

# The Micro Infrastructure Revolution

## Executive Summary

### Synopsis

Most of the Sustainable Development Goals require smart, modern infrastructure solutions, and for mostly rural small villages, the answer will more often be a micro infrastructure approach. Highly decentralized, smart, clean, climate-resilient systems for agriculture, water, energy services will revolutionize poverty-alleviation, but just as microfinance needed specialists to deliver financial solutions to the poor, micro-infrastructure will need specialist designers and investors to deliver appropriate infrastructure to the poorest 1-2 billion people on the planet that need it most.

### The Problem

The poorest 1-2 billion on the planet lack access to electricity, clean cooking, clean water, communication technology, climate-resilient housing, agricultural tools and modern health services. Traditional models centred around large, centralized power stations, water treatment facilities and agricultural processing and preservation centres are bulky and inflexible ways to offer modern services to a highly dispersed, mostly rural population. The 21<sup>st</sup> century is witnessing a rapid decentralization of such large infrastructure, symbolized partly by solar power on households globally - the micro-infrastructure revolution has started! Existing software, design processes from last century and short-term risk-averse impatient investment models are not well matched to the needs of micro-infrastructure. VIA and its partners are building software, hardware and financial solutions.

### The Solution

A first step is to know where the people are that you are trying to serve. VIA is mapping the location of all offgrid households in 50-100 countries, then using this data to design electricity distribution networks (which could also be piped water networks) to every last house, using an appropriate modern mix of extending the existing centralized systems (eg. electricity grid), building stand-alone mini-networks (eg. mini/micro/pico grids for medium/small/tiny villages), or home-based services (such as solar home systems and household water tanks). Most of the global poor are rural small-scale farmers, so a focus on agriculture is also important. Solar water pumps to grow more food without relying on diesel pumps is one solution, but post-harvest innovation is also important to add value to these crops closer to the farm instead of in centralized large mills in towns and cities where there is power. Solar powered micro mills can help farmers add 30-500% to the value of their crops, boosting incomes and reducing the bulk density of finished products, decreasing unit transport costs of crops when delivering them to market. Massively decentralized solar milling to displace centralized diesel and grid powered mills is just one example of a hardware technology solution that need new thinking. Our software services, in partnership with Illustreets and powered by Amazon web servers, can process entire countries' of 10's of millions of data points in less than 1 hour, and can host and design infrastructure solutions for millions of villages globally that serve a billion people, yet can still be used on weak internet systems that are typical in developing countries. Another transformational innovation is solar electric cooking, that can displace 1 Gigatonne of CO2 emissions from wood and charcoal cookstoves, 3% of all global emissions, and reducing pulmonary lung infections, and losses of life and property that occur from cookstove accidents. Solar LED lighting can also reduce similar eye infections and burns/deaths caused by kerosene lamp fires.

### Pathway to Scale

As shown in our presentation materials, access to electricity alone averages \$500 per households for 200 million households (1 billion people) and thus is likely to exceed \$100 billion of necessary investment (some agencies estimate the cost to be over \$500 billion). Adding water and other infrastructure services may generate a total investment need of over \$1 trillion. VIA has begun building such projects with like-minded donor agencies and angel/impact investors, while also providing these tools to others to help them build 10-1000 times more than VIA can build itself. Early results are promising, and offer cost reductions compared to "business as usual" of 50%, using off-the-shelf technologies to design smart 21<sup>st</sup> century solutions to 20<sup>th</sup> century problems. VIA is already engaged in projects in Vanuatu, Indonesia, Honduras, Nigeria, Haiti, Ethiopia and Philippines, planning infrastructure solutions for over 50 million people - we hope you can join us to do more!