Green Power
for Mobile

Community Power from Mobile-Charging Services

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Executive Summary

A significant opportunity exists to provide environmentally sustainable energy to people in the developing world who live beyond the electricity grid. And it is the mobile telecoms industry – which has already brought phones beyond the fixed telecoms grid - that holds the key to this next infrastructure innovation.

There are 1.6 billion people in the world living without access to electricity. The mobile industry is experiencing unprecedented infrastructure growth in these same off-grid regions of the developing world. The GSMA estimates that nearly 639,000 off-grid base stations – the pieces of equipment which provide cellular network coverage - will be rolled out across the developing world by 2012.

Since mobile base stations need power to function, network operators have become adept at generating their own off-grid power. This has typically been achieved by running diesel generators at each site, although increasingly operators are installing renewable energy equipment, such as wind turbines and solar panels, to power their base stations. The opportunity now exists for mobile network operators to provide electricity beyond the base station and into local communities, a phenomenon which the GSMA Development Fund calls “Community Power from Mobile”.

Base stations typically have 5kW of excess power, enough to provide energy to recharge almost 5000 handsets, provide electricity to 40 homes, 10 vaccination fridges or 2 clinics. These base stations are built close to or within off-grid communities. Mobile operators are trialling the provision of excess power for the charging of devices such as mobile handsets, lanterns and household batteries, and ultimately, to power, businesses, clinics, vaccination refrigerators, schools and homes. This white paper will document existing and emerging projects in this emerging sector.

Community Power from Mobile is not just about social benefit; although that impact can be significant. It is also about improving the business case for off-grid telecoms by (a) increased revenue streams via sale of power or site rent (b) increased security from theft (c) charging mobile phones for increased usage (d) increased community support for the company brand and (e) improved advocacy with governments and regulators.

The GSMA Development Fund, together with Lighting Africa, a joint International Finance Corporation (IFC) and World Bank Programme, formally launched Community Power for Mobile at Mobile Asia Congress in November 2010[1]. CPM plans for pilot projects in East Africa and India to be launched during 2011.

As CPM is still an embryonic concept within the mobile industry, this white paper will focus on our initial steps; to provide Device Charging Services. A second white paper on "Community Power from Mobile – the Mini-grid Opportunity" will be published later on this year.. This next report will present the case studies, opportunities and key components that are required for mini-grids to distribute power between cell towers and the local community.

To accelerate the formation of this energy ecosystem CPM calls on existing and emerging stakeholders to highlight their interest in this opportunity, specifically:

- Operators and tower companies that are interested to pilot and move to full scale implementation
- Vendors and energy companies that are positioned to provide products and services
- Financing institutions and development organisations that can facilitate large scale implementation

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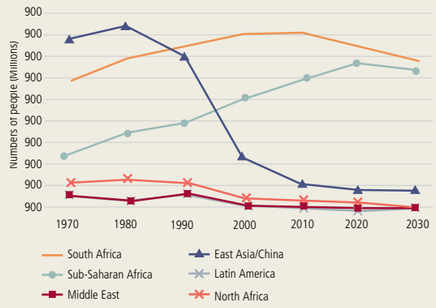
Community Power Today

A report[2] published jointly by the United Nations Development Programme, UN Millennium Project and the World Bank on Energy Access has identified that there are clear 'linkages between all of the Millennium Development Goals (MDGs) and energy from both a micro and a macro viewpoint'. The report also argues that in order to meet the MDGs, the quality and quantity of energy services must vastly improve. Localised examples of this challenge include: lack of electricity for clinics and schools, limited lighting reducing productivity in evening hours, lack of power for income generating machinery such as irrigation pumps and the impact of using fuel wood and crop residues.

These localised linkages aggregate to wider macro-economic benefits demonstrated by a strong correlation between commercial energy consumption and gross domestic product (GDP) in most countries. As per another UNDP report[3], approximately 1.4 billion people lack access to electricity and at least another 1 billion have unreliable grid connections. A further 2.4 billion use traditional biomass fuels, such as fuel wood, for cooking. As per World Health Organisation (WHO) estimates[4], nearly 1.5 million people in developing countries, mostly women and young children, die prematurely each year from breathing in the fumes from indoor biomass stoves. This indoor air pollution is also a significant cause of global warming, due to black carbon emissions and also deforestation. Without additional dedicated policies, by 2030 the number of people lacking electricity access will still be as high as 1.2 billion[5].

Figure 1: Number of People (Actual and Projected) Without Electricity, by Region, from 1970-2030

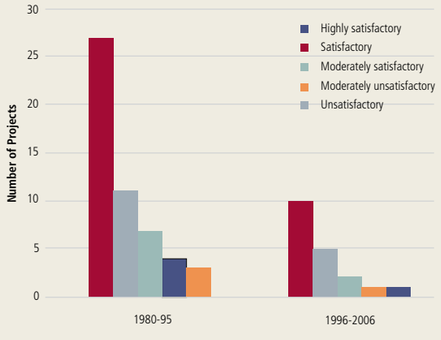


Source: IEA World Energy Outlook 2002

Global efforts to bring energy services to the developing world have a long and extensive history. The World Bank has implemented 120 rural electrification projects globally since 1980 with an investment of more than US$11billion.[6] The World Bank and IFC are also working to bring energy services such as lighting to millions of off-grid sub-Saharan Africans through the Lighting Africa Programme. However, the success of all these rural electrification projects has been varied.

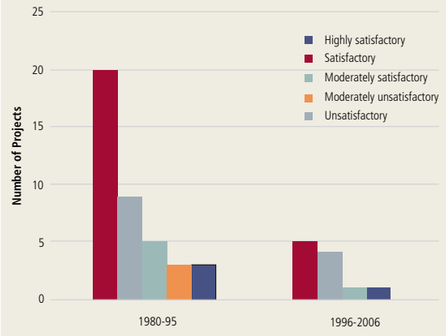
The following figures, 2 and 3, which use evaluation data from the World Bank IEG Impact Evaluation report, provide an overview of the success of these projects:

Figure 2: Impact Evaluation of World Bank-funded Rural Electrification Portfolio



Source: GSMA

Figure 3: Impact Evaluation of World Bank-Funded Rural Electrification Portfolio – Energy Sector only



Source: GSMA

According to the report, even though World Bank funded projects have been successful in implementing physical infrastructure for rural electrification, problems related to institutional development and technical issues still exist. The report has identified the following key barriers for successful institutional development in rural electrification, based on learning from over 25 years of investing in such projects globally:

- Lack of financial sustainability due to unclear revenue streams
- Poor operations and maintenance
- High transmission losses due to inefficient supply systems
- Connection costs for very remote communities are barriers to reaching the very poor.

2 Modi, V., S. McDade, D. Lallement, and J. Saghir, Energy Sector Management Assistance Programme, United Nations Development Programme, UN Millennium Project and World Bank, "Energy and the Millennium Development Goals", 2005

3. Energy Poverty – How to make modern energy access universal – IEA, UNDP, UNIDO – September 2010
4. WHO, "Evaluation of the costs and benefits of household energy and health interventions at global and regional levels", 2006
5. Energy Poverty – How to make modern energy access universal – IEA, UNDP, UNIDO – September 2010
6. The World Bank Group, "The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits: An IEG Impact Evaluation", 2008

Chapter 1
The Issues of Energy Access in Developing Countries

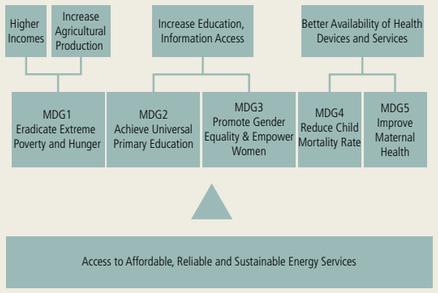
Energy is the cornerstone of human development and has contributed to the rise of modern societies. With 1.4 billion people[7] still living without access to the electricity grid, the divide between the urban and rural population of developing countries has been gradually growing. In many countries of sub-Saharan Africa, the high costs involved in connecting and extending the electricity grid to remote regions prevent communities living in those regions from accessing energy and receiving its social and economic benefits.

7. Energy Poverty – How to make modern energy access universal – IEA, UNDP, UNIDO – September 2010

The Development Factor - Energy Access is Vital to Economic and Human Development

Several studies have identified clear linkages between energy and poverty[8]. Even though the MDGs[9] contain no goal specifically related to energy, its impact on the economic and social turmoil of a region is key to the achievement of many other goals. According to the UNDP[10], to meet these goals by 2015, 395 million people in the developing world need to be provided with electricity and an additional 1 billion given access to clean cooking facilities.

Figure 4: Causal Chain Between Energy and Achieving MDGs



Source: Millennium Project[11]

Most of the people living in off-grid regions of developing countries have a wide access to biomass or kerosene fuel for cooking and lighting applications. However, their use represents a serious hazard to human health. More than access to energy services, there should be a transition from these expensive, hazardous fuels, to more efficient and affordable energy sources.

Overall, the lack or low access to electricity in rural areas is an inhibitor to social development as it is clear that "remote communities provided with any type of decentralised electricity supply have marked improvements in welfare"[12]. Essentially, access to safe, clean energy instigates better communication, productivity, education and healthcare.

Table 1: Energy Availability Impact in Developing Countries

Energy Availability	
Community	Reduced isolation thanks to improvement of communication and information access in remote areas
Productivity	Increased productivity of workers thanks to better and faster communication and business tools
Safety	Increased safety thanks to the availability of street lighting, road signs, alarm devices etc.
Healthcare	Improved healthcare with the ability of powering a clinic, vaccine fridges and medical devices to monitor community health
Education	Improved education by facilitating access to computers and other communication devices, and also enabling pupils to study beyond daylight

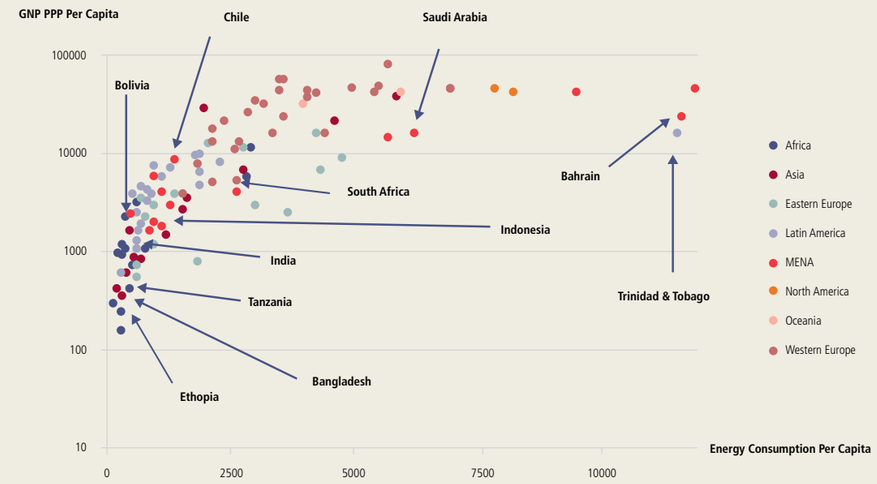
Source: GSMA/ARE[13]

The international community has long been aware of the close correlation between income levels and access to modern energy; not surprisingly, countries with a large proportion of the population living on an income of less than US$2 per day tend to have low electrification rates and rely on traditional biomass.

In the sub-Saharan African region, 585 million people are still reported to lack access to electricity[14], which represents 69% of the total population of the region. The urban and rural divide remains significant with 40% of the people living in urban areas lacking access to electricity compared to 85% for rural areas.

In countries with a lower GNP per capita, independent of the electrification rate of the country, the overall energy consumption in underserved populations is limited due to high costs.

Figure 5: Energy Consumption per Capita (kgoe/a[15]) vs GNP PPP Per Capita



Source: World Bank Data

The Health Factor - Energize the Chain (EtC)

See Appendix 3

Energize the chain is a recently formed initiative that aspires to eradicate vaccine-preventable deaths worldwide by ensuring the delivery of active vaccines by preserving the vaccination cold chain. At the simplest level, EtC proposes to use power installations at cell towers as the energy source to power vaccine refrigeration units in remote locations. Currently these locations lack the energy infrastructure needed to preserve the cold chain. This project will be led by Dr. Harvey Rubin and Dr. Kent Smetters from the University of Pennsylvania.

The Mobile Factor: Communication is Key to Rural Communities Empowerment

There are more than 5 billion mobile connections worldwide today[16] and it is estimated that the 6 billion mark will be passed by the middle of 2012, with India and China accounting for the highest amount of growth. The next growth phase will come from the rural regions of the developing world. The increase of mobile penetration is expected to bring social and economic benefits to this underserved population, but also to the rest of the population globally. Although the economic and social impacts of mobile telecommunications are currently not well quantified, research has shown that a 10% increase in mobile penetration leads to a 1.2% increase in GDP[17].

568 Million of Off-Grid Mobile Subscribers

568 million mobile subscribers live in off-grid areas[18]. These subscribers live predominantly in two regions where the rural population remains high; South Asia and sub-Saharan Africa which account for approximately 75% of all off-grid mobile subscribers. The lack of access to electricity represents a major barrier for subscribers living off-grid from contacting friends and relatives, the doctor and all the services that use mobile as a platform; banking, weather and price information for farmers and healthcare.

8. Modi, V., S. McDade, D. Lallement, and J. Saghir, Energy Sector Management Assistance Programme, United Nations Development Programme, UN Millennium Project and World Bank, "Energy and the Millennium Development Goals", 2005
9. The eight Millennium Development Goals (MDGs), adopted in 2000, were designed to eradicate extreme poverty by 2015
10. Energy Poverty – How to make modern energy access universal – IEA, UNDP, UNIDO – September 2010
11. Energy services for the Poor, Earth Institute and Department of Mechanical Engineering, paper commissioned for the Millennium Project Task Force 1, 2005
12. Designing Sustainable Off grid Rural Electrification Projects: Principles and Practices - World Bank November 2008
13. Alliance for Rural Electrification
14. Source OECD/IEA 2009 – World Energy Outlook 2009
15. Kilogram of oil equivalent per year
16. 5.5 Billion mobile connections at 1Q11
17. Global Mobile Tax Review 2006-2007 - Deloitte/GSMA
18. GSMA Research based on mobile penetration and electrification rate at 2Q2010

Figure 6: Off-Grid Subscribers Segmentation (in Million Subscribers)

Source: GSMA

Current Solutions for Charging Mobile Phones are Costly

The lack of electricity represents a major barrier in mobile phone usage for off-grid subscribers, even if they are covered by a GSM signal. Users end up spending a high proportion of their revenue simply charging their mobile phone. This, coupled with travel expenses to the nearest charging station and the charging process itself, represents up to 50% of a mobile user monthly expenditure[19].

Solutions to mobile phone charging dependent on the country's general access to energy. We found different models of phone charging in use in Uganda, India, Cambodia and Bangladesh. African's for example made most use of 'Charging Shops' and paid local entrepreneurs for this service on a pay per charge basis. In Asia however, most households had large batteries which they used to charge small devices including their mobile phones.

Table 2: Handset Charging Economics Summary

	Uganda	India	Cambodia	Bangladesh
Charging Expenses[20] ($US)	2.5	1.25	1	1
Travel Expenses Impact	High	Low	Average	Average
ARPU (2Q10)[21] ($US)	4.2	2.99	5	2.38
Electrification Rate 2009[22]	9%	66%	17%	39%
GDP per capita 2009 (PPP, $US)[23]	1219	3275	1913	1420

Source: GSMA

To find more information on this subject please refer to 'Charging Choices 2' published by the Green Power for Mobile Programme in July 2011. This will include full results from Asian and African field studies, vendor landscapes and opportunities for mobile operators to distribute their charging devices.

Figure 7: A Charging Shop in Kisoro, Uganda

Source: GSMA

19. Data gathered from GSMA field studies in African and Asian countries - 2010
20. Data gathered from GSMA field studies in African and Asian countries - 2010
21. Wireless Intelligence
22. IEA - 2010
23. World Bank data

Chapter 2
Approach to the Use of Excess Energy from Telecom Towers for Charging Services

The mobile phone industry has seen phenomenal growth over the past two decades, with the number of mobile phone connections reaching 5.2 billion in 2010 and an estimated to 6.2 billion by 2013[24]. The majority of future growth in connections will come from developing world markets as most developed world markets are close to or above 100% penetration.

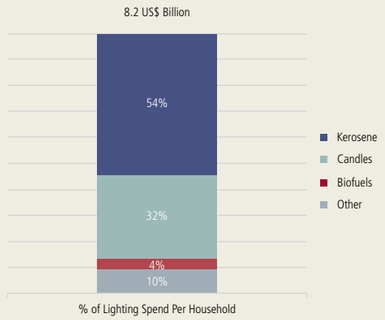
24 Wireless Intelligence

The Off-Grid Energy Market is Significant

Currently 1.4 billion people live off-grid. Their energy needs are served by a largely fragmented energy market selling biomass, charcoal, kerosene, candles and batteries. The Base of the Pyramid population (BoP) is spending US$433 billion on energy (lighting, cooking, phone charging and other appliances) annually. According to another report[25],BoP households regularly dedicate 9% of their expenditures to energy.

Lighting represents one of the main household expenses. One of the most prominent uses of energy in rural households is lighting.[26] Over US$8 billion is spent annually on lighting, primarily kerosene, by the African BoP. This figure is set to rise to US$12 billion by 2015.[27] When taking into consideration cooking and communication expenditures, spend increases to US$239 billion annually.

Figure 8: Energy Consumption Spend on Lighting by Off-Grid Households

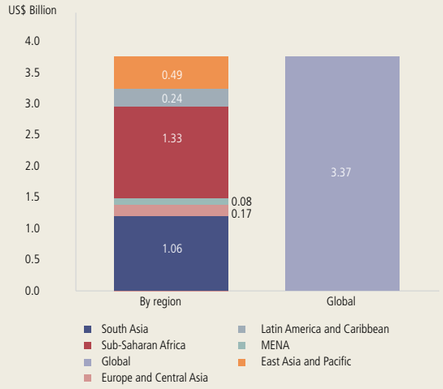


Source: Lighting Africa, Dahlberg Analysis, GSMA

Availability of Charging Solutions Will Bring New Revenues to Mobile Operators

By providing CPM services, mobile operators (in collaboration with 3rd party partners) can both access this off-grid energy market and reduce customer spend on handset charging, thus increasing airtime spend. Only considering the energy expenditure on mobile charging, and based on the ARPU increase by 10% to 14% when subscribers have access to charging solutions[28], this could represent an overall US$3.37 Billion per annum of potential incremental revenues for mobile operators.

Figure 9: Potential Added Revenues from Charging Solutions (US$ Billion)

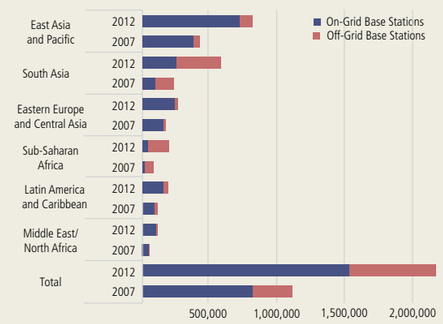


Source: GSMA

Telecom Towers are Rapidly Spreading to Rural Environments

The geographic expansion of mobile networks to provide coverage to the global population relies on radio towers, or base stations, that convert electricity into radio waves. Vast quantities of these are currently being deployed to cater for the expanding subscriber base in the developing world. The GSMA estimates that the number of off-grid base stations in the developing world will reach 639,000 by the end of 2012. Mobile operators have become proficient at generating their own off-grid power, typically by diesel generators, but increasingly using alternative energies such as solar and wind.

Figure 10: Growth in Base Stations in Developing Regions 2007-2012

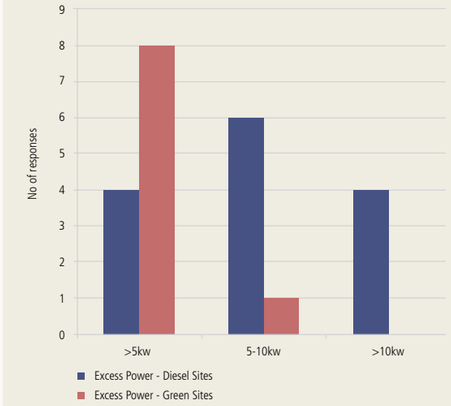


Source: GSMA

Off-Grid Base Stations Typically have Excess Power

GSMA research based on interviews with operators, vendors and managed services companies has found that standalone (not shared) diesel sites have approximately 5kW of excess power each. A high Capital Expenditure (CAPEX) for green power sites means that they have limited excess power availability compared to diesel sites. This excess power represents an opportunity to provide charging services, without impacting power requirements for the base station.

Figure 11: Excess Power Availability at Diesel & Green Sites

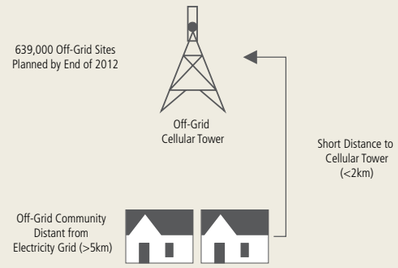


Source: GSMA Research, Based on Operators/Vendors Interviews

Cell Towers are Built Close to Off-Grid Communities

In off-grid regions, the base stations are built close to the communities to cover the maximum population. The distance between the power source at the base station and the communities is often less than 2km. This central position makes for one of the key advantages to the implementation of the charging services model in comparison to communities travelling sometimes up to 50km to access the electricity grid.

Figure 12: A Rural Landscape in Off-Grid Africa (BTS at the Centre of Communities)



Source: GSMA

The Telecom Tower Acts as the Charging point

The growing rural penetration of telecom towers make them an ideal anchor point to set up a charging station benefiting the local community. The power from the base station site will be delivered to the community by the means of a charging station set up at the BTS site or directly at the community location.

Mobile Operators have Already Deployed CPM Sites

The CPM concept has already been implemented on the field by a few mobile operators in Africa and Asia[29]. Those pilots are on a Corporate Social Responsibility (CSR) basis and give access to phone charging as well as provide power for computers, vaccine fridges, the local clinic etc. Feedback from the communities is very positive. To better understand the potential impact of excess energy being redistributed to these communities, 5kW is enough excess power to provide energy to recharge almost 5000 handsets, provide electricity to 40 homes, 10 vaccination fridges or 2 clinics.

25. The Next 4 Billion report – IFC/IDB - 2007
26. The Welfare Impact of Rural Electrification – World Bank - 2008
27. Lighting Africa, Dahlberg Analysis - 2010
28. Estimates by Digicel - 2009
29. See Appendix 1 for details on Community Power deployments

Table 3: Community Power Initiatives

Community Power Initiatives	
Orange Oryx project – Niger	Excess power generated by a solar powered BTS is used to power a small clinic in rural Niger, hosting a vaccine fridge, lights, water point, fans,...
China Mobile	Off-grid site in the Sichuan province, providing 10kW of excess power to local village
Zain (Bharti Airtel) – Kenya	Off Grid site in Dertu, Northern Kenya, where a vaccine fridge is powered by the excess power from the site
Safaricom – Kenya	Network of 30 sites providing power for: mobile phone charging, street lighting, schools, clinics & businesses in various location in Kenya
Grameenphone – Bangladesh	Telecom Tower provides power to several households (only lighting applications for now), charging devices and a computer centre where users can connect to internet
Viom Networks	Viom Networks launched a service centre in partnership with the government of India to provide educational, financial, healthcare, egovernance, telecom and other services to the rural population. The public-private-partnership is considering around 12,000-15,000 towers, spread across 879 districts in the rural areas that can support these centres.

Source: GSMA Based on Operator's Information

A Simple and Central CPM Charging Station

A charging station deployed by Safaricom in the past consisted of a simple dock that could be attached to the BTS site wall. The booth is equipped with several power strips delivering AC voltage to recharge mobile handsets and is also able to safely store the devices being recharged.

Figure 13: Current Safaricom Mobile Handset Charging Dock

Source: Safaricom

In the new model of charging station (proposed by vendors in the charging services business)[30], a booth should be built next to the BTS site or in the community village[31], so that:

- Users will come to the booth to recharge their mobile handsets, battery and lanterns
- The charging station can also be used to sell airtime (depending on which operator owns the site)
- Lamps and batteries can become available for purchase at the charging station

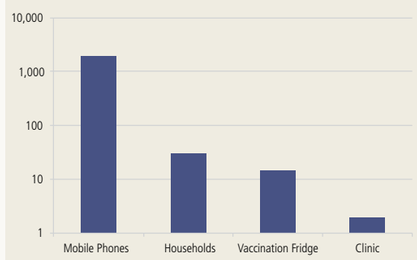
Figure 14: Charging Kiosk model for Community Power from Mobile

Source: MTN

Excess Power Generated by BTS Generator is Enough to Charge Devices

Typically with more than 5 kilowatts (kW) of excess power each, the off-grid base stations will initially be used to charge a range of devices such as mobile handsets, lanterns and household batteries, and ultimately, to power businesses, clinics, vaccination refrigerators, schools and homes. 5kW is enough excess power to provide energy to recharge almost 5000 handsets, provide electricity to 40 homes, 10 vaccination fridges or 2 clinics.

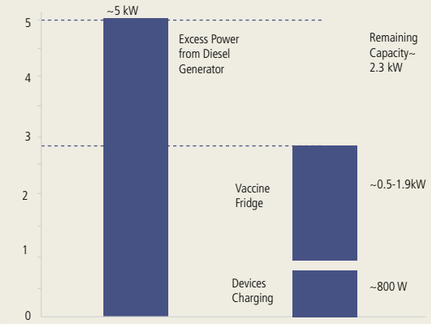
Figure 15: Volume of devices that could be charged by a single BTS excess power (on a peak load mode)



Source: GSMA[32]

In reality, the power drawn for charging devices (handsets, batteries and lamps) will be less than 5 kW at peak load (estimates are thought to be around 800W). Considering that a refrigerator unit consumes between 0.5 – 1.9kWh/24h[33], there is also ample power at most cell tower sites (powered by diesel generators) to supply refrigeration units.

Figure 16: Power Estimated to be Drawn by Charging Services Per Site



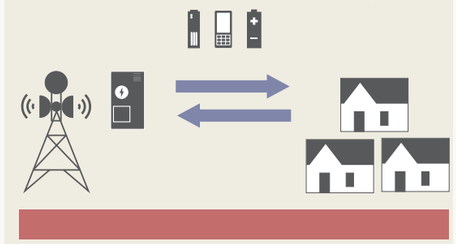
Source: GSMA

Assumptions	
50 Handsets Charged Per Day (20 being charged at the same time)	5 W Per Charge 100 W Peak Load
50 12V Batteries Charged Per Day (10 being charged at the same time)	63 W Per Charge 630 W Peak Load
10 Lamps Charged Per Day	5 W Per Charge 50 W Peak Load

Models to Distribute Energy to the Community

A critical parameter of the Charging Services model is how the power is delivered from the telecom tower to the community. Several models are currently in consideration for closing this gap, several involving vendors and agents.

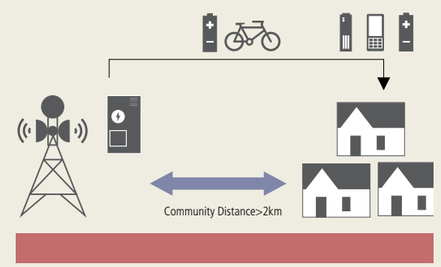
Figure 17: Charging at the BTS (Telecom Tower Sits Within 2km of the Community)



Source: GSMA

In this model, an agent sets up a shop at the base station if the nearest community is less than 2km away, consisting of a number of power strips connected to the generator or batteries. Customers are able to visit the charging shop on a regular basis as the BTS is within a short distance of the community.

Figure 18: Charging in the Community (Telecom Tower is Outside the Community)



Source: GSMA

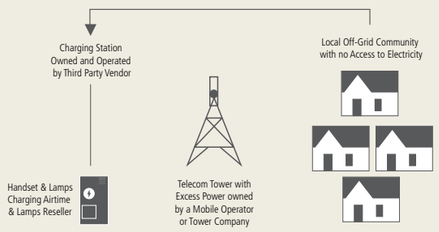
When the BTS is located further than 2km from the community, the travel involved is often more time consuming and, as a result, an alternative solution is required. In this case, the agent owns a set of large batteries which he can charge at the base station and then take to the local community and set up a stall. The agent can then return the depleted battery to the base station to be recharged at the end of the day.
A meter can be installed between the generator and the power strips in order to determine the amount of power that is being drawn each time. More so than the charging booth, investments need to be made into the purchase of batteries and transportation for the batteries from the base station to the community. More often than not, the agent would contract a loan with a MicroFinance Institution in partnership with the vendor to cover these upfront costs.

30. From The Ecology Foundation (TEF) model
31. Depending on the distance of the BTS site to the community
32. Based on average consumption estimates: mobile handsets (~1.6W), household (~170W), vaccine fridge (~400W), clinic (~1.2kW)
33. Harvey Rubin, Alice Conant: Energy For Health: Cell phone expansion and disease prevention - 2010

The Charging Services Value Chain

The technical factor of the charging station implementation is not the main barrier to the delivery of the charging services. Batteries can be charged directly from the excess power at the base station site, it is more a matter of partnership and cooperation between the mobile operator owning the site and the vendor using the power. Therefore the business case on charging services has to be investigated in great details to define the most fruitful interaction and revenue sharing model between partners.

Figure 19: Current Model for Charging Services at BTS Site



Source: GSMA

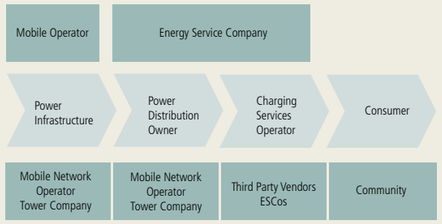
The Charging Station is the Key Element Linking the Different Stakeholders:

- Power Infrastructure Owner & Power Distribution Owner:
  - The mobile operator/tower company provides excess power and site access to a third party vendor
- Charging Services Operator:
  - A 3rd party vendor manages the charging services business
- Consumers:
  - The end users go to the station to charge their handset, batteries and lamps as well as to buy airtime

Selection of Charging Services Operator

There are different kinds of vendors/ESCos who can be implementing CPM charging services models and each of them differ not just in the overall implementation model but also in the direct and strong strategic benefits that each of them would derive from implementing such a model. Each of these models by different vendors/ESCos would be trialled during the pilot phase (with or without GSMA assistance) and post this pilot phase, our assumptions on strategic benefits for each type of vendor/ESCo would be tested so that we gain understanding about the vendor/ESCo and implementation model who would be best suited for the CPM charging services model to scale.

Figure 20: Charging Services Value Chain



Source: GSMA

There are different kinds of vendors/ESCos implementing CPM charging services models. They differ not just in the overall implementation model but also in benefits that each of them bring. Each of these models will be trialled during the pilot phase and then assessed for the benefits to the community before taking the CPM charging services model to scale.

Vendors and ESCOs Include:

- Development Organisations
  - The CPM model complements their existing rural energy access/ electrification programme
- Off-grid Lighting Companies
  - The charging centres at the tower will provide charging services to their lighting products as well as other battery-operated devices when required - it can also act as retailing and customer service centre for the lighting products
- Telecom vendors
  - The major strategic benefit would be to offer a new solution to MNOs who can make additional revenue by offering CPM as a new Value Added Service (VAS) to their off-grid customers, whilst increasing ARPUs from their off-grid towers

In most of these implementation models, the vendor/ESCo could involve local NGOs and/ or local entrepreneurs for the delivery agents of these charging services. They would be responsible for the day-to-day operations of the charging stations as well as other activities that may be required. In some cases, these delivery agents would be expected to bear a portion of the CAPEX for setting up these charging stations however, local MicroFinance Institutions (MFIs) can assist local entrepreneurs with some initial financing.

Table 4: Charging Service Value Chain Roles

Roles	
Mobile Operator	Mobile operators ensure vendors have access to excess power from the base station
Third Party Vendor	In charge of implementing the charging services: design, build up, recruit local agent, train agents, operate charging services, report key data and respect operator KPIs Direct relationship with mobile operator
Local Entrepreneur	Local entrepreneur runs the charging services to the community and ensure local maintenance No direct relationship with mobile operators

Source: GSMA

The Community Power from Mobile Benefits

Revenue Increase from rural Telecom Towers

The mobile operator/tower company provides excess power and site access to a third party vendor.

Table 5: Benefits for Mobile Operators from Community Power deployments

Benefits for Mobile Operators	
Increased Revenue and Profit Streams	From either direct sales of power, rental of base station real estate by third party vendor Local ARPU increase due to availability of charging solutions (10-20%) Savings made by users on charging services can allow community members to purchase new mobile subscriptions
Increased Security from Theft	Reduced theft due to the involvement of the community in the charging services and the preservation of this local energy source - Safaricom estimates a 35% theft reduction from his Community Power pilots
Increased Community Support for the Company Brand	People are increasingly trustful of the operator providing power and energy services to the community
Better Understanding of Rural Customer Base	Mobile operators can obtain more information about rural customers usage and habits to provide better solutions matching their needs and purchasing power
Improved Advocacy with Governments	The role of the mobile operator is becoming central in empowering rural and underserved populations, through the access to communication and energy services.

Source: GSMA

Business Opportunity for Third Party Vendors

A third party vendor manages the charging services business.

Table 6: Benefits for Vendors from Community Power Deployments

Benefits for Vendors	
Stable Revenues from Charging Services	The local community is coming to the shop regularly to charge their handsets, ensuring regular revenue streams
Revenues from Lamps Sales	Lamps are available at the charging station site and can add value to a vendor's revenue
Increased Community Support for the Company Brand	The manager of the charging station is a member of the local community. People are trustful to vendors providing new jobs and revenues to the community
Increased Penetration of Vendor Brand in Rural Regions	Partnership with operator allows vendors to penetrate remote areas, hard to reach otherwise
Scalability of Charging Stations	If proven successful, the charging station model could be replicable across multiple sites from same operator

Source: GSMA

Community Feels Empowered by the Access to Energy

The end users go to the station to charge their handset, batteries and lamps as well as to buy airtime.

Table 7: Benefits for End Users from Community Power Deployments

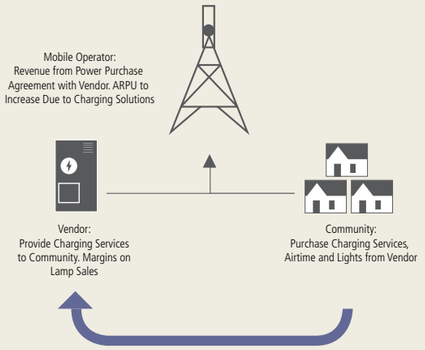
Benefits to End Users	
Time Savings	People living in rural areas don't have to travel anymore to reach the electricity grid to charge their phones and other devices
Cost Savings	It would potentially cost less to charge mobile phones from the charging stations; subscribers would also save money on the travel expenditure to the charging point
Economic Development	Create a local business where local entrepreneur manages the charging site
Access to Lighting Devices	There is a strong demand for sustainable lighting products in off-grid regions. The charging station is also now selling and charging lamps
Theft Prevention	Community take care of the charging station, as the increased importance of charging site for village

Source: GSMA

Business Case for Charging Services

In the current model the mobile operator owns the tower site and the charging service is outsourced to a third part vendor. As a result, the operator has no direct interaction with the end users.

Figure 21: Community Power from Mobile Business Model

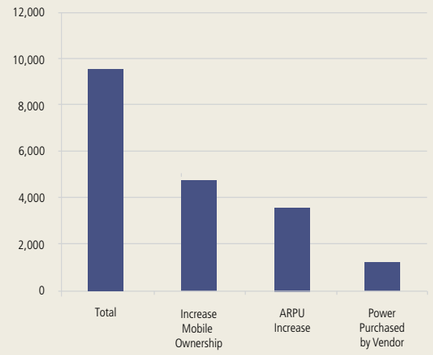


Source GSMA

Added Revenues to Mobile Operators

The Ecology Foundation (TEF)[34] is willing to act as the third party vendor for the Community Power from Mobile deployments. They developed a business model in which the revenue stream per site (charging station) could add US$9600 per year to the mobile operator revenues[35]. Scalable on 200 sites according to TEF plans, a total new revenue opportunity of US$1.92 Million per year[36] exists.

Figure 22: Yearly Revenue Opportunity from Charging Services (in $US Per Site)



Source: The Ecology Foundation

Table 8: Assumptions on Revenue Streams

Revenue Stream	Added Revenue
Increase in Mobile Phone Ownership	20% increase -> US$4800 per BTS
ARPU Increase	10-20% increase -> US3600 per BTS[36].
Power Purchased by Vendor	US$0.40 kWh -> US$1200 per BTS
Cost	Negligible, as power drawn from BTS remains in the excess power available from diesel generators (low impact on operation costs)

Source: The Ecology Foundation

The costs estimated from the charging services for the mobile operators are negligible as the power drawn from the generator is already excess.

Figure 23: Mobile Operator Revenue Streams

ARPU Increase	Phone Ownership	Power Purchase Agreement	Devices Charging (Handset, Battery, Lamps)	Margins on Lamp Sales	Margins on Power Bought from Agent	Battery Purchase on Leasing Service
✓	✓	✓	✗	✗	✗	✗

Source: GSMA

The use of mobile money to pay for charging services could represent an added revenue streams to the operator. As mobile money services are particularly successful in sub-Saharan countries, it is probable that handset owners will use this method to pay for their energy services (see appendix 4).

Micro-Entrepreneurial Opportunities in Rural Regions

Third party vendors will own the charging station and hire a local agent or micro-entrepreneur to manage and operate the charging service. The revenue streams for the vendor would come from:

- Fees for charging devices
- Margins on the sale of lamps
- Margins on the sale of batteries or battery leasing services
- Margins on the power purchased by the agent for the charging services

Figure 24: Third Party Vendor Revenue streams

ARPU Increase	Phone Ownership	Power Purchase Agreement	Devices Charging (Handset, Battery, Lamps)	Margins on Lamp Sales	Margins on Power Bought from Agent	Battery Purchase on Leasing Service
✗	✓	✗	✓	✓	✓	✓

Source: GSMA

34. Company based in Dublin Ireland - http://www.theecologyfoundation.ie/
35. See Appendix 2 for details on The Ecology Foundation model
36. According to TEF model - Assuming 200 users per base station, with ARPU of US$10 per month

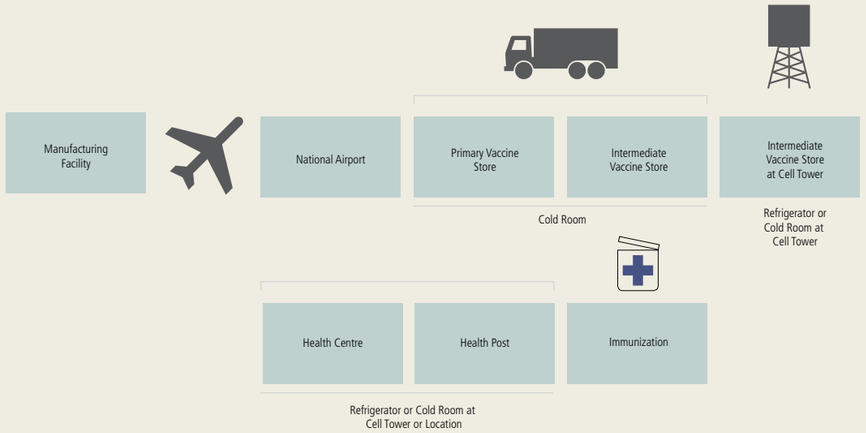
Business Case from Cold Chain Opportunity

By Dr. Harvey Rubin and Judah Levine[37]

This section is a summary of Harvey Rubin and Judah Levine white paper – more meaningful providers.

Preservation of the Cold Chain in off-grid and warm climate environments represents an important opportunity for the various stakeholders of the healthcare and CPM value chain. Access to refrigeration at these remote destinations would enable vaccines to be stored for longer periods of time. The Energize the Chain initiative is working on developing models to preserve the vaccination cold chain and ensure delivery of active vaccines.

Figure 25: The Vaccine Cold Chain Utilising Cell Tower Power Facilities



Source HIP Consult, Energize the Chain

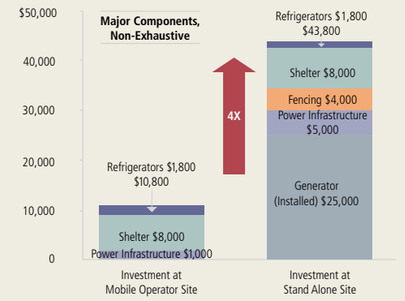
While the opportunity to extend and sustain the vaccination cold chain is clearly compelling from social and macroeconomic standpoints, the attendant challenge is to identify a suitable business model which will allow for a scalable implementation and sustainable operation of this concept. Due to the lack of proven business models, initial funding will need to come from governmental agencies, foundations and other public and private non-for-profit sources. Pilot programs will likely be funded by one time grants, with the goal of working the projects into a more sustainable government or NGO budget. Once the economics of a business model are solidified, then private enterprises may be compelled to enter this space, creating a more competitive and dynamic market which focuses on the cold chain application or uses it as an anchor tenant to support other services.

Energize the Chain is hoping to demonstrate a proof of concept that using cell site refrigeration will help to improve vaccine integrity and reduce costs in the cold chain. In order to do this, it will need to take on the capital and operating expense required to support the refrigeration site. Economic benefits from this are only realised if EtC participates in the portions of the cold chain where costs are reduced; primarily vaccine spoilage and transport efficiencies.

Overall the model is based on the use of cellular tower site to defray capital costs required to establish power for the fridge unit. According to the EtC team estimates, this could lead to a 4x decrease in capital costs.

37. See Appendix 3 for full White Paper on Healthcare Opportunity for Community Power from Mobile

Figure 26: Capital Cost Savings from the use of Cellular Tower in the Cold Chain Preservation



Source: HIP Consult, Energize the Chain

A mobile operator or tower company, which already operates the power generation at its sites, would be the logical support provider for co-located refrigeration shelters. The question is whether supporting the EtC endeavor makes sense for these operators. In terms of pure business merit, supporting the power and shelter requirements for vaccination could represent a high margin business, but requires scale and contains risk (i.e. a simple reality whenever dealing with peoples' lives). However, there are other indirect benefits that may be attractive to operators, such as social responsibility and community goodwill.

The revenue opportunities in supporting this application are multi-fold. Initially there is the straightforward opportunity of selling power as well as leasing land and offering site management services. This may generate an additional US$400 to US$1,200 per month per site using excess power[38]. The margin on these services is high as the investment is sunk and the site is already in operation. Investment in additional power capacity to supply larger refrigeration units could double or quadruple revenue at somewhat lower margins provided demand exists. Beyond the direct revenue potential, there is an opportunity for the operator to offer value added data services related to the refrigeration units and the shelter, such as remote monitoring and alarming on temperature ranges and unit operation, inventory control and tracking, and security monitoring. These revenue opportunities are less quantifiable, but may prove more meaningful for providers.

Potential Barriers to the Implementation of Community Power

The implementation of charging services might raise concerns to the main stakeholders, especially mobile operators, as this innovative concept may be viewed as harmful to their mobile operations. GSMA identified five main barriers that could impact the deployment of charging services pilots.

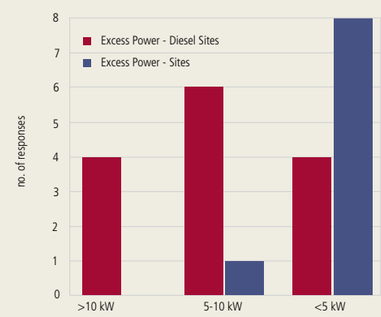
Cost Containment

Cost containment is an important factor for mobile operators, as CAPEX and OPEX remain high in remote areas, where ARPU is also much lower. There is a concern on higher CAPEX involved to over specify the power equipment and increase OPEX, such as diesel consumption.

The charging services are based on the use of preexisting power sources to provide excess energy to the community. Most off-grid sites currently use diesel as the main power source, due to its availability and low CAPEX.

The operator does not need to increase the size or running time/diesel consumption of the generator to accommodate the CPM initiative and in addition the third party investor, builds and operates the charging station, therefore no further expense to the operator.

Figure 27: The Vaccine Excess Power Availability at Diesel & Green Sites



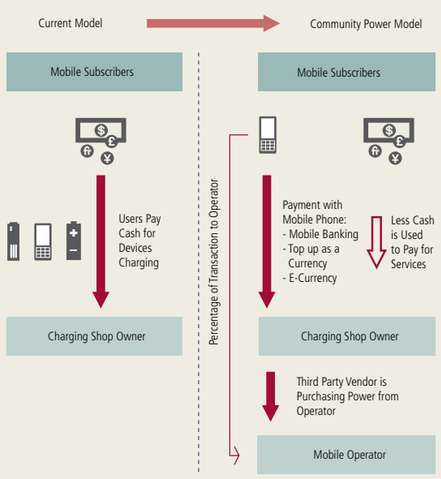
Source: GSMA Interviews – Operator/Tower/Managed Services Companies

38. Estimates based on market land lease and power circuit rates

Payment for Charging Services

Ability of customers to pay is a key to guarantee the sustainability of energy services. To ensure the charging services are affordable to the end users, tariffs will be proposed at slightly lower prices (US$0.15) than the current amount charged by charging shops (~US$0.20). Several innovative methods could also be used to facilitate the payment of services based on mobile phone use, with the goal of minimising the use of cash to pay for charging services.

Figure 28: From Cash to Mobile Money Payment



Source: GSMA

Mobile banking[39] represents an important opportunity when it comes to paying for the charging services. Indeed mobile money services are expanding to several developing countries and face good traction; M-PESA in Kenya is one of the most successful mobile money deployments. Since its commercial launch in March 2007, it has been adopted by 11.9 million customers[40].

One of the biggest barriers to the implementation of mobile banking for charging services remains the high fees charged to end users for small transactions. These fees fluctuate based on the transaction amount. As mobile operators fix their own mobile money tariffs, they differ greatly from one country to another and some countries even charging as little as US$0.1 for mobile money transfers.

The trend is now to lower transaction fees further. In December 2010, Safaricom modified its tariffs to allow for both smaller and larger transactions. The minimum transaction size has been halved from KSH 100 (US$1.2) to KSH 50 (US$0.6). Safaricom confirms its interest to use M-PESA as a payment channel for charging services as the payment system is already setup and its use is widespread.

Table 9: Pros and Cons of Mobile Phone Payment Methods

	Mobile Banking	Top Up as a Currency	E-Currency
Pros	Easy to use Mobile banking model is already set up in several countries	Works well for small transactions Already used to pay for digital goods	Scratchcards can be bought anywhere and be used to pay for goods/services
Cons	Average traction on mobile money services Mostly used for remittances High commission for small transactions	Only for digital goods purchase Users have to buy talktime more often as money is withdrawn directly from airtime	Not widespread Subject to national regulation

Source: GSMA

Theft

Theft is a major problem in base station operation particularly in remote off-grid areas. Diesel is regularly stolen in many developing world markets. Generators are also stolen; an operator in Nigeria is currently replacing 5-10 generators a month due to theft. In some countries, some sites are manned by private security agencies.

The impact of CPM is viewed to be beneficial to the community as a proportion of the BTS power will be shared with the villagers. It also increases the reliance of the community on the telecom towers operation for both communication and energy. Estimates on the percentage of diesel saved from theft/vandalism due to CPM could be as high as 35%[41].

Regulation

As in most developing countries, power distribution to retail consumers, with most of the time state owned companies being the sole authorised power distributors in the country.

The regulation is however relaxed for small scale rural community applications. Governments can in this case offer power distribution license exemptions to small scale energy suppliers. In many countries in the East African region, no regulatory issues prevent the implementation of charging services by a third party vendor: Tanzania, Kenya, Uganda and Burundi. Operators can sometimes request the community to present an appeal for electricity, in order to obtain faster clearance from the government[42].

In most of the countries studied, it is common that for power production up to 1 MW, the power producer is exempt of license requirement. This is then the case for mobile operators and the Community Power from Mobile projects, which will most probably have excess power to share with the community below 20 kW. In this case, the producer has to submit information on location, business registration, capacity of facility, GWh/yr, date of planned construction.

Threat to the Power Required by BTS

While the excess power could be used to provide charging services to the community, the mobile operator may fear that the power distributed to the BTS could be negatively impacted by these different operations.

Minimum available excess will be calculated from the diesel generator capacity and peak capacity of BTS equipment. A safety margin may be added to that. This will define a limit of power capacity that charging point can draw at any instant. With charging stations established at such sites, a controller device will cut-off power drawn by charging equipment when the meter at distribution board registers the predetermined level of accessible power. This will ensure complete protection to BTS equipment.

While the excess power could be used to provide charging services to the community, the mobile operator may fear that the power distributed to the BTS could be negatively impacted by these different operations.

Managing Community Expectations

Once a community is provided with improved energy access, expectations rise and they expect reliable service. Also, they might demand more services once basic service is provided. Managing these expectations is a concern for most operators and tower companies.

As described by a leading pan-African mobile operator, “Providing Community Power may turn into high expectation that the community will always get power and this becomes an issue if we don’t have excess power.”

It is also very important that the Community Power applications implemented match the energy needs of the local community. GSMA research on consumer perspectives at Community Power sites found that in some cases, the local community was not consulted before the implementation and that has resulted in low utility of Community Power infrastructure.

39. See Appendix 4 for details on the use Mobile Money for charging services
40. Mobile Money for the Unbanked - 2010
41. Safaricom estimates on theft reduction at Community Power sites in Kenya
42. Grameenphone Community Power project in Bangladesh

Appendix 1

Community Power Projects

Safaricom Community Power Site at Tegea, Kenya

Tegea is a small village tucked away in a remote corner of Mau forest region in Kenya's renowned Rift Valley, about 250 km North-West of Nairobi. The village is hard to access – one has to drive nearly half of the 70 km distance from the nearest town of Molo on a rocky country road.

As with thousands of other villages in Kenya, the national electricity grid has still not reached Tegea. However, the situation hasn't been the same since Safaricom, Kenya's largest mobile operator, decided to setup one of its ubiquitous sites in the middle of Tegea.

The site's design and logistical considerations necessitated the installation of power equipment with capacity well above the site's peak power load. It wasn't too long before Safaricom realised that the community of Tegea could immensely benefit from the excess power generation capacity available at the site.

There were several issues – regulatory, technical and business – that had to be resolved before the Tegea Community Power infrastructure was setup.

Regulatory

As in most developing countries, power distribution to retail consumers is restricted in Kenya, with the state-owned Kenya Power and Lighting Company (KPLC) being the sole authorised power distributor in the country. However, this regulation has been relaxed for small-scale rural community applications. Safaricom requested Tegea's community to present an appeal for electricity, which was used to obtain the necessary clearance from the government.

Technical & Business

Safaricom considered various design factors such as technical feasibility, business sustainability and community impact. The primary technical/ business factor was of course ensuring that their site's power requirement was not compromised. This was achieved by introducing circuit breakers into the site's design, which disconnect the power supply if the Community Power load exceeds a certain level. Two months after the project was initially conceptualised, a handset charging dock with about 12 power plugs, a network of six street lights in the village's main market street and power to a local church were provided. Power to the site's landlord's house and the village chief's house was also provided.

Impact

The benefits to Tegea's community have been immense. The handset charging dock at the site has eliminated the villagers' need to walk for three hours to the town of Molo just to charge their handsets. Safaricom has also benefited from this move since availability of handset charging has resulted in higher utilisation of Safaricom's services which in turn means higher revenues.

Additionally, the availability of street lighting in Tegea's main street has made post-sunset commercial activity possible. A local vendor, who runs a small grocery store on the street, who used to shut down the store's shutters by 6 pm every evening, now keeps it open until 8.30-9.00pm. Another vendor, who runs a small eatery on the street, says that with the availability of street lights, she now feels safe enough to keep her eatery open until midnight.

This feeling of increased safety has extended throughout the community. Safaricom and Philafe Engineering, who maintain the site, have observed a marked reduction in theft and vandalism at the site since installing the Community Power infrastructure. They believe that this is due to the fact that the local community now has the right incentive to safeguard the site.

Table 10: Community Power Deployments from Safaricom

Name of Site	Location	Applications Supported
Tegea	250 km North West of Nairobi	Mobile phone charging booth Market street lighting Lighting and socket power to local community church Lighting and socket power to the site landlord and the local provincial administration (chief's house)
Faza Island	15km South of Saadani, North Kenya Coast	Mobile phone charging booth Supply of Power to local community school computer room (PC donated by Safaricom)
Chesengoch	220 km North of Nakuru	Mobile phone charging booth Lighting and power socket to mission hospital (maternity) Lighting and power socket to local community library Market street lighting
Archer's Post	600 km North of Nairobi	Power to local community water pumping system
Konyao	Near the Kenya-Uganda border	Mobile phone charging booth Lighting and socket power to local community school
Kilunga Sankuri	450 km North of Mombasa on the East Coast, near the Kenya-Somalia border	Mobile phone charging booth Power to local community radio
Ndau Island, Laisamis, Nyagoko, Tot, Rhamu, Sololo, Lolyangalani	Across Kenya	Mobile phone charging booth

Source: Safaricom

The Dertu Case Study, Kenya

Site Location and Climate:

Dertu is located at North Eastern Province of Kenya. The nearest town, Garisa, is 100km away from Dertu. There is no existence of any deep green plants/crops within 100km of Dertu. The average temperature is 36 degree Celsius. It rains once in every 5-6 months, which makes Dertu an extremely dry place.

Inhabitants and Life Standard:

As per the last census of early-2010, more than 10,000 people live in Dertu millennium village. The main source of income is livestock. Lack of water supply does not allow the local inhabitants to plant any crops and there are not enough sources of drinking water. The available water is salty and usually collected from the upper layers of earth. There is no deep water-pump available in Dertu. Currently a deep water pump is under construction by UNDP. A school, a small market place and a small dispensary with a minimum healthcare facility are available.

Charging Site:

The site was launched in 2008, thanks to a collaboration between Zain, Ericsson and Flexenclosure. Flexenclosure E-site was launched as a power source along with the site, containing a hybrid wind/solar solution.

Handset Charging:

About 4000 people of this village use mobile phone. As per Airtel, the transceiver capacity is always in good use at this site and the revenue is quite high at Dertu. As no grid power is available at the village, charging shops are the only place to charge handset. There are 5-6 charging shops at Dertu (they also sell airtime). It costs Ksh20 (US$0.25) per charge. Usually people charge their phone 3 times a week.

Healthcare Application:

A medical container has been deployed at the same time of the site deployment. The medical container contains a vaccination freeze/refrigerator. The local healthcare dispensary takes care of the medical container. The power consumption of the vaccination refrigerator is about 100 W. The vaccination refrigerator consumes power for 24hrs a day. The E-site managed to provide power to vaccination refrigerator without any failure since its deployment. 3 times every week, the nurse from Dertu dispensary comes to collect vaccine from the vaccination refrigerator. To date, more than 5000 people in Dertu have been given vaccine by the help of vaccination fridge. The vaccination fridge contains not only snake venom but also all necessary vaccine for a new born child. It is a life-saver for new born children and pregnant women. People of Dertu are very thankful to Airtel for arranging such a facility for them.

The GrameenPhone Case Study, Bangladesh

Background and Concept

Grameenphone has been developing a pilot project providing electricity to a community of 140 households in rural Bangladesh. Grameenphone is working with the University of Oslo to deploy this pilot, based on the use of solar panels from the base station. The University of Oslo is also participating in the funding of the project.

For the pilot phase, a very remote village at Hobigonj, Sylhet, has been identified. The village has no grid connection and it is only accessible by boat. Currently, there are around 20,000 inhabitants in the village. There is a primary school and a local college present in the community. To get access to energy, people usually buy solar panels and use batteries to provide charging services to the community – charging costs 50 to 60 taka local currency (~US$0.8).

The Project

The excess power from the solar base station (with diesel back-up) is able to power a Community Information Centre, where people can access a computer, charging phone facility: 1 mobile charging booth with 6 connections.

The Community Information Centre is managed by a partner, contracted by Grameenphone – there is a revenue sharing model (20% of the revenue goes to the agent). The agent manages the centre and also sells airtime.

Each household has received one light (one 5W bulb) that is powered by the base station's energy. Grameenphone is charging 5 takas (US$0.07) per day for the use of 1 bulb to the household. No meters have been installed to date, as households are allowed to only power 1 light from the mini-grid.

The project is run on a CSR basis, however Grameenphone envisions implementing models to enhance cash flows and make this model more sustainable.

Grameenphone faced several challenges while implementing this project:

- Once connected to electricity and having access to charging services, the community tends to have a high demand that may overtake the telecom towers' capacity. In this case, the mobile operator has to clearly communicate the energy available to end users and deal with user requests
- The cost of deployments of mini-grid lines and household connections require high capital expenditure, and the challenge for the mobile operator is how to keep low prices when providing electricity to low income households, pairing with their current expenditures on energy
- As most rural users don't have bank accounts or a regular income, payment collection can be a hard task. In this case, the agent in charge of the mini-grid or Community Information Centre has to recover the payments and establish a trusted relationship with the community. The use of mobile payment for charging services could also ease the transaction
- Strong training and education are needed for the Community Information Centre agents. As they operate these centres, they need basic technical skills to ensure maintenance of the centres, but also ensure a good ongoing relationship with the community.
- The operation and maintenance of mini-grid system has to be carefully performed, to avoid power outages to ensure that customers are receiving the power they are paying for. In rural areas, a disruption in such services could trigger backlashes from community.

Next Steps

The next phase would be to provide enough power to supply the entire market, the school, the local college, a future health facility and preferably all the households in the village. Grameenphone is also thinking of expanding the mini-grid from solar use only (as the payback time is very long), to the use of a biomass plant.

Appendix 2

The Ecology Foundation Model

By Declan Murphy, CEO of The Ecology Foundation

Description

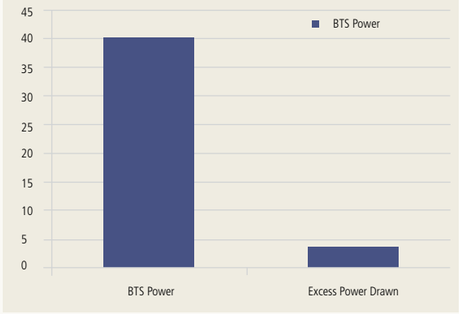
The Ecology Foundation (TEF) has been developing models for sustainable and affordable micro power since 2008 and has partnered with GSMA to pilot systems in 2011. TEF is planning on the installation of a standardised base station interface unit at each BTS site that will be operated by a local Energy Agent, running this charging station. Site selection will be performed with the operators support according to the availability of excess power, the proximity of community and the teledensity.

2 models are being investigated based on the community proximity:

- The charging shop is located at the BTS site (distance below 2km)
- The charging shop is located in the community village (distance over 2 km). In this case, the agent in charge of the services would charge batteries at the BTS site and then deliver it to the village

The business case implemented by TEF is planning on extracting 10% excess generation capacity at existing operator base stations and deliver this direct to off-grid communities. With daily average BTS generated power, the power drawn from the BTS would be up to 4kWh per day. The system would be based on the use of mobile money where a centralised system is granting a certain power amount to the agent.

Figure 29: Excess Power Drawn from BTS



Source: The Ecology Foundation

The community's first usage for power is cell phone charging, domestic lighting and micro business, all of which in turn support the usage of local base station communications traffic.

As the current cost of energy in off-grid areas is very high (from US$0.25 to US0.$75), the goal is to be able to provide affordable cell phone charging services from US$0.15-US$0.20 or even free of charge with airtime purchase.[43]

43. This model is already in use in countries such as Cambodia, where battery charging is free when purchasing airtime

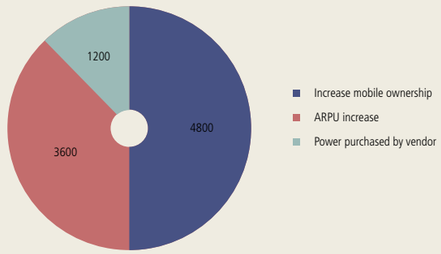
Benefits from CPM

Mobile Operators

The cost to operators is minimal, with minimum installation time required. The incentives of TEF are put on a minimum risk or operational impact on the base stations, and an improved community support to protect base stations. In return, the revenues of operators would rise thanks to 3 factors:

- 20% increase community mobile ownership
- 10 to 20% ARPU increase due to the availability of charging solutions
- Revenue from the power purchased by the charging station owner (0.40 kwh)

Figure 30: Revenue Increase from Charging Services Per BTS site (US$)



Source: The Ecology Foundation

This could led to a US$9,600 revenues per BTS, scalable across multiple operators site. Scaling across the operators country BTS and assuming 200 BTS deploying charging stations, this amounts to US$1.8 Million.

Vendors

Vendors have multiple sources of income:

- Sales of the BTS Installation Kit
- Margins on products sales (batteries, lamps)
- Revenues from the power the agent buys to the vendor (US$2-3 per kwh)

Table 11: The Steps to the Implementation of Charging Services

Step 1.	TEF and Operator select suitable off-grid (or sometimes grid connected) base station sites.
Step 2.	TEF appoints and trains a local "Energy Agent"
Step 3.	Operator installs the TEF standardised base station interface unit. This is a sealed access unit, which is mounted on the inside of the base station perimeter wall/fence. There is a single contact engaged at the BTS electrical distribution board. TEF monitors power usage at interface unit and man in BTS, with auto shut down if the BTS power requirement becomes critical. This ensures the BTS power usage always takes priority.
Step 4.	TEF delivers community energy sales kiosk, (approx. 6m² with devices for multiple phone & other battery charges)
Step 5.	TEF delivers energy services to community as follows… Individual/multiple phone charging. (from $0,15 to $0.00 fee) Airtime sales (charging free if bundled with airtime) Household electric lantern & battery exchange service ($3 per month, 10+ charges)
Step 6.	Community airtime usage and mobile handset penetration increases by 10-20%

Source: The Ecology Foundation

Schedule

The Ecology Foundation is conducting pilots in 2011 with an expected mass rollout in 2012. It is hoped that most off-grid base stations will have the standardised community power module fitted within a short period.

Appendix 3

Healthcare Opportunity from Community Power from Mobile

Harvey Rubin directs the Institute for Strategic Threat Analysis and Response at the University of Pennsylvania, Philadelphia (email rubinh@upenn.edu).

Judah J. Levine is the CEO of HIP Consult Inc., a management advisory firm, with a specialisation in telecommunications, energy, finance and infrastructure in emerging markets (email jjlevine@hipconsult.com).

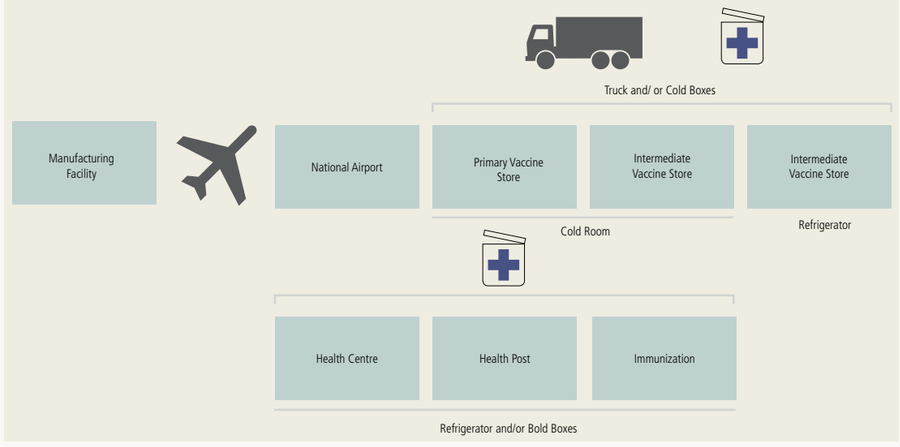
The Idea

We have all heard statistics concerning vaccine-preventable deaths – over two million each year – in developing countries. Although shortage of vaccines may be one key reason, another is that many vaccines must be kept at a prescribed temperature to maintain their potency. Typical distribution models have relied on delivering vaccines to remote destinations in insulated cold-boxes. An efficient "cold chain" normally ensures that temperature-sensitive vaccines remain effective, and any disruption of the cold chain severely impairs these prevention efforts.

In the absence of thermo-stable vaccines – an exciting, but distant possibility – preserving the vaccination cold chain requires immediate focus (See Figure 31). The current approach requires that vaccines be administered almost immediately upon arrival, as the cold-boxes are limited in their ability to maintain the necessary temperature conditions (between 2°C and 8°C). Due to these limitations, vaccines often either freeze or exceed their upper temperature range and are rendered virtually useless.

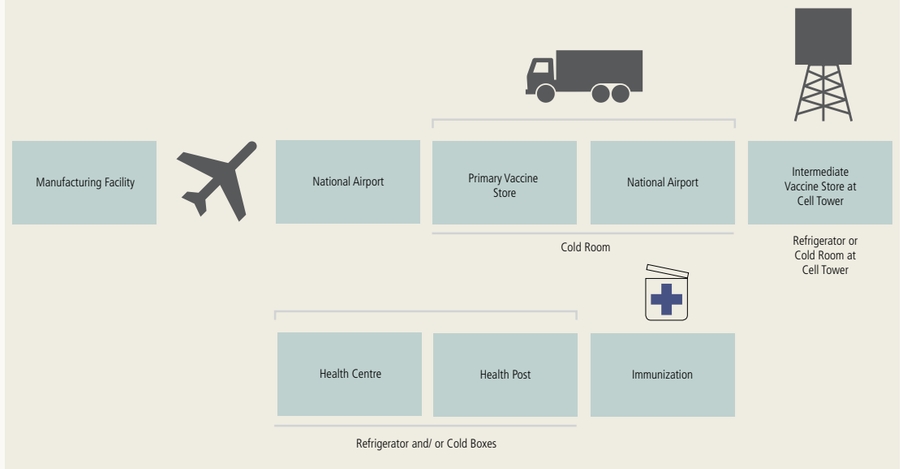
Energise the Chain (EtC), a recently formed, not-for-profit organisation, aspires to eradicate vaccine-preventable deaths worldwide by preserving the vaccination cold chain to ensure delivery of active vaccines. At the simplest level, EtC proposes to use power installations at cell towers as the energy source to power vaccine refrigeration units in remote locations that currently lack the energy infrastructure needed to preserve the cold chain. (See Figure 32).

Figure 31: Standard Vaccine Cold Chain



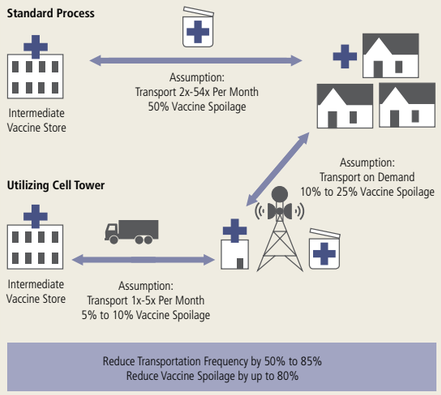
Source: Hip Consult, Etc

Figure 32: The Vaccine Cold Chain Utilising Cell Tower Power Facilities



Source: Hip Consult, Etc

Figure 33: Illustrative View of Efficiency Oppurtunities in Vaccine Cold Chain using Cell Power Facilities



Access to refrigeration at these remote destination points would enable vaccines to be stored for longer periods of time. This would allow for a critical mass of vaccines to be delivered at one time, warranting the use of a transportation vehicle (e.g., a refrigerated truck). This vehicle would provide more stable temperature conditions than a cold-box, thus preserving the integrity of the vaccines and eliminating the pressure to immediately administer them. All of this would not only improve the integrity of the vaccines but also reduce costs (Fig 33).

Approximately 75 percent of the world is covered by a mobile cellular signal, and that percentage is expected to reach nearly 100 percent by 2015.[44] This expansion of mobile coverage transports the presence of energy by necessity to remote locations, many of which are otherwise without access to centrally provisioned power. In off-grid regions, cell towers offer a constant supply of energy, sourced from any combination of diesel generators, battery backup, gas turbine, renewable energy, and other options.

A typical vaccine-storage refrigeration unit requires at least eight hours of daily power supply[45]. Harnessing the energy potential of cell tower facilities provides the means to power these refrigeration units. Research shows that base stations often have a surplus of power capacity of about 5kW for a diesel generator powered BTS and under 5kW for a BTS powered by alternative energy sources.[46] Considering that a refrigerator unit consumes between 0.5 – 1.9kWh/24h[47], there is ample power at most cell tower sites today to supply refrigeration units. Many tower sites also have some spare land available to support an additional shelter for these units.

The Potential Socioeconomic Impact

The numbers of lives impacted by increasing the delivery and access to effective vaccines may extend well beyond the two million lives lost to vaccine-preventable illnesses each year. It is estimated that under the current coverage of vaccine delivery and utilisation there are almost 400 million life years saved and 97 million disability-adjusted life years saved annually by vaccines. The same study showed that there are almost six million deaths prevented annually by vaccination[48] (Fig 34). The World Health Organisation has declared that "… in sub-Saharan Africa only half of the children have access to basic immunisation against common diseases such as tuberculosis, measles, tetanus and whooping cough. In poor and isolated areas of developing countries, vaccines reach fewer than one in twenty children." Such statistics demonstrate that EtC's efforts to ensure an adequate and expansive cold chain could positively impact hundreds of millions of people.

Figure 34: The Benefits of Vaccination

J. Ehreth/Vaccine 21 (2003) 596-600 599

Annual World-wide Benefits of Vaccination and Global Health Improvements

Disease	Deaths prevented per year	Life years saved	Disability-adjusted life years saved
Varicella	57,879	1,615,252	NA
Diptheria	60,000	3,900,000	151,000
Tetanus	862,000	56,030,000	12,020,000
Pertussis	600,000	39,000,000	10,905,000
H. Influenza B	287,000	18,655,000	6,242,000 (Bacterial Meningitis)
Hepatitis B	1,172,500	76,212,500	2,790,000
Measles	1,100,000	71,500,000	29,838,000
Polio	650,000	42,250,000	1,725,000
Tuberculosis	1,188,476	77,250,940	33,287,000
Total	5,977,855	386,413,692	96,958,000

Source: Hip Consult, Etc

Studies have also demonstrated that there are positive economic impacts of vaccination extending beyond life years saved. In a widely influential paper, Bloom, Canning and Weston argue that immunisations not only prevent illness but also provide long-term benefits in cognitive development, physical strength and emotional stability[49].

These factors, they argue, have significant positive downstream effects on the workforce size and productivity, educational accomplishments, savings and investments as well as economic growth of communities. Consistently, we believe that an increase in the delivery and utilisation of effective vaccines will have a scalable impact on millions of lives, both life years saved and economic wellbeing.

The Potential Business Impact

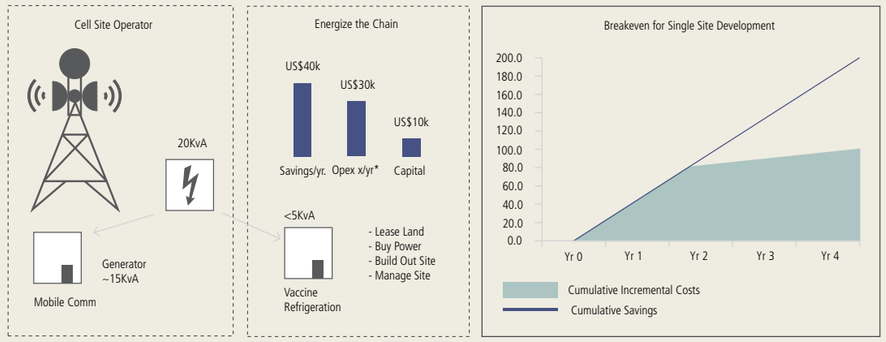
While the opportunity to extend and sustain the vaccination cold chain is clearly compelling from social and macroeconomic standpoints, the attendant challenge is to identify a suitable business model which will allow for a scalable implementation and sustainable operation of this concept. Due to the lack of proven business models, initial funding will need to come from governmental agencies, foundations and other public and private non-for-profit sources. Pilot programs will likely be funded by one time grants, with the goal of working the projects into a more sustainable government or NGO budget. Once the economics of a business model are solidified, then private enterprises may be compelled to enter this space, creating a more competitive and dynamic market which focuses on the cold chain application or uses it as an anchor tenant to support other services.

Base Operating Model

Energize the Chain is hoping to demonstrate the proof of a concept, that using cell site refrigeration will help to improve vaccine integrity and reduce costs in the cold chain. In order to do this, it will need to take on the capital and operating expense required to support the refrigeration site. Economic benefits from this are only realised if EtC participates in the portions of the cold chain where costs are reduced; primarily vaccine spoilage and transport efficiencies (Fig 35).

As an example for potential savings, consider that the aggregate value for a DPT vaccine batch stored in a typical district level refrigerator is approximately US$9,400. This equates to roughly 6 times the value of the refrigeration unit in which it is stored. And as newer, more powerful vaccines are developed, the cost increases dramatically. The liquid pentavalent DPT-HepB+Hib vaccine aggregate value in the same refrigeration unit is US$46,000, about 31 times the value of the unit[50]. When considering vaccine wastage can be as high as 50% and cell site refrigeration may reduce that waste by half or more, savings may be as high as US$40,000. Savings in cold chain transportation and maintenance costs may add another US$3,000, but true savings are difficult to estimate, as one frequent low cost cold box transfer is replaced with a less frequent, but expensive, refrigerated truck.

Figure 35: Energize the Chain Operating Model



Source: Hip Consult, Etc. *Assume site personnel only required in year 1 and 2, at which point local health workers can manage site.

44. World Telecommunication/ICT Development Report 2010. "Monitoring The WSIS Targets: A mid-term review." International Telecommunication Union
45. UNICEF. "Handbook for Vaccine & Cold Chain Handlers 2010." Department of Health and Family Welfare. Ministry of Health and Family Welfare, Government of India
46. "Community Power. Using Mobile to Extend the Grid." The GSM Association Green Power for Mobile. January 2010
47. Harvey Rubin, Alice Conant: Energy For Health: Cell phone expansion and disease prevention
48. Table 4 in Ehreth, J., The Global Value of Vaccination. Vaccine (2003) vol. 21, 596-600
49. Bloom, DE., Canning, D., and Weston, M. The Value of Vaccination. World Economics (2005) Vol. 16, 15-39
50. USAID: Immunisation Basics, Snap Shots News, documents and tools on routine immunisation and sustainable financing July 2008 | Issue 8
51. HIP Consult analysis based on data from EtC, World Health Organisation and UNICEF.
52. cMYP data from 45 countries, WHO/Geneva, Global Immunisation Meeting, February 2008, presented by Patrick Lydon

Figure 35 illustrates the estimated site costs and payback for a single site deployment assuming savings are captured by the EtC[51]. Within this model there are a number of additional considerations such as damage or theft on site, monitoring and alarming requirements, economies of scale, and some staffing considerations, which are assumed to be initially non-incremental. With total costs related to the cold chain reaching over $5B;[52] however, the overall opportunity for cold chain participants is significant.

Cell Site Operator Opportunity

A mobile operator or tower company, which already operates the power generation at its sites, would be the logical support provider for co-located refrigeration shelters. The question is whether supporting the EtC endeavor makes sense for these operators. In terms of pure business merit, supporting the power and shelter requirements for vaccination could represent a high margin business, but requires scale and contains risk (i.e., a simple reality whenever dealing with peoples' lives). However, there are other indirect benefits that may be attractive to operators, such as social responsibility and community goodwill.

The revenue opportunities in supporting this application are multi-fold. Initially there is the straightforward opportunity of selling power as well as leasing land and offering site management services. This may generate an additional $400 to $1,200 per month per site using excess power[53]. The margin on these services is high as the investment is sunk and the site is already in operation. Investment in additional power capacity to supply larger refrigeration units could double or quadruple revenue at somewhat lower margins provided demand exists. Beyond the direct revenue potential, there is an opportunity for the operator to offer value added data services related to the refrigeration units and the shelter, such as remote monitoring and alarming on temperature ranges and unit operation, inventory control and tracking, and security monitoring. These revenue opportunities are less quantifiable, but may prove more meaningful for providers.

Extended Opportunities for Additional Players

Cell site operators are well positioned – if reluctant – to enter the energy market, as they are one of the few enterprises in less developed countries with the necessary capital, customer base, flexibility, and free market mindset. Given the high demand for power in these often underserved locations, and the energy the telecom industry is able to supply, there is a natural economic case supporting this relationship[54]. Seeking to expand local participation in the energy market by creating business opportunities, for example with independent power producers, would create positive externalities in the operation and scaling of the vaccination project (e.g., increased participation in maintaining the vaccination cold chain by embracing the mission as a business opportunity).

The development of an independent service provider sector would yield the most promise in not only developing the cell site refrigeration initiative, but also in the broader utilisation of cell sites to deliver more utility services to the community. Entrepreneurs developing independent business models would remove the burden of project subsidisation either from the public sector or from mobile operators who may feel pressured to do so. This would also help to develop many more business opportunities that may otherwise be ignored by organisations that have a single agenda.

Plans for Pilot Program

While EtC's concept is in its nascent stage, many stakeholders have expressed enthusiastic interest in the program. Currently, EtC is pursuing multiple options for early sites, including locations in India and Africa. They are also developing initial pilots to take place in Andhra Pradesh, India, and in a region in Kenya, which is yet to be selected. In many of the potential early locations, EtC is working with representatives from the government agencies that currently administer most of the vaccines. Given the dependence on multiple stakeholders to implement this concept and ensure its operational success, cross-sector collaboration is essential.

Locations are being prioritised based on the following conditions, considering a lack of reliable centrally provisioned power as an implicit factor: (1) high prevalence of vaccine-preventable diseases coupled with a high penetration of immunisation drives; (2) cell tower site in close proximity to villages covered by a typical primary health centre; (3) supportive local government and/or health organisation; and, (4) collaborative local telecom partner.

After a 12-month period (one full round of immunisations for children in region), the team will evaluate performance data to compare against a baseline. The plan is to run the pilot for three to four additional years to capture multi-year trends.

In preparation for and throughout the course of pilot implementation, EtC will collect data and adjust the pilot parameters as appropriate. Main outcomes of interest will concern the vaccine's maintained integrity at the end of the cold chain. Additionally, EtC will collect data on the availability of cell tower power to assess the efficiency of this energy resource. EtC is sensitive to the fact that partnerships with the public and private sector can be challenging and may even fall through. As such, it will be important to establish relationships with several key stakeholders in a pilot site so that the program's success does not depend on any one partnership. More generally, EtC is eager to collaborate with others to implement these demonstrations and lay the foundation for the progression of our vision—the eradication of vaccine-preventable deaths worldwide.

The authors would like to thank Erik Schmidt of HIP Consult and the Energize the Chain Team for their contributions to the development of this paper.

53. Estimates based on market land lease and power circuit rates

54. HIP Consult. "Africa's Energy Conundrum: Can Telecom Save the Day?" November 2010

Appendix 4

Mobile Money for Charging Services

At the end of 2010, the Mobile Money for the Unbanked Deployment Tracker[55] reported 147 mobile money initiatives in developing markets, 60 of which have already launched. The eight largest operator groups, which together represent over 2 billion consumers, all have live mobile money deployments and strategies to further roll out mobile money across multiple markets. Today, mobile money represents a mainstream strategy for mobile operators in developing markets. Most advanced markets are Kenya, Uganda, Tanzania, Ghana, Thailand; Indian market is low for now but developing fast.

M-PESA in Kenya is one of the most successful mobile money deployments. Since its commercial launch in March 2007, it has been adopted by 11.9 million customers (corresponding to 54% of Kenya's adult population and 73% of Safaricom's subscriber base).

Table 12: Mobile Wallet Deployments in Africa

Country	Service
Burundi	Econet (EcoKash)
Cote d'Ivoire	Orange Money, MTN Mobile Money
Ghana	MTN Mobile Money, Zap, Txtnpay
Kenya	M-PESA, Zap, Yu
Madagascar	Orange Money, mVola
South Africa	MTN Mobile Money, M-PESA, MoPay, FNB, WIZZIT, Standard Bank
Tanzania	Zap, M-PESA, Z-PESA
Uganda	Zap, MTN Mobile Money, M-Sente

Source: GSMA Mobile Money for the Unbanked

One of the biggest hurdles to the implementation of mobile banking for charging services may remain in the high fees charged to end users for small transactions. These fees are fluctuating based on the transaction amount. As mobile operators are fixing their own mobile money tariffs, they differ greatly from one country to another and some countries allow propose very low tariffs (<US$0.1) for mobile money transfers.

Table 13: Mobile Money Tariff Structure[56]

		Minimum Amount	Charge
MPESA Kenya	Registered users	US$0.6	US$0.12
	Unregistered users	US$1.2	US$0.9
MTN Uganda Mobile Money	Registered users	US$2.1	US$0.34
	Unregistered users	US$2.1	US$0.67
Airtel Money Tanzania			US$0.1
Orange Money Niger		US$0.6	US$0.1
Ecokash Burundi			US$0.4

Source: Mobile Operators websites

The trend is now however to lower transaction fees. In December 2010, Safaricom modified its tariffs to allow for both smaller and larger transactions. The minimum transaction size has been halved from US$1.2 to US$0.6.

Top Up as a Currency

Top up as currency is another mobile solution used for now to pay only for digital goods– ex. ringtones, wallpapers - or airtime. However, topup does not have to be limited to enabling phone calls. Instead of traditionally using mobile topup to load an airtime credit onto a phone, the credit can be converted into a stored value in a mobile wallet. This value in return can be used to pay for goods and services or even as a mechanism for saving money.
If this method is easy and ready to use for small transactions, it may face a regulatory barrier as top up as a currency is aimed at virtual goods only for now. Regulation should be reviewed to allow customers to pay for physical services with this method.

55. www.wirelessintelligence.com/mobile-money/

56. http://www.safaricom.co.ke/index.php?id=255

E-Currency

True Money Case in Thailand (Mobile Money for the Unbanked – Paul Leishman)

E-currency is a mobile payment method based on the use of scratch-cards, that can be used to pay for goods/services. This method is for now far from being widespread. Thailand is one of the only countries advanced in terms of e-currency. Launched in 2005 by the True company, True Money is now used by 6 million customers. The system processes over USD$900 million in electronic payments and 120 million transactions per year. This doesn't match the US$3.5 billion in p2p payments M-PESA processes per year, but it does suggest that the model has gained some traction.

Whereas M-PESA has scaled remarkably well as a money transfer offering, True Money has gained its traction as a payments offering. That is, their scratch cards, e-wallet and 8,000 'True Money Express' agents form the basis of a system designed to process True Group bill payments, 3rd party bills, and prepaid bills from niche issuers.

It is still unsure if the True Money example is replicable in other regions, such as sub-Saharan Africa. While Thailand is advanced in terms of banking infrastructure and ID system, Africa is not yet at this stage. Market conditions are key in shaping the strategy of mobile money deployments and operators should work to define a strategy responsive to the context in which they are operating.

Simpa Networks & the Progressive Purchase method

Simpa Networks is a US-based start-up enterprise based in the San Francisco Bay Area which has developed a Progressive Purchase pricing model to market higher value Solar Energy Systems to consumers living at the Base of the Economic Pyramid. Customers make a low upfront payment to take home the solar system, and then purchase energy service (kWh) on a pay-as-you-go basis, i.e. in small user-defined increments using their mobile phone.

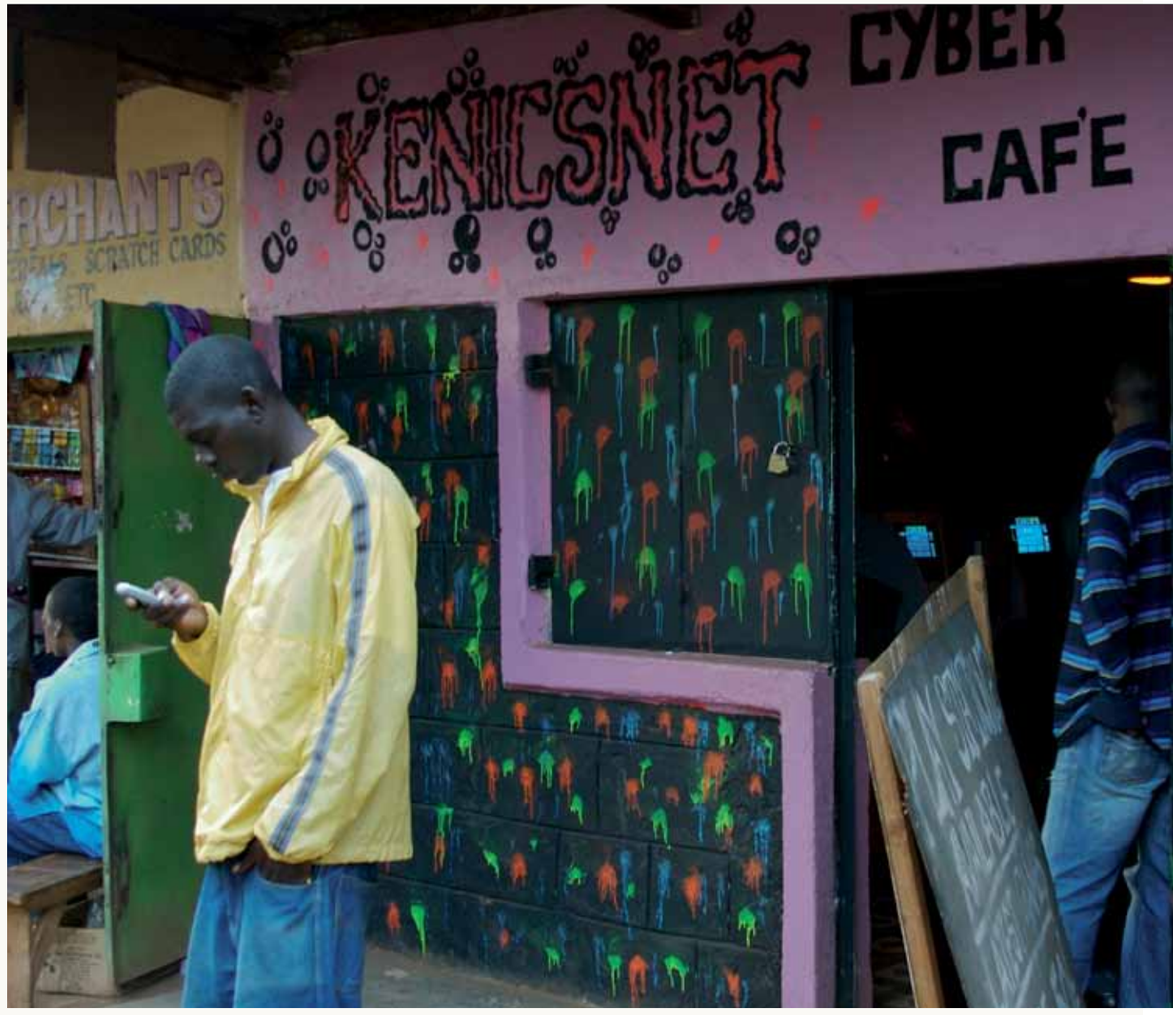
Each payment or "top-up" unlocks the system for an amount of energy consumption, and once that energy is consumed, the system relocks until the customer makes another payment and enters the "top-up" recharge code. Each "top-up" payment accumulates toward the full purchase price of the solar system and the system unlocks permanently once the system is fully paid. The Progressive Purchase model is enabled by a metering hardware (Simpa Regulator) embedded in the Solar Energy System, working in conjunction with cloud-based Revenue Management software. Simpa's solution is currently being pilot tested with urban and rural customers in India in partnership with a major solar energy service provider.

Users will be able to pay for their products via:

- Mobile banking platforms such as MPesa in Kenya or G-Cash in the Philippines
- Banking correspondent agent models, such as FINO and EKO in India
- Purchase of an energy recharge scratch card (similar to mobile phone airtime "top up")

Figure 36: Simpa Networks Scratchcard and metering system

Source: Simpa Networks



Appendix 5

The below article is a Press Release issued by Viom Networks on the 28th March 2011 whilst this report was in production. Therefore this is a verbatim reproduction of Viom's Press release and has not been manipulated in any way. GPM sees this information as vital in relation to CPM and essential for it to be included in this report to draw attention to the work that is being done in India.

Kapil Sibal inaugurates Viom Networks' Rural Service Centre

- Rural Service Centre a culmination of the Hon'ble Minister's vision to usher in Telecom Revolution 2.0 in rural India
- Innovative concept of 'Power of Tower' by Viom, to partner with Government in nation building exercise
- Rural Service Centres to drive the Government's vision of universal Education, Financial inclusion, Telecom services, Healthcare and e-Governance related services for rural India
- Huge employment and entrepreneurship potential for rural population

The Hon'ble Minister of Communications & Information Technology, Mr. Kapil Sibal, today inaugurated the model Rural Service Centre (RSC) of Viom Networks, India's leading independent telecom infrastructure company. Based on the vision of the Hon'ble Minister, the Rural Service Centre, set up at village Badshahpur in Gurgaon, is an innovative concept of .Power of Tower, developed by Viom Networks for leveraging its existing infrastructure through the Public Private Partnership (PPP) model to achieve the Government's vision of providing universal Education, Financial inclusion, Telecom services, Healthcare, e-Governance facilities and other related services to the rural population, thus ushering in the second round of telecom revolution 'Telecom Revolution 2.0' in the country.

Inaugurating the Rural Service Centre, The Hon'ble Minister of Communications & IT, Mr. Kapil Sibal said "I strongly believe that the telecom infrastructure sector offers a tremendous untapped potential that can be leveraged to enhance various Govt. programmes and initiatives in rural India. Telecom infrastructure, especially towers that are located at remote locations in the country can be used to promote various social and economic development initiatives. The industry can, in actual terms, become true partner of the Govt. and play a critical role in promoting growth in rural India. Our host Viom Networks has demonstrated this impressively at their Proof-Of-Concept site at Badshahpur, Gurgaon. I urge the entire telecom infrastructure industry to come together and work towards making this concept a nationwide reality and help the people in rural India enjoy the benefits of connectivity and convergence and be Government's partner in progress."

During the launch of Rural Service Centre Mr. Arun Kapur, CEO, Viom Networks said "Having pioneered the shared telecom infrastructure services industry, it has always been our endeavour to offer various innovative products and solutions to our operator partners. Our telecom infrastructure solutions have significantly reduced investments and costs for telecom operators, resulting in affordable telecom services for the common man thus facilitating the first leg of telecom revolution in the country. The Rural Service Centre concept, envisioned by the Hon'ble Minister and developed by us, is yet another innovation aimed at leveraging our existing telecom infrastructure across the country to usher in the second round of revolution in rural India Telecom Revolution 2.0."

"Through these Centres we aim to partner with the Government to achieve their vision of bridging the digital divide through a range of telecom services, enhancing literacy in rural India, driving the agenda of financial inclusion, providing healthcare facilities & consultation using telecom infrastructure, plugging inefficiencies in the rural system by driving e-Governance and offering various other services aimed at bringing rural India into the mainstream, thus contributing to the Government's vision of Bharat Nirman. This concept can be adopted by the entire telecom infrastructure industry, providing the Government a large canvas to implement its various initiatives effectively that are aimed at the social-economic growth of the rural population", added Mr. Kapur.

The brainchild of the Hon'ble Minister and developed by Viom, the idea behind the Rural Service Centre is to utilize existing telecom infrastructure to partner with the Government through a PPP business model and provide various services and facilities to the rural population. The Centres will also help create huge employment as well as entrepreneurial opportunity at the local level. The company has plans to extend this facility at a pan-India level to its rural sites spread across 879 districts, thereby bringing the real Bharat into the mainstream. Viom's strong grass-root level presence will also aid effective implementation of Government outreach programmes such as Polio Vaccination drives, while the company's time-tested entrepreneurial culture and corporate ethics will ensure accountability and increased productivity in this innovative initiative.

The Rural Service Centre is aimed at offering a range of services:

1. Education for all - e-Education, primary and vocational classrooms
2. Universal Healthcare - vaccine storage, telemedicine leveraging telecom services
3. Financial inclusion through ATM services - biometric ATMs
4. e-Governance: access to PDS rates, Commodity prices, employment exchanges, payment of taxes, birth, death, land record registration
5. Water: provision of bore well water
6. Information Display Board - updated real-time information in local language, weather monitoring, mandi rates, immunization drive etc.

The available site premises will be used for offering a range of additional services such as mobile charging and recharging points, rural cyber cafes as an entrepreneurial opportunity to local youth, as well as other value added services such as utility payments (power, water, telecom bills), travel bookings, mobile top-up facility, weather monitoring, function as Business Correspondent (BC) to raise deposits, disburse tiny loans, recover bad loans, sell micro insurance, mutual funds, pension products and other third-party products, and receive and deliver small value remittances. The real estate and other assets (for e.g. 24x7 power availability) can be extended to other Government & private initiatives based on opportunities.

About Viom Networks Limited: Viom Networks Limited, a joint venture between Tata Teleservices and Quippo, a Srei Group enterprise, is the pioneer in Shared Telecom Infrastructure industry in India. In 2009, the parent company - Quippo Telecom Infrastructure Limited (QTIL) announced its partnership with Tata Teleservices Ltd. (TTSL) with the merger of their passive infrastructure businesses, resulting in the formation of a unified entity - Viom. The company further strengthened its leadership position with the acquisition of the tower arm of Tata Teleservices (Maharashtra) Limited in early 2010. Viom is an independent entity with over 38,000 towers and with over 89,000 tenants. The company plans to roll-out nearly 20-25,000 additional towers in the next two years and take the tenancy ratio to 2.5x from a current of over 2.25x. Viom is the strongest player in neutral host Shared In-Building Communication Solutions (IBS) with installations already completed at most of the major airports.

Services to be offered at the Rural Service Centre

1. **Education for all:** Aimed towards Right to Education (RTE), primary as well as vocational (professional) education will be provided by building an additional shelter in the tower site premises for uninterrupted learning sessions. This will further help build an educated workforce by providing opportunities for entrepreneurship and enhancing employability of the rural population.
2. **Universal Healthcare:** With an objective to make rural areas healthy, safe and equipped with medical facilities, provision of storing Life savings drugs is made in the freezer units installed within the shelters at the sites. The site premises could be used to carry out vaccination programs also.
3. **Financial inclusion through ATM services:** ATMs at the site will help promote financial inclusion in rural India. These machines can be used for disbursal of wages under Mahatma Gandhi National Rural Employment Generation Scheme (MGNREGS), thus minimizing the role of the middle-man. These facilities can also be extended for selling other financial products such as infrastructure bonds, mutual funds, loan disbursals/collections etc.
4. **e-Governance:** Internet enabled computers will allow citizens to access various Government sites for information on PDS rates, Commodity Prices in various markets, employment exchanges, MGNREGA Sites etc. In addition services like payment of taxes, registration and access to birth, death and land records etc. can be used. Sahaj, a group concern of SREI, would aid in this endeavor.
5. **Rural Cyber Cafe:** Computers installed could be leased out to local entrepreneurs to be used as cyber cafe for providing not only Internet access but also value added services such as utility payments (power, water, telecom), undertake travel bookings, mobile top-up facility etc.
6. **Water:** Viom also aims to setup provision of bore-well water at all its Rural Service Centre sites in order to meet the acute storage requirement of local areas.
7. **Information Display Board:** A LED display board, installed on the boundary wall of the site, will provide access to updated real-time information in local language on various rural programs benefiting the local community: weather monitoring, mandi rates, immunization drive etc. The display board will run on remote low-power consumption and will be updated from a central control-room.
8. **Charging Facilities:** Electrical charging facility has been provided for mobile phones and rechargeable electrical lanterns.
9. **Security Cameras:** These will help the security guard in monitoring access-to-site, ATM and Education centre. These cameras can also enable remote monitoring of implementation of Education Programs and ATMs. These could be upgraded and mounted on towers for local area monitoring of sensitive areas.