Challenge Background

By 2030, the world's population will increase by a billion people, to 8 billion people inhabiting our planet, and another 1 billion to be added by the year 2050, for a total of over 9 billion people[1]. Of this population growth, the bulk will be in the least developed nations. The population in these nations are projected to increase by 50% by the year 2030 from 832 million to 1.26 billion people[2].

With this population growth, will come increasing energy demands on our planet's finite energy resources. While energy use intensity has gone down in recent years, the total amount of energy used by the human population has risen significantly, as there are more people using energy-using goods and services[3]. Along with increasing energy consumption, energy challenges exist across household, community and national levels. For example, energy access, energy storage, clean cooking fuel availability, renewable and non-renewable energy supplies and access, and energy storage are just a few of the challenges facing our planet. Accordingly, UN Sustainable Goal #7 is to

"Ensure access to affordable, reliable, sustainable and modern energy for all"

New technologies are emerging to deal with these challenges, renewable energy sources are on the rise, energy efficiency is being utilized more and more, policy innovations are being designed and implemented, and smart energy infrastructures are being created and used to better manage the energy supplies and resources we have. With determination, flexibility, innovation, and a commitment to a better energy future, the Sustainable Development Goal #7 targets can be met.

Challenge - Topics

Sustainable Energy Generation Technology

The development and implementation of sustainable energy generation faces significant financial and system design barriers (i.e. technical capacity). In legacy energy systems in developing countries, energy systems are often designed to last for decades, so regardless of how beneficial new systems are for the community, both financial and non-financial switching costs prohibit technology changes. Where no energy generation technology exists, low population densities provides no incentive to

[1] UNCSD Secretariat, 2012
[2] UNCSD Secretariat, 2012
[3] IEA, 2008: 15

build grid infrastructure out to unserved areas. Waiting for these systems to be built is not a long term solutions and more off grid technology is need to support energy demands. Identifying and transferring the right technology that not only meets the demands of household use, but can also provide sufficient energy to run small business services is critical.

Reliable Energy Transmission and Distribution Technology

Energy transmission and distribution systems are often old and unreliable. There are often extensive limitations to energy transmission and distribution including limited hours of service, unscheduled blackouts and voltage fluctuations which makes the use of any electrical appliances virtually impossible. As such, at a household level, families have found alternative energy production methods that can have multiple negative implications including: indoor air pollution, provide poor lighting at night and enough energy capacity for small businesses to function effectively. Many transmission and distribution services at the small business level require reliable access to modern energy services to operate basic industrial or manufacturing activities.

Energy Storage Technology

A key component of energy security is having sufficient energy storage capacity to level out the peaks and valleys of energy demand on the energy system. This is a problem in the developing world, where renewable energy systems, solar and wind power in particular, lack sufficient energy storage capacity to consistently provide enough power to users and prevent brownouts. Without sufficient energy storage, communities will still have to rely upon fossil fuels to supplement their energy systems, which hinders the path to a sustainable energy future.

Energy Efficiency

To meet future energy demands in developing nations, energy efficiency methods and technologies desperately need to be paired with the widespread adoption of renewable energy sources. For example current demands on energy sources for manufacturing, and agriculture are not utilizing more efficient forms of energy from generation to distribution. With a growing world population, increasing energy demands require sustainable systems and efficient energy consumption vehicles that leverage renewable energy.

Lack of Energy Data

Energy data in developing countries is greatly lacking; it is insufficient or totally absent altogether. Data is lacking on potential and actual energy resources available, current usage numbers, and measures of efficiency, even basic social and economic

information at the community level. This severely limits the ability of planners and policy-makers as they seek to understand and design solutions to energy challenges.

Governance, Operations and Maintenance of Energy Systems

There is a lack of capacity in civil society institutions, government, and private sector stakeholders. Countries lack trained and skilled planning personnel in government, and note that those responsible for planning lack comprehensive policy and strategy to guide sustainable development. Grappling with new and unfamiliar technologies is also challenging due to the lack of standards for efficiency and inter-operability of systems and devices, and the lack of national capacity to develop and enforce such standards. There is also limited technical and management expertise to implement technologies for production of renewable energy – particularly with regard to new and emerging technologies. This is true both at the leadership level and at the level of on-the-ground operations, where there is a need for education and training programs to build a skilled operational workforce.

High Costs of Sustainable Energy

Due to the low incomes that people often have in developing nations, households spend a disproportionately high percentage of their income on energy. This limits household income available for other important investments, such as tuition funds for the children or healthcare for family members. Cheaper sources of energy such as wood create environmental degradation and health issues in the household and do not incent the consumption of clean energy.

Criteria

1. **Focus on the Poor:** World Vision Canada seeks to address some of the most significant challenges addressing the world's poorest communities. Ideas need to be focuses on implementation in South America, Africa and South and East Asia.

2. **Market Based Approaches:** Traditional approaches in the development sector focus on the very poor and are based on the assumption that they are unable to help themselves and therefore need charity, handouts and public funding. Market-based approaches on the other hand are based on the premise that being poor does not eliminate trade and market processes. Market-led approaches therefore look at people as consumers, producers, entrepreneurs and seek solutions that make markets more efficient, competitive and inclusive.

3. **Cost Effectiveness:** With so many people to reach and an expectation for sustainability, cost effectiveness is key.

4. **Sustainable Change:** Energy, light and power are needed every day and solutions need regular maintenance and investment. We're excited about solutions that prioritize the sustainability needed to make lasting change.

5. **Consider Scale:** Despite population growth slowing in recent years, the global population is projected to reach 8 billion in 2025 and about 11 billion by the year 2100[1]. Consequently, solutions that are able to reach scale will be the most impactful.