

**From:** gbennett@nalcoreenergy.com  
**Sent:** Wednesday, July 30, 2014 8:39 PM  
**To:** Bown, Charles  
**Cc:** Ed Martin; Karen O'Neill  
**Subject:** Re: MF Costs  
**Attachments:** bod\_update\_dec\_2013.pdf

Charles,

We flagged the trend to the Board at financial close with the same level of detail as provided to the Province at the time.

The deck used with the Board is attached....

G



bod\_update\_dec\_2013.pdf

 <p><b>nalcor</b> energy LOWER CHURCHILL PROJECT</p>	<p><b>Gilbert J. Bennett, P. Eng., FCAE</b>  <b>Vice President</b>  <b>Lower Churchill Management Corporation</b>  a Nalcor Energy company  t. 709 737 1836 f. 709-737-1782  e. <a href="mailto:gbennett@nalcoreenergy.com">gbennett@nalcoreenergy.com</a>  w. <a href="http://muskratfalls.nalcoreenergy.com">muskratfalls.nalcoreenergy.com</a></p>
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"Bown, Charles W." —07/30/2014 05:55:28 PM---Karen; Ed's phone is on the fritz and he cant access email and contacts.

**From:** "Bown, Charles W." <cbown@gov.nl.ca>  
**To:** Karen O'Neill <KONeill@nalcoreenergy.com>, Gilbert Bennett <GBennett@nalcoreenergy.com>,  
**Cc:** Ed Martin <emartin@nalcoreenergy.com>  
**Date:** 07/30/2014 05:55 PM  
**Subject:** MF Costs

Karen;

Ed's phone is on the fritz and he cant access email and contacts.

the Committee is looking for the details on the change in cost from 6.2 to 6.5 and from 6.5 to 6.9 to address questions that we may get at our media briefing tomorrow. ed has advised that you have a deck that details this information and that it would be very helpful to us in preparing for tomorrow. it would be greatly appreciated if you could send me a copy at your earliest convenience.

Charles

Sent from my iPad

"This email and any attached files are intended for the sole use of the primary and copied addressee(s) and may contain privileged and/or confidential information. Any distribution, use or copying by any means of this information is strictly prohibited. If you received this email in error, please delete it immediately and notify the sender."

# Project Update

18-Dec-2013

Boundless Energy



*Confidential and Commercially Sensitive*



# Agenda

- Safety Moment
- Background Information
- Value Update
  - Cost
  - Revenue
  - Quality
  - Status update from DG3

Take a  
**MOMENT**  
for Safety



IF ONLY ALL HAZARDS WERE THIS OBVIOUS

Whether it's skinning wires or opening a new box of office paper, protect your hands by using the right tool in the right way. And always wear protective gloves.

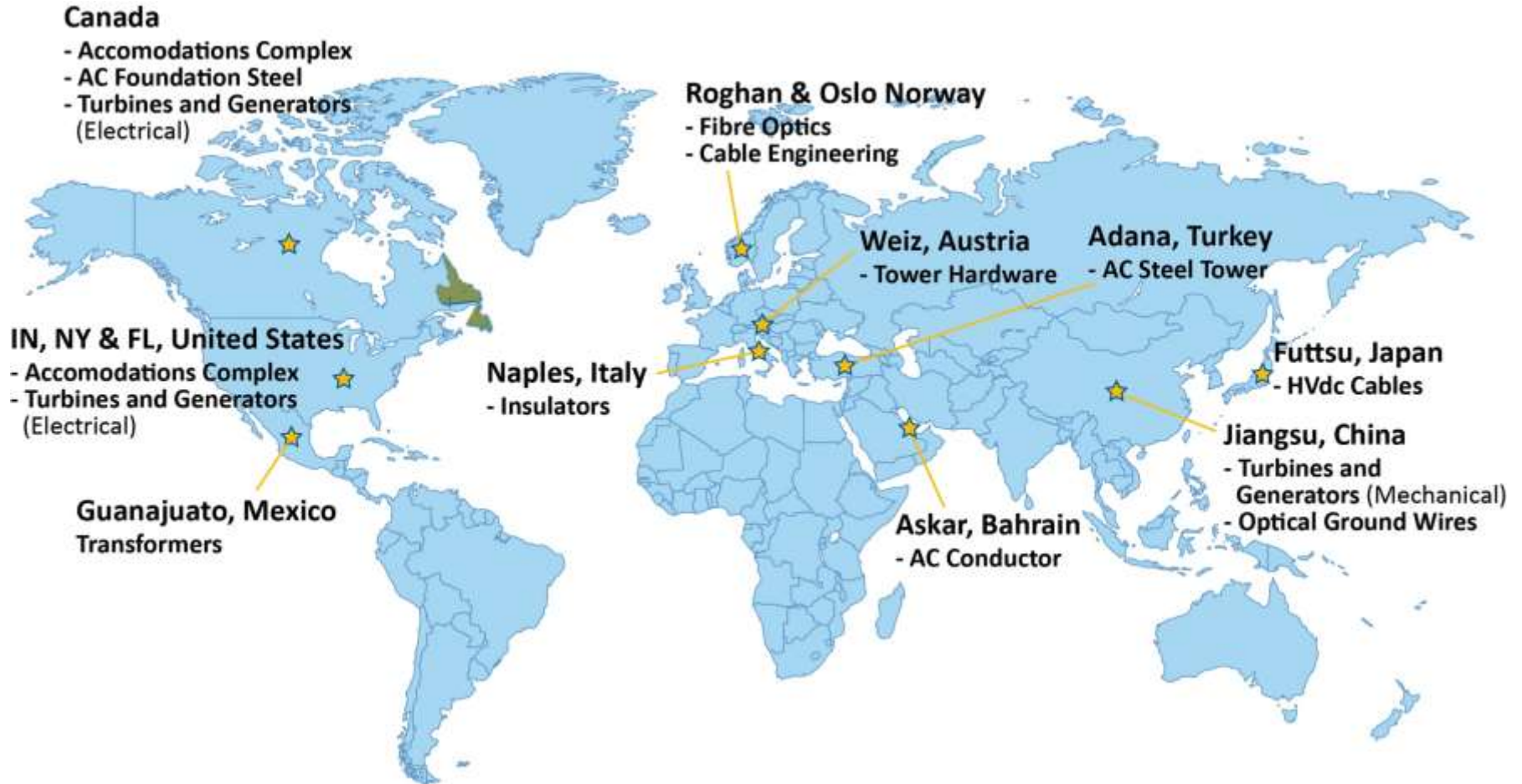
Take a  
**MOMENT**  
for Safety



# Background Information

- Project Engineering >90% complete
  - Detailed engineering completed by year end
- Procurement
  - ~2/3 of total value awarded/ready to be awarded
  - LNTP issued for both major MF civil works and hydro mechanical equipment
  - Award of AC transmission line construction imminent
- Construction
  - Productivity generally aligned with expectations
  - Bulk excavation critical milestone achieved

# LCP Global Reach





# CH0006

## Bulk Excavation

<b>Contract Award:</b>	<b>09-Nov-2012</b>
<b>Cofferdams Complete:</b>	<b>01-Nov-2013</b>
<b>Spillway Excavation Completed:</b>	<b>02-Sept-2013</b>
<b>Powerhouse Excavation Completed:</b>	<b>25-Oct 2013</b>
<b>Substantial Completion;</b>	<b>31-Dec-2013</b>

# Powerhouse Excavation January 2013

CIMFP Exhibit P-03555

Page 10



# Power house Excavation- General View Looking Downstream



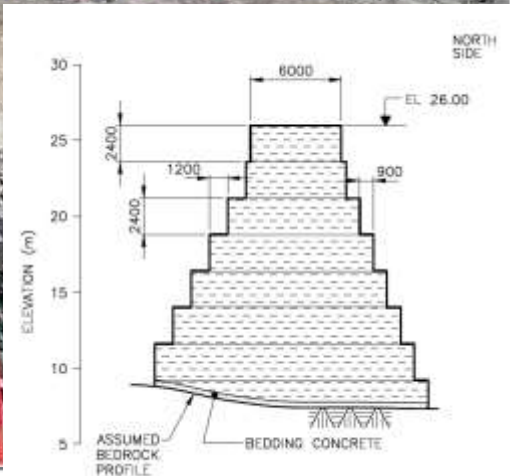
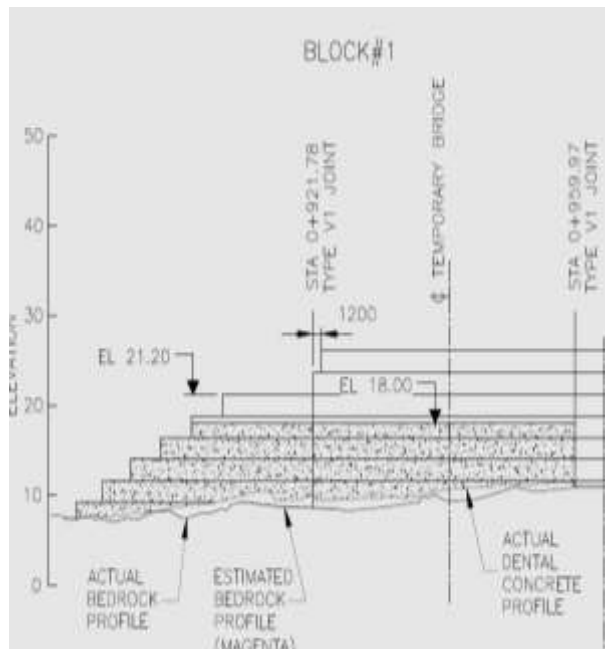
# Powerhouse Excavation September 2013

CIMFP Exhibit P-03555

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# RCC COFFERDAM



# Critical Milestone Achieved

## Riverside RCC Cofferdam Completion 31-Oct-2013



# Muskrat Falls – Switchyard & Converter Earthworks (Site Grading)



# MF Infrastructure





# Churchill Falls - Switchyard Earthworks (Site Clearing)



# SOBI Cable Manufacture

## Stranding



## Paper Lapping



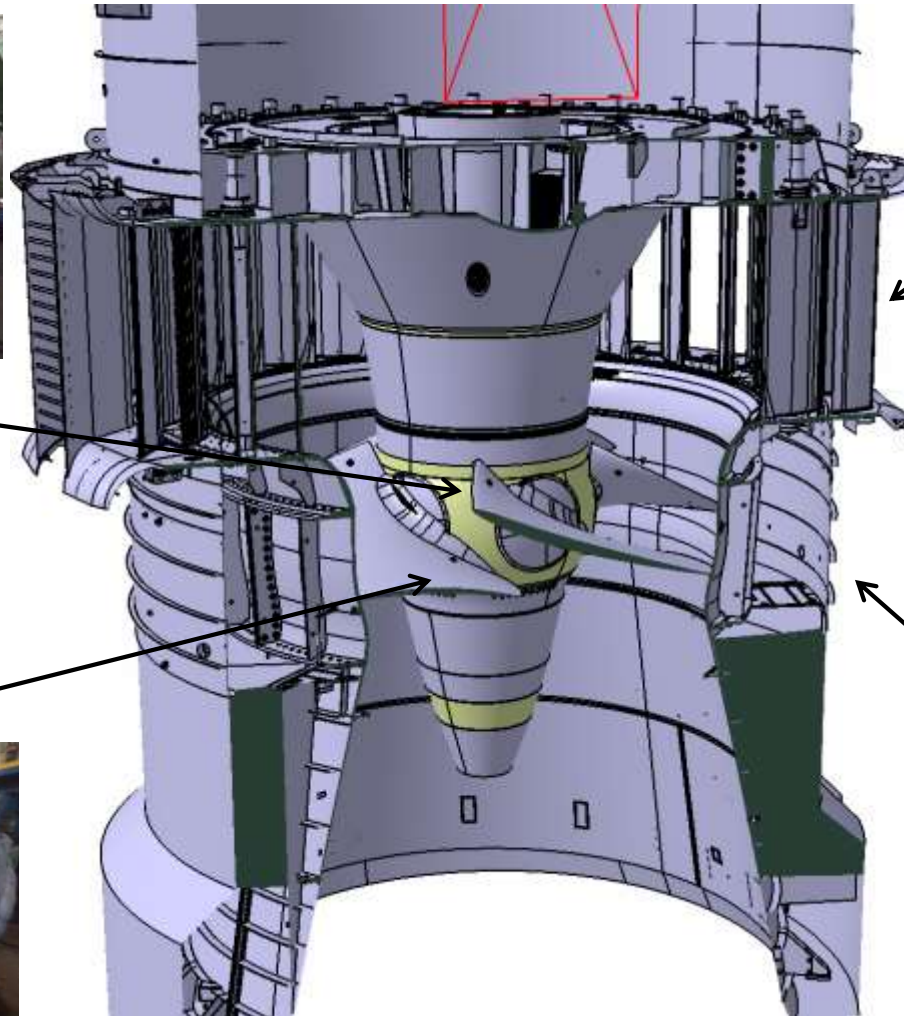
## Drying and Impregnation Vessel



# Turbine Fabrication



Runner Hub



Runner Blades



Stay Ring



Circular Passage Liner

# AC Right of Way Clearing



# 1<sup>st</sup> Batch of TL Towers Arriving *Goose Bay Port*



# 2<sup>nd</sup> Batch of AC Towers being Bundled

## *SARA, Turkey*



# Background Information

- Safety
  - Relentless commitment to safety
  - Positive safety culture emerging at work sites
  - ~4.0 million person hours worked, 1 LTI
- Quality
  - Positive geotechnical conditions combined with prudent execution resulting in high quality excavated surfaces
  - Design progression has resulting in selective enhancements to improve overall reliability
  - Infrastructure enhancements implemented to drive labour productivity

# Background Information

- Labour
  - Collective agreements negotiated and implemented
  - Project workforce = 1,500. No issues with recruitment
- Aboriginal
  - IBA procurement commitments exceeded
  - >100 Innu working on site
  - 20% of Labrador workforce = aboriginal
- NL and Canadian Benefits
  - NL engineering commitments satisfied
  - 76% of project workforce = NL residents
  - 20% NL workforce = female



# Components of Project Value

- Overall project value is a function of revenue, cost, quality/reliability, schedule
- Costs are comprised of three main categories:
  - Facilities capital (incl. in CPW analysis)
  - Operating costs (incl. in CPW analysis)
  - Financing costs (incl. in CPW analysis)
- Revenue comprised of:
  - PPA revenue (incl. in CPW analysis, a function of revenue requirement)
  - value from excess power sales and other storage/transmission opportunities (not incl. in CPW analysis)

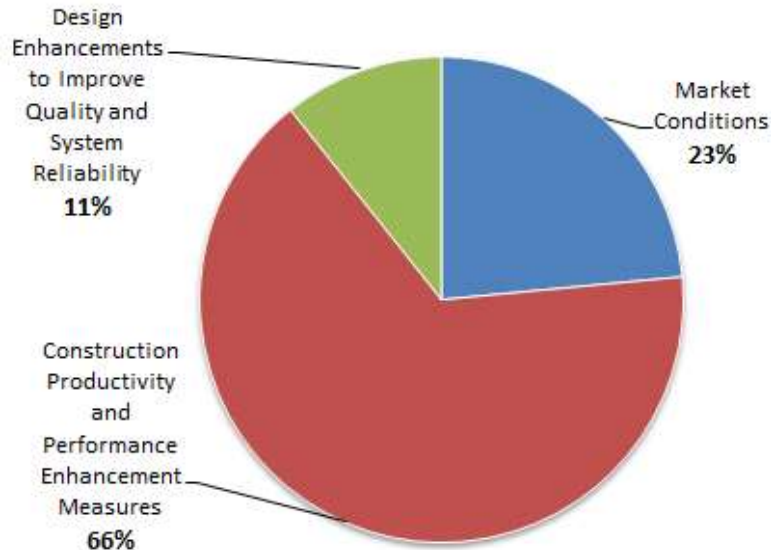
# Key Changes from DG3

- Facilities Capital Cost (+5%)      ↑ ~ \$300mm
- Financing Costs (NPV)      ↓ ~ \$300mm
- Excess Sales/Other Value      ↑ ~ \$100mm
- Quality/Reliability
  - enhanced from DG3
- Schedule
  - 2017 power achievable
  - Focus continues on optimization for resource leveling and execution effectiveness

# Capital Cost Update

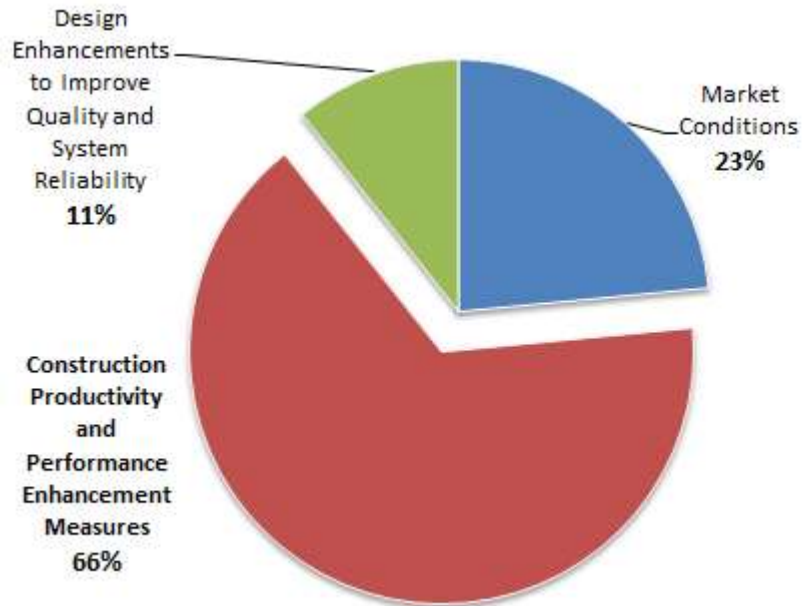


# Cost Growth – 3 Categories



- >2/3 of total cost growth used in investments related to Construction Productivity and Performance Enhancement in order to mitigate construction execution challenges
- Significant investment in design enhancements to improve system reliability
- Market Conditions reflective of current buoyant local / national market.

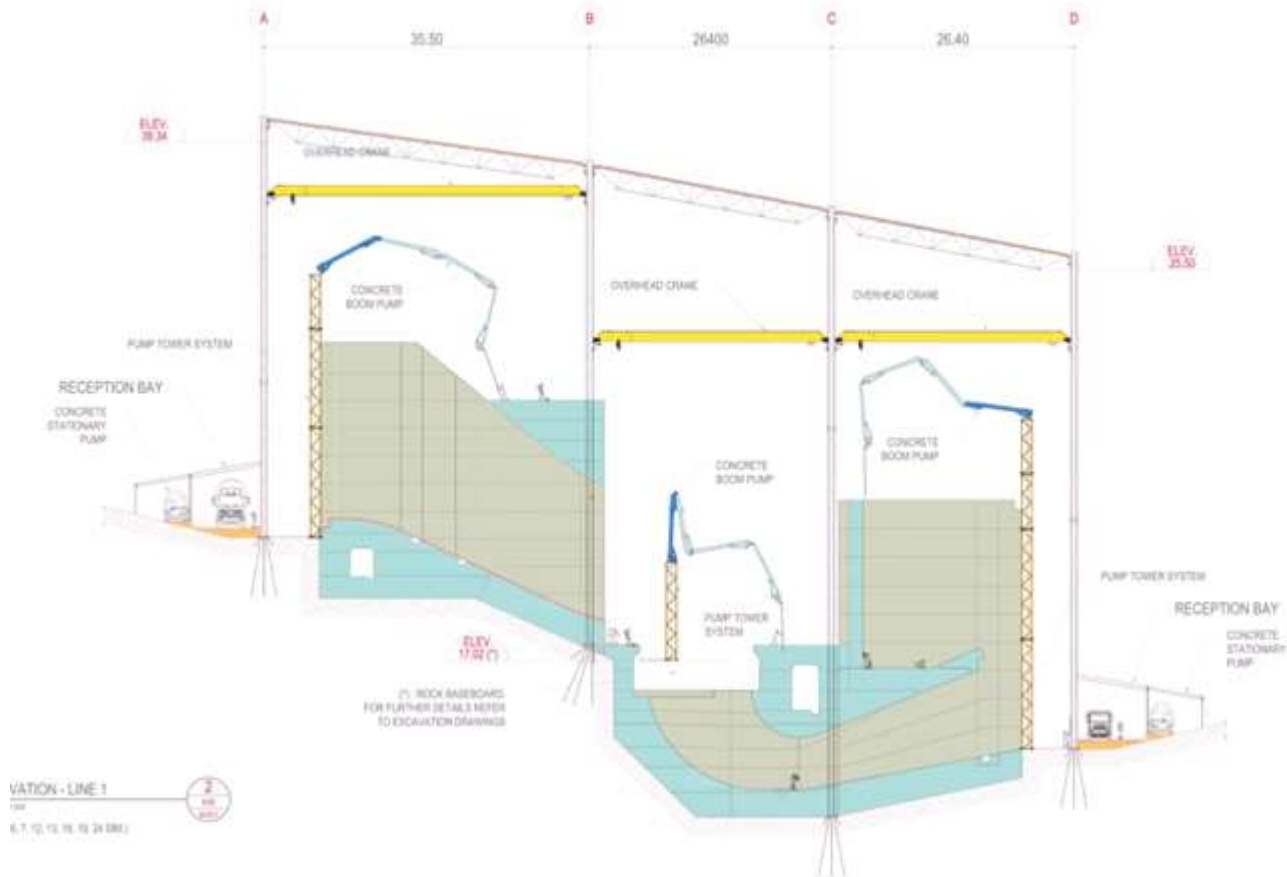
# Category 1: Construction Productivity and Performance Enhancement Measures



## Strategic Investments Include:

- Enclosure of Powerhouse to provide safer working conditions, increased productivity, longer continued employment opportunities for workforce
- Enhanced camp and recreational complex as well as catering to increase worker attraction and retention
- Starter camp to support Bulk Excavation
- Change diversion window from 2015 to 2016 to reduce weather window risk on spillway construction
- Significant site infrastructure upgrades – e.g. laydown area expansion to increase overall efficiencies and productivities
- Extensive investment in environmental mitigations to reduce risk of construction delays
  - Site Water Controls
  - Historical Resource Recovery

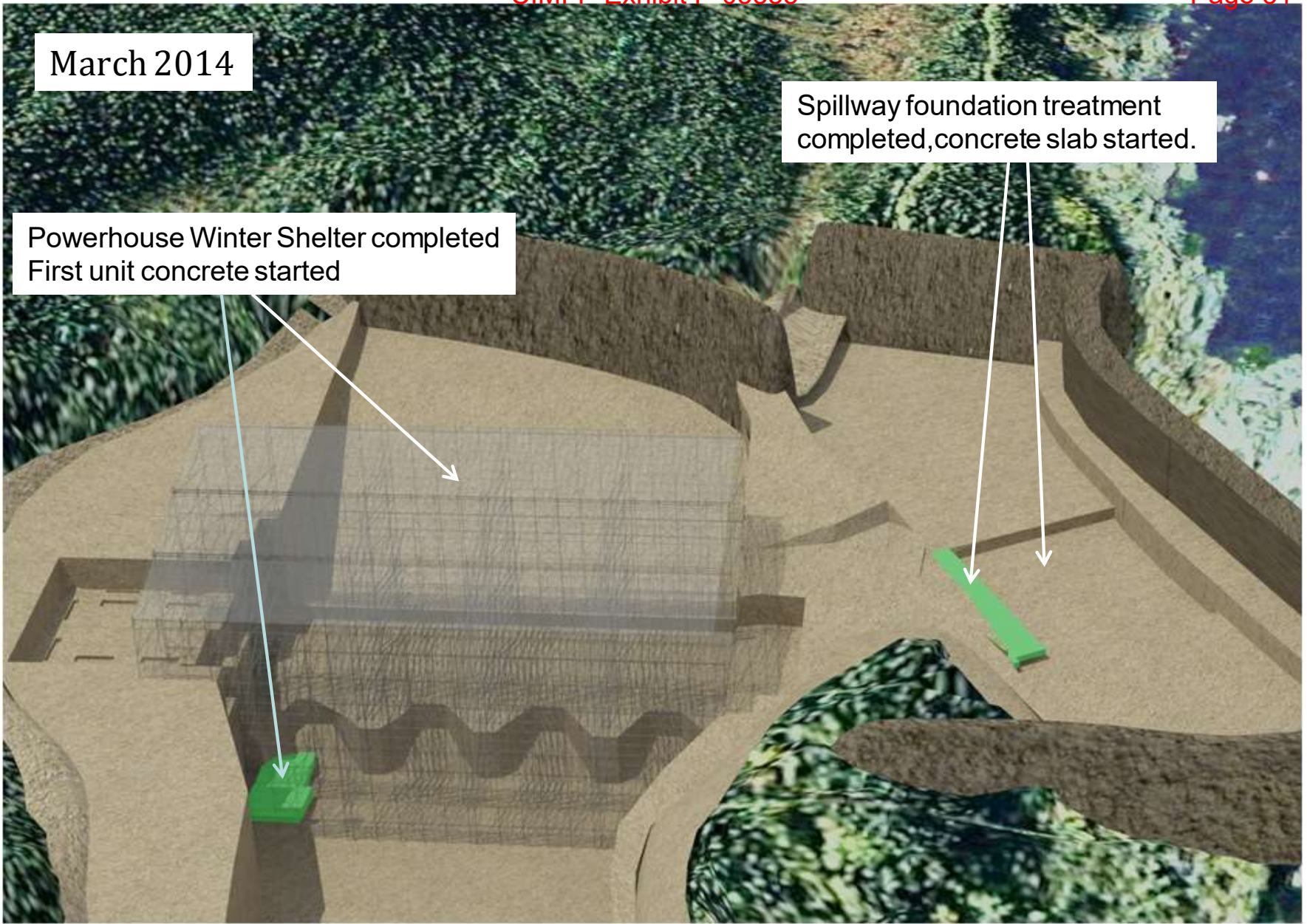
# Astaldi's Integrated All-Weather Cover System



March 2014

Spillway foundation treatment completed, concrete slab started.

Powerhouse Winter Shelter completed  
First unit concrete started



# MF Laydown Area Expansion





# MF Accommodations / Administration Complex



# New Accommodations Camp - Churchill Falls



# TL Material Marshalling Yard



# Site Water Controls



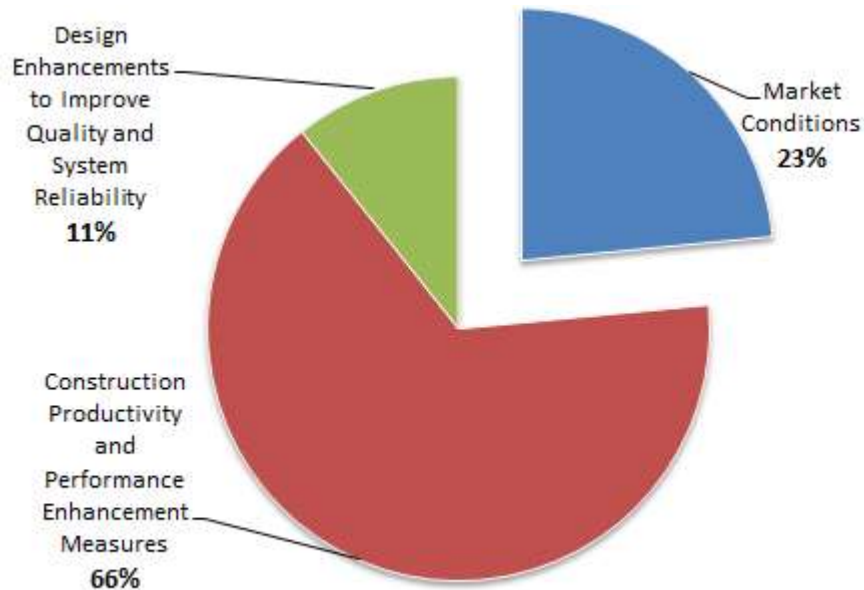
# Historic Resources Recovery



# Churchill River 25kV Line Crossing

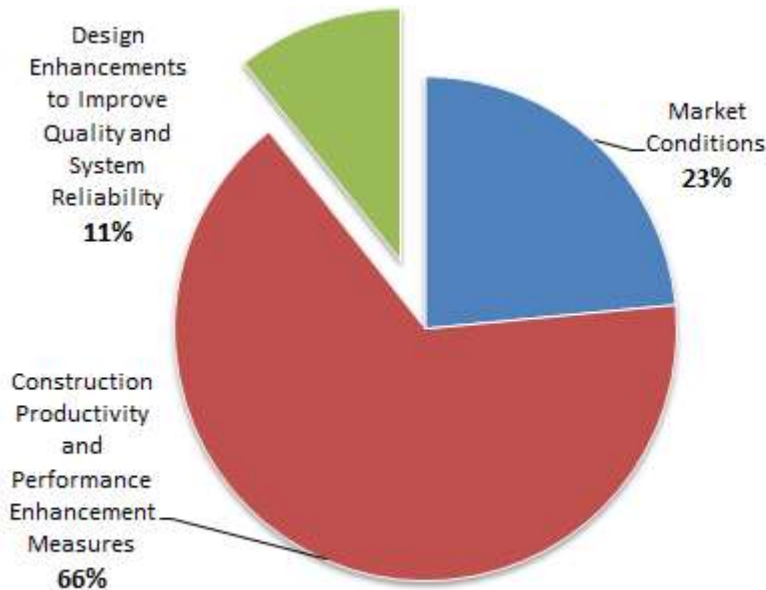


## Category 2: Market Conditions



- Increased contractor margins and risk premiums driven in-part due to contractor's negative views on labor productivity and performance
  - Influenced by the Vale Long Harbour experience
  - Industry trends due to departure of experienced workers
  - We are actively managing this perception
- Permanent plant equipment and material supply cost have been either better or comparable than DG3 estimate, including:
  - SOBI Cable
  - Turbine and Generators
  - Transmission Hardware & Steel
  - Powerhouse Crane

# Category 3: Design Enhancements to Improve Quality and System Reliability



## Substantiate Design Enhancements:

- Use of 5 low-level vertical gates in spillway to improve winter operation reliability
- Spillway discharge channel concrete liner to remove risk of potential erosion
- North Spur cut-off wall extension
- Procurement of additional critical operational spares
- Addition of 2<sup>nd</sup> service bay on North Side of Powerhouse to provide operational flexibility
- Increased reliability in TL beyond initial design return period expectations
  - Use of low temperature steel for HVdc TL
  - Additional foundation corrosion protection
  - Higher utilization factor for AC TL towers



# 315kV Tower Type "D" Prototype Testing



# Protecting Our Investment

- Lump sum or unit price contracts
  - Contractor holds performance accountability
- Category 1 investments to reduce execution risk (Schedule, labor, infrastructure)
- Capped labor exposure with Astaldi using Lmax
- Framework negotiated with Astaldi to expand scope to include N. Spur and Dams
  - Target Price reduces by \$40 million
  - Home overhead, Indirect and equipment cost covered within CH0007
  - Fixed Profit
- Expanding the traditionally local civil subcontractor marketplace for EPC contractors to avail of during preparation of their RFP responses

# Construction Management Update

- H&S Management
  - Maintaining relentless commitment to Zero Harm – Nobody Gets Hurt
  - New initiatives including rollout of Nalcor’s “Take a Moment for Safety” program
- Contractor Performance Management
  - Tier 1 contractors, with “A Execution Teams” identified through comprehensive prequalification and bid evaluation
  - Performance accountability of contractors maintained through fixed and firm or unit price arrangements
- Labor Management
  - Positive experience to-date – good productivity, minimal grievances
- Interface and Integration Management
  - Strong Project Delivery Team in-place actively managing key interfaces