



Advanced Intelligent Energy Management

Energy Huntsville

Complete **Energy Intelligence**[™] through
real-time energy management solutions.



Carina's solutions maximize the:

Availability and accuracy of real-time energy data

Reliability, self-sufficiency, and self-awareness of system

Capacity and flexibility for future growth



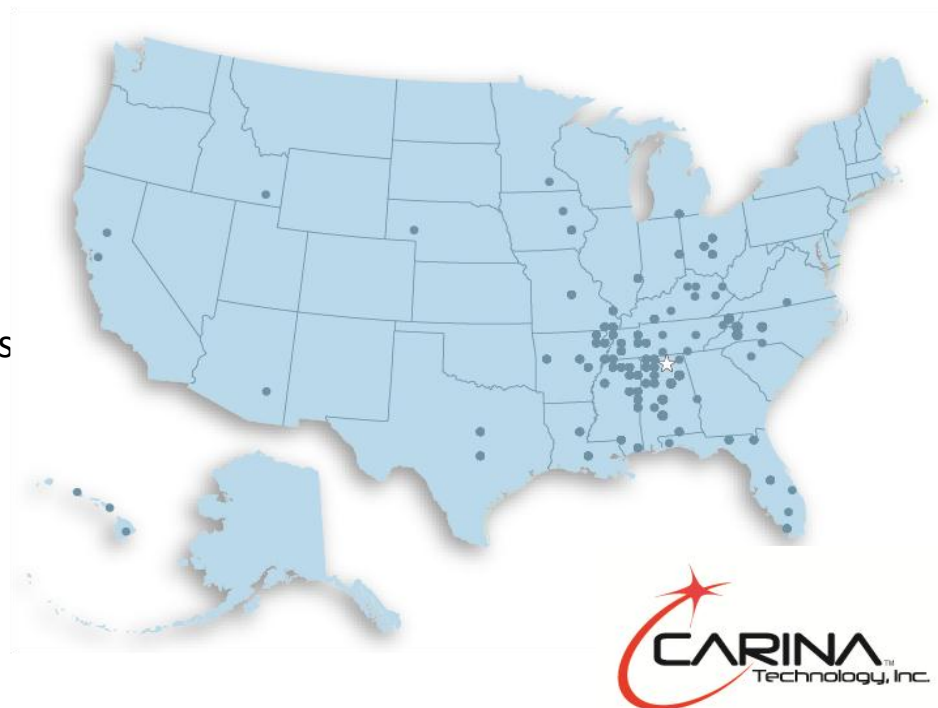
Smart Deployments

Carina's "Energy Intelligence" Approach:

1. Leverages existing communications and smart metering infrastructure where possible
2. Provides "smart apps" to give utilities flexibility and choice, not a one size fits all solution
3. Enables scalability through proprietary database structuring and provisioning

Green Applications/Solutions

- WISE™ Intelligent Demand Response
- FlexPay™ Real-time Prepaid Energy & Services



Why WISE™? (Water heater Information Solution for Energy)

Utility Needs/Challenges

1. Implementation of Peak Pricing

- Beginning in 2012, TVA distributors will be charged seasonal rates for peak power loads
- These TOU (Time of Use) rates are likely to increase current rates by 10X during peak
- Notification for any resulting increase in consumer rates must be provided in **real time**

2. Lack of Generation Capacity

- TVA predicts that by 2012, it will be operating at 99% peak capacity (with reserves)
- Will require construction of a minimum of 1400 MW of new generation to meet demand
- Results in multi-billion dollar, multi-year construction



Field tests now show substantive proof that this method alone has the potential to more than solve TVA's peak capacity challenge.

Carina's WISE Solution

- Patented and patent-pending solution
- Intelligently monitors and controls electric water heaters
- Shifts heating load to off-peak times
- “Feathered” re-heating avoids a false peak after the peak load event
- Minimal to zero discomfort to the consumer
- Real-time notification to both utility and consumer
- Surgically deployable – retro-fit existing residential water heaters, no need to purchase new one



WISE Results



Time	A Avg	B Avg	Avg Diff	% Shift
05:00	260	9	251	96.28
06:00	473	11	-462	97.62
07:00	527	29	-498	94.34
08:00	491	21	-470	95.53
09:00	559	46	-513	91.65
10:00	624	65	-559	89.59

WISE shifts up to 97% of load.



FlexPay™ is a **sleek, fresh, and complete** approach to prepaid energy.

This customer-friendly pay-as-you go program allows reverses the payment cycle – electricity is paid in advance, before it is even consumed!

FlexPay™ is perfect for many types of customers:

- Apartments/rentals
- Energy conscious consumers
- Frequent disconnect
- Transient residents
- Military locations
- Fixed income
- Students

The logo for FlexPay™ features the word "Flex" in a blue, serif font above the word "Pay" in a green, serif font. A small "TM" trademark symbol is positioned to the right of the "y" in "Pay".

Why FlexPay?

FlexPay™ is the FIRST Pro-Active and Instant Solution for Prepaid Energy:

1. **Deployable with or without AMR/AMI** – Integrate or surgically deploy
2. **Complete integration with utility billing system** – MultiSpeak Compliant, web services
3. **Nationwide payment network included** – Secure transactions no manual processing
4. **Digital in-home consumer display** – Utilize InfoPoint™ IHD or web-based dashboard
5. **Real-time “hands-free” solution** – Process occurs without additional intervention
6. **Consumer-friendly approach** – Opt-in service, not a punishment
7. **Complete consumer marketing plan available** – Get the word out, get positive results
8. **Total End-To-End solution** – Full Systems Integration with existing applications or managed services option



Value Proposition for FlexPay

For the Utility:

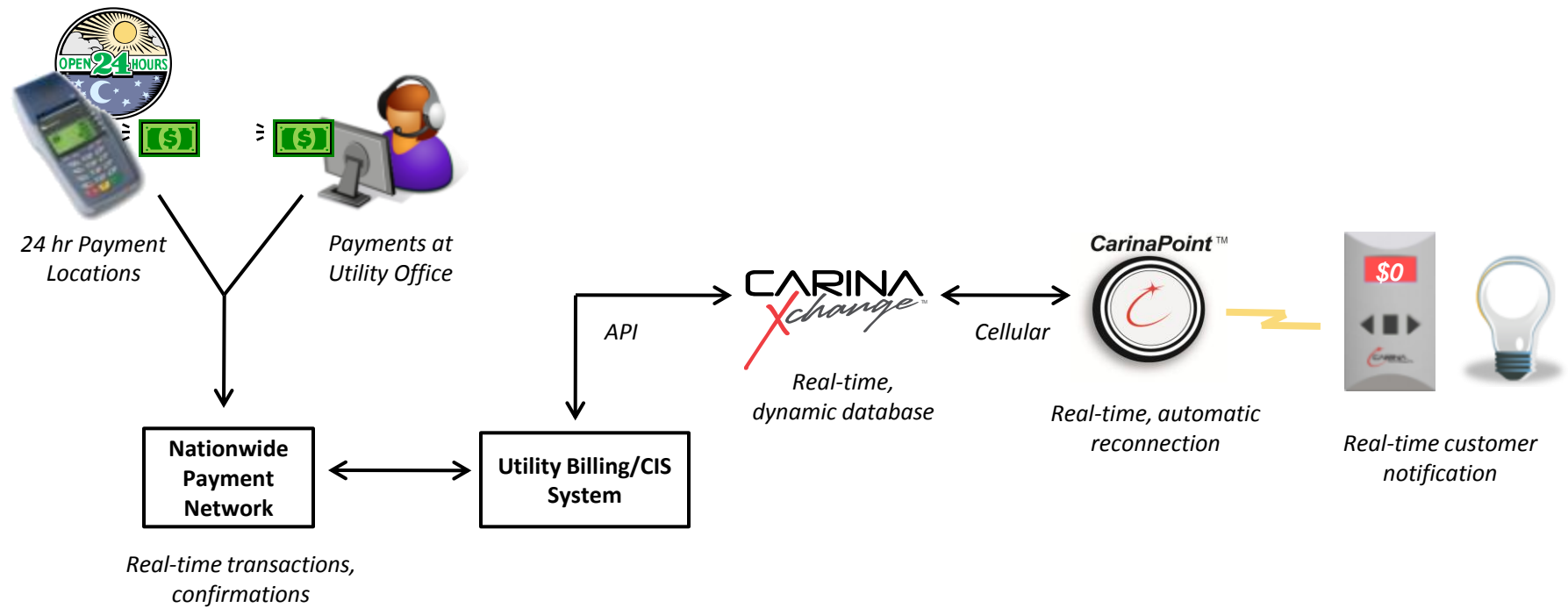
- **Reduces bad debt write off** (average \$260-\$400 per account)
- “Hands Off” prepay – automatic system, no human intervention
- **Surgically deployable**
- **Reverses payment cycle – payment before usage**
- Improves employee morale/safety
- Increases customer service options
- “Actionable Intelligence”

For the Consumer:

- **Eliminates large deposits and late/disconnect/reconnect fees**
- No credit checks
- Automatically repay existing debt over time
- **Consumer decides how and when to pay for energy**
- Convenient – pay, restore power 24/7/365
- Reduce annual usage up to 10-15%



How FlexPay Works



Automated – requires minimal human intervention.



How FlexPay Works



Funds available - Connected



3 Days Remaining – Replenish funds now.



1 Day Remaining – Replenish funds immediately, audio & visual warning of imminent service disconnection.



Building the Smart Grid

Carina

Future

“Maximizing long-term benefits requires investing in infrastructure capable of meeting current and future needs.”

“Moving towards the Utility of the Future provides accelerated benefits that aren't achievable at lower level solutions.”

Consumer portals and inside displays for real-time energy viewing

Self-healing distribution networks

Intelligent sensors to determine exact location of faults in seconds

Real time Power Quality Information from entire system in seconds

Intelligent, automated prepay

Energy Data Management not Meter Data Management

Infrastructure (AMI) as displays

15 minute intervals

• On-demand reads

• Programmable load intervals

Complete integration of all systems

• Bi-directional and net metering

Real time loads on transformers, circuits, and phases

pricing options

• Demand response

Reduced outage time to seconds with intelligent analysis

Zero Discomfort demand response

Current

1980's

Historical

Utility of the Future (Digital Grid)

- Energy Management Services
 - > Residential, Commercial
- Home area network gateway
 - > PLC (i.e. LonWorks)
 - > RF (Bluetooth)
- Web-based applications
 - > Demand response
 - > Prepayment
 - > Load control
 - > Revenue protection
 - > Web move in/out
- Distribution
 - > Load profiling/engineering
 - > Phase balancing
 - > Transformer optimization
 - > Energy forecasting
 - > Outage and GIS
 - > Work force management
 - > Asset management

Smart Meters

- Solid-state platform
- Integrated communications
- Integrated disconnect switch
- Remotely disconnect
- > Remotely connect
- Power quality data
- > Voltage readings
- > Current readings
- > Power Factor
- Frequency
- > Detailed power outage data
- Remotely programmable
- Remotely upgradeable
- Internal expansion port
- > Future functionality

Automatic Meter Reading (AMR)

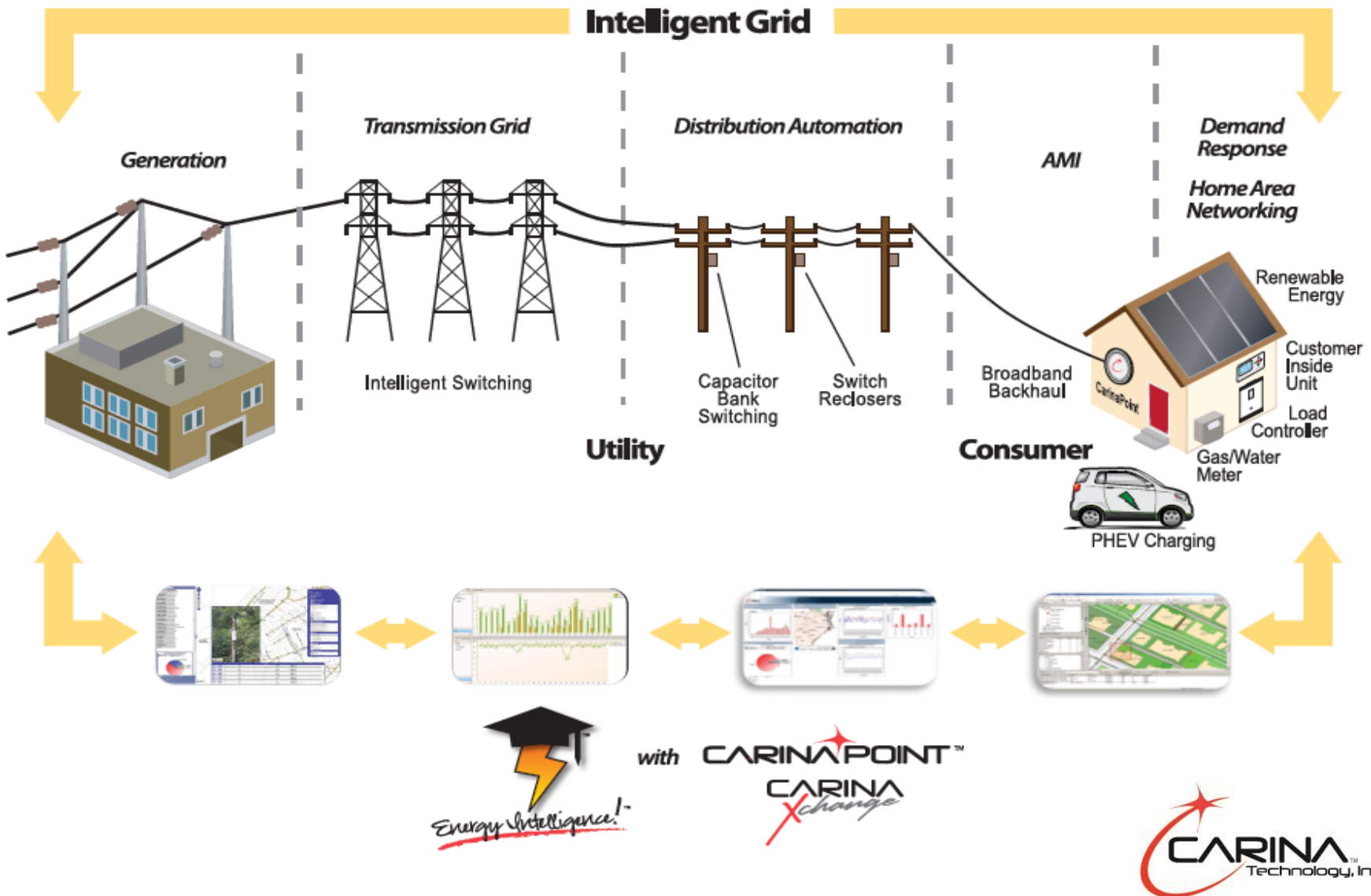
- One-way or two-way
- Monthly kWh reads
- Interval data
- Basic theft detection
- Outage/Restoration Detection

Manual meter reading

- Monthly kWh reads

* Slide excerpted from a presentation by Duke Energy's CEO to Ohio's PSC

Enhancing the Intelligent Grid



Summary

1. Huntsville-based engineering/R&D-heavy company, Huntsville-based manufacturing
2. Deployed solutions to over 100 US utilities since 2005
3. Deployed one of the largest prepay programs in Texas
4. Currently deploying one of the largest FTTH-enabled Smart Grid systems in the US (Bristol, TN)
5. No stranded hardware investment, migrates to Smart Grid apps
6. Sensible and compelling business case customized for each utility
7. Multiple relationships with strong industry partners including meter manufacturers, Smart Grid network providers, system integrators, and nationwide distributors





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