AUTOMATIC COMMERCIAL ICE MAKERS
PRELIMINARY ANALYSIS
ENGINEERING ANALYSIS DETAILS FOR DIRECTLY ANALYZED EQUIPMENT CLASSES

The following tables illustrate the design option analyses used to calculate the incremental manufacturer selling prices at varying efficiency levels. The tables show analyses for equipment classes that were directly analyzed for this rulemaking.

Further detail is available in Chapter 5 of the ACIM Preliminary Analysis Technical Support Document (TSD): http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/acim_prelim_tsd_2012_01_27.pdf. However, note that tables 5.10.2 and 5.10.4 of the preliminary TSD, labeled "Incremental Manufacturer Selling Price" actually show incremental manufacturing production cost.

Table 1 Manufacturing Cost and Energy Consumption Data for Air-Cooled IMH Batch Ice Machines with Capacities less than 450 lb/24 hours

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
8.04	0.0%	$1,671	$2,089	Baseline
7.46	7.2%	$1,678	$2,098	Increase compressor EER from 4.86 to 5.25
7.27	9.6%	$1,680	$2,100	2" wider condenser
7.08	12.0%	$1,686	$2,108	PSC condenser fan motor
6.94	13.7%	$1,690	$2,113	ECM condenser fan motor
6.82	15.2%	$1,696	$2,120	Additional 2" wider condenser
6.69	16.8%	$1,702	$2,128	ECM pump motor
6.26	22.1%	$1,727	$2,159	Harvest assist

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor
Representative Harvest Capacity: 260 lb/24 hours

Table 2 Manufacturing Cost and Energy Consumption Data for Air-Cooled IMH Batch Ice Machines with Capacities greater than 450 lb/24 hours (Smaller Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
6.01	0.0%	$2,447	$3,059	Baseline
5.70	5.1%	$2,447	$3,059	Batch water fill
5.58	7.1%	$2,452	$3,065	3.25" increased condenser width
5.33	11.3%	$2,460	$3,075	6.2 EER compressor
5.16	14.1%	$2,466	$3,083	6.54 EER compressor
5.07	15.6%	$2,476	$3,095	PM pump motor
4.87	19.0%	$2,514	$3,143	Best PSC fan motors
4.83	19.6%	$2,556	$3,195	ECM fan motors
4.80	20.2%	$2,573	$3,216	One row deeper condenser

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor
Representative Harvest Capacity: 800 lb/24 hours

Table 3 Manufacturing Cost and Energy Consumption Data for Water-Cooled IMH Batch Ice Machines with Capacities between 500 and 1436 lb/24 hours

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
4.65	0.0%	$2,762	$3,453	Baseline
4.41	5.0%	$2,770	$3,463	6.2 EER compressor
4.25	8.6%	$2,777	$3,471	6.54 EER compressor
4.16	10.5%	$2,787	$3,484	PM pump motor

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

Representative Harvest Capacity: 850 lb/24 hours

Table 4 Manufacturing Cost and Energy Consumption Data for Water-Cooled IMH Batch Ice Machines with Capacities greater than 1436 lb/24 hours (Larger Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
4.00	0.0%	$6,571	$8,214	Baseline
3.91	2.3%	$6,571	$8,214	Existing Product
3.88	3.1%	$6,583	$8,229	ECM pump motors

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

Representative Harvest Capacity: 2600 lb/24 hours

Table 5 Manufacturing Cost and Energy Consumption Data for Air-Cooled RCU Batch Ice Machines with Capacities greater than 1000 lb/24 hours (Smaller Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
5.1	0.0%	$5,097	$6,371	Baseline
4.89	4.2%	$5,103	$6,379	6.1 EER Compressor
4.67	8.4%	$5,109	$6,386	6.4 EER Compressor
4.59	10.0%	$5,121	$6,401	1.25“ greater width condenser
4.55	10.7%	$5,122	$6,403	3 row higher condenser, 33% more air flow
4.42	13.3%	$5,150	$6,438	6 inch wider condenser
4.30	15.6%	$5,178	$6,473	Best PSC fan motor
4.29	15.9%	$5,194	$6,493	ECM fan motor
4.26	16.5%	$5,200	$6,500	ECM pump motor

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

Representative Harvest Capacity: 1500 lb/24 hours

Table 6 Manufacturing Cost and Energy Consumption Data for Air-Cooled RCU Batch Ice Machines with Capacities greater than 1000 lb/24 hours (Larger Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
5.3	0.0%	$6,205	$7,756	Baseline
5.14	3.1%	$6,210	$7,763	6.84 EER Compressor
4.78	9.8%	$6,352	$7,940	Back to existing product condensing unit
4.74	10.6%	$6,364	$7,955	ECM pump motors
4.56	13.9%	$6,409	$8,011	ECM fan motors

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

Representative Harvest Capacity: 2400 lb/24 hours

Table 7 Manufacturing Cost and Energy Consumption Data for Air-Cooled SCU Batch Ice Machines with Capacities less than 175 lb/24 hours

Energy Consumption *kWh/100 lb*	Capacity *lb/24 hours*	Baseline Energy Consumption *kWh/100 lb*	Percent Energy Use Less Than Baseline	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
12.84	110	12.84	0.0%	$1,806	$2,258	Baseline
11.57	116	12.55	7.8%	$1,816	$2,270	Batch water fill
9.35	136	11.64	19.7%	$1,855	$2,319	4.09 EER compressor
8.67	145	11.18	22.5%	$1,861	$2,326	Increase condenser width 2.5”, depth from 2 to 3 rows
8.46	145	11.18	24.3%	$1,865	$2,331	PSC fan motor
8.31	145	11.18	25.7%	$1,867	$2,334	ECM fan motor
8.08	145	11.18	27.8%	$1,873	$2,341	ECM pump motor

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor
Representative Harvest Capacity: 110 lb/24 hours

Table 8 Manufacturing Cost and Energy Consumption Data for Water-Cooled SCU Batch Ice Machines with Capacities greater than 200 lb/24 hours (Smaller Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
7.6	0.0%	$1,815	$2,269	Baseline
7.05	7.3%	$1,825	$2,281	Batch water fill
6.30	17.1%	$1,838	$2,298	4.69 EER compressor
5.77	24.1%	$1,847	$2,309	5.25 EER compressor
4.73	37.8%	$1,872	$2,340	Harvest Assist
4.61	39.4%	$1,882	$2,353	ECM pump motor

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

Representative Harvest Capacity: 300 lb/24 hours

Table 9 Manufacturing Cost and Energy Consumption Data for Air-Cooled IMH Continuous Ice Machines with Capacities less than 1000 lb/24 hours (Larger Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
5.86	0.0%	$2,786	$3,483	Baseline
5.45	7.0%	$2,786	$3,483	Larger Evaporator
5.25	10.4%	$2,796	$3,495	Better SP condenser fan motor
5.10	12.9%	$2,802	$3,503	One row deeper condenser
3.91	33.3%	$2,835	$3,544	5.95 EER Compressor
3.81	35.0%	$2,838	$3,548	One row higher and 1” wider condenser
3.77	35.7%	$2,848	$3,560	PSC fan motor
3.68	37.2%	$2,879	$3,599	ECM fan motor
3.41	41.8%	$2,924	$3,655	ECM auger motor

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

[1]Baseline is 7.0 kWh/day based on TP NOPR energy use metric, assuming 85% ice quality.

Representative Harvest Capacity: 820 lb/24 hours

Table 10 Manufacturing Cost and Energy Consumption Data for Air-Cooled IMH Continuous Ice Machines with Capacities less than 1000 lb/24 hours (Smaller Sizes)

Energy Consumption *kWh/100 lb*	Percent Energy Use Reduction	Manufacturer Production Cost	Manufacturer Selling Price	Design Options Successively Added
6.16	0.0%	$1,825	$2,281	Baseline
5.75	6.6%	$1,839	$2,299	2-row deep condenser
5.55	9.9%	$1,845	$2,306	PSC fan motor
4.62	25.0%	$1,888	$2,360	Evaporator with 50% improved heat transfer, lower capacity compressor
4.50	27.0%	$1,892	$2,365	ECM fan motor
4.44	28.0%	$1,906	$2,383	ECM auger motor
4.37	29.0%	$1,920	$2,400	3-row deep condenser
4.29	30.3%	$1,987	$2,484	4-row deep condenser

kWh = kilowatt-hours; EER = energy efficiency ratio; PSC = permanent split capacitor; ECM = electronically commutated motor

Representative Harvest Capacity: 310 lb/24 hours