**Cal TF Staff Assessment of Refrigerator and Freezer Recycling Info in Technical Reference Manuals (TRMs)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of Jurisdiction** | **TRM Name** | **Web Site** | **Date** | **Recycling Notes** |
| Alabama | N/A |  |  |  |
| Alaska | N/A |  |  |  |
| Arizona | N/A |  |  |  |
| RTF(OR, WA, ID, MT) | RTF UES database | http://rtf.nwcouncil.org/ | Ongoing updates | * Refrigerators & freezers
* Various impact evaluation reports
* Appliance must be at least 10 cubic feet
* Part use factor, in situ
* For UEC, multiplies DOE tested (lab) UEC by 81% to determine in situ estimated UEC based on 06-08 CA impact evaluation by Cadmus
* 1.25% annual degradation factor in which UEC of recycled unit is expected to increase by rated UEC every year from manufacture year to base year (per NV refrigerator recycling report, 2010 by ADM & Associates)
* Pseudo NTG value (fraction of units that would have been left on grid without program, which implies fraction of units that would have been removed regardless of program, and therefore not counted)
* 6% induced replacement of units by program
* Replacement factors
* RUL 5 years (DOE TSD, appears based on appliance at age 35 years)
* Measure cost $113 (all program costs)
 |
| eo | Mid-Atlantic TRM, ver. 4.0 (June 2014) | http://www.neep.org/mid-atlantic-technical-reference-manual-v4 | June 2014 | * Refrigerators & freezers
* Targets refrigerators age 10+ years, RUL of 8 years
* Existing refrigerator removed and not replaced
* Savings from regression model from Navigant EM&V report for Maryland
* Incremental cost is actual removal/recycling cost
* Demand is calculated as kWh/876 multiplied by “temperature adjustment factor” and “load shape adjustment factor”
	+ TAF and LSAFfrom refrigerator M&V study from 2003-2004
 |
| Arkansas | Arkansas Technical Reference Manual | http://www.apscservices.info/EEInfo/TRM.pdf |  | * Performance degradation factor of 1.25% from NV 2009 recycling EM&V, referencing Cadmus CA impact eval for 06-08 – Refrigerator energy use expected to increase at a rate of 1.25% per year as performance degrades over time.
* 0.81 factor applied to lab UEC to estimate in situ UEC
* RUL = 5 – 10 years depending on age of recycled refrigerator (6 – 19 years); based on ENERGY STAR survival function for refrigerators,
 |
| California | DEER |  |  | * 2011 DEER based on CA impact evaluation for 06-08
* 2016 DEER will leverage CA 10-12 impact evaluation
 |
| Colorado |  | http://www.xcelenergy.com/staticfiles/xe/Regulatory/2012-2013%20Biennial%20DSM%20Plan.pdf |  | * Could not determine sources for estimates
* Refrigerators only
* RUL 7 years
* Baseline unit 7 – 18 years
 |
| Connecticut | Connecticut Program Savings Document, ver. 8 2013 | http://www.energizect.com/sites/default/files/2013%20PSD\_ProgramSavingsDocumentation-Final110112.pdf | 2013 | * Refrigerators & freezers
* Savings appear to be based on energy consumption equation as function of volume, with volume representing 1997 model
 |
| DE | Mid-Atlantic TRM, ver. 4.0 | http://www.neep.org/sites/default/files/resources/Mid\_Atlantic\_TRM\_V4\_FINAL.pdf | June 2014 | See Mid-Atlantic comments above |
| Florida | N/A |  |  |  |
| Georgia | N/A |  |  |  |
| Hawaii | Hawaii Technical Reference Manual (2013) | https://hawaiienergy.com/images/resources/TRMProgramYear\_2013.pdf | 2013 | * Refrigerators
* Appear to be based on ENERGY STAR figures, with weighted UEC estimates between pre- and post- 1993 units
* Removal cost $50 - $100
 |
| Idaho | NW RTF |  |  | See RTF comments above |
| Illinois | Illinois TRM | http://ilsagfiles.org/SAG\_files/Technical\_Reference\_Manual/Version\_4/2-13-15\_Final/Updated/Illinois\_Statewide\_TRM\_Effective\_060115\_Final\_02-24-15\_Clean.pdf | February 2015 | * Refrigerators & freezers
* Measure cost $120 (per Efficiency Vermont)
* EUL 8 years per KEMA “Residential refrigerator recycling ninth year retention study” 2004
* Energy savings from linear regression from impact evaluation
* Includes part use factor
 |
| Indiana | 2013 |  |  |  |
| Iowa | In development |  |  |  |
| Kansas | N/A |  |  |  |
| Kentucky | N/A |  |  |  |
| Louisiana | N/A |  |  |  |
| Maine | Commercial Technical Reference ManualResidential Technical Reference Manual(2014) | http://www.efficiencymaine.com/docs/EMT-Commercial-TRM.pdf |  |  N/A |
| Massachusetts | Massachusetts Technical Reference Manual (2013 – 2015) | http://ma-eeac.org/wordpress/wp-content/uploads/TRM\_PLAN\_2013-15.pdf |  | * Refrigerators & freezers
* Measure life 8 years, from MA program evaluation
 |
| Michigan | Michigan Measures Database | http://www.michigan.gov/mpsc/0,4639,7-159-52495\_55129---,00.html |  | Could not find documentation for EE measures |
| Minnesota | Minnesota Technical Reference Manual, Ver. 1.0 through (Jan 1, 2014 – Dec 31, 2014) | http://mn.gov/commerce/energy/images/MN-TRM-2014-ver1%252E0.pdf |  | * Refrigerators & freezers
* UEC from linear regression using metered data and modeling from impact evaluation
* Includes part use factor
* Measure life of 8 years per 2004 KEMA Res Refrigerator retention study
 |
| Mississippi | N/A |  |  |  |
| Missouri | Ameren IL web-based TRM | Ask Keith Martin for access. Could not find on-line.  | 2013 (?) | TBD |
| Montana | N/A |  |  |  |
| Nebraska | N/A |  |  |  |
| Nevada | N/A |  |  |  |
| New Hampshire | N/A |  |  |  |
| New Jersey | NJ Clean Energy Program Protocols to Measures Energy Savings | http://www.njcleanenergy.com/files/file/Appeals/NJ%20Protocols%20Revisions%202013%20Update\_04-16-2014\_clean.pdf | March 2014 | * UES combination of impact evaluation, DEER, etc.
* Details of analysis/assumptions not described beyond reference list
 |
| New York | New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs | http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/766a83dce56eca35852576da006d79a7/$FILE/TechManualNYRevised10-15-10.pdf | October 2010 | Based on efficiency Vermont TRM |
| North Carolina | N/A |  |  |  |
| North Dakota | N/A |  |  |  |
| Ohio | Ohio EE Technical Reference Manual | http://s3.amazonaws.com/zanran\_storage/amppartners.org/ContentPages/2464316647.pdf | August 2010 | * Refrigerators
* RUL 8 years..NJ and VT TRMs
* Energy savings from Navigant impact evaluation
 |
| Oklahoma | Uses AR TRM (Centerpoint) |  |  | See Arkansas notes above |
| Oregon | NW RTF |  |  | See RTF notes above |
| Pennsylvania | Pennsylvania PUC TRM | http://www.puc.pa.gov/filing\_resources/issues\_laws\_regulations/act\_129\_information/technical\_reference\_manual.aspx | June 2015 | * Refrigerators & freezers
* Measure life 8 years
* UEC from impact evaluations
 |
| Rhode Island | Rhode Island TRM 2013 | http://www.nationalgridus.com/non\_html/eer/ri/Rhode%20Island%20TRM\_PY2013\_final.pdf | 2013 | * Sources not listed
 |
| Tennessee | N/A |  |  |  |
| Texas | Texas Technical Reference Manual ver. 3.0 | http://www.texasefficiency.com/index.php/emv | April, 2015 | * UES based on CA impact evaluation from 06-08 for DOE lab tested models, applied in situ factor and part use factors
 |
| TVA | 2015 |  |  |  |
| Utah |  |  |  |  |
| Vermont | Vermont TRM | http://www.greenmountainpower.com/upload/photos/371TRM\_User\_Manual\_No\_2013-82-5-protected.pdf | January 2012 | * Refrigerators & freezers
* UEC from IL impact evaluation
* UEC includes part use factor
* RUL 8 years based on 2004 KEMA study
* Indicate data suggest average age of retired units is 30 years
 |
| Virginia | Too small |  |  |  |
| Washington | NW RTF |  |  | See RTF notes |
| West Virginia | Too small |  |  |  |
| Wyoming | Too small |  |  |  |
| Wisconsin | Focus on Energy TRM | https://focusonenergy.com/sites/default/files/Wisconsin%20Focus%20on%20Energy%20Technical%20Reference%20Manual%20August%202014\_0.pdf | 8/15/14 | * Refrigerators & freezers
* EUL 8 years (WI EUL database), RUL of an EUL of recycled unit of 20+ yrs
* Single value for each
* Savings from Cadmus EM&V
	+ Midwest
	+ Accounts for part use, in situ
* No measure cost
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