



## Loadshape Catalog Project, Phase 1: Inventory of Recent Metering Studies from the Region<sup>1</sup>

October 14, 2015

Regional Metering Studies Summary Table					
Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
<a href="#">NEEP Ductless Heat Pump Meta-Study</a>	Northeast, Mid-Atlantic, and Northwest Regions	Single-head cold climate, and conventional ductless heat pumps.	Multiple metering studies included. NEEP primary research includes 9 DHPs.	Energy usage in heating climate (pg. 10), coefficient of performance at various temperatures (pg. 8), Demand and load shape (pg. 12)	November 13, 2014  Richard Faesy & Jim Grevatt, Energy Futures Group  Brian McCowan & Katie Champagne, Energy & Resource Solutions
<a href="#">NEEP Variable Speed Drive Loadshape Study</a>	Northeast, Mid-Atlantic Regions	Supply Fans, Return Fans, Cooling Water Pumps, Hot Water Pumps, Hot Water Pumps, Water Source Heat Pump Circulation Pumps.	420 metered VSDs.	Energy savings per unit horsepower by season by measure type (pg. 63), sample loadshapes (pg. 31, 33, 52)	August 2014  Cadmus Group, Inc

<sup>1</sup> Comments on value of studies refer to technical advisors' preliminary assessment of whether a study is could be useful data source to be pooled with other data sources or mined to calculate additional parameters.



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<a href="#">Northeast Residential Hours of Use Study</a>	CT, MA, RI, NY	Halogen, Incandescent, CFLs, LEDs, and Fluorescent lights.	4,462 metered lights.	Household HOU by area, room type, house type, bulb type, and income level (pg. 34), summer and winter load shapes by area (pg. 62), coincidence factors by season and bulb type (pg. 66)	5/5/2014 NMR Group, Inc. DNV GL
<a href="#">C&amp;I Unitary HVAC Load Shape Project</a>	New England and Mid-Atlantic regions, New York.	Unitary C&I HVAC from 1 to 100 ton.	45 small units and 30 large units for each of 6 weather regions for a total sample size of 450 units.	Coincidence factor by region (pg. 58), Annual small and large unit load shapes (pg. 64)	August 2, 2011 KEMA, Inc.
<a href="#">NEEP C&amp;I Lighting Load Shape Project</a>		C&I lighting, taken from other metering studies in the region	775 projects, 3780 loggers	Energy, demand, savings by building type and region (pg. 39),	Other studies with newer data exist. July 19, 2011 KEMA, Inc.
<a href="#">Central Air Conditioning Impact and Process Evaluation</a>	CT	Central Air Conditioners	92 metered central AC systems.	Average daily load profiles for on-peak days and seasonal peak days (pg. 26), Annual energy savings and summer peak demand savings (pg. 22)	10/8/2014 NMR Group, Inc., and DNV GL



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<a href="#">Connecticut Ground Source Heat Pump Impact Evaluation and Market Assessment</a>	CT	Residential ground source heat pumps.	40 metered GSHPs.	For existing and new homes: Gross annual energy savings, seasonal demand coincidence factors (pg. 35), Seasonal and annual electric savings realization rates (pg. 36),	This is valuable. 6/3/2014 NMR Group, Inc., and DNV GL
<a href="#">Impact Evaluation of the Connecticut Small Business Energy Advantage (SBEA) Program</a>	CT	Commercial lighting, compressed air systems, novelty timers, VSDs, motors, anti-condensate heater controls, electrically commutated fan motors and fan motor controls, refrigeration night curtains.	60 customer sites.	Lighting and non-lighting electricity savings and seasonal demand savings with interactive effects KW (pg. 25), realization rates (pg. 2)	April 2014 KEMA, Inc.
<a href="#">Impact Evaluation of the Retro-Commissioning, Operation &amp; Maintenance, and Business Sustainability Challenge Programs</a>	CT	Air compressors, Lighting, Other miscellaneous.	17 sites.	Energy savings, demand savings, and realization rates by project for the retrocommissioning program (pg. 10), O&M program (pg. 26),	Michaels Energy Evergreen Economics



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<a href="#">Evaluation of the Energy Opportunities Program: Program Year 2010</a>	CT	Air compressors, Lighting, VFDs, Controls.	66 lighting and 45 non-lighting electric.	Program, lighting only, and non-lighting energy and demand savings (pg. 26),	Program Year 2011  Energy Market Innovations, Inc.
<a href="#">Efficiency Maine Appliance Rebate Program Evaluation Overall Report</a>	ME	Clothes Washers, Dehumidifiers, Heat  Pump Water Heaters, and Refrigerators	79 sites.	Peak demand, annual energy savings, realization rate broken down by measure (pg. II) Hourly loadshape for Refrigerators (pg. 30), and Clothes washers / dryers (pg. 45). Yearly load shape for dehumidifiers (pg. 55). Weekly load shape for HPWH (pg. 62)	7/18/2014  NMR Group, Inc.  Nexant, Inc.
<a href="#">Efficiency Maine Trust Residential Lighting Report</a>	ME	Lighting	324 loggers in 41 households.	Hours of use (pg. 19). Daily winter and summer loadshapes (pg. 22). Coincidence factor (pg. 22). Gross and net energy savings (pg. 30), Gross and net summer and winter peak demand savings (pg. 30), realization rate (pg. 31)	Valuable  November 1, 2012  The Cadmus Group, Inc.



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Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
<a href="#">Impact Evaluation of 2011-2012 Prescriptive VSDs</a>	MA	Building Exhaust Fans, Cooling Tower Fans, Chilled Water Pumps, Boiler Feed Water pumps, Hot Water Circulating Pumps, Make-up Air Fans, Return Fans, Supply Fans, WS Heat Pump Circulating Loops.	26 sites.	By Site: total energy savings, summer & winter demand savings, 8-month load shape (pgs. A-21 - End)	May 9, 2013  KEMA, Inc. and DMI, Inc
<a href="#">Residential Lighting Controls Initiative Evaluation Final Report</a>	MA	LED bulbs paired with dimmable controls.	16 sites. 52 bulbs on 21 dimmer controls.	Annual operating hours, annual energy usage (pg. 12), Demand and energy savings (pg. 11)	The Cadmus Group, Inc.
<a href="#">Massachusetts Combined Heat and Power Program Impact Evaluation 2011-2012</a>	MA	Combined Heat and Power Systems	25 sites.	Peak demand capacity factors by project (pg. 5-11), Annual electricity savings and realization rates by PA (pg. 5-14), Electric peak demand impacts and realization rates (pg. 5-17),	November, 2013  KEMA, Inc
<a href="#">Impact Evaluation of 2011 Custom Refrigeration, Motor, and Other Installations</a>	MA	Motors, HVAC system drives, Chillers, Ultrasonic humidifiers.	48 sites.	Custom refrigeration, motor, and other annual energy savings, peak demand savings,	Realization rates only.  June 18, 2013



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				and realization rates by PA (pg. 1-9), By site (pg. 5-31)	KEMA, Inc., DMI Inc, and SBW
<a href="#">Impact Evaluation of the Massachusetts Upstream Lighting Program</a>	MA	Lighting	81 sites, including 66 LED and 15 Fluorescent.	LED, fluorescent, and combined energy savings realization rate, demand realization rate, coincidence factors, and interactive effects (pg. 4-26)	Valuable February 19, 2014 KEMA, Inc
<a href="#">Impact Evaluation of 2010 Prescriptive Lighting Installations</a>	MA	Lighting Systems, Lighting Controls, Advanced Lighting Design, Performance Lighting, Refrigerated Case Lighting (LED)	56 sites.	Coincidence factors and realization rates for lighting systems, lighting controls, Refrigerated LED case lighting, and advanced lighting design (4-27)	Valuable June 21, 2013 KEMA, Inc
<a href="#">Small Business Direct Install 2010-2012 Impact Evaluations: Non-Controls Lighting</a>	MA	Lighting (Fixture retrofits),	126 sites.	Realization rates by measure, by customer type, by customer size, statewide (pg. 34), annual energy savings realization rates, peak period coincidence factors, and HVAC interaction factors	Valuable January 29, 2013 The Cadmus Group, Inc. Navigant



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Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
<a href="#">Small Business Direct Install 2010-2012: Pre- and Post-Installation Lighting Occupancy Sensor Study</a>	MA	Lighting (Occupancy Sensors)	203 lighting control measures installed at 69 sites	Interaction factor, realization rate, coincidence factor (pg. B-10), energy savings (pg. B-37), demand savings (pg. B-38), annual operating hours (pg. B-50)	Valuable  January 29, 2013 The Cadmus Group, Inc.  Navigant
<a href="#">Brushless Fan Motors Impact Evaluation</a>	MA, RI	Brushless Fan Motors	26 sites.	Savings by site: heating and cooling savings, total savings, heating and cooling hours, annual savings by site (pg. 25) Savings by state (pg. 28), Summer and Winter Demand Savings (pg. 1),	June 2012  Navigant  Opinion Dynamics Corporation  Itron  ERS  Cadmus
<a href="#">Heat Pump Water Heaters Evaluation of Field Installed Performance</a>	MA	Heat Pump Water Heaters	14 sites.	Energy usage (pg. 22), Peak demand reduction (pg. 30), Hourly load shapes of each site (pg. 32), Seasonal load profile (pg. 33),	Valuable  JUNE 26, 2012  Steven Winter Associates, Inc



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Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
<a href="#">Non-Controls Lighting Evaluation for the Massachusetts Small Business Direct Install Program: Multi-Season Study</a>	MA	Commercial Lighting	126 sites.	Winter and multi-season demand savings with interactive adjustments by program administrator, statewide, and facility demand tiers (pg. 30). Annual operating hours (pg. 43), Summer & winter coincidence factors (pg. 44 & 45), Hourly lighting coincidence factors (pg. 51)	Valuable  June 14, 2012  The Cadmus Group, Inc.  Energy & Resource Solutions
<a href="#">Impact Evaluation of 2010 Custom Lighting Installations</a>	MA	Commercial Lighting	45 sites.	Site-specific annual energy savings, seasonal demand savings (pg. 28), program-wide annual energy and seasonal demand savings (pg. 32)	Realization rates  May 29, 2012  Energy & Resource Solutions  KEEMA
<a href="#">Resource EmPOWER Maryland Residential HVAC Program Evaluation</a>	MD	Residential HVAC (ASHP, Central AC)	6/1/2012-5/31/2013	Realization rate, Ex-ante, ex-post energy and demand savings broken down by utility (pg. 9), Coincident Peak Demand Savings (pg. 5), Energy Savings (pg. 6),	April 4, 2014  Navigant  Cadmus





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Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
<a href="#">ConEd Impact Evaluation of Residential Electric HVAC Program</a>	NY	Ductless Heat Pumps, Air Conditioners	25 DHP sites, and 30 AC.	Gross and net energy and demand savings, realization rates (pg. 2 & 36). Coincidence factors (pg. 8)	August 5, 2014 ERS
<a href="#">Con Edison Small Business Direct Install (SBDI) Final Impact Evaluation Report</a>	NY	CFLs, Tube Lighting, Motors, High Pressure Rinse Valves.	133 sites.	Realization rate (pg. 33), Hours of Use (HOU), (pg. 49), Annual energy savings, summer peak demand savings, interactive factors by site (pg. 1-k1)	July 14, 2014 ERS
<a href="#">ConEd Impact Evaluation of Large Commercial and Industrial Program Group</a>	NY	Custom projects, lighting, HVAC, compressed air, heat recovery systems.	99 sites.	Measure level realization rates (pg. 45), Coincidence Factors (pg. 52),	Dec 11, 2014 ERS
<a href="#">ConEd Impact Evaluation of Residential Room Air Conditioner Program</a>	NY	Window and through-the-wall AC units.	55 sites.	Coincidence factor (pg. 24), Run time (pg. 23), Program energy and demand impacts (pg. 22),	Valuable Oct. 10, 2013 ERS
<a href="#">Statewide Commercial and Residential Light Metering Study</a>	PA	Residential and Commercial Lighting	200 Residential, 495 Commercial lights metered.	Residential hours of use (HOU), interior vs. exterior lights (pg. 27), coincidence factor (pg. 29), Seasonal load shapes (pg. 30),	Valuable January 13, 2014



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Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
				Commercial HOU and coincidence factors by building type (pg. 55), Interactive factors by building type (pg. 56), weekly load shapes by building type (pg. 59),	GDS Associates, Inc. (GDS), Nexant, Inc. (Nexant), Research Into Action, Inc. (Research Into Action), and  Apex Analytics LLC (Apex Analytics)
<a href="#">Impact Evaluation of 2011 Rhode Island Prescriptive Retrofit Lighting Installations</a>	RI	Lighting Systems, Lighting Controls	18 sites.	Lighting systems: Annual energy savings (pg. 4-18), realization rates, summer/winter coincidence factors, summer/winter interactive effects (pg. 4-19)  Lighting Controls: Annual energy savings (pg. 4-20), realization rates, summer/winter coincidence factors, summer/winter interactive effects (pg. 4-21)	Valuable  October, 2013  KEMA, Inc.
<a href="#">Emera Maine Heat Pump Pilot Program</a>	ME	Ductless heat pumps.	64 households.	Peak winter & summer demand impacts (pg 17),	Likely to be valuable.



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				Energy use impacts (pg 12).	November 17, 2014  EMI Consulting
<a href="#">Impact Evaluation of National Grid Rhode Island Commercial and Industrial Upstream Lighting Program</a>	RI	CFLs, LEDs.	54 sites.	Annual energy savings by bulb category (pg. 23 & 26), Realization rate (pg. 24 & 27), summer and winter coincidence factors, summer and winter interactive effects (pg. 25 & 28), hours of use (pg. 32)	Maybe Valuable  August 15, 2014  DNV GL
<a href="#">Dehumidifier Metering Study</a>	MA, NY, MD, VA	Residential Dehumidifiers	21 Dehumidifiers	Average hours of use, active power, standby power, annual energy use (pg. 11). No demand savings.	The Cadmus Group, Inc.
<a href="#">Impact and Process Evaluation of Efficiency Maine Trust's Retro-Commissioning Pilot Program</a>	ME	Fan and pump motor operations, Lighting areas (simple loggers or power panel metering), HVAC package and central plant equipment, Refrigeration systems.	23 sites.	Realization rates (pg. 41), Gross and net energy savings (pg. 41),	Not likely to be valuable  December 28, 2012  The Cadmus Group, Inc.



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Title	Where?	Specific Measures Metered	Sample Size	Key Information	Comments Date/ Consultant
<a href="#">Impact Evaluation of 2010 Rhode Island Custom Process and Compressed Air Installations</a>	RI	Air cooled process chillers, Aerator blowers.	2 sites.	Program-wide annual energy savings (pg. 8), Energy and demand savings, broken down by custom process, compressed air, and custom process and compressed air. (pg. 10)	Not likely to be valuable  August, 2012  KEMA, Inc.
<a href="#">Evaluation of the Energy Opportunities</a>  <a href="#">Program: Program Year 2011</a>	CT	Commercial lighting and HVAC systems to determine interactive effects.	111 electric projects and 33 gas.	Program, lighting only, and non-lighting energy and demand savings (pg. 23),	Realization rates only.  2011  Energy Market Innovations, Inc.
<a href="#">Impact Evaluation of Ngrid's Custom Refrigeration, Motor, and Other Installations</a>	RI	Commercial exhaust fans, recirculation fans, electronic control modules, motors.	6 sites.	Site reports including: Annual energy savings, summer and winter on peak demand, operating hours (pg. 11-75)	Not valuable  August 15, 2014  DNV GL



REGIONAL EVALUATION,  
MEASUREMENT & VERIFICATION FORUM

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