- Pests
- Clutter
- Structural issues

Data & Information

- Data needed to determine best practices are not available
- Who is served/ not served
- Services provided
- Savings achieved

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LIEE POLICIES AND FINANCING MECHANISMS

Policies & Financing

Offerings/Delivery Models

- Public Utility and Electric Cooperative Programs
  - 25% of U.S. electric consumption, but not regulated
  - Some have implemented EE programs to delay power plant investments
- Heat Island Reduction Programs: community investments in cool roofs and pavements, pervious pavements, tree planting
- Community Solar: multiple subscribers purchase power and receive credit on the bill, low-income carve-outs
- School-Based Energy Education Programs: broad reach to low-income and disadvantaged

Program Funding

- Ratepayer & WAP
- LIHEAP: crisis replacement of unsafe heating; Assurance 16 education and advocacy; transfer to WAP
- Rate case & merger settlements
- GRID Alternatives Model: no cost solar to low-income through coordination of state funds, other grants, equipment donations, volunteers, and job trainees

Policies & Financing

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Financing

- On-Bill Lending
- Pay as You Save: charges remain with the meter
- Property Assessed Clean Energy (PACE): assessment on property owner tax bill
- Energy Saving Performance Contracts: ESCO coordinates and is paid from energy savings

Utility Incentives

- Cost recovery: should be equivalent to cost recovery on supply side investments
- Decoupling: removes connection between utility revenue and sales volume
- Energy Efficiency Resource Standards: requires specified consumption reduction
- Energy Efficiency Spending Requirements
- Performance Incentives: financial rewards for measured energy savings

Other Models

- Building Codes: new construction standards
- Green Leases: may help overcome split incentive, include environmental aspects
- Green Banks: finance energy efficiency and other clean energy, work with utility programs

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LIEE EVALUATION

LIEE Evaluation Purpose

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Measure Program Impacts

- Energy usage
- Energy bill affordability
- Economic impacts
- Environmental impacts
- Health, safety, & comfort
- Cost-benefit analysis

Assess Potential Improvements

- Goal achievement
- Efficiency
- Effectiveness
- Equity
- Targeting
- Participant Satisfaction

Meet Regulatory Requirements

LIEE Process Evaluation

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Evaluation Questions

- How is the program designed?
- How is the program implemented?
- Why is the program achieving or not achieving its goals?
- How can the program be improved?

Evaluation Activities

- Background research: Document review & interviews
- Participant and nonparticipant surveys
- On-site research: observations and inspections

LIEE Impact Evaluation

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Evaluation Questions

- How much energy was saved?
- How much energy did individual measures save?
- How do savings vary by pre-treatment usage, housing type, measure package, contractor, home characteristics?

Evaluation Activities

- Program data analysis: Characterize participants, homes, services
- Usage impact analysis: Energy usage billing data
- Payment impact analysis: bills, subsidy, affordability, payment
- Realization rate analysis: comparison of usage estimates to projections
- Cost-effectiveness testing
- Performance measurement

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FINDINGS & RECOMMENDATIONS

Findings & Recommendations

Goals

- Relate to mission
- Concrete & specific
- Outcomes
- Measurement
- Challenging, achievable

Management

- Provide consistent policy
- Coordination: WAP management, electric & gas coordination
- Utility management: customer data
- Agency management: customer acceptance

Measures

- Comprehensiveness
- Based on usage
- Health and safety

Findings & Recommendations

Data

- One database for the program
- Computerized data collection
- Only include fields with an identified purpose

Energy Education

- Partnership model
- Identify opportunities
- Customer follow-up

Quality Control

- Third-party inspector
- Assess missed opportunities and work quality
- Provide additional education

Findings & Recommendations

Rate Design, Cost Recovery, & Utility Incentives

- Minimize percent of bill that is fixed
- Cost recovery equivalent to supply side
- Decoupling and performance incentives
- Specific LIEE targets and use utility billing analysis to measure savings

Funding & Costs

- LIEE funds may be less likely to be raided if they are not in a separate fund
- Low-income unlikely to participate in cost-sharing
- On-bill repayment may generate participation for moderate-income
- Provide credit enhancements, terms as long as payback, increased incentives, shared risk for energy savings

Evaluation

- Third-party evaluator
- Conducted on regular bases
- Billing analysis and process evaluation
- Performance measurement

Cost-Effectiveness Testing

- Balanced
- Low-income baseline
- Measure prioritization

Further Research

Utility Incentives

- Best strategies
- How do decoupling, EERS, and performance incentives best work together?

Financing

- Will low-to-moderate income take advantage of financing?
- Which methods have greatest potential for low-income?

Raided Funds

- How to provide greatest assurance of continued access to dedicated LIEE funding?

Coordination

- Most successful models for funding coordination?

Health & Safety Investments

- What is the right level of investment?
- How can necessary funding be made available?

Further Research

Non-Energy Impacts

- What level can be expected? What NEB adder is most appropriate?

Innovative Methods

- Which new approaches achieved significant savings and should be replicated?

Environmental Justice

- Are LIEE programs reaching this population?
- If not, how can this be improved?

LIEE Savings

- What level of savings can be achieved through various models?
- More studies comparing billing analysis to random control trials and TRM are needed.

Relative LIEE Savings & Cost-Effectiveness

- Compare LIEE and market-rate energy savings and cost-effectiveness

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