

**Energy Efficiency Panel Exhibit \_\_\_\_\_ (EEP-1)  
Central Hudson Gas & Electric Corporation  
Detailed Energy Efficiency Program Descriptions**

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## **I. Introduction**

This exhibit presents information developed by Central Hudson Gas & Electric Corporation (“Central Hudson”) to describe the energy efficiency programs it is proposing to achieve the 91 GWh target assigned to the Company in the June 23, 2008 Order in Case 07-M-0548.

## **II. Utility “Expedited” Programs**

As detailed in the Order, the utilities have been required to put forth proposals for “expedited” electric and gas efficiency programs. These expedited programs include two residential programs and one commercial program as follows:

Residential programs:

1. Residential ENERGY STAR® HVAC
2. Residential Efficient Gas Equipment

Commercial program:

3. Small Commercial Business Direct Installation Program

As shown in Appendix #1, Table 13 at the Order, Central Hudson has been assigned the “expedited” target of 47,779 MWhs (or approximately 48GWhs) of savings, in annual cumulative “sales” terms, by the end of 2011. The following three “expedited” programs (designed according to program descriptions from Appendix #2 of the Order) have been designed to achieve approximately 48,282 MWhs and 170,136 therms of savings by the end of 2011:

## 1. Residential ENERGY STAR® HVAC

The Central Hudson Residential ENERGY STAR® HVAC program has the objective to promote the use of ENERGY STAR® central air conditioners and even more energy efficient HVAC solutions, such as Central Air-Source Heat Pumps, Central Ground-Source Heat Pumps, and Electric Heat Pump Water Heaters in the Central Hudson service territory. This will be accomplished by providing proper training, education and incentives to contractors for quality installations of such energy efficient models. This program will also educate the customer and provide incentives to customers to help pay for incremental costs to install more efficient HVAC solutions.

### 1.1 Eligibility Criteria and Technology Descriptions

#### 1.1.1 Central Air Conditioners

**Eligibility.** ENERGY STAR® rating – See Table 1-1 below (Two Tiers [T1 & T2] specified).

##### **Technology Description**

Central air conditioners are commonly “split systems,” comprising two main components—a heat exchanger (the evaporator) located within or just above the heating furnace, and an outdoor unit that contains a compressor, heat exchanger (the condenser) and a fan to circulate outdoor air through the condenser. The two components are connected via copper refrigerant piping. Air is circulated through the evaporator by a large fan that is also used to circulate air warmed by the heating furnace.

The federal government has developed the Seasonal Energy Efficiency Ratio (SEER) as a standardized efficiency measure for central air conditioners, and has specified efficiency levels that equipment must meet or exceed. In January 2006, the minimum legal SEER was raised from 10 to 13. While useful for purposes of a measure of annual electricity use, SEER is poorly correlated with performance under peak demand conditions. For the latter, the Energy Efficiency Ratio (EER), which characterizes the performance of air conditioners when the outdoor temperature is 95°F, is a better predictor of hot-weather efficiency.

#### 1.1.2 Central Air-Source Heat Pumps

**Eligibility.** ENERGY STAR® rating – See Table 1-1 below (Two Tiers [T1 & T2] specified).

##### **Technology Description**

The common type of heat pump system for heating a home, the *Air-Source Heat Pump* (ASHP) is literally a central air-conditioner that has a reversing valve that enables it to operate in reverse when space heating is needed. The typical air conditioner is actually a one-way (unidirectional) heat pump that (1) extracts heat from the air within a home by transferring the heat to a cold (42°F to 45°F) refrigerant gas, (2) compresses the gas to raise its temperature to around 115°F to 120°F, (3) transfers the heat from the hot gas to the outdoor air (which may be above 90°F), cooling the gas somewhat, (4) rapidly expands the gas, which cause its temperature to drop to around 42°F to 45°F, and (5) repeats steps (1) through (4).

With the ASHP, a valve is actuated during the heating season that causes the unit to operate in reverse: it extracts heat from cold outdoor air and transfers the heat to the air within a home. In very cold weather, the amount of heat that an ASHP can deliver is

reduced, so electric-resistance heating coils are energized to augment the heat pump's output.

The seasonal heating efficiency for Air-Source Heat Pumps is measured by Heating Seasonal Performance Factor (HSPF). The minimum legal HSPF is currently 7.7, which rose from 6.8 in January 2006.

### 1.1.3 Central Ground-Source Heat Pumps

**Eligibility.** ENERGY STAR® rating — See Table 1-1 below (Two Tiers [T1 & T2] specified).

#### **Technology Description**

With GSHPs (also called geothermal heat pumps), instead of rejecting heat to the outdoor air during the summer and extracting heat from outdoor air when space heating is needed, a GSHP rejects heat to and extracts heat from the earth. Instead of a fan blowing outdoor air over the condenser coils, a solution of water and antifreeze is circulated over the coils and through a long closed loop of plastic piping that either (1) goes up and down within a group of deep, back-filled wells, or (2) runs horizontally through a helical coil that is buried 10 to 12 feet below the surface. In either case, the earth is around 45°F to 50°F all year around. Having the heat sink and heat source at this temperature allows the heat pump to operate much more efficiently than when the heat sink is air at 90°F and the heat source is air at 25°F. The drawback is the cost of installing the piping network, which requires well drilling or trench excavation.

For GSHP systems, the analogous measure to HSPF as an efficiency metric during the heating season is the coefficient of performance when the unit operates in the heating mode ( $COP_H$ ).

### 1.1.4 Electric Heat Pump Water Heaters

**Eligibility.** ENERGY STAR® rating — See Table 1-1 below.

#### **Technology Description**

A small stand-alone air-source heat pump can be used to extract heat from the surrounding air, raise its temperature, and use it to heat domestic water in a storage tank. Two types of HPWHs are available: (1) an integrated unit that includes the storage tank and back-up resistance heating elements, and (2) a retrofit HPWH that is connected by piping to an existing conventional electric storage water heater.

HPWHs must be installed in locations that remain in the 40°–90°F range year-round and provide at least 1,000 cubic feet of air space around the water heater. Because they remove heat from the surrounding air, the air is cooled and dehumidified. This reduces the load on an air conditioner during the summer but increases the load on the space heating system during the winter. If the heating system has a fuel-burning furnace or boiler, the ideal location is next to this equipment because furnaces and boilers tend to heat the surrounding air. HPWHs are typically two to three times more energy efficient than conventional electric resistance water heaters.

The performance of water heaters is measured by a parameter termed Energy Factor (EF), which indicates a water heater's overall energy efficiency based on the amount of hot water produced per unit of fuel consumed over a typical day. The higher the energy factor, the more efficient the water heater.

## 1.2 Market Description

### 1.2.1 HVAC Equipment Distribution Channels

Large HVAC equipment (central air-conditioners, heat pumps, furnaces, boilers, and water heaters) are usually procured via a contractor or electrician who may also be a dealer for the equipment.

### 1.2.2 Current Market Penetration

Central Hudson's 2006 Residential Appliance Saturation Survey report provides the following data:

<b>Central Air Conditioners:</b>		<b>Geothermal Heat Pumps</b>	
Homes with one or more:	29%	Homes with one or more:	<0.5%
<b>Air-Source Heat Pumps:</b>		<b>Heat Pump Water Heater</b>	
Homes with one or more:	1+%	Homes with one or more:	3%

The percentage of heat pump water heaters probably reflects survey respondents who answered "yes" because some water heating is done by the desuperheater on the HP used for space heating and cooling. No information is available concerning the penetration of high-efficiency HVAC equipment in Central Hudson's service territory.

### 1.2.3 Market Barriers

The primary market barriers to greater adoption of more energy-efficient residential HVAC equipment include higher first cost, lack of awareness of the equipment and their benefits, and reliance on contractors who may also not be familiar with and "comfortable" recommending the customer purchase the more energy-efficient models (e.g., the contractor may not be trained to install highly specialized equipment such as geothermal heat pumps). If the contractor is a dealer for a manufacturer that does not offer geothermal heat pumps, this option will not be mentioned.

The objective of most residential HVAC programs is to overcome these barriers via customer and contractor education and financial incentives to both parties. Some programs also offer discounted financing. In the case of geothermal heat pumps, programs encourage contractors to become dealers for manufacturers who offer this equipment, and some programs sponsor installer training. There is also the option that the program sponsor will alleviate the first-cost barrier by actually owning the geothermal system and leasing it to the customer over an extended period (e.g., 10-years).

### 1.2.4 Incremental Prices

Research has been performed by NYSERDA and Central Hudson to identify the approximate incremental price that residential consumers will pay for measures eligible for Central Hudson rebates. Table 1-1 shows the results from this research. Note, however, that the Benefit/Cost calculations assume that the federal income tax credit provisions are extended, and the amount of the credit is deducted from the applicable incremental prices.

**Table 1-1: Incremental HVAC Equipment Prices to Residential Customers**

<b>Equipment Type</b>	<b>Minimum Performance</b>	<b>Incremental Price (2007\$)</b>
Central Air Conditioner	T1: SEER = 14 / EER = 12.0	\$500
	T2: SEER = 15 / EER = 13.0	\$650
Air-Source Heat Pump	T1: SEER=14 / EER=12.0 / HSPF=8.5	\$550
	T2: SEER=15 / EER=13.0 / HSPF=9.0	\$800
Ground-Source Heat Pump	T1: EER = 15 / COP <sub>H</sub> = 3.1	\$6,000
	T2: EER = 16 / COP <sub>H</sub> = 3.5	\$6,500
Heat Pump Water Heater	EF = 2.0	\$800

### 1.3 Program Descriptions

#### 1.3.1 Key Trade Allies

The following trade allies will help to promote the highly efficient HVAC equipment endorsed by the program, and/or will deliver vital program services.

- Residential HVAC contractors and dealers
- Electricians
- Plumbers

#### 1.3.2 Program Operation

Central Hudson will recruit and train a network of certified HVAC contractors and dealers, electricians, and plumbers, to “sell” the program to homeowners. Trade allies will be paid an incentive to verify that (1) space heating and cooling systems are not over-sized, and (2) ducts and pipes are well insulated, and ducts do not leak (Over-sizing is a common problem because the “thermal envelope” of many homes has been improved over the years by the addition of insulation and replacement of windows and doors).

Central Hudson will arrange to have Quality Assurance inspections performed of the first four installations made by each HVAC contractor, electrician, and plumber; and every tenth installation thereafter. If any problems are observed, additional inspections will be performed.

#### 1.3.3 Financial Incentives

Under its Residential HVAC Program, Central Hudson will pay the rebates listed in Table 1-2 to encourage Central Hudson residential customers to purchase eligible HVAC equipment. A federal income tax credit is also available for highly efficient residential HVAC equipment (i.e., SEER = 15, EER = 13.0, HSPF = 9.0 for central air conditioners and air-source heat pumps; EER = 14.1 and COP<sub>H</sub> = 3.3 for GHP systems, AFUE = 95% for furnaces and boilers fueled by natural gas, and EF = 2.0 for heat-pump water heaters).

As noted in the preceding section, HVAC contractors and dealers will be paid an incentive to verify that central air-conditioning and heat pump units are correctly sized. The incentive will be \$50 plus \$50 for every half-ton of cooling capacity and that is reduced relative to the less-efficient unit being replaced. Participating customers also benefit because of the cost savings related to installing a smaller-capacity unit, and dehumidification is more effective.

**Table 1-2: Residential HVAC Program Incentives to Participating Customers**

<b>Equipment Type</b>	<b>Minimum Performance</b>	<b>Incentive</b>
Central Air Conditioner	T1: SEER = 14 / EER = 12.0	\$100/ton
	T2: SEER = 15 / EER = 13.0	\$150/ton
Central Air-Source Heat Pump	T1: SEER=14 / EER=12.0 / HSPF=8.5	\$120/ton
	T2: SEER=15 / EER=13 / HSPF=9.0	\$200/ton
Ground-Source Heat Pump	T1: HP Unit: EER = 15 / COP <sub>H</sub> = 3.1	\$200/ton
	T2: HP Unit: EER = 16 / COP <sub>H</sub> = 3.5	\$300/ton
	New Ground Loop (well or trench)	\$700/ton
Electric HP Water Heater	EF = 2.0	\$500

## 1.4 Estimated Program Installations and Savings

### 1.4.1 Estimated Installations

Table 1-3 presents estimated annual installations for each type of eligible HVAC equipment during each year of program operation.

**Table 1-3: Estimated Annual HVAC Equipment Installations**

<b>Equipment Type</b>	<b>Distribution By Tier</b>	<b>Year</b>	<b>Installations</b>
Central Air Conditioner	Tier 1: 80% Tier 2: 20%	2009	150
		2010	360
		2011	<u>550</u>
		<b>Total</b>	<b>1,060</b>
Air-Source Heat Pump	Tier 1: 70% Tier 2: 30%	2009	120
		2010	250
		2011	<u>450</u>
		<b>Total</b>	<b>820</b>
Ground-Source Heat Pump	Tier 1: 60% Tier 2: 40%	2009	15
		2010	35
		2011	<u>75</u>
		<b>Total</b>	<b>125</b>
Heat Pump Water Heater	N/A	2009	15
		2010	50
		2011	<u>250</u>
		<b>Total</b>	<b>315</b>

### 1.4.2 Per Unit Savings

Tables 1-4A and 1-4B present estimated per-unit savings for each equipment type and efficiency option, relative to a representative assumed baseline unit. These are the “deemed savings” values that will be used until an Impact Evaluation is performed.

**Table 1-4A: Per-Unit Annual Electric Energy Savings**

<b>Equipment Type / Baseline</b>	<b>Minimum Performance</b>	<b>kWh/yr</b>
Central Air Conditioner / <i>Baseline: SEER = 11</i>	SEER = 14 / EER = 12.0	409
	SEER = 15 / EER = 13.0	509
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>429</b>
Air-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	SEER=14 / EER=12.0 / HSPF=8.5	1,574
	SEER=15 / EER=13.0 / HSPF=9.0	1,976
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>1,694</b>
Ground-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	EER = 15 / COP = 3.1	3,698
	EER = 16 / COP = 3.5	4,483
	<b>Weighted Average Value (4.5-ton unit)</b>	<b>4,012</b>
Heat Pump Water Heater / <i>Baseline: EF = 0.9</i>	EF = 2.0	2,320

**Table 1-4B: Per-Unit Peak Summer System Demand Savings**

<b>Equipment Type / Baseline</b>	<b>Minimum Performance</b>	<b>kW</b>
Central Air Conditioner / <i>Baseline: SEER = 11</i>	SEER = 14 / EER = 12.0	1.0
	SEER = 15 / EER = 13.0	1.2
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>1.0</b>
Air-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	SEER = 14 / EER = 12.0 / HSPF = 8.5	1.2
	SEER = 15 / EER = 13.0 / HSPF = 9.0	1.3
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>1.0</b>
Ground-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	EER = 15 / COP = 3.1	1.2
	EER = 16 / COP = 3.5	1.5
	<b>Weighted Average Value (4.5-ton unit)</b>	<b>1.4</b>
Heat Pump Water Heater / <i>Baseline: EF = 0.9</i>	EF = 2.0	0.5

### 1.4.3 Measure Life and Persistence

Operating life data are provided in Table 1-5. Persistence of savings with time over the operating life is assumed to be 100%.

**Table 1-5: HVAC Equipment Operating Lives**

Equipment Type	Life (years)
Central Air Conditioner	18
Central Air-Source Heat Pump	18
Ground-Source Heat Pump	20
Heat Pump Water Heater	15

### 1.4.4 Net-to-Gross Factor

The factor that accounts for free-ridership and spillover is assumed to be 95 percent for all equipment.

### 1.4.5 Net Energy and Demand Savings

Table 1-6 presents estimated annual net electricity savings for each year's cohort of HVAC equipment purchased via the program, and Table 1-7 presents cumulative net energy savings over the average life of each electric equipment type. Table 1-8 shows estimated annual net natural gas energy savings, and Table 1-9 presents cumulative net energy savings over the average life of each of gas equipment type.

**Table 1-6: Annual Net Electric Energy and Peak Demand Savings**

Equipment Type	Year	MWh/yr	Summer kW	3-Year Totals
Central Air Conditioner	2009	61	143	MWH/yr: 432 kW: 1,007
	2010	147	342	
	2011	224	522	
Central Air-Source Heat Pump	2009	193	114	MWH/yr: 1,320 kW: 779
	2010	402	238	
	2011	725	427	
Ground-Source Heat Pump	2009	57	20	MWH/yr: 476 kW: 166
	2010	133	47	
	2011	286	99	
Heat Pump Water Heater	2009	33	1	MWH/yr: 694 kW: 30
	2010	110	5	
	2011	551	24	
<b>Totals:</b>	2009	<b>344</b>	<b>303</b>	<b>MWH/yr:</b> <b>2,922</b> <b>kW: 1,982</b>
	2010	<b>793</b>	<b>611</b>	
	2011	<b>1,785</b>	<b>1,045</b>	

**Table 1-7: Cumulative Net Electrical Energy Savings Over Equipment Lives**

Equipment Type	MWh
Central Air Conditioners	7,776
Air-Source Heat Pump	23,753
Ground-Source Heat Pump	9,529
Heat Pump Water Heater	10,414
<b>Program Totals</b>	<b>51,472</b>

**1.4.6 Program Budget**

The program budget is presented below:

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$70,000	\$35,000	\$130,000	\$209,055	\$24,000
2010	\$60,000	\$35,000	\$ 80,000	\$481,025	\$32,000
2011	<u>\$70,000</u>	<u>\$15,000</u>	<u>\$100,000</u>	<u>\$936,425</u>	<u>\$53,000</u>
<b>Total</b>	<b>\$200,000</b>	<b>\$85,000</b>	<b>\$310,000</b>	<b>\$1,626,505</b>	<b>\$109,000</b>

Year	Total
2009	\$468,055
2010	\$688,025
2011	<u>\$1,174,425</u>
<b>Total</b>	<b>\$2,330,505</b>

**1.4.7 Program Cost-Effectiveness**

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program:

	TRC Test <sup>1</sup>	TRC+C Test
Present Value of Benefits:	\$4,548,107	\$4,740,573
Present Value of Costs:	\$2,260,464	\$2,260,464
Net Present Value:	\$2,287,643	\$2,480,109
<b>B/C:</b>	<b>2.01</b>	<b>2.10</b>

<sup>1</sup> For assumptions and TRC methodology, please see attached spreadsheets and Section III of this document.

## **2. Residential Efficient Gas Equipment**

The Central Hudson Residential Efficient Gas Equipment program has the objective to promote the use of energy efficient furnaces, boilers, and water heaters in the Central Hudson service territory. The program also has the objective to promote hot water conservation through the promotion and installation of low-flow showerheads and faucets and ENERGY STAR® clothes washers. This will be accomplished by providing proper training, education and incentives to contractors for quality installations of such energy efficient models. This program will also educate the customer and provide incentives to customers to help pay for incremental costs to install more efficient gas equipment.

### **2.1 Eligibility Criteria and Technology Descriptions**

#### **2.1.1 Gas–Fired Central Furnaces and Boilers**

**Eligibility.** See Table 2-1 below (Two Tiers specified for furnaces; three Tiers for boilers).

##### **Technology Description**

The performance of furnaces and boilers is measured by Annual Fuel Use Efficiency (AFUE). The current legal minimum, which was set in 1989, is 78%. The Department of Energy recently published a ruling that would slightly raise the minimum to 80%. However, nearly all of the units currently being sold have an AFUE of at least 80% because the most common furnace design features, such as intermittent ignition and induced draft, typically produce efficiencies close to 80%. This is also the *de facto* “cap” for *non-condensing* furnaces today, since pushing AFUE higher without the power-venting features of condensing systems runs the risk of causing flue gas condensation in older chimneys.

Condensing furnaces, which typically test at AFUE levels of at least 90%, capture additional heat by condensing water vapor from the exhaust gases. Consequently, they cool the exhaust gases enough that they can be power-vented in sealed PVC pipe instead of a chimney.

Two types of heating boilers are in common use: steam boilers and hydronic boilers, which produce hot water that is held under pressure to prevent boiling. Hydronic boilers are much more common, since they can be used to heat concrete floor slabs into which plastic piping has been embedded.

#### **2.1.2 Natural Gas Water Heating**

**Eligibility.** See Table 2-1 below.

##### **Technology Description**

This Measure Category includes both measures that produce hot water and measures that reduce hot water usage.

##### ***Water Heater Measures***

Most water heaters have an insulated storage tank that holds 20 gallons or more of heated water. The disadvantage is that heat is constantly being lost from the water because no insulation is perfect. When the temperature of the water drops by about 3 or 4°F, the heater “fires-up” to raise the water temperature back to the desired set-point.

### **Three Types of High-Efficiency Natural Gas Water Heaters:**

**Tank Type.** A high-efficiency tank-type water heater that uses natural gas as fuel has extra insulation to reduce standby heat losses, a high-efficiency burner, and an enhanced heat-exchanger to transfer more heat from the hot products of combustion to the stored water.

**Solar-Augmented Tank Type.** Solar collectors either heat water directly or heat a water-glycol solution in a separate loop whenever the sun is shining. In either case a small pump operates to circulate the fluid, and in the case of the separate loop, a heat exchanger is needed. The separate-loop configuration is the most common, and a separate tank is installed to store the domestic water that has been pre-heated by the sun. Depending on (a) the amount of solar energy available on a given day, and (b) the demand for hot water on that day, the pre-heat-tank may or may not be heated to the main tank's set-point temperature. Typically, the solar system reduces annual natural gas usage by about 50% to 60%.

**Instantaneous Type.** Instantaneous water heaters provides hot water only when it is needed. When a hot water tap is turned on, cold water flows into the unit and a high-power gas burner lights to heat the water to the set-point temperature while it is flowing.

Typically, instantaneous water heaters provide hot water at a rate of 2–5 gallons per minute, which will probably satisfy the needs of a small family. However, if a home has a need for a large flow of hot water to simultaneously serve multiple uses (e.g., the shower and dishwasher), two or more instantaneous water heaters can be installed, connected in parallel. An alternative is to install separate units for appliances that use a lot of hot water. The U.S. Department of Energy estimates that:

- For homes that use 41 gallons or less of hot water per day, instantaneous water heaters can be 24% to 34% more energy efficient than water heaters with storage tanks.
- They can be 8%–14% more energy efficient for homes that use around 86 gallons of hot water per day.

Instantaneous water heaters cost more than conventional storage water heaters but have a smaller operating cost, which can offset their higher purchase price.

### **Measures that Reduce Hot Water Demand**

Two measures are considered in the program:

- Replacement of the existing clothes washer with a new one that is ENERGY STAR® rated and requires less hot water.
- Installing low-flow shower heads and faucets.

Tests have shown that both measures can, on average, reduce water heating requirements.

## 2.2 Market Description

### 2.2.1 Gas Equipment Distribution Channels

Large gas equipment is usually procured via a contractor who may also be a dealer for the equipment.

### 2.2.2 Current Market Penetration

Central Hudson's 2006 Residential Appliance Saturation Survey report provides the following data:

<b>Natural Gas Furnace:</b>		<b>Natural Gas Boiler:</b>	
Homes with one or more:	~6%	Homes with one or more:	~12%
<b>Natural Gas Water Heater</b>		<b>Low-Flow Showerheads and Faucets</b>	
Homes with one or more:	20%	Homes with three or more:	Unk.

No information is available concerning the penetration of high-efficiency gas equipment in Central Hudson's service territory.

### 2.2.3 Market Barriers

The primary market barriers to greater adoption of more energy-efficient residential gas equipment include higher first cost, lack of awareness of the equipment and their benefits, and reliance on contractors who may also not be familiar with and "comfortable" recommending the customer purchase the more energy-efficient models.

The objective of most residential gas programs is to overcome these barriers via customer and contractor education and financial incentives to both parties.

### 2.2.4 Incremental Prices

Research has been performed by Central Hudson to identify the approximate incremental price that residential consumers will pay for measures eligible for Central Hudson rebates. Table 2-1 shows the results from this research. Note, however, that the Benefit/Cost calculations assume that the federal income tax credit provisions are extended, and the amount of the credit is deducted from the applicable incremental prices.

**Table 2-1: Incremental Gas Equipment Prices to Residential Customers**

Equipment Type	Minimum Performance	Incremental Price (2007\$)
Natural Gas Furnace	T1: AFUE = 92	\$300
	T2: AFUE = 95 / ECM driving fan	\$600
Natural Gas Boiler	T1: AFUE = 82 (Steam w/elec. ignition)	\$250
	T2: AFUE = 85 (Circulating hot water)	\$500
	T3: AFUE = 90 (Circulating hot water)	\$900
Natural Gas Water Heating	EF = 0.62 (Storage tank type)	\$70
	EF = 0.82 (Instantaneous type)	\$400
	EF = 1.30 (Solar-augmented type)	\$4,000
	ENERGY STAR® Clothes Washer	\$120
	Low-flow showerheads and faucets	\$20

## 2.3 Program Descriptions

### 2.3.1 Key Trade Allies

The following trade allies will help to promote the highly efficient HVAC equipment endorsed by the program, and/or will deliver vital program services.

- Residential HVAC / gas equipment contractors and dealers, and plumbers
- Home builders

### 2.3.2 Program Operation

Central Hudson will recruit a network of certified HVAC / gas equipment contractors, dealers, and plumbers to “sell” the program to homeowners.

***Furnaces and Boiler Measures.*** Trade allies will be paid an incentive to verify that (1) space heating systems are not over-sized, and (2) ducts and pipes are well insulated, and ducts do not leak (Over-sizing is a common problem because the “thermal envelope” of many homes has been improved over the years by the addition of insulation and replacement of windows and doors).

***Water-heating Measures.*** Program rules will require that installing contractors provide the participating customer with written information concerning the additional savings that can be achieved by installing an ENERGY STAR® rated clothes washer, low-flow showerheads and faucets. The program literature will state that Central Hudson will provide a rebate to help make the washer more affordable, and the contractor will install the low-flow showerheads and faucets at a cost of only \$10.

***All Measures.*** Central Hudson will arrange to have Quality Assurance inspections performed of the first four installations made by each HVAC / gas equipment contractor or plumber, and every tenth installation thereafter. If any problems are observed, additional inspections will be performed.

### 2.3.3 Financial Incentives

Under its Residential Efficient Gas Equipment Program, Central Hudson will pay the rebates listed in Table 2-2 to encourage Central Hudson residential customers to purchase eligible gas equipment. A federal income tax credit is also expected to be available for highly efficient residential gas equipment.

As noted in the preceding section, HVAC / gas equipment contractors will be paid an incentive to verify that gas heating equipment is correctly sized. The incentive will be \$50 plus \$50 for every 10,000 Btuh of heating capacity and that is reduced relative to the less-efficient unit being replaced. Participating customers also benefit because of the cost savings related to installing a smaller-capacity unit.

**Table 2-2: Residential Gas HVAC Program Financial Incentives to Participating Customers**

Equipment Type	Minimum Performance	Incentive
Natural Gas Furnace	T1: AFUE = 92	\$200
	T2: AFUE = 95 / ECM driving fan	\$500
Natural Gas Boiler	T1: AFUE = 82 (Steam w/elec. ignition)	\$200
	T2: AFUE = 85 (Circulating hot water)	\$400
	T3: AFUE = 90 (Circulating hot water)	\$800
Natural Gas Water Heating	EF = 0.62 (Storage tank type)	\$50
	EF = 0.82 (Instantaneous type)	\$300
	EF = 1.30 (Solar-augmented type)	\$2,000
	ENERGY STAR® Clothes Washer	\$75
	Low-flow showerheads and faucets	\$10

## 2.4 Estimated Program Installations and Savings

### 2.4.1 Estimated Installations

Table 2-3 presents estimated annual installations for each type of eligible gas equipment during each year of program operation.

**Table 2-3: Estimated Annual Gas Equipment Installations**

Equipment Type	Distribution By Tier	Year	Sales
Natural Gas Furnace	Tier 1: 80% Tier 2: 20%	2009	60
		2010	120
		2011	<u>120</u>
		<b>Total</b>	<b>300</b>
Natural Gas Boiler	Tier 1: 50% Tier 2: 40% Tier 3: 10%	2009	40
		2010	90
		2011	<u>100</u>
		<b>Total</b>	<b>230</b>
Natural Gas Water Heater	85%: 0.62 EF (Tank type) 10%: 0.82 EF (Instantaneous type) 5%: 1.30 EF (Solar augmented)	2009	70
		2010	180
		2011	<u>180</u>
		<b>Total</b>	<b>430</b>

### 2.4.2 Per Unit Savings

Table 2-4 presents estimated per-unit savings for each Gas equipment type and efficiency option, relative to a representative assumed baseline unit. These are the “deemed savings” values that will be used until an Impact Evaluation is performed.

**Table 2-4: Per-Unit Annual Natural Gas Energy Savings**

Equipment Type / Baseline	Minimum Performance	Therms/yr
Natural Gas Furnace / <i>Baseline: AFUE = 75</i>	AFUE = 92	163
	AFUE = 95 / ECM driving fan	185
	<b>Weighted Average:</b>	<b>167</b>
Natural Gas Boiler / <i>Baseline: AFUE = 69</i>	AFUE = 82 (Steam w/electronic ignition)	140
	AFUE = 85 (Circulating hot water)	155
	AFUE = 90 (Circulating hot water)	180
	<b>Weighted Average:</b>	<b>170</b>
Natural Gas Water Heater / <i>Baseline: EF = 0.58</i>	EF = 0.62 (Storage tank type)	20
	EF = 0.82 (Instantaneous type)	80
	EF = 1.30 (Solar-augmented type)	150
	ENERGY STAR® Clothes Washer	16
	Low-flow showerheads and faucets	40
	<b>Weighted Average:</b>	<b>36</b>

In the case of the two measures that reduce hot water usage (i.e., ENERGY STAR® Clothes Washer and Low-flow showerheads and faucets), it is assumed that 2% of program participants who upgrade their water heater install an ENERGY STAR® clothes washer, and that 7% of these customers install low-flow showerheads and faucets.

### 2.4.3 Measure Life and Persistence

Operating life data are provided in Table 2-5. Persistence of savings with time over the operating life is assumed to be 100%.

**Table 2-5: Gas HVAC Equipment Operating Lives**

Equipment Type	Life (years)
Natural Gas Furnace	20
Natural Gas Boiler	25
Natural Gas Water Heater (Tank type)	15
Natural Gas Water Heater (Instantaneous)	15
Programmable Thermostat	15

### 2.4.4 Net-to-Gross Factor

The factor that accounts for free-ridership and spillover is assumed to be 95 percent for all equipment.

### 2.4.5 Net Energy and Demand Savings

Table 2-6 presents estimated annual net natural gas energy savings, and Table 2-7 presents cumulative net energy savings over the average life of each of gas equipment type.

**Table 2-6: Annual Net Natural Gas Energy Savings**

Equipment Type	Year	Therms/yr	3-Year Total
Natural Gas Furnace	2009	9,519	47,595
	2010	19,038	
	2011	19,038	
Natural Gas Boiler	2009	6,460	37,145
	2010	14,535	
	2011	16,150	
Natural Gas Water Heater	2009	2,394	14,706
	2010	6,156	
	2011	6,156	
<b>Total:</b>	2009	11,063	<b>99,446</b>
	2010	31,370	
	2011	50,303	

**Note:** No savings have been allocated for 2008. If program begins in 2008, it is assumed that program total therm savings will remain the same, but savings will start in last quarter 2008.

**Table 2-7: Cumulative Net Natural Gas Energy Savings Over Equipment Lives**

Equipment Type	Therms
Natural Gas Furnace	951,900
Natural Gas Boiler	928,625
Natural Gas Water Heater	220,590
<b>Program Totals</b>	<b>2,101,115</b>

#### 2.4.6 Program Budget

The program budget is presented below:

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2008	\$0	\$0	\$0	\$0	\$0
2009	\$20,000	\$20,000	\$85,000	\$49,650	\$19,000
2010	\$20,000	\$15,000	\$60,000	\$110,850	\$23,000
2011	<u>\$20,000</u>	<u>\$10,000</u>	<u>\$60,000</u>	<u>\$115,000</u>	<u>\$23,000</u>
<b>Total</b>	<b>\$60,000</b>	<b>\$45,000</b>	<b>\$210,000</b>	<b>\$275,500</b>	<b>\$65,000</b>

Year	Total
2008	\$0
2009	\$193,650
2010	\$228,850
2011	<u>\$228,000</u>
<b>Total</b>	<b>\$650,500</b>

**Note:** No dollars have been allocated for budget in 2008. If program begins in 2008, it is assumed that program total budget will remain the same, but will begin to be spent in last quarter 2008.

#### 2.4.8 Program Cost-Effectiveness

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program:

	TRC Test	TRC+C Test
<b>Present Value of Benefits:</b>	\$ 1,275,609	\$ 1,376,439
<b>Present Value of Costs:</b>	\$ 591,295	\$ 591,295
<b>Net Present Value:</b>	\$ 684,314	\$ 785,144
<b>B/C:</b>	<b>2.16</b>	<b>2.33</b>

### **3. Small Commercial Business Direct Installation Program**

The purpose of the Small Business Direct Installation Program is to help Central Hudson's non-residential customers to make their facilities more energy efficient, and thereby to reduce their energy usage and, correspondingly, the size of their energy bills. The target of this program is Central Hudson's smaller C&I customers (i.e., non-residential customers with electricity demand under about 100-kW). Decision-makers in this customer segment are typically regarded as "hard-to-reach" and are generally under-served by traditional C&I Efficiency programs, where the focus is most frequently on large customers because savings are estimated to be likewise large.

The energy efficiency program that we plan to offer at present, which is mainly focused on the "Under-100-kW" segment of our non-residential customers, has the following components:

- Energy Upgrade Facilitation (i.e., energy audits coupled with implementation assistance)
- Rebates to make the economics of upgrading the efficiency of lighting, HVAC (including natural gas heating and water-heating), and other equipment powered by electricity or natural gas more economical and compelling.

#### **3.1 Energy Upgrade Facilitation Component**

##### **3.1.1 Description of Services Offered**

The key implementation barriers experienced by customers in the small-C&I sector are widely recognized to be:

- Lack of information about what efficiency measures are available and effective,
- Skepticism about the accuracy of cost-saving claims provided by contractors,
- Lack of expertise, staff resources and especially time to seek reliable information concerning efficiency measures, obtain quotes from vendors and contractors, verify references, and obtain financing.
- Split equipment ownership: Typically, the utility customer (i.e., the entity to whom electricity and fuel bills are sent) is the **business owner** and this is the entity responsible for controlling energy use by equipment at the facility. However, the business owner may not own all the equipment they control or operate. In the case of rental properties, for example, the **building owner** (as opposed to the owner of the business that occupies a portion of the building) may own the lights and HVAC equipment. In some instances the building owner is the utility customer, and an allocated portion of the energy bill is included in the monthly rent amount paid by the business owner.

The proposed Energy Upgrade Facilitation process is designed to overcome these barriers, eliminating or significantly reducing the inconvenience and "hassle factors" business owners typically would experience if they try to manage retrofit projects while simultaneously managing their businesses operations. Our approach

provides comprehensive energy efficiency implementation services to support all aspects of a retrofit project, including the energy audit, project specification and design, financing, bid solicitation, bid evaluation, contractor selection, work scope management, and project inspection—all on behalf of the customer.

If the owner expresses interest, the energy audit can either be done immediately or—if proceeding immediately is not feasible—can be scheduled for a later time. (Details concerning the Audit Phase are provided below in Section 3.3.)

The results of the energy audit are presented to and discussed with the business owner. The discussion includes an explanation of cost-effectiveness, the Central Hudson rebate of 70 percent of the total cost, federal and state tax incentives, and non-energy benefits (e.g., more attractive appearance, more reliable operation, reduced Greenhouse gas emissions).

The business owner is also presented with a proposal for installation of the energy efficiency measures recommended in the audit, but it is made clear that the business owner can also get a proposal from other contractors. Whichever proposal results in a contract, the business owner will receive the rebates and have the option of paying for his or her 30-percent portion of the work via On-Bill Financing.

### **3.1.2 Marketing Activities**

Direct marketing of the program involves a personal visit by a Central Hudson representative. Chain accounts will be targeted as well as “stand-alone” accounts. A program brochure will be prepared that explains the approach and program rules. As projects are completed, Case Study reports will be prepared and used in the marketing effort. These reports will document actual savings achieved by in a variety of different facility types.

The marketing campaign will also feature:

- Pro-active outreach to property managers, suggesting they discuss the program with the property owner and recommend participation, or to facilitate a meeting between the owner and a Central Hudson representative.
- Pro-active outreach to trade allies such as electricians, HVAC contractors, wholesalers, dealers, and plumbers, suggesting they “sell” customers—especially those with whom they have an existing relationship—on installing efficiency measures. Training sessions will be held to familiarize trade allies with the Program’s incentives and procedures.
- Participation by program representatives in trade association and business organization meetings, trade fairs, and other events. Program literature will be distributed during these meetings and events.

### **3.2 Rebates for Energy Efficiency Measures**

As noted above, the Program will cover 70 percent of the cost of each efficiency-upgrade project. If Central Hudson does not manage the installation, a Central Hudson representative will inspect the project at completion to verify that the upgrade matches the performance specified in the Central Hudson proposal, which will be the basis of the 70 percent rebate.

### **3.3 Energy Audit**

The purpose of the energy audit assessment is to educate customers concerning ways they can reduce natural gas and electricity usage by installing specific energy-efficiency measures and/or undertaking specific practices. The assessment will identify the prescriptive rebates a customer may be eligible for if certain measures are installed. Where applicable, the assessment will provide industry-specific recommendations. The output of the assessment process is a report that includes graphics and text and that:

- Shows the customer how much electricity and natural gas are currently being used by various items of equipment;
- Recommends specific energy-efficiency measures, explains the key features of each measure, and indicates approximately how much energy-usage and operating costs each measure will save each year;
- Provides the approximate cost of installing each measure, the amount of rebate that a program will provide, and the approximate payback period;
- Identifies next steps for implementing energy efficiency measures and for receiving the rebate(s).

The report will be printed onsite and presented to the customer immediately following the data-collection phase of the assessment. In addition to personally delivering the report, the trained Central Hudson representative performing the assessment will discuss the report's recommendation with the business owner or a representative designated by the owner, and will explain the incentives that can be provided for each recommended measure.

The program data record will include the customer's business name and address, and the name and contact information of the owner and key management staff. In addition, the customer's billing history will be pre-loaded into the computer so it is instantly available for use by the software.

On-site data-collection activity will involve collecting and storing in the Assessment Database the following data elements:

- Facility name, address, telephone and fax numbers, website URL, and account numbers
- Business owner name, address, telephone and fax numbers, and key decision-makers' names, phone numbers, and email addresses.
- Business type and peak/average numbers of occupants/employees.
- (If applicable: ) Property manager's name, address, telephone and fax numbers, and key decision-makers' names, cell phone numbers, and email addresses.
- (If applicable: ) Property owner name, address, telephone and fax numbers, and key decision-makers' names, cell phone numbers, and email addresses.<sup>2</sup>
- Business operating schedule
- Facility structural data including age, type of construction, size, materials, etc.
- Fenestration and doors (sizes, heat-transfer characteristics)
- Thermal insulation in walls, ceiling, etc.
- Summary of energy end uses by all fuels (including electricity).
- Equipment inventory list including information collected on (a) lighting equipment and controls; (b) heating, ventilation and air conditioning (HVAC) equipment, including capacity ratings, efficiencies, controls, and control setpoints and schedule; (c) domestic hot water (DHW) equipment, including type (tank/instantaneous, direct/indirect, electricity, natural gas, propane, fuel oil, solar-assist, AC-desuperheater-assist), temperature, storage volume, power input (kW or Btu/hr); (d) refrigeration equipment (types, sizes, compressor and fan nameplate data, operating temperature, stored items); (e) process equipment, including: cooking equipment, dishwashers, clothes washers and dryers, air compressors, printing presses, machine tools; (f) office equipment, including computers, printers, copying machines, fax machines; (g) other equipment that uses a significant amount of energy.
- Equipment operating schedules, approximate ages, and general condition.

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<sup>2</sup> These items often are not known by the business owner, who routinely deals only with the property manager.

### 3.4 Program Tracking System

The Program Tracking System (PTS) will be linked to the Assessment database, and will also contain participant-specific records detailing:

- Customer profile, including name, address, telephone, fax, e-mail, primary NAICS code, and business size code, and account numbers.
- Dates of: brochure mailing, initial visit, audit (or code indicating customer declined to have audit), follow-up contacts, contract signing (or code indicating customer declined to proceed with installing any measures), start of measure installation, completion of measure installation, payment of rebates to customers or contractor(s), and customer acceptance of project either individually or in total.
- All measures recommended, with estimated kWh, seasonal kW, and therm savings.
- Savings resulting from each energy-efficiency improvement.
- Installed costs for each recommended measure.
- Rebate amounts quoted for each energy efficiency measure.
- Application data, including trade ally identification code, measure code, measure category, date submitted, incentive amount, date approved, method of approval, and name of approver.

When the customer (i.e., business owner) agrees to have a specific set of measures installed, the following data will be captured in the PTS:

- Energy-efficiency equipment information, including equipment type, make, model, and serial number.
- Equipment purchase information, including sale date, as well as total cost of equipment and rebate amount.
- Installation information, including date of installation, contractor(s), date of inspection (if required), and appliance ownership data.
- Electricity savings (kWh/yr) and peak-demand reduction (kW); fuel savings (million Btu/yr), and fuel type.

### 3.5 Summary of Key Program Features

The key Program design features of the program are listed in Table 3-1. These features can maximize participation by small businesses while optimizing cost-effectiveness.

Table 3-1: Small Business Direct Install Program Design Features

Design Feature	How the Feature Contributes to Success
Marketing and sales focus on closing lighting and HVAC retrofit projects	Program delivery efficiency is maximized by having auditor/sales personnel close lighting retrofit sales during the initial in-person visit to a small business prospect. This reduces the need for additional follow-up contacts to initiate a retrofit project.
Saturation marketing in local business districts and neighborhoods	Door-to-door saturation marketing is effective with small business customers, especially when promoted through local business associations and/or cultural organizations, and supported by targeted direct mail advertisements. Geographic packaging of retrofit projects to contractors increases installation efficiency, resulting in lower installation costs.
Direct contact with land-lords initiated to gain their support and participation	Property management firms are key trade allies, and winning their support is given a high priority. In many instances, they will take the lead in convincing the customer to participate. Upgrading the property is often win-win for all parties.
Bundled retrofit product and rebate with uniform pricing within a pool of pre-qualified contractors*	This feature simplifies and expedites program administration and helps to minimize first costs to the small business participant. For example, standardized lighting retrofit pricing bundled with Central Hudson rebates provide the lowest out-of-pocket cost to the customer.
70% Rebate of project cost combined with on-bill payment of customer's share	Provides a compelling "value proposition" to the customer
Federal and state tax incentives	Further reduces first costs to the small business participant.
Customer support at each step of the retrofit process	The "no-hassle" turnkey or wrap-around service approach is crucial to move small businesses to take action. Essential features are low first-costs bundled with all services necessary to accomplish the retrofit, with minimal involvement required from the business owner.

\* Customers will have the option of using a contractor of their own choosing.

### 3.6. Estimated Net Savings

Program participation is estimated to increase each year during the three-year duration, as an ever-increasing number of trade allies become familiar with it. Table 3-2a and 3-2b provide our estimates of cumulative savings that will be achieved at the end of the program term.

Table 3-2a: Estimated Program Three-Year Savings, Electric Portion<sup>3</sup>

Equipment	Year	Units	MWh/yr Saved (Net)	KW Reduction (Net)
<b>Lighting-1</b>	2009	5,000	2,890	525
	2010	16,000	9,248	1,681
	2011	35,000	20,230	3,677
		<b>56,000</b>	<b>32,368</b>	<b>5,884</b>
<b>Lighting-2</b>	2009	250	371	48
	2010	700	1,040	135
	2011	1500	2,228	290
		<b>2,450</b>	<b>3,640</b>	<b>473</b>
<b>HVAC-1</b>	2009	350	452	371
	2010	600	774	636
	2011	1,000	1,291	1,060
		<b>1,950</b>	<b>2,517</b>	<b>2,066</b>
<b>HVAC-2</b>	2009	15	108	35
	2010	60	431	138
	2011	180	1,294	415
		<b>255</b>	<b>1,834</b>	<b>588</b>
<b>Custom</b>	2009	120	513	228
	2010	350	1,496	665
	2011	700	2,993	1,330
		<b>1,170</b>	<b>5,002</b>	<b>2,223</b>
		<b>TOTAL</b>	<b>45,360</b>	<b>11,234</b>

<sup>3</sup> Totals may be ±1 due to rounding in the spreadsheet that this information was extracted from.

**Table 3-2b: Estimated Program Three-Year Savings, Natural Gas Portion**

Equipment	Year	Units	therms/yr Saved (Net)
Furnace	2009	25	8,170
	2010	50	16,340
	2011	50	16,340
		<b>125</b>	<b>40,850</b>
Boiler	2009	20	5,206
	2010	35	9,111
	2011	35	9,111
		<b>90</b>	<b>23,427</b>
Water Heating	2009	30	1,283
	2010	60	2,565
	2011	60	2,565
		<b>150</b>	<b>6,413</b>
		<b>TOTAL</b>	<b>70,690</b>

Table 3-3a and 3-3b provide estimated combined cumulative savings over the life of the installed measures for both electric and gas installations.

**Table 3-3a: Estimated Cumulative Program Savings, Electric**

Installed Measure	Net Cumulative MWh Savings
Lighting-1	485,514
Lighting-2	43,678
HVAC-1	45,306
HVAC-2	36,673
Custom	75,026
<b><i>Total</i></b>	<b>686,196</b>

**Table 3-3b: Estimated Cumulative Program Savings, Natural Gas**

Installed Measure	Net Cumulative therm Savings
Gas Furnaces	817,000
Gas Boilers	585,675
Gas Water Heating	96,188
<b><i>Total</i></b>	<b>1,498,863</b>

### 3.7. Program Budgets

The program budget is presented below:

#### Electric Portion

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$125,000	\$80,000	\$700,000	\$901,484	\$95,000
2010	\$140,000	\$60,000	\$850,000	\$2,331,416	\$150,000
2011	<u>\$150,000</u>	<u>\$30,000</u>	<u>\$1,000,000</u>	<u>\$4,992,049</u>	<u>\$320,000</u>
<b>Total</b>	<b>\$415,000</b>	<b>\$170,000</b>	<b>\$2,550,000</b>	<b>\$8,224,949</b>	<b>\$565,000</b>

Year	Total
2009	\$1,901,484
2010	\$3,531,416
2011	<u>\$6,492,049</u>
<b>Total</b>	<b>\$11,924,949</b>

#### Natural Gas Portion

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$25,000	\$10,000	\$87,000	\$23,835	\$8,000
2010	\$12,500	\$5,000	\$75,000	\$45,623	\$7,500
2011	<u>\$12,500</u>	<u>\$5,000</u>	<u>\$75,000</u>	<u>\$45,623</u>	<u>\$7,500</u>
<b>Total</b>	<b>\$50,000</b>	<b>\$20,000</b>	<b>\$237,000</b>	<b>\$115,081</b>	<b>\$23,000</b>

Year	Total
2009	\$153,835
2010	\$145,623
2011	\$145,623
<b>Total</b>	<b>\$445,081</b>

#### Total Budget

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$150,000	\$90,000	\$787,000	\$925,319	\$103,000
2010	\$152,500	\$65,000	\$925,000	\$2,377,039	\$157,500
2011	\$162,500	\$35,000	\$1,075,000	\$5,037,672	\$327,500
<b>Total</b>	<b>\$465,000</b>	<b>\$190,000</b>	<b>\$2,787,000</b>	<b>\$8,340,030</b>	<b>\$588,000</b>

Year	Total
2009	\$2,055,319
2010	\$3,677,039
2011	\$6,637,672
<b>Total</b>	<b>\$12,370,030</b>

### 3.8 Program Cost-Effectiveness

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program

#### Electric Portion

	<b>TRC Test</b>	<b>TRC+C Test</b>
Present Value of Benefits:	\$45,007,970	\$47,718,667
Present Value of Costs:	\$12,390,187	\$12,390,187
Net Present Value:	\$32,617,784	\$35,328,481
<b>B/C:</b>	<b>3.63</b>	<b>3.85</b>

#### Natural Gas Portion

	<b>TRC Test</b>	<b>TRC+C Test</b>
Present Value of Benefits:	\$913,274	\$985,398
Present Value of Costs:	\$414,453	\$414,453
Net Present Value:	\$498,821	\$570,945
<b>B/C:</b>	<b>2.20</b>	<b>2.38</b>

#### Total program

	<b>TRC Test</b>	<b>TRC+C Test</b>
Present Value of Benefits:	\$45,921,244	\$48,680,697
Present Value of Costs:	\$12,876,367	\$12,876,367
Net Present Value:	\$33,044,877	\$35,804,330
<b>B/C:</b>	<b>3.57</b>	<b>3.78</b>

### III. “Jurisdictional Gap” Programs

As detailed in the State of New York Public Service Commission (PSC) “Order Establishing Energy Efficiency Portfolio Standard and Approving Programs” (issued and effective June 23, 2008), the utilities of New York State also have been required to put forth proposals for “jurisdictional gap” electric and gas efficiency programs to achieve certain MWh savings targets.

As shown in Appendix #1, Table 11 at the Order, Central Hudson has been given the full program target (after deduction of “Conversation TIP” programs) to achieve 91,079 MWhs of savings in annual cumulative “sales” terms by the end of 2011. Since it is projected that 48,282 MWhs of savings will be achieved in the “expedited” programs described above, therefore the “jurisdictional gap” programs need to account for a total of 42,797 MWhs.

Central Hudson has also been ordered to allow third parties to implement energy efficiency in their service territory. Therefore, Central Hudson has developed a “set aside” of approximately 12,000 MWh to be allocated to third parties. If third parties do not actively engage Central Hudson and implement energy efficiency programs in their service territory, the Company will be able to expand programs detailed below to reach the full 91,079 MWh target.

Central Hudson puts forth the following residential and commercial programs to achieve this target in the Order:

## **1. Residential Lower Income Assistance Program**

Low-income customers often use a higher proportion of their income to pay energy bills, and typically pay higher bills overall as many low-income families live in older, often un-insulated dwellings. As these customers generally lack resources to implement energy efficiency measures, programs targeting this group can provide substantial societal benefits.

### **1.1 Program Description**

The primary objective of the program offering for lower income participants is to motivate lower income residential energy consumers to utilize a whole-house approach to reduce energy consumption. In this program, the homeowner or building owner would be provided with an assessment of how a combination of improvements, including weatherization, improving HVAC and upgrading lighting and appliances would result in a more comfortable home, with decreased energy consumption. These energy conservation measures would be covered up to \$3,000 for homeowners and up to \$6,000 for 2-4 building owners. An income qualified owner that occupies a unit in a 2-4 unit building can receive a subsidy of up to \$3,000 for the whole building without any income verification required for the tenants. A higher subsidy, up to the total of \$6,000 per building, may be available if one or more tenants also are income eligible. In addition, this program would serve to develop a trained and certified group of contractors capable of providing whole house energy services in the Central Hudson territory. Contractors would be offered training opportunities and encouraged to become quality certified by organizations such as the Building Performance Institute and National Association for Technical Excellence (NATE).

### **1.2 Eligible Measures**

Eligible measures for this program will include insulation upgrades, air sealing, duct sealing, heating system improvement and repairs (excluding asbestos abatement and electrical work), DHW improvement, ENERGY STAR® appliance and lighting upgrades.

### **1.3 Market Description**

Residential customers in existing homes who have an income below 60% of the state median (HEAP guidelines) would be eligible for this program, as depicted in Table 1–1 HEAP Income Eligibility below. Central Hudson will have the discretion to include a customer in the program who does not meet all the eligibility criteria upon evidence that program participation will increase the likelihood that the customer will be able to maintain continuous service without compromising other essential household needs.

Table 1-1: HEAP Income Eligibility

Household size	Tier 1	Tier 2
1	0 – 1,062	1,063 – 1,764
2	0 – 1,430	1,431 – 2,307
3	0 – 1,798	1,799 – 2850
4	0 – 2,167	2,168 – 3,393
5	0 – 2,535	2,536 – 3,936
6	0 – 2,903	2,904 – 4,479
7	0 – 3,272	3,273 – 4,580
8	0 – 3,640	3,641 – 4,682
9	0 – 4,008	4,009 – 4,784
10	0 – 4,377	4,378 – 5,050
11	0 – 4,745	4,746 – 5,475
11+	+368	+425

#### 1.4 Program Operation

Program implementation will be accomplished through a third-party vendor to be selected through competitive RFP process. With Company oversight, the vendor will be responsible for recruiting and training contractors, processing incentives, and spot audit verification. The Company will work with the vendor to develop a detailed implementation plan, measure lists, and deemed savings levels. Coordination with existing Trade Allies and increasing the base of trained and certified contractors will be an integral part of providing this program to customers.

#### 1.5 Incentives

Incentives in this program will be in the form of direct incentives for energy efficiency improvements.

#### 1.6 Measurement, Verification and Evaluation

Energy savings estimates for this program will be available from the software programs utilized by the contractors to evaluate customers' homes. Contractors will upload acquired data to a central database to acquire savings information. Field verification of measure installation will be made for a statistically significant sample of projects.

This program will be formally evaluated after the first full year of program implementation to serve as a basis of future recommended program changes.

Table 1-2: Per-Unit Annual Gross Energy and Peak Demand Savings

Dwelling Type	Summer kW	Winter kW	Annual (kWh)	Therms/yr
Single Family	0.27	0.35	2,200	338
Building Owner (2-4 family)	0.30	0.37	4,100	435

Table 1-3: Annual Net Electric Energy and Peak Demand Savings

Year	Single Family Participant	Building Owner Participants	Summer kW	Winter kW	Annual (MWh/yr)	Annual Therms
2009	100	50	42	54	425	55,500
2010	200	75	77	98	748	100,225
2011	300	100	111	142	1,070	144,900
<b>Total</b>	<b>600</b>	<b>225</b>	<b>230</b>	<b>294</b>	<b>2,243</b>	<b>300,675</b>

Table 1-4: Estimated Cumulative Program Savings, Natural Gas

	Net Cumulative Savings
<b>Cumulative MWh</b>	40,374
<b>Cumulative therms</b>	5,411,250

## 1.7 Program Budget

The program budget is presented below:

Table 1-5: Program Budget

Year	Administration	Marketing	Contractors	Incentives	Evaluation	Total
2009	\$50,000	\$50,000	\$120,000	\$500,000	\$40,000	\$760,000
2010	\$40,000	\$40,000	\$160,000	\$875,000	\$40,000	\$1,155,000
2011	\$30,000	\$20,000	\$230,000	\$1,250,000	\$100,000	\$1,630,000
<b>Total</b>	<b>\$120,000</b>	<b>\$110,000</b>	<b>\$510,000</b>	<b>\$2,625,000</b>	<b>\$180,000</b>	<b>\$3,545,000</b>

## **2. Residential Appliance Recycling Program**

The purpose of the Central Hudson Appliance Recycling Program is to provide a collection and recycling service to Central Hudson customers in order to capture significant energy savings and environmental benefits by recycling old refrigerators, freezers, and room AC units.

Refrigerators qualifying for the program could be either 1) primary refrigerators displaced by new refrigerators or 2) older working secondary refrigerators and freezers that many homes keep in a basement, garage or other storage space.

The customer giving up a refrigerator would receive a \$50 per unit “bounty” for one or two working refrigerators/freezers. The units would be collected from the customer’s home by an experienced utility refrigerator recycling program delivery contractor.

This program will also target the collection of working inefficient room air conditioners (AC) (either window or thru-wall) when collecting a refrigerator or freezer from a customer. An individual collection will not be made solely to pick up an inefficient room AC unit to improve the cost-effectiveness of the program. The customer giving up a room AC unit would receive a \$25 per unit “bounty” for one or two working units.

The recycling program would be promoted by Central Hudson through traditional channels such as bill inserts and/or its web site, and also could be incorporated into any area newspaper or TV promotion.

The primary goal of the program is to remove cost effectively old refrigerators/freezers from customers’ homes and make sure they do not return to the Central Hudson area grid through donation, gifting or resale. A secondary goal is to collect inefficient working room AC units while at the customer’s premise.

Another goal of the program is to recycle responsibly the refrigerators, freezers, and room AC units collected through a process that captures all the hazardous materials (including CFC-11 and CFC-12, oils, PCBs, mercury) and recycles as much material as possible (>95%).

### **2.1 Program Theory**

This Appliance Recycling Program (ARP) will use a program design and incentive levels similar to electric utility ARP’s in northern California (e.g., PG&E, SMUD, Lodi Electric, Silicon Valley Power, and the City of Palo Alto).

The ARP’s core theory is that many customers retain and operate spare appliances even though such units are old, inefficient, and/or ineffectively operated (e.g., a secondary refrigerator is frequently mostly empty, or used simply to keep beverages cold). These circumstances occur because the customer 1) does not recognize the full cost of operating the units in this way and/or 2) perceives a hassle factor regarding the

disposal of the unit. The ARP overcomes this inertia by 1) publicizing the true costs of running the old, inefficient units, 2) making unit disposal extremely convenient and hassle-free, and 3) offering an incentive.

The ARP also prevents the customer from either 1) using a haul-away and resale service, or 2) transferring the appliance to another Central Hudson or New York State customer. In either of these options, the older, inefficient appliance usually continues to be utilized.

## 2.2 Program Description

Key features of the successful ARP design include the following:

Target primary and secondary refrigerators and freezers with the following attributes:

- Customer type: units must be located at a residential location served by Central Hudson.
- Unit status: units must be demonstrated to be operating (i.e., producing appropriately cold temperatures) at the point of pick-up.
- Unit types: refrigerators and freezers both eligible.
- Size: units 10-30 cubic feet eligible (i.e., smaller and larger units not eligible)
- Age: no vintage restrictions – experience from other successful programs shows that 1) newer models will make up an insignificant percentage of all the units, 2) the average age of recycled units is typically 20-25 years, and 3) vintage restrictions can cause customer service issues for those customers whose refrigerators do not qualify. [If an age restriction must be utilized, it is suggested limiting them to refrigerators and freezers, and basing it on the presence of a compressor that utilizes CFC-12 or CFC-22 (a surrogate for units manufactured before approximately 1995).]
- Efficiency: ENERGY STAR® refrigerators not eligible.
- Number: up to two units harvestable from any given customer account per calendar year.

For room AC units:

- Customer type: units must be located at a residential location served by Central Hudson accompanied by a recycled refrigerator/freezer.
- Unit status: units must be demonstrated to be operating (i.e., producing appropriately cold temperatures) at the point of pick-up.
- Unit types: window and thru-wall air conditioners
- Size: 6,000 BTU and larger units
- Age: no vintage restrictions
- Efficiency: ENERGY STAR® air conditioners not eligible.
- Number: up to two units harvestable from any given customer account per calendar year.

Clear, call-to-action marketing – for Central Hudson will market the program through its typical customer communication channels.

Reasonable incentive level – incentive levels for ARPs typically range between \$25 and \$50 per harvested unit. For the Central Hudson ARP, the highest level of \$50 will be used to induce customer participation. For air conditioners, an incentive of \$25 will be offered. These incentive levels may increase or decrease over the life of the program.

Excellent customer service – Central Hudson residential customers will be able to call a toll-free number and/or use the Internet to schedule pick-ups, and have an excellent customer service experience.

Complete tracking – the system will track units from the time a customer contacts the program, to the customer site unit collection, and all the way through the recycling process. Tracking includes (but is not limited to) noting the disabling of appliances at the customer site, customer verification and full documentation of number, size and type of units recycled, and the total volume of materials recycled.

Responsible, complete recycling – since the utility is encouraging customers to dispose of their refrigerators, freezers and air conditioners, it is incumbent upon the utility to provide the most responsible recycling. The ARP offers the most complete recycling available. The process captures hazardous materials and Greenhouse Gas (GHG) Ozone Depleting Substances (ODS). The process also recycles over 95% of unit materials (i.e., metal, glass, plastic). The process has become the standard for programs offered essentially statewide in California, Nevada, Washington, Utah and New Mexico, and meets the requirements of the EPA's Responsible Appliance Disposal (RAD) program (see <http://epa.gov/ozone/partnerships/rad/radusappldisposal.html>).

### **2.3 Advertising, Marketing, and Public Relations**

A formula has been developed for determining how many refrigerators/freezers can be collected annually in any given utility service territory based on experience. Volumes are directly proportionate to the amount and type of marketing used to advertise the program.

Central Hudson's 2006 Residential Appliance Saturation Survey report provides the following data:<sup>4</sup>

<b>Full-Size Refrigerators:</b>	
Homes with none:	1%
Homes with one:	81%
Homes with two:	18%
Homes with three or more:	1%
<b>Separate freezers:</b>	
Homes with none:	68%
Homes with one:	30%
Homes with two:	2%
Not Reported:	1%
<b>Room Air Conditioner:</b>	
Homes with one or more:	57%
Average number: 2.2	

Since there are an average of 1.18 refrigerators per household in the United States<sup>5</sup> (reinforced by Central Hudson's 2006 Appliance Saturation Survey that 18% of residential have second refrigerators) and since households replace their primary kitchen refrigerator approximately every 18 years<sup>6</sup>, the number of available units is extremely large (and continues to be "replenished" on a daily basis).

Experience dating back to 2001 is that a geographically utility ARP can collect annual unit volumes amounting to a "harvest rate" of approximately 1% of the total number of residential electric service accounts with a modest marketing budget (i.e., comprised significantly of bill stuffers and utility web site materials, and supplemented with targeted newspaper and TV ads). Significantly higher annual harvest rates of as high as 3-4% are attainable for a number of consecutive years, but only if mass media (e.g., newspapers and TV commercials) are used relatively aggressively.

## 2.4 Estimated Program Collections and Savings

As a conservative number Central Hudson will use a 1.5% harvest rate for their approximations. This is based on the fact that Central Hudson will use a somewhat aggressive advertising and marketing budget for this program. Therefore for 251,900

<sup>4</sup> Totals may differ from 100% because of rounding of individual values.

<sup>5</sup> See [http://www.eia.doe.gov/emeu/reps/enduse/er01\\_us\\_tab1.html](http://www.eia.doe.gov/emeu/reps/enduse/er01_us_tab1.html) ; 126.0 million refrigerators divided by 107.0 million total households = 1.18.

<sup>6</sup> SERA, "Revised/Updated EULs based on Retention and Persistence Studies Results", submitted to Southern California Edison, 7/8/05, Table 3.1, row entry 43. Study available at: <http://eega.cpuc.ca.gov/deer/> .

residential customers (as of 2007), the following refrigerator and freezer penetration rates can be estimated:

$$251,900 \text{ residential customers} \times 1.5\% = 3,779 \text{ units per year}$$

From past programs, it has been shown that collections have typically been 80% refrigerators and 20% freezers. Therefore, Table 2-1 below presents estimated annual collections for each type of eligible appliance during each year of program operation.

From the Central Hudson's 2006 Residential Appliance Saturation Survey, it is estimated that about half of the homes visited for collection of a refrigerator or freezer will also have a room AC unit. Therefore, as a conservative approximation, it is estimated that 20% of customers visited to turn in a refrigerator or freezer will also turn in an old room AC unit.

Table 2-1: Estimated Annual Appliance Collections

<b>Appliance Type</b>	<b>Year</b>	<b>Sales</b>
Refrigerator (Collected)	2008	80
	2009	3,000
	2010	3,000
	2011	<u>3,000</u>
	<b>Total</b>	<b>9,080</b>
Freezer (Collected)	2008	20
	2009	750
	2010	750
	2011	<u>750</u>
	<b>Total</b>	<b>2,270</b>
Room AC Units (Collected)	2008	20
	2009	750
	2010	750
	2011	<u>750</u>
	<b>Total</b>	<b>2,270</b>

## 2.5 Per-Unit Gross Savings

Table 2-2 presents estimated per-unit gross savings for each eligible appliance, relative to a representative assumed Baseline unit. (Source: NYSERDA's Deemed Savings Database.)

Table 2-2: Per-Unit Annual Gross Electrical Energy and Peak Demand Savings

Appliance Type	kWh/yr	Summer kW	Winter kW
Refrigerator (Collected – Typical Age) <sup>7</sup>	681	0.080	0.080
Freezer (Collected - Typical Age) <sup>8</sup>	897	0.100	0.100
Room AC Units (Collected)	180	0.225	-

## 2.6 Net Energy and Demand Savings

Table 2-3 presents estimated annual net savings for each year's cohort of appliances purchased via the program. Table 2-4 presents cumulative net electrical energy savings over the average life of each measure type.

Table 2-3: Annual Net Electrical Energy and Peak Demand Savings

Equipment Type	Year	MWh/yr	Summer kW	Winter kW
Refrigerator (Collected – Typical Age)	2008	54	6	6
	2009	2,043	240	240
	2010	2,043	240	240
	2011	<u>2,043</u>	<u>240</u>	<u>240</u>
	<b>Total</b>	<b>6,183</b>	<b>726</b>	<b>726</b>
Freezer (Collected - Typical Age)	2008	18	2	2
	2009	673	75	75
	2010	673	75	75
	2011	<u>673</u>	<u>75</u>	<u>75</u>
	<b>Total</b>	<b>2,036</b>	<b>227</b>	<b>227</b>
Room AC Units (Collected)	2008	2	4	
	2009	88	143	
	2010	88	143	
	2011	<u>88</u>	<u>143</u>	
	<b>Total</b>	<b>267</b>	<b>431</b>	
<b>Program Totals</b>	2008	75	12	8
	2009	2,804	458	315
	2010	2,804	458	315
	2011	<u>2,804</u>	<u>458</u>	<u>315</u>
	<b>Total</b>	<b>8,487</b>	<b>1,386</b>	<b>953</b>

<sup>7</sup> Based on KEMA-Xenergy, "Measurement and Evaluation Study of 2002 Statewide Residential Appliance Recycling Program", 2/2004; value assumes 1946 gross kWh and 35% NTG (NTG corrects for full and partial free ridership, and partial year use); value is conservative relative to what will be reported for 2004-2005 program in ADM final report to be published by 12/2007.

<sup>8</sup> Based on KEMA-Xenergy, "Measurement and Evaluation Study of 2002 Statewide Residential Appliance Recycling Program", 2/2004; value assumes 1662 gross kWh and 54% NTG (NTG corrects for full and partial free ridership, and partial year use); value is similar to what will be reported for 2004-2005 program in ADM final report to be published by 12/2007.

If it is assumed that the collected refrigerators and freezers would have been in service for another 8 years<sup>9</sup> and the room AC units for 10 years if not collected, then the cumulative MWh savings for collecting these units would be as shown below:

Table 2-4: Cumulative Net Electrical Energy Savings

<b>Equipment Type</b>	<b>MWh</b>
Refrigerator (Collected – Typical Age)	49,468
Freezer (Collected - Typical Age)	16,290
Room AC Units (Collected)	2,674
<b>Program Totals</b>	<b>68,432</b>

## 2.7 Program Operation

### 2.7.1 Call Center / Web Site Customer Service

A call center will operated by the hired contractor with inbound toll-free numbers for utility customers to schedule appointments to have their refrigerators or freezers picked up and recycled. Alternatively, customers can register online and create their own tracking number and choose their collection date and time. These services are offered in both English and Spanish, with other languages available as needed. Customers will have the option to have room AC units picked up only when they are handing in a refrigerator or freezer. An individual collection will not be made solely to pick up an inefficient room AC unit.

### 2.7.2 Appliance Collection

Appliance pick-up teams will call 24-48 hours ahead to remind customers of their appointments, and will set a 4 hour window for them to arrive. Upon arrival, staff will show ID badges, check the working condition of the refrigerators and/or freezers and AC units, and have the customer answer some questions regarding the unit and their ARP experience to date.

The customer is given a copy of a triplicate Appliance Tracking Order (ATO) that the crew prints from the database for their daily collection route. The ATO also serves as a receipt for the customer incentive check.

The unit collection crew will move the appliance to the truck, and will smash the cold control, destroy the door gaskets, and place a large spray-painted colored “X” and tracking number on the side to indicate that the harvested unit is not to be reused and will be recycled.

<sup>9</sup> Based on Kema, "Residential Refrigerator Recycling Ninth Year Retention Study", Study ID's 546B, 563; prepared for SCE, 7/22/2004; available from Calmac web site as study # SCE0130.01.

### 2.7.3 *Appliance Recycling*

Units collected from Central Hudson customers will be sent to a facility for processing. The CFC (or HFC) refrigerant and compressor oil will be evacuated and recycled, any PCBs or mercury components will be removed, stored and destroyed as hazardous waste, and all plastic, glass, and metals will be separated and recycled.

Of critical importance is the fact that the program offers capture and destruction of 95+% of the CFCs and HFCs used in polyurethane foam insulation material. Most refrigerators and freezers manufactured in the US between 1975 and 1995 contain polyurethane insulation in the walls of the appliance. During this 20-year period, CFC-11 (an ozone-depleting chemical that also contributes to the Greenhouse effect responsible for Global Warming) was used as a blowing agent in this foam. Refrigerators typically contain 6 to 8 ounces of CFC-12 refrigerant in the cooling system, and up to 1 lb of CFC-11 in the foam insulation. Recycling a unit without addressing the presence of the CFC-11 foam will cause the gas to be released into the atmosphere when the unit is shredded for scrap metal (with the rest of the materials being land-filled). Approximately 35% of the CFC-11 will be released at the time of metal shredding, and it will continue to out-gas at a rapid rate in the landfill.

Foam insulation material containing CFCs or HFCs will be treated using patented appliance recycling methods and line equipment. The approach and line equipment are considered the state-of-the-art in the world for refrigerator de-manufacturing. It was developed in response to Kyoto Treaty-driven Western European environmental regulations that are significantly more stringent than American environmental regulations. A summary of the approach and line equipment is available online at <http://seg-online.de/en/kuehlgeraete.pdf>, as well as in a DVD that can be provided upon request. Completed installations worldwide are certified by RAL Quality Assurance Association (the "UL" of Europe).

### 2.7.4 *Incentive Check Fulfillment*

The customer incentive payment process involves 1) getting the appliance turn-in forms from the recycling processing facility to the contractor headquarters (shipped weekly), 2) verifying all data, and 3) mailing the checks to the customer addresses. The incentive payment process is managed through a comprehensive program tracking database.

The contractor will issue all incentive checks to Central Hudson ARP participants within four weeks of unit pickup. The four week time frame includes an allowance for delays in postal service and possible "returned mail" cycles. Most checks will be issued within 14 days of the actual pick up. Checks will utilize the Central Hudson logo.

### 2.7.5 *Data Management*

All customers who schedule an appointment through the toll free number or online are given a unique tracking number. This tracking number follows the appliance from the time it is scheduled until it is recycled and all the materials separated into various waste streams.

The tracking system allows Central Hudson to see when a unit was collected, how old it was, how much refrigerant and oil was in the unit, and whether or not it contained a PCB or mercury component. The database can be accessed in real time via website reporting and has fields for program information pertaining to orders and units.

## 2.8 Program Evaluation

Energy savings are characterized using a unit-specific, “bottom up”, “as experienced” approach (as opposed to a deemed savings approach). Specifically, units will be matched by brand names and model numbers for all harvested refrigerators and freezers with an associated annual kWh consumption value listed in an appliance database – most likely from either [www.homeenergy.org](http://www.homeenergy.org) (which utilizes when-new annual kWh values<sup>10</sup>) or [www.focusonenergy.com/embed.jsp?pagelid=1532](http://www.focusonenergy.com/embed.jsp?pagelid=1532) (appliance age-based annual kWh values).

The specific database utilized will be chosen after joint reviews of each source. The [www.homeenergy.org](http://www.homeenergy.org) source is typically utilized (based on high coverage rates and a grounded understanding of its coverage biases). Record values from the agreed-upon database will be utilized in ARP reports. If desired, a program-wide adjustment factor (e.g., for partial-year use effects) can be identified and applied to the reported annual kWh data.

Harvested units whose records are unable to be matched will be assigned a default/deemed annual kWh value based on an agreement regarding the likely typical unit size, age, and configuration.

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<sup>10</sup> The when-new data then can be subsequently adjusted by an age degradation factor, e.g., 1.37% per year of age. The 1.37% factor is per Miller and Pratt, “Estimates of Refrigerator Loads in Public Housing Based on Metered Consumption Data”, October 1998; refer to Table 3.2 in the study.

## 2.9 Program Budget

The program budget is presented below:

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2008	\$1,000	\$1,750	\$13,160	\$4,000	\$996
2009	\$40,000	\$66,625	\$493,500	\$150,000	\$37,456
2010	\$40,000	\$66,625	\$493,500	\$150,000	\$37,456
<u>2011</u>	<u>\$40,000</u>	<u>\$66,625</u>	<u>\$493,500</u>	<u>\$150,000</u>	<u>\$37,456</u>
Total	\$121,000	\$198,625	\$1,493,660	\$454,000	\$113,364

Year	Total
2008	\$20,906
2009	\$787,581
2010	\$787,581
2011	<u>\$787,581</u>
<b>Total</b>	<b>\$2,383,649</b>

## 2.10 Program Cost-Effectiveness

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program:

	TRC Test	TRC +C Test
<b>Present Value of Benefits:</b>	\$ 4,812,011	\$ 5,126,194
<b>Present Value of Costs:</b>	\$ 1,646,500	\$ 1,646,500
<b>Net Present Value:</b>	\$ 3,165,512	\$3,479,694
<b>B/C:</b>	<b>2.92</b>	<b>3.11</b>

### **3. Expanded Residential HVAC Program**

This program expands the Residential ENERGY STAR® HVAC program under the Utility “Expedited” Programs. In order to conform with established energy savings targets, the Utility “Expedited” programs for residential HVAC was truncated. This program provides anticipated savings available, but not met by the “Expedited” program. Further, this program relies on deeper penetration of the same installed measures, and additionally, expands to include window and through wall air conditioners, as well as programmable thermostats.

#### **3.1 Eligibility Criteria and Technology Descriptions**

##### **3.1.1 Central Air Conditioners**

##### **3.1.2 Central Air-Source Heat Pumps**

##### **3.1.3 Central Ground-Source Heat Pumps**

##### **3.1.4 Electric Heat Pump Water Heaters**

*For Sections 3.1.1 through 3.1.4, please refer to Section 1, Residential ENERGY STAR® HVAC under Utility “Expedited” Programs.*

##### **3.1.5 Room-Size Air Conditioners**

**Eligibility:** ENERGY STAR® label, 6,000 Btu/hr and greater

###### **Technology Description**

Single-package air-conditioner that contains compressor, evaporator and condenser, and two fans: one to circulate room air through the evaporator coils and the other to circulate outdoor air through the condenser coils. Units are typically mounted in a window or a special opening in an outside wall, and are sized to cool only the room in which they are mounted.

##### **3.1.6 Programmable Thermostat**

**Eligibility.** ENERGY STAR® label

###### **Technology Description**

Programmable thermostats enable the set-point temperature to be automatically set back (lowered) during heating operation during sleeping or unoccupied hours, and to be automatically increased when central air-conditioning or heat pumps operate in the cooling mode, again during sleeping or unoccupied hours.

#### **3.2 Program Description**

Program attributes for Central Air Conditioners, Central Air-Source Heat Pumps, Central Ground Source Heat Pumps, and Electric Heat Pump Water Heaters remain constant as described previously in Residential ENERGY STAR® HVAC under Utility “Expedited” Programs. Window and through wall air conditioning unit specifics as well as programmable thermostats are addressed further herein.

### 3.2.2 Current Market Penetration

Central Hudson's 2006 Residential Appliance Saturation Survey report provides the following data:

<b>Window Air Conditioner:</b>	
Homes with one or more:	57%
<b>Average units per Home</b>	<b>2.2</b>

### 3.2.3 Market Barriers

The primary market barriers to greater adoption of more energy-efficient residential HVAC equipment include higher first cost, lack of awareness of the equipment and their benefits, and reliance on contractors who may also not be familiar with and "comfortable" recommending the customer purchase the more energy-efficient models (e.g., the contractor may not be trained to install highly specialized equipment such as geothermal heat pumps). If the contractor is a dealer for a manufacturer that does not offer geothermal heat pumps, this option will not be mentioned.

The objective of most residential HVAC programs is to overcome these barriers via customer and contractor education and financial incentives to both parties. Some programs also offer discounted financing. In the case of geothermal heat pumps, programs encourage contractors to become dealers for manufacturers who offer this equipment, and some programs sponsor installer training. There is also the option that the program sponsor will alleviate the first-cost barrier by actually owning the geothermal system and leasing it to the customer over an extended period (e.g., 10-years).

### 3.2.4 Incremental Prices

Research has been performed by NYSERDA and Central Hudson to identify the approximate incremental price that residential consumers will pay for measures eligible for Central Hudson rebates. Table 3-1 shows the results from this research. Note, however, that the Benefit/Cost calculations assume that the federal income tax credit provisions are extended, and the amount of the credit is deducted from the applicable incremental prices.

**Table 3-1: Incremental HVAC Equipment Prices to Residential Customers**

Equipment Type	Minimum Performance	Incremental Price (2007\$)
Central Air Conditioner	T1: SEER = 14 / EER = 12.0	\$500
	T2: SEER = 15 / EER = 13.0	\$650
Air-Source Heat Pump	T1: SEER=14 / EER=12.0 / HSPF=8.5	\$550
	T2: SEER=15 / EER=13.0 / HSPF=9.0	\$800
Ground-Source Heat Pump	T1: EER = 15 / COP <sub>H</sub> = 3.1	\$6,000
	T2: EER = 16 / COP <sub>H</sub> = 3.5	\$6,500
Heat Pump Water Heater	EF = 2.0	\$800
Room-Size AC Unit	ENERGY STAR®	\$35
Programmable Thermostat	ENERGY STAR®	\$80

### 3.3 Program Descriptions

#### 3.3.1 Key Trade Allies

The following trade allies will help to promote the highly efficient HVAC equipment endorsed by the program, and/or will deliver vital program services.

- Residential HVAC contractors and dealers
- Electricians
- Plumbers

#### 3.3.2 Program Operation

Central Hudson will recruit and train a network of certified HVAC contractors and dealers, electricians, and plumbers, to “sell” the program to homeowners. Trade allies will be paid an incentive to verify that (1) space heating and cooling systems are not over-sized, and (2) ducts and pipes are well insulated, and ducts do not leak. (Over-sizing is a common problem because the “thermal envelope” of many homes has been improved over the years by the addition of insulation and replacement of windows and doors.) When installing a CAC, ASHP. Or GSHP system, contractors will install a programmable thermostat at no cost to the customer if one is not already installed at the home.

Central Hudson will arrange to have Quality Assurance inspections performed of the first four installations made by each HVAC contractor, electrician, and plumber; and every tenth installation thereafter. If any problems are observed, additional inspections will be performed.

#### 3.3.3 Financial Incentives

Under its Residential HVAC Program, Central Hudson will pay the rebates listed in Table 3-2 to encourage Central Hudson residential customers to purchase eligible HVAC equipment. A federal income tax credit is also available for highly efficient residential HVAC equipment (i.e., SEER = 15, EER = 13.0, HSPF = 9.0 for central air conditioners and air-source heat pumps; EER = 14.1 and COP<sub>H</sub> = 3.3 for GHP systems, AFUE = 95% for furnaces and boilers fueled by natural gas, and EF = 2.0 for heat-pump water heaters).

As noted in the preceding section, HVAC contractors and dealers will be paid an incentive to verify that central air-conditioning and heat pump units are correctly sized. The incentive

will be \$50 plus \$50 for every half-ton of cooling capacity and that is reduced relative to the less-efficient unit being replaced. Participating customers also benefit because of the cost savings related to installing a smaller-capacity unit, and dehumidification is more effective.

For window and through wall air conditioning units, incorporated are turn-in events at locations such as major box stores or company premises where the customer will be able to drop off their inefficient, working, room AC units and receive up to a \$50 coupon towards the purchase of a new ENERGY STAR® qualified room AC unit.

Programmable thermostats will be promoted in all energy efficiency literature, and rebate coupons issued via bill stuffers and in store (limit of 2 per household), that can be mailed in to receive payment.

**Table 3-2: Expanded Residential HVAC Program Financial Incentives to Participating Customers**

Equipment Type	Minimum Performance	Incentive
Central Air Conditioner	T1: SEER = 14 / EER = 12.0	\$100/ton
	T2: SEER = 15 / EER = 13.0	\$150/ton
Central Air-Source Heat Pump	T1: SEER=14 / EER=12.0 / HSPF=8.5	\$120/ton
	T2: SEER=15 / EER=13 / HSPF=9.0	\$200/ton
Ground-Source Heat Pump	T1: HP Unit: EER = 15 / COP <sub>H</sub> = 3.1	\$200/ton
	T2: HP Unit: EER = 16 / COP <sub>H</sub> = 3.5	\$300/ton
	New Ground Loop (well or trench)	\$700/ton
Electric HP Water Heater	EF = 2.0	\$500
Room-size AC Unit*	ENERGY STAR®	\$50
Programmable Thermostat**	ENERGY STAR®	\$25

\* The participant is required to turn-in a working room-size AC to obtain the incentive.

\*\* A programmable thermostat is installed at no cost at the homes of participants in the CAC, ASHP, and GSHP programs. The incentive shown applies to retail purchases.

### 3.4 Estimated Program Installations and Savings

#### 3.4.1 Estimated Installations

Table 3-3 presents estimated annual installations for each type of eligible HVAC equipment during each year of program operation.

**Table 3-3: Estimated Annual HVAC Equipment Installations**

<b>Equipment Type</b>	<b>Distribution By Tier</b>	<b>Year</b>	<b>Installations</b>
Central Air Conditioner	Tier 1: 80% Tier 2: 20%	2009	180
		2010	380
		2011	<u>600</u>
		<b>Total</b>	1,160
Air-Source Heat Pump	Tier 1: 70% Tier 2: 30%	2009	100
		2010	170
		2011	<u>320</u>
		<b>Total</b>	590
Ground-Source Heat Pump	Tier 1: 60% Tier 2: 40%	2009	15
		2010	40
		2011	<u>75</u>
		<b>Total</b>	130
Heat Pump Water Heater	N/A	2009	15
		2010	50
		2011	<u>200</u>
		<b>Total</b>	265
Window AC Unit	N/A	2009	900
		2010	2,000
		2011	<u>3,000</u>
		<b>Total</b>	5,900
Through Wall AC Unit	N/A	2009	120
		2010	380
		2011	<u>500</u>
		<b>Total</b>	1,000
Programmable Thermostat	N/A	2009	600
		2010	1,200
		2011	<u>2,000</u>
		<b>Total</b>	3,800

### 3.4.2 Per Unit Savings

Tables 3-4A and 3-4B present estimated per-unit savings for each equipment type and efficiency option, relative to a representative assumed baseline unit. These are the “deemed savings” values that will be used until an Impact Evaluation is performed.

**Table 3-4A: Per-Unit Annual Electric Energy Savings**

<b>Equipment Type / Baseline</b>	<b>Minimum Performance</b>	<b>kWh/yr</b>
Central Air Conditioner / <i>Baseline: SEER = 11</i>	SEER = 14 / EER = 12.0	419
	SEER = 15 / EER = 13.0	522
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>440</b>
Air-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	SEER=14 / EER=12.0 / HSPF=8.5	1,613
	SEER=15 / EER=13.0 / HSPF=9.0	2,025
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>1,736</b>
Ground-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	EER = 15 / COP = 3.1	3,791
	EER = 16 / COP = 3.5	4,595
	<b>Weighted Average Value (4.5-ton unit)</b>	<b>4,112</b>
Heat Pump Water Heater / <i>Baseline: EF = 0.9</i>	EF = 2.0	2,320
Room-Size AC Unit	ENERGY STAR®	124
Programmable Thermostat	ENERGY STAR®	See Note 1

Note 1: It is assumed that a programmable thermostat is installed with every CAC, ASHP and GSHP system. The savings shown in the table include a 2.5% addition to account for the savings produced by the programmable thermostat. Purchases of thermostats by customers are assumed to result in a savings of 42 therms/year of natural gas.

**Table 3-4B: Per-Unit Peak Summer System Demand Savings**

<b>Equipment Type / Baseline</b>	<b>Minimum Performance</b>	<b>kW</b>
Central Air Conditioner / <i>Baseline: SEER = 11</i>	SEER = 14 / EER = 12.0	1.0
	SEER = 15 / EER = 13.0	1.2
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>1.0</b>
Air-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	SEER = 14 / EER = 12.0 / HSPF = 8.5	1.2
	SEER = 15 / EER = 13.0 / HSPF = 9.0	1.3
	<b>Weighted Average Value (3.5-ton unit)</b>	<b>1.0</b>
Ground-Source Heat Pump / <i>Baseline: SEER = 11 ASHP</i>	EER = 15 / COP = 3.1	1.2
	EER = 16 / COP = 3.5	1.5
	<b>Weighted Average Value (4.5-ton unit)</b>	<b>1.4</b>
Heat Pump Water Heater / <i>Baseline: EF = 0.9</i>	EF = 2.0	0.5
Room-Size AC Unit	ENERGY STAR®	0.2
Programmable Thermostat	ENERGY STAR®	0.0

### 3.4.3 Measure Life and Persistence

Operating life data are provided in Table 3-5. Persistence of savings with time over the operating life is assumed to be 100%.

**Table 3-5: HVAC Equipment Operating Lives**

<b>Equipment Type</b>	<b>Life (years)</b>
Central Air Conditioner	18
Central Air-Source Heat Pump	18
Ground-Source Heat Pump	20
Heat Pump Water Heater	15
Window AC Unit	14
Programmable Thermostat	10

### 3.4.4 Net-to-Gross Factor

The factor that accounts for free-ridership and spillover is assumed to be 95 percent for all equipment.

### 3.4.5 Net Energy and Demand Savings

Table 3-6A and 3-6B present estimated annual net electricity and natural gas savings, respectively, for each year's HVAC equipment purchased via the program, and Table 3-7 presents cumulative net energy savings over the average life of each electric equipment type.

**Table 3-6A: Annual Net Electric Energy and Peak Demand Savings**

Equipment Type	Year	MWh/yr	Summer kW	3-Year Totals
Central Air Conditioner	2009	75	171	MWh/yr: 485 kW: 1,102
	2010	159	361	
	2011	251	570	
Central Air-Source Heat Pump	2009	165	95	MWh/yr: 973 kW: 561
	2010	280	162	
	2011	528	304	
Ground-Source Heat Pump	2009	59	20	MWh/yr: 508 kW: 173
	2010	156	53	
	2011	293	100	
Heat Pump Water Heater	2009	33	1	MWh/yr: 584 kW: 25
	2010	110	5	
	2011	441	19	
Room-Size AC Unit	2009	106	171	MWh/yr: 695 kW: 1,121
	2010	236	380	
	2011	353	570	
<b>Totals:</b>	2009	<b>438</b>	<b>458</b>	<b>MWh/yr: 3,245 kW: 2,982</b>
	2010	<b>941</b>	<b>961</b>	
	2011	<b>1,866</b>	<b>1,563</b>	

**Table 3-6B: Annual Net Natural Gas Energy Savings**

Equipment Type	Year	Therms/yr	3-Year Total
Programmable Thermostat	2009	23,940	<b>151,620</b>
	2010	47,880	
	2011	79,800	

**Table 3-7: Cumulative Net Energy Savings Over Equipment Lives**

Equipment Type	MWh	Therms
Central Air Conditioners	8,722	N/A
Air-Source Heat Pump	17,518	N/A
Ground-Source Heat Pump	10,157	N/A
Heat Pump Water Heater	8,762	N/A
Room-Size AC Unit	9,730	N/A
Programmable Thermostat	N/A	1,516,200
<b>Program Totals</b>	<b>54,889</b>	<b>1,516,200</b>

### 3.4.6 Program Budgets

The program budget is presented below:

#### Electric Portion

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$73,000	\$32,000	\$170,000	\$275,475	\$28,000
2010	\$65,000	\$32,000	\$130,000	\$605,830	\$43,000
2011	<u>\$75,000</u>	<u>\$13,000</u>	<u>\$160,000</u>	<u>\$1,093,855</u>	<u>\$70,000</u>
<b>Total</b>	<b>\$213,000</b>	<b>\$77,000</b>	<b>\$460,000</b>	<b>\$1,975,160</b>	<b>\$141,000</b>

Year	Total
2009	\$578,475
2010	\$875,830
2011	\$1,411,855
<b>Total</b>	<b>\$2,866,160</b>

#### Natural Gas Portion

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$7,000	\$3,000	\$10,000	\$15,000	\$2,000
2010	\$5,000	\$3,000	\$10,000	\$30,000	\$3,000
2011	<u>\$5,000</u>	<u>\$2,000</u>	<u>\$10,000</u>	<u>\$50,000</u>	<u>\$4,000</u>
<b>Total</b>	<b>\$17,000</b>	<b>\$8,000</b>	<b>\$30,000</b>	<b>\$95,000</b>	<b>\$9,000</b>

Year	Total
2009	\$37,000
2010	\$51,000
2011	<u>\$71,000</u>
<b>Total</b>	<b>\$159,000</b>

#### Overall (Electricity and Natural Gas)

Year	Administration	Marketing	Contractors	Incentives	Evaluation
2009	\$80,000	\$35,000	\$180,000	\$290,475	\$30,000
2010	\$70,000	\$35,000	\$140,000	\$635,830	\$46,000
2011	<u>\$80,000</u>	<u>\$15,000</u>	<u>\$170,000</u>	<u>\$1,143,855</u>	<u>\$74,000</u>
<b>Total</b>	<b>\$230,000</b>	<b>\$85,000</b>	<b>\$490,000</b>	<b>\$2,070,160</b>	<b>\$150,000</b>

Year	Total
2009	\$615,475
2010	\$926,830
2011	<u>\$1,482,855</u>
<b>Total</b>	<b>\$3,025,160</b>

### 3.4.7 Program Cost-Effectiveness

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program:

#### Electric Portion

	TRC Test	TRC+C Test
Present Value of Benefits:	\$5,632,975	\$5,841,634
Present Value of Costs:	\$2,589,889	\$2,589,889
Net Present Value:	\$3,043,086	\$3,251,745
<b>B/C:</b>	<b>2.17</b>	<b>2.26</b>

#### Natural Gas Portion

	TRC Test	TRC+C Test
Present Value of Benefits:	\$1,077,083	\$1,171,262
Present Value of Costs:	\$295,935	\$295,935
Net Present Value:	\$781,148	\$875,327
<b>B/C:</b>	<b>3.64</b>	<b>3.96</b>

#### Overall (Electricity and Natural Gas)

	TRC Test	TRC+C Test
Present Value of Benefits:	\$6,710,059	\$7,012,896
Present Value of Costs:	\$2,885,824	\$2,885,824
Net Present Value:	\$3,824,235	\$4,127,072
<b>B/C:</b>	<b>2.33</b>	<b>2.43</b>

#### **4. Residential Lighting – Community Group CFL Sales Program**

The purpose of the Central Hudson Residential Lighting – Community Group CFL Sales program is to promote the efficient use of lighting through the sale of Compact Fluorescent Lamps (CFLs) by community groups in Central Hudson’s territory. This program encourages Central Hudson customers to purchase CFLs from local community groups as a fundraiser. Central Hudson will provide the CFLs to the community groups by purchasing the CFLs at the wholesale cost. The community groups fundraise by selling the bulbs at or near the normal sales price earning about \$4.00 for every CFL sold. Only one type of screw-in CFL at three different wattages (14W, 19W, and 23W sizes equivalent to 60W, 75W, and 100W) will be available for sale during the program.<sup>11</sup>

This program will achieve MWh and MW savings, but it also will serve as part of the community outreach and education program. Brochures for other Central Hudson energy efficiency programs will be attached to CFL packages purchased during the program to promote the HVAC, gas equipment, refrigerator recycling, and other programs.

This program also compliments current NYSERDA CFL upstream incentive programs by motivating customers to buy a full range of high-quality CFL products from local retailers. Through educating customers about the benefits of CFLs and since only limited CFL types are available through this program, customers will look to retail stores in New York State to fill their residential lighting needs for different types of CFLs.

##### **4.1 Program Theory**

The Residential Lighting – Community Group CFL Sales program will demonstrate that customers will pay the full retail cost when the energy efficiency message is conveyed in a meaningful way and to help community groups. This type of program benefits everyone including community groups, customers, the utility, retail stores, and NYSERDA.

This program provides a new approach to encourage customers to install energy efficient bulbs. The fund raiser model is designed to create a delivery mechanism that leverages community groups to explain the complex value proposition for CFLs in a direct (i.e. face-to face) sales environment to support CFL sales of a premium quality product at its full retail price. This approach better supports customers’ trail experience of the bulbs through initial purchases from the groups during a targeted one-month sales campaign while allowing the local retailers to generate follow-on sales at their full retail price.

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<sup>11</sup> This program may be expanded to include holiday light LEDs (possibly in exchange for normal incandescent holiday lights) during the second year of the program to allow the community groups to sell another product to diversify their offerings.

## 4.2 Program Description & Operation

Central Hudson will actively recruit community groups that the company's employees or associates are involved with. Various informational events and communications through direct-mail and e-mail will be used to promote this program to community groups.

A community group coordinator will need to complete a registration form to sign up their community group for the fundraiser. A group training session will be scheduled to educate and train members of the community group about the use of CFLs and the group will receive sales materials, order envelopes, flyers, and product samples. The group will then go out into the community and sell the CFLs at the full sales price (approximately \$4/bulb) for a four week period or longer as listed below.

The community group coordinator will collect all order envelopes and one consolidated order will be made for each community group or groups bringing in their orders at the same time. Central Hudson will buy these bulbs at the wholesale price (assumed to be \$1.50/bulb). The community group will fundraise the full price that they sell the CFL at (approximately \$4.00/bulb).

After the order is received, the community group members deliver their orders to the Central Hudson customers. Community group members will be required to make sure that they are selling the bulbs to Central Hudson customers and community group members will be made to track their deliveries.

## 4.3 Eligibility Criteria and Technology Descriptions

The screw-in CFLs to be sold in this program will be chosen with the following characteristics:

**Eligibility:** Screw-base CFLs with:

- ENERGY STAR® label
- Rating of 14W, 19W, or 23W sizes equivalent to 60W, 75W, and 100W

### **Technology Description**

Screw-base CFLs have an integral electronic ballast and are designed to fit into standard incandescent light fixtures as a direct replacement. ENERGY STAR® qualified screw-base CFLs must:

- Meet minimum efficacy ratings (initial lumens per watt) based on lamp power and configuration;
- Meet established specifications for lumen maintenance;
- Meet requirements for color quality and color temperature;
- Meet a range of electrical performance criteria including power factor, start-up time, operating frequency, and compatibility with lighting controls;
- Meet minimum rated lamp life and maximum interim life failure requirements;

- Carry a manufacturer's warranty for at least one year from purchase and contact information for complaint resolution.

#### 4.4 Estimated Program Sales and Savings

It is expected based on the Central Hudson's 2006 Residential Appliance Saturation Survey that there is a market for CFL sales in Central Hudson's service territory. The report provides the following data:

Homes with one CFL:	10%	Homes with no CFLs:	64%
Homes with two CFLs:	7%	Not Reported:	7%
Homes with three or more CFLs:	12%		

Based on this market data and experience in other states<sup>12</sup>, the following estimated annual community group CFL sales is projected:

Table 4-1: Estimated Annual CFL Sales

Appliance Type	Year	Sales
Screw-In ENERGY STAR® CFL	2009	6,000
	2010	14,000
	2011	<u>10,000</u>
	<b>Total</b>	<b>30,000</b>

#### 4.5 Per-Unit Gross Savings

Table 4-2 presents estimated per-unit gross savings for each eligible type of CFL, relative to a representative assumed Baseline incandescent unit. The values in the table are based on a recent detailed evaluation of the *Efficiency Maine* Residential Lighting Program:

Table 4-2: Per-Unit Annual Gross Electrical Energy and Peak Demand Savings

Equipment Type / Baseline	kWh/yr	Summer kW	Winter kW
Screw-In ENERGY STAR® CFL <i>Baseline: Incandescent Lamp</i>	50.5	0.001	0.048

#### 4.6 Measure Life and Persistence

**CFLs.** It has been assumed that the operating life of each CFL is 7 years, and that annual persistence over this period is 99.5 percent (i.e., 0.5% of the lamps are removed each year because the household relocates outside of New York State, the lamp fails and is not replaced in-kind, etc.).

<sup>12</sup> Based on existing program sales experience at the Orlando Utilities Commission.

#### 4.7 Net-to-Gross Factor

It has been assumed that:

90% of purchased screw-in CFLs are installed in homes in New York State, and that the factor to account for free-ridership and spillover is 85%

Central Hudson's T&D line-loss factors for peak demand and annual energy are:

$$\text{T\&D Line-Loss Factor (Energy)} = 7.2\%$$

For CFLs, the overall net-to-gross factors (NTGFs) therefore are:

$$\text{NTGF}_{\text{Energy}} = (0.90) \times (0.85) \times (1.072) = 0.820$$

#### 4.8 Net Energy and Demand Savings

Table 4-3: Annual Net Electrical Energy and Peak Demand Savings

Equipment Type	Year	MWh/yr	Summer kW	Winter kW
<b>Program Totals</b>	2009	248	5	238
	2010	580	12	554
	<u>2011</u>	<u>414</u>	<u>8</u>	<u>396</u>
	<b>Total</b>	<b>1,242</b>	<b>25</b>	<b>1,188</b>

Table 4-4: Cumulative Net Electrical Energy Savings

Equipment Type	MWh
<b>Cumulative MWh Program Totals</b>	<b>9,938</b>

#### 4.9 Program Evaluation

Central Hudson's Program Evaluation contractor will conduct a Process Evaluation during the end of year-one of the program to identify and recommend program modifications. The contractor will also conduct telephone surveys of samples of program participants as tracked by the community groups during sale and delivery of the CFLs during each calendar quarter to obtain data to gauge satisfaction with the program and with the performance of the lighting units. Survey results and records documenting the wattage, hours of use, and installed location for the new CFLs and the replaced incandescent lamps will be entered into the Program Tracking System (PTS).

#### 4.10 Program Budget

The program budget is presented below:

Year	Administration	Marketing / Group Recruitment	Cost of CFLs	Evaluation
2009	\$ 20,000	\$ 5,000	\$ 9,000	\$ 1,200
2010	\$ 20,000	\$ 5,000	\$ 21,000	\$ 1,800
<u>2011</u>	<u>\$ 20,000</u>	<u>\$ 5,000</u>	<u>\$ 15,000</u>	<u>\$ 1,500</u>
<b>Total</b>	<b>\$ 60,000</b>	<b>\$ 15,000</b>	<b>\$ 45,000</b>	<b>\$ 4,500</b>

Year	Total
2009	\$ 35,200
2010	\$ 47,800
<u>2011</u>	<u>\$ 41,500</u>
<b>Total</b>	<b>\$ 124,500</b>

#### 4.11 Program Cost-Effectiveness

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program:

	TRC Test	TRC +C Test
<b>Present Value of Benefits:</b>	\$ 521,909	\$ 577,168
<b>Present Value of Costs:</b>	\$ 151,018	\$ 151,018
<b>Net Present Value:</b>	\$ 370,890	\$ 426,150
<b>B/C:</b>	<b>3.46</b>	<b>3.82</b>

## **5. Mid-Size Commercial Business Program**

The purpose of the Mid-size Commercial Business Program is to help Central Hudson's customers in the bracket between the small commercial and industrial sectors to make their facilities more energy efficient, and thereby to reduce their energy usage and, correspondingly, the size of their energy bills. Specific sectors that will be focused on in this program are typically underserved by traditional C&I efficiency programs, and will include businesses such as hospitality (hotels and motels), restaurants, grocery stores, colleges, etc.

The energy efficiency program that we plan to offer, focuses on the 100 kW – 300 kW segment of our non-residential customers, and has the following components:

- Energy Upgrade Facilitation (i.e., energy audits where necessary coupled with implementation assistance)
- Rebates to make the economics of upgrading the efficiency of lighting, HVAC (including natural gas heating and water-heating), and other equipment powered by electricity or natural gas more economical and compelling.

### **5.1 Energy Upgrade Facilitation Component**

#### **5.1.1 Description of Services Offered**

The key implementation barriers experienced by customers in the C&I sector are widely recognized to be:

- Lack of information about what efficiency measures are available and effective,
- Skepticism about the accuracy of cost-saving claims provided by contractors,
- Lack of capital
- Lack of expertise, staff resources and especially time to seek reliable information concerning efficiency measures, obtain quotes from vendors and contractors, verify references, and obtain financing.

The proposed Energy Upgrade Facilitation process is designed to overcome these barriers, eliminating or significantly reducing the inconvenience while providing incentive rebates based on energy savings from installed measures. Our approach provides comprehensive energy efficiency information, recommendations, and implementation assistance to support all aspects of a retrofit project, including the energy audits if necessary or assistance with interpreting prior audit recommendations, project recommendation, contractor selection, work scope management, and project inspection—all on behalf of the customer.

If the owner expresses interest, and an energy audit has not previously been completed on the business, an energy audit can be arranged for.

The results of any energy audit are reviewed and discussed. The discussion includes an explanation of cost-effectiveness, Central Hudson rebates, federal and

state tax incentives, and non-energy benefits (e.g., more attractive appearance, more reliable operation, reduced Greenhouse gas emissions).

### **5.1.2 Marketing Activities**

Direct marketing of the program involves a personal visit by a Central Hudson representative. Chain accounts will be targeted as well as “stand-alone” accounts. A program brochure will be prepared that explains the approach and program rules. As projects are completed, Case Study reports will be prepared and used in the marketing effort. These reports will document actual savings achieved by in a variety of different facility types.

The marketing campaign will also feature:

- Pro-active outreach to property managers, suggesting they discuss the program with the property owner and recommend participation, or to facilitate a meeting between the owner and a Central Hudson representative.
- Participation by program representatives in trade association and business organization meetings, trade fairs, and other events. Program literature will be distributed during these meetings and events.

## **5.2 Rebates for Energy Efficiency Measures**

Central Hudson will pay rebates to the business owner, property owner, or directly to the installing contractor (when the customer authorizes this option and the contractor meets Central Hudson requirements). The contractor will net their invoice by the amount of the project’s rebate.

Rebate amounts will be calculated based on estimated energy savings, computed at:

- \$0.09/kWh saved
- \$0.80/therm saved

If Central Hudson does not manage the installation, a Central Hudson representative will inspect the project at completion to verify that the upgrade matches the performance specified in the Central Hudson proposal, which will be the basis of the 70 percent rebate.

## **5.3 Energy Audit**

The purpose of the energy audit assessment is to educate customers concerning ways they can reduce natural gas and electricity usage by installing specific energy-efficiency measures and/or undertaking specific practices. The assessment will identify the prescriptive rebates a customer may be eligible for if certain measures are installed. Where applicable, the assessment will provide industry-specific recommendations. The output of the assessment process is a report that includes graphics and text and that:

- Shows the customer how much electricity and natural gas are currently being used by various items of equipment;
- Recommends specific energy-efficiency measures, explains the key features of each measure, and indicates approximately how much energy-usage and operating costs each measure will save each year;
- Provides the approximate cost of installing each measure, the amount of rebate that a program will provide, and the approximate payback period;
- Identifies next steps for implementing energy efficiency measures and for receiving the rebate(s).

The report will be prepared and presented to the customer immediately following the data-collection phase of the assessment. In addition to delivering the report, the trained Central Hudson representative performing the assessment will discuss the report's recommendation with the business owner or a representative designated by the owner, and will explain the incentives that can be provided for each recommended measure.

The program data record will include the customer's business name and address, and the name and contact information of the owner and key management staff. In addition, the customer's billing history will be pre-loaded into the computer so it is instantly available for use by the software.

On-site data-collection activity will involve collecting and storing in the Assessment Database the following data elements:

- Facility name, address, telephone and fax numbers, website URL, and account numbers
- Business owner name, address, telephone and fax numbers, and key decision-makers' names, phone numbers, and email addresses.
- Business type and peak/average numbers of occupants/employees.
- (If applicable: ) Property manager's name, address, telephone and fax numbers, and key decision-makers' names, cell phone numbers, and email addresses.
- (If applicable: ) Property owner name, address, telephone and fax numbers, and key decision-makers' names, cell phone numbers, and email addresses.<sup>13</sup>
- Business operating schedule
- Facility structural data including age, type of construction, size, materials, etc.
- Fenestration and doors (sizes, heat-transfer characteristics)
- Thermal insulation in walls, ceiling, etc.
- Summary of energy end uses by all fuels (including electricity).

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<sup>13</sup> These items often are not known by the business owner, who routinely deals only with the property manager.

- Equipment inventory list including information collected on (a) lighting equipment and controls; (b) heating, ventilation and air conditioning (HVAC) equipment, including capacity ratings, efficiencies, controls, and control setpoints and schedule; (c) domestic hot water (DHW) equipment, including type (tank/instantaneous, direct/indirect, electricity, natural gas, propane, fuel oil, solar-assist, AC-desuperheater-assist), temperature, storage volume, power input (kW or Btu/hr); (d) refrigeration equipment (types, sizes, compressor and fan nameplate data, operating temperature, stored items); (e) process equipment, including: cooking equipment, dishwashers, clothes washers and dryers, air compressors, printing presses, machine tools; (f) office equipment, including computers, printers, copying machines, fax machines; (g) other equipment that uses a significant amount of energy.
- Equipment operating schedules, approximate ages, and general condition.

#### 5.4 Program Tracking System

The Program Tracking System (PTS) will be linked to the Assessment database, and will also contain participant-specific records detailing:

- Customer profile, including name, address, telephone, fax, e-mail, primary NAICS code, and business size code, and account numbers.
- Dates of: brochure mailing, initial visit, audit (or code indicating customer declined to have audit), follow-up contacts, contract signing (or code indicating customer declined to proceed with installing any measures), start of measure installation, completion of measure installation, payment of rebates to customers or contractor(s), and customer acceptance of project either individually or in total.
- All measures recommended, with estimated kWh, seasonal kW, and therm savings.
- Savings resulting from each energy-efficiency improvement.
- Installed costs for each recommended measure.
- Rebate amounts quoted for each energy efficiency measure.
- Application data, including trade ally identification code, measure code, measure category, date submitted, incentive amount, date approved, method of approval, and name of approver.

When the customer (i.e., business owner) agrees to have a specific set of measures installed, the following data will be captured in the PTS:

- Energy-efficiency equipment information, including equipment type, make, model, and serial number.
- Equipment purchase information, including sale date, as well as total cost of equipment and rebate amount.
- Installation information, including date of installation, contractor(s), date of inspection (if required), and appliance ownership data.
- Electricity savings (kWh/yr) and peak-demand reduction (kW); fuel savings (million Btu/yr), and fuel type.

## 5.5 Summary of Key Program Features

The key Program design features of the program are listed in Table 3-1. These features can maximize participation by businesses while optimizing cost-effectiveness.

**Table 3-1: Mid-Size Commercial Program Design Features**

Design Feature	How the Feature Contributes to Success
Marketing and sales focus on closing lighting and HVAC retrofit projects	Program delivery efficiency is maximized by having auditor/sales personnel close lighting retrofit sales during the initial in-person visit to a business prospect where possible. This reduces the need for additional follow-up contacts to initiate a retrofit project.
Saturation marketing by sector	Sector saturation marketing is effective. Geographic packaging of retrofit projects to contractors increases installation efficiency, resulting in lower installation costs.
Direct contact with property and business owners initiated to gain their support and participation	Property management firms are key trade allies, and winning their support is given a high priority. In many instances, they will take the lead in convincing the customer to participate. Upgrading the property is often win-win for all parties.
Bundled retrofit product and rebate with uniform pricing within a pool of pre-qualified contractors*	This feature simplifies and expedites program administration and helps to minimize first costs to the business participant. For example, standardized lighting retrofit pricing bundled with central Hudson rebates provide the lowest out-of-pocket cost to the customer.
Rebate incentives based on energy saved	Provides a compelling “value proposition” to the customer.
Federal and state tax incentives	Further reduces first costs to the small business participant.
Customer support at each step of the retrofit process	The wrap-around service approach is crucial to move businesses to take action.

\* Customers will have the option of using a contractor of their own choosing.

## 5.6. Estimated Net Savings

Program participation is estimated to increase by more than 100% each year during the three-year duration, as an ever-increasing number of trade allies become familiar with it. Table 3-2 provides our expectation of cumulative savings that will be achieved at the end of the program term.

Installed measures are defined as follows:

- Lighting-1: Lighting measures involving several different fixture types that use pin-base CFL lamps LED Exit signs, and 4-foot T8 and T5 lamps.
- Lighting-2: Lighting measures involving occupancy sensing and daylight-dimming controls.
- HVAC-1: Combination of high efficiency Central Air Conditioning and Air Source Heat Pump Units.
- HVAC-2: Ground Source Heat Pump Units and heat pump water heaters.
- Custom: A variety of motor, motor controls (i.e., variable speed drives - VSDs), refrigeration measures.

**Table 3-2: Estimated Program Three-Year Savings Accomplishments**

Equipment	Year	Units	MWh/yr Saved (Net)	KW Reduction (Net)
Lighting-1	2009	2500	1,445	263
	2010	5000	2,890	525
	2011	7000	4,046	735
		<b>14,500</b>	<b>8,381</b>	<b>1,523</b>
Lighting-2	2009	200	297	39
	2010	400	594	77
	2011	600	891	116
		<b>1,200</b>	<b>1,783</b>	<b>232</b>
HVAC-1	2009	160	413	339
	2010	350	904	742
	2011	550	1,420	1,166
		<b>1,060</b>	<b>2,736</b>	<b>2,246</b>
HVAC-2	2009	142	135	43
	2010	426	404	130
	2011	852	809	259
		<b>1,419</b>	<b>1,348</b>	<b>432</b>
Custom	2009	175	214	71
	2010	298	363	121
	2011	875	770	257
		<b>1,348</b>	<b>1,347</b>	<b>449</b>
		<b>TOTAL</b>	<b>15,595</b>	<b>4,883</b>

Table 3-3 provides estimated combined cumulative savings over the life of the installed measures for both electric and gas installations.

**Table 3-3: Estimated Cumulative Program Savings Accomplishments**

<b>Installed Measure</b>	<b>Net Cumulative MWh Savings</b>
Lighting-1	125,713
Lighting-2	21,393
HVAC-1	49,255
HVAC-2	26,966
Custom	20,199
<b>Total</b>	<b>243,527</b>

### 5.7. Program Budgets

The program budget is presented below:

#### Total Budget

<b>Year</b>	<b>Administration</b>	<b>Marketing</b>	<b>Contractors</b>	<b>Incentives</b>	<b>Evaluation</b>
2009	\$70,000	\$40,000	\$400,000	\$525,922	\$45,000
2010	\$75,000	\$40,000	\$420,000	\$1,180,446	\$75,000
2011	<u>\$80,000</u>	<u>\$20,000</u>	<u>\$450,000</u>	<u>\$1,951,459</u>	<u>\$120,000</u>
<b>Total</b>	<b>\$225,000</b>	<b>\$100,000</b>	<b>\$1,270,000</b>	<b>\$3,657,827</b>	<b>\$240,000</b>

<b>Year</b>	<b>Total</b>
2009	\$1,080,922
2010	\$1,790,446
2011	<u>\$2,621,459</u>
<b>Total</b>	<b>\$5,492,827</b>

### 5.8 Program Cost-Effectiveness

The Total Resource Cost (TRC) Test results and TRC Test taking into account externalities due to carbon reduction (TRC+C) are shown below for this program:

#### Total Mid-size Commercial Program Cost Effectiveness

	<b>TRC Test</b>	<b>TRC+C Test</b>
Present Value of Benefits:	\$16,930,242	\$17,888,163
Present Value of Costs:	\$6,038,986	\$6,038,986
Net Present Value:	\$10,891,257	\$11,849,177
<b>B/C:</b>	<b>2.80</b>	<b>2.96</b>

**Energy Efficiency Panel Exhibit \_\_\_\_\_ (EEP-2)  
Central Hudson Gas & Electric Corporation  
Energy Efficiency Program by Program Information  
Per Appendix 3 Categories**

	Residential Lower Income Assistance Program	Residential Appliance Recycling Program	Expanded Residential HVAC and Early Retirements Program	Residential Lighting – Community Group CFL Sales Program	Mid-Size Commercial Business Direct Install Program
<b>Market Information</b>					
- Market Segment Need	Program targets customers at and around HEAP eligibility, who use higher portion of income to pay for energy and typically lack resources to implement efficiency measures	Program aggressively targets older secondary refrigerators, freezers, and air conditioning units. No existing programs of similar nature in NYS	Program expands approved “utility expedited” program design, in order to reach fuller penetration	Program aimed at providing energy savings through CFL installation, utilizing Community Group to distribute through fundraising, thereby promoting energy efficiency and providing unique education channel	Program targets 100KW-300KW commercial market, that typically lack resources to effectively implement efficiency measures
- Underserved Markets	Addresses multi-family and rental units	Available to all residential customers	Available to all residential customers	Available to all residential customers	Typical underserved businesses include hospitality, restaurants, grocery stores, educational institutions, etc

Portfolio Factors					
- Portfolio Balance	Compliments NYSERDA EmPower program with greater penetration	Unique program	Compliments proposed CHG&E expedited program, utilizing same distribution and operation channels	Designed to compliment upstream market transformation efforts through "jump starting" awareness and educating customers	Designed to deliver efficiency services to customers in the bracket between proposed "utility expedited" small commercial direct install and existing and expanding NYSERDA Flex Tech programs
- Depth of Savings	Utilizes whole house approach through energy audit and provides consumer education	Main target of program is refrigerator and freezer units; however, room A/C's recycled with bounty paid while collecting other appliances. Will also provide "leave behind" educational material	Expands proposed CHG&E expedited program to include programmable thermostats and room A/C units, thereby increasing breadth of service during contact	Brochures for other Central Hudson energy efficiency programs will be attached to CFL packages purchased during the program to promote the HVAC, gas equipment, refrigerator recycling, and other programs.	Utilizes whole facility approach with education
- Co-benefits	Provides local employment opportunities for "green collar" workforce, both in audit and efficiency retrofit / measure installation	Provides local employment opportunities. Also provides environmental benefit by ensuring correct recycling of appliances	Provides local employment opportunities for "green collar" workforce.	Initiates involvement with Community Groups, providing positive societal impact	Provides local employment opportunities for "green collar" workforce.

- Program Commitment Term	Ramp of contractors and workforce complete by end of program first year	Ramp to program implementation estimated at 3 months, pending competitive bidding process	Ramp to program implementation estimated at 3 months, pending competitive bidding process	Ramp to program implementation estimated at 2 months, pending competitive bidding process	Ramp to program implementation estimated at 3 months, pending competitive bidding process
- Fuel Integration	Energy savings for both electric and gas accomplished through installed measures utilizing whole house approach	Targeted at electric energy savings, but will also provide “leave behind” educational material	Targeted at both electric and gas savings	Targeted at electric savings, but promotes other efficiency programs	Targeted at electric savings, but promotes other efficiency programs
- Demand Reduction and System Benefits	Please refer to Exhibit (EEP-3)				
- Coordination	Subsidy for energy efficiency measures designed to compliment assistance from NYSERDA and EmPower	Unique program targeted at specific energy savings	Program will utilize channels for program delivery developed for “utility expedited” HVAC program and benefit from economy of scale	Unique program, designed to compliment NYSERDA efforts with well timed promotion	Provides services in 100KW – 300KW bracket, currently not targeted
- Evaluation	Current evaluation plan to be revised to meet guidance as provided by Director of Office of Energy Efficiency and Environment				
- Customer Outreach	Accomplished through allotted marketing, and outreach/education budgets, utilizing customer data for targeting specific consumers	Accomplished through allotted marketing, and outreach/education budgets. Marketing through direct mail, aggressive advertisement, etc.	Accomplished through allotted marketing, and outreach/education budgets. Marketing through direct mail, aggressive advertisement, etc.	Marketing through Community Group outreach and education	Direct marketing approach through personal contact with CHG&E representative
<b>Process Factors</b>					
- Collaborative Approach	Consistent approach to other industry programs; community organization input	Program design consistent with other successful programs operated in other States	Program design consistent with “utility expedited” requirements	Consistent design with successful industry programs	Consistent design with successful industry programs

- Transparency	Full descriptive information has been provided				
- Procurement	Competitive process				
<b>Screening Metrics</b>					
- TRC B/C Ratio		2.93	2.06	3.26	2.80
- TRC plus Carbon		3.12	2.17	3.82	2.96
- Electric Rate Impact (ERI)					
- ERI/MWh Saved					
- ERI/MWh Saved (Coincident)					
- 2015 MWh Saved A					
- 2015 MWh Saved B		51,072	21,092	7,288	88,138
- 2015 MW Saved (Coincident)		1.39	2.99	0.03	4.88
- 2015 Peak Coincidence Factor		0.24	1.24	0.03	0.49
- 2015 Class Participation Percentage					
- Gas Rate Impact					
- Total Levelized MBTU Saved					

# Energy Efficiency Panel Exhibit (EEP-3) Central Hudson Gas and Electric Corporation Energy Efficiency Program Costs and Savings Matrix

Program Name	Eligible Equipment	Rebate Philosophy	Marketing	Program Design	3 1/4 Year (4th Q 2008 - 2011)			Over Life of Measures Cumulative MWht	
					Program Cost	MWh Savings	KW Savings		therm Savings
Residential ENERGY STAR® HVAC	*Central air conditioners, Air-source heat pumps, Ground-source heat pumps, Heat pump water heaters	*Tiered rebates for customers based on efficiency level of installed equipment *Incentives for contractors	*Trade Allies *Mass Market	*Customer & contractor incentives / contractor training	\$2,330,505	2,922	1,982	51,472	
Residential Gas Equipment	*Furnaces (AFUE of 92 & 95), *Boilers (AFUE of 82, 85 & 90), *Water Heaters (EF = 0.80 & 0.82),	*Tiered rebates for customers based on efficiency level of installed equipment *Incentives for contractors	*Trade Allies *Mass Market	*Promote efficient furnaces, boilers, water heaters, clothes washers, and solar hot water. *Training for proper installation	\$650,500	-	-	99,446	
Small Commercial Business Direct Installation	*Lighting, HVAC, motors, refrigeration, controls and custom installs	*Utility to pay for 70% / Customer to pay for 30% of measure cost	*Mass Market *Local Groups (e.g., Chambers)	*Focus on small commercial customers (up to 100-kW peak demand)	\$12,370,030	45,360	11,234	70,690	
Third Party (Set Aside)				Utility Expedited Programs Totals =	\$15,351,035	48,282	13,216	170,136	
*As ordered, Central Hudson has set aside a portion of its MWh savings goal to allow third parties to collaborate on energy efficiency program in Central Hudson's service territory.					TBD	11,985	TBD	TBD	
<b>Residential "Jurisdictional Gap" Programs</b>									
Lower-Income Assistance	*Weatherization, HVAC, lighting, appliances (whole house approach)	*Income-qualified owner would receive \$3,000 subsidy (single homeowner) / \$6,000 (2-4 building owners)	*In conjunction with NYSERDA	*Designed to complement NYSERDA Empower program	\$3,545,000	2,243	230	300,675	5,411,250
Appliance Recycling	*10 to 30 cubic-foot refrigerators / freezers demonstrated to be operating unit *Any room (window or thru-wall) air conditioner unit larger than 6,000 Btu/hr	*\$35 incentive to customer for handling in refrigerator/freezer unit *\$25 incentive to customer for handling in eligible room AC unit	*Mass Market	*Program targets collection of inefficient second refrigerators, freezers and room AC units.	\$2,383,649	8,487	1,386	-	68,432
Expanded Residential HVAC & Early Retirements	*Central AC, Air-source heat pumps, Ground-source heat pumps, Heat pump water heaters, Room AC units, and programmable thermostats	*Tiered Rebates based on efficiency level of new unit *Incentive to hand in old room AC to upgrade to CAC *Incentives for contractors *\$50 coupon for purchase of a new ENERGY STAR room AC unit when handling in an old unit	*Trade Allies *Mass Market	*Customer & contractor incentives / contractor training	\$3,025,160	3,245	2,982	151,620	1,516,200
Lighting - Community Group CFL Sales	*ENERGY STAR® Compact Fluorescent Lamps (CFL)	*None	*Community Groups	*Community groups sell CFLs and keep profit after utility buy-downs	\$124,500	1,242	25	-	9,938
<b>Commercial "Jurisdictional Gap" Programs</b>									
Mid-Size Commercial Business	*Lighting, HVAC, motors, refrigeration, controls and custom installs	*Rebates for customers based on energy saved through installed measures.	*Mass Market *Door-to-door *Personal contact	*Focus on underserved mid-size commercial customer between 100-kW and 300-kW on peak, but not industrial customers (Designed to avoid overlap w/ NYSERDA Flex Tech programs).	\$5,492,827	15,595	4,883	-	243,527
Outreach / Education / Promotion (including on-line audit program) =					\$2,600,000				
Enhanced Measurement & Verification (5% of total program budget) =					\$1,496,109				
Initial Start-Up (Tracking System Costs, etc.) =					\$500,000				
Three Year Program Totals =					\$34,518,280	91,079	22,722	622,431	1,154,828
								1,154,828	10,527,428

**Energy Efficiency Panel Exhibit (EEP-4)  
Central Hudson Gas and Electric Corporation  
Energy Efficiency Program Total Resource Cost (TRC) Table**

	Utility Expedited Programs					Jurisdictional Gap Programs					Savings/Central			
	Residential Energy Star® HVAC	Residential Gas Equipment	Small Commercial Direct Installation (Electric)	Small Commercial Direct Installation (Gas)	Utility Expedited Program Totals	Overall Expedited Program Totals	Appliance Recycling	Expanded Residential HVAC (Electric)	Expanded Residential HVAC (Gas)	Lighting - Community Group CFL Sales	Mid-Size Commercial Business	Jurisdictional Gap Program Totals	Expedited and Jurisdictional Gap Combined Program Totals	Overall Expedited and Jurisdictional Gap Combined Program Totals <sup>1</sup>
Present Value - Benefits	\$4,548,107	\$1,275,609	\$45,007,970	\$913,274	\$51,744,960	\$51,744,960	\$4,812,011	\$5,632,975	\$1,077,083	\$521,909	\$16,930,242	\$28,974,221	\$80,719,180	\$80,719,180
Present Value - Benefits w/C	\$4,740,573	\$1,376,439	\$47,718,667	\$985,398	\$54,821,077	\$54,821,077	\$5,126,194	\$5,841,634	\$1,171,262	\$577,168	\$17,888,163	\$30,604,421	\$85,425,498	\$85,425,498
Present Value - Costs	\$2,260,464	\$591,295	\$12,390,187	\$414,453	\$15,656,398	\$25,441,663 \$26,056,886	\$1,646,500	\$2,589,889	\$295,935	\$151,018	\$6,038,986	\$10,722,328	\$26,378,726	\$39,275,374 \$40,216,637
Net Present Value	\$2,287,643	\$684,314	\$32,617,784	\$498,821	\$36,088,561	\$26,303,297	\$3,165,512	\$3,043,086	\$781,148	\$370,890	\$10,891,257	\$18,251,893	\$54,340,454	\$41,443,806
Net Present Value w/C	\$2,480,109	\$785,144	\$35,328,481	\$570,945	\$39,164,679	\$28,764,191	\$3,479,694	\$3,251,745	\$875,327	\$426,150	\$11,849,177	\$19,882,093	\$59,046,772	\$45,208,861
TRC	2.01	2.16	3.63	2.20	3.31	2.03	2.92	2.17	3.64	3.46	2.80	2.70	3.06	2.06
TRC+C	2.10	2.33	3.85	2.38	3.50	2.10	3.11	2.26	3.96	3.82	2.96	2.85	3.24	2.01

Notes: 1. Overall Program Totals include utility incentive, outreach and education, Enhanced M&V, and initial start-up costs.

	Expedited	Gap
Utility Incentive	20% Net Benefits	
Outreach / Education	\$1,300,000	\$1,300,000
Enhanced M&V	\$767,552	\$728,557
Utility Start-Up	\$500,000	

M&V = 5% of program budget

**Energy Efficiency Panel Exhibit \_\_\_\_ (EEP-5)  
Central Hudson Gas and Electric Corporation  
Energy Efficiency Program Budgets (2009-2011)**

Exhibit\_\_(EEP-5)

2009		Administration	Marketing	Contractors	Incentives	Evaluation	Totals
Residential Energy Star HVAC	Electric	\$70,000	\$35,000	\$130,000	\$209,055	\$24,000	\$468,055
Residential Gas Equipment	Gas	\$20,000	\$20,000	\$85,000	\$49,850	\$19,000	\$193,850
Small Commercial Business Direct Install	Electric	\$125,000	\$80,000	\$700,000	\$901,484	\$95,000	\$1,901,484
	Gas	\$25,000	\$10,000	\$87,000	\$23,835	\$8,000	\$153,835
Lower Income	Electric	\$42,500	\$42,500	\$102,000	\$425,000	\$34,000	\$646,000
	Gas	\$7,500	\$7,500	\$18,000	\$75,000	\$6,000	\$114,000
Appliance Recycling	Electric	\$41,000	\$68,375	\$506,660	\$154,000	\$38,452	\$808,487
	Gas	\$73,000	\$32,000	\$170,000	\$275,475	\$28,000	\$578,475
Expanded Residential HVAC & Early Retirement	Electric	\$7,000	\$3,000	\$10,000	\$15,000	\$2,000	\$37,000
	Gas	\$20,000	\$5,000	\$9,000	\$9,000	\$1,200	\$35,200
Lighting - Community Group CFL Sales	Electric	\$70,000	\$40,000	\$400,000	\$525,922	\$45,000	\$1,080,922
Mid-Size Commercial Business	Electric	\$501,000	\$343,375	\$2,208,660	\$2,663,421	\$300,652	\$6,017,108

2010		Administration	Marketing	Contractors	Incentives	Evaluation	Totals
Residential Energy Star HVAC	Electric	\$60,000	\$35,000	\$80,000	\$481,025	\$32,000	\$688,025
Residential Gas Equipment	Gas	\$20,000	\$15,000	\$60,000	\$110,850	\$23,000	\$228,850
Small Commercial Business Direct Install	Electric	\$140,000	\$80,000	\$850,000	\$2,331,416	\$150,000	\$3,531,416
	Gas	\$12,500	\$5,000	\$75,000	\$45,623	\$7,500	\$145,623
Lower Income	Electric	\$34,000	\$34,000	\$136,000	\$743,750	\$34,000	\$981,750
	Gas	\$6,000	\$6,000	\$24,000	\$131,250	\$8,000	\$173,250
Appliance Recycling	Electric	\$40,000	\$66,625	\$493,500	\$150,000	\$37,456	\$787,581
	Gas	\$65,000	\$32,000	\$130,000	\$605,830	\$43,000	\$875,830
Expanded Residential HVAC & Early Retirement	Electric	\$5,000	\$3,000	\$10,000	\$30,000	\$3,000	\$51,000
	Gas	\$20,000	\$5,000	\$21,000	\$21,000	\$1,800	\$47,800
Lighting - Community Group CFL Sales	Electric	\$75,000	\$40,000	\$420,000	\$1,180,446	\$75,000	\$1,790,446
Mid-Size Commercial Business	Electric	\$477,500	\$301,625	\$2,278,500	\$5,831,190	\$412,756	\$9,301,671

2011		Administration	Marketing	Contractors	Incentives	Evaluation	Totals
Residential Energy Star HVAC	Electric	\$70,000	\$15,000	\$100,000	\$936,425	\$53,000	\$1,174,425
Residential Gas Equipment	Gas	\$20,000	\$10,000	\$60,000	\$115,000	\$23,000	\$208,000
Small Commercial Business Direct Install	Electric	\$150,000	\$30,000	\$1,000,000	\$4,992,049	\$320,000	\$6,492,049
	Gas	\$12,500	\$5,000	\$75,000	\$45,623	\$7,500	\$145,623
Lower Income	Electric	\$25,500	\$17,000	\$195,500	\$1,062,500	\$85,000	\$1,385,500
	Gas	\$4,500	\$3,000	\$34,500	\$187,500	\$15,000	\$244,500
Appliance Recycling	Electric	\$40,000	\$66,625	\$493,500	\$150,000	\$37,456	\$787,581
	Gas	\$75,000	\$13,000	\$160,000	\$1,093,855	\$70,000	\$1,411,855
Expanded Residential HVAC & Early Retirement	Electric	\$5,000	\$2,000	\$10,000	\$50,000	\$4,000	\$71,000
	Gas	\$20,000	\$5,000	\$15,000	\$15,000	\$1,500	\$41,500
Lighting - Community Group CFL Sales	Electric	\$80,000	\$20,000	\$450,000	\$1,951,459	\$120,000	\$2,621,459
Mid-Size Commercial Business	Electric	\$502,500	\$186,625	\$2,578,500	\$10,599,411	\$736,456	\$14,603,492

2009-2011		Administration	Marketing	Contractors	Incentives	Evaluation	Totals
Residential Energy Star HVAC	Electric	\$200,000	\$85,000	\$310,000	\$1,626,505	\$109,000	\$2,330,505
Residential Gas Equipment	Gas	\$60,000	\$45,000	\$205,000	\$275,500	\$65,000	\$650,500
Small Commercial Business Direct Install	Electric	\$415,000	\$170,000	\$2,550,000	\$8,224,949	\$565,000	\$11,924,949
	Gas	\$50,000	\$20,000	\$237,000	\$115,081	\$23,000	\$445,081
Lower Income	Electric	\$102,000	\$93,500	\$433,500	\$2,231,250	\$163,000	\$3,013,250
	Gas	\$18,000	\$16,500	\$76,500	\$393,750	\$27,000	\$531,750
Appliance Recycling	Electric	\$121,000	\$201,625	\$1,493,660	\$454,000	\$113,364	\$2,383,649
	Gas	\$213,000	\$77,000	\$460,000	\$1,975,160	\$141,000	\$2,866,160
Expanded Residential HVAC & Early Retirement	Electric	\$17,000	\$8,000	\$30,000	\$95,000	\$9,000	\$159,000
	Gas	\$60,000	\$15,000	\$0	\$45,000	\$4,500	\$124,500
Lighting - Community Group CFL Sales	Electric	\$225,000	\$100,000	\$1,270,000	\$3,657,827	\$240,000	\$5,492,827
Mid-Size Commercial Business	Electric	\$1,481,000	\$831,625	\$7,065,660	\$19,094,022	\$1,449,864	\$29,922,171

Programs Subtotal 2009-2011		2009	2010	2011	Total
	Electric	\$5,518,823	\$8,702,848	\$13,914,369	\$28,135,840
	Gas	\$498,485	\$598,723	\$689,123	\$1,786,331
	<b>Totals</b>	<b>\$6,017,108</b>	<b>\$9,301,671</b>	<b>\$14,603,492</b>	<b>\$29,922,171</b>

Enhanced Measurement & Verification		2009	2010	2011	Total
	Electric	\$275,931	\$435,143	\$695,719	\$1,406,792
	Gas	\$24,924	\$29,936	\$34,456	\$89,317
	<b>Totals</b>	<b>\$300,855</b>	<b>\$465,079</b>	<b>\$730,176</b>	<b>\$1,496,109</b>

Outreach / Education Campaign		2009	2010	2011	Total
	Electric	\$800,000	\$900,000	\$500,000	\$2,200,000
	Gas	\$200,000	\$100,000	\$100,000	\$400,000
	<b>Totals</b>	<b>\$1,000,000</b>	<b>\$1,000,000</b>	<b>\$600,000</b>	<b>\$2,600,000</b>

Utility Administration Start Up	2009
	\$500,000

Grand Total		2009	2010	2011	Total
	Electric	\$6,894,554	\$10,037,991	\$15,110,088	\$32,042,632
	Gas	\$923,409	\$728,659	\$823,579	\$2,475,647
	<b>Totals</b>	<b>\$7,817,963</b>	<b>\$10,766,650</b>	<b>\$15,933,667</b>	<b>\$34,518,280</b>