ecova®

total energy and sustainability management

80 PLUS® CERTIFICATION PROGRAM OVERVIEW

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SEE MORE SAVE MORE SUSTAIN MORE

Agenda

- Ecova Introduction
- 80 PLUS
  - Recognition
  - Badge Levels
  - Application Process
  - Test Capabilities
- Future Directions

A Brief Introduction to Ecova

Total Energy & Sustainability Management Solutions

Growing results on saving resources – cost-effectively

- 28 billion kWh saved
- Nearly 50 utilities and energy efficiency leaders

- Nearly $20B in expenditures under management
- Over 700,000 commercial sites

Energy	Water	Waste	Telecom	Facility

Ecova value proposition to utility customers

Acquire efficiency most effectively

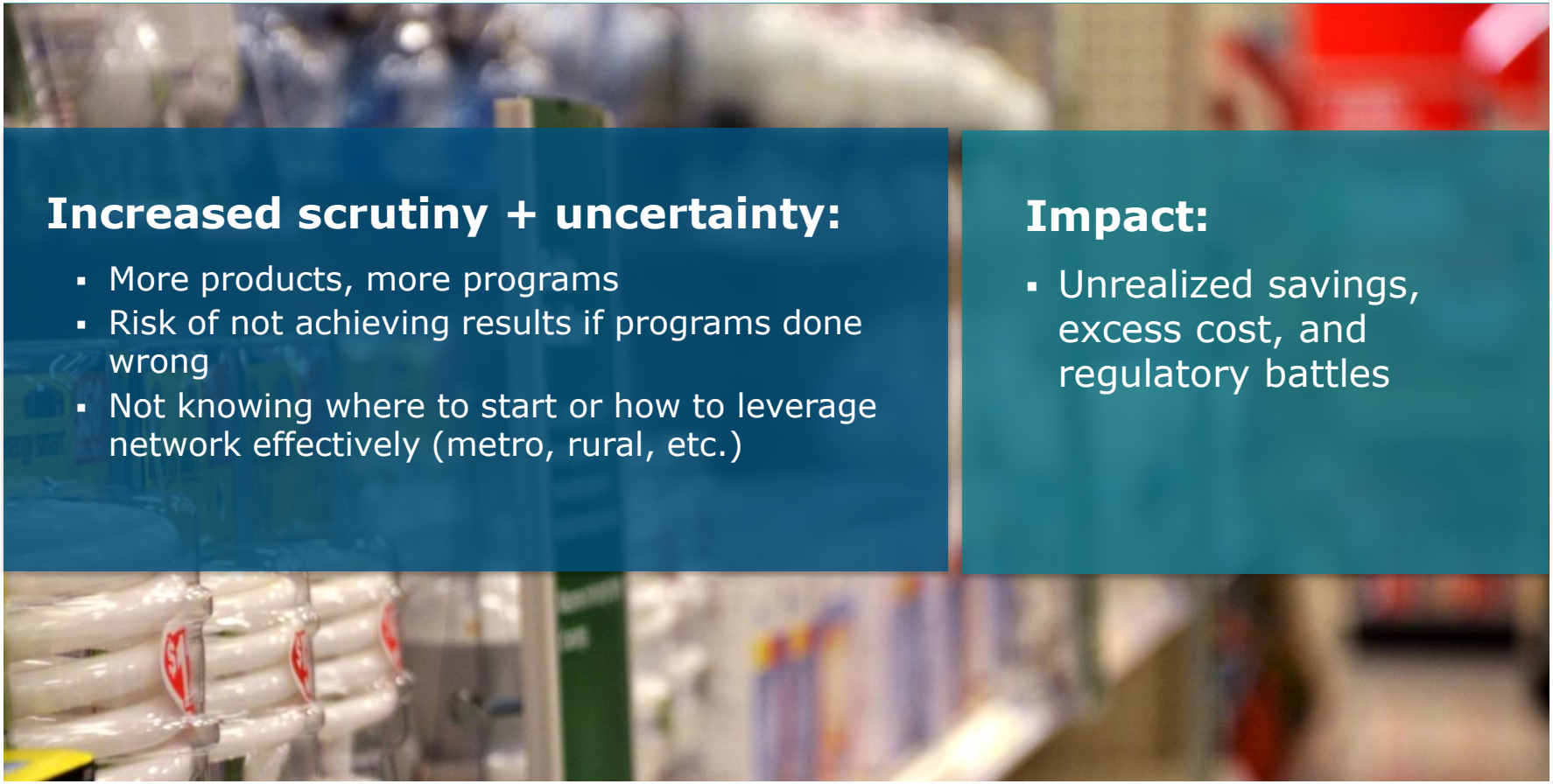
Program strategy
with a portfolio of programs that grow stronger with time

Home energy improvement
with a more personal face to your customers

C&I energy improvement
with ready access to high-impact accounts

Retail channel programs
with turnkey results for virtually any product category

Retail Channel



Increased scrutiny + uncertainty:

- More products, more programs
- Risk of not achieving results if programs done wrong
- Not knowing where to start or how to leverage network effectively (metro, rural, etc.)

Impact:

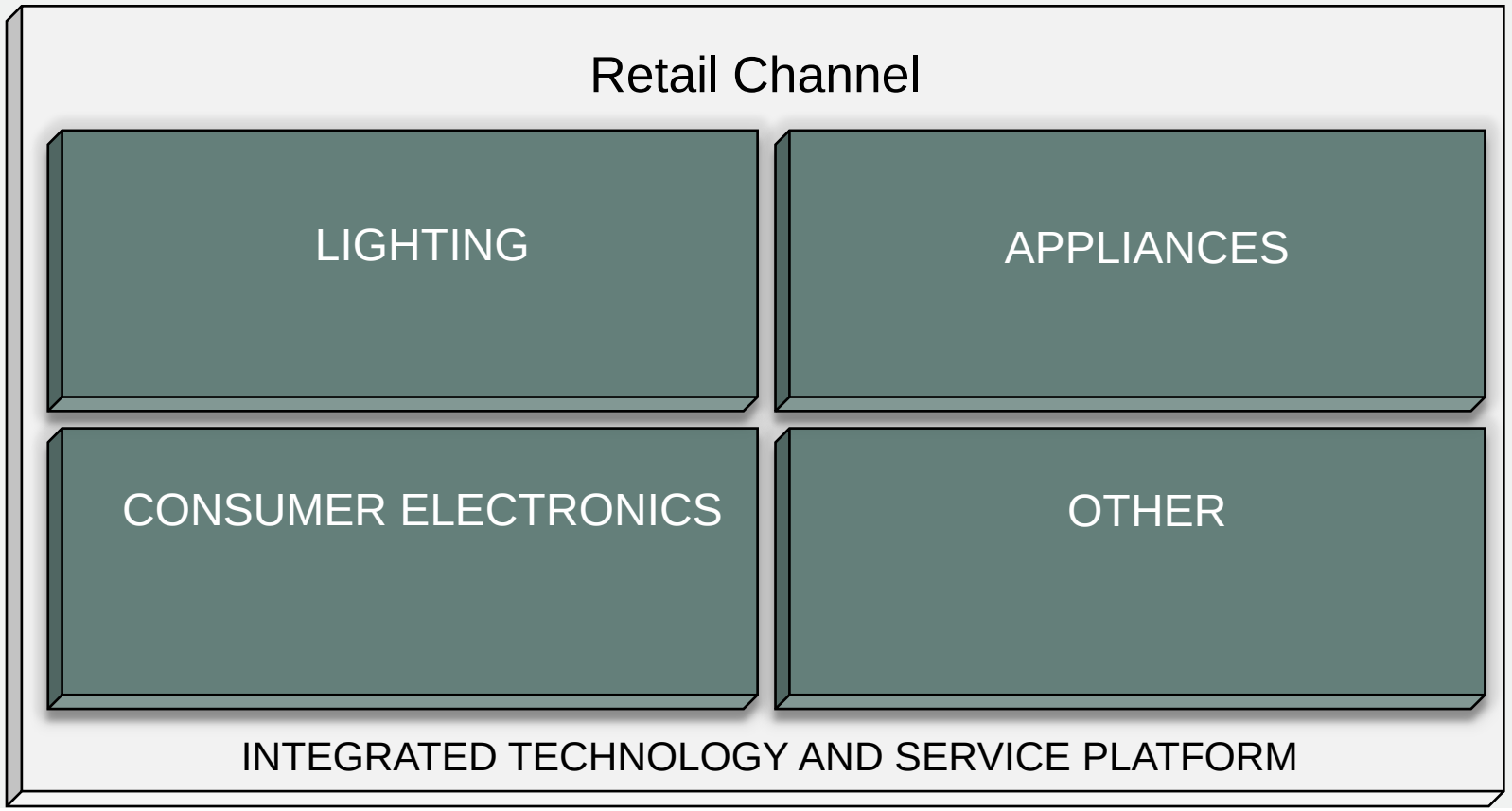
- Unrealized savings, excess cost, and regulatory battles

Retail Channel

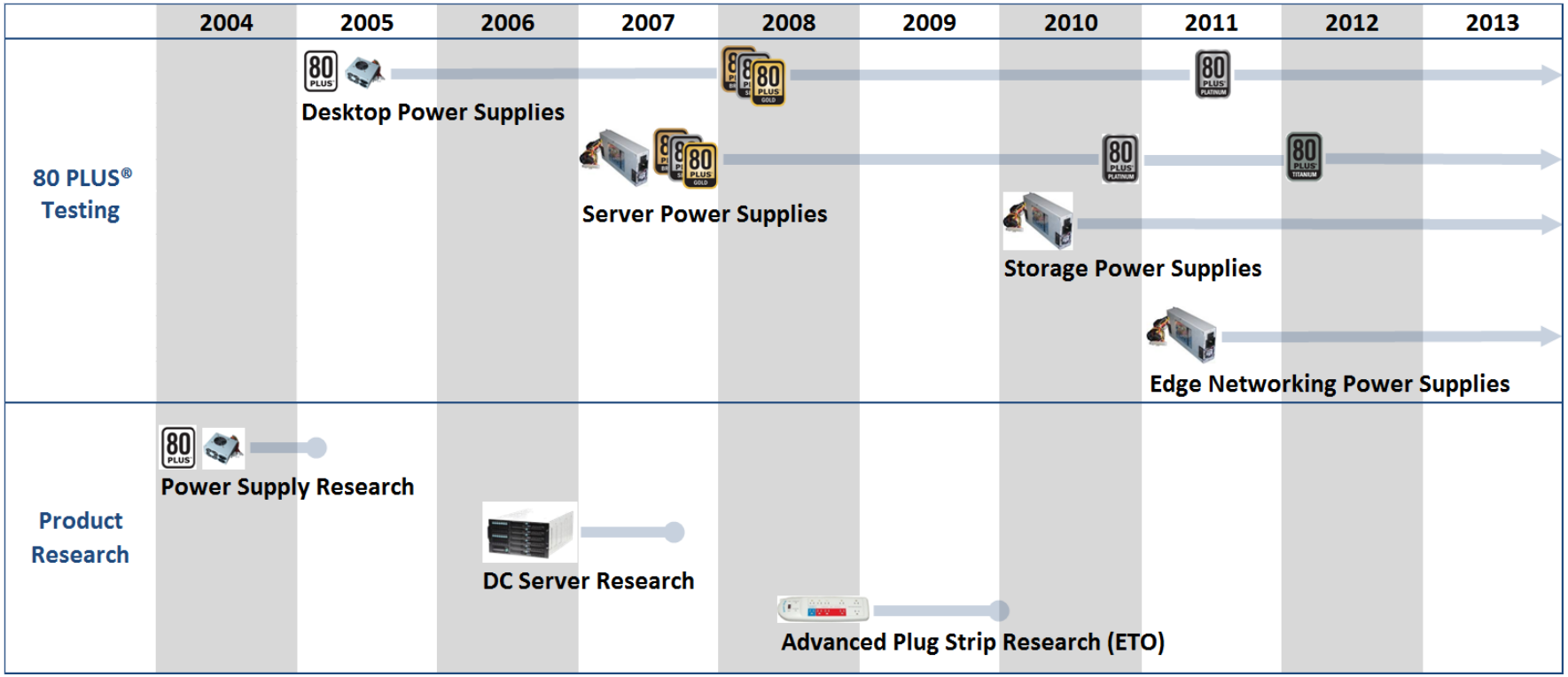
More cost effective savings

- 14 years experience and best-practices
- Time-tested award winning programs
- Manufacturer and Retailer relationships
- Nationally-recognized marketing
- Policy, research and technology influence

Retail Channel



80 PLUS Testing and Research



What is 80 PLUS Certified

80 PLUS Certification	115V Internal				230V Internal			
% of Rated Load	10%	20%	50%	100%	10%	20%	50%	100%
80 PLUS	---	80%	80%	80% / PFC .90	---	---	---	---
80 PLUS Bronze	---	82%	85% / PFC .90	82%	---	81%	85% / PFC .90	81%
80 PLUS Silver	---	85%	88% / PFC .90	85%	---	85%	89%/ PFC .90	85%
80 PLUS Gold	---	87%	90% / PFC .90	87%	---	88%	92% / PFC .90	88%
80 PLUS Platinum	---	90%	92% / PFC .95	90%	---	90%	94% / PFC .95	91%
80 PLUS Titanium	---	---	---	---	90%	94% / PFC .95	96%	91%

80 PLUS License and Certification Fees

- One time License fee of $1,000 USD
  - Jpeg logo posting to website
  - URL to redirect customers to your website
- 230V Per model fee $2,000 USD
  - Units must be configured with external fan leads for testing in order to remove fan power from calculation
  - 2 samples requested
- 115V Per model fee $1,500 USD
  - No fan power leads needed
  - 2 samples requested

80 PLUS Certification Process

TEST & CERTIFICATION PROCESS

- Submitting manufacturer completes an online application http://www.plugloadsolutions.com/80PlusPowerSupplies_Application.aspX
- Manufacturer receives a confirmation email and shipping address details for submitting their samples to EPRI, the program's certified independent testing partner
- Test reports are available approximately three weeks after the manufacturer's product samples (or) application questionnaire have been received by the 80 PLUS program
- Test reports and an invoice are sent to the submitting manufacturer according to the contact(s) provided on the application questionnaire
- Once the submitting manufacturer completes payment for their invoice and approves the report content, Ecova verifies receipt of invoice and updates the test report to the website http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx

80 PLUS Test Capabilities

- 115V and 230V Single phase input
- 3 Phase input possible for custom setup
- Input power to 45KVA
- Output power to 10KW per module
- Multiple outputs from 1V to 360V, 0 Amp to 1000 Amp
- Shunt measurement of output currents
  - Calibrated Accuracy within ±30ppm
- WT2030 Power Analyzers on input power
- WT3000 Power Analyzer available
- Fluke 8846A (6 ½ digit) measurement on all output voltages and output shunt voltages
- Overall efficiency uncertainty varies with wattage and PF read
  - UNC < 0.3% in all cases

80 PLUS Test Capabilities

- Correlation with other test labs is a concern.
- Test Setup must be per the Generalized Test Protocol
  - Insertion of a LISN and X Cap is important
- Major Uncertainty (U) in efficiency testing is due to Power Analyzer used, and calibration of current shunts used.
- 80 PLUS Runs a repeatability test every week for 115V input bench and 230V input bench. Data is tracked and has been tracked for years on “GOLD” standard power supplies
- 80PLUS load shunts calibrated by Ohm-Labs to within 30 PPM.

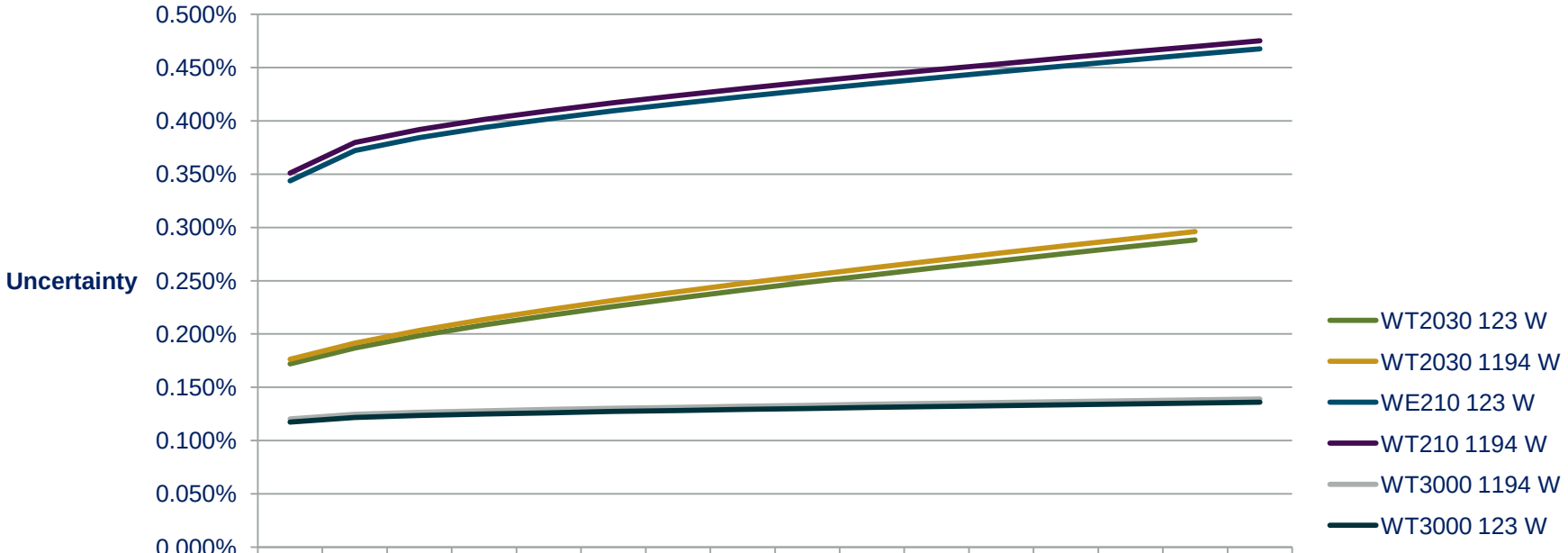
Uncertainty Comparison

Uncertainty variation with PF and Load For 1200 Watt PS

Uncertainty Comparison

- Comparison of Uncertainty for
  - WT210
  - WT2030
  - WT3000
- 1200 Watt Power Supply
  - Load at 10% and 100% of rating
- Based on Yokogawa Uncertainty Worksheet
  - Source Bill Gaithersburg Yokogawa Applications

Uncertainty vs. PF
by Power Analyzer Model



	1	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.9	0.89	0.88	0.87	0.86	0.85
WT2030 123 W	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.26	0.27	0.28	0.28	
WT2030 1194 W	0.17	0.19	0.20	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.26	0.27	0.28	0.28	0.29	
WE210 123 W	0.34	0.37	0.38	0.39	0.40	0.40	0.41	0.42	0.42	0.43	0.44	0.44	0.45	0.45	0.46	0.46
WT210 1194 W	0.35	0.38	0.39	0.40	0.40	0.41	0.42	0.43	0.43	0.44	0.44	0.45	0.45	0.46	0.47	0.47
WT3000 1194 W	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
WT3000 123 W	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13

Power Factor

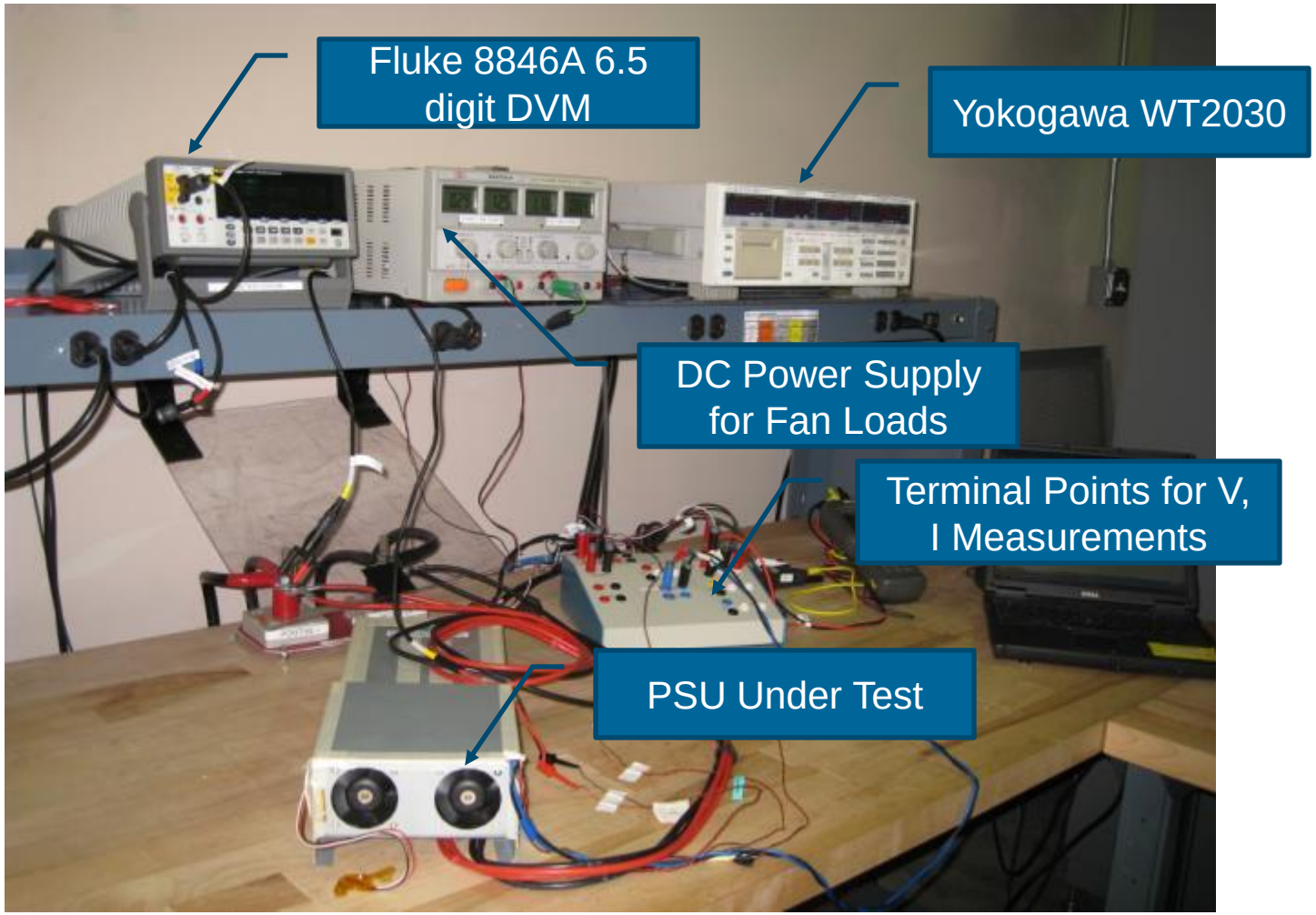
Uncertainty Comparison

- **Comparison of Uncertainty for example:**
- **Consider a 700 Watt power supply meeting Energy Star at 10% load and 230 VAC input . The Power supply would have a minimum input PF of 0.65 and 70 Watts output power while drawing 87.5 Watts. Uncertainty(UNC) of the input power measurement using the WT2030 is:**

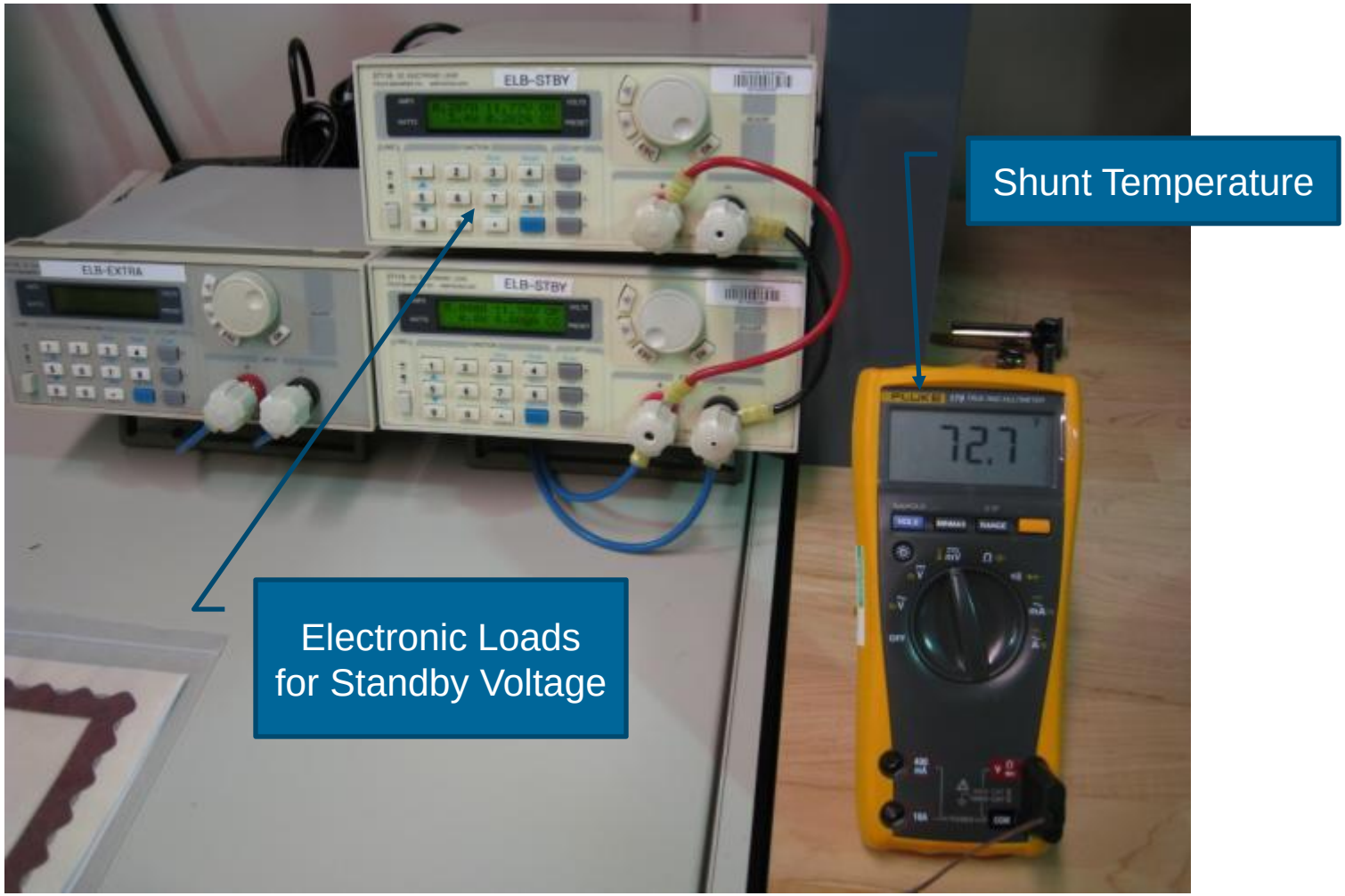
- **UNC=(Power Accuracy)*($P_{reading}$)+(Range Accuracy)*(Voltage Range)*(Current Range)+(PF Correction 45Hz to 66Hz)*(Tangent(Arc Cosine(PF)))*((Voltage Range)*(Current Range))**

- **UNC=(0.0004)*(87.5)+(0.0004)*(300)*(1)+(0.001)*(Tan(Acos(0.65)))*(300)*(1)=0.5057 Watts**
- **This error means the input power could be as low as 87.5-0.5057 Watts or as high as 87.5+0.5057 Watts. This range is 86.99 Watts to 88.01 Watts input power. The % Uncertainty around 80% nominal is +0.469% and -0.464%. This is the maximum tolerable and is mainly due to input power factor. If the power factor under the same conditions is 0.99 then the Uncertainty improves to +0.181% and -0.181%.**

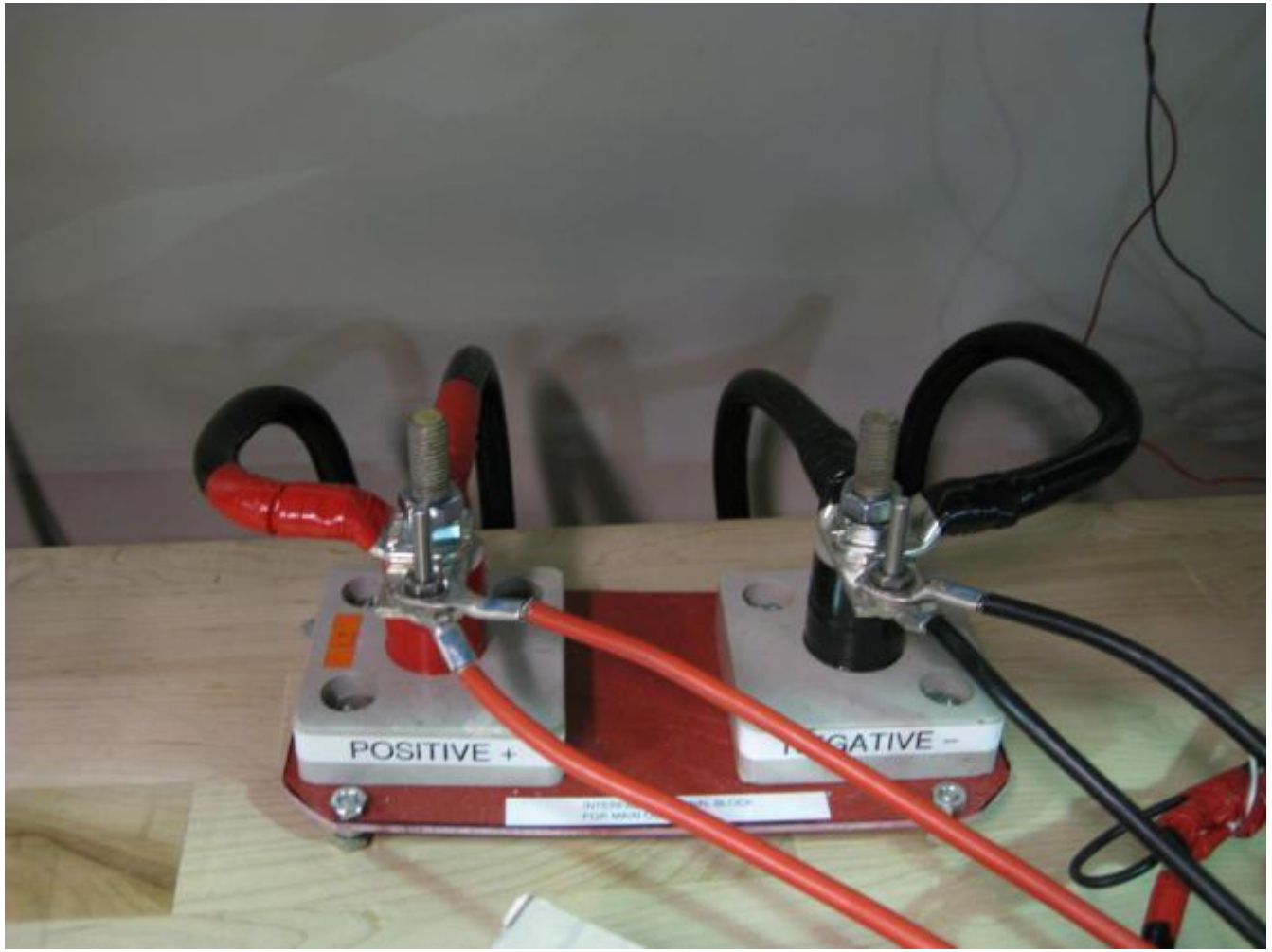
230V Test Bench Setup



Standby- Loads

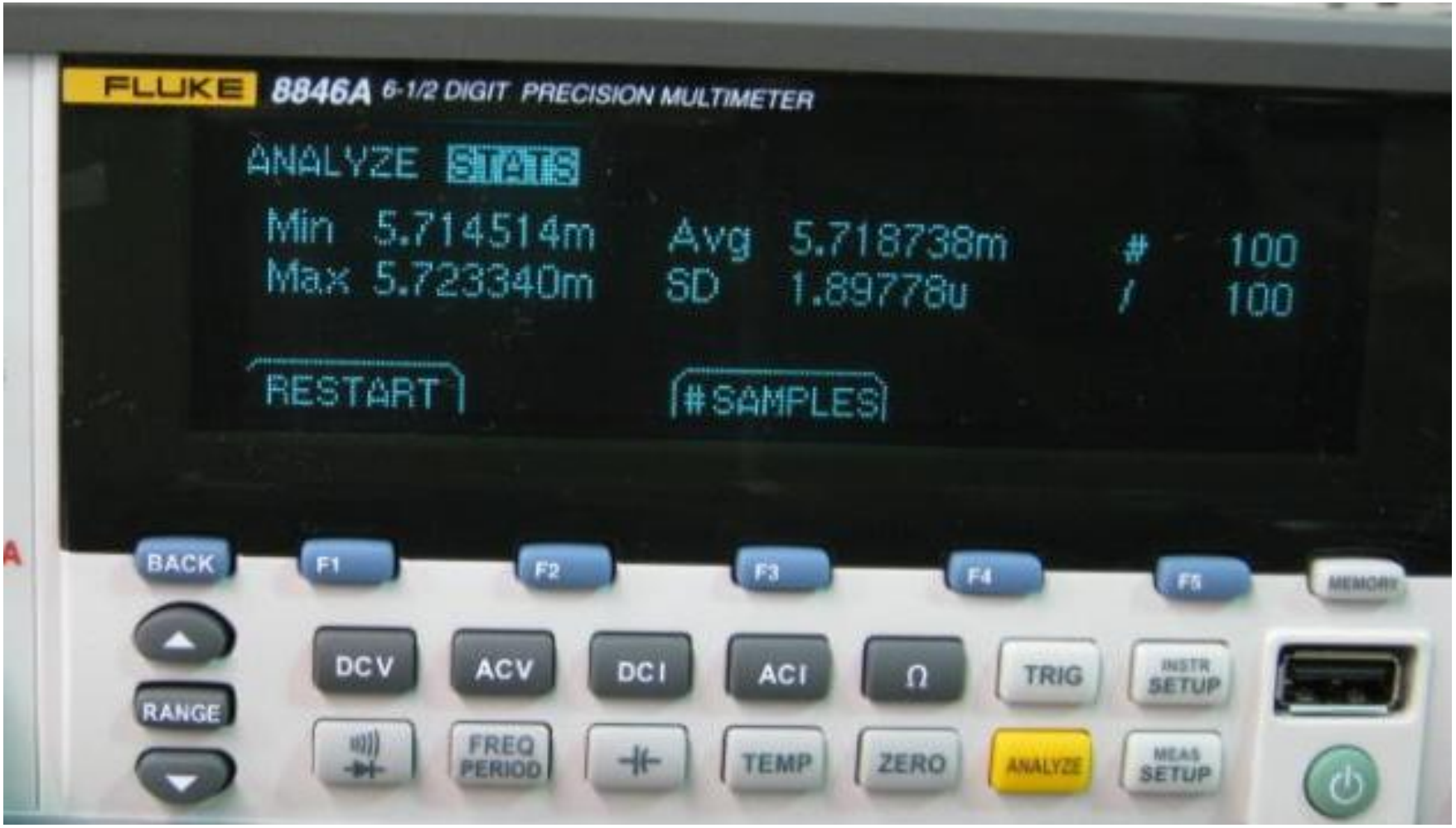


Terminal Points for Shunt

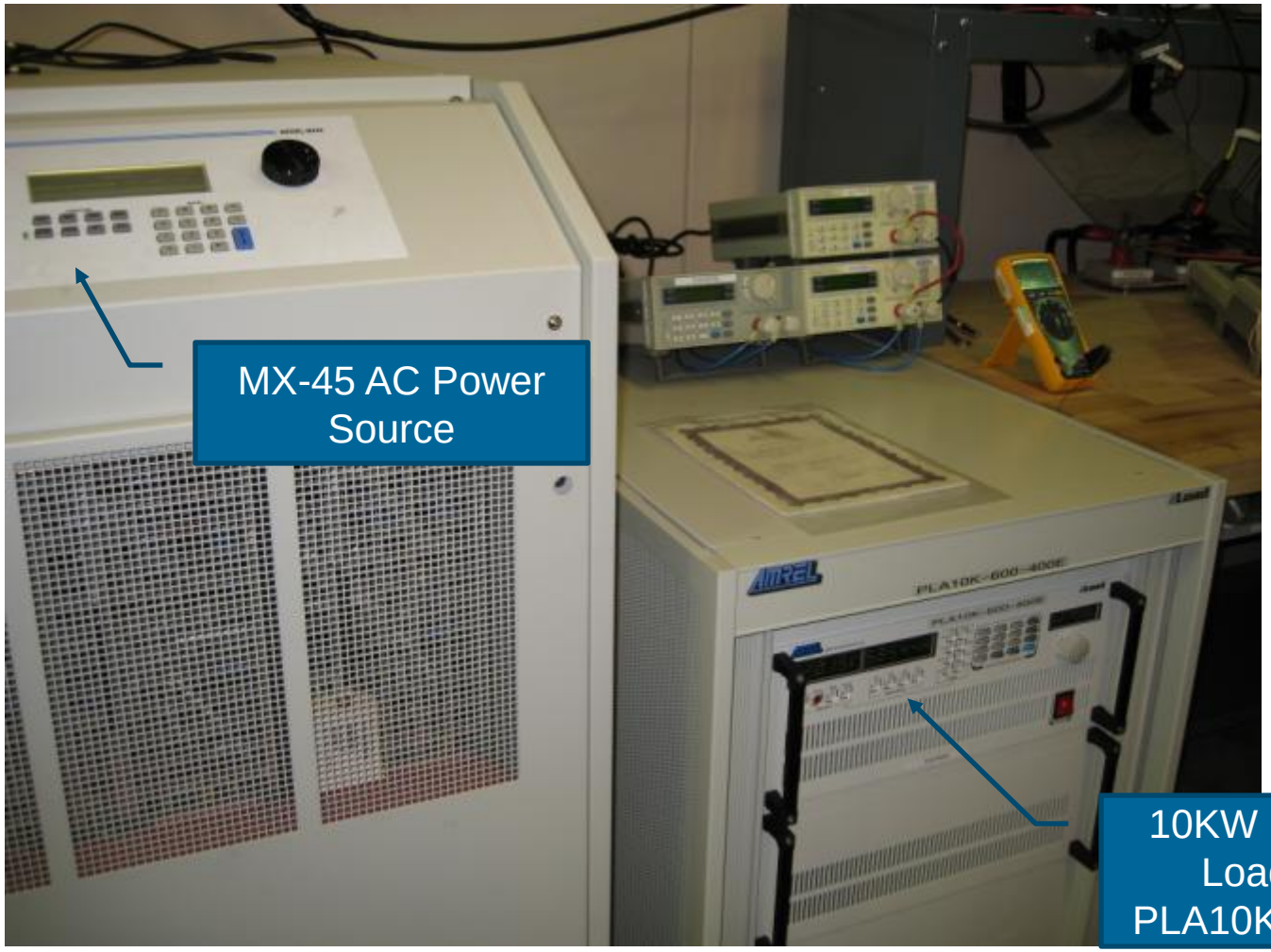


Fluke 8846A

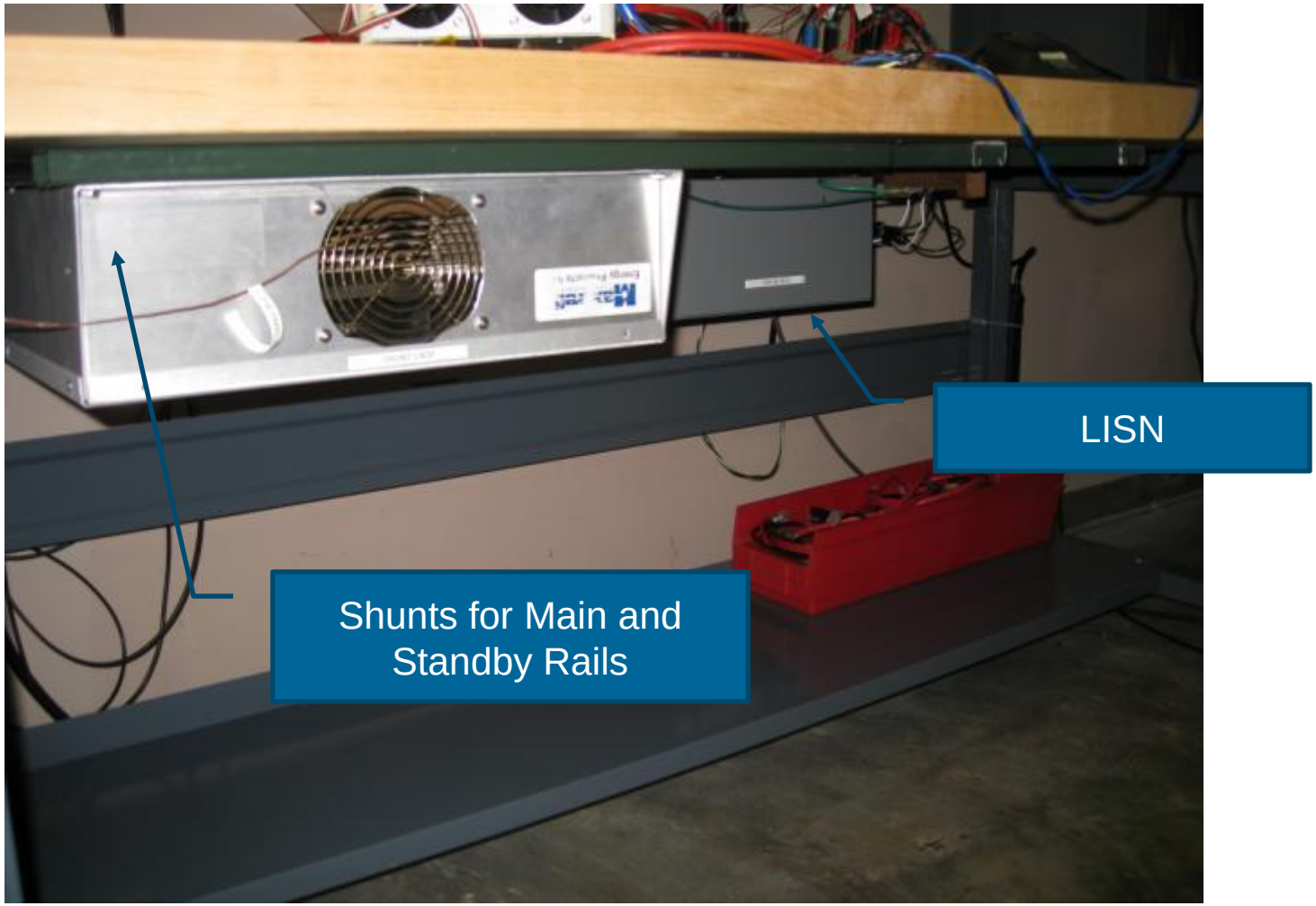
Fluke 8846A (in Close-up View)



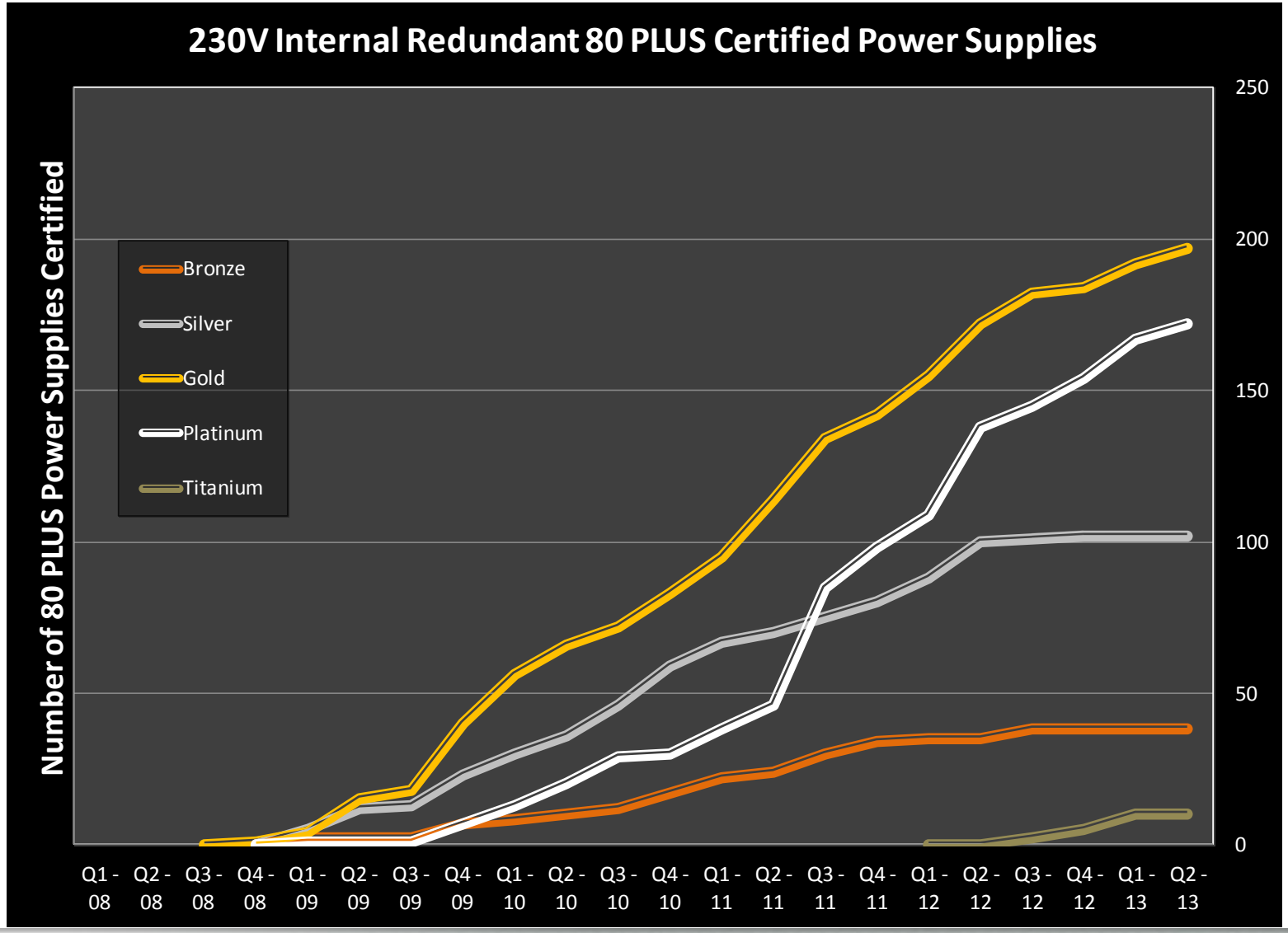
Power Source & Electronic Loads



Shunt and LISN (Located Under the Test Bench)



80 PLUS certification history



Power Supply Future trends

Power Conversion technology is mature

- Power architectures are not
- Digital Control technology offers a leap forward with added control features
- Semiconductor technology continues to evolve

Titanium

- Available in Single output designs, few applicants
- Not available in multiple outputs, but some are requesting

UnObtanium is just that, efficiency demands are unlikely to go higher

- PF requirements will continue to tighten. O.9PF at 50% load is very achievable. PF > 0.95 across load band has been done and will be demanded by large data centers


Q&A Discussion

Do **YOU** do your part?

Thank You! Questions?

To learn more, contact program staff or visit:
plugloadsolutions.com

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