

Building Envelope Cal TF Presentation



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Building Envelope Measure Affirmation

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“Cal TF affirms the subcommittee recommendations regarding ‘Stage 1 Issues’ for Building Envelope Measures.”

- 8.01 – Window Tint Film
- 8.02 – High Performance Window Retrofit
- 8.04 – Residential Reduced Building Leakage
- 11.03 – Residential Whole House Upgrade
 - (AKA Energy Upgrade California)

Measure Consensus -

8.01 Window Tint Film

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- Application of IR-blocking film to interior of existing windows
- Primarily Commercial Buildings
 - ❑ POU TRM has residential, but not being used
 - ❑ DEER residential prototype largely precludes benefits of window shading
- Should be REA measure
 - ❑ Ideal retrofit is on existing single-pane windows
 - ❑ Recent models indicate negative gas savings (heating penalty)
- POU TRM contains measure
 - ❑ Based on 2012 PG&E work paper

Measure Consensus -

8.01 Window Tint Film

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- Savings taken from DEER 2005, with adjustments made using eQuest models to derate/scale savings
 - PG&E and SCE used eQuest adjustment
 - SDG&E used similar measure comparisons between 2005 and 2017 DEER to scale savings
 - Savings are exposure-dependent
 - ✦ Northern exposures typically save 25-35% less than other exposures

Measure Consensus - 8.01 Window Tint Film

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- Measure Costs
 - WO17 (2013) = \$4.49/sq.ft.
 - SCE work paper (2015) = \$5.64/sq.ft.
 - CMUA TRM = \$3.44/sq.ft.
- SCE values are most recent
- Costs to be adjusted to 2019 values using RS Means inflators

Measure Consensus - 8.01 Window Tint Film

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	eTRM Measure Value	PG&E	SCE	SDG&E	SCG
BldgType	Asm,ECC,EPr,ERC,ESe,EUn,Gro,Gst,Hsp,Htl,MBT,MLI,Mtl,Nrs,OfL,OfS,RFF,RSD,Rt3,RtLrtS,SCn,COM	No Value	Asm,ECC,EPr,ERC,ESe,EUn,Gro,Gst,Hsp,Htl,MBT,MLI,Mtl,Nrs,OfL,OfS,RFF,RSD,Rt3,RtLrtS,SCn	Asm,Com,EPr,ERC,ESe,EUn,Gro,Hsp,Htl,MBT,MLI,Mtl,Nrs,OfL,OfS,RFF,RSD,RtL,RtS,SCn	OfS
BldgVintage	Any	No Value	Any	Ex,New	Any
BldgLoc	CZ01,CZ02,CZ03,CZ04,CZ05,CZ06,CZ07,CZ08,CZ09,CZ10,CZ11,CZ12,CZ13,CZ14,CZ15,CZ16,IOU	No Value	CZ06,CZ08,CZ09,CZ10,CZ13,CZ14,CZ15,CZ16	CZ06,CZ07,CZ08,CZ10,CZ14,CZ15,IOU	CZ06
BldgHVAC	Any	No Value	Any	Any	Any

	eTRM Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	REA	No Value	REA	REA	REA
NormUnit	Area-ft2	No Value	Area-ft2	Area-ft2	Area-ft2
EUL ID	GlazDaylt-WinFilm	No Value	GlazDaylt-WinFilm	GlazDaylt-WinFilm	GlazDaylt-WinFilm
RUL ID	BS-Win (20 yrs) (1/3 of 20 yrs)	No Value	GlazDaylt-WinFilm	No Value	No Value
NTGR	Com-Default>2yrs Ind-Default>2yrs Ag-Default>2yrs	No Value	Com-Default>2yrs	Com-Default>2yrs	Com-Default>2yrs
DeliveryType	DirInstall PreRebDown	No Value	DirInstall PreRebDown	PreRebDown	PreRebDown
GSIA	Def-GSIA	No Value	Def-GSIA	No Value	No Value

Measure Consensus -

8.02 Tinted Window Retrofit

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- Replace existing window assemblies with high-performance retrofit assemblies
 - ❑ Not a window replacement
 - ❑ Does not currently trigger Title 24 compliance
- Residential only
 - ❑ POU's would like to keep
 - ❑ IOU's not offering in 2018
 - ❑ Limited number of claims in 2017
- May only be beneficial as early replacement
 - ❑ Code updates may eliminate normal replacement savings in 2020
- Biggest opportunity is hard-to-reach (HTR) market

Measure Consensus -

8.02 Tinted Window Retrofit

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- Costs

- ❑ SCE (2016) = \$15.69/sq.ft. installed
- ❑ CMUA TRM – no costs provided, uses actual costs
- ❑ WO17 – not included in study
- ❑ Propose updating 2016 costs using RS Means escalators

Measure Consensus -

8.02 Tinted Window Retrofit

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	eTRM Measure Value	PG&E	SCE	SDG&E	SCG
BldgType	MFm,SFm	No Value	MFm,SFm	No Value	MFm,SFm
BldgVintage	Any	No Value	Any	No Value	Any
BldgLoc	CZ01,CZ02,CZ03,CZ04,CZ05,CZ06,CZ07,CZ08,CZ09,CZ10,CZ11,CZ12,CZ13,CZ14,CZ15,CZ16	No Value	CZ06,CZ08,CZ09,CZ10,CZ13,CZ14,CZ15,CZ16	No Value	CZ06,CZ08,CZ09,CZ10,CZ13,CZ14,CZ15,CZ16
BldgHVAC	Any	No Value	Any	No Value	Any

	eTRM Measure Value	PG&E	SCE	SDG&E	SCG
MeasureAppType	ER	No Value	ER	No Value	REA
NormUnit	Area-ft2	No Value	Area-ft2	No Value	Area-ft2
EUL ID	BS-Win	No Value	BS-Win	No Value	BS-Win
RUL ID	BS-Win (1/3 of 20 yrs)	No Value	BS-Win	No Value	No value
NTGR	Res-Default>2	No Value	Res-Default>2	No Value	Res-Default>2
DeliveryType	PreRebDown	No Value	PreRebDown	No Value	PreRebDown
GSIA	Def-GSIA	No Value	No Value	No Value	No Value

Measure Consensus -

11.03 Whole House Upgrade

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- Comprehensive suite of measures

- ❑ Reduce building leakage
- ❑ Insulate ducts
- ❑ Reduce duct leakage
- ❑ Insulate attic
- ❑ Insulate walls
- ❑ Insulate floor above crawlspace
- ❑ High Performance windows
- ❑ Efficient central AC
- ❑ Efficient furnace
- ❑ Efficient wall heater
- ❑ Efficient water heater
- ❑ Hot water pipe wrap
- ❑ Thermostatic shower shutoff valve
- ❑ Low-flow showerhead

Measure Consensus -

11.03 Whole House Upgrade

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- Unlike other programs, this one is difficult to break down into constituent measures
 - ❑ Due to interactions from measure stacking, modeling and regression analyses are performed to determine savings from varying combinations of measures
- Some measures can be separated out due to no modeled energy interactions
 - ❑ Efficient Hot Water Heater
 - ❑ Shower Thermostatic Shutoff Valve
 - ❑ Water Heater Pipe Wrap
 - ❑ Low-Flow Showerhead
 - ❑ Auto-diverting Tub Spout with Thermostatic Shut-off Valve

Measure Consensus -

11.03 Whole House Upgrade

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- Remaining Measures Likely need consideration as package
 - This leaves large number of combinations
 - ✦ 96 Scenarios (house foundation, climate zone, HVAC, # floors)
 - ✦ ~3,400 HVAC and Envelope combinations
 - ✦ 326,000 permutations
 - It may be possible to reduce combinations
 - ✦ Only put in eTRM most cost-effective combinations
 - e.g., 15% leakage reduction + attic insulation
- We are exploring mechanisms to simplify relationships to enable incorporation into eTRM

Measure Consensus -

11.03 Whole House Upgrade

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- What is future of this program?
 - ❑ Investor Owned Utilities stated last week that this program was being discontinued
 - ✦ Low uptake
 - ✦ Not cost effective
 - ❑ This could affect approach toward consolidation and eTRM

Measure Consensus -

8.04 Residential Leakage Reduction

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- Originally a DEER 2005 measure
- Current work papers not found
- Savings and Costs can be extracted from other measure
 - ❑ 11.03 Whole House Upgrade
 - ✦ 15% and 30% reduction options
 - ❑ Existing conditions used as baseline

Other Measures

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- 3P Water Measures Program
 - ❑ Third Party program targeted at mobile homes
 - ❑ Low flow aerators, showerheads, pipe wrap
 - ✦ Recent iterations removed pipe wrap, added duct sealing
 - ❑ No notable interactions between measures
 - ❑ Water measures already addressed by Hot Water subcommittee
 - ✦ Need to add mobile home building type to existing data specs
 - ❑ Duct Test and Seal being addressed by HVAC subcommittee
 - ✦ Will monitor to ensure duct seal methodology can align with same measure contained in Whole House Upgrade
 - ❑ No further work from Building Envelope subcommittee

Other Measures

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• DEER Measures

- ❑ Large number of legacy DEER measures without dedicated work papers were reviewed by subcommittee
- ❑ Mostly HVAC and Lighting
 - ✦ HVAC measures handed off to HVAC subcommittee
 - ✦ Lighting measures largely deprecated or technologically obsolete
- ❑ A few supermarket refrigeration measures were also included
 - ✦ These were mostly addressed by refrigeration subcommittee
 - ✦ Remaining measures have little traction based on feedback
 - Mechanical subcooling for low-temp and medium-temp systems
 - Low-temp covered by Title 24
 - Medium temp has considerably less savings for roughly same cost
 - May revisit as part of Stage 2 research if there is interest

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Questions...

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