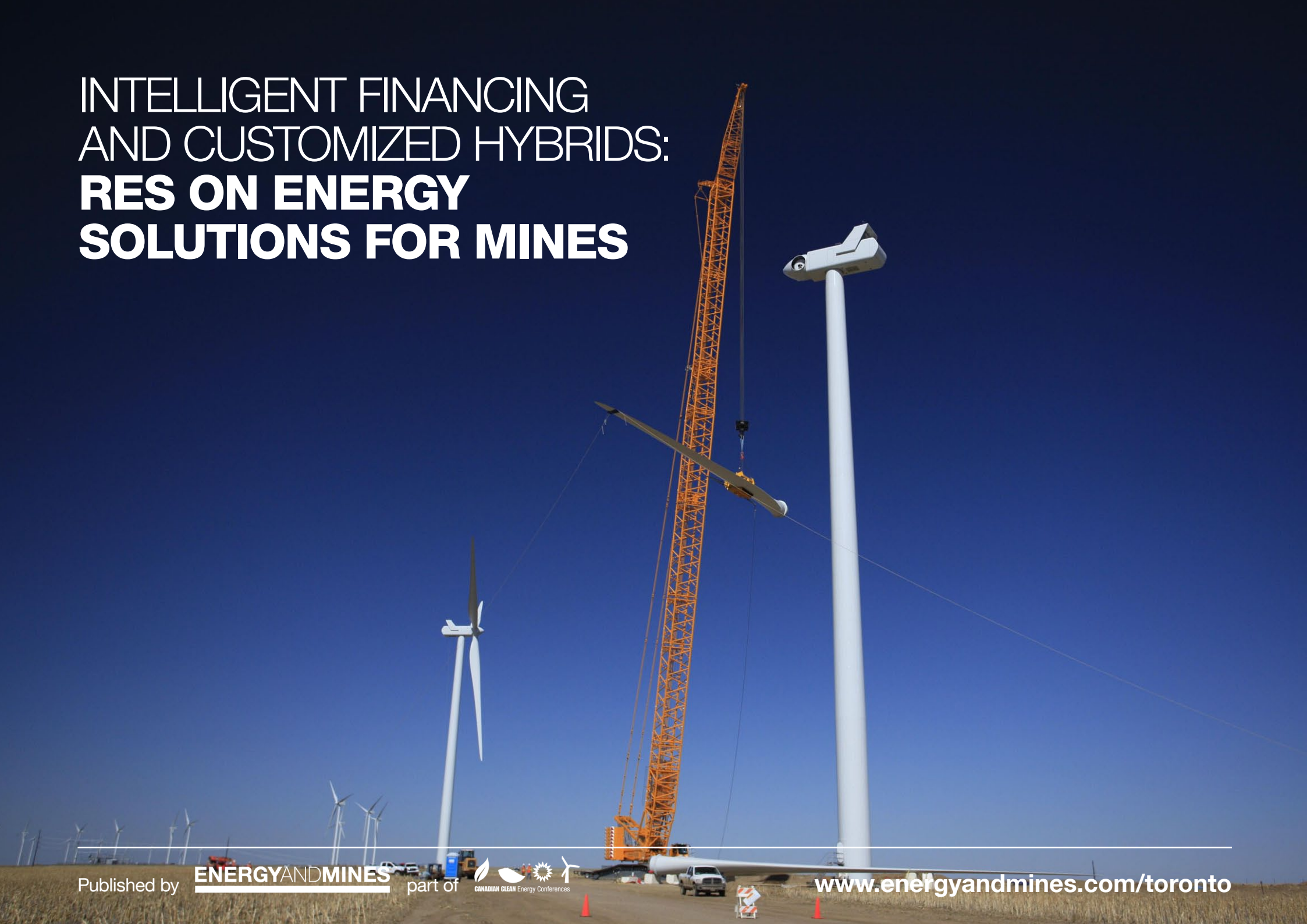


INTELLIGENT FINANCING AND CUSTOMIZED HYBRIDS: **RES ON ENERGY SOLUTIONS FOR MINES**





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Douglas McAlpine
Project Manager
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Douglas McAlpine, in charge of microgrids at Renewable Energy Systems (RES), discusses the outlook for hybrid renewable energy solutions over the coming years. McAlpine believes that mines are beginning to see the potential of renewables and they will start to proactively engage on a significant scale as more projects are built and demonstrate proven reliability.

Q: How would you describe the current opportunity for wind and solar projects with mining off-takers?

A: My view is that opportunities currently exist but they are limited and difficult to execute, mainly due to the limited track record of hybrid systems combined with the necessary cautiousness of mines. That said, the future potential is large. Mines are keen for solutions to the increasing pressures facing remote electricity generation. Once they've seen that renewables can be reliable, I expect the market will grow rapidly.

Today there seems to be a lack of coherence in the industry with many different approaches to deliver-

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“I believe that once there are a few operational deployments of hybrid systems, several megawatts in capacity and with decent penetration levels, it will make a big difference.”

ing projects and no clear preference from the mining community. This should become more consistent over the next few years as preferred project delivery routes and structures become established. So limited current opportunities with a large future potential, making it a difficult market.

Q: What particular services and expertise does RES offer for private PPAs?

A: We offer a wide range of services: feasibility, development, design and engineering, construction, financing, operations, and asset management. Our experience comes from developing renewable energy plants over 30 years during which time we have negotiated and signed numerous PPAs with both private and public organizations.

Increasingly we are seeing non-utilities sign renewable energy PPAs, such as our recent deal with Microsoft Corporation for the energy produced at the RES developed and built 110MW Keechi wind farm in Texas. Similar to mines, counterparties like Microsoft are seeking to hedge power price volatility and reduce their carbon impact.

One key area of expertise RES offers is the correct sizing of hybrid systems, combining our knowledge of generation and storage systems with our financial modeling expertise to maximize project efficiency, both economically and technically. There are a limited number of companies who are able to determine the correct penetration level and actually design, in-

“Some of the smaller mining companies that are more flexible in their approach may be quicker to take on new ideas and new technologies than the larger companies.”

stall, and operate that system in a committed-cost model.

Q: I know that RES also provides storage solutions. Can you tell us more about some of the projects you have completed that include storage?

A: We developed, built, and currently own and operate two 4MW/2MWh, utility-scale, grid-connected batteries, one in Ohio and one in Ontario. These systems provide frequency regulation services to the grid operator on a 24/7 capacity basis. Some of our storage proposals allow capital investment deferrals, a useful application for many utilities. We also provided SCADA for the world's first integrated wind/cavern based compressed air storage scheme (2MW / 500MWh) in the U.S., and have developed solar ramp mitigation and energy storage state of charge models. It's this SCADA and control software, the design of which RES performs in-house,



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that we see as vital to the success of hybrid renewable systems.

Q: How are the new storage solutions performing?

A: They're performing well. These are relatively new services that are being offered and so far they are performing as designed. Non-performance means financial penalties so we're incentivized to get it right the first time. We now have a development portfolio of over 200 megawatts of storage globally.

Q: How could this type of storage solution be applied to a mining operation to help further offset diesel?

A: For mines, the key application of storage is enhancing reliability and increasing the renewable energy penetration level, or the percentage of renewable energy you are able to inject into a system relative to that system's total capacity. Storage can be used to smooth the output of the system so that there is no sudden drop-off in output when a cloud passes over a solar plant or the wind drops. Whilst applicable to all intermittent generation sources, it's particularly effective for wind energy, which has a less predictable output profile. This is important for mines to ensure their operations are receiving stable supply. As penetration levels increase, storage also plays a role in maintaining the frequency stability of the system.

Q: What are some of the main barriers or objections mines have for moving forward with renewables integration?

A: In my experience, the first and most fundamental barrier is the reliability of electricity supply to mines. This can be a vital part of their operations and the last thing they want to see is any disruption to that electricity supply. Mines have become very good at operating conventional fossil-fuel generators, which they've been doing for decades. The introduction of a new system is understandably seen with caution.

Secondly, the intermittency of renewables is often perceived as unreliability. With renewables, you can't control the output as you can with a conventional, fossil-fuel generation plant. But by using renewable energy in conjunction with fossil fuels and the correct control systems, it is just as reliable. Overcoming that perceived unreliability remains a hurdle.

Another issue is the lack of proven track record for hybrid renewable plants, particularly at a large scale. I believe that once there are a few operational deployments of hybrid systems, several megawatts in capacity and with decent penetration levels, it will make a big difference. Other mines will be able to see these operational examples and the benefits they can bring. The final major barrier I see is the capital costs required for renewable energy projects. The requirements are much larger than mines are accustomed to budgeting for a diesel generator, and I hope that will be overcome by third-party ownership of hybrid systems and intelligent financing solutions.

Q: How do you see the market for renewables for mines evolving over the next couple of years?

A: I see a gradual, relatively slow deployment of hybrid systems over the next couple of years. Some of the smaller mining companies that are more flexible in their approach may be quicker to take on new ideas and new technologies than the larger companies. Once those projects have been up and running for a year or two and have good operational records, then I think we'll see a significant push in the number of projects being developed or built. I hope that this "second wave" of projects will see projects striving for significantly increased renewable energy penetration levels. ■

Douglas McAlpine will be speaking at the **Renewables and Mining Summit and Exhibition**, October 15-16, Toronto. Details at www.energyandmines.com/toronto