

LEAN ALTERNATIVE ENERGY - REPAIR PROGRAM

**LEAN =
Low Income
Energy Affordability Network**

Bruce Ledgerwood

BruceLedgerwood@comcast.net

LEAN Network

- ❖ 21 statewide Community Action Agencies
- ❖ Provide energy services, as well as other services, to eligible clients
- ❖ Energy services funded by federal and utility sources

LEAN Energy Services

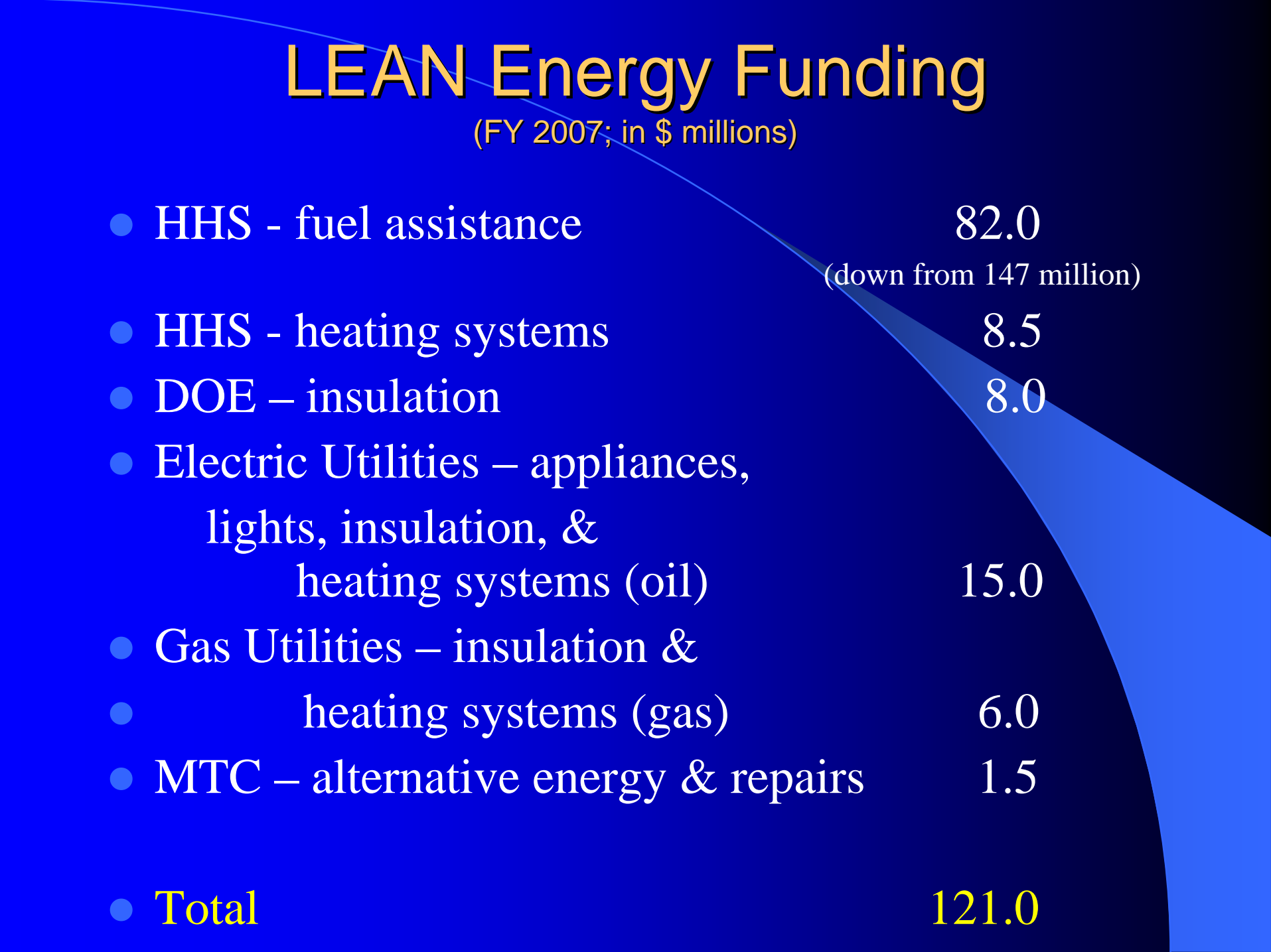
- ❖ Insulation and tightening of homes
- ❖ Appliance efficiency
- ❖ Heating system replacements
- ❖ Renewable energy measures

- ❖ Repairs to enable above

- ❖ Fuel assistance subsidies
- ❖ Arrearage management assistance

LEAN Energy Funding

(FY 2007; in \$ millions)



● HHS - fuel assistance	82.0
	(down from 147 million)
● HHS - heating systems	8.5
● DOE – insulation	8.0
● Electric Utilities – appliances, lights, insulation, & heating systems (oil)	15.0
● Gas Utilities – insulation & heating systems (gas)	6.0
● MTC – alternative energy & repairs	1.5
● Total	121.0

Massachusetts Technology Collaborative (MTC)

<http://www.mtpc.org/renewableenergy/index.htm>

- Electric ratepayer funds collected for development of renewable energy
- 10% of Ma Grid by 2010
- \$25 million annually; \$250 through 2004
- \$0 allocated to low income projects
- LEAN negotiated grant in 2004
 - Equitable allocation rationale
 - Political support for MTC

ALTERNATIVE ENERGY - REPAIR PROGRAM

-\$10 million over 4 years from the MTC; 2 components:

1. Renewable Projects – MTC managed \$7.0
 - 3 large wind turbines; revenues to accrue to LEAN;
 - \$500K annually expected
 - 1 medium sized wind project underway
 - LEAN proposing smaller scale Renewable alternatives
2. Alternative Energy/Repairs – LEAN managed \$3.0
 - other LEAN funding sources insufficient for repairs, or don't allow for alternative energy measures
 - 2005: Researched alternative energy; repairs
 - 2006-7: Alternative energy; repairs

Cost Effectiveness of Selected Measures

● Micro turbines	24
● Fuel Cells	55
● PV inclined roof	59
● PV flat roof	98
● PV ground mounted	67
● Wind Micro 0-3 KW	11
● Wind Small 3-60 KW	13
● Solar Hot Water Evacuated Tube	26
● Solar Hot Water Flat Plate	10
● Geo thermal heat pump	23

Photovoltaic Systems

- Southerly orientation within 25 d. S
- Shading – **eliminate any shading on the installed system from 9 AM to 3 PM**
- 20 year life for roof
- Electric bill small enough to have sizable impact (if not, invest elsewhere first)
- Client ok with roof install and looks

Photovoltaic Costs/Benefits

- Installed System – \$8/Watt; \$20,000
- Materials = 66% of installed costs
- Systems range from 1.0KW to 3.8KW
- Systems generate from 1500 to 4500 KWH per year
- Clients save about \$.12-.15 per KWH
- Tree work 45% of the time
- Roof work 55% of the time (20 year life needed; extends life of roof)

Solar DHW Systems

- Solar Orientation – same as PV
- No shading!
- Roof condition
- DHW demand – family # - 4+

Solar DHW Costs/Benefits

- System costs \$5,800 - \$9,000
- Installed systems usually are 1 to 2 flat plate or evacuated tube applications
- All are pumped systems with external heat exchangers & antifreeze solution
- Clients will displace roughly 2000 KWh to 3000 KWH/yr, saving \$270 - \$400/yr

Wind Systems

- 11 mph+ average wind speed
- 30' above anything within 300'
- Fall zone = tower height + 10%
- Building Code exception needed over 35'
- Client acceptance – noise - visual
- Abutter acceptance – noise - visual
- Electric bill small enough to have sizable impact (do other measures first)

Wind Costs/Benefits

- Cost from \$10,000 to \$70,000 to install a 1.8 KW to 10 KW wind generator
- Systems can generate 3,600 KWH to 15,000 KWH per year
- Displaces \$.12=.15/KWH cost to client, saving \$486-2025/yr

Micro Combined Heat and Power Systems

- Replaces Natural Gas furnace
- Hydronics coming
 - DHW tie in

Micro Combined Heat and Power Costs/Benefits

- Cost \$12,000; will go down
- High efficiency FWA heating system @ 93% efficiency
- Elec generator system @ of 83% to 90%
- 1.2 KW Honda engine providing electricity & heat (producing approximately 4,500 KWH annually & 11,000 BTU/Hr of heat)

Hyde Park CH & P

- Pre:
 - Gas cost 1631
 - Electricity cost 922
- Post:
 - Gas cost 1638
 - Electricity cost 105
- Savings: \$810/yr
- 7 months without an electric bill
- Possible pilot to demo peak demand impact

Lessons Learned: Clients

● +’s:

- No shortage of interest
- Pleasantly surprised by electric bill impact
- Very appreciative of agency work and contractors (mostly)
- After 1-2 days of construction, have not been aware of anything different
- Greater sense of conserving

● -’s:

- Some unrealistic expectations of production
- Take back
- Elderly reluctant to have their roofs altered
- Some people don’t like the looks of the solar panels
- Has been a tendency to serve “well to do” low income households

Lessons Learned: Contractors

- +’s:

- Recruited easily and want to work with us (we pay; we have materials)
- Extremely good quality
- Good prices
- Clients generally very pleased with work
- Have quickly fixed any problems

- -’s:

- Multiple task coordination sometimes a problem (roof, trees, electric)

Lessons Learned: Utilities

- +’s:

- Have been generally supportive and interested, especially EE staff and Distributed Generation staff

- -’s:

- Have had some difficulty in net metering accounting; one part of the company doesn’t know what the other part is doing
- 4 cases of billing department sending out order for meter changes due to “0” reads

Lessons Learned: Agencies

- +’s:

- Initially, a lot of interest; new topic, sexy
- Trained in initial solar and wind site assessment
- Broad participation across 21 agencies

- -’s:

- Only a few auditors came up with multiple prospects
- At \$20k per unit, not that many possibilities statewide
- With little practice, finding, assessing, and managing contractors not becoming institutionalized. Perhaps 4-5 of 21 are able to manage a project soup to nuts.

Lessons Learned: Suppliers

- +'s
 - LEAN had materials through EFI
 - EFI knew contractors
- -'s
 - No savings

Lessons Learned: Funders

- Reporting
- Quality control
- Politics
- Familiar with programs vs. projects
- Be prepared with Plan B

Arlington Repair

- Elderly resident
- Roof Replaced by LEAN-MTC
- Allowed for insulation of attic and walls
- Estimated annual savings: 175 gallons of oil per year
- MTC funded repair enabled client to qualify for subsidized loan for additional water damage control

Watertown Repair

- Elderly disabled veteran
 - Roof replaced by LEAN-MTC
 - Allowed wall and attic insulation
 - Estimated annual savings: 200 gallons of oil per year
(on an annual oil usage of 800 gallons)

Repairs Results

✓ MTC investment -	\$1,103,675
✓ Leveraged investment -	\$746,490
✓ Total investment -	\$1,850,165
✓ Lifetime dollar benefits -	\$2,088,591
✓ MA DTE Cost-Effectiveness Test –	1.13
✓ Participant Cost-Effectiveness Test –	1.32

Repairs Results (2 Years)

- 173 households served in 97 separate communities
- Repairs provided:
 - 79 Roof repairs
 - 14 Ceiling & wall
 - 12 Electrical system
 - 14 Heating distribution
 - 16 Bulk water management jobs
 - 14 General carpentry projects
- Hi-efficiency measures provided that would not have been installed except for MTC \$'s :
 - 19 Indirect Hot Water Tanks
 - 11 Hi-efficiency window jobs

Repairs/Weatherization Results (2 Years)

- EE Measures enabled by MTC \$'s:

● Attic insulation	159
● Ventilation	115
● Wall insulation	96
● Floor insulation	34
● Infiltration work	154
● Heating System	121
● Distribution system work	46
● Hot Water	5
● Lighting	5
● Refrigerators	3
● Other	23