

## APPENDIX K



### Conservation Load Shapes

#### CONSERVATION LOAD SHAPE FILES

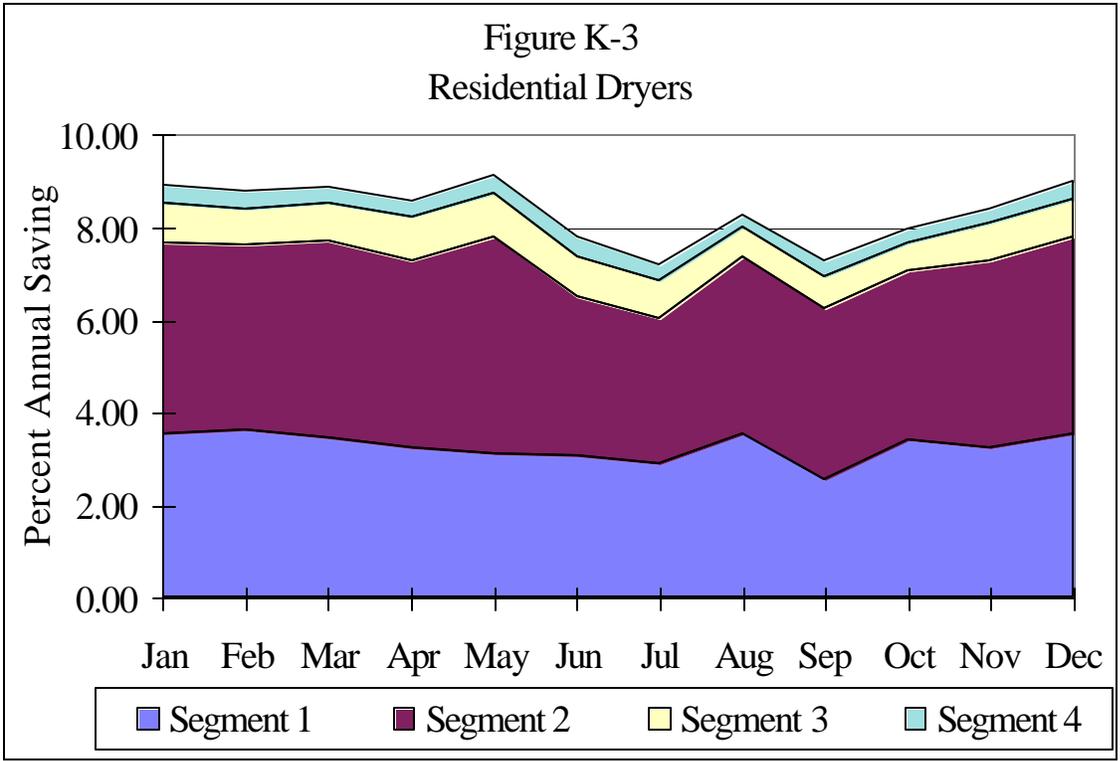
The need for resources in the regional power system fluctuates dramatically from month to month and hour to hour. In order to calculate the benefits of any new resource, the distribution of energy produced by the resource must be compared to the shape of the regional system and valued accordingly. Traditionally, the supply curve models used to estimate cost-effective conservation measures has been based on annual energy savings and compared to an “average” system cost of a marginal resource. For RTF's analysis, a greater emphasis was placed on estimating the capacity constraints of the regional system and valuing new resource acquisitions accordingly. In order to accomplish this, a demand modeling system was developed that translated the annual energy savings from conservation measures or the net energy production of a customer side generating renewable resource or direct application renewable resource into blocks of energy corresponding to specific power system conditions. For purposes of this analysis, the critical time periods for the regional system were sorted into four “load segments” of hourly conditions for each month of the year. These load segments correspond to a time series of marginal avoided resource costs that are multiplied by the energy in each of these segment/months and summed over the analysis period to calculate the benefit to the region's bulk power system of a conservation measure or the net energy production of a renewable resource. Figure K-1 "maps" of the hours of the week into the appropriate load segments.

The models used to translate annual energy savings/production were developed using the Council's Load Shape Forecasting System. For the residential, industrial and irrigation sectors, this system was used to generate matrices that would directly represent the distribution of annual energy savings for each load segment in each month. For the commercial sector, rather than shaping the energy *savings* to the appropriate load segments, individual end-use load shapes were developed to distribute the annual energy *consumption* for a specific end-use. These shapes were created for both a baseline condition and an efficient condition for each of five end-uses (heat, ventilation, cooling, lighting, other), three separate base fuel conditions (electric resistance, heat pump, gas), and two different types of efficiency measures (lighting or comprehensive) for each prototype. Energy consumption for each load segment for the two cases, baseline and efficient, are subtracted to compute the actual energy in each load segment to multiply by the corresponding marginal cost value. The various fuel cases are weighted proportionately to their fuel share and then all the end uses are summed across each load segment to derive the overall load shape for that measure in that prototype. After all cost-effective measures have been determined, they are bundled together and the resulting changes in end-use for each period are summed and normalized to produce an overall distribution of the savings across load segments and months.

Figures K-2 through K-19 depict the conservation load shape distributions for residential, commercial, industrial, and irrigation. In each figure, the percent of the annual savings distributed to each segment is plotted by month. The segments are stacked in order to show the total distribution for any given month. The segments are layered in each figure in order; i.e., the first segment is on the bottom, the second segment is next, etc. For commercial, only the load shapes for the bundle of all cost-effective measures are included.

**Figure K-1 - Allocation of Hourly Loads to Load Segments Used to Value Conservation Savings and Customer-Side Renewable Resources**

Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Holiday
1	3	3	3	3	3	4	4	4
2	3	3	3	3	3	4	4	4
3	3	3	3	3	3	4	4	4
4	3	3	3	3	3	4	4	4
5	2	2	2	2	2	2	2	4
6	2	2	2	2	2	2	2	3
7	2	2	2	2	2	2	2	3
8	2	2	2	2	2	2	2	3
9	1	1	1	1	1	2	2	2
10	1	1	1	1	1	2	2	2
11	1	1	1	1	1	2	2	2
12	1	1	1	1	1	2	2	2
13	1	1	1	1	1	2	2	2
14	1	1	1	1	1	2	2	2
15	1	1	1	1	1	2	2	2
16	1	1	1	1	1	2	2	2
17	1	1	1	1	1	2	2	2
18	1	1	1	1	1	2	2	2
19	2	2	2	2	2	2	2	3
20	2	2	2	2	2	2	2	3
21	2	2	2	2	2	2	2	3
22	2	2	2	2	2	2	2	4
23	3	3	3	3	3	4	4	4
24	3	3	3	3	3	4	4	4



**RESIDENTIAL CONSERVATION LOAD SHAPES**

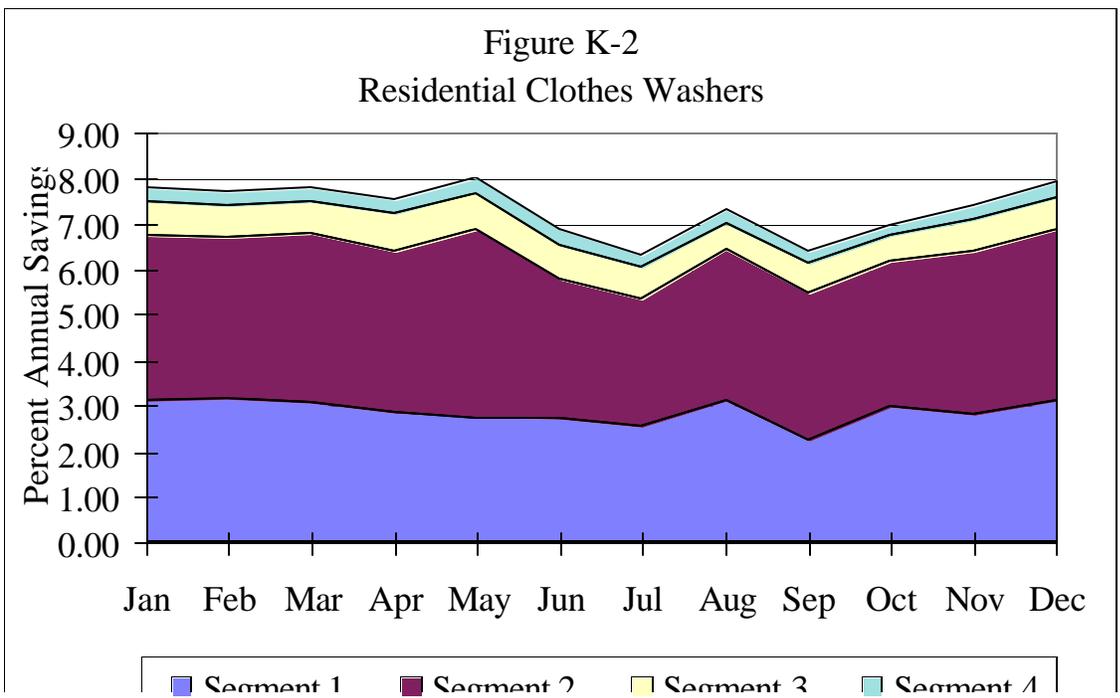


Figure K-4  
Residential Cooking

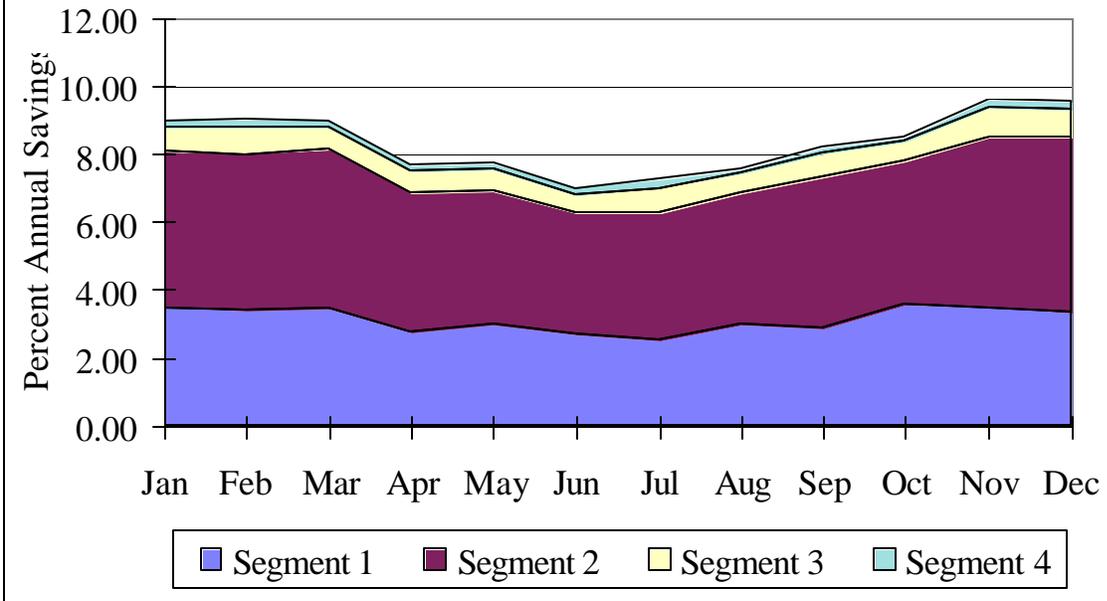


Figure K-5  
Residential Freezers

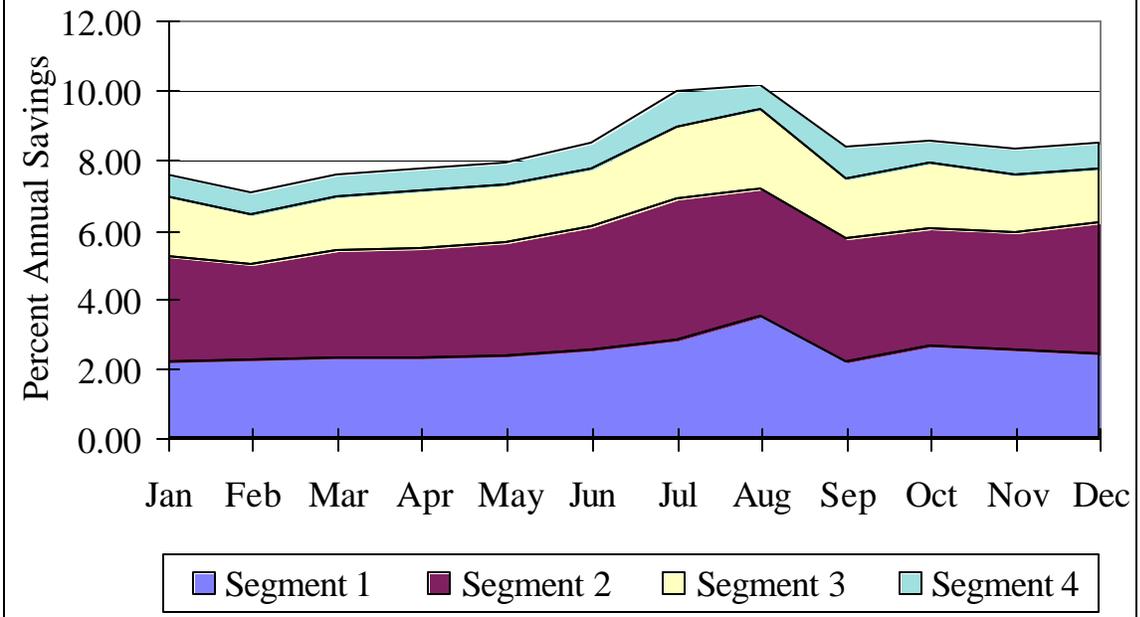


Figure K-6  
Residential Refrigerators

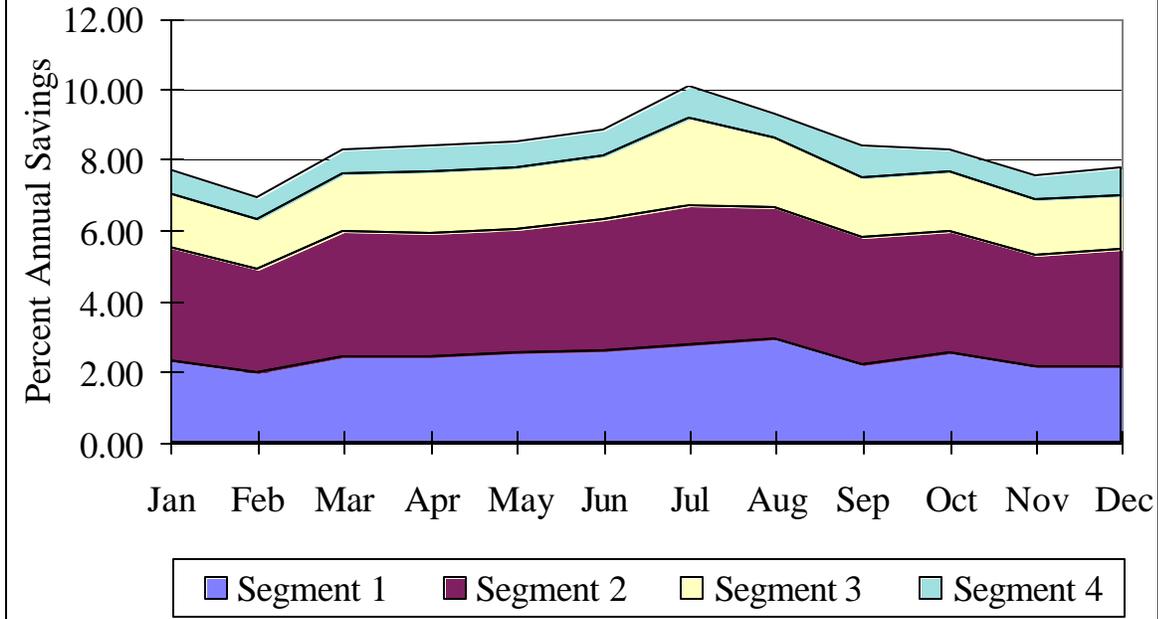


Figure K-7  
Residential Lighting

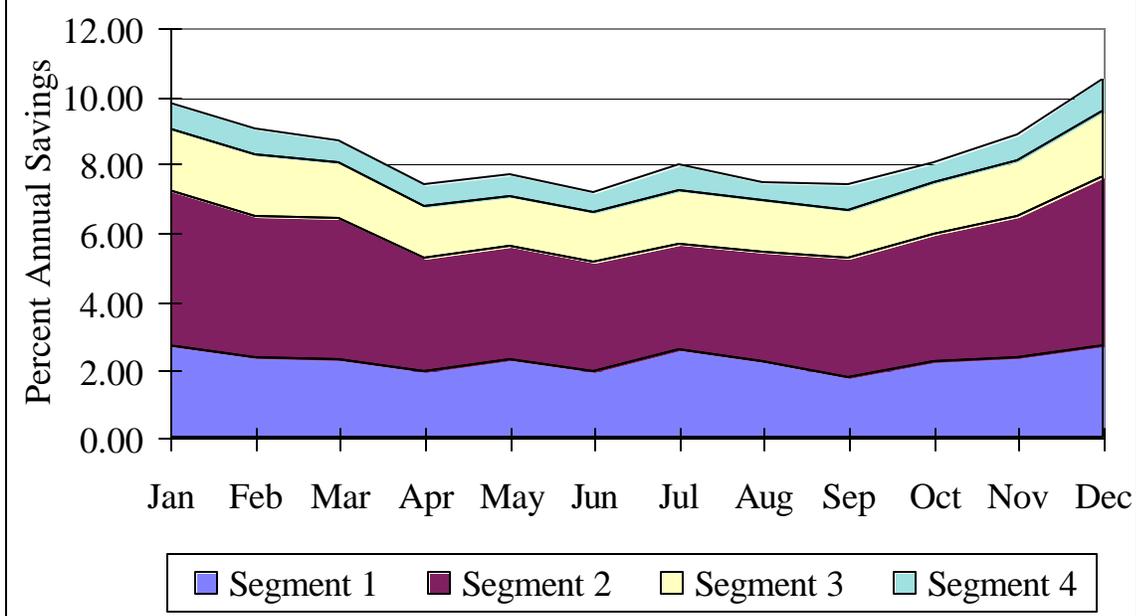


Figure K-8  
Residential Water Heating

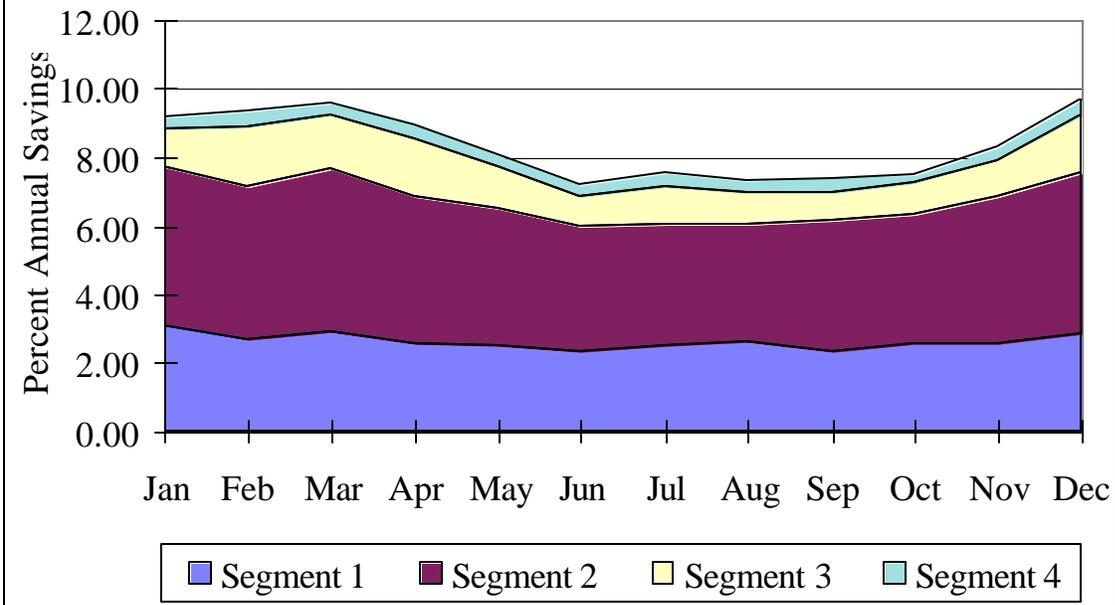


Figure K-9  
Residential Central Air Conditioning

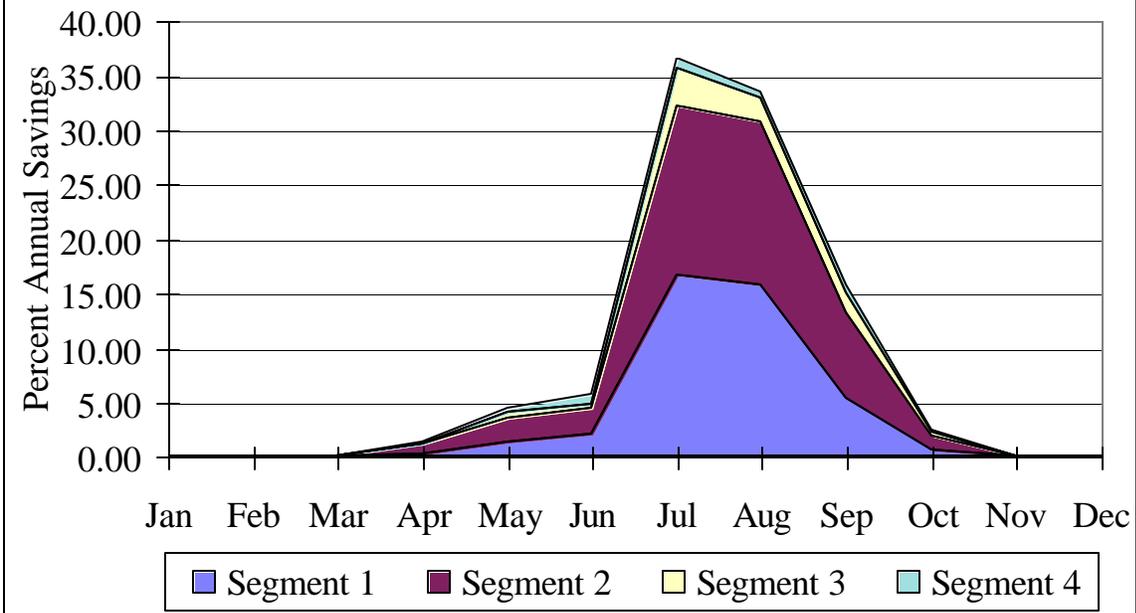


Figure K-10  
Residential Room Air Conditioning

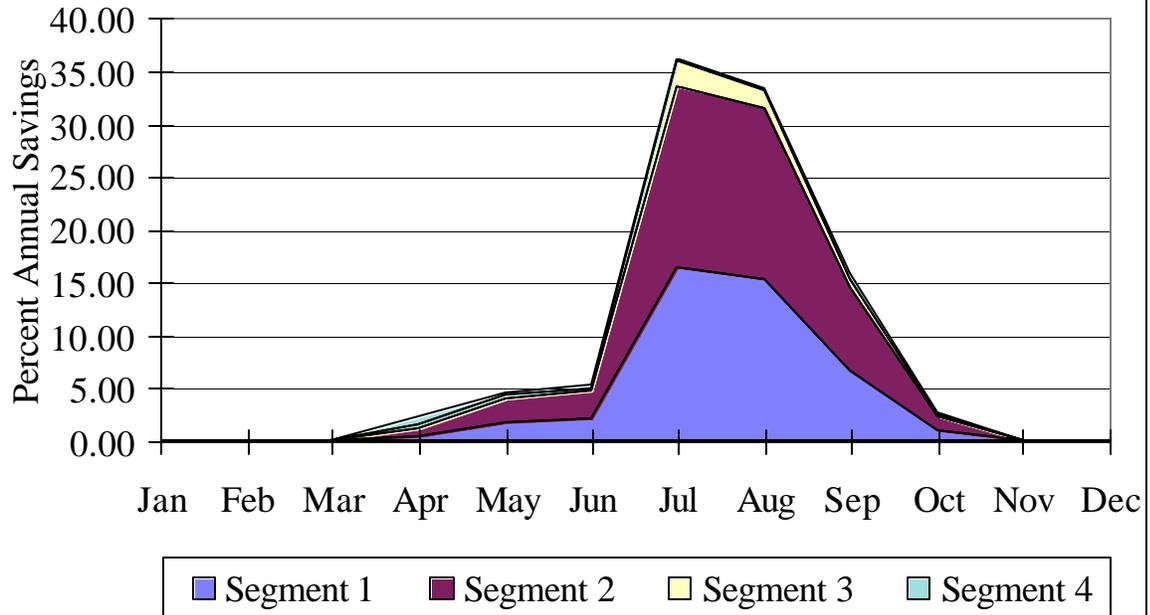


Figure K-11  
Residential Existing Construction Space Heat

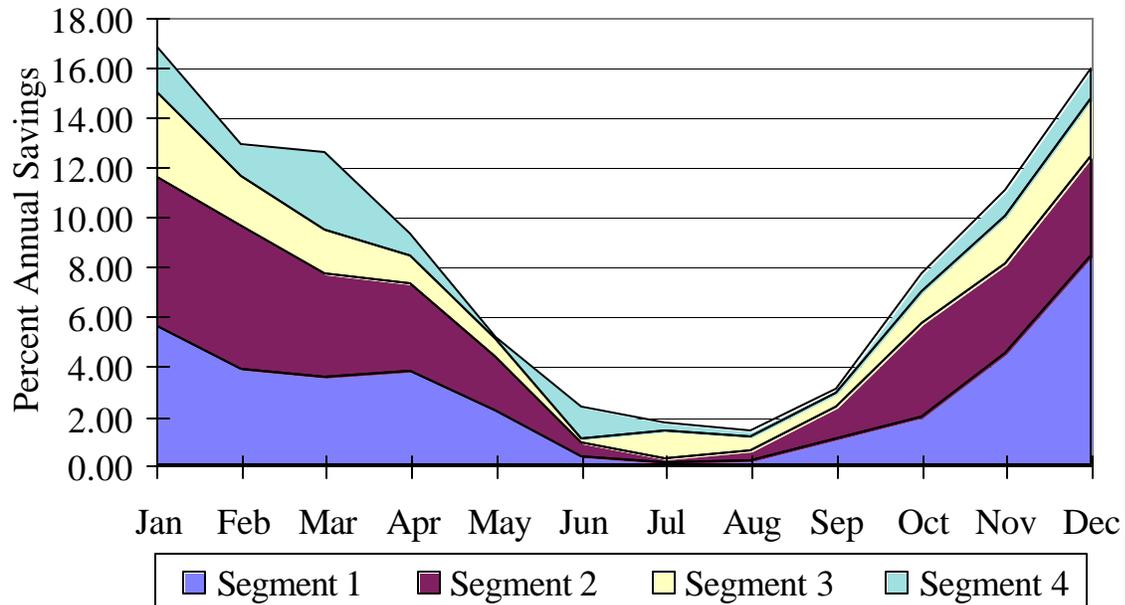


Figure K-12  
Residential New Construction Space Heat

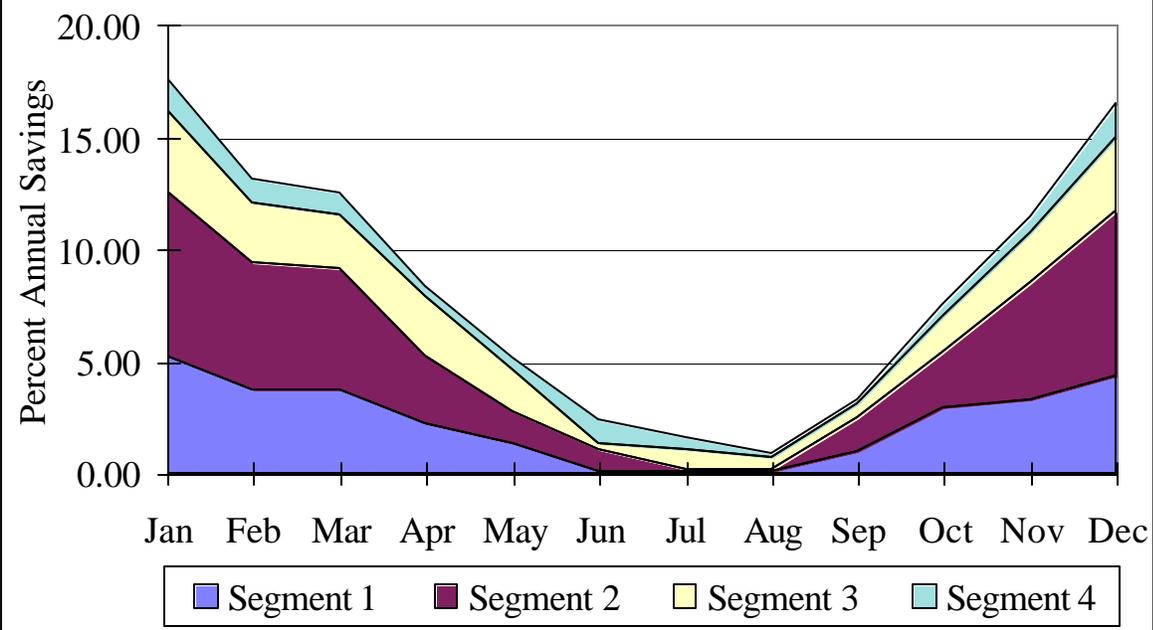
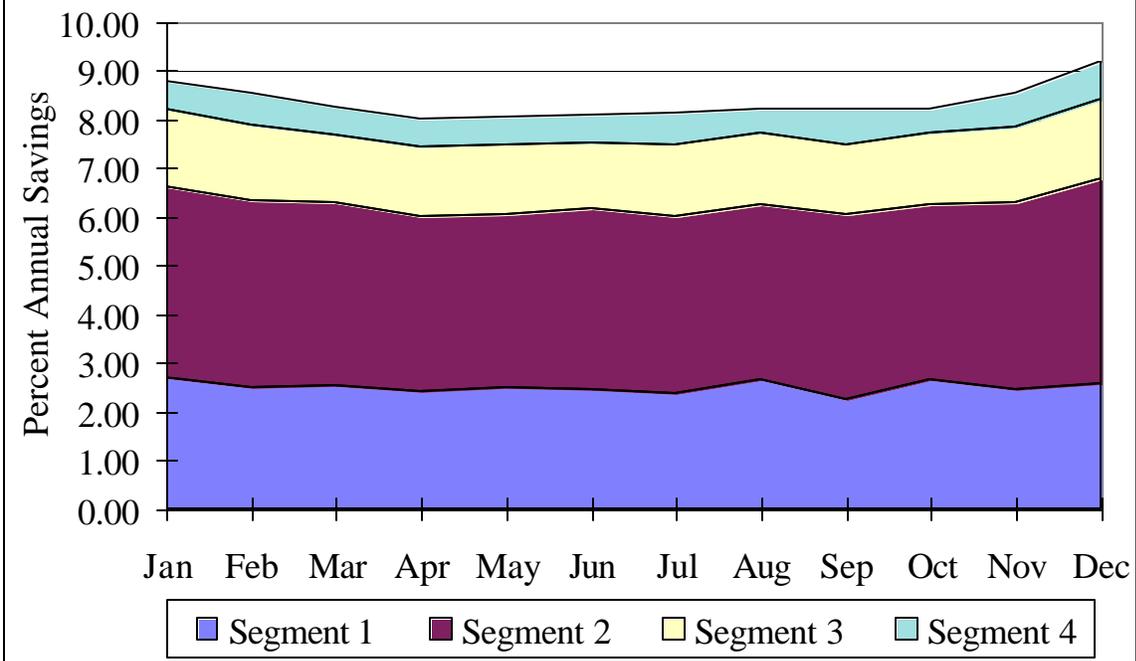
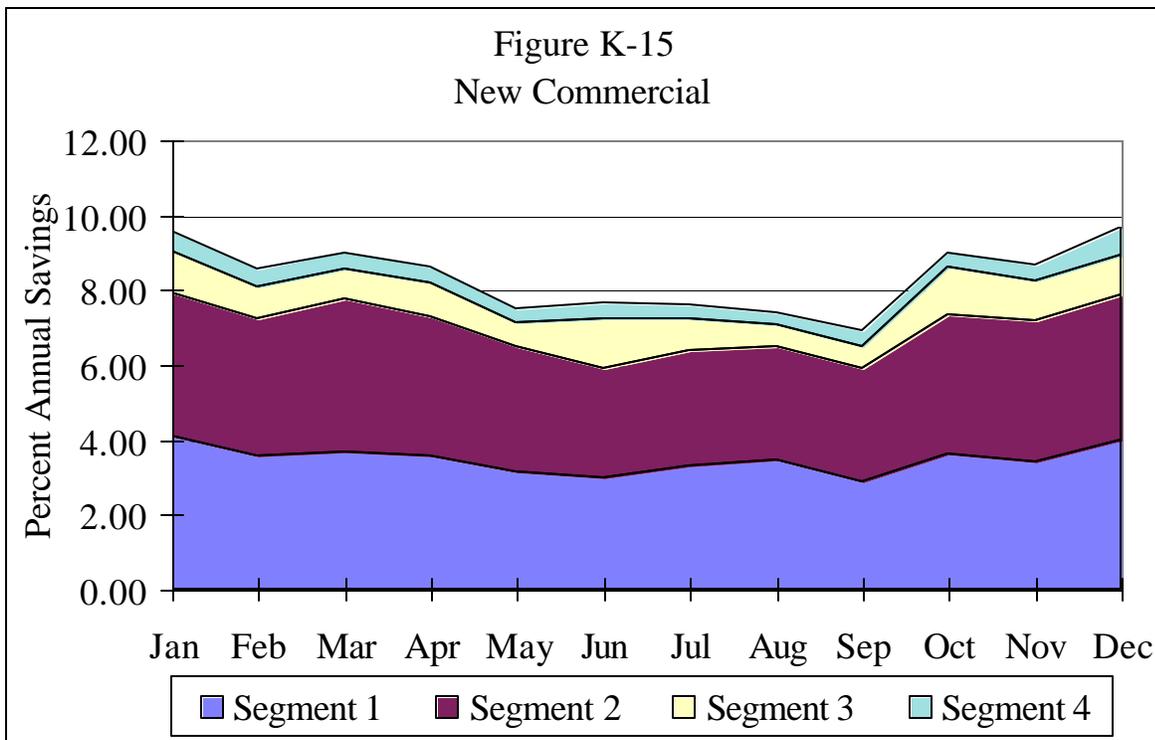
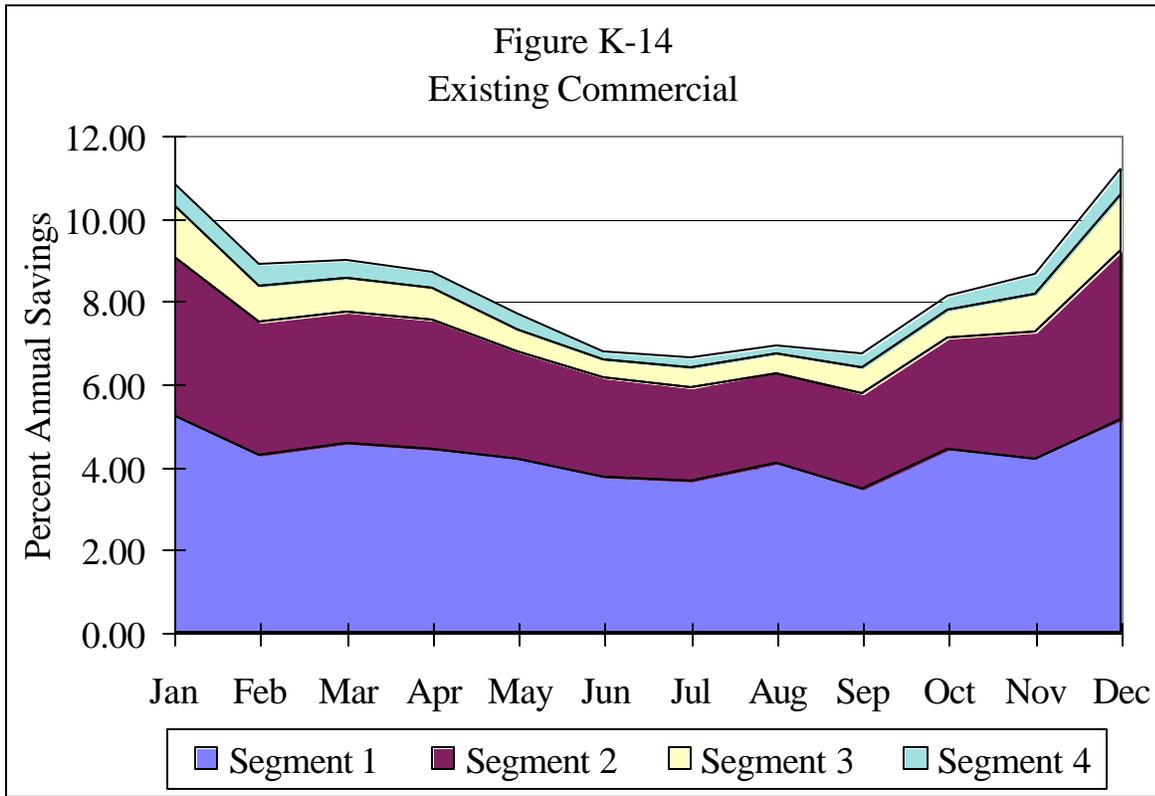


Figure K-13  
Residential Other



**COMMERCIAL CONSERVATION LOAD SHAPES**



**INDUSTRIAL CONSERVATION LOAD SHAPES**

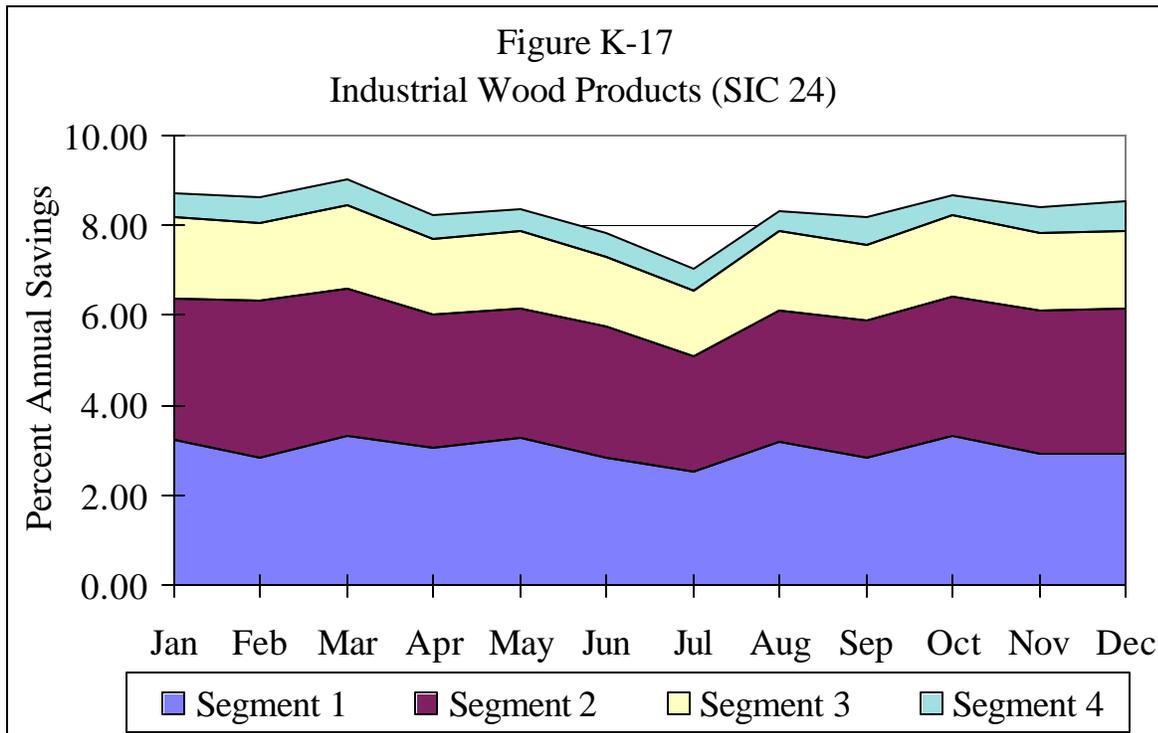
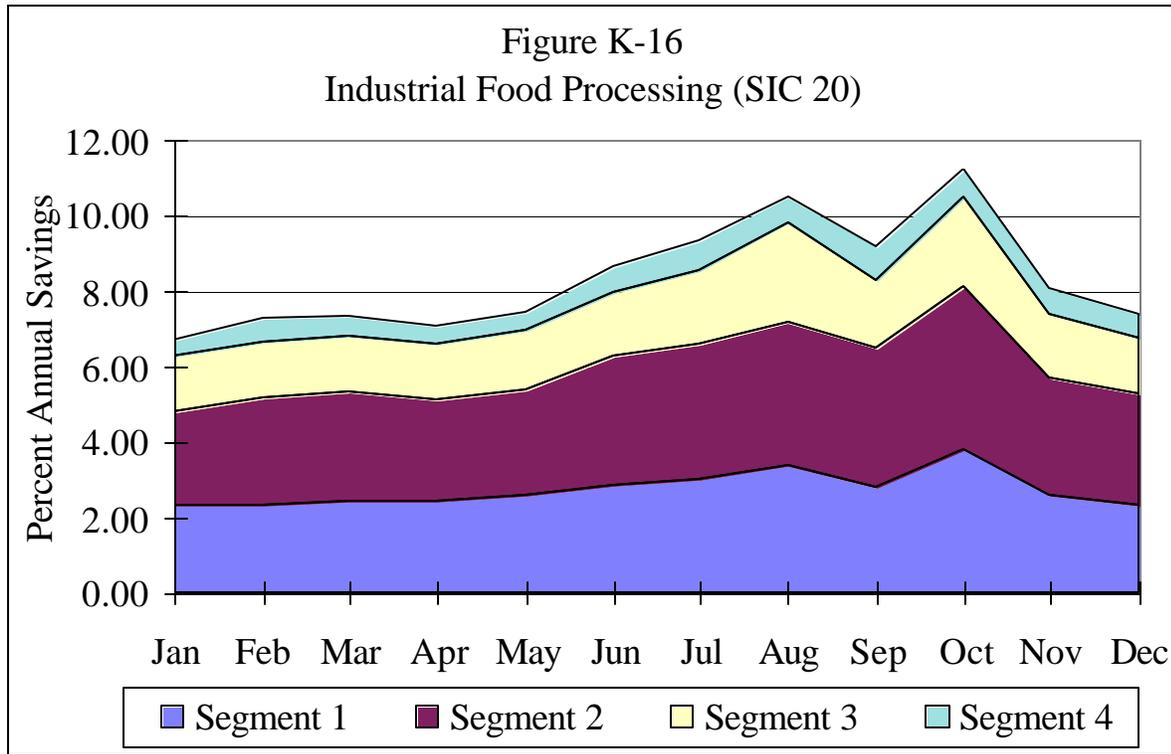


Figure K-18  
Industrial Pulp and Paper (SIC 26)

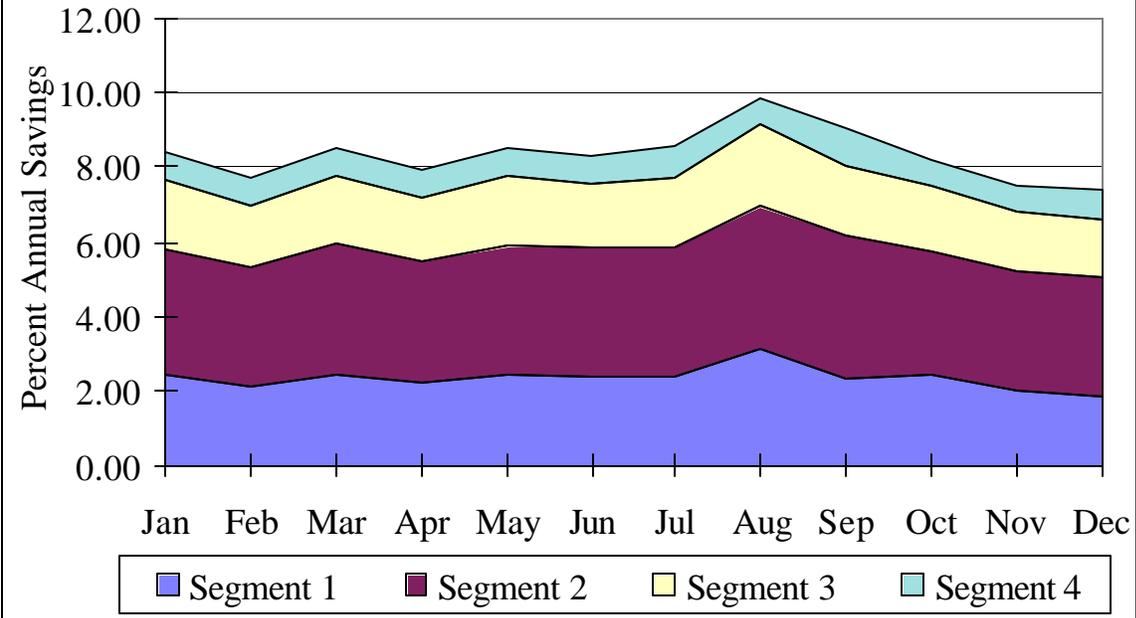
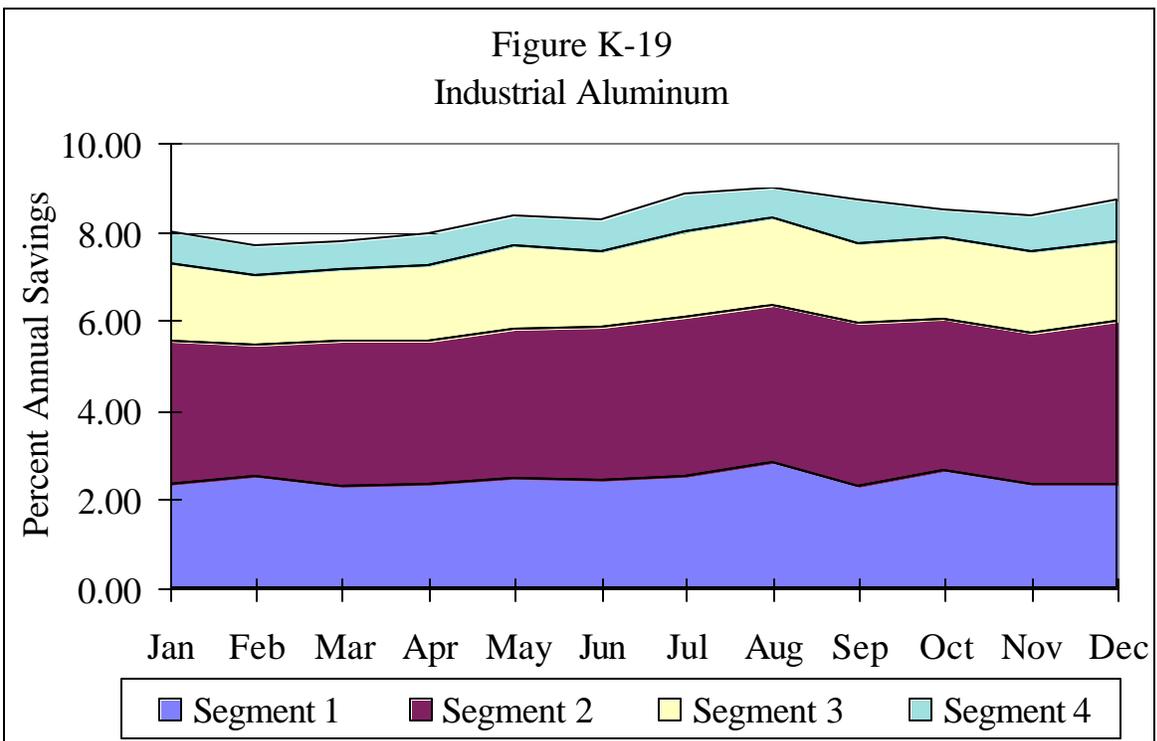
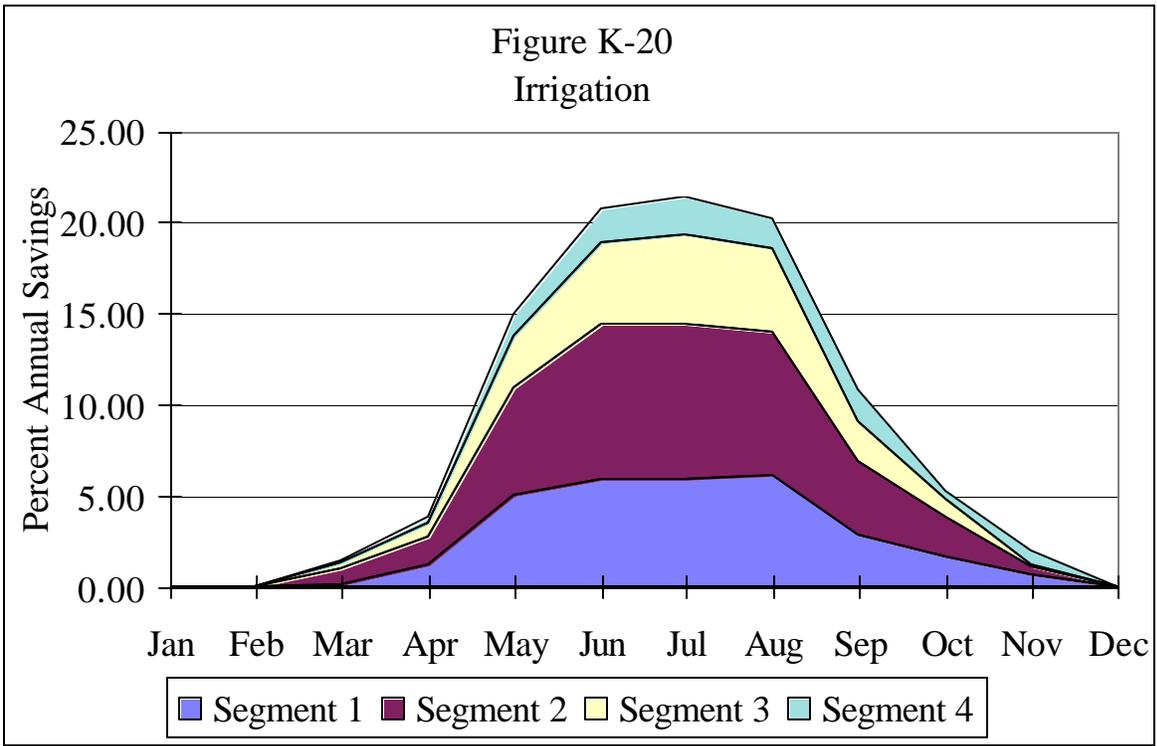


Figure K-19  
Industrial Aluminum



# IRRIGATION CONSERVATION LOAD SHAPE



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