Alaska Railbelt Electric Grid Authority (REGA) Study
Revised Discussion Paper - Paths and Scenarios

Note to Advisory Group Members: The purpose of this document is to outline the potential Paths and Scenarios to be evaluated as part of the REGA Study, and identify the evaluation criteria to be used. It has been revised from the previous version that you saw to reflect the results of the first Advisory Group meeting.

The word "Paths" refers to the organization structural options for the "restructuring" of the Railbelt utilities (hereafter referred to as "REGA Paths").

The word "Scenarios" refers to "alternative futures" that would reflect the variety of uncertainties that exist within Alaska over the next 30 years (the time horizon of the study). We propose not to complete sensitivity analyses for each individual uncertainty, due to: 1) the fact that looking at individual uncertainties has limited value in a study of this nature, and 2) the fact that the primary focus of the REGA Study is to compare REGA Paths under different Scenarios, not vice versa.

All four REGA Paths will be compared to each other under all of the chosen Scenarios. Ideally, the best REGA Path will be the same under all Scenarios. If not, we will deal with that when the time comes.

This document is intended to foster discussion among Advisory Group members as to which REGA Paths and Scenarios should be included in the detailed analysis.

Organizational Paths to be Evaluated

The table on the next page summarizes the various REGA Paths available for consideration as part of the REGA Study. This table is intended to be inclusive of the primary options; there are other less significant options, and variations of the options shown in the table, that could be considered but we have tried to limit the options to the most feasible to guide discussions with the Advisory Group.

On the left-hand side of this table, we have shown the primary functional areas, or requirements, involved in the provision of electric service. These functional areas include:

- ***Generation Infrastructure***
    - **Planning** – planning of future generation resources (both traditional and renewables)
    - **Project Development** – development of new generation facilities
    - **Operations** – operations of existing and future generation facilities

Summary of Organizational Options

Functional Area	Railbelt Utilities			Voluntary Agreements	JAA/G&T	RTO/ISO	State Agency	Other
	Current Structure	Consolidated						
		Public Entity(ies)	Invester-Owned					
Generation Infrastructure								
Planning	X	X	X	X	X		X	
Project Development	X	X	X	X	X		X	X
Operations	X	X	X	X	X			X
Transmission Infrastructure								
Planning	X	X	X	X	X	X	X	
Project Development	X	X	X	X	X	X	X	
Operations	X	X	X	X	X	X	X	X
Economic Dispatch		X	X	X	X	X	X	
Distribution	X	X	X					
Customer Services								
DSM/Energy Efficiency Programs	X	X	X	X	X		X	X
Other Services	X	X	X					X
Competitive Procurement								
Power Supplies	X	X	X	X	X			
Fuel Supplies	X	X	X	X	X			
Other Products and Services	X	X	X	X	X			
Market Development	X	X	X		X	X	X	

- ***Transmission Infrastructure***
    - **Planning** – planning of future transmission grid expansions
    - **Project Development** – development of new transmission assets
    - **Operations**– day-to-day operations of the transmission grid to meet reliability, security, congestion management, and ancillary services requirements
    - **Economic Dispatch** – centralized economic dispatch of all generation resources within the Railbelt
- ***Distribution*** – provision of distribution services to move power from the transmission grid to individual businesses and residences (note: this is outside of the scope of the REGA project but is included here for completeness sake)
- ***Customer Services***
    - **DSM/Energy Efficiency Programs** – the provision of demand-side management (DSM) and energy efficiency programs to customers
    - **Other Services** - provision of other customer services (e.g., metering and customer call centers) (note: again, this is outside of the scope of the REGA project but is included here for completeness sake)
- ***Competitive Procurement***
    - **Power Supplies** – competitive solicitation of power supplies, either on an individual utility or regional basis
    - **Fuel Supplies** – regional, competitive procurement of fuel supplies
    - **Other Products and Services** – competitive procurement of other required products and services (e.g., procurement of power poles)
- ***Market Development*** – development and operation of a competitive power market

Going across the table, we show a number of potential REGA Paths for the provision of the functional requirements of electric service. These include:

- ***Railbelt Utilities***
    - **Current Structure** – this Path represents the continuation of the current utility structure within the Railbelt
    - **Consolidated**
        - **Public Entity(ies)** – this Path involves the consolidation of the existing six utilities into one or more public utilities
        - **Investor-owned Utility (IOU)** - this Path involves the consolidation of the existing six utilities into an IOU
- ***Voluntary Agreements*** – this Path involves maintaining the existing utility structure within the Railbelt but entering into additional cooperative agreements
- ***JAA/G&T*** – this Path consists of the formation of a new joint action agency (JAA) or generation and transmission (G&T) cooperative

- ***RTO/ISO*** – this Path consists of the formation of a Regional Transmission Organization (RTO) or Independent System Operator (ISO)
- ***State Agency*** – this Path involves expanding the responsibilities of an existing, or the formation of a new, state agency
- ***Other*** – this includes other entities (e.g., independent power producers)

The "X"s shown in the table indicate feasible entities for the provision of specific functional requirements involved in the provision of electric service.

The task before us is to determine which entities to evaluate in detail. The REGA Study scope of work, as originally envisioned, includes the detailed assessment of three feasible Paths. Our proposed Paths for detailed evaluation include the following:

Path 1. **Status Quo (without Chugach/ML&P Merger)**

This Path assumes that the six Railbelt utilities continue to conduct business essentially in the same manner as now (i.e., six separate utilities with limited coordination and bilateral contracts between them). This is, in essence, the "Base Case" and the other Paths will be compared to this Path for each of the scenarios considered.

Path 2. **Form an Entity (e.g., JAA, G&T Cooperative or State Agency) That Would be Responsible for Joint Operation of the Railbelt Transmission Grid**

Under this Path, a new entity would be formed to independently operate the Railbelt transmission grid. This new entity would not perform regional economic dispatch; therefore, this Path could be viewed as "Path 1 Heavy" or "Path 2 Lite". This Path was added because it most closely captures the thinking of former Rep. Rokeberg who was the author of the enabling legislation for the REGA Study.

Path 3. **Form an Entity (e.g., JAA, G&T Cooperative or State Agency) That Would be Responsible for Joint Economic Dispatch**

Currently, the Railbelt utilities have three control centers (GVEA, Chugach and ML&P). The operations of these centers are coordinated (but generation is not economically dispatched on a regional basis) through the Intertie Operating Committee.

This Path would expand upon this coordination through the formation of an organization (perhaps a JAA, G&T or State Agency) that would be responsible for the joint economic dispatching of all generation facilities in the Railbelt.

This Path might require additional investment in transmission capacity and/or SCADA/telecommunications capabilities. This Path would also require the development of operating and cost sharing agreements to guide how economic

dispatching would occur and how the related costs and benefits would be allocated among the six Railbelt utilities.

Variation of Path 3: Develop Operating/Cost Sharing Agreement and Designate one of the Utilities to be Responsible for Joint Economic Dispatch - instead of forming a JAA, G&T Cooperative or State Agency, the benefits of this Path could perhaps be achieved simply through an operating/cost sharing agreement with one of the utilities assuming the overall responsibility for dispatching all of the generation assets. An example of this would be the old NEPOOL Agreement. Under the parameters of this Agreement, each utility remained responsible for their own costs. Fifty percent (50%) of the savings from economic dispatch were used to cover the costs associated with NEPOOL operations, and 50% were returned to the utilities as credits based upon their respective loads. As new generation and transmission resources were required, utilities could either build the facilities themselves, or jointly in concert with other participating utilities.

Path 4. Form an Entity (e.g., JAA or G&T Cooperative or State Agency) That Would be Responsible for Joint Economic Dispatch, Regional Resource Planning and Joint Project Development

This Path is similar to Path 2 except the scope of responsibilities of the new organization would be expanded to include regional integrated resource planning and the joint project development of generation and transmission assets. This would involve the potential formation of a JAA, G&T or State Agency (as in Path 2) or the development of an operational/cost sharing agreement (as in the Variation to Path 2). An important issue that will need to be discussed relative to this Path is the ownership of both existing and future generation and transmission assets.

Potential Scenarios to be Evaluated (for each Organizational Path above)

Uncertainties

The various uncertainties facing the Railbelt include, but are not limited to, the following:

- Future fuel supplies/costs
- Environmental legislation (including carbon taxes), regulations and constraints
- Future desirability and costs of major generation facilities (e.g., coal, nuclear, and hydro facilities)
- Outcome of proposed Chugach/ML&P merger, coordinated operations, and/or joint project development
- Load growth, military base realignment, economic development, and power exports

- Aging generation and transmission assets and planned retirements
- Transmission system expansions
- DSM, renewables, and distributed generation resources - resource potential, relative economics, and policy-driven targets and growth
- Growth in non-utility generation (e.g., QFs, IPPs)
- Financing – access to capital, costs, tax implications
- Future role of State, AEA and AIDEA – expand, maintain or sell energy assets
- Impact of a major power project coming on-line in the Railbelt; such as a large hydropower project

Potential Evaluation Scenarios

So, our challenge is to convert this list of uncertainties into a reasonable number of Scenarios (probably two to four) that we will evaluate for each Path. The following is our proposal regarding what the Scenarios could/should be. We have provided only a high-level description of each Scenario; we will develop detailed assumptions for each Scenario once input from the Advisory Group is received. These input assumptions will be discussed during the second Advisory Group meeting.

It is important to note that all potential resource options (e.g., natural gas, coal, large and small hydro, other renewables, energy efficiency programs, etc.) will be considered under each Scenario; the input assumptions, however, will differ between the Scenarios to "bound" the list of uncertainties listed above.

Scenario 1. Environmental/Renewables/DSM/Energy Efficiency Scenario

- Load forecast based on utility forecasts
- Retirement of aging generation facilities at planned lives
- Renewable portfolio standard (RPS) is established as State policy
- Substantial DSM/energy efficiency programs are implemented (either voluntarily or State-mandated)
- State subsidies are provided for the expansion of DSM/energy efficiency programs and/or renewable resources
- New gas supplies limited; current gas supplies move to market prices as contracts expire
- Revised Susitna project included (with revised cost estimate) with State financing and subsidies
- Carbon tax in place that is towards the higher end of the potential range

Scenario 2. Continued Ample Supply of Natural Gas Scenario

- Load forecast based on utility forecasts
- Aggressive life extension of aging generation facilities
- No State subsidies or policies to foster the development of DSM/energy efficiency programs and/or renewable resources
- Ample, new natural gas supplies from either Cook Inlet and/or North Slope, priced at a discount from market prices; current gas supplies move to a discount from market prices as contracts expire
- Revised Susitna project included (with revised cost estimate) with State financing but no subsidies
- Carbon tax that is towards the lower end of the potential range

Scenario 3. Reduced Dependence on Natural Gas, Larger Fossil-Fueled Plants Scenario

- Load forecast based on utility forecasts
- Retirement of aging generation facilities at planned lives
- No State subsidies or policies to foster the development of DSM/energy efficiency programs and/or renewable resources
- New gas supplies limited; current gas supplies move to market prices as contracts expire
- Development of larger fossil-fueled generation facilities and related transmission capacity
- Revised Susitna project included (with revised cost estimate) with State financing but no subsidies
- Low to moderate carbon tax

Scenario 4. Major Growth in Load Due to Economic Development Activities Scenario

- Large increase in load due to a major new load in or connected to the Railbelt region (e.g., Pebble Mine or Donlin Creek Mine)
- Retirement of aging generation facilities at planned lives
- No State subsidies or policies to foster the development of DSM/energy efficiency programs and/or renewable resources
- New gas supplies limited; current gas supplies move to market prices as contracts expire
- Revised Susitna project included (with revised cost estimate) with State financing but no subsidies
- Moderate carbon tax

Evaluation Criteria

We propose the following criteria for the evaluation of alternative REGA Paths under the selected Scenarios:

- **Economic Impacts**
  - Generation and transmission costs (both initial and annual)
  - Organizational costs (both start-up and annual)
  - Utility-specific impacts
- **Reliability Impacts**
- **Ease of Implementation** - considering legal, regulatory, market, governance, and other issues
- **Impact on Flexibility** – to migrate to a new or different model, if appropriate, over time as market, supply and load conditions change
- **Impact on Emissions**