High-Efficiency UPS Equipment for a Data Center – E3TNW Record # 488

- Good idea - but not emerging - well known. challenge is encouraging replacement of working UPS based only on marginal increase in efficiency
- UPS replacements are typically costly and disruptive enough that they're only replaced at end of life. Efficiency gains of high efficiency units tend not to be cost effective as an efficiency only upgrade.
- Easy, available, cost-effective
- Also one that has an effective bypass mode to eliminate conversion loss
- But not new/emerging.
- Not an ET.
- I think the savings potential is higher than this description indicates
- Nearly all datacenters simply must have a UPS solution.

Airflow Management in Data Centers – E3TNW Record # 62

- Good practice - but often results in no energy savings because temp settings on air or chilled water system are not changed. For incentives need to be clear that air management ALONE is not sufficient - HVAC energy reduction must occur.
- Technique and benefits are well understood, but underutilized. Not entirely clear how to turn into a program given that it isn't a widget that can be installed and inspected. Persistence is a question since good airflow management requires discipline to maintain.
- One of the most viable retrofit measures for most data centers (not for server closets that don't have dedicated cooling)
- NB: 1. This is not an emerging technology (ET). 2. In general BC Hydro Power Smart programs do not offer custom incentives for this.
- Specifically, I am interested in the ideas of adding aisle and rack containment and the impact on DC ops (MAC work can be particularly impacted with poor design or implementation).

Air-Side Economizer for Data Centers - E3TNW Record # 119

- I support this technology, but have reservations about the tendency to promote direct outside air use for cooling over indirect air side economizing, fluid economizing. There are a number of methods for data center to avoid use of mechanical cooling. Air side economizing is not always the best choice, or most reliable means for a given facility to minimize use of mechanical cooling.
- Implications for code (new construction); challenge for retrofit
- With higher air temperatures possible, economizer cooling seems highly attractive for this market.
- But difficult to justify as a retrofit measure.
- Not an ET. We consider each project as custom with guarantee that we can offer incentives.
- In the Northwest this should be the default method of cooling, except near pulp and paper plants.
- Same as #258, I suggest eliminating #258

Server Virtualization - E3TNW Record # 164

- Solid well established technology with significant energy savings. SHOULD NOT receive any utility incentives. VM Ware is market leader and has over $1 Billion in annual revenue - there is no reason to use utility dollars to support what is already a financial no-brainer.
- I strongly support this technology. I've observed that it is generally standard practice for most enterprise and large scale IT departments to use virtualization in new deployments of servers and applications. Utility incentives may still be able to accelerate virtualization in smaller organizations that need additional resources to expand their level of virtualization to older applications that were already running in their data center.
- Critical measure for small facilities; not a free ridership issue for smaller DCs
- It remains to be seen whether this is really an emerging technology in the PNW.
- This is not an ET. The market is almost transformed to virtualization and we can only claim savings but not offer incentives.

Premium HVAC Equipment – E3TNW Record # 105

- Better yet is using 100% outside air and MINIMIZING HAVC equipment - THEN use most efficient
- e.g. Efficient CRAC/CRAH etc.; could be packaged with AFM
- Well understood technologies and benefits. Readily incorporated into a program.
- This is not necessarily an emerging technology.
- High efficiency CRAC units with economizer capability like the Liebert DSE have huge potential for savings

Storage Area Network (SAN) and Network Core Consolidation – E3TNW Record # 509

- consolidation and refresh to new equipment will result in savings - no emerging, hard to justify utility spending to support this
- This 100% is not an ET.

Ongoing Commissioning of Economizers in a Data Center - E3TNW Record # 486

- not emerging - simply good maintenance practice - if economizers are installed, they should be kept in working order
- Especially for air side economizers. Seattle Energy code requires their installation, but often they do not work b/c the facility staff does not know how to correctly maintain and operate them.
- Always need to be sure economizers are in operation
- But this isn't new or emerging.
- Not an ET.

Efficient Power Supplies for Electronic Devices - E3TNW Record # 1

- no brainer - quickly becoming industry standard
- Definitely support this technology. From a utility incentive program perspective I think it is still difficult to document incremental costs though.
- Good idea for servers; complete for computers; concern about free ridership for servers
- Not sure this is an emerging technology anymore.
- Not an ET.
- Specifying specific power supplies when ordering new hardware is feasible. Depends on availability and ROI.
- Same as #189 and #488. Pretty small potatoes - today's power supplies are pretty darn efficient already

Power Management for IT Equipment – E3TNW Record # 508

- It works, it is common, it is free! Not emerging, should NOT be incentivized - need training (will never happen if IT does not pay power bill - if they pay the power bill it will happen next day!)
- This is not an ET as this software has been around for over 8 years (VMWare distributed Power Management). But there are huge barriers for this ECM's adoption.

Solid State Drives (Flash Memory) – E3TNW Record # 159

- Valid for performance - small energy savings. Waste of incentive money. Facebook "cold storage" is much better concept - just turn OFF hard drives when not needed
- Difficult to implement and verify
- I believe this has to be a leading emerging tech.

- Not an ET.
- Cost per gig still high but coming down.
- long term storage may require a duplicate storage strategy
- Very hard to control what tenants buy, long payback
- SSDs not only provide much faster data read and write operations, but also have a much smaller energy footprint due to their low voltage operation.

Direct Server Cabinet Cooling – E3TNW Record # 68

- very expensive and typically uses MORE ENERGY (if done in addition of air cooling rather than in-pace of - which is how it is typically used). This treats the symptom of a hot spot for poor data center planning. This occurs when a rack power density exceeds the data centers cooling capacity (watts/sq-ft) creating a hot spot. This can be avoided by using less dense rack loading. ONLY needed if space constrained which is rare.
- Most likely to be used in a new build out. I would estimate that this technology has limited applicability in the retrofit market because of the reluctance to disrupt an operational data center
- Practical; issues with water in a data center (end user concerns); costly to implement
- Lots of resistance to this in the industry. Also, not clear on economics. If the numbers can be made to work has great potential.
- Most direct server cabinet cooling systems are not ET's but some are. We provide incentives for this in new construction projects but not retrofit projects

Optimizing Data Center Controls – E3TNW Record # 505

- Yes - if it results in CRAC units being turned off. So has to be set up to result in energy savings - not just "optimize" air
- Not an ET.

Data Center Infrastructure Management – E3TNW Record # 504

- Unclear what this is referring to.
- Not an ET.

Best Practices and Software Tools Training for Data Center Designers - E3TNW Record # 489

- Data designers are not the barrier - it is the owners / finance teams of existing data centers. Designers know how to build highly efficient data centers - look at the $100Millions the big guys are spending
- I think most designers that are doing a significant amount of data center design are very aware of, and are being challenged by their clients to push the envelope on efficient data center design. There may be room for this measure for design firms that provide more general commercial building design that will include small / mid-size server rooms.
- Difficult in embedded DCs
- There's a lot out there already though.
- Not an ET.
- Education needed for IT managers and facility managers. Combine with #235 and #348
- Showing the customers that "energy saving modes" or more highly efficient software won't degrade overall or peak performance will probably have the greatest return on energy efficiency. Educating the buyers about the more efficient solutions already on the market.

Low Standby Power in Electronics - E3TNW Record # 169

- Good idea - hard in practice because technology changes much faster than Energy Star standard. Most manufacturer's don't both to get products certified because standard is so old
- Good idea; part of the definition of E* server
- It remains to be seen to what extent Energy Star servers are used in this market.
- Not in my mind applicable to data center IT equipment.
- Not an ET. We only claim electrical savings from top 10% tier ENERGY STAR IT equipment over baseline taken as average ENERGY STAR watt ratings.
- While this meets the reality of the target group of smaller DC's, the better motivation is toward scaling the IT equipment to meet actual loads - higher density.
- reducing energy use in IT equipment has a cascading benefit on the infrastructure
- very hard to control what tenants buy

Training on Energy-Efficient Product Selection - E3TNW Record # 348

- energy efficient products are widely available but IT folks don't understand the benefits because they don't pay for power and efficient is not as sexy as super-powered high density (think Prius vs. Porsche)
- This type of training would need some templates or ROI calculators provided to allow for easier documentation of the bottom line benefits for these selections to get traction with management and finance teams.

- Non-resource/ behavior program; difficult to quantify savings
- A better use of resources would be teaching basic concepts and system design.
- Not an ET.
- Education is most needed for IT and facility managers
- Showing the customers that "eco modes" or more highly efficient equipment won't degrade overall or peak performance will probably have the greatest return on energy efficiency. Educating the buyers about the more efficient solutions already on the market can dramatically impact energy usage.

Modular UPS Equipment in a Data Center – E3TNW Record # 492

- No data this is more efficient - modular can use more energy in total, since they are sized for max demand and are rarely turned off. Nice theory on paper, not used that way in real word (not emerging)
- Available and a great idea to get load up to achieve peak efficiency
- Especially viable for smaller data centers. But, not new!
- I like the battery pack option better
- Not an ET.

Improved Data Storage Management – E3TNW Record d # 507

- Facebook cold storage is the way to go, not sure it can be called emerging since it is so public, no reason to spend utility money because the financial payback is large as is
- Mostly not an ET.

Educating Installers in New Technologies and Relevant Incentives - E3TNW Record # 235

- Installers have almost no impact on energy use in data centers - this is a design problem (we are not talking about residential HVAC guys here). Any incentives to installers is likely 100% free rider - they are installing the equipment to meet load needs
- The education would need to be accompanied by templates and training the simplify adoption of the strategies and provide better engagement with the utility incentive programs. Calculation spreadsheets or templates to provide documentation for utilities to use in base line development and energy savings / incentive calculations.
- Non-resource/ behavior program; difficult to quantify savings
- Installers install what is on drawings. I agree that educating IT professionals would help.
- Not ET's generally.
- Education is most needed for IT and facility managers

Optimized Controls for Expected Loads - E3TNW Record # 41

- Variable load efficiency is key since few data centers operate at capacity. Effective implementation is not easy
- Good idea; difficult to M&V
- I presume this item endorses variable speed drive for HVAC systems, which makes a lot of sense for this market.
- Not all optimized controls are ET's.
- Doesn't seem relevant to server rooms which have fairly constant loads

Wireless Sensor Network for Data Centers - E3TNW Record # 473

- Good idea to collect data - does not save any energy on its own.
- Takes a dedicated knowledgeable facility staff to make use of this data, this measure is best combined with a control system.
- Wireless sensors can also report on power use,
- But it has to have a control component to generate energy savings!
- hard wired is better, no batteries to replace and no waste to recycle
- Not an ET.
- overkill for small server rooms- could be useful in one as a demo, to refine airflow management practices for an entire program