



DTE Energy

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Detroit Edison – 2010 Energy Efficiency Program Peak Demand Reduction

Presented to
MPSC EO Collaborative
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In addition to presenting the demand reduction achieved by Detroit Edison's 2010 EO programs this presentation seeks to kick off several important discussions:

- 1) ENERGY SAVINGS DO NOT EQUAL DEMAND SAVINGS**
- 2) Not all programs or measures are equal at reducing peak demand**
- 3) Peak Demand is a Key determinant of the need for new generation resources**
- 4) Under the current rules EO program providers currently design their programs to achieve energy savings (only)**

Detroit Edison's 2010 EO Programs achieved substantial energy savings, but only had a limited impact on peak demand



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Detroit Edison 2010 Energy Efficiency Programs
MWh and MW Impacts by Program

Program *	MWh	MW
C&I Portfolio		
C&I Prescriptive ^b	102,668	15.30
<i>C&I Prescriptive - Standard</i>	73,673	15.08
<i>Multifamily - Commercial</i>	1,670	0.22
<i>ENERGY STAR Lighting</i>	27,325	N/A
C&I Non-Prescriptive	53,112	
C&I Total	155,780	15.30
Residential Portfolio		
Residential and Small Business ENERGY STAR Products	135,906	19.90
Residential Multifamily-Standard	12,978	1.30
Residential Audit and Weatherization ^c	14,215	1.60
<i>Audit and Weatherization - Standard</i>	4,128	0.30
<i>NESO Initiative</i>	10,087	1.30
Residential Energy Efficiency Assistance ^d	7,179	0.59
<i>Energy Efficiency Assistance</i>	4,224	0.29
<i>Multifamily - Low Income</i>	2,955	0.30
Residential HVAC	5,286	0.80
Residential Appliance Recycling	33,071	3.90
Residential New Construction	34	0.05
Residential Total	208,669	28.14
Total	364,449	43.44

While producing significant energy savings, Detroit Edison's energy efficiency programs generate only a relatively small reduction in peak demand.

As one might expect, the high volume, high savings programs produced the bulk of the peak reduction.

However, the relative production of demand reductions compared to energy savings varies widely among the programs.

Lighting measures represented the bulk of demand reduction, as well as energy savings



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**Detroit Edison 2010 Energy Efficiency Programs- Residential
Measures With Significant Effect on Peak Demand (By Peak Reduction)**

Program/Measure	Verified No. of Measures	Total MWh	Total MW	MW/MWh
CFL Bulbs Regular	3,244,391	143,079	14.59	0.00010
CFL Screw In	136,069	27,486	6.74	0.00025
ARP - Refrigerator	15,787	26,396	3.00	0.00011
CFL Bulbs Specialty	372,831	16,442	1.50	0.00009
ARP - Freezer	4,035	6,258	0.70	0.00011
ECM Furnace	6,932	5,079	0.40	0.00008
Floor Insulation	8,402	371	0.40	0.00108
Smart Strip plug outlet	1,413	260	0.40	0.00154
Furnace/AC - SEER 15	335	162	0.20	0.00123
Window Replacement	1,254	143	0.20	0.00140
CFL Bulbs High Wattage	5,458	617	0.10	0.00016
CFL Fixture	1,145	392	0.10	0.00026
ARP - Dehumidifier	1,892	263	0.10	0.00038
Energy Star Dehumidifier	2,513	211	0.10	0.00047
Furnace/AC - SEER 14	171	58	0.10	0.00172
Furnace/AC - SEER 16	255	90	0.10	0.00111
Low Flow Showerheads	9,278	673	0.10	0.00015
Low Flow Faucet Aerators	20,876	531	0.10	0.00019
Roof Insulation	2,374	98	0.10	0.00102
ARP - Room AC	1,366	154	0.10	0.00065
Energy Star New Home	146	32	0.05	0.00156
Occupancy Sensors under 500 W	390	155	0.04	0.00026

Much of the energy savings comes from lighting measures which have long hours-use, but moderate coincidence factors with the service area peak.

Air-Conditioning related measures have significant impact on peak, but not enough hours-use to be highly cost-effective when only energy savings are considered. Hence, their relatively small role in Detroit Edison's programs.

The last column, MW/MWH, is a relative measure of the productiveness of each measure in creating demand savings compared to energy savings.

This measure suggests lighting programs get demand reductions, but not very efficiently.

Air conditioning-related programs delivered five to ten times the peak reduction of lighting, relative to energy savings



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Detroit Edison 2010 Energy Efficiency Programs- Residential
Measures With Significant Effect on Peak Demand (By MW per MWh)

Program/Measure	Verified No. of Measures	Total MWh	Total MW	MW/MWh
Furnace/AC - SEER 14	171	58	0.10	0.00172
Energy Star New Home	146	32	0.05	0.00156
Smart Strip plug outlet	1,413	260	0.40	0.00154
Window Replacement	1,254	143	0.20	0.00140
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CFL Bulbs High Wattage	5,458	617	0.10	0.00016
Low Flow Showerheads	9,278	673	0.10	0.00015
ARP - Refrigerator	15,787	26,396	3.00	0.00011
ARP - Freezer	4,035	6,258	0.70	0.00011
CFL Bulbs Regular	3,244,391	143,079	14.59	0.00010
CFL Bulbs Specialty	372,831	16,442	1.50	0.00009
ECM Furnace	6,932	5,079	0.40	0.00008

0.00121
(two lead zeros)

0.000122
(three leading zeros)

Even though they are more productive in producing demand reduction, the service area's low hours-use of air conditioning limits the cost-effectiveness of these measures when measured only in energy savings. Hence, their relatively low prominence in Detroit Edison's programs.

MEMD Measures with high coincidence factors are likely to produce peak savings



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2011 MEMD Residential Measures - Non-Weather Sensitive

Proposed Technologies for Measures Library	Assumed hours of operation	CF	Actual (non-coincident) kW	Target kWh percust	Target (coincident) kW percust	kW/kWh
Refrigerator recycling	8760	1	0.191	1672	0.191	0.00011
Freezer recycling	8760	1	0.177	1551	0.177	0.00011
CEE Tier 2 Room A/C	447	1	0.138	80	0.138	0.00173
CEE Tier 1 Room A/C	447	1	0.108	62	0.108	0.00174
Room A/C recycling	1056	1	0.107	113	0.107	0.00095
Energy Star Room A/C	447	1	0.076	44	0.076	0.00173
Energy Star Dehumidifier	1620	1	0.052	84.1	0.052	0.00062
Dehumidifier recycling	3970	1	0.035	139	0.035	0.00025
Refrigerators/Freezers Energy Star - Side by Side	5700	1	0.019	109	0.019	0.00017
Freezers Energy Star - Bottom Freezer	5700	1	0.016	96	0.016	0.00017
Refrigerators Energy Star - Refrig. Only - single door	5700	1	0.015	85	0.015	0.00018
Refrigerators Energy Star - Refrig/Freezer - single door	5700	1	0.015	86	0.015	0.00017
Freezers Energy Star - Upright Freezer	5700	1	0.014	81	0.014	0.00017
Refrigerators/Freezers Energy Star - Top Freezer	5700	1	0.013	79	0.013	0.00016
Freezers Energy Star - Chest Freezer	5700	1	0.008	46	0.008	0.00017
ECM Furnace	8760	0.9	0.073	730	0.0657	0.00009
Gravity Film Heat Exchanger GFX	587	0.7	0.148	919	0.104	0.00011
Pump and motor w/auto controls - multi speed	920	0.5	1.592	1081	0.796	0.00074
Pump and Motor Single Speed	920	0.5	0.715	694	0.357	0.00051
Smart Strip plug outlet	7474	0.5	0.026	184	0.013	0.00007
Residential PV	1145	0.47	1	1145	0.47	0.00041
Balance of CF's <= 0.1						

Water Heating Measures excluded since incidence of Electric Water Heating is too low to have significant impact on peak despite 1.0 Coincidence Factor (DCF)

Looking at coincidence factors in MEMD can help focus on measures most likely to produce peak demand reductions.

Among the MEMD non-weather related measures, room air conditioning and other refrigeration-related measures seem to be the best candidates.

A wide variety of weather-related MEMD measures produced significant demand savings...



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2011 MEMD Residential Measures - Weather Sensitive

Measure	System	Units	kWh/unit	Summer kW/unit	Base efficiency
Central dual fuel heat pump Average			215.32	0.09	
Central air source heat pump Average			421.67	0.11	
Duct Insulation	Central AC with gas furnace	1000 sq ft cond floor area	4.78	0.02	Uninsulated ducts
Infiltration reduction - 15%	Central AC with gas furnace	1000 sq ft cond floor area	15.36	0.06	Varies by vintage
Infiltration reduction - 10%	Central AC with gas furnace	1000 sq ft cond floor area	9.22	0.03	Varies by vintage
Infiltration reduction - 15% and attic insulation	Central AC with gas furnace	1000 sq ft cond floor area	32.08	0.07	Varies by vintage
Duct sealing 15% leakage base	Central AC with gas furnace	1000 sq ft cond floor area	11.38	0.02	15% total
Infiltration reduction - 10% and attic insulation	Central AC with gas furnace	1000 sq ft cond floor area	28.56	0.06	Varies by vintage
Infiltration reduction - 20%	Central AC with gas furnace	1000 sq ft cond floor area	18.09	0.03	Varies by vintage
RCA 10% improvement	Central AC with gas furnace	ton	39.93	0.07	10% EER degradation
RCA 15% improvement	Central AC with gas furnace	ton	59.93	0.11	15% EER degradation
Infiltration reduction - 30%	Central AC with gas furnace	1000 sq ft cond floor area	25.94	0.05	Varies by vintage
O&M Tune-up	Central AC with gas furnace	ton	47.86	0.08	10% EER degradation; 5% furnace efficiency degradation
Duct sealing 20% leakage base	Central AC with gas furnace	1000 sq ft cond floor area	19.80	0.03	20% total
RCA 5% improvement	Central AC with gas furnace	ton	20.01	0.03	5% EER degradation
Duct sealing 25% leakage base	Central AC with gas furnace	1000 sq ft cond floor area	27.87	0.05	25% total
Duct sealing 30% leakage base	Central AC with gas furnace	1000 sq ft cond floor area	36.63	0.06	30% total
Infiltration reduction - 30% and attic insulation	Central AC with gas furnace	1000 sq ft cond floor area	45.16	0.07	Varies by vintage
Infiltration reduction - 20% and attic insulation	Central AC with gas furnace	1000 sq ft cond floor area	37.77	0.06	Varies by vintage
Infiltration reduction - 40%	Central AC with gas furnace	1000 sq ft cond floor area	36.92	0.05	Varies by vintage
Infiltration reduction - 40% and attic insulation	Central AC with gas furnace	1000 sq ft cond floor area	55.12	0.07	Varies by vintage
Furnace/AC - SEER 16	Central AC with gas furnace	ton	144.92	0.19	SEER 13
Furnace/AC - SEER 16 with 95 AFUE furnace	Central AC with gas furnace	ton	144.92	0.19	SEER 13; 78 AFUE
Wall Insulation	Central AC with gas furnace	1000 sq ft wall area	25.58	0.03	Varies by vintage
Infiltration reduction - 50% and attic insulation	Central AC with gas furnace	1000 sq ft cond floor area	65.07	0.08	Varies by vintage
Infiltration reduction - 50%	Central AC with gas furnace	1000 sq ft cond floor area	47.90	0.06	Varies by vintage
Furnace/AC - SEER 17	Central AC with gas furnace	ton	195.43	0.23	SEER 13
Furnace/AC - SEER 17 with 95 AFUE furnace	Central AC with gas furnace	ton	195.43	0.23	SEER 13; 78 AFUE
Energy Star Door	Central AC with gas furnace	Door	21.38	0.02	Standard door
Roof Insulation	Central AC with gas furnace	1000 sq ft roof area	30.20	0.03	Varies by vintage
Furnace/AC - SEER 14	Central AC with gas furnace	ton	160.04	0.17	SEER 13
Furnace/AC - SEER 14 with 95 AFUE furnace	Central AC with gas furnace	ton	160.04	0.17	SEER 13; 78 AFUE
Window Replacement	Central AC with gas furnace	100 sq ft window area	125.36	0.14	Varies by vintage
Furnace/AC - SEER 15	Central AC with gas furnace	ton	173.19	0.16	SEER 13
Furnace/AC - SEER 15 with 95 AFUE furnace	Central AC with gas furnace	ton	173.19	0.16	SEER 13; 78 AFUE
Window Film	Central AC with gas furnace	100 sq ft window area	165.67	0.14	2 pane clear, SHGC = .8
Duct location	Central AC with gas furnace	1000 sq ft cond floor area	60.18	0.05	Ducts outside conditioned space
Basement Wall Insulation	Central AC with gas furnace	1000 sq ft basement wall area	(25.60)	(0.02)	No insulation
High efficiency 92 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
High efficiency 94 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
High efficiency 95 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
High efficiency 93 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
High efficiency 96 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
High efficiency 97 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
High efficiency 98 AFUE furnace with ECM	Central AC with gas furnace	kBtu/hr furnace capacity	5.38	0.00	AFUE 78 standard motor
Ceiling Fans	Central AC with gas furnace	lfan	56.21	0.03	Standard fans, 140 W/cfm
Central AC with gas furnace Average			57.48	0.07	
Central AC with elec furnace Average			469.45	0.07	

All the weather-related Residential measures that have high per-unit or per-customer demand savings had one element in common--**the homes had central air conditioning.**



- Portfolios only designed to maximize energy savings will not produce the most effective approaches to achieving peak demand reductions
 - Many relatively high yield energy savings programs have relatively little impact on peak demand
 - CFLs save a huge amount of energy, but many of them aren't on at time of the summer peak.
 - Other programs produce demand reduction but aren't cost effective if only energy savings benefits are counted
 - Central air conditioning programs cut demand, but the current approach doesn't allow for effective incentives
 - Hours use is too low to produce significant energy savings
- The need for future generation is driven by the peak as well as the total amount of energy needed
- To have effective demand-reducing EO programs, the programs need to get credit for their demand-reductions as well as their energy savings. (Hard to do under current rules)