EXECUTIVE SUMMARY
Borden Gold ‘*Mine of the Future’*

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- Goldcorp’s Borden Gold *‘Mine of the Future’* project will be the first underground mine in Canada to replace all diesel mobile equipment with Battery Electric Vehicles (BEVs)
- Historically, mining is a capitally intense industry which reduces risk appetite.
- Partnering with like-minded suppliers, Government and First Nations to commercialize clean technologies, reduce GHG emissions, modernize the regulatory regime and improve the social acceptability of the industry.
- The impact of this project will transform the industry and beyond.
- Strong environmental, health and safety, and economic co-benefits.

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Goldcorp is a Canadian, publicly traded company with production of 3 to 4 million ounces of gold across 6 large scale mining operations, 3 of which are in Ontario.

We employ over 15,000 people globally and more than 3,000 in Ontario.

Across our operations, we are focused on improving our environmental performance by reducing water and energy use, and driving down GHG emissions.

Safe, sustainable and responsible mining is a company-wide commitment rooted in our values as an organization.

Together, Creating Sustainable Value

GOLDCORP IN ONTARIO

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- 3,000+ Ontario employees
- 99% jobs located in Northern Ontario
- 22 Agreements with First Nations
- 19% of Ontario's gold reserves
- ~50% Ontario's Gold prod.
- 180+ years of combined continuous operations
- $1.4B in GDP created and $300 M in total Gov't revenues.

- Musselwhite Mine
  811 employees 270,000 oz
- Red Lake Gold Mines
  1,100 employees 378,000 oz
- Porcupine Gold Mines
  1,100 employees 315,000 oz
- Borden Gold Project
  Borden Gold is a new greenfield project near Chapleau, Ontario, ~200 KMs southwest of our Porcupine Gold Mines facility in Timmins
- Toronto Office

HISTORY OF CHAPLEAU

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- In 1885, CP Rail came to town.
- Pulp and paper was a large employer but economic conditions led to many layoffs.
- At its peak, the town had a population of 5000 people.
- The town has been shrinking since 1950 and currently less than 2000.
- Currently 4 distinct communities lives in the surrounding of the mine.

WHAT IS SPECIAL ABOUT BORDEN

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Borden Gold – Safe – Simple – Green – Silent – Invisible & Inclusive Project

- Together Creating Sustainable Value.
- An efficient mine where innovation, digitization and automation will play a key role.
- A focus on inclusion, consultation with local communities, local procurement and employment.
- A low carbon footprint and robust economics.
- All underground diesel equipment will be replaced with Battery Electric Vehicles (BEVs)
- Reduced noise pollution
- No camp – using community facilities in Chapleau
- Remaining geological potential across 900 sq km of claims in a new mining region.

GOLDCORP'S CRITICAL INGREDIENTS FOR INNOVATION

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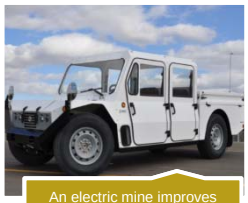
1. ***Just do it….***so we stop doing what we've done in the past.

2. ***Be a catalyst, challenge others to innovate….*** so we can Meet and exceed gov't, community, employee and societal expectations.

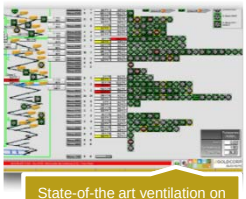
3. ***Design together*** **(partner)…**and design and build the 'Mine of the Future' together.

INNOVATION AT BORDEN GOLD

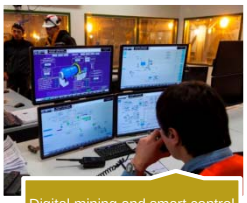
- Adaptation and use of innovative and novel clean energy technologies will improve environmental and health and safety performance.
- Energy efficient and reduction of GHG also makes the mine more efficient and productive



An electric mine improves maintenance costs, eliminates fuel and reduces GHGs.



State-of-the art ventilation on demand drives further cost reduction and energy efficiency



Digital mining and smart control technologies

Tele-remote equipment to allow for more continuous mining

Conservation and demand management

Renewable energy, biomass or energy storage

FULL BEVs AT BORDEN GOLD

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All diesel equipment replaced with Battery Electric Vehicles (BEVs), with annual reductions of:

- **6,600 tCO2e** of GHG emissions (70%).
- **2 M liters** of diesel and **1 M liters** of propane.
- **33,000 MWh per year** because of huge reduction in ventilation requirements.
- **4 MWs ($2M annually)** less Provincial Global Adjustment to pay.
- Electric engines are **3x** more efficient than diesel equivalent.
- **Total OPEX of $8 Million not including health and safety benefits and productivity gains.**

Comes with….

- **Health and safety** performance improvements
- **Diesel Particulate Matter** is classified as a **known carcinogenic.**
- **No diesel and less propane on the road** to heat underground / surface air.

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PARTNERING WITH TECHNOLOGY SOLUTIONS PROVIDERS

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- To support the vision of the Borden project, Goldcorp approached all major mining equipment suppliers with expanding Battery Electric programs (Atlas Copco, Caterpillar, GE, MacLean, Sandvik, RDH, Normet, Marcotte).
- The discussion focused on the best fit for Borden's needs (14 yd^3 scoops, 40 t trucks, state of the art drills - with automation capability, robust bolters, utility vehicles and a grader.
- Overall, the best fit for Borden was a fleet comprised of equipment from Sandvik and MacLean.
  - **Scoops**: Sandvik LH 514 E – tethered electric
  - **Trucks**: Sandvik TH 54-0 diesel - with a firm commitment to a 40 T battery truck
  - **Drills**: Sandvik DD 422i
  - **Bolters**: MacLean MEM 975 Scissor Bolter
  - **Utility Vehicles**: MacLean Cassette Carries and Scissor Lift
  - **Grader**: MacLean conversion of a Cat 12 M2 diesel grader
  - **Personnel Carriers** Multiple options
- The business reasons supporting this decision were:
  - Safe Production: On Board batteries - no swapping of batteries and proven technology
  - Technology: Tele remote scoops and automation-ready drills
  - Scale: 14 yd3 scoops and 40 t trucks

SANDVIK EQUIPMENT

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Scoops : Sandvik 14T LHD

- Teleoperated capable from surface via Wifi (100%)
- Tethered unit has no battery
- Will only perform when powered to the grid
- https://vimeo.com/162330918

Trucks: Sandvik 40T truck

- Sandvik committed to delivering a 40T BEV truck by 2020
- Challenge is duty cycle 17% ramp and 2 km without recharging
- We have alternatives to achieve an electric mine.

Drills Sandvik Drill

- On board charger, charges while drilling
- System has approx. 4 years of testing in Sandvik UG test mine
- Total tramming distance 14 km on flat ground 5 km on 1:7 ramp

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Canadian Company, MacLean, leading the way in product development

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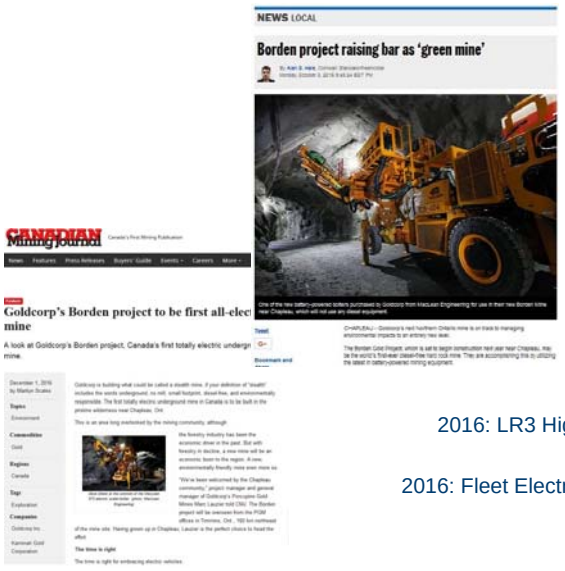
NEWS LOCAL

Borden project raising bar as 'green mine'

CANADIAN Mining Journal

Goldcorp's Borden project to be first all-elec mine

A look at Goldcorp's Borden project, Canada's first totally electric undergr mine.

1974: Long Tom Drill
1981: Blockholer Drill
1988: Scissor Bolter
2001: Block Caving Product Suite
2004: Utility Vehicle Product Suite
2015: Mobile Rockbreaker
2015: Cable Bolter
2015: High-Reach Bolter
2016: LR3 High-Reach/Heavy-Load Utility Vehicle
2016: Face Bolting
2016: Fleet Electrification – battery electric propulsion

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MACLEAN ENGINNEERING EQUIPMENT

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Currently purchased:

- Boom Truck
- Cassette Truck
- Scissor lift
- Emulsion loader
- Bolter

- Every unit has a on board charger
- Charge with conventional underground extension cord
- Limited autonomy compare to diesel
- Require to take advantage of opportunity charge

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MACLEAN BOLTER

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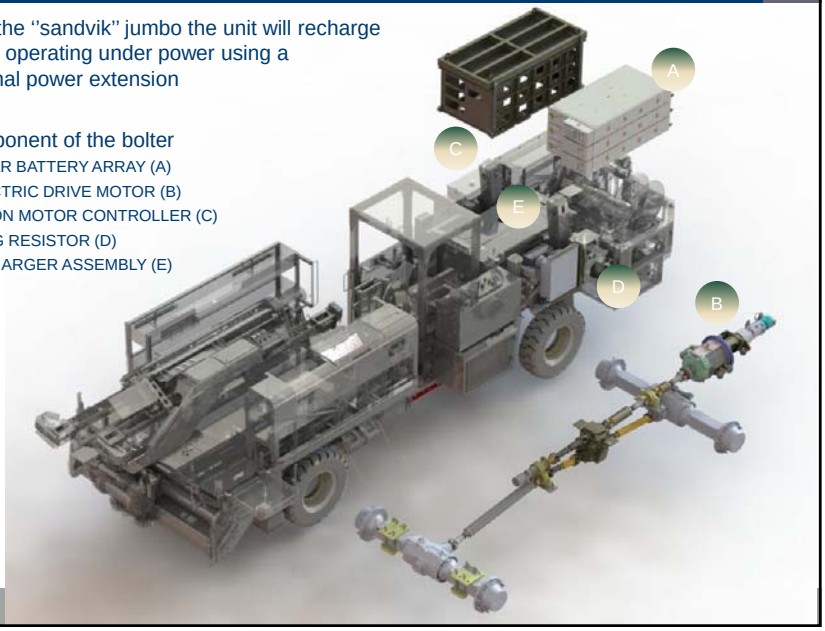
Similar to the ''sandvik'' jumbo the unit will recharge itself while operating under power using a conventional power extension

Main component of the bolter

- MODULAR BATTERY ARRAY (A)
- DC ELECTRIC DRIVE MOTOR (B)
- TRACTION MOTOR CONTROLLER (C)
- BRAKING RESISTOR (D)
- DUAL CHARGER ASSEMBLY (E)



MacLean Battery Bolter:
Hill Test (Duntroon Highlands - October 2015)

BATTERY CHEMISTRY: HIGH DENSITY / HIGH PERFORMANCE

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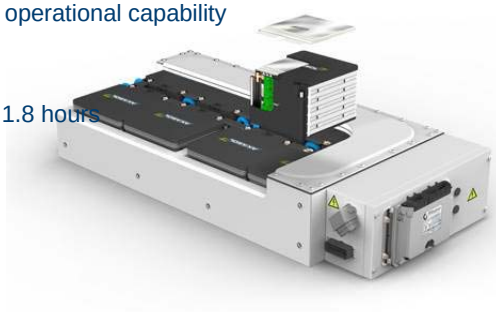
- Proven, best-in-class technology:
  - Lithium Ion/Manganese/Nickel/Cobalt battery chemistry
- Sourced from Established European Battery Supplier:
  - Global leader in battery development and industrial integration
- 30.67 kw per module:
  - Stackable
  - Each module has stand-alone operational capability
- Capable of 6200 charge cycles
  - Charge rate 40 kw/h
  - Complete (80%) charge cycle 1.8 hours
- Battery management system:
  - internal cooling (liquid)
  - cell capacity
  - charge level



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BATTERY ELECTRIC MOBILE FLEET

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Equipment	Model	kW Rating	Quantity
Jumbo	AC Bommer M2D-Battery	179	3
Truck	AC Mine Truck MT 42	414	5
Bolter	AC Boltec S Battery	113	3
Drill rig	AC Simba S7 C – Battery	113	2
Boom truck	E-BT3 Boom	93	2
ANFO loader	AC3 ANFO Charger	93	3
Scissor lift	McL SL3 Scissor lift	31	2
Block holer	Mcl E-BH3	93	1
Grader	E-Grader (estimate)	93	1
Personel carrier	Marmot-EV	95	5
Tractor	E-mine Cat (estimate)	93	5
Shotcreter	McL E-SC3	93	1
Mixer	E-Concrete Mixer (estimate)	93	1
Scoop	AC Scooptram ST14	414	5
Scoop	AC Scooptram® Model BEST 7	259	2
	Total Number of Units		41

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SUMMARY OF VENTILATION REQUIREMENTS

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Estimated ventilation requirement

Based on the requirement for year 2022

Battery equipment will offer a ventilation reduction of 40% over a diesel fleet

This is with no VOD in both cases

Battery fleet will require higher capital but will reduce OPEX requirement

Electricity consumption will decrease with a fleet of electric equipment

Air Usage	Diesel Fleet Airflow (m^3/s)	Battery Fleet Airflow (m^3/s)
Development	65.7	36.0
Production	88.9	24.0
Backfill	59.5	24.0
Infrastructure	45.0	45.0
Inactive Levels	20.0	20.0
Distribution Factor	51.8 (20%)	15.7 (10%)
Safety Factor	38.9 (15%)	23.6 (15%)
Total Mine Air	**369.8**	**216.3**
CFM/Tonne Mined	0.97	0.57

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PROJECT TIMELINE

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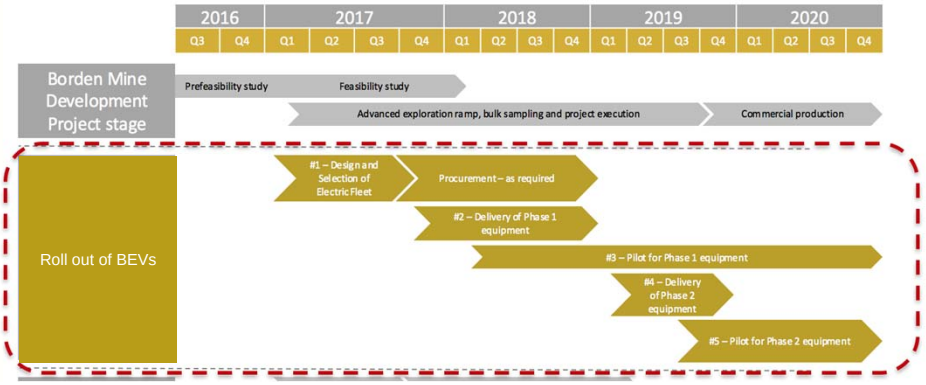

BENEFITS OF BATTERY ELECTRIC

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Benefits

- Elimination of all air quality issues associated with dust generation and diesel exhaust porting
- Elimination of all DPM and all emissions associated with diesel engines
- Elimination of the diesel fuel expense
- Elimination of fuel distribution and storage expense
- Elimination of diesel engine service and scheduled maintenance expenses
- Elimination of a potential source of ignition, as a result of no diesel exhaust components or shielding
- Elimination of all noise, vibration and heat generation traditionally associated with diesel engines
- Overall reduction of ventilation required to match Horse Power Ratings underground
- Overall reduction of energy required to heat ventilation air
- Reduce site GHG footprint
- Potential to recover some of the extra capital required through Federal and provincial grant (GHG reduction program, power reduction program)

CHALLENGES OF BATTERY ELECTRIC

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Benefits

- Ramp and lateral development cross-section area can be reduced based on equipment operating parameters rather than regulatory ventilation requirements.
- Reduced sizing of the ventilation fans.
- FAR and RAR reduced to 4 m diameter based on 20 m/s maximum air velocity.
- Cost effective

Potential challenges

- Higher capital required to purchase equipment
- Tramming limitations compare to diesel
- Limited suppliers
- Suppliers with limited experience
- Unexpected complications and unproven reliability with new equipment
- Cold weather & temperature changes vs batteries
- Design criteria for ventilation not as straightforward

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PROJECT CO-BENEFITS

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- **PARTNERING** Consortiums, Gov't, OEMs, non-traditional suppliers, other industries.
  - Partnering with Glencore and CMIC to push development of high capacity BEVs (14-18 LHDs and 40 Tonne trucks).
  - Exploring Battery Electric or Hydrogen trucks to move ore from Borden to mill in Timmins.
  - Supercluster application
- **EXISTING OPERATIONS–** Goldcorp transitioning off diesel equipment at existing Ops.
- **ANY NEW BUILD** should be based on the latest clean technologies
- **ESTABLISHING WIDELY ACCEPTED STANDARDS** and compatibility will further increase rate of adoption.
- **STRONGER EVIDENCE AND DATA SETS** knowledge transfer, piloting, data will push beyond tipping and prove BEVs are equivalent or superior to diesel will de-risk adoption.
- **TURN THE PAGE ON STEREOTYPE OF MINING** and jump into the 'mine of the future'
- **MEET SOCIETAL EXPECTATIONS** and recruit the next generation of talent.
- **FIRST NATIONS inclusion**
  - Memorandum of Understanding (MOU) with 4 local First Nations (Chapleau Cree, Chapleau Ojibwe, Brunswick House First Nation and Michipicoten).

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PROJECT IMPACT AND SCALABILITY

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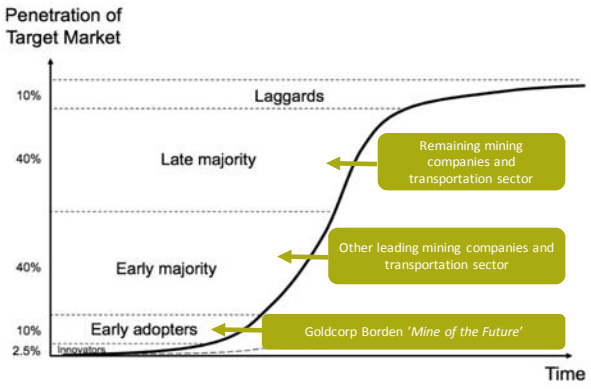
- Completely scalable within the mining industry for existing and new mines.
- Applicable to on-road transportation vehicles, construction vehicles, and farming equipment.
- We believe, conservatively, that at least 50% of new mines in Canada will be built with BEVs and that more than 50% of existing mines will replace their diesel powered vehicles with BEVs within 10 years.



PROJECT SITE (June 2017)

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THANK YOU

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TOGETHER, CREATING SUSTAINABLE VALUE