



Energy Efficiency
Program Success
through

Innovation

November 17, 2015

From Our Home To Millions More **embertec**[®]

- Embertec invented the Tier 2 Advanced Power Strip (T2 APS) over 11 years ago in Adelaide, South Australia.
- It was developed at first simply to address wasted energy in our own home, we then decided all homes should have access to this technology.
- 1st generation T2 APS launched in 2011 and has been deployed in millions of homes worldwide, through partnerships with utilities & implementers.



Embertec in North America



- Today we employ over 35 engineers (across electronic, mechanical and software disciplines) with 65 team members in total.
- In 2011 Embertec commenced numerous independent utility funded field trials on our technology platform in North America.
- To date, 9 independent utility evaluations have been completed proving our energy saving performance. (data available upon request)
- All data supporting the use of Tier 2 APS in North America is based solely on Embertec's independent field trial results and patented technology platform.
- Embertec is the best performing Tier 2 APS product in all markets we participate in, both in terms of proven energy savings and units deployed.
- Currently deploying our 7th Generation Tier 2 APS in both residential and commercial programs for over 2 years in North America.
- Our most recent Tier 2 APS approval for Embertec from the CPUC (September 2015)



Embertec Utility Programs



North America

- 6 Direct Installation
- 8 Direct Distribution
- 5 Online Retail

**Over 2.5 Million
Embertec Tier 2
APS Installed**

Outside of North America

- 15 Direct Installation
- 2 Direct Distribution

Plug-load Challenge & Opportunity

“NRDC characterizes plug-in equipment (plug load) as the fastest growing source of energy consumption...”

Page 22 of CPUC Proposed Decision

This plug load challenge can be addressed through the deployment of Tier 2 APS.

2016 Tier 2 APS Product Range



Ember IQ

SPECIFICATIONS LINK



8 Outlet AV Plug

8 Outlet AV Strip



8 Outlet PC+ Strip



Tier 2 IT APS



Much like the limitations of Tier 1 AV APS devices where the main energy user (the TV) is not addressed, the same problem is occurring in PC environments also.

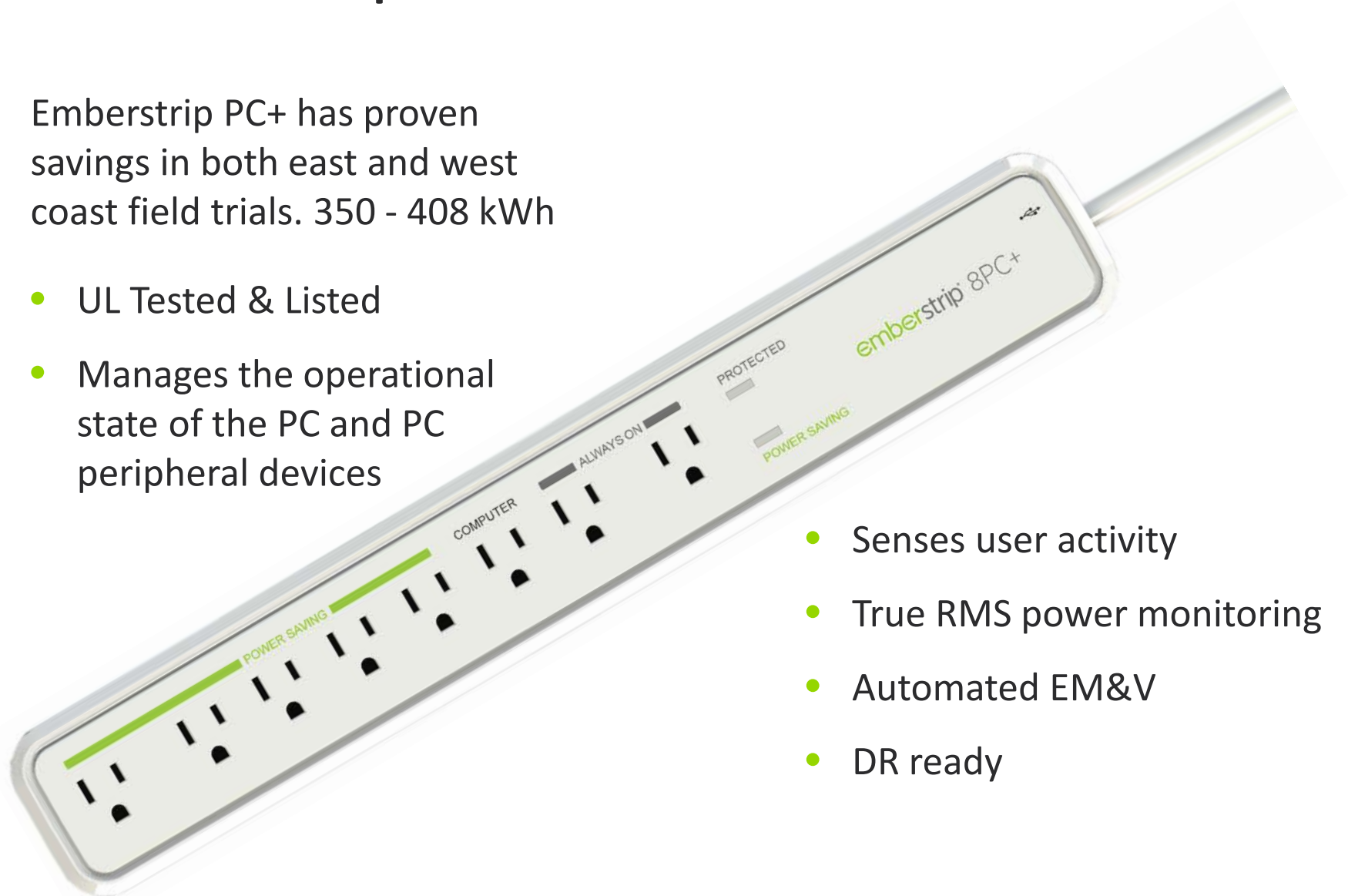
Embertec has addressed this through the development of our Tier 2 IT APS solution which eliminates the wasted energy and poor usage patterns of the PC itself, not only the PC peripherals.

Emberstrip 8PC+

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Emberstrip PC+ has proven savings in both east and west coast field trials. 350 - 408 kWh

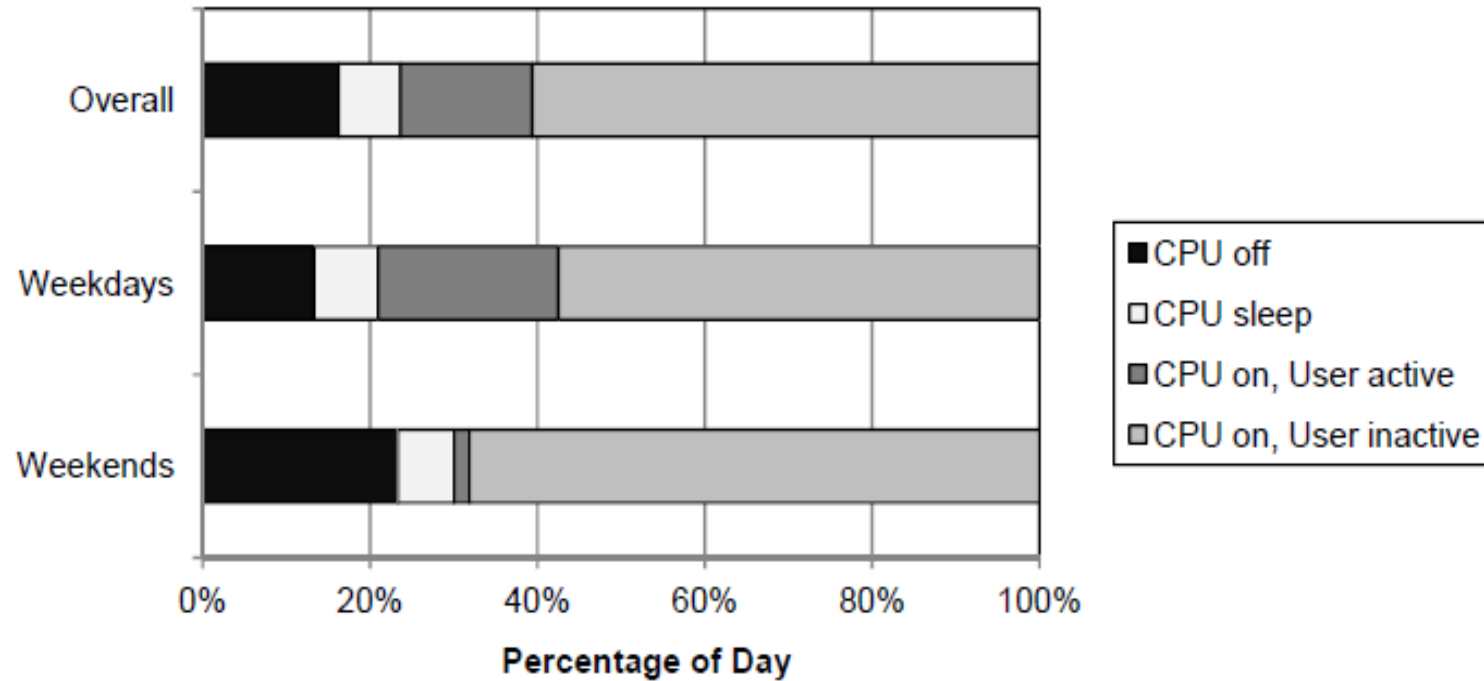
- UL Tested & Listed
- Manages the operational state of the PC and PC peripheral devices



- Senses user activity
- True RMS power monitoring
- Automated EM&V
- DR ready

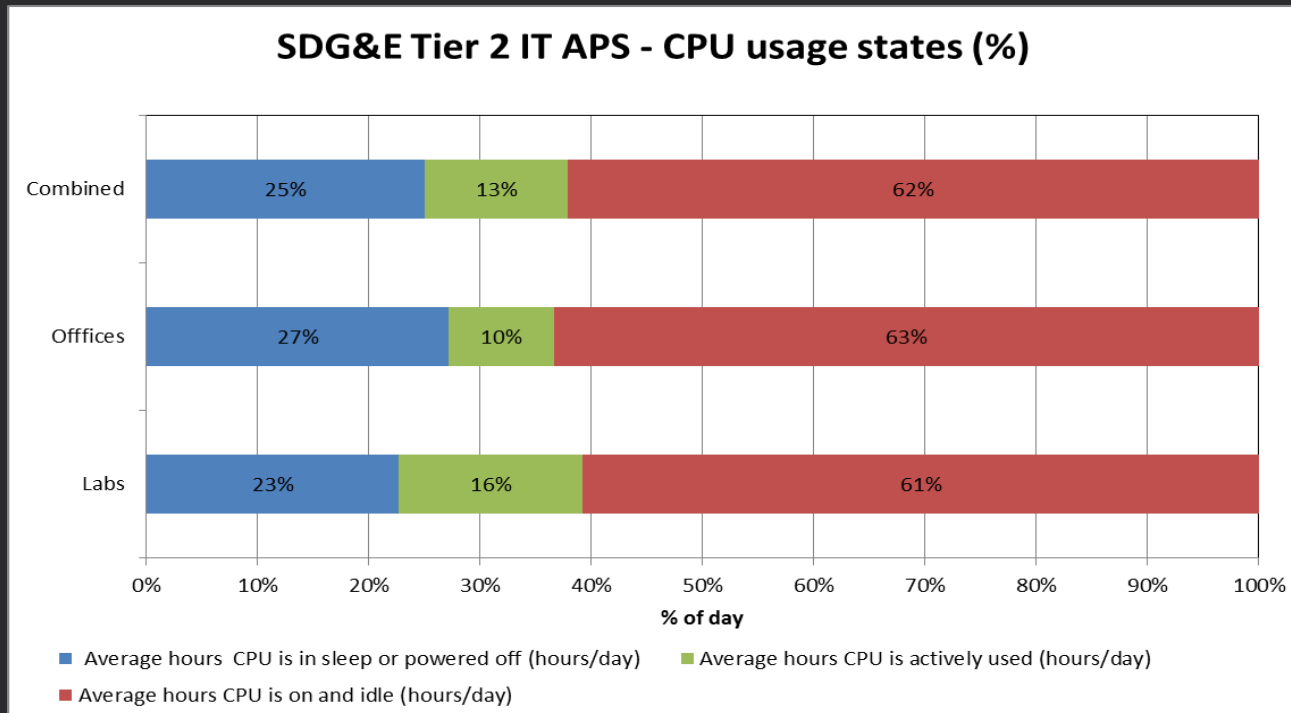
Commercial in Confidence

Figure ES-1: Percentage of Day that Office Desktops Spent in Each State on Average, Overall and by Time of Week



Source: Pixley, Joy E.; Stuart A. Ross. (University of California, Irvine). 2014. *Monitoring Computer Power Modes Usage in a University Population*. California Energy Commission. Publication number: CEC-500-2014-092.

SDG&E Field Trial



- Less than 3% variation in CPU usage state across CalPlug office evaluation and SDG&E field trial.
- This highlights a significant plug load management opportunity in commercial offices

Emberstrip PC +

- Desktop and Laptop compatible
- Real world field trials
- NEEP/ERS Field Trial 408 kWh
- SDG&E 371 kWh
- CalPlug 350 kWh savings
- Addresses both peripheral and PC energy wastage as opposed to only addressing peripheral energy waste and standby power

SDG&E Commercial Field Trial

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DATASET	Monitored Time [Days]	Weekly Active Usetime [Hours]	Baseline Annual Usage [kWh]	Annual Energy Savings [kWh]	% Savings
Office Settings	12	19.6	621.5	494.0	79.5%
Computer Lab Settings	13	28.3	342.9	253.5	73.9%
Combined	13	24.0	479.5	371.4	77.5%

Tier 2 APG Follow Up 3/5/2015

Emberstrip PC +



- € Question regarding commercial office space variability and the effect on energy savings:
 - The performance of Tier 2 IT APS as with all APS will be based on the connected equipment load in the targeted environment
 - Trials in computer labs and commercial offices found that there was a +/- 3% variation in the Energy Reduction Percentage (ERP) between these two very different commercial IT environments
 - Although the average energy savings from computer labs and commercial offices was 253 kWh & 494 kWh respectively, a recent ETCC report found a direct correlation between the connected controlled load and annual energy usage/savings irrespective of PC environment type (i.e. computer lab / offices)
 - As the EmberStrip PC+ can measure and report on the connected load it can very accurately project and report on the energy savings in each environment.

IT APS Product Comparison



The recent SDG&E field trial enabled a comparison between 3 types of commercial APS devices:

- Tier 1 APS – Requires the PC to be placed into a lower energy state to **save power to the peripheral devices only**
- Motion Sensing APS – Requires there to be no user activity to **save power to the peripheral devices only**
- Tier 2 APS – Adjusts to user activity automatically to **save power to the PC and the PC peripheral devices**

	Energy Reduction Percentage	kWh Saved
Tier 1	0.40%	2.1
Motion Sensing	14.70%	78.5
Embertec Tier 2	77.50%	371.4

SDG&E 2014/2015 Field Trial Evaluation

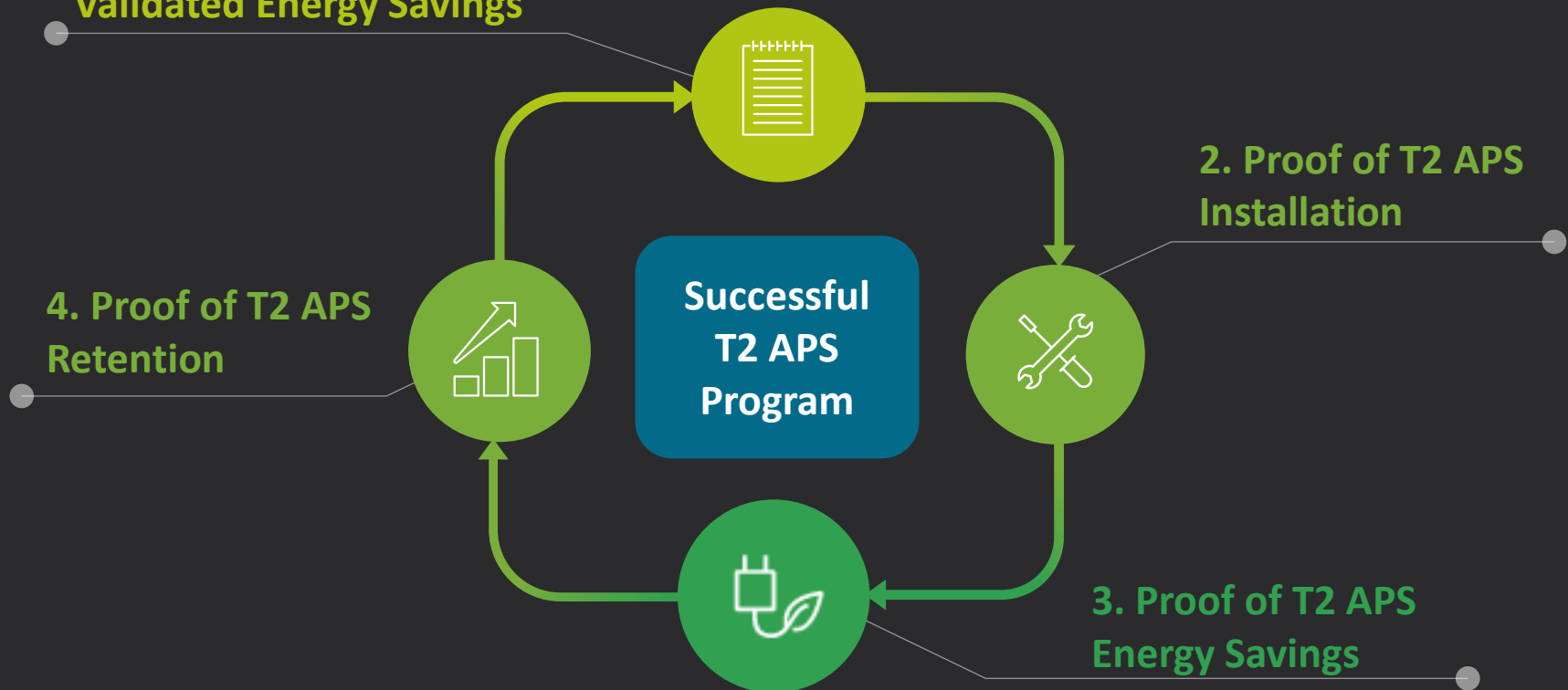
Opportunity & Risk Dynamic

- Such a significant opportunity to deliver energy efficiency through management of plug loads, requires diligent and ongoing measurement and verification.
- Without proper program assessment, control and validation of energy efficiency performance, ex-post evaluation risk cannot be properly mitigated by IOU program managers and implementers.
- The greater the savings potential the greater the IOU risk around new emerging technology (ET) activities which will lead to slower scale up and slower realization of energy efficiency potential.
- Lost energy efficiency leads to a higher cost to rate payers as cost efficiencies of scale are not realized.

Understanding the Barriers of Energy Efficiency Program Success

- The Tier 2 APS product category will need to address market barriers to prove program performance to ensure their mainstream adoption.

1. Utility Field Trial Validated Energy Savings



Understanding the Barriers ...

- Gathering this level of data to prove program performance has previously been very laborious, time intensive and expensive.
- If this data could be attained quickly and efficiently to prove program performance, we could de-risk this new activity for utilities and their implementers.
- De-risking programs accelerates their adoption and drives greater energy efficiency faster and more cost effectively.

EM&V Risk Mitigation

*“To ex-ante or not to ex-ante,
that is the question but,
ex-post is clearly the answer”*



EM&V Risk Mitigation

- Bridging the gap between ex-ante estimates and ex-post evaluation can best be facilitated through collecting better data.
- Better data means:
 - More data points
 - More samples
 - More frequently
- Traditionally this has also meant more cost...

PC+ EM&V Capability

☉ Embertec Tier 2 PC+ APS has the ability to meter:

- That proper installation has occurred
- Cumulative energy used in both operational and simulated modes
- Retention assessment by installation

☉ This data can be used for:

- Program monitoring & improvement
- Ex-ante / ex-post program evaluations
- Flexible delivery channels beyond DI

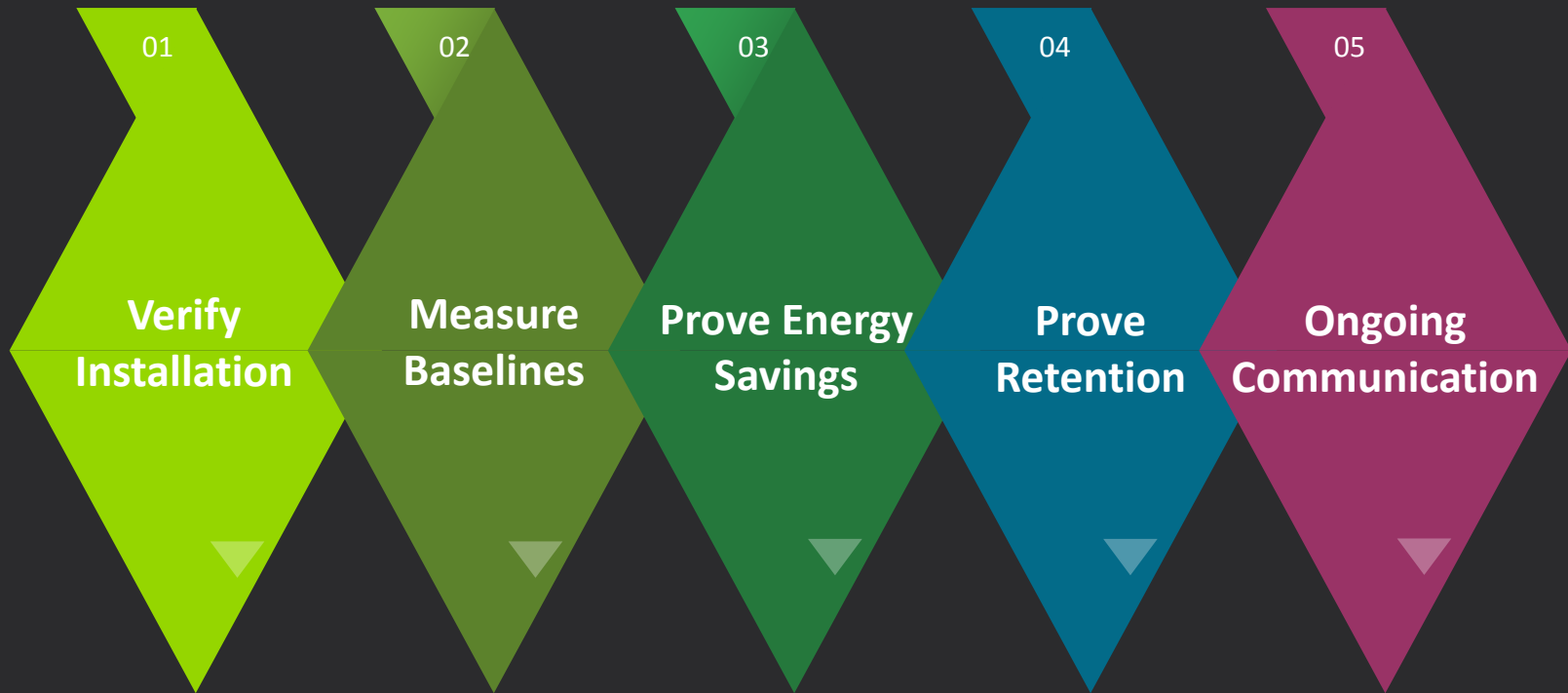
☉ Similar data collection for Tier 2 Residential AV APS applications



Benefits of wireless EM&V processes

- Wireless communications are dropping in price, becoming more frequently available and can now be utilized within new emerging technology activities.
- In the case of Tier 2 APS technologies wireless communications can be used to:
 - Validate installation
 - Validate Tier 2 APS energy savings
 - Validate Tier 2 APS product retention rates
- Collecting this data will assist in reviewing ex-ante EUL and kWh values and support ex-post evaluation efforts irrespective of the distribution strategy.

Benefits of Tier 2 APS + Wireless Communications



Program Distribution Options



- Easier installation process over Tier 1 IT APS devices
(i.e. no more product limitations to desktop PC's only and no more motion sensors or manual threshold adjustment requirements)
- **Wireless automated installation, energy savings and retention verification**
- Numerous delivery strategies are now available through wireless communications
 - Direct Install, Efficiency Kit Programs, Time of Sale, New Construction, Retrofit, Early Replacement, Early Retirement
- Upstream, Downstream and Mid-stream programs are all options due to automated EM&V with this Tier 2 IT APS
- **Cost per kWh saved \$0.15c in the first year \$0.0212 per kWh saved over the measure life**
- Given the cost effectiveness of the measure over Tier 1, it could also be used as an early retirement program replacing existing Tier 1 APS installations!

Knocking Down Market Barriers



- Embertec delivers another first for the Tier 2 APS category we created.
- Ongoing Tier 2 APS program assessment at the push of a button from the comfort of your office
- Many more program benefits for utilities, implementers and their customers only possible through this latest Embertec innovation.

Contact us to learn more

www.embertec.com

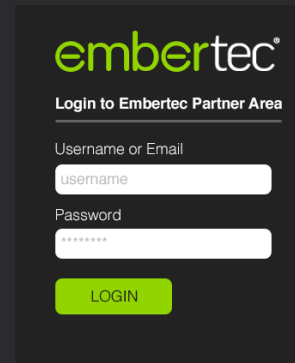
PC+ Enterprise Features

Overview

PC+ Enterprise is a cloud based service used to configure and manage all Embertec PC+ products in a targeted commercial environment.

Key Features

- Allows IT administration to centrally install, update and manage Embertec PC+ software and hardware.
- Enables PCs connected to the corporate intranet to be individually identified and optionally grouped together
 - *All PCs in a lab/office can be identified & managed together*
- Enables creation of multiple configuration (wake up sessions) to be created and then assigned to individual or groups of PCs
 - *PCs will then wake up when required for essential system maintenance and security*
- Provides a report on power usage both by individual PCs and collectively as a group such as in a lab, room, building or campus
- Enables PCs to be put to sleep remotely on demand – if the PC is not being used, thus saving additional power.

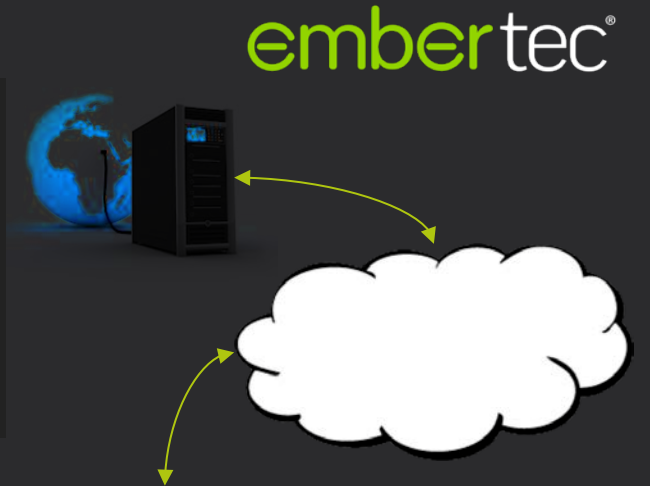


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Concluding Points

- Delivery approach: Available for all deployment methods due to wireless installation verification.
- Tier 2 IT APS as a replacement for all existing Tier 1 APS programs in commercial environments.
- Eligible customers: All commercial customers as majority of savings are derived from the PC.
- Energy savings: Proven 370+ kWh per year
- Proposed marketing strategy: Bundled measure with all existing commercial energy efficiency programs and many more options.

Questions?



- Ask for your complementary 8GB Embertec USB for this presentation and other product/technology information.

Thank You!



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