# Memo

**Date:** November 09, 2017

**To:** New Jersey Board of Public Utilities

**From:** Willdan Energy Solutions

**Re:** NJCEP Protocols for Public Comment Package

The following memo presents Willdan Energy Solutions' (Willdan) response to the New Jersey Board of Public Utilities' (NJ BPU) request for public comment on the New Jersey Clean Energy Program's (NJCEP) Protocols to Measure Resource Savings (the Protocols).

## Protocols to Measure Resource Savings Comments

Willdan Group, Inc. (NASDAQ: WLDN) is a leading nationwide provider of energy efficiency and value-added professional technical and consulting services to various sectors. We have been proudly serving our clients for over 50 years. In 2015, Willdan opened our first New Jersey office, employing over 250 employees in the Tri-State Area to support our clean energy practice.

Willdan is the largest direct install lighting contractor in the nation and we have performed over 131,000 lighting audits and installations, for customers ranging from large corporate campuses and multifamily housing developments to healthcare facilities and other sensitive facilities like data centers to small mom-and-pop businesses. In New York City metropolitan area alone, Willdan currently performs over 1,000 lighting audits per month, mostly through the Con Edison Commercial Direct Install (CDI) Program, resulting in as many as 12,000 LED fixtures installed per day. In 2016, Willdan was awarded a contract for the NJCEP's Direct Install Program, and we now provide direct install services in Essex and Union Counties through this program.

In addition to participating in the region's largest and most successful direct install programs, Willdan has turnkey capabilities to undertake major infrastructure upgrade and utility efficiency projects from inception to completion. We have helped numerous small to large facilities to upgrade their base building infrastructure, extend the life of the equipment, and reduce energy costs. Our services includes: pre-development and financing; investment grade audits; engineering; project design; general contracting; construction management and administration; testing, balancing and commissioning; warranty services and owner training; guaranteed savings; and monitoring and verification of savings.

For over eight years, Willdan has been providing engineering services in the NY-NJ metropolitan area to aid clients through the various programs of the NJCEP and other programs offered by the local utilities. Willdan has used this experience to thoroughly review the NJCEP Protocols for Public Comment Package provided by the NJ BPU. Willdan has taken the view point of how the Protocols calculate savings and their effect on the various New Jersey incentive programs. Willdan

has focused its efforts on the Commercial and Industrial Energy Efficient Construction (C&I) section of the Protocols. The table below summarizes our response to the review of NJ protocols.

Respectfully submitted,

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| Comment No. | Existing/New Section | Section | Comments | Recommendations |
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| 1 | Existing | General - All Measures | Formulae are typed in plain text. | Use the Equation Tool for all formulae. |
| 2 | Existing | General - All Measures | There is no de-rate factor to account for efficiency losses in older equipment. | Add a de-rate factor for older equipment. This factor should be based on the type of equipment and the age of the equipment. Typical equipment that should be covered by these factors are airside HVAC, boilers, and chillers. |
| 3 | Existing | General - All Measures | EFLHs not included for all building type verticals. | Add recommended EFLH for different verticals based on occupancy and usage characteristics. For example: A supply fan in a hospital environment serving patient areas typically runs 24x7, whereas the same fan in an office building would only run for 10-12 hours a day. |
| 4 | Existing | C&I Performance Lighting | Over consolidating building types. | These types should be broken out as they previously were due to the various operating parameters of these facility types. |
| 5 | Existing | C&I Lighting Controls | SVG rates are too low. These are the most conservative rates. | Rates should be 31% for occupancy savings and 40% for daylight savings. US DOE reference RPI study that shows greater savings, specifically for office buildings. Two studies below show rates greater than the NJCEP protocols.<br><br>https://energy.gov/sites/prod/files/2015/11/f27/fupwg_fall2015_matour.pdf<br><br>https://escholarship.org/content/qt9t48j3rj/qt9t48j3rj.pdf?nosplash=5a15a1343ccc1cd1318420e6ad21ccdf |
| 6 | Existing | C&I Premium Efficiency Motors | Why has this section been deleted? There are many facilities that have old motors not meeting these standards. This section should not be removed. | Keep this section. |
| 7 | | | The baseline should not be ASHRAE 90.1 2013, rather it should be the existing motors. | Change the baseline to existing motors, if any.<br><br>Since ASHRAE 90.1 2013 is the baseline of a new construction project, this section is not applicable to new construction projects. There is currently no motor on the market exceed the efficiency of premium motors. |
| 8 | | | Chilled Water Pump and Hot Water Pump calculations currently use EFLHs. | Chilled Water Pump and Hot Water Pump calculations could use CDD and HDD hours, respectively. Fan motors could use typical facility run hours. |
| 9 | Existing | C&I Dual Enthalpy Economizers | Savings per Ton of Cooling System table does not cover hospitals. | Not sure since they just referencing NY TRM V4 and this does not have hospitals either. |
| 10 | Existing | C&I Occupancy Controlled Thermostats | TRC is looking to make this a prescriptive measure. | The formula allows for this to be a custom measure. Making this a prescriptive measure would be too restricting as there are so many variables to consider, such as EFLH, Weekly Occupied Hours, AFUE, and EER. |
| 11 | | | Assuming 5 days per week for calculations. | The facility types this measure is targeting are not limited to 5 days per week of operation. This should be 7 days per week. |

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| 12 | | | Cooling Energy Savings formula mistake<br>Cooling Energy Savings (kWh) = (((Tc * (H+5) + Sc * (168 - (H+5)))/168)Tc) * (Pc * Caphp * 12 * EFLHc/EERhp) | Cooling Energy Savings (kWh) = (((Tc * (H+5) + Sc * (168 - (H+5)))/168) - Tc) * (Pc * Caphp * 12 * EFLHc/EERhp) |
| 13 | | | Heating Energy Savings formula mistake<br>Heating Energy Savings (kWh) = (((Th * (H+5) + Sh * (168 - (H+5)))/168)-Th) * (Ph * Caphp * 12 * EFLHh/EERhp) | Heating Energy Savings (kWh) = (Th-((Th * (H+5) + Sh * (168 - (H+5)))/168)) * (Ph * Caphp * 12 * EFLHh/EERhp) |
| 14 | Existing | C&I Electric Chillers | On Pg 114 Calcualtion Using IPLV Using EFLH | Recommending using CDD hours for suitable region as IPLV accounts for part load efficiency throughout the year |
| 15 | New | C&I Data Centers | No section specific to data centers. | Add a section. |
| 16 | New | C&I Data Centers Server Upgrade/Consolidation | No section specific to data centers for server upgrades or consolidation. | This section should require that a performance metric be established relative to demand. This metric could be CPU/Process metrics (% CPU use per Watt, processes per Watt, processes per second per Watt), Disk metrics (such has [Tera, Giga, Mega]Bytes per second per Watt), etc. In house metrics should also be acceptable considering the extreme customer dependent requirements of these systems.<br><br>The metric per server could be averaged for a make and model, given the assumption that the servers are generally configured in a similar fashion.<br><br>The performance metric would be required of the baseline and proposed servers. Demand savings would be calculated given the following:<br><br>$\Delta$D (kW) = ((M_b*N_b)-(M_p*N_p))/1000(W/kW)<br>Where M_b = baseline metric per server<br>M_p = proposed metric per server<br>N_b = Qty of baseline servers<br>N_p = Qty of proposed servers<br><br>The above equation is formulated with the knowledge that the exponential growth of technology will, more often than not, allow for the proposed case to install less servers to meet the metric demand of the baseline case. This means that the upgrade/consolidation is not a 1-for-1 server replacement. |
| 17 | New | C&I Data Centers CRAHs / CRACs Upgrades / VFDs | No section specific to data centers for CRAH / CRAC Upgrades or adding VFDs to units. | This section should refer to ASHRAE 90.1 2013 for efficiency guidelines. Also, consider referencing the new ASHRAE 90.4 for data center measures.<br><br>CRAH units will be purely a fan motor savings. CRAC units will be a compressor motor and fan motor savings.<br><br>Typical technologies that will be more efficient than traditional CRAHs / |

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| | | | | CRACs are In-row cooling and door cooling.<br><br>Fan motor savings will be an efficiency savings calculation. VFD savings can use the same formulae from the Variable Frequency Drives section, with some modification.<br><br>The compressor savings for CRAC units can use the same formulae from the Electric HVAC Systems section, with some modification. |
| 18 | New | C&I Data Centers Hot / Cold Aisle Containment | No section specific to data centers for hot / cold aisle containment. | This section should cover the decrease in mixing cold and hot aisle air. It could be approached as a rated savings per ton of IT load, or per volume of air passed through the cooling units or racks (should be the same). |
| 19 | New | C&I Data Centers Humidification | No section specific to data centers for humidifiers. | This measure would be similar to any other humidification system, except that the parameters for a DC are different than normal occupied spaces.<br><br>Typical high efficiency equipment would be ultrasonic humidifiers and water atomizers.<br><br>Savings would be calculated by the humidity setpoint, lbs. of water required, and the demand per lb of water required. |
| 20 | New | C&I - New Measure | No section for converting DC motors to AC motors, particularly with elevators. | Include a section for converting DC motors to AC motors, especially for elevators. |
| 21 | New | C&I - New Measure | No section for commercial dryers. | Include a section for commercial dryers. |
| 22 | New | C&I - New Measure | No section for steam trap and steam system leak repairs. | Include a section for steam trap and steam system leak repairs. "Energy Savings Calculation and Cost Analysis Handbook For New York Power Authority" Version 1 2013 Section 2.9 has a section that covers this. |
| 23 | New | C&I - New Measure | No section for rapid roll-up doors. | Include a section for rapid roll-up doors. "Energy Savings Calculation and Cost Analysis Handbook For New York Power Authority" Version 1 2013 Section 2.3 has a section that covers this. |
| 24 | New | C&I - New Measure | No section for energy management and control systems. | Include a section for energy management and control systems. "Energy Savings Calculation and Cost Analysis Handbook For New York Power Authority" Version 1 2013 Section 2.18 has a section that covers this. |