Authority: Section 1001–1004 of Pub. L. 102–486, 106 Stat. 2776 (42 U.S.C. 2296a *et seq.*).

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David E. Mathes,

Office of Disposal Operations, Office of Technical and Regulatory Support.

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DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

[Docket No. EERE–2011–BT–NOA–0065]

Request for Information (RFI) Regarding Miscellaneous Residential and Commercial Electrical Equipment

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Request for Information.

SUMMARY: The Department of Energy (DOE) is evaluating the energy use and energy efficiency potential of miscellaneous residential and commercial electrical equipment, including: audio-video equipment, computer systems, household cleaning equipment, imaging equipment, network equipment, personal space heating equipment, thermal household equipment, thermal kitchen equipment, uninterruptible power supplies (UPS), and vertical transport equipment. DOE is requesting information from interested parties regarding product markets, energy use, test procedures, and energy efficient product design.

DATES: Written comments and information are requested by March 26, 2012.

ADDRESSES: Interested persons may submit comments in writing, identified by docket number EERE–2011–BT–NOA–0065 by any of the following methods:

- *Federal eRulemaking Portal: www.regulations.gov*. Follow the instructions for submitting comments.
- *Email: MEL-RFI-2011-NOA-0065@ee.doe.gov.*
- *Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–2J, Request for Information for on Miscellaneous Electrical Equipment, EERE–2011–BT–NOA–0065. 1000 Independence Avenue SW., Washington, DC 20585–0121. *Phone:* (202) 586–2945. Please submit one signed paper original.
- *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza SW., Washington, DC 20024. Phone: (202) 586–2945. Please submit one signed paper original.

Instructions: All submissions received must include the agency name and docket number.

Docket: For access to the docket to read background documents or comments received, please call Ms. Brenda Edwards at the above telephone number.

FOR FURTHER INFORMATION CONTACT: Jeremy Dommu, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–2J, 1000 Independence Avenue SW., Washington, DC 20585–0121. Telephone: (202) 586–9870. Email: *jeremy.dommu@ee.doe.gov.*

In the Office of General Counsel, Ms. Elizabeth Kohl, U.S. Department of Energy, Office of the General Counsel, GC–71, 1000 Independence Avenue SW., Washington, DC 20585–0121. Telephone: (202) 586–7796. Email: *Elizabeth.Kohl@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

1. Statutory Authority

Title III of the Energy Policy and Conservation Act (EPCA), as amended (42 U.S.C. 6291 *et seq.*), sets forth various provisions designed to improve energy efficiency. Part B of Title III of EPCA established the ''Energy Conservation Program for Consumer Products Other Than Automobiles.'' [1] Part C of Title III includes measures to improve the energy efficiency of commercial and industrial equipment.

2. Miscellaneous Residential and Commercial Electrical Equipment Considered

In this notice, DOE seeks data and information on the energy use of a variety of miscellaneous residential and commercial electrical equipment. For the purposes of this request for information, these products are organized into the following categories.

a. Audio-Video Equipment

This category includes devices that offer audio amplification, optical disc drive functions, and/or audio digital signal processing as a primary function. Example products include DVD and Blu-ray players, stereo systems, and clock radios.

b. Computer Systems

This category includes devices and systems that primarily perform logical operations and process data, and components of such devices. Example products include desktop computers (including integrated computers), laptop computers, servers, monitors, and video game consoles.

c. Household Cleaning Equipment

This category includes devices whose principle function is to remove dirt, stains, and/or odors from interior dwelling spaces and furniture. Example products include steam cleaners and vacuum cleaners.

d. Imaging Equipment

This category includes devices whose primary function(s) include generating hard copy output from electronic input, generating electronic output from hard copy input, generating hard copy duplicates from hard copy originals, or some combination of these. Example products include printers, scanners, copiers, facsimile (fax) machines, and multi-function devices (such as a combination printer, scanner and fax).

e. Network Equipment

This category includes devices whose principle function(s) is to pass Internet Protocol traffic among various network interfaces. Example products include routers, modems, switches, and integrated home access devices. This category also includes security equipment.

f. Personal Space Heating Equipment

This category includes electrical devices that primarily deliver thermal energy (heat) for the purpose of space conditioning a person's body or single room. Example products include electric blankets and space heaters.

g. Thermal Household Equipment

This category includes electrical devices that primarily deliver thermal energy (heat) for the purpose of personal grooming. Example products include clothing irons and hair dryers.

h. Thermal Kitchen Equipment

This category includes electrical devices that primarily deliver thermal energy (heat) for the purpose of food or beverage preparation. Example products include toasters, toaster ovens, slow and rice cookers, and coffee makers.

i. Uninterruptible Power Supplies (UPSs)

This category includes devices that are a combination of converters, switches, and energy storage devices

[1] For editorial reasons, upon codification in the U.S. Code, Parts B and C were re-designated as Parts A and A–1, respectively.

(such as batteries) constituting a power system for maintaining continuity of load power in case of input power failure. Example products include static, rotary, modular and multi-mode UPSs. (Note that while DOE currently has an ongoing rulemaking to cover residential UPSs,[2] it does not cover exclusively commercial-sector UPSs.).

j. Vertical Transport Equipment

This category includes electrical equipment designed to move people or goods between floors of a structure. Example products include elevators and escalators.

3. Preliminary Evaluation of Miscellaneous Residential and Commercial Electrical Equipment

The energy use of many miscellaneous residential and commercial electrical equipment (including audio-video equipment, computer systems, imaging equipment, network equipment, thermal kitchen equipment, and uninterruptible power supplies) has been increasing in the last twenty years due to increased ownership and use of miscellaneous electrical (particularly electronic) devices, rapid growth in internet connections in both residential and commercial settings, and increased computing power of many electronic devices. The energy use of household cleaning equipment, personal space heating equipment, thermal household equipment, and vertical transport equipment may not have grown appreciably, but the energy use of these types of products and equipment remains high. Significant variation in the annual energy consumption of different basic models exists for many of these types of products and equipment, which indicates that technologies likely exist to reduce their energy consumption.

a. Consumer Products: Average Residential Energy Use

DOE calculated average energy use for the products described in this request for information based on several reports and DOE's own estimates.[3] Table 1 summarizes available estimates for miscellaneous residential electrical products. Subsequent discussion provides additional detail on DOE's energy use calculations for each product category. DOE seeks feedback from interested parties on any revised estimates of residential energy use for miscellaneous electrical equipment.

TABLE 1—ENERGY CONSUMPTION ESTIMATES OF MISCELLANEOUS RESIDENTIAL ELECTRICAL PRODUCTS[4]

	Stock[a] (millions)	Average unit energy use (kWh/yr)	Annual energy use[a] (TWh/yr)	Percentage of households	Household energy use (kWh/yr)	Source
Audio-Video Equipment						
Compact Audio	63	105	6.6	54	105	Urban et al. (2011).[5]
Computer Speakers	74	37	2.8	47	50	Urban et al. (2011).
Home Theater Systems (in-a-box)	30	91	2.7	26	91	Urban et al. (2011).
MP3 Player Docking Stations	48	25	1.2	41	25	Urban et al. (2011).
Portable Audio	120	6	0.7	30	19	Urban et al. (2011).
Radios	81	16	1.3	70	16	Urban et al. (2011).
Clock Radios	157	15	2.3	90	22	Roth et al. (2007).[6]
All audio equipment	577		17.8	[b]99+	154	
Blu-ray Players	12	14	0.2	11	13	Urban et al. (2011).
DVD Players	223	28	6.3	93	58	Urban et al. (2011).
Video Cassette Recorders (VCR)	57	47	2.7	49	47	Urban et al. (2011).
All video players	292		9.1	[b]97	81	
Audio/Video Receivers	99	65	6.4	50	111	Urban et al. (2011).
Total	962		33.2	[b]99+	286	
Computer Systems						
Desktop	101	220	22.2	66	290	Urban et al. (2011).
Portable	132	63	8.3	61	118	Urban et al. (2011).
All computers	233		30.5	[b]87	303	
Desktop PC Monitors	96	97	9.3	63	93	Urban et al. (2011).
Portable PC Monitors	35	97	3.4	16	25	Urban et al. (2011).
All monitors	131		12.7	[c]69	158	
External Storage Devices	80	11	0.8	69	11	Urban et al. (2011).

[2] Battery Chargers and External Power Supplies Preliminary Analysis Public Meeting, Appliances & Commercial Equipment Standards, U.S. Department of Energy, 13 October 2010. 75 FR 56021–56024 *http://www1.eere.energy.gov/buildings/appliance_standards/residential/battery_external_preliminaryanalysis_public_mtg.html.*

[3] Desroches, L.B., & Garbesi, K., 2011, *Max Tech and Beyond: Maximizing Appliance and Equipment Efficiency by Design*, Lawrence Berkeley National Laboratory Final Report, LBNL–4998E. *http://efficiency.lbl.gov/bibliography/max_tech_and_beyond.*

[4] Note: Some totals within the table may not sum precisely due to rounding.

[5] Urban, B., V. Tiefenbeck, and K. Roth. 2011. *Energy Consumption of Consumer Electronics in U.S. Homes in 2010,* Final Report to the Consumer Electronics Association (CEA), Fraunhofer Center for Sustainable Energy Systems, December.

[6] Roth, K.W. *et al.* 2007. *Residential Miscellaneous Electric Loads: Energy Consumption Characterization and Savings Potential.* Prepared by TIAX LLC for DOE.

TABLE 1—ENERGY CONSUMPTION ESTIMATES OF MISCELLANEOUS RESIDENTIAL ELECTRICAL PRODUCTS [4]—Continued

	Stock [a] (millions)	Average unit energy use (kWh/yr)	Annual energy use [a] (TWh/yr)	Percentage of house-holds	Household energy use (kWh/yr)	Source
Video Game Consoles	109	135	14.7	48	264	Urban et al. (2011).
Total	553		58.8	[b,d] 93	544	
Household Cleaning Equipment						
Vacuum Cleaners	114	42	4.8	98	42	Roth et al. (2007).
Imaging Equipment						
Printers & Multi-Function Devices	113	12	1.3	71	16	Urban et al. (2011).
Copiers	9	14	0.1	8	14	Urban et al. (2011).
Fax Machines	10	46	0.5	9	46	Urban et al. (2011).
Total	132		1.9	[b] 76	21	
Network Equipment						
Integrated Access Devices	42	53	2.2	33	58	Urban et al. (2011).
Modems	46	44	2.0	36	48	Urban et al. (2011).
Routers	49	44	2.1	35	53	Urban et al. (2011).
All Network Equipment	137		6.4	[e] 69	79	
Security Equipment	27	61	1.7	23	61	Roth et al. (2007).
Total	164		8.0	[b] 76	90	
Personal Space Heating Equipment						
Electric Blankets	29	120	3.5	25	121	Sanchez et al. (2008).[7]
Thermal Household Equipment						
Clothes Irons	107	53	5.7	92	53	Roth et al. (2007).
Hair Dryers	100	42	4.2	86	42	Roth et al. (2007).
Total	207		9.9	[b] 99	86	
Thermal Kitchen Equipment						
Coffee Makers	71	60	4.2	61	60	Roth et al. (2007).
Rice Cookers	20	45	0.9	17	45	Desroches and Garbesi (2011).
Slow Cookers	51	25	1.3	43	25	Desroches and Garbesi (2011).
Toasters	105	39	4.1	90	40	Roth et al. (2007).
Toaster Ovens	65	33	2.1	56	33	Roth et al. (2007).
Total	311		12.7	[b] 99	110	

[a] Stock and annual energy use have been adjusted to reflect the number of households in 2011.
[b] Percentage of households owning at least one device is assumed to be uncorrelated for each device or device category.
[c] Percentage of households owning at least one device is assumed to be the sum of individual percentages.
[d] Monitors and external storage devices are assumed to be 100% correlated with owning a computer, so the percentage of households owning at least one type of computer equipment is assumed to be the joint uncorrelated probability of owning a computer and video game console.
[e] Percentage of households owning at least one device is assumed to be the sum of integrated access devices (which contain modems) and standalone modems.

i. Audio-Video Equipment

DOE calculated average residential energy use for audio-video equipment, in households that used the product, based on data from reports on residential miscellaneous electric loads.[9] These reports provide annual energy use per device and the total number of devices in operation in the U.S. Types of residential audio-video equipment included compact audio, computer speakers, home theater in-a-box systems, MP3 player docking stations, portable audio, radios, clock radios, Blu-ray players, digital versatile disk (DVD) players, video cassette recorders (VCR) and audio-video

[7] Sanchez, M.C., Koomey, J.G., Moezzi, M.M., & Huber, W., 1998, *Miscellaneous Electricity Use in the U.S. Residential Sector*, Lawrence Berkeley National Laboratory Final Report, LBNL–40295.

[8] Energy Information Administration. 20110. *Annual Energy Outlook (AEO) 2011.*

[9] Roth *et al.,* 2011; Urban et al., 2011.

receivers. See Table 1 for more information. Based on these data, DOE believes the presence of one type of audio or video equipment within a household is not necessarily correlated with the presence of another type of audio or video equipment. Therefore, DOE estimated the percentage of households with at least one type of audio or video equipment to be more than 99%, by calculating the total uncorrelated probability of all device combinations.[10]

The total number of households in the U.S. in 2011 was 116 million;[11] therefore DOE estimated the number of households in which audio or video equipment was used to be 116 million. The estimated total household energy use of audio-video equipment was 33.2 billion kWh. Therefore, the estimated average annual U.S. household energy use for homes with audio-video equipment was 286 kWh.

ii. Computer Systems

DOE calculated average residential energy use for computer systems in households that used the product, based on data from a report on residential miscellaneous electric loads.[12] This report provides annual energy use per device and the total number of devices in operation in the U.S. Types of residential computer systems included desktop computers, portable (laptop, netbook, and tablet) computers, monitors (for desktop and portable computers), external storage devices, and video game consoles. See Table 1 for more information. Based on these data, DOE believes that monitors and external storage devices are only present along with a computer, but the presence of one type of computer system (desktop computer, portable computer or game console) within a household is not necessarily correlated with the presence of another type of computer system. Therefore, DOE estimated the percentage of households with at least one type of computer equipment to be 93%, by calculating the total uncorrelated probability of all device combinations.

The total number of households in the U.S. in 2011 was 116 million;[13] therefore, the number of households in which computer systems were used was approximately 108 million. The total reported household energy use of computer systems was 58.8 billion kWh. Therefore, the estimated average annual U.S. household energy use for computer systems was 544 kWh.

iii. Household Cleaning Equipment

DOE calculated average residential energy use for household cleaning equipment, in households that used the product, based on data from a report on residential miscellaneous electric loads.[14] This report provides annual energy use per device and the total number of devices in operation in the U.S. Types of household cleaning equipment included vacuum cleaners; no data were available for other types of devices, including steam cleaning equipment and possibly other devices, which may be potentially significant categories of residential energy use. See Table 1 for more information. The percentage of households with at least one type of household cleaning equipment is estimated to be 98%.

The total number of households in the U.S. in 2011 was 116 million;[15] therefore, the number of households using household cleaning equipment was approximately 114 million. The total estimated household energy use of household cleaning equipment was 4.8 billion kWh. Therefore, the average U.S. per-household energy use of household cleaning equipment was 42 kWh.

iv. Imaging Equipment

DOE calculated average residential energy use for imaging equipment in households that used the product, based on data from a report on residential miscellaneous electric loads.[16] This report provides annual energy use per device and the total number of devices in operation in the U.S. Types of residential imaging equipment included printers, copiers, fax machines, and multi-function devices (such as a combination printer, scanner and fax). See Table 1 for more information. Based on these data, DOE believes the presence of one type of imaging equipment in a household is not necessarily correlated with the presence of another type of imaging equipment. Therefore, DOE estimated the percentage of households with at least one type of imaging equipment to be 76%, by calculating the total uncorrelated probability of all device combinations.

The total number of households in the U.S. in 2011 was 116 million;[17] therefore, the number of households in which imaging equipment was used was approximately 88 million. The total reported household energy use of imaging equipment was 1.9 billion kWh. Therefore, the estimated average annual U.S. household energy use for imaging equipment was 21 kWh.

v. Network Equipment

DOE calculated average residential energy use for network equipment in households that used the product, based on data from reports on residential miscellaneous electric loads.[18] These reports provide annual energy use per device and the total number of devices in operation in the U.S. Types of residential network equipment included modems, routers, integrated access devices (IAD, which are combination modem/routers), and security equipment. See Table 1 for more information. Based on these data, DOE believes the presence of an IAD within a household excludes the presence of a modem and vice-versa. DOE also believes that routers are 100% correlated with the presence of a modem or IAD, and that security equipment is uncorrelated with other network equipment. Therefore, DOE estimated the percentage of households with at least one type of network equipment to be 76%, by calculating the total probability of all device combinations.

The total number of households in the U.S. in 2011 was 116 million;[19] therefore, the number of households using network equipment was approximately 88 million. The total reported household energy use of network equipment was 8.0 billion kWh. Therefore, the average U.S. per-household energy use for network equipment was 90 kWh.

vi. Personal Space Heating Equipment

DOE calculated average residential energy use for personal space heating equipment, in households that used the product, based on data from a report on residential miscellaneous electric loads.[20] This report provides annual energy use per device and the total

[10] The uncorrelated probability of owning more than one type of device is equal to one minus the probability that a home has neither type. This latter quantity is found by multiplying the probabilities that a home does not have each type of device. For instance, for video players, the probability that a home has a Blu-ray player is 11%, a DVD player, 93% and a VCR, 49%. Therefore, the probability that a home has none of these types is (1—11%) (1—93%) (1—49%) = 3%, while the probability that a home has at least one type is 1—3% = 97%. Similarly, the probability that a home has at least one type of audio equipment is more than 99%, and of audio/video receivers is 50%. Therefore, the joint probability that a home has at least one type of audio or video equipment is 1— (1—97%) (1—99%) (1—50%) = 99.99%

[11] *AEO 2011.*

[12] Urban *et al.,* 2011.

[13] *AEO 2011.*

[14] Roth *et al.,* 2007.

[15] *AEO 2011.*

[16] Urban *et al.,* 2011.

[17] *AEO 2011.*

[18] Roth *et al.* 2007; Urban et al., 2011.

[19] *AEO 2011.*

[20] Sanchez *et al* (2008).

number of devices in operation in the U.S. Types of personal space heating equipment included electric blankets; no data were available for other types of devices, including electric space heaters, which may be a potentially significant category of residential energy use. See Table 1 for more information. The percentage of households with at least one type of personal space heating equipment was estimated to be 25%.

The total number of households in the U.S. in 2011 was 116 million;[21] therefore, the number of households using personal space heating equipment was approximately 29 million. The total reported household energy use of personal space heating equipment was 3.5 billion kWh. Therefore, the average U.S. per-household energy use of personal space heating equipment was 121 kWh.

vii. Thermal Household Equipment

DOE calculated average residential energy use for thermal household equipment, in households that used the product, based on data from a report on residential miscellaneous electric loads.[22] This report provides annual energy use per device and the total number of devices in operation in the U.S. Types of thermal household equipment included clothes irons and hair dryers; no data were available for other types of devices, which may be potentially significant categories of residential energy use. See Table 1 for more information. Based on these data, DOE believes the presence of one type of thermal household equipment within a household is not necessarily correlated with the presence of another type of thermal household equipment. Therefore, DOE estimated the percentage of households with at least one type of thermal household equipment to be 99%, by calculating the total uncorrelated probability of all device combinations.

The total number of households in the U.S. in 2011 was 116 million;[23] therefore, the number of households using thermal household equipment was approximately 115 million. The total reported household energy use of thermal household equipment was 9.9 billion kWh. Therefore, the average U.S. per-household energy use thermal household equipment was 86 kWh.

viii. Thermal Kitchen Equipment

DOE calculated average residential energy use for thermal kitchen equipment, in households that used the product, based on data from a report on residential miscellaneous electric loads[24] and DOE's own estimates.[25] These reports provide annual energy use per device, and the total number of devices in operation in the U.S. Types of residential thermal kitchen equipment included coffee makers, rice cookers, slow cookers, toasters and toaster ovens. See Table 1 for more information. Based on these data, DOE believes the presence of one type of thermal kitchen equipment within a household is not necessarily correlated with the presence of another type of thermal kitchen equipment. Therefore, DOE estimated the percentage of households with at least one type thermal kitchen equipment to be 99%, by calculating the total uncorrelated probability of all device combinations.

The total number of households in the U.S. in 2011 was 116 million;[26] therefore, the number of households using thermal kitchen equipment was approximately 115 million. The total reported household energy use of thermal kitchen equipment was 12.7 billion kWh. Therefore, the average U.S. per-household energy use of thermal kitchen equipment was 110 kWh.

ix. Other Devices

Many other types of residential products or equipment not covered in the discussion above are listed in Appendix A of Roth et al. (2007). The data available for these types of products and equipment include estimates of numbers of installed devices, unit energy consumption and national energy consumption, but no energy savings potentials. Some of these devices, and other devices not listed in the appendix, represent significant energy consumption and may warrant evaluation by DOE.

b. Commercial Equipment: Average Commercial Energy Use

DOE calculated average estimated energy use for the commercial equipment described in this request for information based on several reports and DOE's own estimates.[27] Table 2 summarizes available estimates for miscellaneous commercial electrical equipment. Subsequent discussion provides additional detail on DOE's energy use calculations for each product category. DOE seeks feedback from interested parties on any revised estimates of commercial energy use for miscellaneous electrical equipment.

TABLE 2—ENERGY CONSUMPTION ESTIMATES OF MISCELLANEOUS COMMERCIAL ELECTRICAL EQUIPMENT[28]

	Stock (millions)	Average unit energy use (kWh/yr)	Annual energy use (TWh/yr)	Notes	Source
Computer Systems					
Desktop	60	500	30.0		Zogg et al. (2009).
Laptop	48	28	1.3		Zogg et al. (2009).
All computers	108	290	31.3		
Desktop monitors	65	108	7.0	Low est	Zogg et al. (2009).
	160	169	27.0	High est	McKenney et al. (2010).[30]
Servers:					
—Low-end (volume) servers	12.8	2,100	27.3		Zogg et al. (2009).
—Mid-range servers	0.35	6,900	2.4	Low est	Zogg et al. (2009).

[21] *AEO 2011.*

[22] Roth *et al.* 2007.

[23] *AEO 2011.*

[24] Roth *et al.* 2007.

[25] Desroches and Garbesi, 2011.

[26] *AEO 2011.*

[27] Desroches and Garbesi, 2011.

[28] **Note:** Some totals within the table may not sum precisely due to rounding.

[29] Zogg, R. *et al.,* 2009. *Energy Savings Potential and RD&D Opportunities for Commercial Building Appliances.* Prepared by Navigant Consulting, Inc. for DOE.

[30] McKenney, K., *et al.,* 2010, *Commercial Miscellaneous Electric Loads: Energy Consumption Characterization and Savings Potential in 2008 by Building Type.* Prepared by TIAX LLC for DOE.

TABLE 2—ENERGY CONSUMPTION ESTIMATES OF MISCELLANEOUS COMMERCIAL ELECTRICAL EQUIPMENT [28]—Continued

	Stock (millions)	Average unit energy use (kWh/yr)	Annual energy use (TWh/yr)	Notes	Source
	1.3	3,923	5.1	High est	McKenney et al. (2010).
—High-end servers	0.018	81,400	1.5	Low est	Zogg et al. (2009).
	0.015	2.13×10^6	32.0	High est	McKenney et al. (2010).
—Subtotal	13.2	2,335	30.7	Low est	
	14.1	4,533	64.0	High est	
Total	186	371	69.5	Low est	
	282	434	122.8	High est	
Imaging Equipment					
Fax machines	5.5	55	0.3	Low est	McKenney et al. (2010).
	16.1	320	5.2	High est	Zogg et al. (2009).
Impact printers	2.9	120	0.3	.....	Zogg et al. (2009).
Ink-jet printers	12.8	44	0.6	.....	Zogg et al. (2009).
Laser printers	6.8	440	3.0	.....	Zogg et al. (2009).
Printers	34.0	324	11.0	.....	McKenney et al. (2010).
Copiers	3.7	730	2.7	.....	McKenney et al. (2010).
Scanners	3.6	28	0.1	Low est	McKenney et al. (2010).
	12.3	37	0.5	High est	Zogg et al. (2009).
Multi-function devices	6.0	67	0.4	Low est	McKenney et al. (2010).
	8.6	890	7.7	High est	Zogg et al. (2009).
Total	75.3	244	18.4	Low est	
	97.2	318	30.9	High est	
Network Equipment					
Commercial Routers/WLAN	7	250	1.8	.....	Lanzisera (2010).[31] Lanzisera et al. (2011).[32]
Commercial Switches	435	16.5	7.2	.....	Lanzisera (2010). Lanzisera et al. (2011).
ISP Equipment	91	14	1.3	.....	Lanzisera (2010). Lanzisera et al. (2011).
Security Equipment	2.5	920	2.3	.....	Lanzisera (2010). Lanzisera et al. (2011).
Total	*109	114	12.5		
Uninterruptible Power Supplies					
UPS (double conversion)	1.3	3498	4.5	.....	Zogg et al. (2009).
UPS (line interactive)	4.5	158	0.7	.....	Zogg et al. (2009).
UPS (standby)	9.0	131	1.2	.....	Zogg et al. (2009).
Total	14.7	429	6.4		
Vertical Transport Equipment					
Elevators + Escalators	0.660	5,910	3.9	Low est	McKenney et al. (2010).
Elevators	0.700	7,600	5.3	High est	Zogg et al. (2009).
Escalators	0.035	22,850	0.8	High est	Zogg et al. (2009).
Total	0.660	5,910	3.9	Low est	
	0.735	8,330	6.1	High est	

*Assuming approximately 50 ports per commercial switch.

i. Computer Systems (Commercial Use)

DOE calculated average commercial energy use for computer systems based on data from reports on commercial miscellaneous electric loads.[33] These reports provide annual energy use per device and the total number of devices in operation in the U.S. Types of commercial computer systems include desktop computers, laptop computers, desktop monitors, and servers. See Table 2 for more information. The total number of computer systems in all commercial settings in the U.S. was estimated at between 186 and 282 million in 2008. The total reported

[31] Lanzisera, S., 2010, personal communication, Lawrence Berkeley National Laboratory.

[32] Lanzisera, S., B. Nordman, and R. E. Brown, 2011. ''Data Network Equipment Energy Use and Savings Potential in Buildings.'' *Energy Efficiency,* 23 September, DOI: 10.1007/s12 (053–011–9136–4, *http://www.springerlink.com/content/tm23317547277650.*

[33] Zogg *et al.,* 2009; McKenney et al., 2010.

energy use of devices in all commercial settings was estimated at between 69.5 and 122.8 billion kWh.

ii. Imaging Equipment (Commercial Use)

DOE calculated average commercial energy use for imaging equipment based on data from reports on commercial miscellaneous electric loads.[34] These reports provide annual energy use per device and the total number of devices in operation in the U.S. Types of commercial imaging equipment included ink-jet printers, laser printers, impact printers, copiers, scanners, fax machines, and multi-function devices (such as a combination printer, copier and fax). See Table 2 for more information. The total number of imaging equipment in all commercial settings in the U.S. was estimated at between 75.3 and 97.2 million in 2008. The total reported energy use of devices in all commercial settings was estimated at between 18.4 and 30.9 billion kWh.

iii. Network Equipment (Commercial Use)

DOE calculated average commercial energy use for network equipment based on data from a study on network equipment energy use.[35] This report provides annual energy use per device and the total number of devices in operation in the U.S. Types of commercial network equipment included commercial routers/wireless local area networks (WLAN), commercial switches, Internet service provider (ISP) equipment and security equipment. See Table 2 for more information. The total number of network equipment in the U.S. in all commercial settings was estimated to be 109 million in 2008. The total reported commercial energy use of network equipment was 12.5 billion kWh.

iv. Uninterruptible Power Supplies (UPS)

DOE calculated average commercial energy use for uninterruptible power supplies based on data from reports on commercial miscellaneous electric loads.[36] These reports provide annual energy use per device and the total number of devices in operation in the U.S. Types of uninterruptible power supplies included double conversion, line interactive, and standby, all of which are typically found in data centers. See Table 2 for more information. The total number of uninterruptible power supplies in the U.S. in all commercial settings was 14.7 million in 2008. The total reported commercial energy use of uninterruptible power supplies was 6.4 billion kWh.

v. Vertical Transport Equipment

DOE calculated average commercial energy use for vertical transport equipment, based on data from reports on commercial miscellaneous electric loads.[37] These reports provide annual energy use per device and the total number of devices in operation in the U.S. Types of vertical transport equipment included elevators and escalators. See Table 2 for more information. The total number of vertical transport equipment in all commercial settings in the U.S. was estimated to lie between 660 and 735 thousand in 2008. The total reported energy use of devices in all commercial settings was estimated to lie between 3.9 and 6.1 billion kWh.

c. Energy Savings Estimates: Technical Potential

Reports on miscellaneous residential and commercial electric products and equipment as well as DOE's own estimates, as discussed above, provided estimates of typical energy savings from these products and equipment ranging from 3% to more than 80%. In the sections below, the technical savings potential has been determined by comparing the energy use of best-in-class devices to the average energy use for a particular device. DOE seeks feedback from interested parties on any revised estimates of energy savings potential for miscellaneous residential and commercial electrical equipment.

i. Audio-Video Equipment

Typical energy savings for audio equipment vary from approximately 3% to 60%, with most of the savings at the high end of the range, and typical energy savings for video equipment vary from approximately 35% to 85%. While the power draw in active and idle modes has generally decreased in home audio and video products as a result of gradual technology improvements and an increased focus on power management by manufacturers, the majority of energy savings opportunities continue to exist in these two modes.

ii. Computer Systems

Typical energy savings for computer systems and computer components vary from approximately 30% to 45%. [38] Most of these savings arise from better power management, but some savings are due to lower power draw values in each mode as well, presumably from more efficient components. Improvements in power consumption among notebook computers, particularly chip-level voltage and clock frequency scaling, can be applied to desktop computer systems as the architecture is virtually identical.[39]

iii. Household Cleaning Equipment

ENERGY STAR has evaluated potential savings for vacuum cleaners and determined that a 17% to 33% energy savings is possible by reducing motor size from 12 amps to between 8 and 10 amps, with no impact on performance.[40] Little other information exists about energy savings opportunities for vacuum cleaners, aside from one identified technology that utilizes a closed air circuit to reduce the suction motor power, achieving a 50% reduction in energy use.[41] The energy savings potential of other household cleaning equipment devices is unknown.

iv. Imaging Equipment

Typical energy savings for imaging equipment can be up to 90%.[42] Most of these savings arise from better power management, but some savings are due to lower power draw values in each mode (*i.e.,* active and standby modes). More efficient electrophotographic (e.g., laser) technology can also reduce active mode energy use in some devices.

v. Network Equipment

Typical energy savings for network equipment are approximately 40%.[43] Network equipment typically does not scale energy consumption with utilization. As a result, there is very little difference between the active and sleep mode power consumption. Some technologies exist that allow network ports to power down when not in use, but wake within a fraction of a second. It is not known, however, if such options are feasible for security systems.[44]

vi. Personal Space Heating Equipment

The energy savings opportunities of personal space heating equipment are mostly unknown.

vii. Thermal Household Equipment

While limited information exists, clothes irons and hair dryers appear to

[34] Zogg *et al.* 2009, excluding products listed elsewhere in this RFI.

[35] Lanzisera, 2010; Lanzisera *et al.,* 2011.

[36] Zogg *et al.,* 2009.

[37] Zogg *et al.,* 2009, excluding products listed elsewhere in this RFI.

[38] Roth *et al.,* 2007.

[39] Intertek, personal communication, 2011.

[40] Roth *et al.,* 2007.

[41] Roth *et al.,* 2007.

[42] Roth *et al.,* 2007; Zogg et al., 2009.

[43] Lanzisera, 2010; Lanzisera *et a*l., 2011.

have limited savings opportunities, though hair dryers may offer some savings by reducing standby losses from ground fault circuit interrupters (GFCI).[45] The energy savings potential of other thermal household equipment devices is unknown.

viii. Thermal Kitchen Equipment

Typical energy savings for examined types of thermal kitchen equipment vary from approximately 20% to 33%.[46] Approaches include use of more insulating materials, increasing the radiant efficiency of heating elements, modifying the internal geometry of the devices to prevent undesirable heat loss, and automatic shutoff control. In particular, for coffee makers, the use of a thermal insulating carafe to keep brewed coffee hot could reduce energy consumption by 26%, with minimal impact on consumer utility, other than a slightly smaller capacity (which could be compensated by a larger exterior volume) and slow cooling of the beverage (which could conceivably be addressed by periodic reheating). For toasters and toaster ovens, infrared heating elements offer the ability to reduce amount of energy required to heat the elements and are also very efficient radiators.

ix. Uninterruptible Power Supplies (UPS)

Typical energy savings for uninterruptible power supplies are approximately 50%.[47] The main means of accomplishing these savings are through replacement of double conversion (from AC to DC back to AC current) to DC-based power distribution, and minimizing UPS system sizing by moving from a single, central UPS system to distributional approach, where small UPS systems are dedicated to each machine.

x. Vertical Transport Equipment

Typical energy savings for vertical transport equipment vary from approximately 25% to 30%, though some manufacturers of efficient escalators claim savings up to 50%.[48] Some important improvements include: Variable-voltage, variable-frequency drives, gearless permanent magnet motors, regenerative braking drives (for elevators), motor efficiency controllers, controls to shut off lights and fans when not in use, destination control software to optimize elevator trips, and higher-efficiency lighting technology (CFL, LED).

d. Consumer Utility Considerations

Reducing energy consumption when equipment is idle or off must be balanced against network availability and the need for continuous communication among many types of miscellaneous electrical equipment, especially computer systems, imaging equipment, network equipment, and, increasingly, audio-video equipment. Security requirements and wake-up time are also important considerations for almost all equipment of these types. DOE seeks data and information on potential utility impacts associated with efficiency improvements for the various product and equipment types discussed above.

4. Other Regulatory Programs

The U.S. Environmental Protection Agency and DOE jointly administer the voluntary ENERGY STAR labeling program (*www.energystar.gov*) for various products and equipment. ENERGY STAR currently has standards for miscellaneous residential and commercial electrical equipment that includes audio-video equipment, computers, displays, imaging equipment, and set-top boxes & cable boxes. ENERGY STAR programs for network equipment and uninterruptible power supplies are currently under development.

5. Public Participation

A. Submission of Information

DOE will accept information and data in response to this Request for Information under the timeline provided in the **DATES** section above. Information submitted to the Department by email should be provided in WordPerfect, Microsoft Word, PDF, or text file format. Those responding should avoid the use of special characters or any form of encryption, and wherever possible, comments should include the electronic signature of the author. Comments submitted to the Department by mail or hand delivery/courier should include one signed original paper copy. No telefacsimiles will be accepted. Comments submitted in response to this notice will become a matter of public record and will be made publicly available.

B. Issues on Which DOE Seeks Information

DOE welcomes comments on all aspects of its consideration of miscellaneous residential and commercial electrical equipment. DOE is particularly interested in receiving comments from interested parties on the following issues:

(1) Which products or equipment should be included in the following categories of miscellaneous residential and commercial electrical products or equipment: Audio-video equipment, computer systems, household cleaning equipment, imaging equipment, medical equipment, network equipment, personal space heating equipment, thermal household equipment, thermal kitchen equipment, uninterruptible power supplies, and vertical transport equipment.

(2) Should DOE consider additional categories of miscellaneous residential electrical products or equipment, such as those referenced in Section 3.a)(ix)?

(3) Recent estimates of the energy use of the various types of miscellaneous residential and commercial electrical products and equipment.

(4) Examples of efficient technologies and energy savings potential of miscellaneous residential and commercial electrical products and equipment.

(5) Overview of miscellaneous residential and commercial electrical product and equipment markets, including stocks in U.S. residential and commercial buildings, shipments, and efficiency ranges.

(6) Availability and applicability of U.S. and international test procedures for miscellaneous residential and commercial electrical products and equipment.

(7) Information regarding potential test procedure designs or enhancements for categories of miscellaneous electrical products and equipment.

(8) Information regarding voluntary and mandatory product labeling programs in the U.S. or in other countries that have been effective in enabling consumers to chose more efficient miscellaneous electrical products and equipment.

Issued in Washington, DC, on January 4, 2012.

Kathleen B. Hogan,

Deputy Assistant Secretary for Energy Efficiency, Energy Efficiency and Renewable Energy.

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[45] Roth *et al.,* 2007.

[46] Roth *et al.,* 2007; Desroches and Garbesi, 2011.

[47] Zogg *et al.,* 2009.

[48] Zogg *et al.,* 2009; McKenney *et al.,* 2010.

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings #1

Take notice that the Commission received the following electric rate filings:

Docket Numbers: ER07–562–000.

Applicants: Trans-Allegheny Interstate Line Company.

Description: Trans-Allegheny Interstate Line Company, Revised Electronic Informational Filing of 2011 Formula Rate Annual Update.