

Kauai Smart Grid Initiative

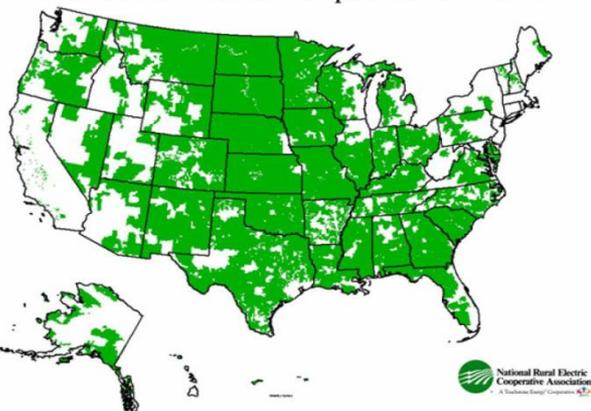
August 13th, 2012

Asia Clean Energy Summit

*Michael Yamane, P.E.
Chief of Operations*

U. S. Department of Energy National Energy Technology Laboratory
Recovery Act – Smart Grid Demonstrations
Funding Opportunity Number: DE-FOA-0000036

America's Electric Cooperative Network

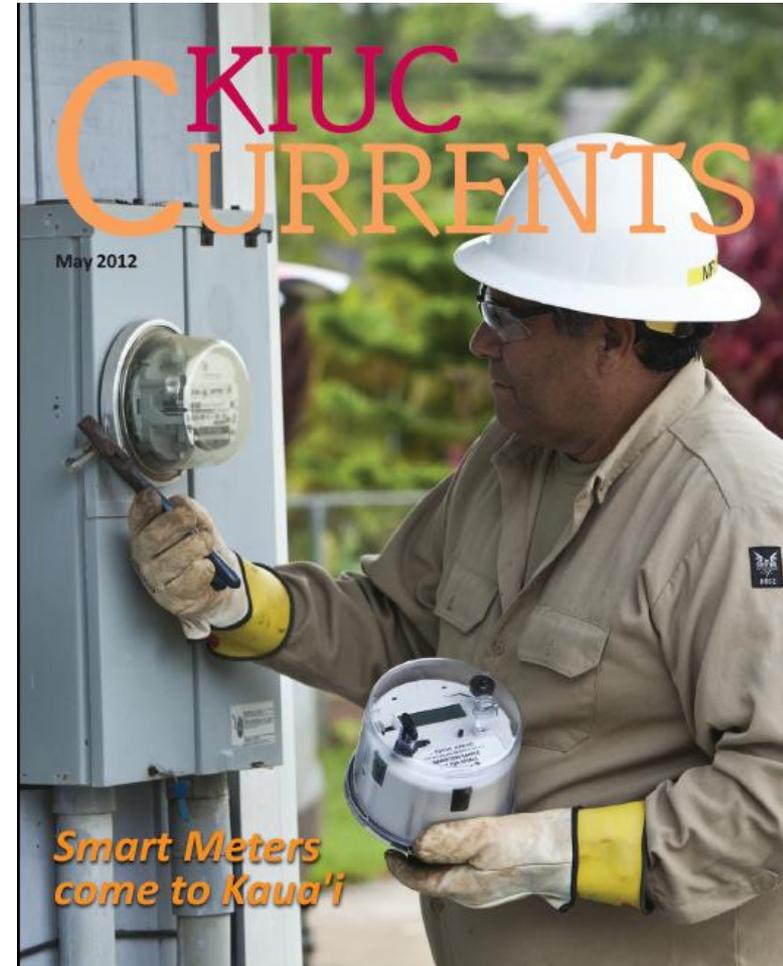


- KIUC has partnered with CRN(Cooperative Research Network) and NRECA (National Rural Electric Cooperative Association)
- Demonstrate diverse Smart Grid Technologies spanning multiple utilities, geographies, climates, and applications.
- Consortium effort with other 27 cooperatives in 11 States
- Total Project involves installation of:
 - 131,720 smart meter modules
 - 18,840 demand response switches
 - 3,859 In Home displays/Smart thermostats
 - 2,825 ZigBee gateways
 - 169 voltage sensors
 - 247 fault detectors



Kauai Smart Grid Initiative

- Install 33,000 smart meters
- Install AMI (Island wide communications infrastructure)
- Install associated hardware/software
- Awarded 5.5 million DOE funds.
- 1000 In Home Displays.
- 500 Load control devices.



What is AMI? (Advance Metering Infrastructure)

Collector

- Variable power up to 1W
- Coverage – 3-30 square miles
- 14,000+ meters
- C2R 1-5 miles



Router

- Variable power up to 1W
- Range – 2-7 miles
- 1400+ meters



Meters

- Variable power up to 425 mW
- M2M Range > 1/4 mile
- M2R Range > 1/3 mile



AMI Collectors



AMI Routers



AMI meters

- Typically a AMI meter is outfitted with a method for digitally communicating measurements such as kWh, demand, voltage, power outages and restorations to the utility office



In Home Display

In-home energy monitor

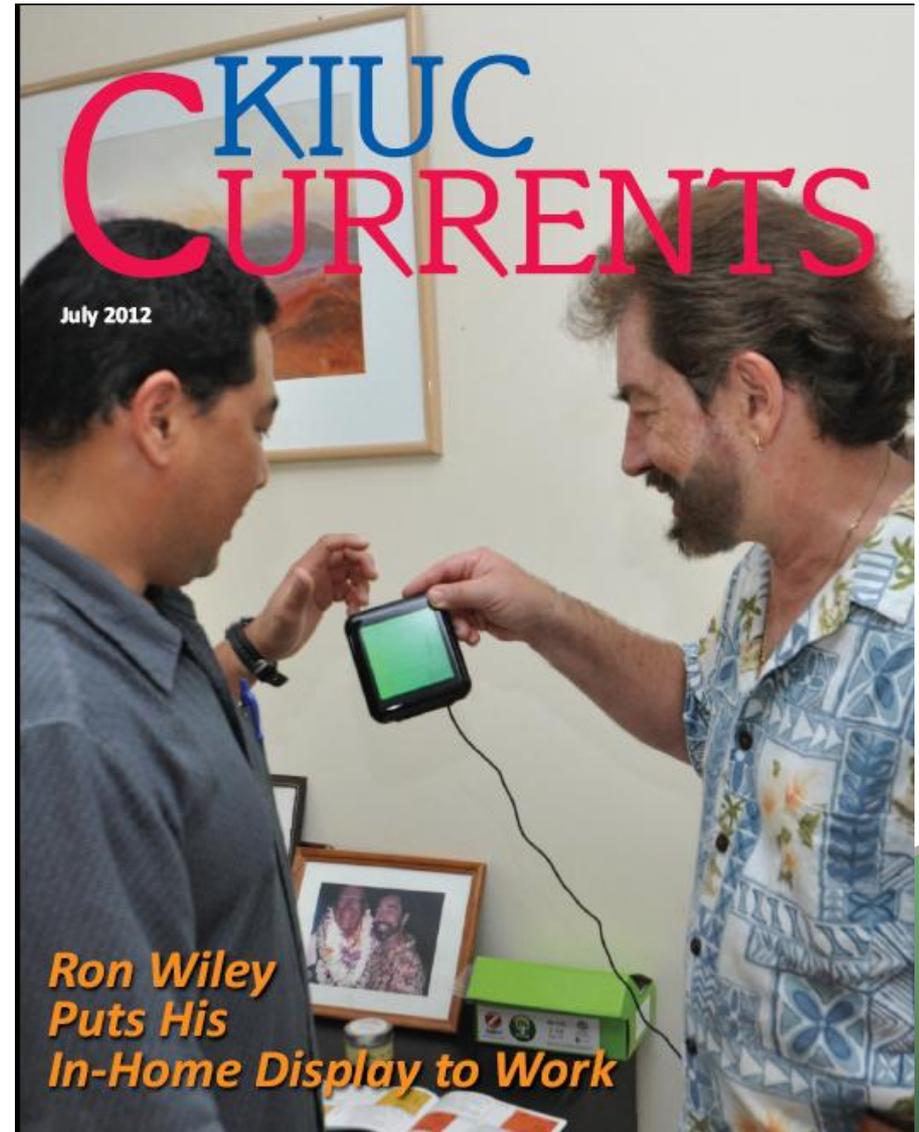
- Calculates and displays the cost of energy consumption
- Easy-to-read with large numbers and LED back-lighting
- Counter-top design allows for placement in high-traffic areas
- Actionable demand alert via LED lights
- Environmental impact displayed with carbon emissions rate (optional feature)
- Educate customers on energy usage to encourage conservation



In Home Displays in action



Ua: "MOM! IT'S RED!!! We using TOO MUCH energy!
Hurry turn something off!"
YES it's working, even the kids are becoming more
aware of what we use. LOVE this device!



Demand Response

Consumer Focus

- Strengthen relationship
- Choose devices that fit
- Consumer awareness



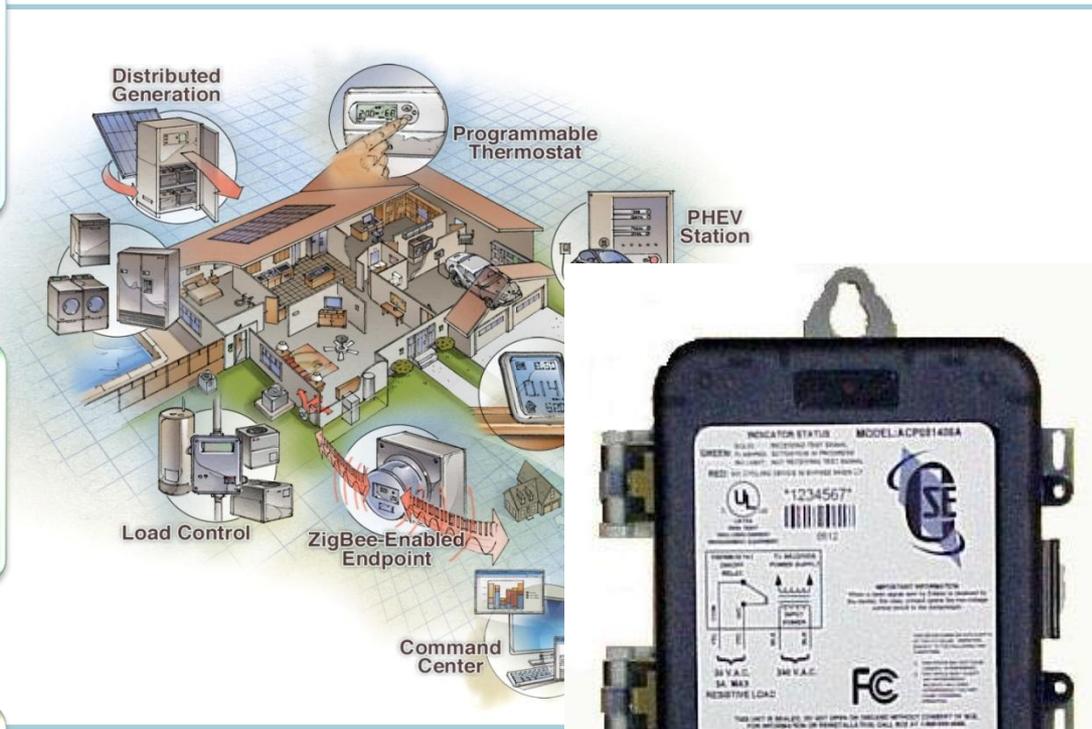
Utility Control

- NIC enabled direct load control
- HAN enabled IHD applications



Poised for the Future

- Standards based
- Interoperable certification
- Market driven



Command Center

Gridstream RF Endpoint Information [Meter A0124717, S/N 4033808419(F06F0823)] - Windows Internet Explorer

http://amiweb/cc/endpointinfo2.aspx?id=14851

File Edit View Favorites Tools Help

Gridstream RF Endpoint Information
Meter #A0124717 Endpoint S/N 4033808419(F06F0823)

Status: Normal [View History] Last Reading: 708.6726 - 8/9/2012 3:04 AM
Model: RF Enhanced Integrated Focus AX
Configuration Group: LG RF Residential Configuration D Latitude: 22.05774830 Longitude: -159.34424300
Collector: Kapaa_C7400 - Layer: 3 WAN Address: FE.F0.6F.08.23.80
311 HOOKIPA RD, KAPAA, HI 967461213 Current Neighbor: S/N 4028973451(F025418B) (Normal)
ApTitle: n/a

General Manage Readings Interval Data History HAN

Switch State	Connected	Multiplier	
Demand Multiplier		Meter Dial Digits / Kh	5 / 7.2
Initial/Latest kWh	0 / 708.6726	Module Firmware Version	251284-06.15
Meter Firmware Version	05.34	Zigbee Firmware Version	061411-01.04.07
DCW Version	2001.06.13	Tickle %	
Number of Neighbors		Initial Programming	3/9/2012 2:41 PM [Transaction Log]
Last Programming	3/9/2012 2:41 PM	Last Good Packet	8/9/2012 3:04:00 AM
Pending Firmware Version		Firmware Download Status	Zigbee Success
Will Be Activated On		Next Demand Reset Date	7/20/2012 12:00:00 AM
Grid Location		Custom #1	YAMANE, NOBORU
Pole Number		Custom #2	
Meter Position		Map Location	
Customer ID		Billing Cycle	13
Account Number	614390037-001	Revenue Class	1D1
Service Location	01728400000 RTE - 37		

LG RF Residential Model	Command Groups	Model Family	LG RF Residential Model
LG RF Residential Configuration D		RF Endpoint Configuration	LG RF Residential Configuration D
GS Focus AXI 3G Meter Platform		Firmware Platform	GS Focus AXI 3G Meter Platform
Group		Group	
RF Enhanced Integrated Focus AX		Hardware Model	RF Enhanced Integrated Focus AX
Model Group		Model Group	
Default Sec Config Group -		RF Security Configuration	Default Sec Config Group -
Standard Mode		Group	Standard Mode

Status Groups Add to Group

No status groups

Notes (+Add Note)

Close

Done Local intranet 100% Unknown Zone (Mixed) 100%

Why? Kauai Smart Grid Initiative

- **Reduced dependency on fossil fuels requires grid modernization**
 - Integrate Intermittent renewable resources
 - Energy Efficiency
 - Load Management
 - Demand response
 - In Home Display/Home Area Networking/Smart Appliances
 - Electric Vehicles
- **Reliability**
 - Reduced Outage duration
 - Power Quality
 - Self Healing grid
 - Distribution Automation
- **Operational Efficiency**
 - Remote meter reads/disconnects/reconnects
 - Load research capabilities
 - Analyze and develop different rate structures
 - Tamper and theft detection

Q&A

Thank you

www.kiurenablesolutions.com