



# ENERGY STAR

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**Education for the  
future.**





**GreenPlumbers®**

CLIMATE CARE

# **Green Plumbers USA**

## **12 Week Presentation**

### **Week 6**

### **“Climate Care”**





# **Topics Covered in Climate Care**

- **Introduction to Climate Change**
- **The Water-Energy-GHG Relationship**
  - **Why Hot Water?**
  - **Water Heating Technologies**  
(Law, Energy Star, Types, Alternatives)
  - **Hot Water Distribution**



# **Climate Care Workshop**

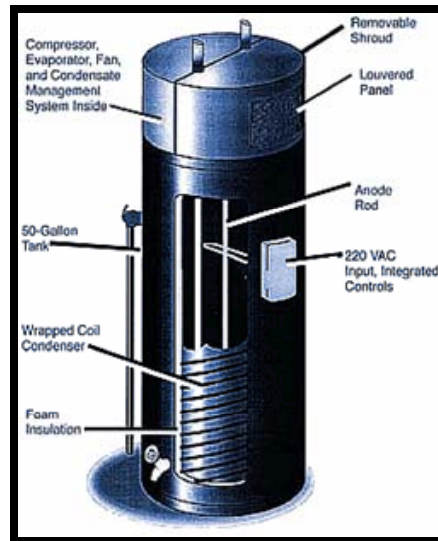
**The Climate Care project is concerned with reducing the greenhouse gas-emission impacts of:**

- household plumbing services**
- water heating equipment**
- heating & cooling appliances**

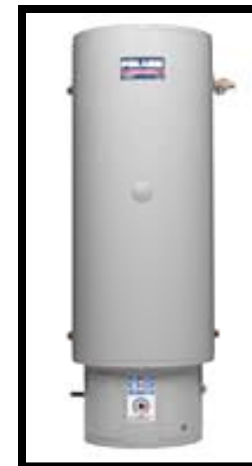


# Water Heating Technologies

## Electric



## Gas





Remember your goal is to be an **advisor**  
“Energy Star—anybody can get that information,”  
Do you want to do the homework yourself?  
Use the tools that are already out there!

40,000 energy efficient products

Rebates

Tax credit opportunities

Life Cycle estimating spreadsheets





# Energy Star for Water Heaters

- **Facts to note:**
  - No Energy Star for resistance electric water heaters – storage and tankless
  - No Energy Star for EPAAct water heaters
  - EF level for standard gas storage water heaters increased to 0.67 in 2010
- **Opportunity!**
  - This program should facilitate the sale of more efficient water heaters.



**Table 1: Energy and Cost Comparison: Electric Water Heating – 50-gallon capacity**

Electric Water Heater	Standard	High-Performing	Tankless	HPWH	Solar
Energy Factor	0.904	0.95	0.99	2.0	1.8 <sup>6</sup>
Annual Consumption (kWh/yr) <sup>7</sup>	4,857	4,622	4,435	2,195	2,429
Annual Savings (kWh/yr)	None	235	422	2,662	2,428
Annual Cost of Operation (\$/yr)	\$505	\$481	\$461	\$228	\$253
Annual Savings (\$/yr)	None	\$24	\$44	\$277	\$252
Life Expectancy	13 years <sup>8</sup>	13 years	20 years	10 years <sup>9</sup>	20 years
Lifetime Savings (kWh)	None	3,055	8,440	26,620	48,570
Lifetime Savings (\$)	None	\$318	\$878	\$2,768	\$5,051
Installed Cost	~\$650	~\$700	~\$1,000- \$2,000	~\$1,500 <sup>10</sup>	~\$3,200 <sup>11</sup>
Price Premium	NA	~\$50	~\$350-\$1,350	~\$850	~\$2,550
Payback on Price Premium	NA	~2 years	~8-31 years	~3 years	~10 years
Residential Annual Sales	~4.8 million <sup>12</sup>		~45,000 <sup>13</sup>	<2,000 <sup>14</sup>	~8,500 <sup>15</sup>

**Table 2: Energy and Cost Comparison: Gas Water Heating – 50-gallon capacity**

Gas Water Heater	Standard	High-Efficiency	High-Performance	Tankless	Gas-Condensing	Solar
Energy Factor	0.575	0.62	0.67	0.82	0.8	1.2 <sup>16</sup>
Annual Consumption (therm/yr) <sup>17</sup>	261	242	224	183	187	131
Annual Savings (therm/yr)	None	19	37	78	74	130
Annual Cost of Operation (\$/yr)	\$360	\$334	\$309	\$253	\$258	\$180
Annual Savings (\$/yr)	None	\$26	\$51	\$108	\$102	\$180
Life Expectancy	13 years <sup>18</sup>	13 years	13 years	20 years <sup>19</sup>	15 years	20 years
Lifetime Savings (therms)	None	247	481	1,560	1,110	2,610
Lifetime Savings (\$)	None	\$341	\$664	\$2,153	\$1,532	\$3,602
Installed Cost	~\$865 <sup>20</sup>	~\$935	~\$1,265	~\$1,470-\$2,500 <sup>21</sup>	~\$1,300-\$1,800 <sup>22</sup>	~\$3,200
Price Premium	None	~\$70	~\$400	~\$605-\$1,635	~\$435-\$935	~\$2,335
Payback on Price Premium	None	~2.5 years	~8 years	~5.5-15 years	~4-9 years	~13 years
Residential Annual Sales	~4.7 million <sup>23</sup>			~254,600 <sup>24</sup>	NA	~8,500

Hot Water	Delta T	Weight	Raw	EF	Adj.	Therms	Therm	Yearly	Yearly
Day		Gallon	BTUs		BTUs	Day	Cost		Cost
64.3	70	8.34	37538	0.58	65284	0.65	1.18	365	280.65
64.3	70	8.34	37538	0.62	60546	0.61	1.18	365	260.28
64.3	70	8.34	37538	0.67	56027	0.56	1.18	365	240.86
64.3	70	8.34	37538	0.70	53626	0.54	1.18	365	230.54
64.3	70	8.34	37538	0.90	41709	0.42	1.18	365	179.31
64.3	70	8.34	37538	0.96	39102	0.39	1.18	365	168.10
Base Model	Premium	\$ Saving	ROI		Natural Gas @ 1.18 per therm				
0.67	675.00	39.79	16.96						
0.70		50.12							
0.90	1950.00	101.35	19.24						
0.96	3150.00	112.55	27.99						

Hot Water	Delta T	Weight	Raw	EF	Adj.	Therms	Therm	Yearly	Yearly
Day		Gallon	BTUs		BTUs	Day	Cost		Cost
64.3	70	8.34	37538	0.58	65284	0.65	1.46	365	347.90
64.3	70	8.34	37538	0.62	60546	0.61	1.46	365	322.65
64.3	70	8.34	37538	0.67	56027	0.56	1.46	365	298.57
64.3	70	8.34	37538	0.70	53626	0.54	1.46	365	285.77
64.3	70	8.34	37538	0.90	41709	0.42	1.46	365	222.27
64.3	70	8.34	37538	0.96	39102	0.39	1.46	365	208.38
Base Model	Premium	\$ Saving	ROI		Natural Gas @ 1.46 per therm				
0.67	675.00	49.33	13.68						
0.70		62.12							
0.90	1950.00	125.63	15.52						
0.96	3150.00	139.52	22.58						

Install On Demand Circ System			Cost/CCF		Savings		
Water saved	10,000 gals	14 CCF	3.00		42.00		
Sewer saved	10,000 gals	14 CCF	3.00		42.00		
						Combined	
						Water/Sewer	
	Raw BTUs	Adj BTUs	Therms	Therm	Yearly	Energy	
<b>Heater EF</b>	<b>Saved/YR</b>	<b>Saved/YR</b>	<b>Saved</b>	<b>Cost</b>	<b>Saving</b>	<b>Savings</b>	
0.67	6106648	9114400	91	1.18	107.55	191.55	
0.7	6106648	8723782	87	1.18	102.94	186.94	
0.9	6106648	6785164	68	1.18	80.06	164.06	
0.96	6106648	6361091	64	1.18	75.06	159.06	
High Efficiency Water Heater Only				With On Demand Circ System (est 500 installation)			
<b>Base Model</b>	<b>Premium</b>	<b>\$ Saving</b>	<b>ROI</b>		<b>Premium</b>	<b>\$ Saving</b>	<b>ROI</b>
0.67	675.00	39.79	16.96		1175.00	231.34	5.08
0.70		50.12					
0.90	1950.00	101.35	19.24		2450.00	265.41	9.23
0.96	3150.00	112.55	27.99		3650.00	271.61	13.44