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Is Mining a Renewable Energy Industry?

Brian Yates, Vice President & Regional Leader
British Columbia

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A Renewable Future

- Mining and renewable energy industries are reaching a mutually beneficial moment
- Boom in demand for solar panels and wind turbines

A Renewable Future

- Advancements in solar, wind, and other technology put cost effective renewable energy in reach
- Mining industry can realize benefits related to reduced energy costs, improved environmental performance, and enhanced social license

Is Mining a Renewable Energy Industry?

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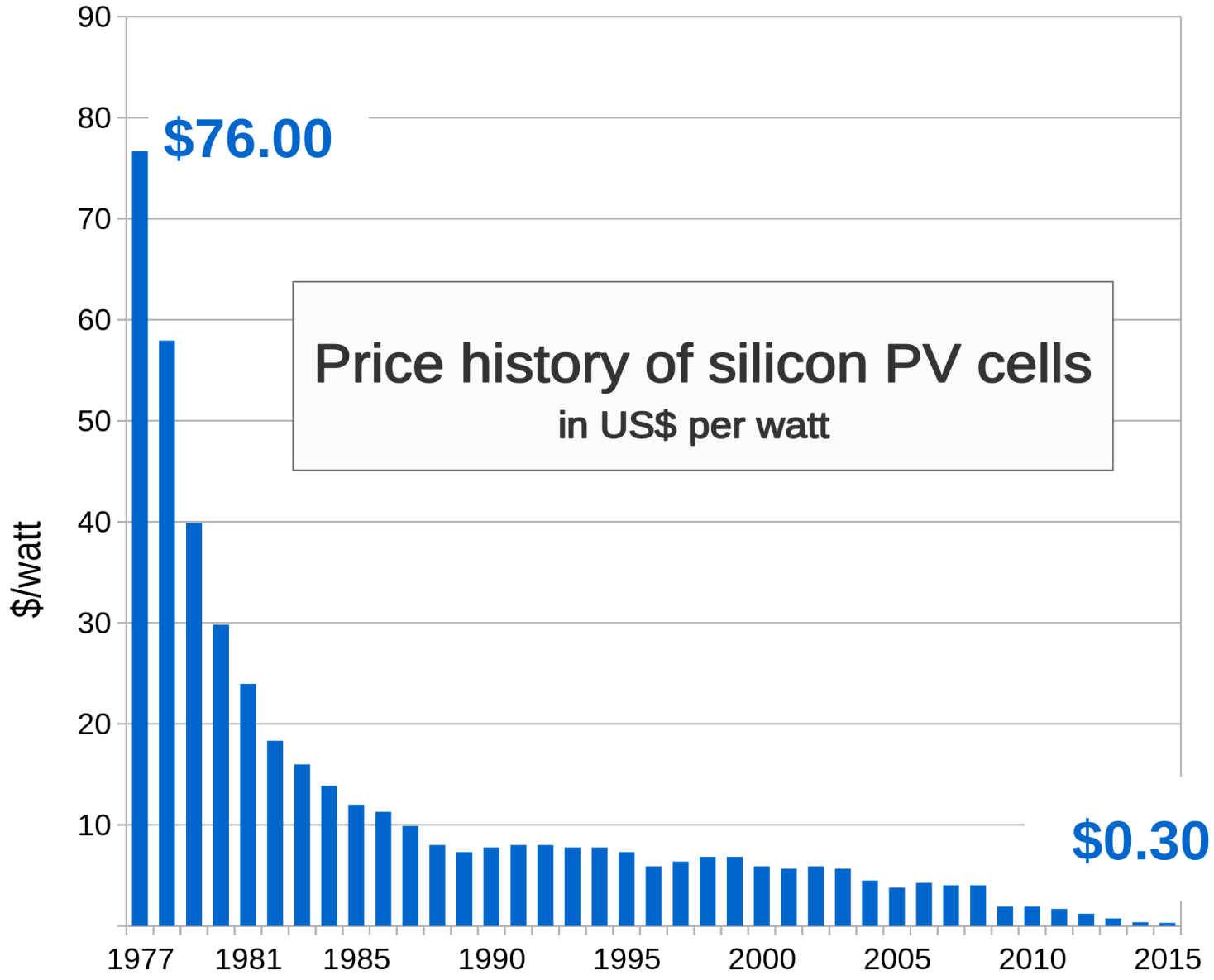

Source: Bloomberg New Energy Finance & pv.energytrend.com

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Mine Energy Considerations

With energy as the second highest cost after labour in a mine's total operating costs, several factors can affect a mine's profitability:

- Energy consumption and cost
- Remote locations and access to fuel; transportation, security and diesel price volatility
- Reliability and quality of grid dependent energy
- Greenhouse gas emissions and carbon pricing
- Mining's environmental impact
- Public renewable energy targets and availability of government funding
- Social license and creating value for surrounding communities and stakeholders

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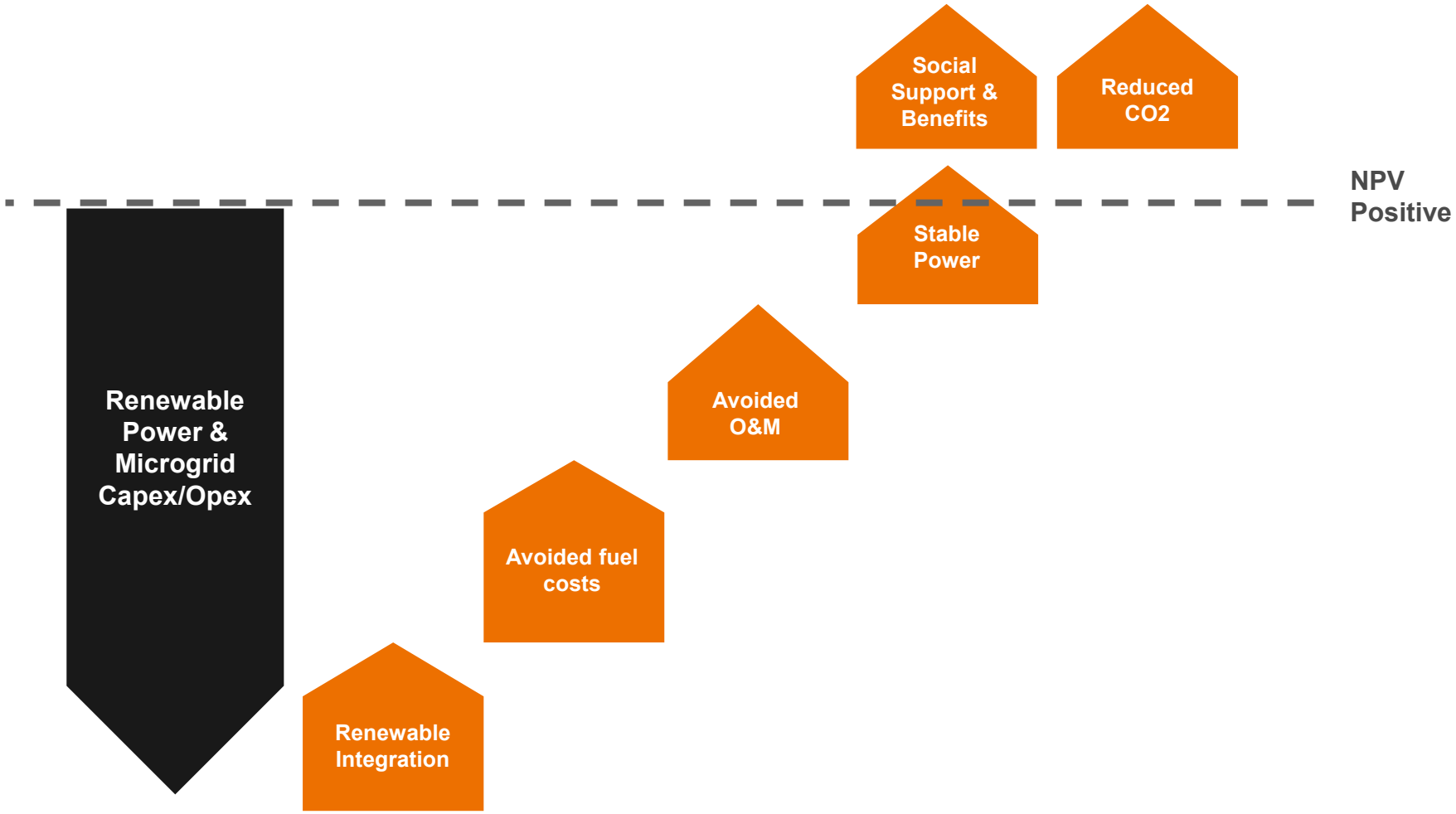
The Business Case for Hybrid Renewable Power

Value Stacking



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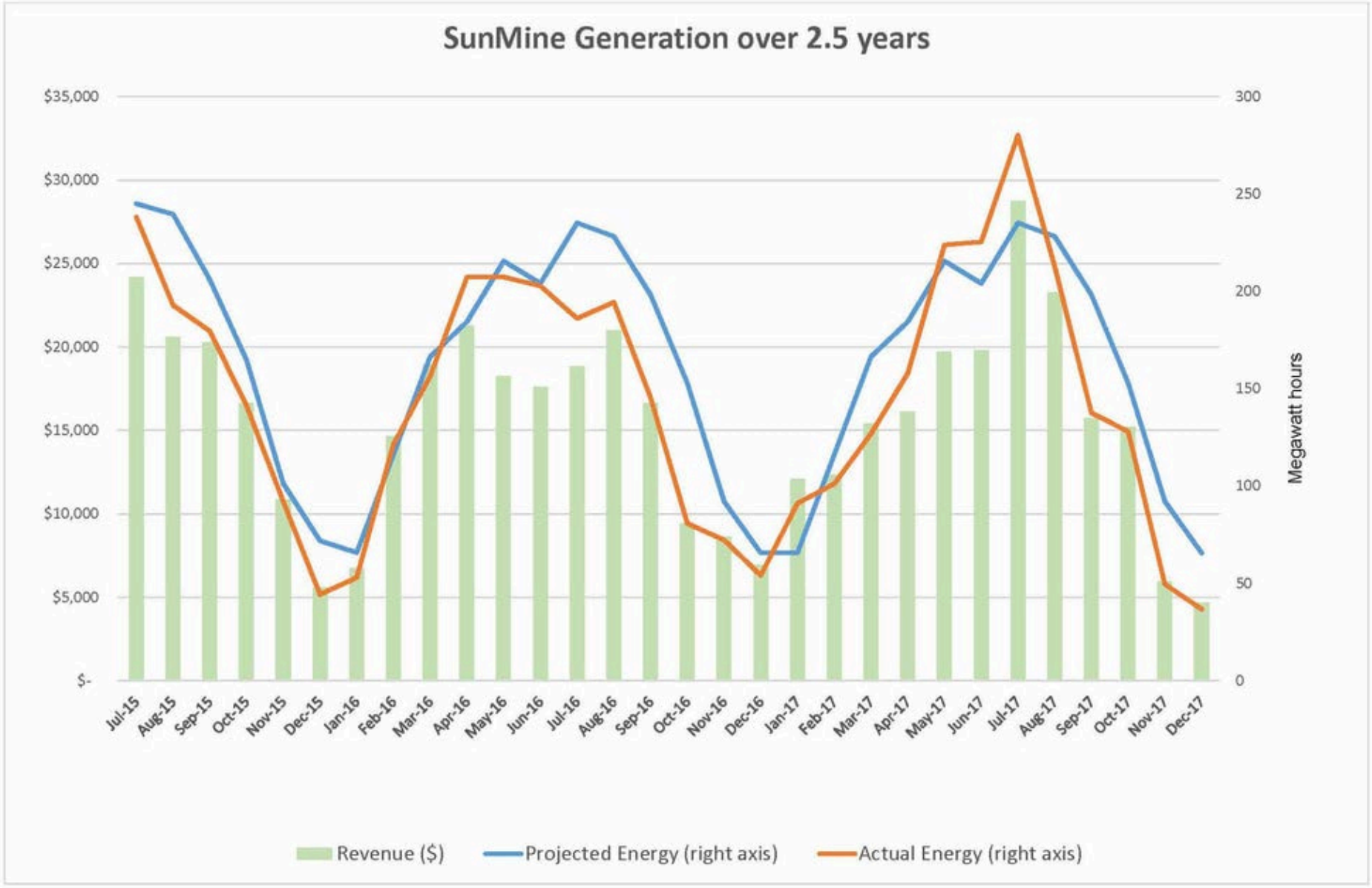
SunMine Solar Power Project

- Built on Teck's reclaimed Sullivan Mine site
- Began commercial operation in 2015
- 1.05 MW – enough to power 200 homes
- 4032 solar cells on 96 Trackers
- BC's largest solar project & first to sell to BC Hydro grid
- Teck provided land, site infrastructure & $2 million contribution
- Community owned


SunMine Generation over 2.5 years
$35,000
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$-
300
250
200
150
100
50
0
Megawatt hours
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
Feb-16
Mar-16
Apr-16
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Revenue ($)
Projected Energy (right axis)
Actual Energy (right axis)

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Sustainable Benefits

- Long term community investment
- Innovation and experience in renewable energy
- Sustainable land use post mine closure
- Adding renewable energy to portfolio builds social license

"Participating in SunMine reflects both Teck's commitment to supporting local communities, even after mining has ceased, and our focus on expanding the use of alternative energy"
– Don Lindsay, President and CEO, Teck

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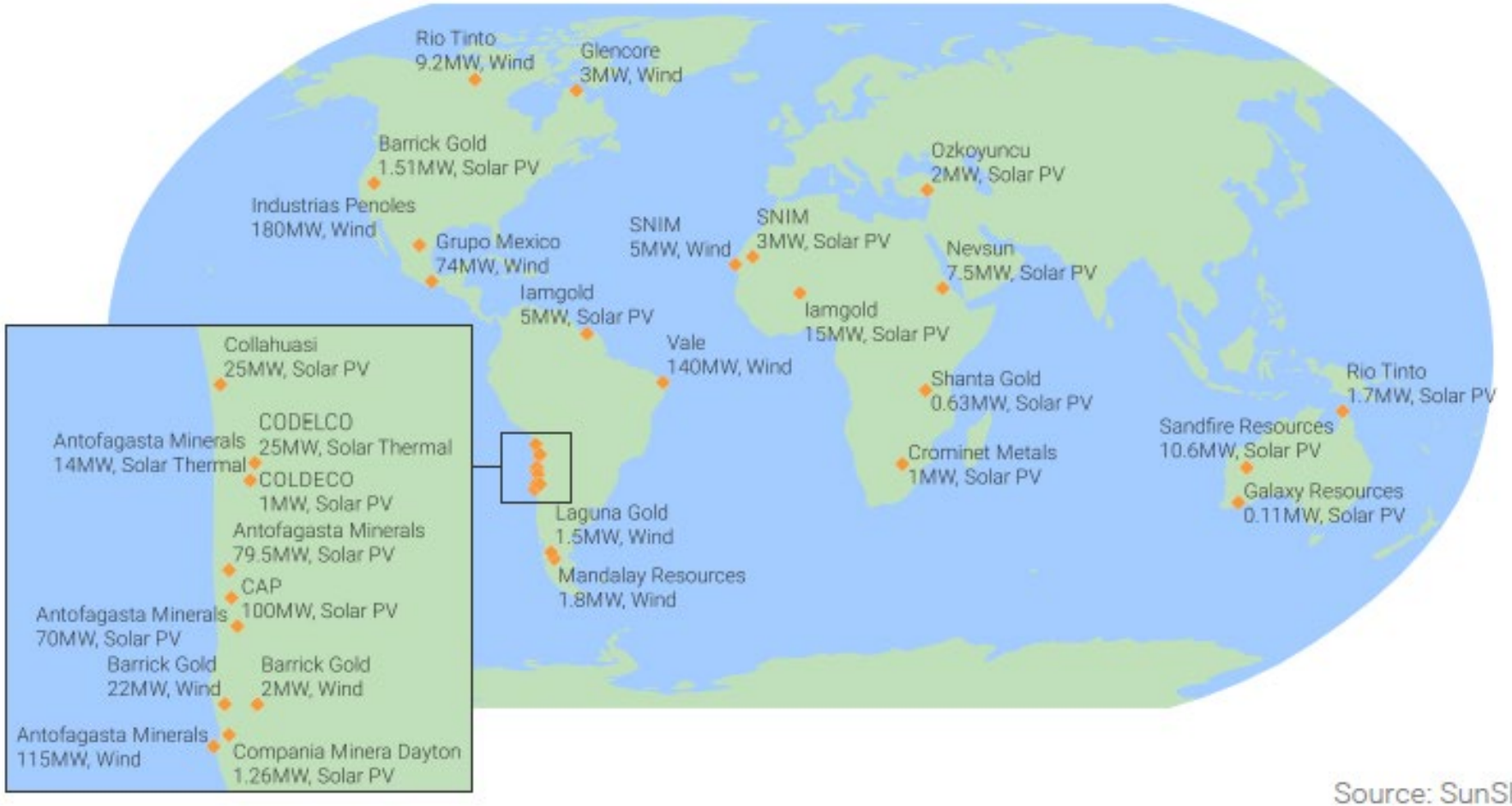
Current Installations of Renewables at Mines

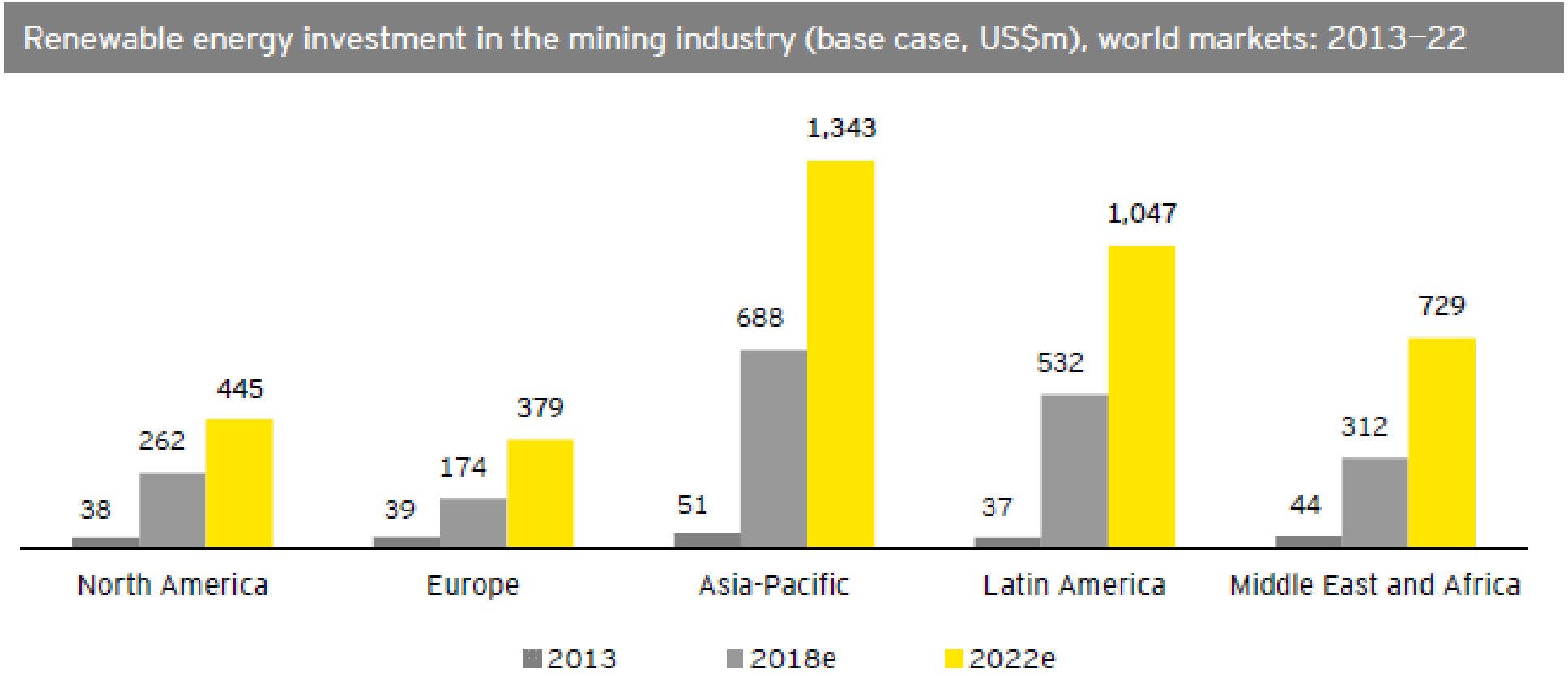
Sufficient case studies to demonstrate market acceptance



Source: SunSHIFT (June 2017)

Forecast Growth in Renewable Energy for Mines

The growth forecast for Renewable Energy investment in mining based on a 2013 study – before the dramatic decrease in renewable pricing



Source: "Renewable Energy for the Mining Industry Revenue by Technology, Aggressive Investment Scenario, World Markets: 2013-2022," Renewable Energy in the Mining Industry, Navigant Consulting, Inc., 2013.

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Opportunities for Every Stage of the Project Lifecycle

Development & Construction

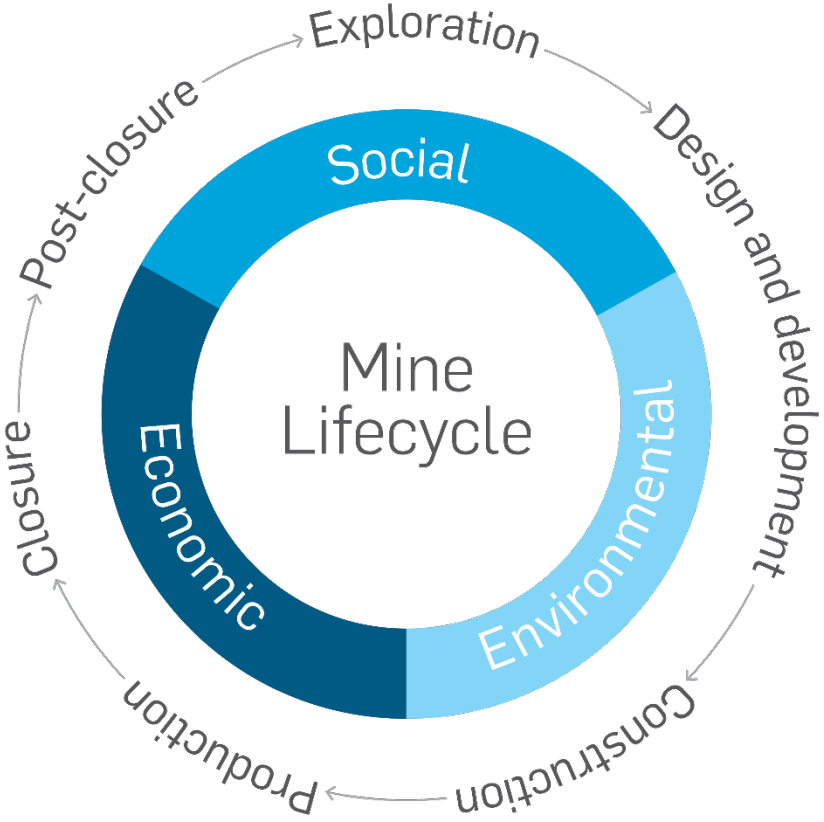
- Energy tradeoff studies that incorporate renewable power, microgrid or battery storage solutions into Feasibility Studies
- Solar installation at remote exploration camps
- Rapid deployment of solar power for use during construction
- Renewable Power EPC for greenfield sites

Operations

- Energy & process optimization
- Renewable Power EPC and integration with existing power at mine operations
- Microgrid and battery storage
- Electrification of mine & vehicles

Closure

- Solar / wind installation as part of reclamation solution
- Community integration and legacy



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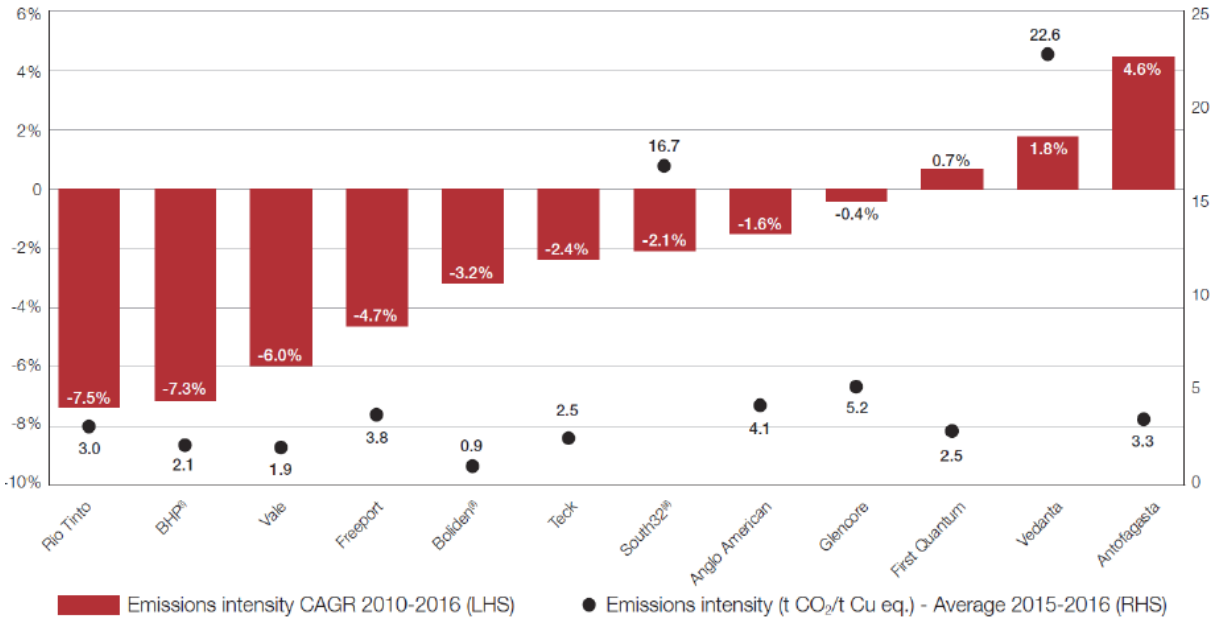
Reducing Carbon Footprint

The leading mining companies have been working to cut emissions and energy intensity at mine operations over the past few years and are now taking the next step to assess adding Renewable Energy

Most miners have cut operational emissions intensity



- Nine of 12 companies have reduced emissions intensity and eight have cut energy intensity of operations since 2010.
- Measures consistent with industry cost cutting drive since 2013.
- Vedanta and South32 have significantly higher emissions intensity levels relative to peers.

Social License and Community Investment

- Adding renewables to portfolio improves public perception and global reputation
- Ongoing benefits forges long term partnership with local communities
- Consistent with corporate sustainability goals and commitments to shareholders
- Fosters engagement with Indigenous Communities (47% of BC First Nations engaged in clean energy industry)

Sustainable Land Use

- Conversion of site to renewable energy can offset mine impacts and provide sustainable post-closure land use
- Maximizes benefit of existing infrastructure such as lines & roads

“..miners have the opportunity to drive down energy costs by up to 25% in existing operations and 50% in new mines through an effective energy management program, of which renewables are a major component. In addition to cost savings, the ability to reduce emissions and preserve the mine’s social license to operate increases the size of the prize even more.”

- Deloitte, 2017

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QUESTIONS?

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