

# ARE YOU **WISE**™ ?

Introducing the Next Level of Demand Dispatch

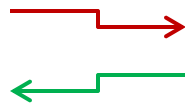
Water heater Information Solution for Energy



# Why WISE™?



WISE™ with  
CarinaXchange™



## Carina – Intelligent Load Control

- ✓ Possible 6hr AM and 8hr PM control (14-hrs per day possible)
- ✓ Stand-alone solution; no AMI required
- ✓ Retrofit existing water heaters in minutes
- ✓ Measures top and bottom water temperatures
- ✓ Intelligent feathered heating on rebound
- ✓ No false peak
- ✓ Zero Discomfort for consumers
- ✓ Consumer-friendly
- ✓ No wasted heating
- ✓ On-board metering functionality
- ✓ Intelligent monitoring and control
- ✓ Immediate confirmation 2-way communications
- ✓ Decision Support Software



On/Off Switch



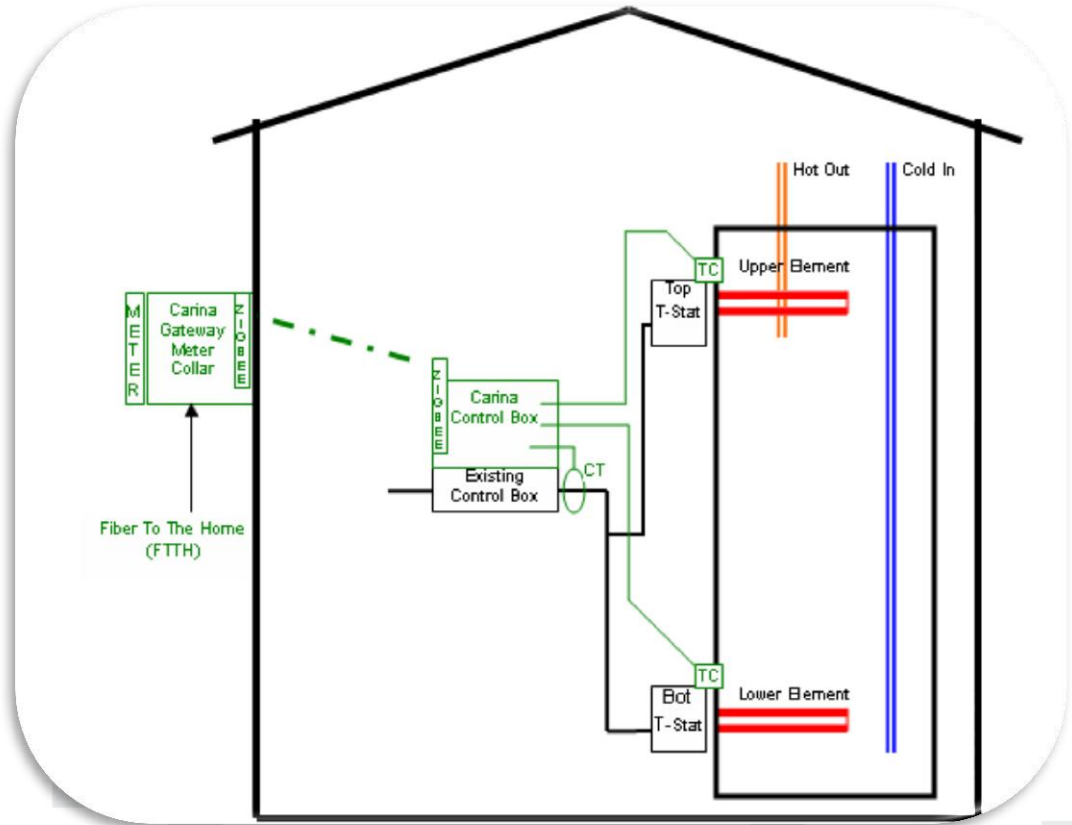
## Traditional – Direct Load Control

- |   |   |   |                                       |
|---|---|---|---------------------------------------|
| ? | <b>NO CONFIRMATION</b>                  | ? | 3-hr control maximum                  |
| ? | Water heater on - <b>Unknown</b>        | ? | Complete system rebound after 3 hours |
| ? | Water heater off - <b>Unknown</b>       |   |                                       |
| ? | Load shifted - <b>Unknown</b>           |   |                                       |
| ? | Amount of load shifted - <b>Unknown</b> |   |                                       |
| ? | Water temperature – <b>Unknown</b>      |   |                                       |



# Installation

**WISE installation time: < 1 hour**



# Six Hour Winter Shift

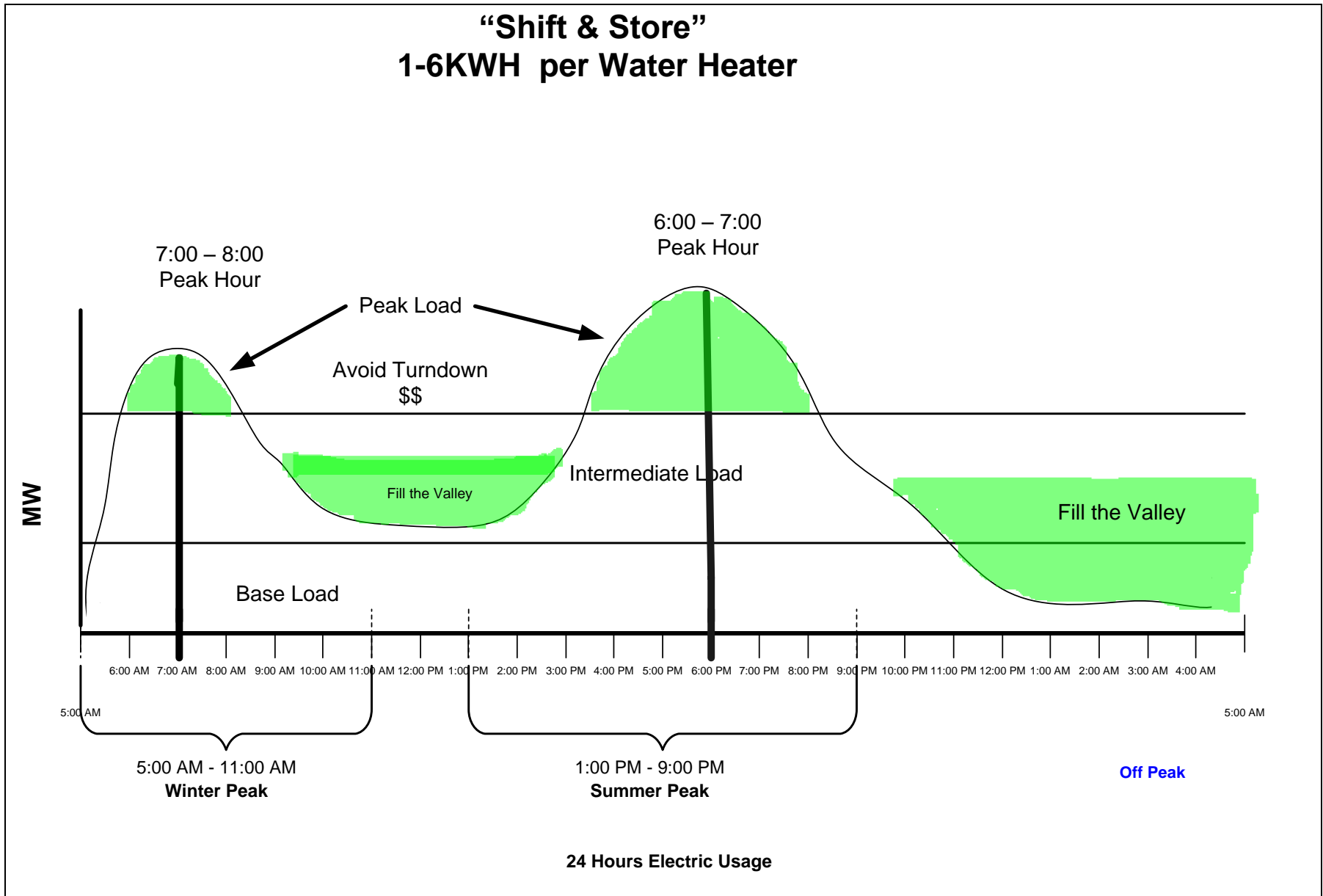
		5-6	6-7	7-8	8-9	9-10	10-11	Total Shifted
<b>KW shifted</b>		<b>0.22</b>	<b>0.55</b>	<b>0.74</b>	<b>0.60</b>	<b>0.52</b>	<b>0.43</b>	<b>3.06</b>
<b>MW shifted</b>								
<b>50000</b>	<b>units</b>	<b>10.90</b>	<b>27.45</b>	<b>36.85</b>	<b>30.15</b>	<b>25.75</b>	<b>21.65</b>	<b>152.75</b>
<b>100000</b>	<b>units</b>	<b>21.80</b>	<b>54.90</b>	<b>73.70</b>	<b>60.30</b>	<b>51.50</b>	<b>43.30</b>	<b>305.50</b>
<b>300000</b>	<b>units</b>	<b>65.40</b>	<b>164.70</b>	<b>221.10</b>	<b>180.90</b>	<b>154.50</b>	<b>129.90</b>	<b>916.50</b>
<b>600000</b>	<b>units</b>	<b>130.80</b>	<b>329.40</b>	<b>442.20</b>	<b>361.80</b>	<b>309.00</b>	<b>259.80</b>	<b>1833.00</b>

# Eight Hour Summer Shift

Summer		13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	Total Shifted
KW shifted		0.22	0.23	0.22	0.24	0.28	0.31	0.34	0.38	2.23
MW shifted										
50000	units	11.00	11.30	10.90	12.10	14.10	15.60	17.15	19.10	111.25
100000	units	22.00	22.60	21.80	24.20	28.20	31.20	34.30	38.20	222.50
300000	units	66.00	67.80	65.40	72.60	84.60	93.60	102.90	114.60	667.50
600000	units	132.00	135.60	130.80	145.20	169.20	187.20	205.80	229.20	1335.00

# Leveling the TVA daily load shape by load shifting and “Filling the Valley” with the shifted stored energy from the water heater

## “Shift & Store” 1-6KWH per Water Heater



# Unique Value with WISE Product

Feature	Benefit	Value to TVA
Shifts Peak for Entire TVA Peak Period	<ul style="list-style-type: none"><li>• Generation avoidance</li><li>• Avoids “Rebound” peak</li><li>• Leveling Load</li><li>• Assists with balancing TVA’s portfolio</li></ul>	100 MW shift per 100,000 units installed
Measurement and Verification of Load Shifted for Store	<ul style="list-style-type: none"><li>• Ability to “Fill the Valley”</li><li>• Additional control strategy options</li><li>• Avoid/minimize Turn-Downs</li><li>• Assists with balancing TVA’s portfolio</li></ul>	300-450 MW available per 100,000 units installed

# Unique Value with WISE Product

Feature	Benefit	Value to Distributor
Intelligent Load Control	<ul style="list-style-type: none"><li>• Always catches distributor's peak</li><li>• Reduces peak WITHOUT rebound effect</li><li>• Leveling Load</li></ul>	Monthly demand charge savings
Longer Control Period	<ul style="list-style-type: none"><li>• Moves energy out of T.O.U.</li></ul>	Currently \$0.01 per KwH and expected to increase
Real Time Measurement and Control of Water Heater Temperature	<ul style="list-style-type: none"><li>• Zero discomfort to consumer</li><li>• Low risk of customer cold-water complaints</li></ul>	<ul style="list-style-type: none"><li>• Retention of participants</li><li>• Improved public relations</li></ul>



# Unique Value with WISE Product

Feature	Benefit	Value to Consumer
Real Time Measurement and Control of Water Heater Temperature	<ul style="list-style-type: none"><li>• Zero discomfort</li><li>• Low risk of cold water complaints</li></ul>	<ul style="list-style-type: none"><li>• Retention in Program</li><li>• Improved public relations</li><li>• Hot water always available upon demand</li></ul>
Longer Control Period	<ul style="list-style-type: none"><li>• Moves energy out of T.O.U.</li></ul>	\$0.36 - \$3.00 per month savings on energy bill
Win-win-win solution	<ul style="list-style-type: none"><li>• Incentive to consumer to participate</li></ul>	\$1.25 per month or one-time up front payment

# TVA Benefits

- Significantly Reduces TVA's Peak Load
- Eliminates Need to Operate Gas Peaking Plants
- Defined and Stable Cost – No Cost Volatility (Natural Gas)
- Generation Avoidance – May Help Avoid New Construction
- Ability to Store Load to use during Off-Peak Hours
- Covers TVA's Entire Peak Period – and Can Be Extended
- On Demand - Call All Load, or by Region, or by Distributor
- Customer Comfort Promotes Consumer Participation
- Customer Comfort Ensures Long-Term Program Retention
- Extensive Measurement and Verification (M&V) Abilities
- Can Use Stored Load to Avoid/Reduce Turn-Down Costs



# TVA Benefits (continued)

- Helps Optimize Generation Assets to Maximize Margins
- WISE Benefits Promote TVA's Energy Efficiency Goals
- Retrofits Existing Electric Water Heaters – of Any Size
- Multiple Levels of Load Visibility – System, Region, or Utility
- Store Value can be Projected 24 Hours in Advance to Dispatch
- WISE Data can be Integrated into DR Desktop (Integration)
- Can Be Used For Wind Regulation and Balancing
- Promotes 'Green' Initiatives
- Considerable Opportunities Exist for Additional Control Strategies (additional R&D may be required)
- Integrated Inventory Management of WISE Assets
- Zero Discomfort for the Consumer



# Distributor Benefits

- Enables the Distributor to 'Catch' their Peak Hour
- Reduces Costs Incurred for Wholesale Power Purchased
- Enables Distributor to Manage Water Heater Energy Load to Move Outside of Time-Of-Use Period
- Distributor Incentive for Peak Shifting – From TVA
- Distributor Incentive for Storing Energy Off Peak – From TVA
- Allows Distributor to Pass Energy Savings to Consumer in TOU
- Can Validate Exactly How Much Load is Shifted
- Helps Keep Rates Low by Helping TVA
- Scalable, Turn-Key Solution
- Specific to Demand Dispatch – NOT and AMI add-on
- Integrated Inventory Management plus M&V



# Consumer Benefits



- Zero Discomfort – No Cold Water Complaints
- Small Energy Savings per Month
- Helps Consumer Help the Utility
- Helps the Utility to keep Rates Low
- ‘Green’ Initiative
- Benefits the Environment
- Promotes Energy Efficiency
- One-time Incentive to Install



# Carina WISE – Intelligent Load Control



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- ✓ Possible 6hr AM and 8hr PM Control or Both
- ✓ 14-hrs of Control per Day Possible
- ✓ Enhanced 2-way Communications
- ✓ On-board Metering Functionality
- ✓ Measures Top and Bottom Water Temperatures
- ✓ Zero Discomfort – Consumer Friendly
- ✓ Intelligent Store ability for Valleys
- ✓ Intelligent Monitoring and Control
- ✓ Intelligent Feathered Heating on Rebound
- ✓ Immediate Confirmation – Extensive M&V
- ✓ Stand-alone Solution - No AMI Required
- ✓ Modular - for Communications Options or possible AMI Vendor Expandability
- ✓ Retrofit Existing Water Heaters in < 1 hr

*Energy Intelligence!*





*Energy Intelligence!*

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