

# Cobalt Fundamentals

# SIGNIFICANCE OF COBALT FOR POWER ORE

- **Power Ore owns the past producing Mann Cobalt-Silver mine** located in the Milner Township, west of Cobalt, Ontario in the renowned Temiskaming silver district. The mine previously produced 330,000 ounces of silver prior to 1987, and has not been evaluated for its cobalt content
- Significant infrastructure in place including paved road access, 9 historic shafts, and a ramp driven to the 210-foot level
- The current global cobalt supply gap is expected to increase with production mainly coming from DRC (high-risk); Power Ore owns a cobalt asset in a safe, mining-friendly jurisdiction—Canada

[Click here to view Power Ore's Mann Mine Project Presentation](#)

# CHEMISTRY

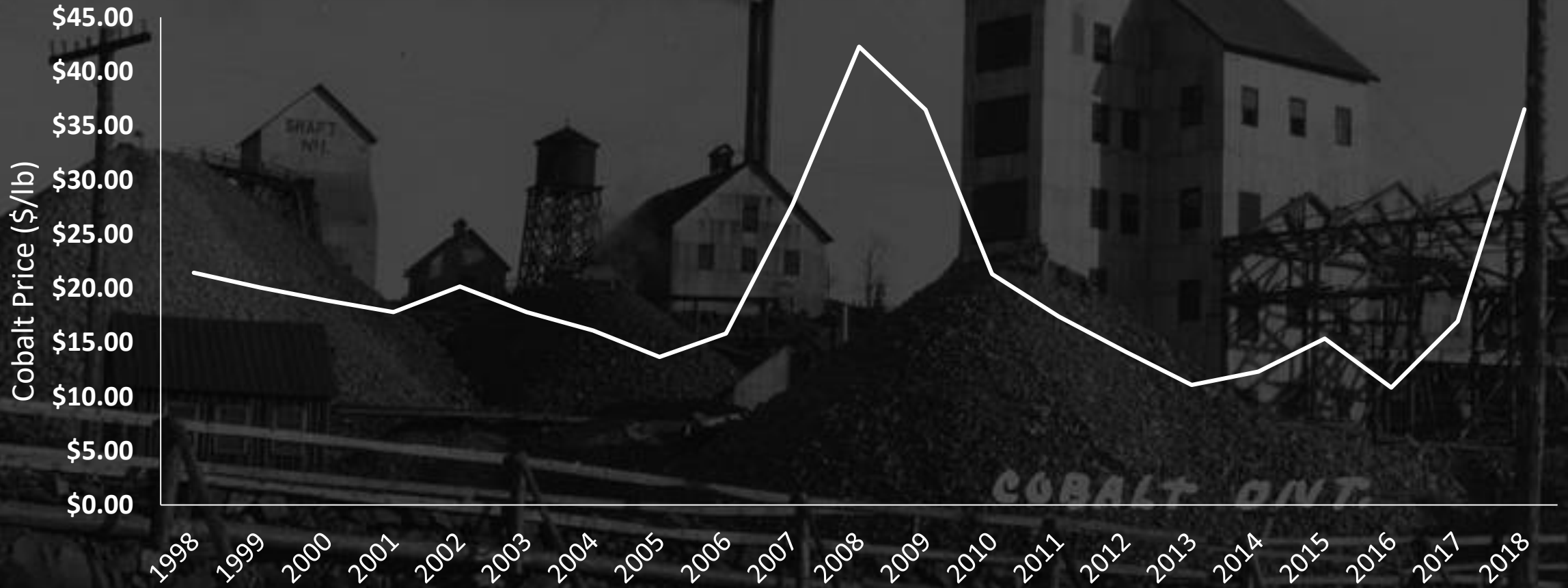
- High melting point, magnetic properties similar to those of iron
- 20-30 parts per million (ppm) in the Earth's crust
- Occurs in nickel laterites and nickel-copper sulfide deposits



# COBALT USES

- Super alloys (stellite), wear-resistant alloys (Vitallium)
- Metallic cathodes of rechargeable batteries
- Petrochemical catalysts
- Ceramic pigments

# COBALT PRICE TREND



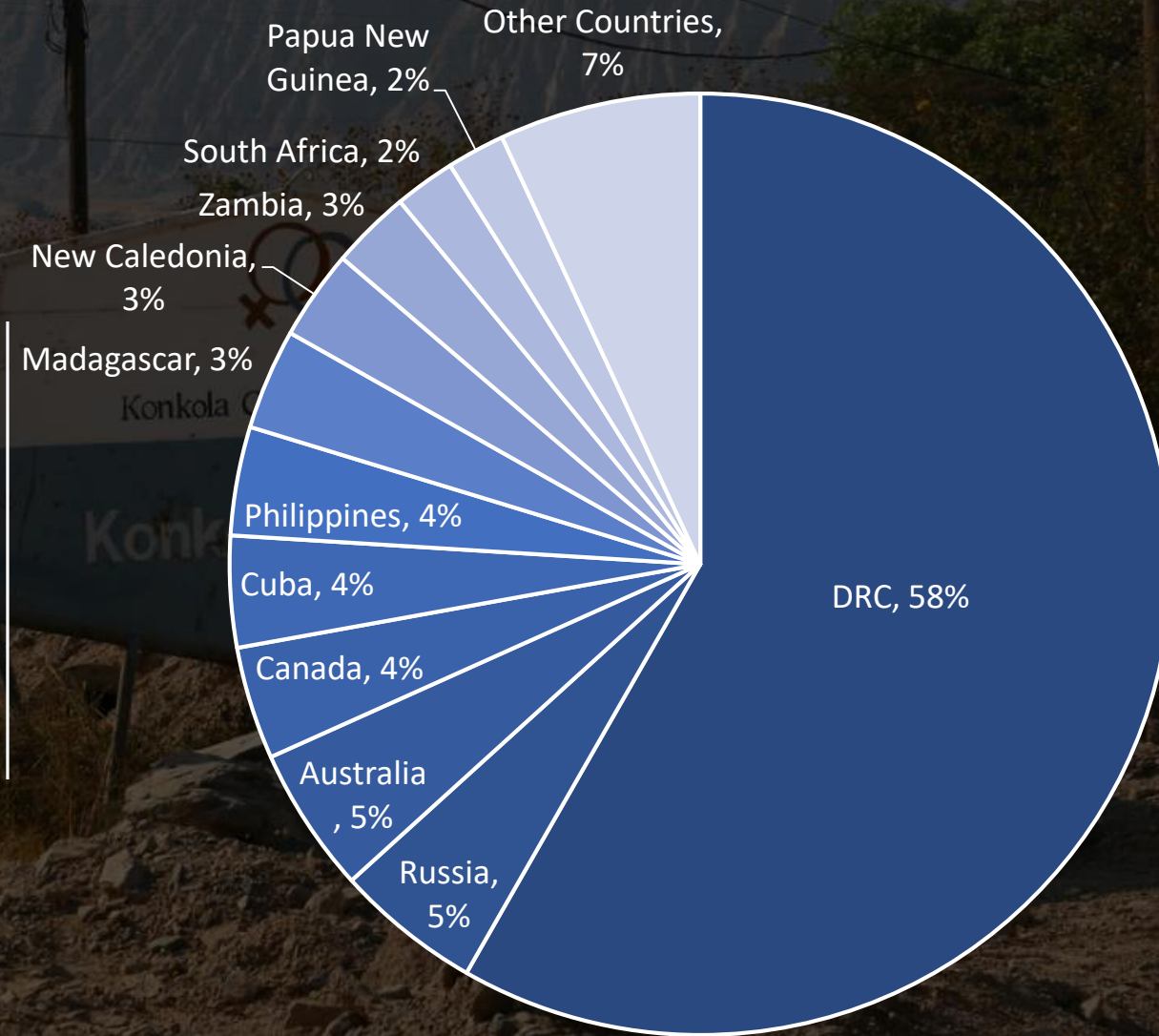


# COBALT SUPPLY

- Global production is ~100,000 tonnes
- 60% of global supply originates from Democratic Republic of Congo (DRC)
- 58% of global supply sourced as a by-product of copper mining, while majority of remaining as a by-product of nickel mining
- Only primary cobalt mine located in Morocco – Bou Azzer, produces < 2,500 tonnes
- Top 3 Cobalt mines:
  - Katanga (DRC) – 34 kt/y (by-product of Copper)
  - Mutanda (DRC) – 24 kt/y (by-product of Copper)
  - Tenke Fungurume – 17 kt/y (by-product of Copper)



# COBALT SUPPLY



Konkola Copper Mines plc  
**PRIVATE ROAD**  
NO ENTRY OF UNAUTHORISED  
VEHICLES AND PERSONS

Konkola C

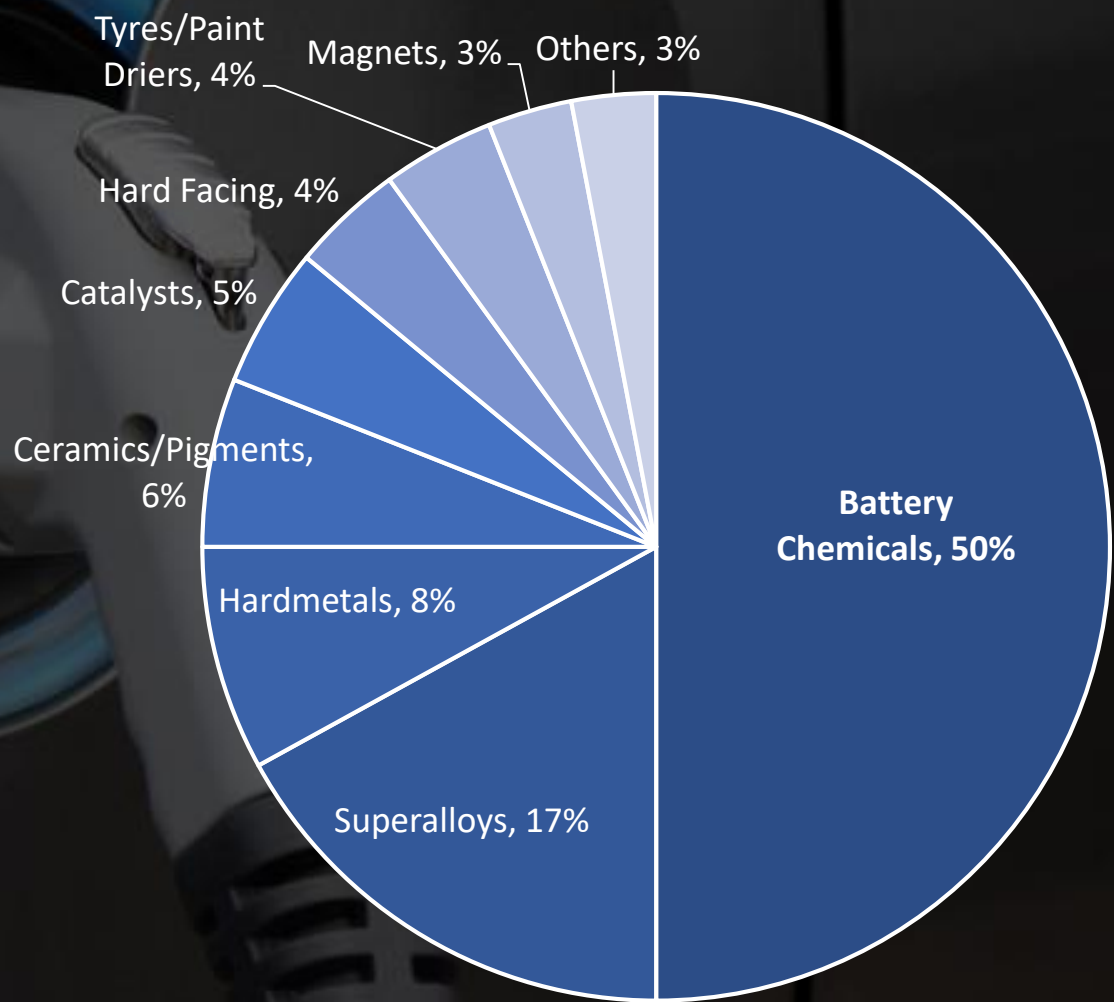


# COBALT DEMAND

- Demand growth significantly impacted by the battery sector as a result of electrification of automobiles (>50% of consumption to Lithium-Ion batteries in 2016)
- Demand for cobalt in batteries forecast to grow at 14.5% per year to 2027—to 240 kt, more than 2x current cobalt production
- Demand further exacerbated by other industries including aerospace
- Increasing demand will broaden the cobalt supply deficit unless substantial amount invested in bringing online new capacity



# COBALT DEMAND



# COBALT GEOLOGY BASICS

## Sediment-hosted Deposits

- >50% of global cobalt production, as a by-product of copper mining
- Common model for ore genesis involves metal concentration as a result of erosion of Paleoproterozoic and Archean basement terrains rich in cobalt, copper, nickel and gold, and influx of these eroded sediments into a basin, with further concentration by evaporation in an arid climate
- Example: Central African Copperbelt, spans more than 500km through DRC and Zambia

## Laterite Deposits

Occurs in tropical and subtropical climates due to intense weathering of ultramafic rocks, causing significant cobalt and nickel enrichment.

## Hydrothermal and volcanogenic deposits

- Wide range of deposit types into one major group
- Common model involves precipitation from hydrothermal fluids passing through host rock as a result of volcanic activity
- Minerals remobilized along fault planes, in veins, fissures and cracks of host rock
- Examples: Bou Azzer, Morocco; Idaho Cobalt Belt, USA; **Cobalt-Gowganda and Thunder Bay, Canada**

## Magmatic Sulphide Deposits

- Wide range of morphologies and styles of mineralization
- Metal-rich layers generally found as lenses near the base of intrusions, due to denser sulphide minerals settling out from lighter silicate-rich host rocks
- Mineralization generally massive, interstitial or disseminated sulphides
- Examples: Noril'sk, Russia; Merensky Reef, South Africa; Kambalda, Western Australia; **Sudbury, Canada**



# SUMMARY

1. Cobalt is a critical metal contained in lithium-ion batteries
2. Global cobalt supply is dominated by high-risk DRC, and the continent of Africa in general (i.e. Zambia, Morocco)
3. Demand is dominated by China, and >50% of cobalt use is towards lithium-ion batteries
4. Supply gap expected to increase given the upcoming increase in demand driven by electrification of automobiles

# CONTACT US

**Stephen Stewart**

CEO & Director

Power Ore Inc.

[SSTEWART@POWERORE.COM](mailto:SSTEWART@POWERORE.COM)

416.644.1571

1805 – 55 University Avenue

Toronto, Canada

[www.POWERORE.COM](http://www.POWERORE.COM)