



Me² Commercial PACE Eligible Improvements (September 2013)

INTRODUCTION

Me² Commercial PACE provides clean energy financing for energy efficiency and renewable energy projects between \$20,000 and \$5 million. PACE financing helps make energy efficiency projects work for your bottom line. The program is offered by the City of Milwaukee's Office of Environmental Sustainability.

PACE Financing allows a property owner to implement energy efficiency and renewable energy improvements without a large up-front cash payment. The property owners that voluntarily choose to participate in the PACE Financing program repay their improvement costs over a set time period (typically 10 to 20 years) through municipal special charges, which are secured by the property itself and paid as an addition to the owner's property tax bill. Non-payment generally results in the same set of repercussions as the failure to pay any other portion of a property tax bill.

ELIGIBLE IMPROVEMENTS

The Me² Commercial PACE program provides financing for a wide variety of commercial energy and water saving projects that can include common measures as well as custom measures. See below for a complete list of eligible common measures. Please refer to the Program Handbook for more details and requirements for the approval of energy efficiency and renewable energy measures under the program. All measures approved for funding under the program must have the capacity to save energy or produce renewable energy as compared to building base case systems. Refer to the program handbook for details on the program requirements. **NOTE: Cost savings from the improvements over the life of the improvement should exceed the improvement cost.**

CONTACT

For details on the Me² Commercial PACE program visit www.smartenergypays.com

For any questions on Me² PACE financing, contact:

Erick Shambarger, City of Milwaukee

(414) 286-8556

eshamb@milwaukee.gov

KEY

ACRONYMS / DEFINITIONS

ACH	Air changes per hour
ASHRAE	American Society for Heating Refrigeration and Air-conditioning Engineers (www.ashrae.org)
CADMAC	California DSM Measurement Advisor Committee (http://www.calmac.org/)
CEE	Consortium for Energy Efficiency (www.cee1.org)
CSI	California Solar Initiative - PV
CSI-Thermal	California Solar Initiative - Water heating
CRRC	Cool Roof Rating Council (www.coolroofs.org)
DEER	Database for Energy Efficient Resources (www.energy.ca.gov/deer/)
DSIRE	Database of State Incentives for Renewables and Efficiency (www.dsireusa.org)
DHW	Domestic Hot Water
EMS	Energy management systems
EUL	Expected Useful Life
HET	High Efficiency Toilets
HEU	High Efficiency Urinals
HID	High Intensity Discharge
IC	Internal Combustion
IOU	Investor owned utility
PV	Photovoltaic
SAE	Society of Automotive Engineers
SGIP	Self-Generation Incentive Program
SRCC	Solar Rating and Certification Corporation
VFD	Variable Frequency Drive (aka Adjustable Frequency Drive, Variable Speed Drive)

**Me² Commercial PACE
Eligible Improvements
(September 2013)**

ELIGIBLE ENERGY EFFICIENCY IMPROVEMENTS

System	Subsystem	Measure	Effective Useful Life (yrs)	Source for Effective Useful Life
Domestic Hot Water (DHW)	Water Heater	Efficient Unit Replacement	14	ASHRAE: DHW
	Water Heater	DHW Pipe Insulation	20	CADMAC EUL (Appendix F)
	Commercial Kitchen	Pre-rinse Spray Valve	5	Watersmart Guidebook (EBMUD - 2008)
	Commercial Laundry	Ozone Laundry System	10	PG&E Work Paper
	Pumps	Efficient Unit Replacement	24	ASHRAE: Heating Pump
	Pumps	Trimmed impeller	24	ASHRAE: Heating Pump
	Pumps	Installing VFD & controls	13	ASHRAE: EMS Controls
Envelope	Doors	Reduce Building Infiltration	Subject to review	
	Walls	Insulation (Conditioned spaces only)	22	ASHRAE - HVAC Applications 36.3 Table 4: Insulation
	Roof	Insulation (Conditioned spaces only)	22	ASHRAE - HVAC Applications 36.3 Table 4: Insulation
	Roof	Cool roof surface	15	DEER 2008: EUL Summary
	Roof	Green roof installation	Subject to review	
	Windows	High Performance Windows	20	DEER 2008: EUL Summary
	Windows	Window film installation	10	DEER 2008: EUL Summary
Lighting	Fluorescent	Efficiency Improvement	12	DEER 2008: EUL Summary
	Compact Fluorescent	Efficiency Improvement	12	DEER 2008: EUL Summary
	Induction Lighting	Efficiency Improvement	12	DEER 2008: EUL Summary
	Cold Cathode Lamps	Efficiency Improvement	12	DEER 2008: EUL Summary
	HID	Efficiency Improvement	14	DEER 2008: EUL Summary (avg of all HID)
	Bi-Level Fixtures	Replace existing lighting in Stairwells and Garages with Bi-level Lighting fixtures	16	DEER 2008: EUL Summary
	Exit Signs	Replace with LED / LEC exit Sign	16	DEER 2008: EUL Summary
	Exit Signs	Replace with self-luminescent	16	DEER 2008: EUL Summary
	Interior Lighting	Replace with Induction or LED	10	IOU-specific Measure Evaluations
	Exterior Lighting	Replace with Induction or LED	10	IOU-specific Measure Evaluations

Me² Commercial PACE Eligible Improvements

	Street Lighting	Replace with Induction or LED	10	IOU-specific Measure Evaluations	
	Daylighting	Skylights	NA	NA	
	Controls	Demand Response Controls	13	ASHRAE: EMS Controls	
	Controls	Lighting scheduling controls	8	DEER 2008: EUL Summary	
	Controls	Daylighting controls	16	DEER 2008: EUL Summary	
	Controls	Occupancy sensors	8	DEER 2008: EUL Summary	
	General	De-lamping			
HVAC	AC/Split Systems/Heat Pumps	Efficient Unit Replacement	18	ASHRAE: AC/HP/Split	
	AHUs	Airflow distribution improvements	24	ASHRAE - HVAC Applications 36.2 Table 3: DX air dist equip	
	AHUs	Economizer (Air or Water-side)- Repair or New Unit	10	IOU-specific Measure Evaluations	
	Boilers	Burner upgrade	21	ASHRAE-HVAC Apps 36.3 Table 4: Burners	
	Boilers	Combustion fan VFD	13	ASHRAE: EMS Controls	
	Boilers	Economizers	10	IOU-specific Measure Evaluations	
	Boilers	Efficient Unit Replacement	22	ASHRAE - HVAC Applications 36.2 Table 3: Boilers, HW, steel gas-fired	
	Boilers	Heat recovery	22	ASHRAE - HVAC Applications 36.2 Table 3: Boilers, HW, steel gas-fired	
	Boilers	Oxygen trim controls	15	IOU-specific Measure Evaluations	
	Boilers/Chillers	Pipe Insulation	20	CADMAC EUL (Appendix F)	
	Chillers	Add water-side economizer	15	DEER 2008: EUL Summary	
	Chillers	Efficient Unit Replacement	21	ASHRAE: Chillers	
	Chillers	Heat recovery	25	ASHRAE: Chiller, Heat Recovery	
	Cooling Tower	Installing VFD & controls - fans	13	ASHRAE: EMS Controls	
	Cooling Tower	Replacement or add. capacity	22	ASHRAE - HVAC Applications 36.2 Table 3: Cooling Towers, metal	
	Energy Management Controls	Cooling tower fan sequencing	13	ASHRAE: EMS Controls	
	Energy Management Controls	Demand Response Controls	13	ASHRAE: EMS Controls	
	Energy Management Controls	Improved scheduling capability	13	ASHRAE: EMS Controls	
	Energy Management Controls	Sensors calibration/optimal relocation	13	ASHRAE: EMS Controls	
	Energy Management Controls	Ongoing-comissioning software			
	Evaporative Cooling Systems	Offset existing mech. cooling	15	DEER 2008: EUL Summary	
	Fans	Installing VFD & controls	13	ASHRAE: EMS Controls	

Me² Commercial PACE Eligible Improvements

	Furnaces	Condensing furnaces	18	ASHRAE - HVAC Applications 36.3 Table 4: Furnace
	HVAC System (General)	Duct testing and sealing	Subject to review	
	HVAC System (General)	Duct testing and sealing	Subject to review	
	HVAC System (General)	VAV system conversions	15	IOU-specific Measure Evaluations
	HVAC System (General)	Radiant Heating / Cooling	Subject to review	
	HVAC System (General)	Geothermal HVAC	Subject to review	
	HVAC System (General)	Thermal Storage for Load Shifting	Subject to review	
	Steam Heating	Install/Replace Steam Traps		
	Labs	Reduced ACH	15	IOU-specific Measure Evaluations
	Labs	VAV fume hoods	15	IOU-specific Measure Evaluations
	Motors	Efficient Unit Replacement	18	ASHRAE: Motors
	Pumps	Efficient Unit Replacement	19	ASHRAE: Cooling Pumps
	Pumps	Trimmed impeller	19	ASHRAE: Cooling Pumps
	Pumps	Installing VFD & controls	13	ASHRAE: EMS Controls
	Ventilation	Demand controlled ventilation	21	ASHRAE: Exhaust Fan
	Ventilation	Garage CO controls	21	ASHRAE: Exhaust Fan
Refrigeration	Refrigerated Cases / Walk-ins	Addition of insulation	11	DEER 2008: EUL Summary
	Refrigerated Cases / Walk-ins	Anti-sweat heater controls	12	DEER 2008: EUL Summary
	Refrigerated Cases / Walk-ins	Auto-closers for cooler/freezer doors	8	DEER 2008: EUL Summary
	Refrigerated Cases / Walk-ins	Case-lighting Controls	13	ASHRAE: EMS Controls
	Refrigerated Cases / Walk-ins	Efficient evaporator fan motors	18	ASHRAE: Motors
	Refrigerated Cases / Walk-ins	Efficient Unit Replacement	13	ASHRAE: Refg. Equipment
	Refrigerated Cases / Walk-ins	Evaporator fan controllers	16	DEER 2008: EUL Summary
	Refrigerated Cases / Walk-ins	High Efficiency Display Cases	13	ASHRAE: Refg. Equipment
	Refrigerated Cases / Walk-ins	Improved Defrost Controls	13	ASHRAE: EMS Controls
	Refrigerated Cases / Walk-ins	Install doors w/ low/no anti-sweat heat	12	DEER 2008: EUL Summary
	Refrigerated Cases / Walk-ins	Installing Night covers	5	DEER 2008: EUL Summary
	Refrigerated Cases/Walk-ins	Suction line insulation	22	ASHRAE - HVAC Applications 36.3 Table 4: Insulation
	Thermal Storage Systems	Thermal Storage for Load Shifting	Subject to review	
	Compressors	Add VFD and Controls	13	ASHRAE: EMS Controls
	Compressors	Added Heat Recovery	15	IOU-specific Measure Evaluations
	Compressors	Addition of Mechanical Sub-cooling	15	DEER 2008: EUL Summary
	Compressors	Efficient Unit Replacement	15	IOU-specific Measure Evaluations

Me² Commercial PACE Eligible Improvements

	Compressors	Floating Head Pressure Controls	15	DEER 2008: EUL Summary	
	Compressors	Floating Suction Pressure	15	DEER 2008: EUL Summary	
	Condensers	Efficient Unit Replacement	15	DEER 2008: EUL Summary	
	Condensers	Evaporative Condensers	20	ASHRAE - HVAC Applications 36.3 Table 4: Condensers, Evaporative	
	Condensers	Floating Head Pressure	15	DEER 2008: EUL Summary	
	Condensers	Replace Air Cooled with Evaporative Condenser	20	ASHRAE - HVAC Applications 36.3 Table 4: Condensers, Evaporative	
	Controls	Retro-commissioning	10	DEER 2008: EUL Summary	
Compressed Air	Air Compressors	Efficient Unit Replacement	20	ASHRAE - HVAC Applications 36.3 Table 4: Recip Compressors	
	Compressed Air Storage	Additional compressed air storage	15	IOU-specific Measure Evaluations	
	Controls	Improved compressor sequencing	13	ASHRAE: EMS Controls	
	Controls	Improved scheduling or controls	13	ASHRAE: EMS Controls	
Process / Plug Loads	Boilers	Efficient Unit Replacement	22	ASHRAE - HVAC Apps 36.2 Table 3: Boilers, HW, steel gas-fired	
	Boilers	Burner upgrade	21	ASHRAE - HVAC Apps 36.3 Table 4: Burners	
	Boilers	Combustion fan VFD	13	ASHRAE: EMS Controls	
	Boilers	Economizers	10	IOU-specific Measure Evaluations	
	Boilers	Heat recovery	22	ASHRAE - HVAC Applications 36.2 Table 3: Boilers, HW, steel gas-fired	
	Boilers	Oxygen trim controls	15	IOU-specific Measure Evaluations	
	Chillers / Cooling	Efficient Unit Replacement	15	IOU-specific Measure Evaluations	
	Air / Water Distribution System	Efficiency Improvement	12	IOU-specific Measure Evaluations	
	Fans	Efficient Unit Replacement	20	ASHRAE - HVAC Applications 36.3 Table 4: Fans	
	Fans	Installing VFD & controls	13	ASHRAE: EMS Controls	
	Industrial Process	Equip. scheduling for load reduction	Subject to review		
	Industrial Process	Process improvement	Subject to review		
	Motors	Efficient Unit Replacement	18	ASHRAE: Motors - NRR manual	
	Elevators	Hoisting and Standby improvements	Subject to review		
	Pool	Add pool cover	6	IOU-specific Measure Evaluations	
	Pool	Efficient Heater Replacement	5	DEER 2008: EUL Summary	
	Pool Pump	Reduce/Optimize Flow/Configuration	13	ASHRAE: EMS Controls	
Pool Pump	Replace Motor	18	AHRAE: Motors - NRR manual		



Me² Commercial PACE Eligible Improvements

	Pool Pump	Replace Pump	20	ASHRAE - HVAC Apps 36.3 Table 4: Pumps
	Pool Pump	Variable Flow	15	IOU-specific Measure Evaluations
	Pumps	Efficient Unit Replacement	20	ASHRAE HVAC Apps 36.3 Table 4: Pumps
	Pumps	Installing VFD & controls	13	ASHRAE: EMS Controls
Mobility	Elevators		20	
	Escalators		20	

ELIGIBLE WATER CONSERVATION IMPROVEMENTS

System	Subsystem	Measure	Effective Useful Life (yrs)	Source for EUL
Domestic Water Use	Toilets	Efficient Unit Replacement	20	Watersmart Guide (EBMUD - 2008)
	Urinals	Efficient Unit Replacement	10	Watersmart Guide (EBMUD - 2008)
	Commercial Kitchen	Pre-rinse Spray Valve	5	Watersmart Guide (EBMUD - 2008)
	Laundry Systems (Multi-family dwellings)	Efficient Unit Replacement	13	Water Conservation Handbook (2002) - pg 125
Commercial Kitchens	Pre-Rinse Valves	Efficient Unit Replacement	5	Watersmart Guide (EBMUD - 2008)
	Dishwashers	Efficient Unit Replacement	10	Watersmart Guide (EBMUD - 2008)
	Commercial Ice-makers	Efficient Unit Replacement	6	Watersmart Guide (EBMUD - 2008)
Laundry & Laundromats	Commercial Laundry	Efficient Unit Replacement	13	Water Conservation Handbook (2002) - pg 125
	Commercial Laundry	Retrofit with wastewater recovery system	TBD	
HVAC	Cooling Towers	Upgrades to Reduce Bleed-off and Drift	TBD	
	Condensers	Upgrades to Reduce Bleed-off and Drift	TBD	
	Steam Boilers	Upgrades to Reduce Bleed-off	TBD	
Industrial / Process Water	Steam Sterilizers / Autoclaves	Efficient Unit Replacement	10	Watersmart Guidebook (EBMUD - 2008)



Me² Commercial PACE Eligible Improvements

	Car Wash Operations	Water Recycling System	TBD		
	Manufacturing	Film / X-Ray Processing	TBD		
	Manufacturing	Food / Beverage Processing	TBD		
	Manufacturing	Metal Finishing	TBD		
	Manufacturing	High Tech Manufacturing	TBD		

ON-SITE CLEAN ENERGY PRODUCTION

System	Subsystem	Measure	Effective Useful Life	
Renewable - Thermal Energy				
DHW	Service water	Solar thermal water heat	35	
HVAC	Heating	Solar thermal space heat (hydronic)	35	
Process	Pool	Solar pool heat	20	
Renewable - Electrical Energy				
Photovoltaic	PV	PV System	20-25	
Microturbine (Renewable fuel)	Micro-turbine using renewable fuel	Micro-turbine	15	
Internal Combustion Engine (ICE) (Renewable fuel)	ICE using renewable fuel	Internal combustion engine	15	
Fuel Cell (Renewable fuel)	Electric-only fuel cell using renewable fuel	Fuel cell	15	
Non-Renewable - Electrical Energy				
<i>Subject to review: Contact Me² PACE</i>	Electric-only fuel cell using non-renewable fuel (e.g., natural gas)	Grid-tied fuel cell	15	

EUL of solar hot water (SHW) from Center for Sustainable Energy 2008 Natural Gas Cost Effectiveness Model

http://energycenter.org/index.php/incentive-programs/solar-water-heating-pilot-program/swhpp-documents/cat_view/55-rebate-programs/172-swhpp/321-cpuc-documents

EUL of PV from "CPUC Self-Generation Incentive Program – Fifth Year Impact Evaluation Report", Itron, March 2007. Range (20-25) depends on type of PV material.

P.U. Code 216.6 applies to cogeneration of heat and power using non-renewable fuel

<http://law.onecle.com/california/utilities/216.6.html>

INELIGIBLE MEASURES

The following are non-qualifying efficiency measures.

Compact fluorescent, screw-in lamps.

Plug load devices.

Measures that are not permanently installed and can be easily removed.

Measures that save energy solely due to operational or behavioral changes

Power correction, power conditioning .

Any measure that does not result in energy savings or renewable energy production.

Any measure that can not be explained in terms of industry-standard engineering or scientific principles.

Vending machine controllers

Refrigerant charge (AC/Split Systems/Heat Pumps)