



Integrating Solar into A Mine's Energy Supply: Challenges and Opportunities

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Scott Tampke, Director of Business Development for Renewable Energy at Black & Veatch, offers a compelling business case for why solar energy can be an invaluable part of Chilean mines' energy mixes.

Q What would you say are the top three reasons mining and renewables are starting to partner in Chile?

A To begin, access to electricity is a function of three things, the conversion technology, access to a fuel source, and the collective cost of the system. Solar energy is free, photovoltaic technology continues to decline in cost and at the same time is becoming more efficient. Combine these two items with the fact that the location of mines in Chile sit on top of some of the best solar energy resources in the world and you've got a great opportunity for a green and cost effective, energy solution.

Second is the location of mining operations themselves. Many are in isolated areas and, as a result, have energy profiles that could be referred to as an island or microgrid. That is, being completely, or at least partially, isolated from substantial transmission resources. Thus, in these locations relying on fossil resources such as gas, coal, or oil presents additive cost risk to the operation, both in transport and through the global fuel markets.



Scott Tampke

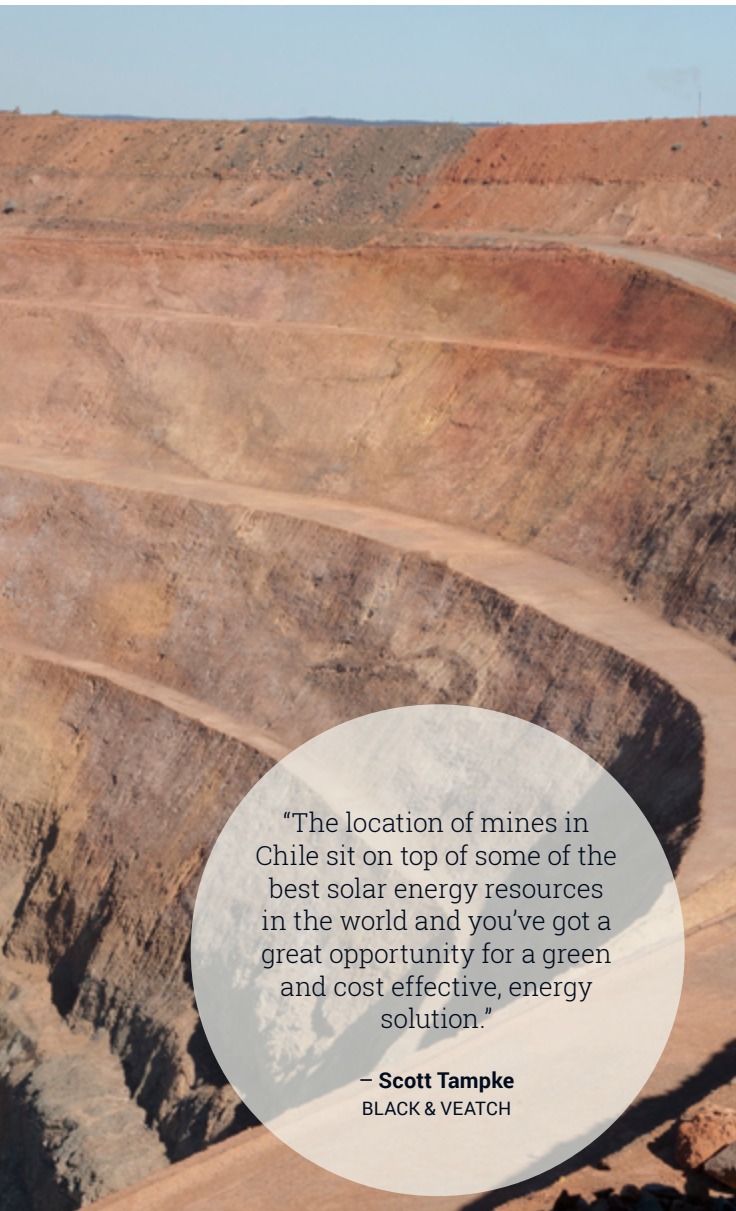
Director of Business Development
for Renewable Energy,
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Lastly, the global social perspective on energy has been shifting towards utilizing more sustainable energy solutions and with this comes an increased focus to reduce emissions of NOx, SO2, Hg, particulate, and now CO2. A solution like photovoltaics, which produces none of these by-products, can therefore be compelling to industries wishing to demonstrate additional social or environmental awareness.

Q How would you address concerns around the intermittency of solar for mines if you were explaining this to a mining engineer?

A When talking about solar photovoltaics, the issue of power intermittency is often the first topic to come up. Simply put, when the sun isn't shining, power isn't being produced. However, what can go unsaid is when the sun is shining, power generation from photovoltaics is incredibly steady. Couple this fact with the number of days the sun shines in Chile and a very steady and predictable annual power production profile can be achieved.

When people look at renewable resources by themselves, the question often is: How can I take something I can't always rely on to provide something that I must have 24 hours a day 7 days a week? An integrated, portfolio-based approach is one way to do this



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and happens to be a core strength for Black & Veatch. By integrating photovoltaics into a solution that may include battery storage, small aeroderivative units, or reciprocating engines, the end result can often be a more reliable, predictable power generation solution with lower long-term operating costs.

Q What are the critical differences to bear in mind when customizing an energy solution for a mining client versus a utility offtaker?

A There are two things to keep in mind. The first is utilities often have the ability to pass all or part of capital investments and operations costs directly to their customers through a rate recovery process. Mining clients do not have this option and are exposed to a fully competitive marketplace. Thus, finding the most reliable energy solution delivered at the lowest cost is critical for creating sustainable solutions.

Secondly, the overall load profiles between a traditional utility and a mining operation are often different. Large mines often operate around the clock, so hourly demand for energy is very consistent. Utilities, on the other hand, see a daily load that fluctuates based on weather conditions and the schedules of their customers. Thus, the power generation solutions that work for utilities may not be ideal for mining.

Q Financing is often one of the biggest barriers for renewables projects. What sort of innovative models and solutions could help unlock investment potential here?

A One innovative solution available to mines would be to engage with developers to sign multi-year power purchase agreements. The developer then takes on the capital and operational risks to construct the resource and supply the power.

This turns the process of utilizing photovoltaics by mines into an operational cost. This would also provide the developer with added flexibility in the design of the solution. It could serve more than one client and be integrated with retail electricity markets. In general, this idea has the opportunity to create optimized risk profiles for all involved stakeholders.

Q There is often a cultural divide between mining and renewables in terms of how energy is viewed. What do you think would help open up the dialogue on energy between the two sectors?

A Engineers, and I'm one, are creatures of habit and often suspicious of new or emerging technologies. When you introduce something new to them, the question is not: What are the benefits? The question is: What are the risks? Demonstrating the benefits, perhaps initially on a smaller, or test, scale or as part of an integrated solution will help demonstrate the benefits without risking the core focus of the mining industry, reliability and cost-competitiveness.

There is also the need to address the social license to operate. Traditional fossil/non-renewable operations are under consistent pressure to become more sustainable. The integration of renewable power generation into mining operations is one way to do this moving forward.