# 4. RAILBELT LOAD FORECASTS

Much of the generation and transmission infrastructure of the Railbelt region of Alaska is aging and is at or near its time for replacement. The Railbelt is generally defined as the service areas of six regulated public utilities: Anchorage Municipal Light & Power (ML&P), Chugach Electric Association (Chugach), Golden Valley Electric Association (GVEA), Homer Electric Association (HEA), Matanuska Electric Association (MEA), and the City of Seward Electric System (SES). This region covers a significant area of the state and contains the majority of the state's population and economic activity; it extends from Homer to Fairbanks and includes major metropolitan areas such as Anchorage, Fairbanks, and the Matanuska-Susitna Valley.

Concern over both the future cost and supply of fuel for electricity generation in South-central and Interior Alaska, and the projected high capital costs of new energy projects, caused the State Legislature in 2008 to task AEA with developing an Alaska Railbelt Draft Regional Integrated Resource Plan (RIRP). At the same time, the State re-evaluated the hydroelectric power potential of the Susitna River. The draft RIRP was completed in 2010, and represents a long-range conceptual generation and transmission plan for the Railbelt to minimize future power costs, and maintain or improve on current levels of power supply reliability. The intent of the RIRP was to compile system load data and use it to evaluate options for development of a diverse portfolio of power supply, and reliable, stable priced electrical energy over a 50-year planning horizon.

## 4.1. Regional Generation Facilities

It was determined that even if very low future electricity demand increases are assumed for the Railbelt region, retirement of older generating units will require substantial new generation capacity to be constructed over the next two decades to meet demands and provide system reserves.

Section 4 of the draft RIRP provides a detailed description of existing Railbelt utility generation resources. As indicated in Table 4.1-1, total combined installed capacity in 2009 was about 1,275 megawatts (MW), an amount which is just sufficient to meet current demands plus contingency reserve requirements (see Figure 4.3-1 and Figure 4.3-2).

**Table 4.1-1. Railbelt Installed Capacity 2009 (MW)**

| Utility | Thermal Existing Capacity | Bradley Lake Capacity[1] | Eklutna Lake Capacity | Cooper Lake Capacity | Total |
|---|---|---|---|---|---|
| MEA | 0 | 16.1 | 6.7 | 0 | 22.8 |
| HEA | 42 | 14.0 | 0 | 0 | 56.0 |
| CEA | 500.5 | 35.6 | 12 | 20 | 568.1 |
| GVEA | 278.1 | 19.8 | 0 | 0 | 297.9 |
| ML&P | 278.3 | 30.3 | 21.3 | 0 | 329.9 |
| SES | 0 | 1.2 | 0 | 0 | 1.2 |
| Total | 1,098.9 | 117 | 40 | 20 | 1275.9 |

Notes:
1 The nameplate rating for Bradley Lake is 120 MW with 90 MW dispatchable and 27 MW available for spinning reserve under normal conditions.

## 4.2. Regional Transmission Facilities

For purposes of the RIRP study, the Railbelt transmission system was defined as having four main load centers:

- GVEA, or the interior;
- MEA;
- Anchorage, comprised of Chugach's and ML&P's service areas; and,
- the Kenai Peninsula, comprised of HEA and SES.

Within each load center, energy is assumed to flow freely without transmission constraints. The existing transmission system of the Railbelt is characterized as weak and in need of improvement. Power transfer between areas of the system is currently constrained by weak transmission links and stability constraints. Generating reserves cannot be readily shared between areas and project development activities are seriously affected.

**GVEA** – GVEA's service area is connected with 138-kilovolt (kV) lines that supply Delta Junction, Fairbanks, and Healy.

The interior and MEA load centers are interconnected via the Alaska Intertie and the Healy-Fairbanks and Teeland-Douglas transmission lines. The Alaska Intertie is a 345-kV (operated at 138-kV), 170-mile transmission line that is owned by AEA connecting the Douglas and Healy substations. The Healy-Fairbanks transmission line is a 230-kV, 90-mile transmission line, operated at 138-kV, and runs from the Healy to the Wilson substations, which deliver power from the Alaska Intertie directly into the city of Fairbanks. Another 138-kV transmission line also runs from Healy to Nenana to Goldhill and delivers power to Fairbanks. The 138-kV, 20-mile Douglas-Teeland transmission line stretches between the Douglas and Teeland substations and connects the southern portion of the Alaska Intertie to the MEA load center. The current transfer capability of the Alaska Intertie and Healy-Fairbanks transmission lines are assumed to be 75 MW and 140 MW, respectively.

**MEA** – MEA serves customers along the southern half of the intertie and beyond through the cities of Wasilla and Palmer.

**Anchorage** – The Anchorage load center consists of ML&P's and Chugach's service territories. ML&P serves the load of the residents and businesses in the central core of Anchorage. Chugach also serves residents and businesses in Anchorage along with the area south of Anchorage, the City of Seward, and into the southern portion of the Kenai Peninsula. For modeling purposes, the City of Seward's load and generation were placed in the Kenai Peninsula to allow economic commitment and dispatch in accordance with regional requirements.

The MEA and Anchorage load centers are connected via two transmission lines. A 230-kV transmission line connects the Teeland substation to Chugach's Beluga plant in the western portion of the Anchorage load center. A 115-kV transmission line connects the Eklutna Hydro Project and runs through ML&P's area, continuing into Chugach's service territory. The current total transfer capability of these lines is assumed to be 250 MW when power is flowing north into MEA and 50 MW when power is flowing south into Anchorage.

The Anchorage and Kenai load centers are connected via a 135-mile, 115-kV transmission line, referred to as the "Southern Intertie," which connects the Chugach system to that of the Kenai Peninsula. The current transfer capability of the Southern Intertie is assumed to be 75 MW when power is flowing north to Anchorage, and 60 MW when the flow is south into the Kenai.

**Kenai Peninsula** – The Kenai Peninsula load center consists of HEA's and the SES service territories. The HEA service area includes the cities of Homer, Kenai and Soldotna.

## 4.3. Regional Electrical Load Requirements

For development of the draft RIRP, current load data and forecasts of future loads were provided by the utilities in response to a data request. Since the draft RIRP Study has a 50-year planning horizon, load forecast data was extrapolated through 2060. The load forecast does not include incremental Demand Side Management/Energy Efficiency (DSM/EE) programs not inherently included in the utilities' forecasts.

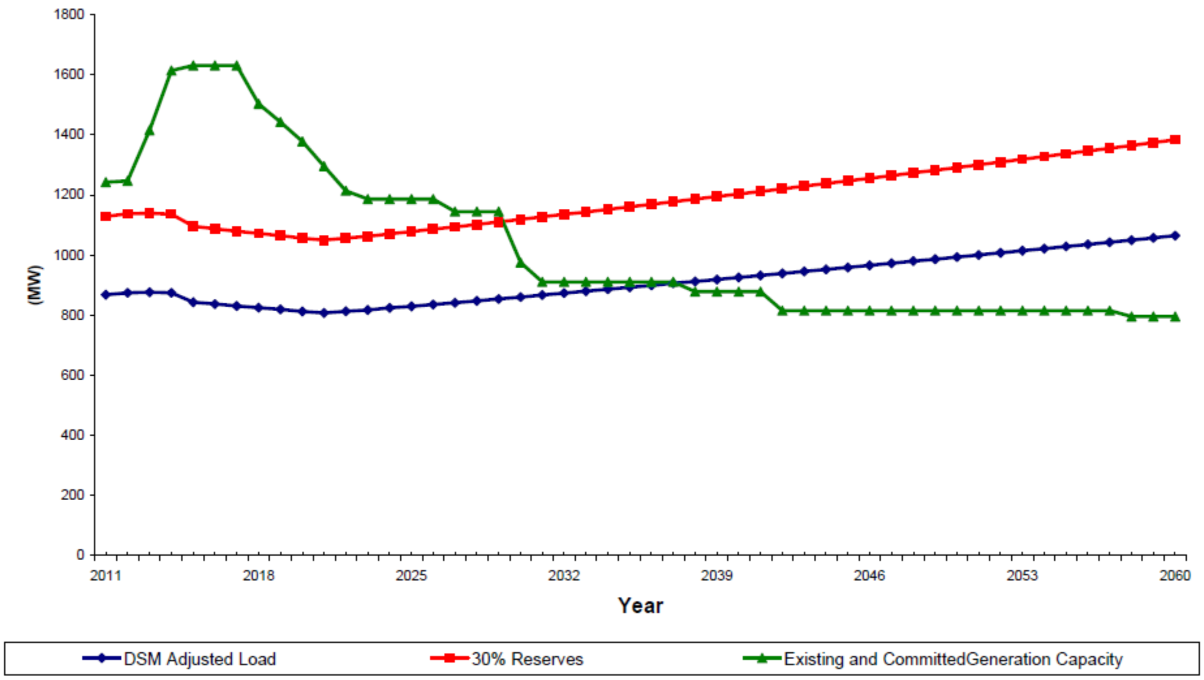
Each utility provided load forecasts spanning different lengths of time that required extrapolation to develop annual peak and energy requirements for the regional electrical system over the 50-year study period. Typically, simple extrapolation of load forecasts is based on exponential growth by using the average annual percentage growth rate for the last 5 or 10 years. This potentially can lead to over-forecasting when these percentage growth rates are applied over long periods. To compensate for this potential over-forecasting, the load forecasts were extrapolated in two different ways and took the average of the two extrapolations as the forecast used in the draft RIRP.

The first method of extrapolation was the typical approach of extrapolating at the average annual percentage load growth over the last 10 years.

The second method extrapolated the average annual increase in load over the last 10 years. In addition to peak load forecasts, annual minimum load, or valley, forecasts were also developed for the regional system. The peak and valley demand and net energy for load requirements forecasts were developed at the time; it should be noted that demand and energy forecasts do not include estimates of transmission losses between utilities.

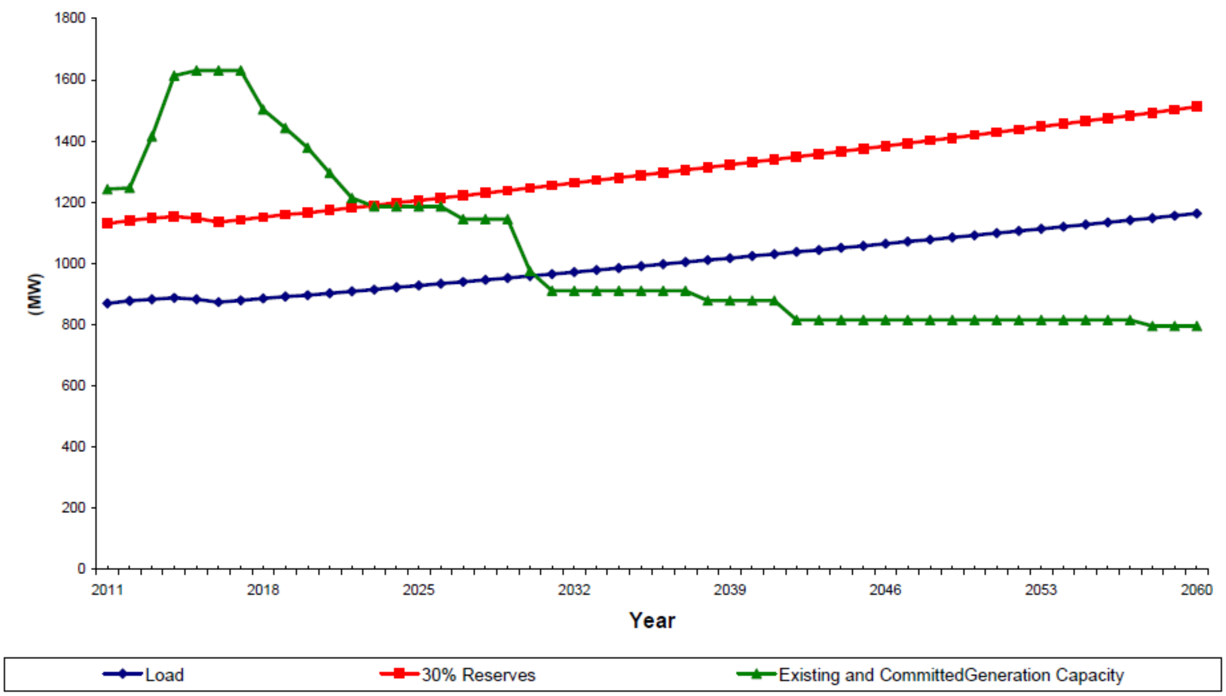
The following load curves, Figure 4.3-1 and Figure 4.3-2 (Figure 9-6 from the draft RIRP) illustrates the base case scenario used to model the various future supply options and compare total system power costs under a wide variety of underlying assumptions. As indicated, even with DSM/EE reductions, existing resources are only sufficient to meet overall demands, including reserve requirements, until about the year 2029. Without these reductions new resources will be needed much sooner. As indicated, with DSM/EE reductions total capacity requirements, including a 30 percent reserve margin allowance, are estimated to be approximately 1,400 MW by the year 2060. This assumes that DSM measures are implemented to reduce demand over that time period. Without this level of DSM/EE load reductions, total capacity requirements would be about 130 MW higher.

Again, this information is excerpted directly from the 2010 RIRP. Since the development of the RIRP, AEA has been working closely with the Railbelt utilities on further evaluation of future electrical load requirements and evaluating options for future generation system improvements. Since project sizing to match future load requirements is a critical factor for the Susitna-Watana Project feasibility study, utility system planning has been undertaken as a parallel effort to the feasibility study and the Federal Energy Regulatory Commission (FERC) licensing studies. As part of that effort, updated load and resource data was compiled for use in more specific system model studies to provide the most current and accurate information for use in future financial analyses and project sizing efforts. This work was carried out by Slater Consulting, under subcontract to MWH, and is described in Section 5.




*Source: RIRP, Figure 9-6*

**Figure 4.3-1. Scenario 1A: Capacity Requirements Including Committed Units with DSM/EE**




*Source: RIRP, Figure 9-5*

**Figure 4.3-2. Scenario 1A: Capacity Requirements Including Committed Units without DSM/EE**

The Susitna-Watana Project is a key resource that is factored into individual Railbelt utilities' expansion plans as a resource available to meet projected electrical loads starting about 2025. In conjunction with ongoing feasibility study work for the proposed project, additional regional transmission system stability and reliability modeling has also been conducted – by Electrical Power Systems Inc. (EPS) under subcontract to MWH. Results from all of these concurrent activities has provided input to project sizing studies, finalization of design concepts for major features, operational parameters for the project, and determination of how it will best integrate into the Railbelt electrical system.

There are possibilities of increased loads in the Railbelt from large new industrial loads. A list of potential economic development projects compiled by the Alaska Industrial Development and Export Authority and included in the last RIRP is presented in Table 4.3-1 below.

**Table 4.3-1. Potential Economic Development Projects**

| Potential Project Area Location | Load (MW) |
|---|---|
| Ore Processing Facility Anchorage | 300 |
| Internet Server Facility Anchorage | 300 |
| Coal Mine Anchorage | 50 |
| Subtotal – Anchorage Area | 650 |
| Gold Mine Interior | 150 |
| Mine Interior | 200 |
| Subtotal – Interior | 350 |
| Nitrogen/Urea Facility Kenai | 50 |
| TOTAL | 1050 |

Other potential large loads could be from electric compressors for the proposed natural gas pipelines from the North Slope. Many of these compressors, however, would likely be remotely located. It appears conceivable that 1,000 MW of new load could potentially be developed in the Railbelt within the horizon of the previous RIRP study. Such new load would likely require specific policies to be implemented whether from fuel switching or large industrial loads.