



Launching a Refrigerator and Freezer Recycling Program

Including Sample Recycling Contract Language and Online Resources

A Win/Win Proposition

Recycling old refrigerators and freezers saves energy, helps curtail growing peak load demand, and prevents the release of greenhouse gases. Over 40 Energy Efficiency Program Sponsors (EEPS) currently provide incentives to customers in return for unplugging and properly recycling their old refrigerators. These programs tend to target working *second* refrigerators, which are typically older and less efficient than primary kitchen refrigerators (often because they became the second unit after a new one was purchased). A typical refrigerator made before 1993 uses over 1,000 kWh per year, so removing these “pre-1993” units from the grid provides significant energy and capacity benefits. Because the savings are so large, the programs can be very cost effective for EEPS. On average, the Total Resource Cost (TRC) ratio of refrigerator recycling programs in the United States is greater than 2.0.¹

Some EEPS also promote recycling at the time a customer buys a new refrigerator – in order to prevent the original unit from becoming a second refrigerator. (It is common practice for retail delivery people to move the customer’s old refrigerator to a garage or basement when delivering a new one.) Partnering with local appliance retailers is a good way to reach customers at the time of purchase.

Efficiency Fuels a Growing Trend

Even when an old refrigerator or freezer is replaced with a new one, the savings potential is large due to the dramatic increases in efficiency over the last sixteen years (see table below). All newly manufactured ENERGY STAR® labeled full-sized refrigerators must be at least 20 percent more efficient than the current federal standard – and this means they are 61% more efficient than pre-1993 units. In addition, new ENERGY STAR qualified freezers are required to be at least 10 percent more efficient than the minimum federal standard – an improvement of 47% compared to pre-1993 units.

REFRIGERATOR ENERGY EFFICIENCY CHANGES	
Standard/Spec Change	Description
1993 Federal Standard	30% more efficient than the 1990 standard
1997 ENERGY STAR	20% more efficient than the 1993 standard (44% better than the 1990 standard)
2001 Federal Standard	30% more efficient than the 1993 standard (51% better than the 1990 standard)
2001 ENERGY STAR	10% more efficient than the 2001 standard (56% better than the 1990 standard)
2004 ENERGY STAR	15% more efficient than the 2001 standard (58% better than the 1990 standard)
2008 ENERGY STAR	20% more efficient than the 2001 standard (61% better than the 1990 standard)



Common Program Elements

- 1. Program Plan:** Most EEPS begin with a cost-effectiveness analysis that quantifies the potential energy and capacity savings, and the cost to run the program. It is helpful to consult with experienced program implementers and recyclers when gathering cost information. Most EEPS that operate recycling programs outsource the refrigerator collection and recycling to an outside party. The approximate cost to recycle a unit ranges from \$130-\$180, and vary based on the number of units recycled. Costs will be higher for smaller programs with relatively low recycling volume, especially when there are no other large programs in the vicinity. If significant economies of scale are present, or a program is planned for at least three years, it can be worthwhile for a recycler to create a new recycling facility in a region. EEPS also establish eligibility parameters, such as type of units (refrigerators, freezers, or both), minimum age, that the unit must be in working condition, and maximum number of units that can be submitted per household.
- 2. Marketing Activities:** Outreach efforts are needed to promote the recycling program to customers and generate requests. This is typically accomplished through a combination of web content, bill inserts, advertisements, and retail point of purchase materials. Some type of incentive or “bounty” is often provided to entice participation. This may be a cash rebate (e.g., \$25 - \$60), savings bond, or something like free ENERGY STAR qualified CFLs.
- 3. Scheduling Pick Up:** A call center is established to handle incoming requests from customers. Experience has shown that follow-through is highest when the pick-up is scheduled within 3 to 5 days of the request. Making the process quick and easy prevents the customer from changing his or her mind.
- 4. Refrigerator and Freezer Collection:** In most EEPS programs, the recycler handles pick up from the customer’s home. Collected units are then delivered to the recycling center. Another option is to partner with local appliance retailers to coordinate pick-up at the time newly purchased refrigerators are being delivered. A key step is for the recycler to ensure that the old unit being picked up is in working condition. This helps prevent instances where the program is paying residents to pick up trash and assures reduction in energy use. Before loading the unit to be recycled on the truck, it is best if the recycler can mark the refrigerator or freezer with a large ‘X’ or otherwise deface it, and cut the cord in order to assure the customer that the unit will not be resold or reused.
- 5. Recycling:** Once the refrigerator or freezer is in the recycling facility, its components are separated and recycled. In the cases where the most advanced recycling techniques are used, ninety eight percent of the unit is recycled, and only two percent goes to the landfill. The large appliance recycling companies, as well as partners of Environmental Protection Agency’s [Responsible Appliance Disposal Program](#), capture the chlorofluorocarbons (CFCs), particularly CFC-11, CFC-12, and HCFC-134a, from the refrigerant and the insulating foam, to prevent their release into the atmosphere. These practices help avoid further destruction of the ozone layer and global warming. (See sample contract language below for more specifics on what to require of recyclers to ensure proper disposal).
- 6. Data Management and Reporting:** On a continuous basis, the recycler reports on the number and type of refrigerators/freezers collected. EEPS can use this data to calculate energy savings from the program.



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For a list of current refrigerator and freezer recycling programs throughout the U.S., visit the ENERGY STAR Make a Cool Change campaign, found in the “Refrigerators & Freezers” section at www.energystar.gov/recycle. For additional information, contact appliancecampaign@energystar.gov.

¹ Nicholas, B. Big Foot - Big Energy! Refrigerator and Freezer Decommissioning. *Energy Pulse*. January 9, 2008. http://64.233.169.104/search?q=cache:gfXJDAGNVUYJ:www.energypulse.net/centers/article/article_display.cfm%3Fa_id%3D1647+refrigerator+recycling+cost+benefit+analysis&hl=en&ct=clnk&cd=2&gl=us&client=firefox-a.



Sample Contract Language² for Recycling of Refrigerators and Freezers

Contractor agrees not to re-sell or re-use any refrigerators and freezers collected, and to properly recycle these refrigerators including disposing of refrigerators and freezers in a way that meets or exceeds the federal law. Federal law stipulates ([40 CFR Part 82 Subpart F](#)) that refrigerant must be recovered prior to dismantling or disposal and that all mercury, used oil and PCBs be properly managed and stored (40 CFR Parts [273](#), [279](#), [761](#) and summarized below). Contractor also agrees to comply with additional state laws, where applicable, which may have additional requirements. For example, in 2006, California introduced a law requiring entities that remove materials such as mercury, used oils, polychlorinated biphenyls PCBs, and refrigerants from appliances are certified by the State ([AB 2277](#)). Similarly, some states require that certain durable appliance materials be recycled. At this time (February 2009), no federal or state laws require that appliance insulation foam be recovered; however, the common practice of shredding and/or landfilling of foam represents a significant source of ozone-depleting substance (ODS) and greenhouse gas (GHG) emissions which could be avoided through foam recovery. Contractor agrees to make available licenses and certifications to prove compliance with federal and state guidelines upon request.

Refrigerant

Refrigerant or coolant must be properly recovered using U.S. Environmental Protection Agency (EPA)-certified refrigerant recovery equipment. Once recovered, refrigerant must either be reclaimed by an EPA-certified reclaimer for reuse, or destroyed using approved destruction technologies. Technicians disposing of/dismantling appliances are not required to be certified. However, disposal companies must certify to their EPA regional office that they have acquired and are properly using refrigerant recovery/recycling equipment.

Mercury

As a toxic substance, mercury waste must be recovered from switches and relays found in appliances prior to their disposal. These wastes must be handled by a qualified recovery facility that has appropriate hazardous waste management permits. At approved facilities, mercury wastes are managed in accordance with applicable federal, state, and local hazardous waste regulations (e.g., waste must be properly packaged prior to transport). For more information on the proper storage of hazardous waste, visit <http://www.epa.gov/epawaste/hazard/tsd/index.htm>.

Used Oil

If improperly handled, used oil can leak into groundwater and major waterways and pollute drinking water sources. Used oil from appliances may contain toxic chemicals and heavy metals, which are dangerous to human health. Therefore, used oil must be recovered from appliances and properly managed in accordance with federal standards ([40 CFR 279](#)) and any applicable state regulations. Once used oil is recovered, it must be stored in appropriate containers that are in good condition, with no visible leaks. Additionally, any refrigerant contaminating the used oil must be recovered to the fullest extent possible, and reclaimed or destroyed (as explained above). Used oil from refrigerated appliances cannot be mixed with used oil from other sources.



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PCBs

Polychlorinated biphenyls (PCBs) are regulated by EPA as toxic substances; they may cause cancer, liver damage, and can have negative impacts on the neurological development of children, the human reproductive system, the immune system, and the endocrine system. PCBs can be found in capacitors (used to store electrical charge in the compressor) of refrigerated appliances. If the capacitor fails to state "contains no PCBs" or the capacitor (or appliance) was manufactured before 1979, one should assume that the capacitor contains PCBs. By law, PCB capacitors may not be stored for more than one year. EPA-approved storage and disposal companies can assist you in properly handling any PCB capacitors recovered from appliances. To find an EPA-approved PCB storage facility near you, visit <http://www.epa.gov/pcb/pubs/comstor.htm>.

² Source: The Environmental Protection Agency's Responsible Appliance Disposal Program, <http://www.epa.gov/Ozone/partnerships/rad/>. For more information about joining the RAD Program and to receive a Standard Partnership Agreement, please contact Evelyn Swain at swain.evelyn@epa.gov or 202-343-9956.



Refrigerator Recycling References

- Ameren UE Missouri Refrigerator Recycling Program Report. 2005. <http://www.mwalliance.org/image/docs/resources/MEEA-Resource-13.pdf>. This 19-page report provides a detailed overview of the pilot program implemented by the Midwest Energy Efficiency Alliance throughout Ameren UE's Missouri territory and the subsequent program rollout. It discusses successes and lessons learned, and reports the challenges experienced during program implementation.
- American Council for an Energy Efficient Economy. Residential Appliance Recycling Exemplary Program. Southern California Edison. <http://www.aceee.org/utility/4aesrecycscal.pdf>. This brief 3-page document discusses Southern California Edison's residential refrigerator or freezer recycling program, its performance, and lessons learned. It reports energy and financial savings.
- Dunham, M. and Jacob A. Refrigerator Recycling Overview. Presentation for ENERGY STAR Appliance Partner Meeting. October 2004. www.energystar.gov/ia/partners/downloads/Plenary_C_Michael_Dunham.pdf. This 18-slide PowerPoint presentation provides various financial, environmental, and load-related reasons to offer a refrigerator recycling program, discusses components of a program, implementation steps, and provides examples from Nevada's 2004 program.
- Nicholas, B. Big Foot - Big Energy! Refrigerator and Freezer Decommissioning. Energy Pulse. January 9, 2008. http://www.energypulse.net/centers/article/article_display.cfm?a_id=1647. This Energy Pulse article discusses refrigerator recycling program results from the Snohomish County Public Utilities Department and cites useful Total Resource Cost data.
- Responsible Appliance Recycling Program. U.S. Environmental Protection Agency. <http://www.epa.gov/ozone/partnerships/rad/index.html>. EPA's Responsible Appliance Disposal (RAD) Program is a voluntary partnership program that began in October 2006 to help protect the ozone layer and reduce emissions of greenhouse gases. As part of the RAD program, partners recover ozone-depleting chemicals from old refrigerators, freezers, air conditioners, and humidifiers. Using best practices, RAD partners ensure that: refrigerant is recovered and reclaimed or destroyed; foam is recovered and destroyed, or the blowing agent is recovered and reclaimed; metals, plastic, and glass are recycled; and PCBs, mercury, and used oil are recovered and properly disposed.
- Wall, B. Market Transformation Through Appliance Recycling. Appliance Recycling Centers of America. Presentation for Energy Efficiency Market Transformation Opportunities for Texas. September 2007. <http://www.citizen.org/documents/Wall%20-%20Market%20Transformation%20Through%20Appliance%20Recycling.pdf>. This 15-slide PowerPoint presentation discusses key elements of an appliance recycling program such as collection and recycling procedures. It also identifies factors that contribute to successful implementation of programs.