

# Canada's First Utility-Scale Energy Storage System

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Hedberg Peak

Mt Deville

Mt King

Mt Vaux

Golden

Field

95

# The Solution

One Megawatt battery located at a BC Hydro compound 5km south of Field

Designed to deliver 7 hours of power to Field (Actually delivered up to 24)

Utilized for demand reduction for peak shaving



**BC hydro** 

# Controlling the Islanding

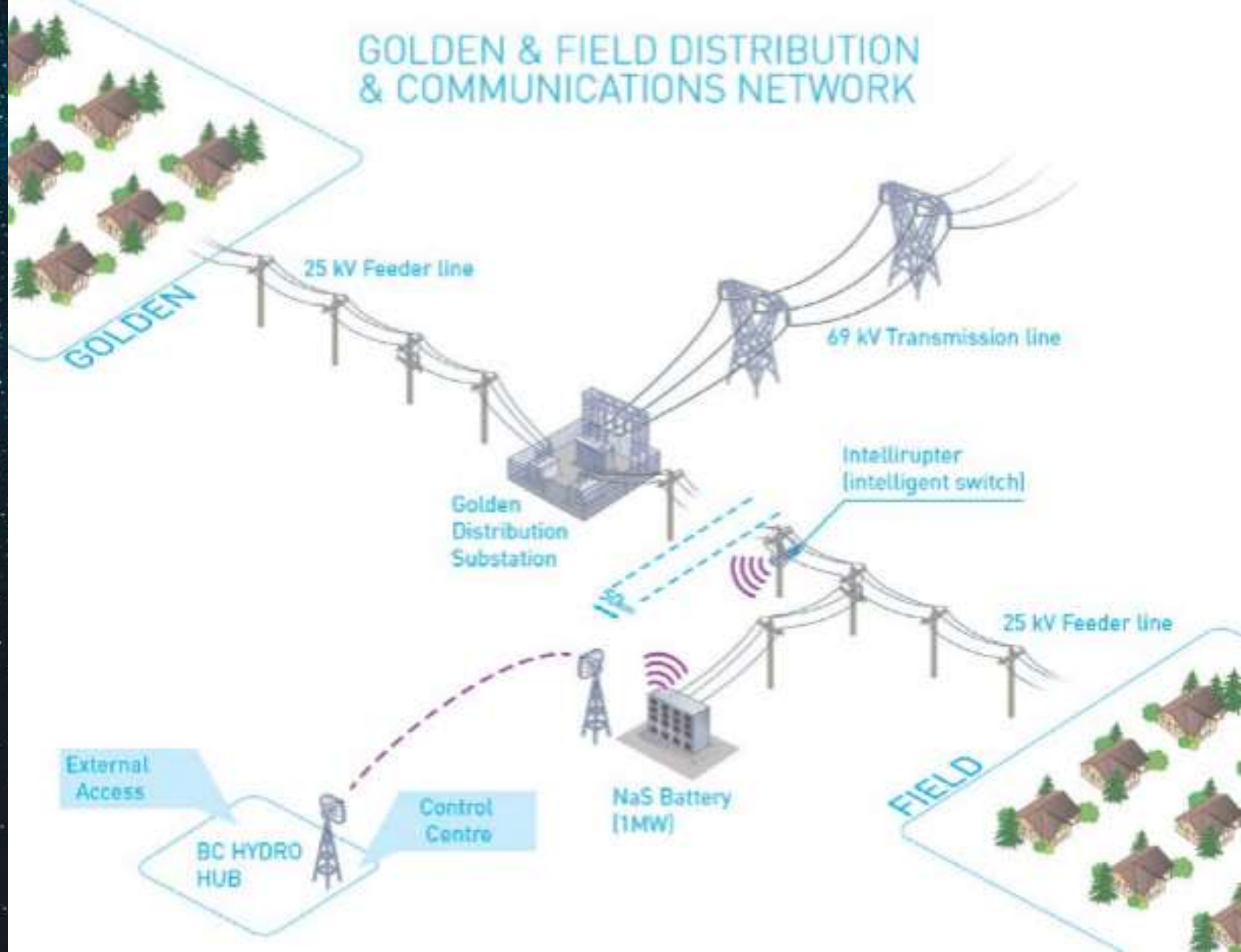
A single point of coupling between the islandable community and the distribution line

Pulse reclosing (95% less power when reclosing to detect a fault)


Closes connection to grid and redirects after permanent fault to serve Field via energy storage



# GOLDEN & FIELD DISTRIBUTION & COMMUNICATIONS NETWORK



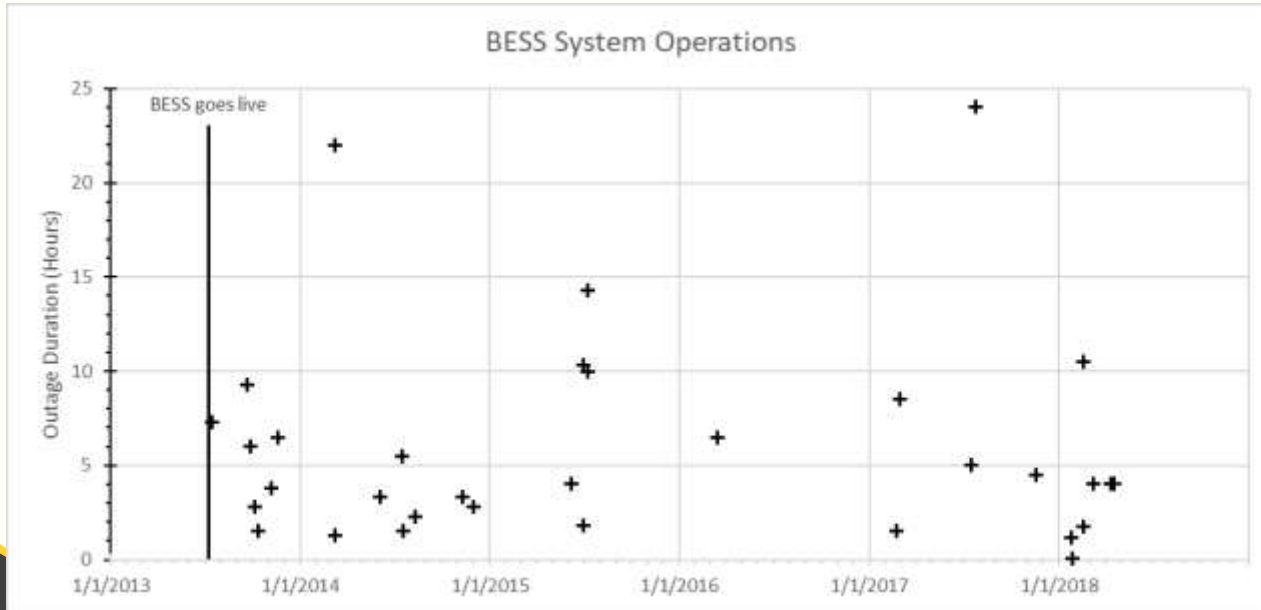
# Project Objectives

- Reduce interruptions for the community of Field
  - Prove the business case
  - Gain knowledge in the deployment of battery energy storage for peak shaving and islanding (for backup power)
  - Understand the additional challenges of the Canadian climate and environment.
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# Project Results

BC Hydro reduced the number of extended outages for the community by up to 80%. And prevented over 80 hours of outages within just 1 year

- ✓ 33 islanding events since going live
- ✓ Total of 195 hours of island operation
- ✓ Average outage duration 5.9 hours



# Customer Engagement

Automated battery Twitter feed

Updates system status every 30 minutes when in island mode

Allows residents to reduce energy usage to lengthen battery operating time

Increased the 7 hour design service into up to 24 hours



The image shows a screenshot of a Twitter profile for 'Field\_Outage\_Status' (@FieldOutageInfo). The profile picture is a circular image of a green metal building. The header shows 316 tweets and 58 followers. The tweets listed are:

- Field\_Outage\_Status** @FieldOutageInfo · Apr 17  
Grid Power Restored, Battery State: OFF @ 4/17/2018 1:02:14 PM  
Hours Remaining: 17hrs  
Capacity: 80%  
Average Load: 293kW
- Field\_Outage\_Status** @FieldOutageInfo · Apr 17  
Loss of Grid Power Update, Battery State: ON since 4/17/2018 8:55:08 AM  
Hours Remaining: 16hrs  
Capacity: 81%  
Average Load: 313kW
- Field\_Outage\_Status** @FieldOutageInfo · Apr 17  
Loss of Grid Power Update, Battery State: ON since 4/17/2018 8:55:08 AM  
Hours Remaining: 17hrs  
Capacity: 84%  
Average Load: 314kW



# Lessons Learned

ESS required government grant to become economically competitive

ESS delivered a broader set of benefits versus diesel

Combination of resilience and peak demand reduction needs = excellent opportunity for non-wires alternative

BC Hydro tracking 13 categories of lessons learned in order to improve future performance for this project and others

Lessons Learned	BC Hydro Case in Field	Considerations for Future Projects
Civil Design	<ul style="list-style-type: none"> <li>➤ -50°C design temperature;</li> <li>➤ Heated building required to house batteries</li> </ul>	Location and weather condition of battery site should be considered to minimize requirements for battery storage structure
Battery Site Location	<ul style="list-style-type: none"> <li>➤ Within Yoho National Park;</li> <li>➤ Approximately 4 km from the Town of Field;</li> <li>➤ Location due to available land</li> </ul>	Site location should be as close as possible to the distribution loads; currently any fault between battery site and town of Field (4 km) would disable the battery islanding function
Building Permit	<ul style="list-style-type: none"> <li>➤ Within Yoho National Park;</li> <li>➤ Park Canada building permit was required</li> </ul>	Possible permitting delays due to the site location
Environmental Assessment	<ul style="list-style-type: none"> <li>➤ Environmental assessment was required as per Canadian Environmental Assessment Act</li> </ul>	Possible delays due to environmental assessment
Stakeholder Engagement	<ul style="list-style-type: none"> <li>➤ First Nations and Community Engagement</li> </ul>	Stakeholder engagement may affect schedule
Fire Safety	<ul style="list-style-type: none"> <li>➤ Fire of the NaS battery site in Japan</li> </ul>	Even the most mature technologies have not been proven over a full life-cycle
Chemical Safety	<ul style="list-style-type: none"> <li>➤ Possible SO<sub>2</sub> gas leakage from the battery systems</li> </ul>	Chemical hazard should be considered in the safety plan
Request For Proposal Process	<ul style="list-style-type: none"> <li>➤ No standards for procurement process</li> </ul>	Possible delays due to lack of standards
Knowledge	<ul style="list-style-type: none"> <li>➤ Limited in-house experience with battery energy storage systems</li> </ul>	The balance of in-house participation and resource constraints when internal knowledge of the new technology is limited
Non-standard Equipment	<ul style="list-style-type: none"> <li>➤ No standard developed for the BESS components</li> <li>➤ Operational, maintenance procedures were developed specifically for this system</li> <li>➤ Extra time and effort were required to train personnel and develop operating order</li> </ul>	Extra effort required to operationalise non-standard equipment
BESS Controls	<ul style="list-style-type: none"> <li>➤ Integration of the controls of the different systems was not seamless</li> </ul>	A centralized control interface would greatly improve the operation of BESS
BESS Management Systems	<ul style="list-style-type: none"> <li>➤ Human Machine Interface (HMI) was not developed for the whole system</li> <li>➤ HMI was available for the individual components (IntelliRupter, SMS)</li> </ul>	Extra effort to train with less user-friendly management system interface. Simplified HMI for ease of use for crew and operation centre personnel is not available
Telecom Design	<ul style="list-style-type: none"> <li>➤ Satellite, communication network was not available due to location and terrain of battery site</li> </ul>	Additional infrastructure needed to provide telecommunications (new poles, fibre section)

Thank you for your time.



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