

THE LOCKED-UP TREASURE IN EMERGING-MARKET CELL TOWERS

**AFFORDABLE POWER TO 137 MILLION PEOPLE
& 12.7 MILLION METRIC TONNES OF CARBON DISPLACED**

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EMERGING MARKET: MOBILE PHONES & POWER

Imagine that your only means of distance communication is your mobile phone. You rely on it to send money to your extended family and to buy necessities like food or clothing. But your basic needs (food, water, shelter) are barely being met, and your phone, which you depend on so heavily, can't be charged because you don't have access to an electrical grid or even a generator. At night your home is completely dark, other than your kerosene lamp and—if you can get wood or dried cow-dung for fuel—an open fire in a stone or cement pit. That means your kids, if they can get to school at all, can't study at night.

What's more, the kerosene is expensive, and the fumes, which contain not only CO₂ but black carbon, are harmful to you and your family as well as the environment. The lack of electricity also means your phone can't be charged at home. You will likely walk a few miles tomorrow to pay someone to charge your phone for a few minutes. Because you have to struggle every day to meet your family's basic needs, education, entertainment, and access to the internet are not priorities. Despite having a mobile phone, you are locked into poverty, most of all because you and your community lack access to clean, affordable power.

THE BOTTOM OF THE PYRAMID

This is the reality in rural Africa and India and in other parts of the developing world, such as rural southeast Asia and Central America—and increasingly, parts of the Arab world as well. In these areas an estimated 4 billion people are living in poverty, defined as surviving on less than \$2 per day. These people are often referred to as “the bottom of the pyramid,” a term from C.K. Prahalad's book *The Fortune at the Bottom of the Pyramid; Eradicating Poverty Through Profits*. This huge percentage of the population has yet to be “unlocked” and connected to the world that we know.

COMMUNITY SOLUTION—AFFORDABLE POWER

The key that can unlock the future for this bottom 4 billion is affordable power, which facilitates economic development. When people have power in these communities, they have light in their homes and the ability to cook using electricity—there are small, cheap electric stoves designed for this market. They can also charge their mobile phones at home. Because their phones stay charged, the mobile phone companies get interested in installing Wi-Fi, 2G or even mobile broadband in their villages, as this will bring in data traffic revenue. And because they have internet access through their phones, they also have access to education and mobile commerce. Down the road a little, affordable power also makes it easier for locals to start businesses and create jobs.

PROGRESS IN POWER TO COMMUNITIES

Despite data and power being unavailable in these markets, it simply doesn't make business sense for mobile operators or utility power companies to extend grid distribution into these rural areas: the cost of extending the grid is very high, while the customers are very poor and therefore, under traditional models, unlikely to generate sustainable business as customers.

All the same, African and Indian rural communities are gaining a lot more attention these days, as entrepreneurs and investors embrace a “profits with a purpose” philosophy. These startups are innovative yet practical in their approach. Companies such as [PowerHive](#), [Off-Grid Electric](#), and [M-Kopa](#) have been funded to expand their various platforms for providing affordable solar power to the poorest people in the world.

These solar solutions range from individual, meaning enough to supply power for a single residence (like [SolarCity](#) or [Grameen Shakti](#) in Bangladesh) to “distributed solar [micro-grids](#)”—micro-solar plants, with batteries, control systems and distribution to all homes in a community. The power is sold in mini-increments, in some cases by the watt, giving consumers who live on less than \$2 per day a way to get affordable power and an alternative to harmful kerosene. These companies envision bringing power to millions over the coming years. In the industry, they are referred to as renewable energy service companies or [RESCO](#)s, a modification of the traditional [ESCO](#) (Energy Service Company) acronym.

FINANCEABILITY OF SOLAR MICRO-GRIDS

The primary challenge (from an investor perspective) in providing power to the 4 billion people on the bottom is the ability to scale in a sustainable/profitable way. A typical project requires finance, and at a very basic level, this requires a creditworthy customer and a financeable long term contract, similar to a power purchase agreement (PPA). Unfortunately, these customers are not able to sign long-term (predictable-revenue) contracts, nor are they creditworthy in that sense. Hence traditional project financing is difficult to secure in these cases.

This makes it difficult to scale quickly, but there is good progress on this front, as customers are demonstrating an ability to pay and consume power more predictably as more and more get connected to micro-grids. Through a combination of focus from the community power start-ups and impact-investor backing, this space is showing a lot of promise over the next few years. At the same time, there is a complementary opportunity for companies to install micro-grids that can contribute immediately to powering over 136 million people while dramatically enhancing their communications.

SOLAR MICRO-GRIDS FOR CELL TOWERS

Installing micro-grids for cell towers presents a solid business case because the customer (think American Tower, Vodafone) is creditworthy and the long-term contracts can be project financed. The cell tower owners are currently powering their towers in rural areas with diesel generators. They use these generators because they are dependable: the cell towers cannot afford to be without power, lest the owners lose their customers and face penalties/fines. But powering cell towers using diesel generators is also very expensive for the tower owners, and for the environment in terms of carbon emissions. Both of these problems are solvable today with the technology we have.

The business case for micro-grids here is simple. It works, and it has been proven for the last six years in India and more recently in Africa. Again, the technology is proven and cost-effective, the customer is creditworthy, and the long-term contracts are financeable, so investors can invest. There are over 350,000 cell towers in rural locations “off-grid,” and the locked-up potential positive socioeconomic impact in this space is enormous.

CELL TOWER MICRO-GRID EXPANSION TO COMMUNITIES

So how does this benefit the poor people in the villages? The micro-grid platform at each cell tower provides a readily financeable starting point for micro-grid extension to nearby rural communities. It is estimated that at least 30% of the 350,000 sites have a sizable (average 1,300-plus people per village)

rural community nearby, allowing an extension of the micro-grid platform to service these communities. This means that through cell tower micro-grid adoption, we can provide about 136 million people with an extendable platform for power. This is an impactful, complementary contribution to what companies like [Powerhive](#) or [PowerGen](#) are already doing. In fact, [Powerhive](#) or a similar company could handle the micro-grid extension to these communities. This type of extension is known as the “final mile” because it is less capital-intensive and carries less risk than starting from scratch.

TARGETING CELL TOWERS

So the target here is the 350,000 off-grid cell towers in India, Africa, and Myanmar. By powering them with the solar micro-grid solution, we can achieve the following results in 5 years:

- 12.7 million metric tons of CO₂ eliminated
- 136 million more people with access to power
- 5 billion liters of diesel fuel displaced

... And this doesn't even take into account the displacement of kerosene in all these homes and the additional positive health and environmental effects. My ultimate goal is to facilitate the large-scale adoption of renewables in places where the business case is obvious and the benefit is massive for all involved. My immediate goal is to see every generator in the mobile industry replaced by this *proven* renewable solution that sustainably displaces diesel by 95% or more.

This can be done, and it can be done profitably for the mobile operator, tower owner, renewable power provider, investors, government, and local communities while benefiting local public health and our global environment. *That's right—we can displace 12.7 billion kg of CO₂ emissions by over 95% right now, and everyone profits while we do it.* The equivalent amount of forest required to offset this level of emissions is about 9.8 million acres, an area roughly the size of Switzerland.

EXISTING POWER INFRASTRUCTURE

Mobile networks and towers are dispersed throughout India and Africa, in both urban and remote rural locations. Telecom is considered part of a country's necessary infrastructure. So is power. The mobile networks have [leapfrogged](#) over land-line adoption, and they are poised to do the same with distributed power.

This should not be a threat to utility power, but rather a complement to it. As traditional utility grids expand their distribution, so too will distributed power by solar micro-grid. Where there is overlap, the micro-grid will act as an existing “last mile” distribution system for the existing grid and can also sell the renewable power back to the utility, while acting as backup when the main grid goes down, as it does frequently in these countries.

A further point is that once we accomplish this micro-grid solarization in the telecoms space, it establishes the platform and sets the pace for exponential adoption throughout other multibillion-dollar verticals, including commercial buildings, banks, ATMs, petrol stations, mines, and of course the communities themselves. This expansion into other verticals also multiplies the impact initially generated by targeting cell towers.

CAPITAL REQUIRED & MACRO BUSINESS CASE

This is high-impact investing: solarizing 350,000 sites only requires approximately \$4.5 billion in capital for the assets, including installation. The current annual spend related to diesel on these sites is around

\$12 billion, while the spend after solarizing the sites is only around \$2.1 billion per year. Hence the savings per year is about \$10 billion, with a return on capital in less than 1 year, which allows plenty of room for all stakeholders to benefit in the solar micro-grid conversion equation. (See [Cambridge Clean Energy Case Studies](#).)

ADOPTION CHALLENGES

There have been many adoption challenges over the last six years. Most have been overcome: the technology is proven, the cost of technology has fallen, and business models are field-tested to provide a measurable track record. However, there is still one major concern from an investor perspective. When RESCO models are viewed on a small scale, say up to 10,000 cell tower sites in this case, investors worry about long-term viability (10-plus-year contracts)—and investors are crucial to rapid adoption.

Specifically, investors are concerned that the TowerCos managing the sites and responsible for power will begin to “squeeze” the profit margins of the smaller RESCOs over the contract period, thus lowering investors’ expected returns and threatening the business model. Unfortunately, this unrealized risk is currently stifling large-scale market adoption despite the apparent business case outlined above.

IMMEDIATE SOLUTIONS

There are three primary initiatives that can be deployed in parallel, for immediate impact and 5-year market adoption:

- A commercially collaborative approach (joint ventures) between RESCOs and TowerCos;
- Mandates to convert all cell sites running on more than two hours of diesel generator per day; and
- A subsidy for RESCOs to assure the sustainability of the business model.

As RESCOs and TowerCos begin to work collaboratively on the opportunity, a commercial solution can be achieved. Mandating the conversion to solar micro-grids while providing a subsidy to RESCOs will stimulate immediate action, and the implementation of this already proven technology and business model. Going further into specifics, public TowerCos are likely in the best position to move this adoption over the line quickly as they are *not* driven by the exit/return objectives of their private equity investors, as is the case with private TowerCos. (This important point was brought up by [TowerXchange](#) CEO [Kieron Osmotherly](#), a colleague and known expert in this space.) These three basic initiatives will allow us to achieve distributed renewable power adoption at scale, which will bring the price of renewable micro-grid power down to or below the price of utility grid power for all customers.

PATH FORWARD

And so, again, when we boil all this down, the impact when the goal is reached is clearly apparent, and everyone benefits tremendously. The opportunity is massive, and the place to start in order to reach the proverbial tipping point is clear; it is the most critical infrastructure of these markets—the cell towers.

The plan is simple. We facilitate the joining of hands between TowerCos and the governments and regulatory bodies of India, Myanmar, and key African countries to mandate solarizing all sites, while also providing subsidies to RESCOs to assure a healthy business case. This will allow investors to facilitate the market-wide adoption of this proven business model, setting the stage for the global benefits of powering about 136 million people and preventing 12.7 billion kg of CO₂ from entering our atmosphere each year.

WHO AM I?

My name is [William \(Bill\) Bubenicek](#) and I have been working in the telecom and power sector of the emerging markets (Africa, India, Latin America) for over 11 years now. The statements I have made above are based on my involvement in the space, as well as my involvement as an entrepreneur and CEO of [Cambridge Clean Energy Ltd](#) (CCE), former CEO of Clean Power Systems, and former Commercial Director of GSM Systems. I love creating businesses, and emerging markets have been my passion because of the scale of impact that is possible.

In more recent years, my focus has been on creating profitable businesses with a purpose. In fact, since reading Richard Branson's [Business Stripped Bare](#) in 2008, I have been on a mission to create profitable businesses that have a positive social and/or environmental impact. More recently, since reading [Abundance](#) and [Bold](#) by [Peter Diamandis](#), I have widened my perspective further to ensure that these businesses are not only profitable and with purpose, but that their impact is also exponential and global.

At 36, I am still early in my entrepreneurial career and I am still very much in my pursuit of "making it" as an impact entrepreneur. I am not focused on philanthropy, but I do aim to create and facilitate businesses that have a positive impact on the world as a result of their success.

WHY SHOULD YOU LISTEN TO ME?

During my 11 years in this space, I have had the benefit of working directly with its major constituents, from the field level up to the board/investor level. I have worked on the ground in Africa and India. I have seen the villages, worked with the local people, and have an intimate understanding of the realities on the ground. I have also worked with the C-Level and board level of tower companies and operators, such as American Tower, Eaton Towers, Helios Towers, Indus Towers, Vodafone, Millicom/TIGO, Airtel, and IDEA. More importantly, I have done business with these customers over the last 11 years in various ways, specifically in providing renewable power solutions, in products, and as a RESCO.

At the investor level, I have been involved in raising capital for CCE and/or its affiliates since 2011. I have been through hundreds of investor discussions about this space: understanding the key areas of perceived risk, figuring out how to mitigate the risks, and ultimately how to effectively deploy capital in this space. I have met with investors around the world over the past few years, including the big names like Och-Ziff, TPG, IFC/World Bank, and Providence Equity. Raising capital forces you to dive deep into the macros in play, the competitive landscape, the risks for market adoption, future rollup potentials, exit plans, and so on. As a result, you become an expert and get to know every macro and micro level detail of your business: the markets, the competition, the threats, and the opportunities. That is the process I have been through in this space.

All this positions me uniquely to suggest an achievable solution and the roadmap to it. Yet despite my ability to deploy over \$21 million in CCE over the past few years, this is really just scratching the surface relative to the size of the opportunity.

[CCE](#) is a RESCO, but at a micro level: that is, we create many hundreds and eventually thousands of small sites, typically less than 10 kW in size. This is still a very new space, as the traditional ESCO model is for large solar farms that feed the power back into the grid, typically on 20-year PPAs. That's not CCE. We provide hundreds of small systems to service individual telecom sites on a 10-year, fixed-price contract basis.

As we have already proven our technology, track record, and ability to deliver on the operational expectations, we are beyond the startup phase. We are now at the growth phase of the company and the key elements involved in putting together RESCO deals involve overcoming the “4 Cs” in order to finance the projects, as follows: Contract, Customer, Currency and Country.

The most important C is the contract with the customer: the contract structure must mitigate currency risk, country risk, and customer risk, as this is what allows for project financing. Assuming we can overcome the risks, a contract can be put in place and securitized against the assets and cash flows, allowing a senior lender to provide debt to the project. CCE contributes the equity and relies on the debt to lever up the returns for all.

Again, the project itself must be project-financeable. This implies that it is also commercially viable, is profitable, and has overcome the risks mentioned. It must also make business sense for the customer (e.g., Vodafone or American Tower); this it does by way of the displacement opportunity, which offers enough room to give the customer a better value than what they had previously.

SOLUTION & CONCLUSION

There is sufficient margin profit for all involved in implementing this solution, and more than enough room for additional firms to participate. Moreover, large-scale adoption carries a vast potential benefit to our environment and to the social development of four billion “bottom of the pyramid” people in these markets. No one loses, if we can combine our efforts to make this commercially viable in the immediate term by way of the three initiatives below:

- RESCO and TowerCo collaboration
- Mandatory cell-tower conversion to solar
- Subsidy for RESCOs

Today, when it is often difficult to identify high-impact social and environmental change initiatives that are also business opportunities, solarizing cell towers constitutes low-hanging fruit. The benefits are obvious and dramatic, the solutions are proven and readily achievable. I invite industry, governments and citizens to join in ensuring their full and rapid implementation.

William Bubenicek

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