Key Findings

- Fuel costs to support the utility’s operations are high in Bethel. Comparison of fuel costs to other rural utilities demonstrate that location and storage differences impact the overall fuel cost in Bethel.

- Ratepayers in Bethel could potentially save five percent to eight percent by the utility providing its own fuel storage. Depending on the ownership structure and the estimated storage cost paid by BUC, the analysis shows that it may be cheaper for the utility to store fuel in their own tanks rather than paying Crowley for storage.

- Building a pipeline does not result in significant savings. Depending on ownership structure, the savings from adding a pipeline results in rate increases of 0.2 percent to rate decreases of 0.4 percent.

Bethel Utility Corporation (BUC) Fuel Procurement

Currently, diesel fuel is the main source of energy used in the City of Bethel for the heating and electricity needs of industrial, commercial, and residential consumers. This section of the report explores some possible options for fuel procurement associated with electricity production that would provide cost savings.

Due to a lack of road access and the high cost of air deliveries, Bethel receives its fuel by barge from the Kuskokwim River. From refineries in Anchorage and Asia, ocean-going line-haul barges (about 400 feet in length) bring diesel fuel to Kuskokwim Bay and the mouth of the Kuskokwim River. The barge is lightered so that approximately 1.5 to 2.5 million gallons, around two-thirds of the original shipment, makes the trip up the river to the Port of Bethel. Due to river ice, barge deliveries can only be made during the summer shipping season from June 1 to Nov. 1. During this short window of time, fuel is offloaded in the Port of Bethel around nine days per year. Once in the Port, the fuel is then transported by Crowley Marine Services to its tank farm and stored. Daily deliveries by truck are made to BUC’s two 20,000-gallon storage tanks for distribution to its customers.

Crowley owns its own barges and the tank farm in which the fuel is stored after being offloaded at the Port. Bethel Utility Corporation receives its fuel shipments FOB (free on-board) meaning that Crowley assumes all liability and costs for the fuel and its delivery until it arrives in the BUC day storage tanks. This includes liability, security, insurance, and capital costs for transportation, operation and maintenance for the tank farm, and Port fees and taxes.

Figure 6.1 and 6.2 show the transportation route for fuel used to generate electricity to BUC’s customers.
1 Ocean-going barge (mainline barge)
Ocean-going tankers (also called 1x4’s because they are 100 feet wide and 400 feet long) typically ship diesel fuel from Cook Inlet to the Kuskokwim Bay. The diesel fuel typically comes from the Tesoro refinery in Nikiski or refineries in the state of Washington. Diesel fuel may also be coming from Asia (most likely Korea).

2 Fuel is lightered
Before traveling 40 miles up the Kuskokwim River to Bethel, the fuel is lightered so the barge weighs less. This transfer of fuel (lightering) typically occurs at either Cape Newenham or Eck Island depending on weather, the draft of the vessel, and time constraints.

3 Bethel Petro Port (fuel offload)
Diesel fuel is offloaded at the Bethel Petro Port at a rate of 4 cents per gallon, about nine times per year, during the summer shipping season.

4 Piped to Crowley’s tank farms
Diesel fuel is pumped via pipeline to Crowley’s privately-owned tank farms and stored for further delivery.

5 Delivered to Bethel Utility
Several times per week, Crowley makes fuel deliveries via truck transport to Bethel Utility Company’s 20,000-gallon storage tanks.
Alternative Fuel Procurement Options

Many options have been proposed that look to decrease Bethel’s cost of providing fuel, including the installation of a pipeline from Crowley’s tank farm to BUC, building more on-site storage, and pooling BUC’s fuel purchasing with other regional utilities to avail itself of possible advantages from competitive bidding.

The construction, ownership, and operation of BUC’s own pipeline to deliver fuel from Crowley’s tank farm to their operating plant has been analyzed by BUC in the past. By installing this pipeline, BUC would aim to eliminate its daily delivery charge for Crowley to truck fuel to their plant storage tanks. However, the pipeline’s construction and capital cost (estimated at $1 million per mile of pipeline¹) have been argued as being too high and a detriment to the ratepayer because the utility would ultimately have to raise rates in the long term to cover fixed costs. The proposed land between BUC and Crowley’s tank farm is also owned by the Bethel Native Corporation, and an easement agreement would have to be reached before any pipeline could be built.

Building more on-site storage near the BUC plant could potentially reduce the cost of storage charged by Crowley. Again, BUC has argued that this option would not reduce costs to BUC’s rate payers and would, in fact, increase risks associated with obtaining fuel for generation. To satisfy Bethel’s fuel needs, any fuel used needs to be transported, delivered, stored, inventoried, and insured. These fixed costs cannot be avoided and could escalate the price of any fuel-related venture. Estimates of constructing a BUC tank farm (in 2011 dollars) range from $2.14² to $2.50³ per gallon for a 2.2 million gallon facility and $3.48⁴ per gallon for a three million gallon facility.

A pooling option, between BUC and Alaska Village Electric Cooperative (AVEC) for example, would help this entity compete for fuel procurement against Crowley and possibly lower the overall cost of buying fuel.

In order to evaluate these options, the components of the BUC fuel costs were examined and compared to fuel costs at other utilities in rural Alaska.

¹ From interviews with industry experts.
³ From interviews with industry experts.
⁴ Exhibit ELT-B of pre-filed testimony of Edward Tilbury, Docket U-04-104, pg. 26
Comparison of Fuel Costs

Much of the cost of providing diesel fuel in Bethel lies in the difficulty of transporting it to Bethel. This difficulty, including distance, weather, remote location, modes of transportation and shipment timing, is one of the basic reasons for Bethel’s high cost of fuel. In order to examine if the fuel in Bethel is priced above fuel in similar communities, an analysis of average fuel cost from the 2009 and 2010 PCE reports was undertaken.

Criteria to choose comparable communities

The following criteria were used to select the utilities for the comparison:

- In the PCE program (a rural utility).
- Larger in size (over 15 million kWh generated).
- Serves a larger population (larger than 1,000 people).
- AVEC communities were also included because of their fuel storage practices. AVEC typically stores their own fuel and is now shipping their own fuel.
- Added in several villages, such as Aniak (IOU), Akiak, Akiachak, and Atmautluk because of fuel storage practices and their location near Bethel.

Comparison Results

Table 6.1 provides a comparison of fuel costs reported in the 2009 and 2010 PCE reports. Based on this table, it is clear that BUC pays high fuel costs. BUC pays the highest price for fuel ($4.25 per gallon in 2010 or a total of $17.5 million per year) compared to the ten other rural communities evaluated. The BUC fuel prices are 25 percent higher than the sample communities.

However, not all data in the PCE reports show the same type of information. The PCE data does not provide an “apples to apples” comparison. This is due to differences in transportation cost, commodity costs, and fuel storage costs among the communities. For example, included in BUC’s fuel cost is the cost of storage and “just in time” delivery. BUC receives fuel directly to the plant on a daily basis. The fuel provider is on the hook to provide fuel even if there is an interruption in fuel supply. BUC does not have to pay the cost for insurance, liability, operations, and carrying costs of owning a tank farm. In order to try to make appropriate comparisons between utilities, the components of the BUC fuel cost were estimated and then a separate comparison of utilities was conducted.

Estimate Components of BUC’s Fuel Cost

The price BUC pays for fuel includes the following costs:

- Commodity cost,
- Mainline barge transportation,
- Lightering to get into the Bethel port,
- Port fee,
- Storage,
- Trucking to BUC, and
- Fuel tax.
Table 6.1 Comparison of Fuel Costs Using PCE Data

<table>
<thead>
<tr>
<th>Population Served</th>
<th>2010 Avg. Residential Rate ($/kWh)</th>
<th>kWh Generated</th>
<th>Diesel Fuel Prices</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2010</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>kWh Used</td>
<td>kWh Sold</td>
<td>Total Diesel Used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>gallons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larger PCE Communities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bethel Utilities Corporation (IOU)</td>
<td>5,760</td>
<td>$41.74</td>
<td>42,115,200</td>
<td>0</td>
</tr>
<tr>
<td>Naknek Electric (coop)</td>
<td>1,029</td>
<td>$51.49</td>
<td>21,192,783</td>
<td>0</td>
</tr>
<tr>
<td>Nushagak Electric (in Dillingham - coop)</td>
<td>2,589</td>
<td>$34.05</td>
<td>19,139,350</td>
<td>0</td>
</tr>
<tr>
<td>Kotzebue Electric Association (municipal)</td>
<td>3,126</td>
<td>$47.85</td>
<td>18,811,088</td>
<td>776,693</td>
</tr>
<tr>
<td>Nome Joint Utility System (municipal)</td>
<td>3,570</td>
<td>$35.66</td>
<td>24,286,291</td>
<td>0</td>
</tr>
<tr>
<td>Average of Larger PCE Communities</td>
<td>$42.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akiak</td>
<td>341</td>
<td>$63.00</td>
<td>1,118,360</td>
<td>0</td>
</tr>
<tr>
<td>Akiachak</td>
<td>659</td>
<td>$63.00</td>
<td>1,936,063</td>
<td>0</td>
</tr>
<tr>
<td>Atmautluak</td>
<td>306</td>
<td>$69.86</td>
<td>493,980</td>
<td>0</td>
</tr>
<tr>
<td>Aniak</td>
<td>494</td>
<td>$69.23</td>
<td>2,630,400</td>
<td>0</td>
</tr>
<tr>
<td>Kalsag</td>
<td>235</td>
<td>$51.94</td>
<td>1,400,964</td>
<td>0</td>
</tr>
<tr>
<td>Alaska Village Electric Coop</td>
<td>22,648</td>
<td>N/A</td>
<td>77,555,904</td>
<td>2,307,510</td>
</tr>
<tr>
<td>Average of Communities (incl. BUC)</td>
<td>$52.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUC Percent Above Average</td>
<td>-21%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The cost of each of these components was estimated based on existing studies, in particular from the Institute of Social and Economic Research (ISER), and interviews with industry experts. The starting point for the analysis was the average calendar year 2010 delivered fuel cost from BUC’s COPA filings ($4.404 per gallon). The reason the COPA filing data was used and not the PCE data was due to the need to provide consistency with other line items in the BUC cost structure, which also come from their COPA annual filings. Figure 6.3 shows the estimated cost of the various components of BUC fuel costs and the methodology used to arrive at the estimate of each component is described in the following section.

Figure 6.3 Estimated BUC Fuel Component Costs (based on BUC's 2010 actual fuel cost of $4.404 per gallon)

Source: BUC COPA filings for 2010, industry experts, published studies

### Commodity Cost

Based on discussion with industry experts, the historic OPIS LA commodity index was examined to determine a seasonally adjusted average commodity price for jet fuel plus $0.06 cents. This value was assumed to represent the average cost that Crowley would have paid for the commodity. Commodity prices can vary significantly, and Crowley could have purchased fuel during a low or a high pricing period. However, this methodology assumes that Crowley averaged fuel purchases over the five-month time period that delivery is possible, thus averaging the price of the fuel sold to BUC. For this analysis the average commodity price was estimated at $2.207 per gallon in 2010.

### Mainline Barge Transportation

Once the commodity (or fuel) has been purchased, it is transported to the Kuskokwim Bay. Based on interviews and literature information, it is estimated that mainline barge transportation costs between $0.45 and $0.50 per gallon.
**Lightering to the Port of Bethel**

Before the fuel can be delivered into the Port of Bethel, the mainline barge needs to be lightered due to the shallow river passage. Based on interview information, it is estimated that lightering adds approximately $0.25 per gallon to the cost of fuel.

**Port Fee**

The Port charges $0.04 per gallon on fuel offloaded at the port. In addition, the Port charges a fixed fee to Crowley. Based on Crowley’s invoice to BUC, the final port charge is approximately $0.046 per gallon.

**Transportation to BUC**

Crowley provides daily trucking of fuel to BUC’s two 20,000 gallon tanks. Based on Crowley’s invoice to BUC, the delivery by truck is approximately $155,000 per year or $0.05 per gallon.

**Fuel Tax**

The City charges a six-percent sales tax on fuel sold by Crowley to BUC. This charge, based on the 2010 invoices, was $0.249 per gallon.

**Storage**

The final component of the cost of fuel is storage. The cost of storage was calculated as the remainder after all other charges were accounted for. This resulted in a cost of storage of $1.10 per gallon. The way this model was developed, the storage value changes if the assumptions in the other components change. For example, if the commodity cost was $2.40 per gallon, rather than $2.207 per gallon, the storage cost would decrease to $0.908. The reason the model was developed this way was to begin comparing the estimated storage costs at BUC to published or reported costs of other utilities in order to develop a sense as to whether the BUC fuel costs are substantially higher than other utilities.

**Developing an “Apples to Apples” Comparison**

As mentioned earlier, the comparison of fuel costs published in the PCE report does not provide an “apples to apples” comparison. This is due to differences in transportation cost, commodity costs, and fuel storage costs among the communities. In order to compare if BUC’s fuel costs are significantly different than the fuel costs in other rural communities, an estimate of the range of storage and transportation costs was developed. This range was then used to adjust the reported fuel cost data for transportation to Bethel and to include storage.

**Transportation**

The first step in developing an “apples to apples” comparison was to determine the difference in transportation costs of fuel by location. Communities where mainline barges can be offloaded without lightering were assumed to have a transportation cost of $0.45 to $0.50 per gallon. For BUC, the transportation cost has to include lightering and the total transportation cost is therefore assumed at $0.75 per gallon. Finally, for communities upriver from Bethel, where after the fuel is lightered onto smaller barges, the barges travel further upriver, the transportation cost was assumed at $0.85 per gallon. Figure 6.4 provides the comparison of transportation costs by location.
Storage

The cost of storage depends not on location, but depends on the type of ownership of the utility. Based on information provided by AVEC and cost estimates of building a new storage facility from previous filings by BUC, four storage cost scenarios were developed as shown in Figure 6.5.
Range of Fuel Storage Costs – Assumptions

The cooperative/municipal scenarios assumed the following:

- The utility built a 3,000,000-gallon storage facility.
- Financing assumes a 4.5 percent borrowing cost.
- Fuel tank O+M is based on AVEC actual costs per gallon.
- Included depreciation based on BUC’s depreciation rate.
- Included working capital, assuming the utility would have to borrow to pay for the fuel and hold it for six months at a 4.5 percent interest rate.
- In the high case included an administrative adder (per AVEC), in the low case did not include the administrative adder.
- Included insurance, estimated at 0.5 percent of the facility’s value.

The IOU scenarios assumed the following:

- The utility built a 3,000,000 gallon storage facility.
- Financing assumes a 5.5 percent borrowing cost and a 14 percent return on equity.
- Fuel tank O+M is based on AVEC actual costs per gallon.
- Included depreciation based on BUC’s depreciation rate.
- Included working capital, assuming utility would have to borrow to pay for the fuel and hold it for six months at a 5.5 percent interest rate.
- Included an administrative adder (per AVEC).
- Included insurance, estimated at 0.5 percent of the facility’s value.
- In the high case, assumed the IOU purchased storage facilities at a 50 percent premium.

This analysis resulted in storage costs ranging from $0.48 per gallon to $1.12 per gallon. Bethel Utility Corporation’s calculated storage cost of $1.10 per gallon is very close to the highest range for storage costs. This indicates that BUC could potentially save by owning and operating its own storage facilities.

Results of the “Apples to Apples” Comparison

The next step in the process to develop an “apples to apples” comparison of fuel costs was to adjust the reported PCE costs for differences in transportation using the information in Figure 6.4. Next, two storage scenarios were developed, given the large difference in storage costs based on utility ownership. Table 6.2 provides the results of the “apples to apples” analysis. This analysis demonstrates that once the fuel costs are adjusted for locational differences and for IOU storage costs, BUC fuel costs are more in line with the comparable utilities.
**Table 6.2 Comparison of Fuel Costs, PCE Data, and Controlling for Differences in Fuel Delivery**

<table>
<thead>
<tr>
<th>Item</th>
<th>PCE Data</th>
<th>“Apples to Apples” Comparison (Adds storage and Bethel transportation costs to all sample communities)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$0.45 / gallon for storage</td>
</tr>
<tr>
<td>Avg. All Utilities Analyzed (including)</td>
<td>$3.39/gallon</td>
<td>$3.81/gallon</td>
</tr>
<tr>
<td>BUC % Above Avg. All</td>
<td>25.4%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Avg. Large Rural Utilities (including)</td>
<td>$3.39/gallon</td>
<td>$3.95/gallon</td>
</tr>
<tr>
<td>BUC % Above Large Rural All</td>
<td>25.4%</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

Note: See Table 6.1 for list of communities in the comparison

**Alternative Fuel Procurement Options**

While BUC fuel costs are reasonable when compared to other communities after adjusting for location and including storage, the storage analysis demonstrated significant differences in the cost of storage among ownership options and utilities. In addition, it appears that BUC pays storage costs that are high compared to the cost of building new facilities, even when including carrying costs, return and insurance. The next analysis, therefore, examines the potential savings if a new utility owner builds and owns the storage facilities. In addition, the issue of building a pipeline to transport fuel from Crowley, rather than transporting by truck, is explored.

**Scenario 1: Utility Owns and Operates Fuel Storage**

This scenario examines the potential savings (depending on ownership option) from procuring fuel and storing it in the utility’s own tanks. Based on AVEC information and the cost of building a new storage facility, it is estimated that the cost to construct new storage ranges from $0.45 to $0.90 per gallon.

This analysis includes the capital and financing costs assuming new tanks, insurance costs, carrying costs, operation and maintenance costs. The analysis does not take into account the risk of losing fuel supply and having to fly in fuel.
Figure 6.6 Average Rate with PCE: Build New Storage Tanks

![Graph showing average rates with PCE for build new storage tanks.]

Table 6.3 Comparison of Utility Rates by Ownership Category: New Storage Facility

<table>
<thead>
<tr>
<th></th>
<th>All Customers</th>
<th>Residential</th>
<th>City Facilities</th>
<th>All Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Avg. Rate</td>
<td>% Impact</td>
<td>Avg. Rate</td>
<td>% Impact</td>
</tr>
<tr>
<td>BUC</td>
<td>$0.4304</td>
<td>0.0%</td>
<td>$0.2939</td>
<td>0.0%</td>
</tr>
<tr>
<td>IOU</td>
<td>$0.4063</td>
<td>-5.6%</td>
<td>$0.2845</td>
<td>-3.2%</td>
</tr>
<tr>
<td>Muni</td>
<td>$0.3772</td>
<td>-12.4%</td>
<td>$0.2641</td>
<td>-10.2%</td>
</tr>
<tr>
<td>Coop</td>
<td>$0.3747</td>
<td>-12.9%</td>
<td>$0.2618</td>
<td>-10.9%</td>
</tr>
</tbody>
</table>

Note: Percent change is the comparison between each alternative and the BUC business as usual option.

Figure 6.6 and Table 6.3 demonstrate that if a municipal or cooperative utility purchase BUC and new storage facilities are built, customers could save up to 13 percent on their average rates. If an IOU, such as TDX purchases BUC, it would still be advantageous for the utility to build storage facilities, as customers could save between three percent and six percent.
Scenario 2: Utility Owns and Operates Fuel Storage and Pipes Fuel to the Plant

The final scenario examines the cost impact of adding a pipeline to transport fuel from Crowley to BUC, rather than delivering the fuel on a daily basis by truck. The scenario also assumes that the utility builds, owns, and operates a fuel storage tank. BUC currently spends approximately $155,000 per year, or $0.05 per gallon, in delivery costs, according to the 2010 Crowley invoices.

For this analysis, it was assumed that the pipeline would cost approximately $1,000,000 per mile to build. It was assumed that there is approximately one mile between Crowley’s facilities and BUC. Costs included in the analysis were O+M at $25,000 per year, depreciation, insurance of 0.5 percent of declared value and applicable taxes.

The total annual cost for a municipal or cooperative utility to build the pipeline would be $117,000 per year. However, the comparable cost for an IOU would be $235,000 per year. These estimates do not include the cost of land or take into account access to land issues related to building the pipeline.

Based on this analysis, it is not cost effective for an IOU to build a pipeline to replace the daily deliveries. However, if a new utility is a cooperative or a municipal utility, a pipeline may be a cost effective way to receive fuel. Before any additional steps are taken related to the pipeline, the actual length and path of the pipeline would have to be determined. In addition, engineering estimates of the construction and O+M costs would have to be obtained.

The results of adding the pipeline to the storage analysis can be seen in Figure 6.7 and Table 6.4.
Figure 6.7 Average Rate with PCE: Build New Storage Tanks and Pipeline

Table 6.4 Comparison of Utility Rates by Ownership Category: New Storage Facility and Pipeline

<table>
<thead>
<tr>
<th></th>
<th>All Customers</th>
<th>Residential</th>
<th>City Facilities</th>
<th>All Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Avg. Rate</td>
<td>% Impact</td>
<td>Avg. Rate</td>
<td>% Impact</td>
</tr>
<tr>
<td>BUC</td>
<td>$0.4304</td>
<td>0.0%</td>
<td>$0.2939</td>
<td>0.0%</td>
</tr>
<tr>
<td>IOU</td>
<td>$0.4082</td>
<td>-5.2%</td>
<td>$0.2854</td>
<td>-2.9%</td>
</tr>
<tr>
<td>Muni</td>
<td>$0.3763</td>
<td>-12.6%</td>
<td>$0.2637</td>
<td>-10.3%</td>
</tr>
<tr>
<td>Coop</td>
<td>$0.3738</td>
<td>-13.1%</td>
<td>$0.2613</td>
<td>-11.1%</td>
</tr>
</tbody>
</table>

Note: Percent change is the comparison between each alternative and the BUC business as usual option.