

Renewable Energy Fund Data Collection and Management

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07/02/2014

Alaska Energy Authority



ACEP
Alaska Center for Energy and Power

Data Collection and Management (DC&M) Program

Mission: To support Alaska communities, agencies, and utilities in the collection, management, and dissemination of high quality technical energy data.



DC&M Program Objectives

- Facilitate data-driven decisions, design, analysis
- Reduce data “friction”
- Support robust, high-quality research
- Open data
- Cooperation, synergy, and compatibility
- Communicate Alaska experience and expertise



DC&M Program Services

Collection

- Instrumentation, acquisition, programming, technical assistance

Management

- Processing and standardization, quality assurance, archiving, access

Product

- Project-specific tasks (reporting, analysis, dissemination, etc.)



DC&M Program Team



Jason Meyer
Program Manager



Tom Johnson
Research Engineer



Heike Merkel
Data Manager



Chris Pike
Research Engineer



Brendan Babb
Data Manager



Nathan Green
Student



DC&M Program Infrastructure

Arctic Region Supercomputing Center

- Computing services
 - Linux workstations
- Website services
 - Alaska Energy Data Gateway
- Storage services
 - Bigdipper (9 TB)
 - Automated tape library (29 PB)



Alaska Energy Data Gateway



Three RePower 2.05 megawatt turbines at the Eva Creek Wind Farm (Rich Stromberg, AEA)

Public Data

The Alaska Energy Data Gateway provides the public, as well as project developers and researchers, with comprehensive energy data from across the state. With this information, the public can make informed decisions about energy issues in their communities and see how similar issues are being addressed in other parts of the state. To access our public data, choose one of the options below.

Most of the data in the Alaska Energy Data Gateway is available at the community level with the intent of providing information to assist communities in their on-going energy development and efficient energy use. Information can be downloaded and combined with data from the [Alaska Community Database Online](#) to provide comprehensive community information.

Community Data Summaries

Community Data Summaries show a selection of current data about communities, including geography, population and employment, fuel prices, electric rates, and more. To see the data summary for a community, select the community from the menu below.

Select a community

Community Data Summary Select another community

Bethel

Overview

Geography		Population and Employment	
Borough/Census area	Bethel Census Area	Population (2012)	6,113
Energy region (MEA)	Lower Yukon Subdivision	Residents age 18 and over (2011)	3,875
Alaska Native Regional Corporation	Central Corporation	Residents employed (2011)	2,718

Data Search Tool

The Data Search tool provides capabilities to browse, search, filter, preview, and download all of our public datasets in a variety of file formats with complete documentation. To use the data search tool, click the button below.

Data Search 1. Start 2. Select Dataset 3. Filter Data 4. View/Download

Fuel Price Survey Data

Data from the semiannual surveys conducted by the Alaska Housing Finance Corporation (AHFC) for use in AHFC's energy programs and stored in the AEDG database. AHFC collaborates with the Alaska Department of Commerce, Community, and Economic Development (DCCED), Division of Community and Regional Affairs (DCRA) to include data from communities surveyed by DCRA. Prices for home heating fuel (No. 1 and No. 2 fuel oil, propane, and wood) are collected from vendors serving communities around the state and select fire price reported by the vendor at the point in time of the survey.

Select Variables



Overview of RSA #1420



RSA Summary

- Develop REF “data oversight services” with ability to:
 - Collect accurate and appropriate performance data
 - Measure and report project effectiveness
- ACEP products include:
 - Data processing, management, archiving, and dissemination (methods, tools, and infrastructure)
 - Automated reporting
 - *Data collection plans
- Utilized historic data from relevant projects
 - Cordova, Nome




Data and the REF

- Data critical to informing funding decisions, project design, best practices, lessons learned, project/program performance, etc.
- Limited technical performance data available, especially at higher resolution
- Current reporting could significantly benefit from automated data collection
- Publicly funded projects, publicly available data





Value of High Resolution Data

- Increased complexity of energy systems rely on data-driven design and analysis
 - Integration of renewables, system optimization
- High resolution data needed for modelling efforts
 - Power-flow studies, power integration, HOMER
- In many cases, already generating high resolution data, just “throwing it away”




CASE STUDY: Cordova Electric Cooperative, Inc.





"Cordova Electric highly recommends Canary Labs trending software as a low-cost, high value, user-friendly solution for system wide data storage and analysis."

- Clay Koplin, PE
Chief Executive Officer



Configuration Overview:

- Trend Historian
- Trend Link

Canary Labs Integration:

- Wonderware InTouch

Company Overview
Cordova Electric Cooperative is the sole provider of electricity to approximately 1600 customers in the coastal community of Cordova, Alaska. Cordova is flanked on three sides by rugged mountain ranges and by the Gulf of Alaska. Fishing is the basis of Cordova's economy. Cordova is accessible only by air or by sea. There is no power grid in much of rural Alaska, so if the local power system goes down, there is no electricity. It is therefore critical to quickly find and resolve any problems since these rural Alaskan villages are dependent solely on the local power system.

Background
Cordova Electric produces 60% of Cordova's electricity from the Power Creek Hydroelectric Project, a Green-E certified, low impact, run-of-the-river hydroelectric project. The project uses an inflatable dam that can be raised and lowered as needed. The project began revenue service in January 2001 and is remotely operated, and automated to run unsupervised. The project directly offsets the use of diesel fuel to generate electricity.

Situation: Bearing High Temperature Alarm
In August 2009, during a peak system load on a relatively warm day, the automation system indicated a high main bearing temperature on a hydroelectric turbine. The cost of removing a hydro turbine from service is \$675 per hour in fuel cost, plus troubleshooting time and overtime. This is because diesel fuel must be used to run a diesel turbine while the hydro turbine is not generating electricity. A standard approach to this problem would have been to take the unit offline, remove cover plates, inspect the bearing, measure tolerances, change lube oil and filters, restart, test, and monitor the unit temperature. This would have resulted in over 24 hours of downtime.

Power Creek uses Trend Historian and Trend Link from Canary Labs with Wonderware's InTouch HMI package. In February 2004, CEC began trending approximately 500 data tags. With this data, CEC is able to mine seven years of continuous data for information such as interior and exterior plant temperatures, turbine bearing temperatures, generator winding temperatures, power output and system frequency data, the status of electrical distribution system feeders and plant station service voltages, dam intake structure water elevations, and penstock pressures.

CEC estimates that the \$750,000 cost of automating two hydroelectric plants was recovered within three years. Canary Labs trending software is a key component of the savings derived from the automated system. Examples of cost savings include access to raw data for engineering studies and evaluations, preventative maintenance, and emergency maintenance.

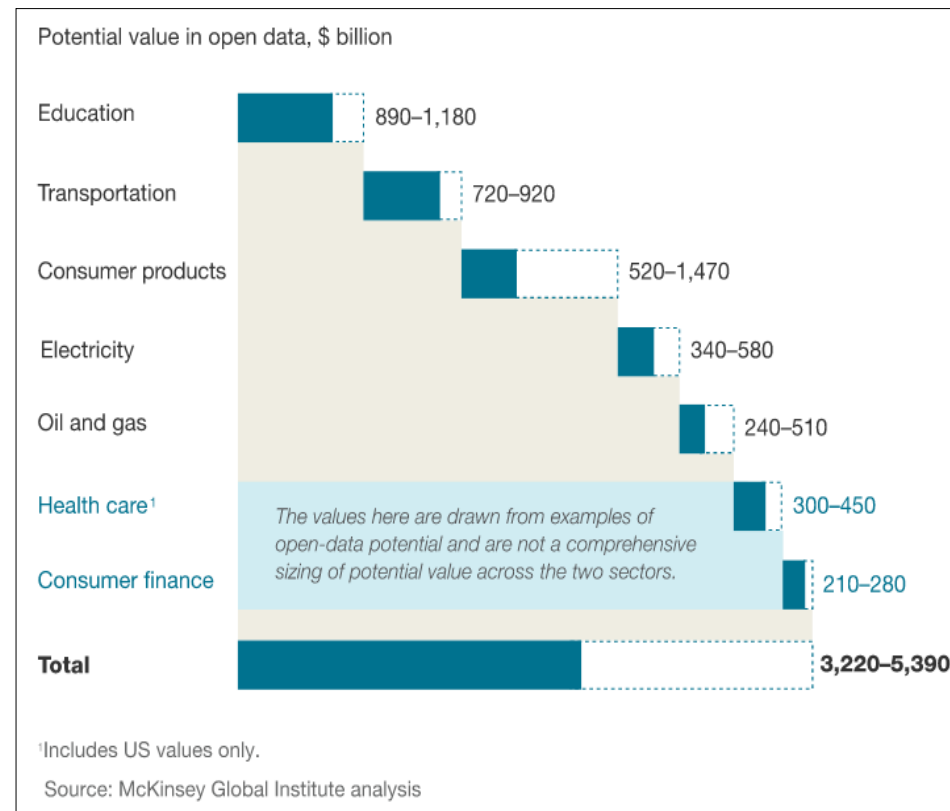
10,000 Implementations in over 24 Countries, and growing.
www.canarylabs.com Sales 814.793.3770



Value of Open Data

McKinsey Global Institute, October 2013
Open data: Unlocking innovation and performance with liquid information

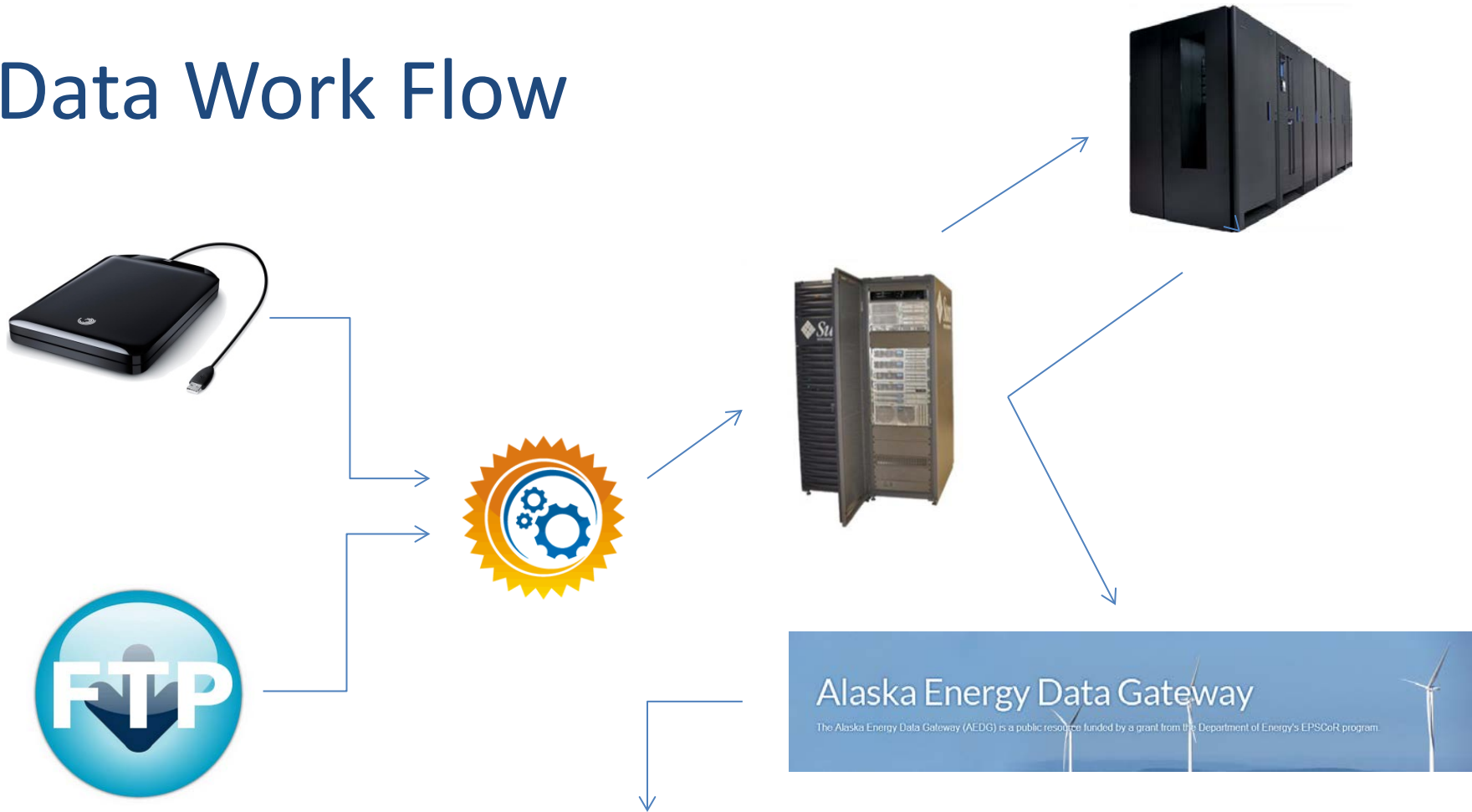
“Making data more “liquid” (open, widely available, and in shareable formats) has the potential to unlock large amounts of economic value, by improving the efficiency and effectiveness of existing processes; making possible new products, services, and markets; and creating value for individual consumers and citizens.”



Summary of RSA #1420 Activities



Data Work Flow



Alaska Energy Data Gateway :: technical data portal



Data Processing Stages

Raw (.CSV) Data

- Formatting
- Field correction

Raw Matlab Data

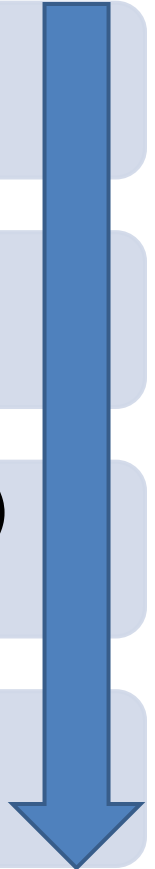
- Time standardization/conversion
- SI unit conversion

Q/A Matlab Data

- Filtering (thresholds, data irregularity)
- Calculated values, statistics

Q/A NetCDF Data

- Metadata addition



Data Processing Considerations

- Use of state/national/international IDs and standards
- Improper use of commas, tabs
 - 6,030
- Extraneous information
 - Headers, proprietary system information
- Missing information
 - Metadata
- Time conversion, synchronization
 - Coordinated Universal Time (UTC)



Nome Joint Utility System

- 2 years of data, 132 weeks
 - May 2011 – October 2013
 - New turbines online April 2013
- 1 second or less data, CSV format
 - 1,056 files
- 99 channels / 127 channels
- NJUS uses Canary Labs
 - Limiting data format (CSV or Excel) and proprietary interface
 - Not meant for data dissemination, public interface
 - No modelling ability
- Initial file processing:
 - 1 week, 14 channels, ~400 MBs
 - >3 million rows on Excel
- Optimized file processing
 - 33 days to process 132 weeks
 - 11 hours utilizing ARSC services
- Matlab file is 15x smaller
 - Channel data and time stamp
- Monthly netCDF file for each channel with all metadata

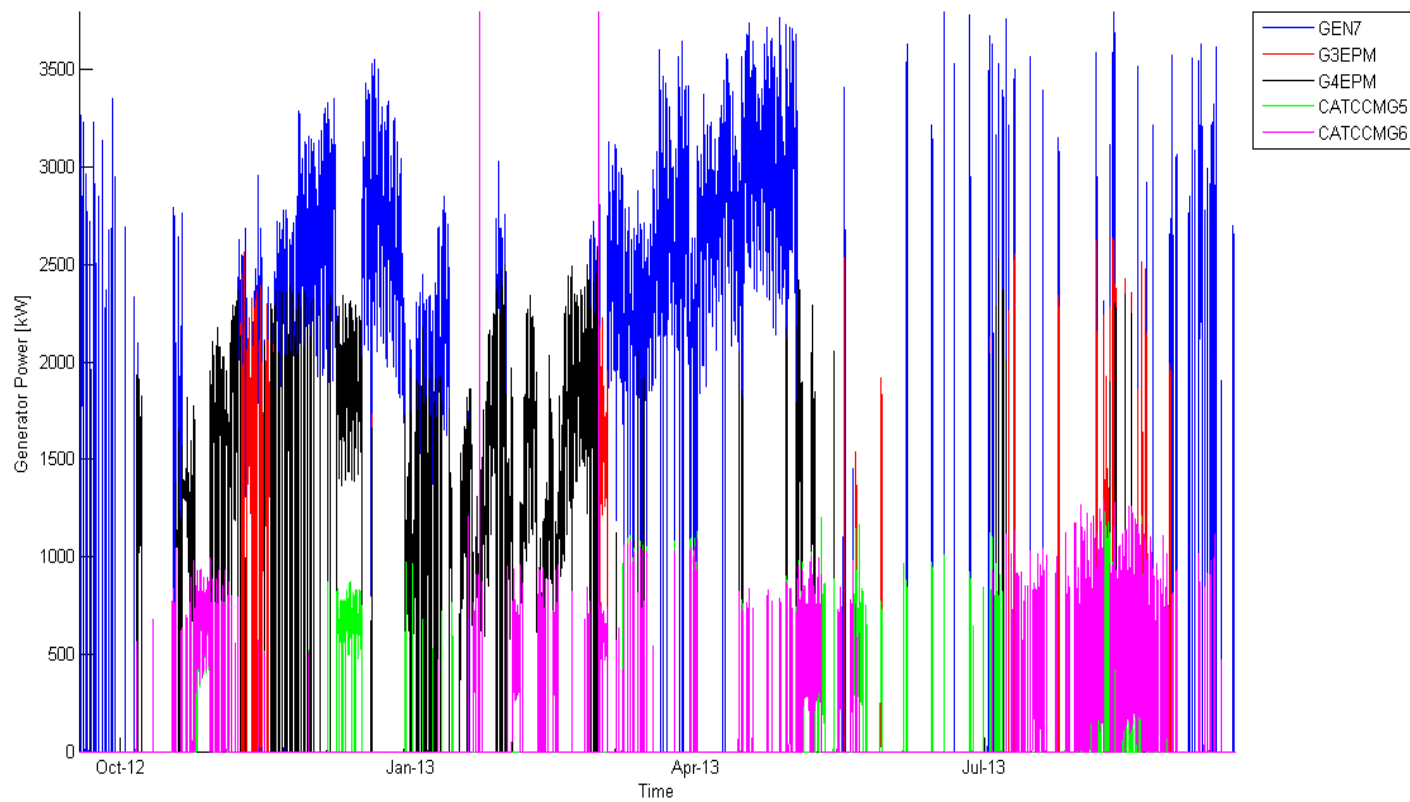


Cordova Electric Cooperative

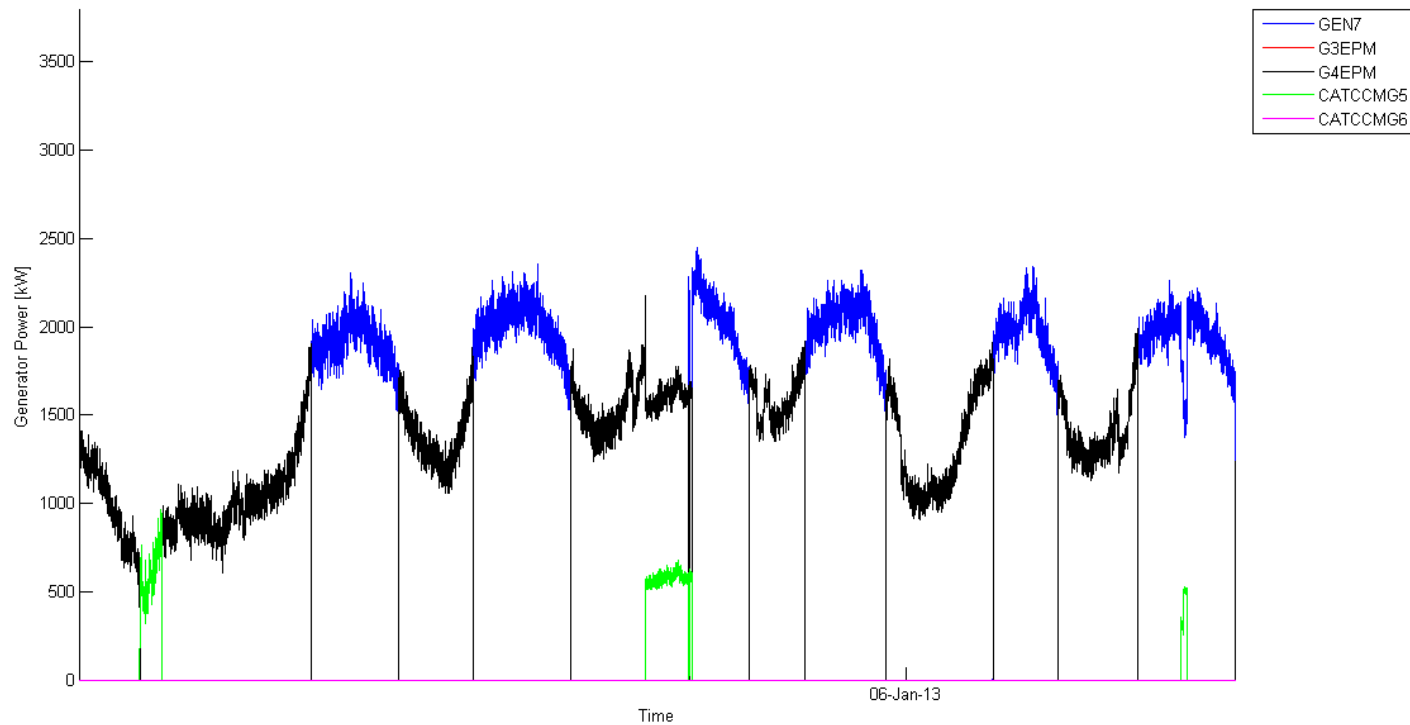
- 1 year of data
 - Sept. 2012 – Sept. 2013
- 1 second data, CSV format
- 56 channels
 - Orca Diesel, Humpback Creek and Power Creek Hydroelectric
- Hard drive download
 - 15hr download
- CEC uses Canary Labs



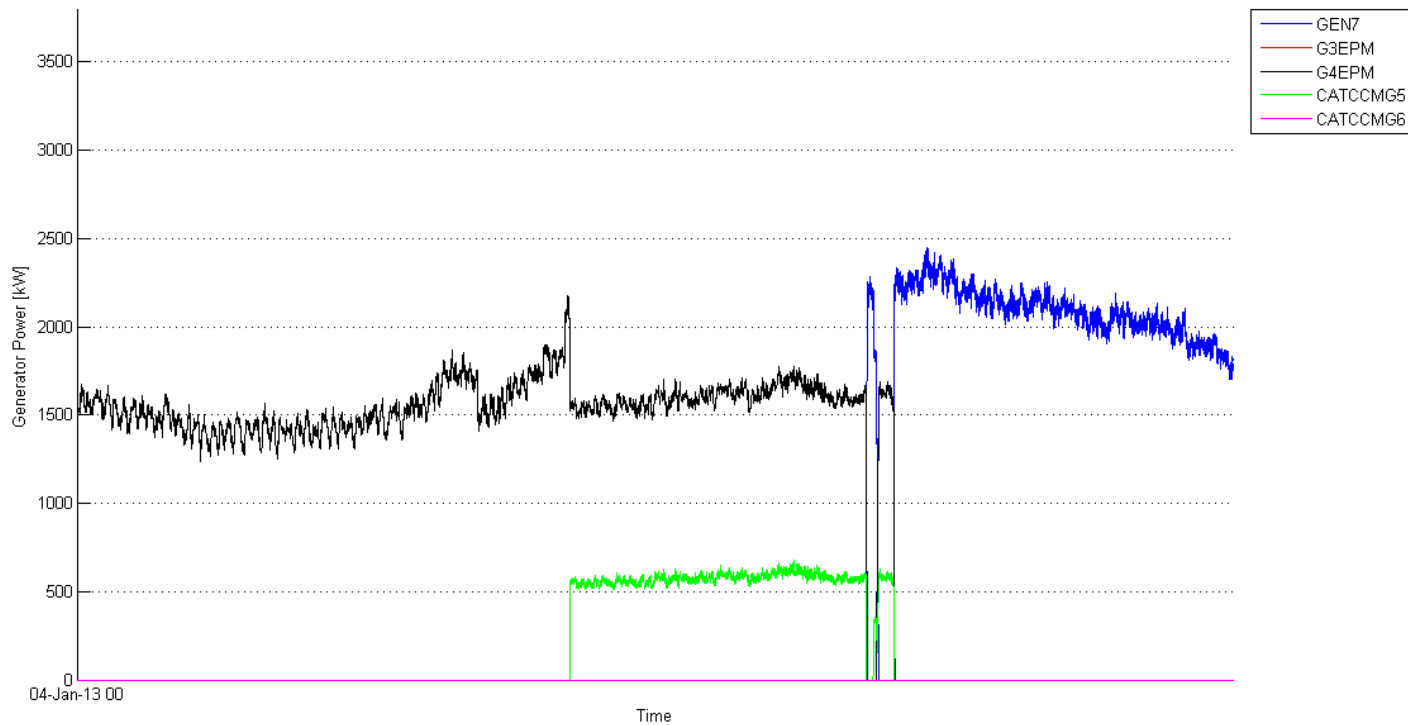
Orca Diesels, 1 Year



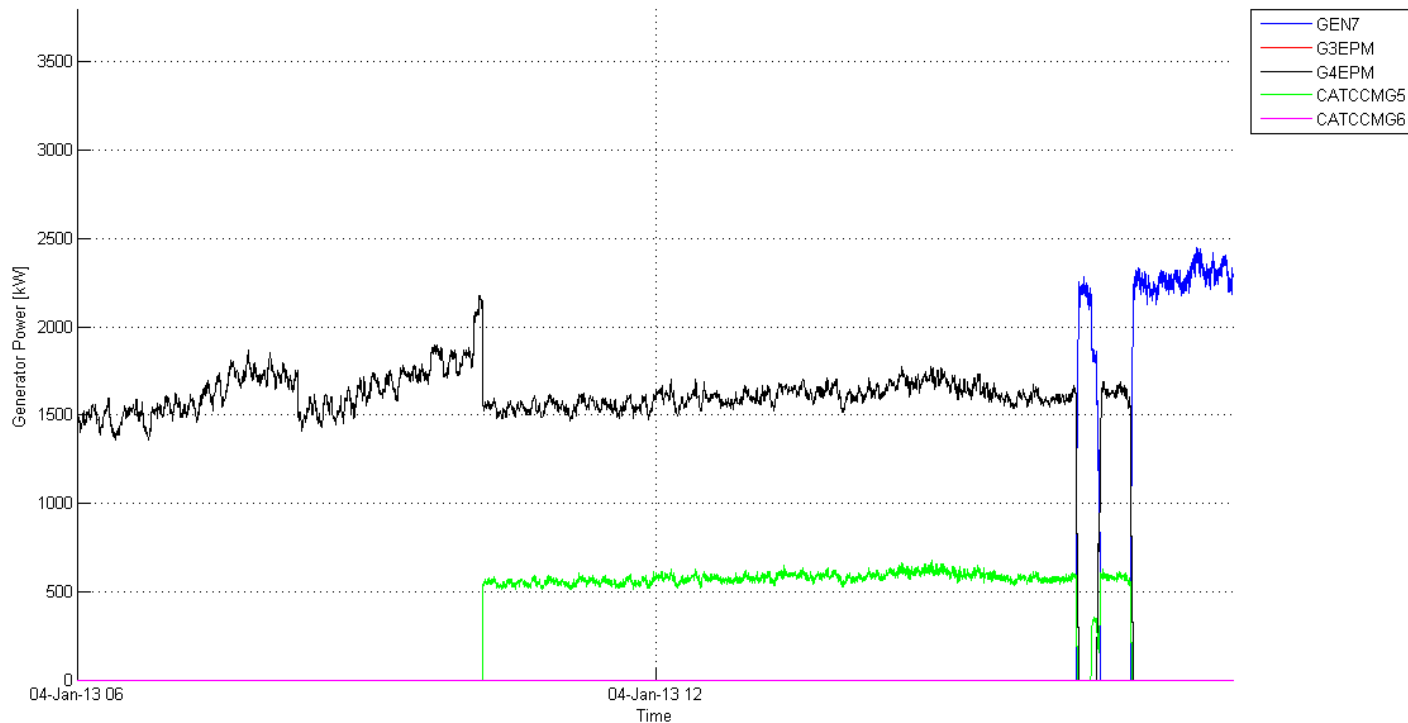
Orca Diesels, 1 Week



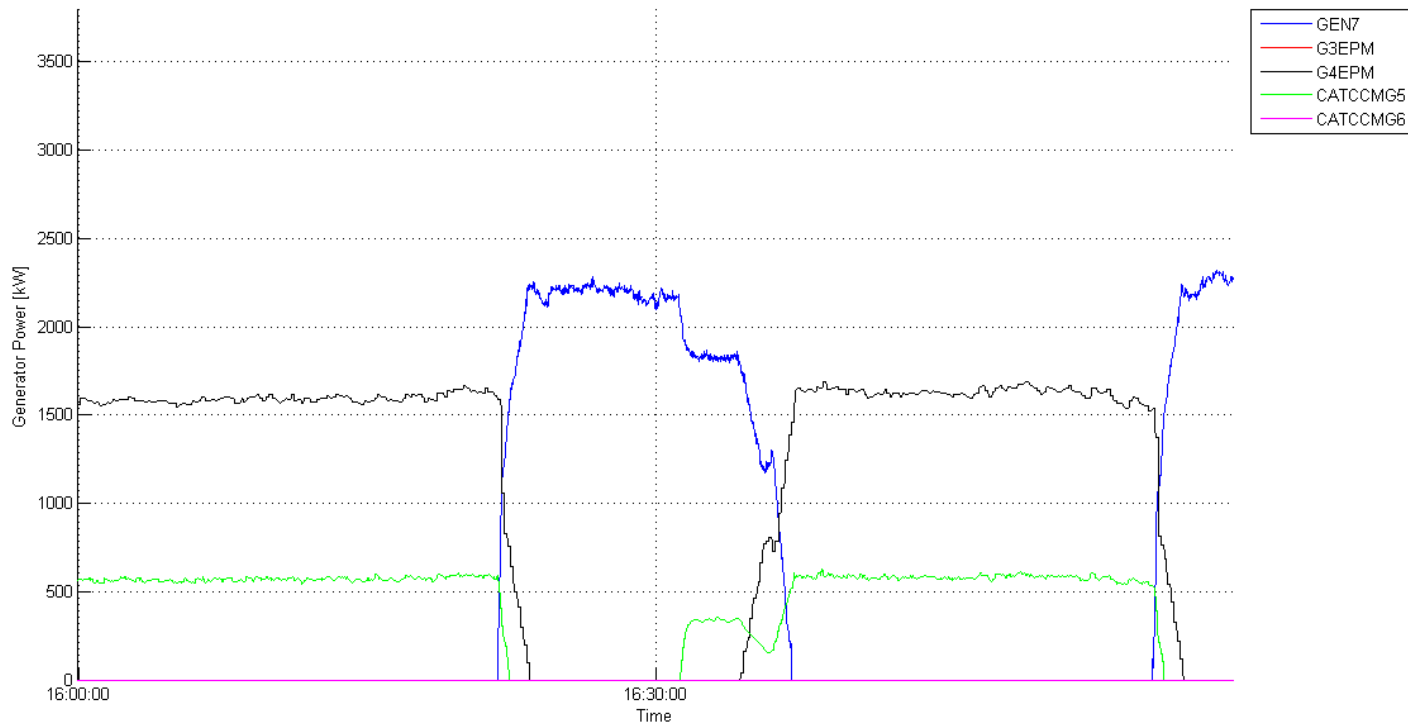
Orca Diesels, 1 Day



Orca Diesels, 12 Hours



Orca Diesels, 1 Hour



Summary of RSA #1420 Products



Automated Reporting

- Reporting that is automatically produced and published
 - Customized time-scales, data resolution, audiences, content
- Quality assurance a key aspect to reporting
- Examples:
 - Weekly Report, Annual Report
 - “Roll-Up” / Program / Summary Report
- Collaboration with ISER Program/Project Reporting

ACEP Automated Data Report
ANNUAL POWER SYSTEM REPORT
FOR
CORDOVA ELECTRIC
HYDRO-DIESEL SYSTEM

Marc Mueller-Stoffels

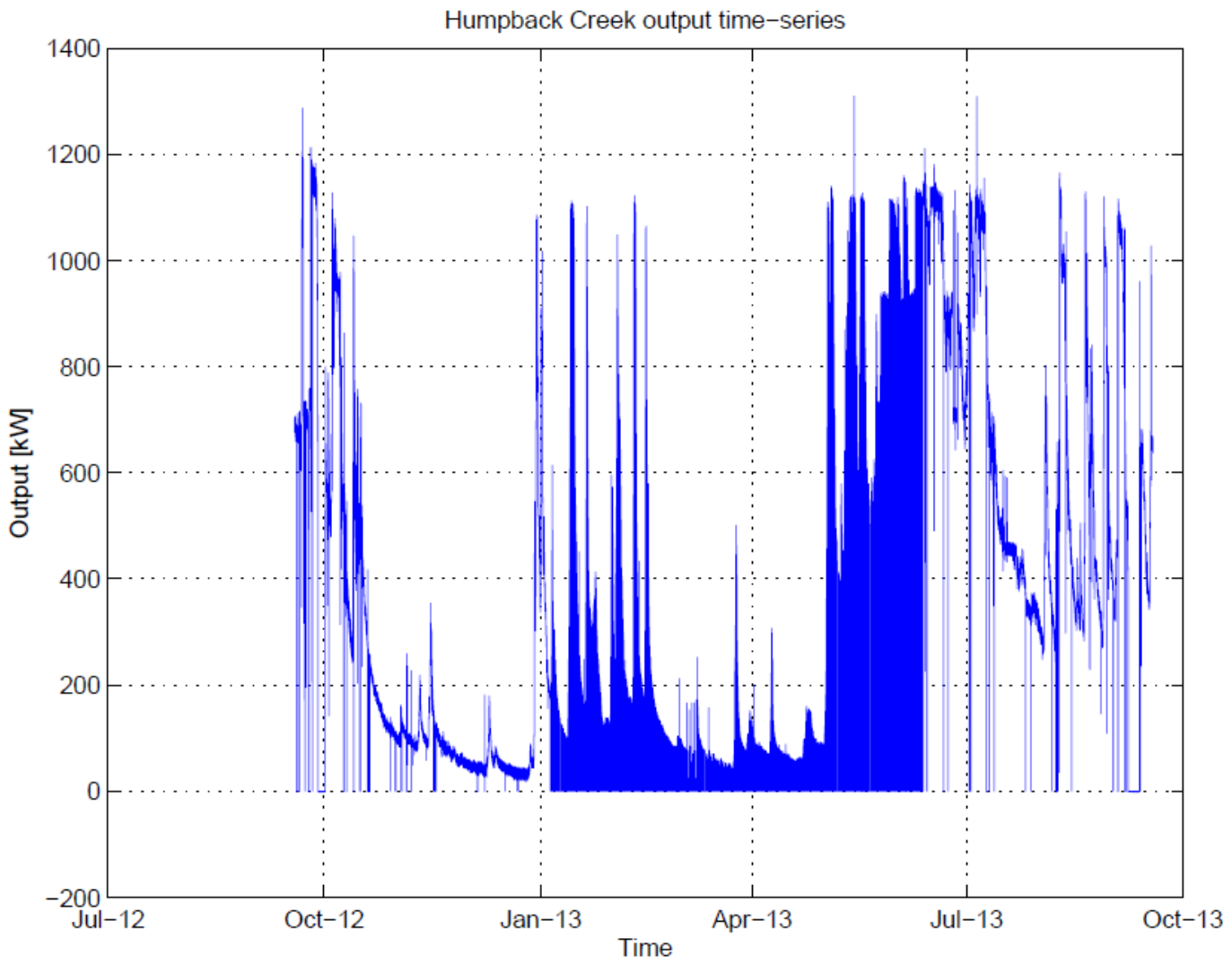
Funded by the
Alaska Center for Energy and Power

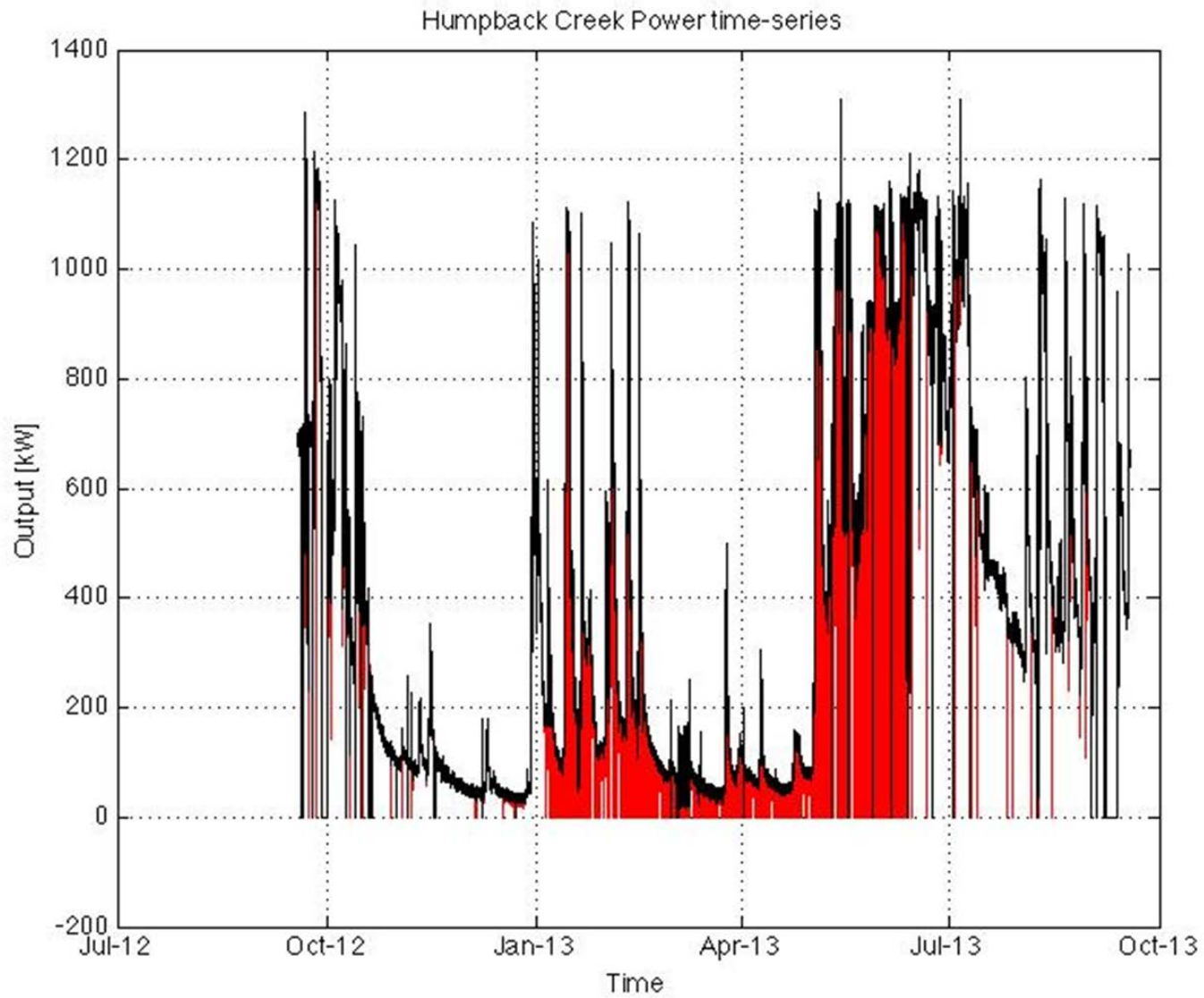


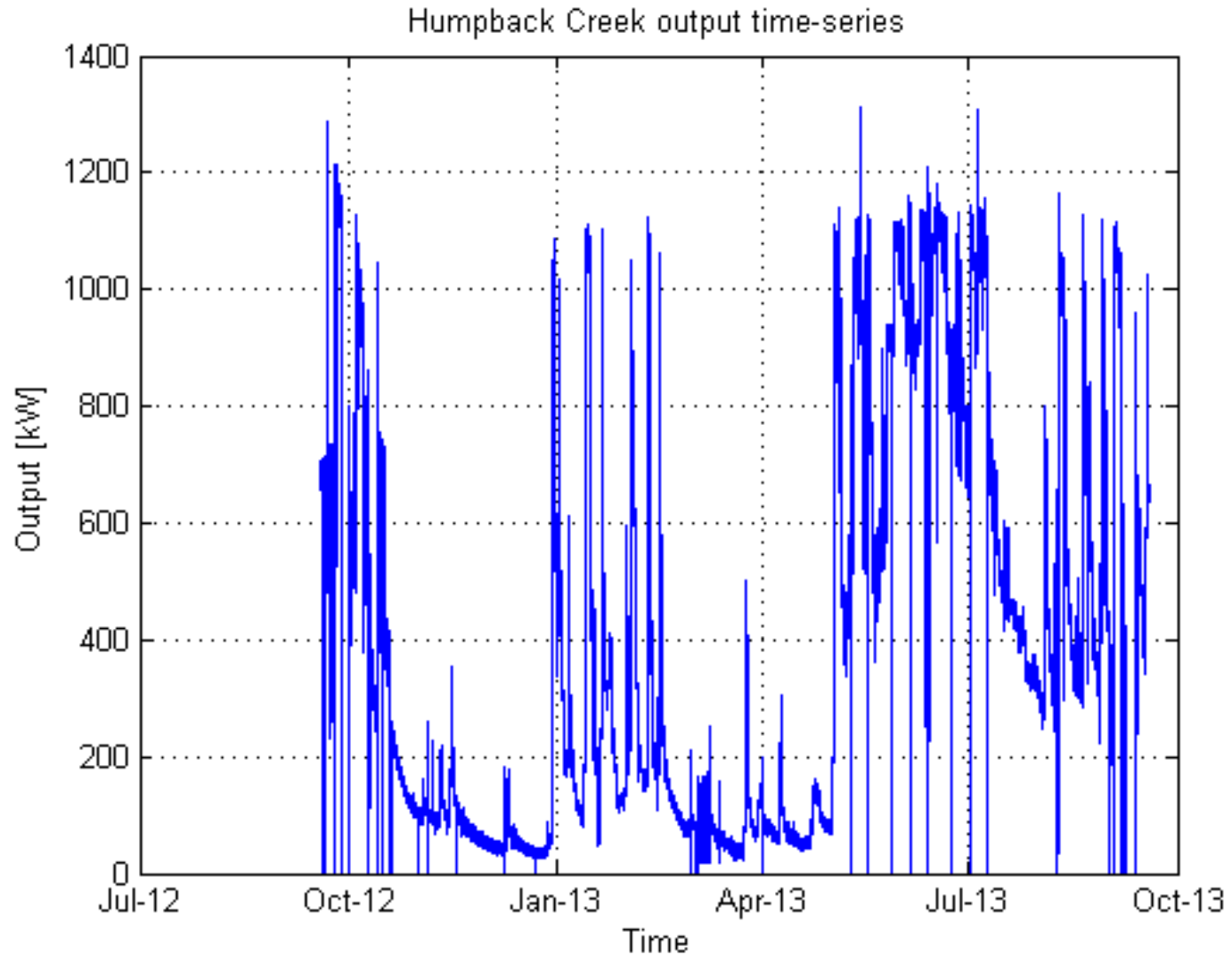
ACEP
Alaska Center for Energy and Power

April 2014









Alaska Energy Data Gateway :: technical data portal

ACEP | AEA

Home » Map

2012-09-30 2013-07-05

Please select Location/Technology below:

Location:

Cordova

Technology:

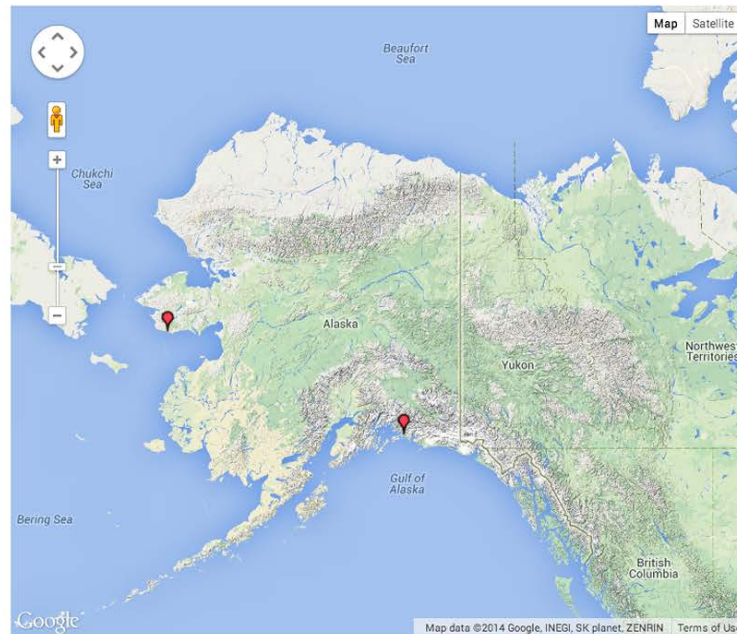
- Diesel Generator
- Hydropower Turbine
- Wind Turbine

Get Data Files

[clear form](#)

(Select Desired Date Range of Data Above.)

Reference Map



This web application is in beta testing!

For questions or comments regarding this website, contact acep@alaska.edu



Alaska Energy Data Gateway :: technical data portal

ACEP | AEA

[Home](#) » [Map](#)

Please select required files below and place in the shopping cart:

Please select Location/Technology below:

Location:

Cordova

Technology:

- Diesel Generator
 Hydropower Turbine
 Wind Turbine

Get Data Files

[clear form](#)

Location: Cordova

Technology: Diesel Generator

- Cordova-OrcaDieselPlant-BusP@2012-10-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2012-11-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2012-12-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2013-01-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2013-02-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2013-03-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2013-04-01T000000Z@P1M@PT15.nc
 Cordova-OrcaDieselPlant-BusP@2013-05-01T000000Z@P1M@PT15.nc

Technology: Hydropower Turbine

- Cordova-PowerCreek-BusP@2012-11-01T000000Z@P1M@PT15.nc
 Cordova-PowerCreek-BusP@2012-12-01T000000Z@P1M@PT15.nc
 Cordova-PowerCreek-BusP@2013-01-01T000000Z@P1M@PT15.nc
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 Cordova-PowerCreek-BusP@2013-05-01T000000Z@P1M@PT15.nc
 Cordova-PowerCreek-BusP@2013-06-01T000000Z@P1M@PT15.nc

Download

For questions or comments regarding this website, contact acep@alaska.edu



Continuing Efforts

- Additional filters for data identification and selection
- Enhanced data retrieval based on archiving
- Increased integration of Alaska Energy Data Gateway
- Cross-database functionality (scripts, APIs, etc)
- Retrieval, export, and file format tools
- “Low resolution” product
 - [Socrata](#), [ckan](#)
- Optimized processing, data receipt



Contact Information

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Project Partners and Contributors

- Alaska Energy Authority
- Department of Energy
 - Experimental Program to Stimulate Competitive Research
- Institute of Social and Economic Research
- Arctic Region Supercomputing Center
- Cordova Electric Cooperative



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