



# SMART VILLAGES

New thinking for off-grid communities worldwide

## Off-grid Energy Challenges in the ASEAN Region

The ASEAN region is now the engine of the global economy. Its spectacular growth over the past two decades has lifted hundreds of millions of people out of poverty. Energy demand has grown 2.5 times since 1990 and is due to increase 80% by 2035. Yet 139.5 million people in the region, particularly in rural areas, still lack access to electricity and therefore have yet to enjoy the health, social, and economic benefits afforded by modern energy services.

While there is universal or very high levels of access to electricity in Brunei Darussalam, Malaysia, Thailand and Singapore, levels are below 75% in Cambodia, Myanmar, the Philippines and Indonesia.



POTENTIAL FOR SOLAR HOME SYSTEMS:

**25%**

> UP TO 7.5 MILLION SOLAR HOME SYSTEMS

## OFF-GRID MEETS REGIONAL PROBLEMS

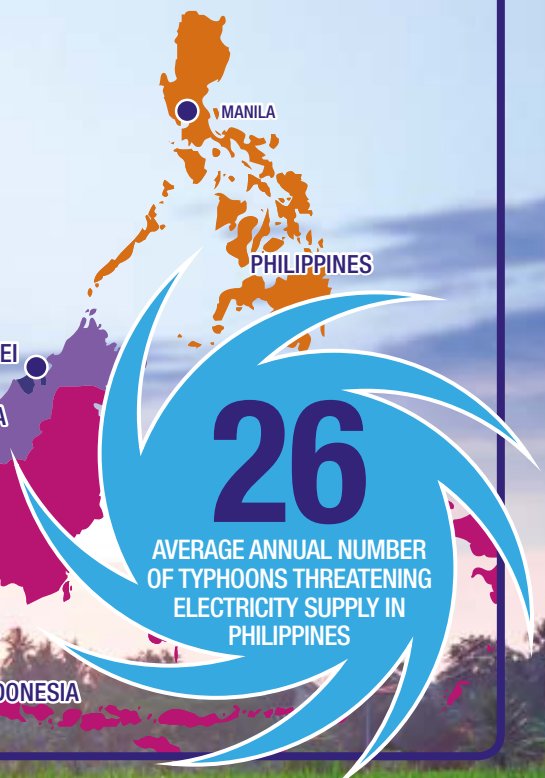
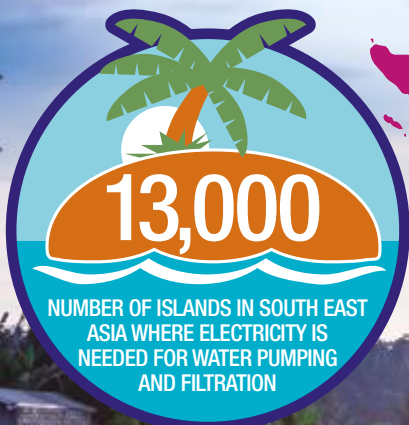
**30**  
MILLION  
HOUSEHOLDS  
WITHOUT  
ELECTRICITY



POTENTIAL FOR MINI GRID:

**50%**

> 50,000 MINI GRIDS (PV, HYDRO OR HYBRID)



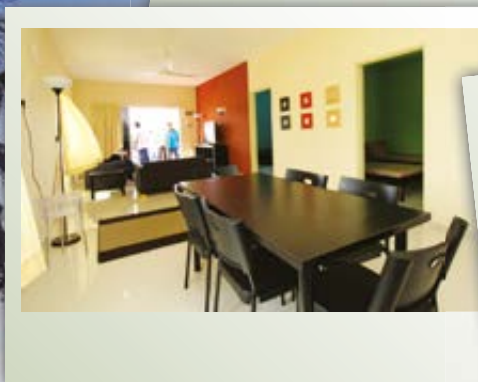
# MALAYSIA

Improving rural development through the 21st-Century Village Programme is a key aim of the Malaysian government. Such villages are planned to have a vibrant economy and good income level, together with improved living conditions and infrastructure. It is also hoped that young people will find it attractive to work and live in 21st-century villages rather than to add to the urban poor. Driven by either the State, Private Sector, Cooperatives or Young Entrepreneurs, the villages are also planned

for off-grid remote sites powered by either diesel gen-sets or hybrid systems.

So far three 21st Century Villages have been built in Malaysia - each with 100 pre-fabricated homes at a cost of around \$3,000 per unit. Four more are under construction and 15 are planned in the next two years with adjacent farms. Fewer than one in 20 families invited to live and work in a rural 'smart village' decline the opportunity.

"Achieving sustainable development requires the sort of imaginative innovation being pioneered through the smart communities program in Malaysia," said Tan Sri Zakri Hamid, science advisor to Malaysian Prime Minister Najib Razak.



# SMALL SOLUTIONS TO A BIG PROBLEM

Throughout the region, communities located far from the main electricity grid are developing innovative approaches to meet their energy needs. Often with the support of international organizations and governments, they are using household solar panels, mini hydro systems powered by nearby rivers, local wind turbines and biomass or biogas cooking and heating solutions. These small initiatives, if scaled up, could change the energy dynamic in Asia.

If clean, modern energy could be produced in the most remote corners of Asia and the Pacific, the effect on poor communities would be dramatic. Energy access brings modern medical equipment and refrigeration that reduces disease, as well as child and maternal mortality. It also brings pumping systems that put safe drinking water into communities, and power equipment that reduces hunger by increasing the production of food. Women and girls are relieved of the time consuming and sometime dangerous tasks of collecting water

Providing energy in a bottom-up way instead has a lot to recommend it. There is no need to wait for politicians or utilities to act. The technology in question, from solar panels to low-energy light-emitting diodes (LEDs), is rapidly falling in price. Local, bottom-up systems may be more sustainable and produce fewer carbon emissions than centralised schemes. In the rich world, in fact, the trend is towards a more flexible system of distributed, sustainable power sources. The developing world has an opportunity to leapfrog the centralised model, just as it leapfrogged fixed-line telecoms and went straight to mobile phones.

THE ECONOMIST

and fuel. On a broader level, small clean energy solutions contribute to global environmental sustainability. The more clean energy produced off the grid, the less pressure to burn fossil fuels.

Throughout the Asia and Pacific region there are encouraging signs pointing to the fact that an energy revolution is under way.

Asian Development Bank

## The Benefits of Rural Off-Grid Electrification 3 ASEAN CASE STUDIES

### PHILIPPINES

Barangay Bunog is one of two remote villages where the Philippines' Department of Energy has been rehabilitating old renewable energy systems with funding from Denmark's ADB. The nearest electric pole is 30 kilometers away, and it would cost the Palawan Electric Cooperative P15 million (about \$375,000) to extend the grid. The impact has been dramatic. "The solar energy helps us a lot because it gives us light, especially at night. Our children are able to study their lessons and we are able to do our household chores even at night," said one mother.

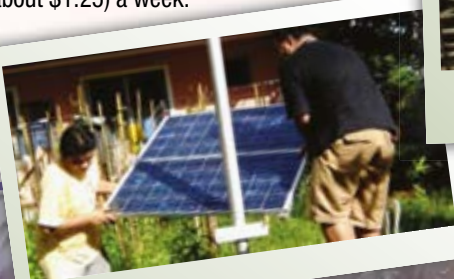
"We benefit a lot from solar power. It helps augment our income because we can sell even at night," said store owner Rosalia Dulig. "We used kerosene before. It blackened our walls and the smoke was bad for our children's health," added Apolonia Cortaje. "Now, we get to save because solar power is cheaper." Apolonia is also BEE- or "babaeng (female) energy entrepreneur", who manages one of six solar battery-charging stations in Barangay Bunog. Each station caters to 10-15 households and can charge an average of six batteries a week, earning for them an extra income of P50 (about \$1.25) a week.

### LAOS

As well as extending the grid, the Rural Electrification Program in Laos also promotes off-grid renewable energy to rural households, which account for 68% of the total population. Some 35,000 households now use off-grid systems such as solar home systems or mini-hydro power plants. A comprehensive socio-economic survey conducted in 2005 showed a growing number of new businesses in newly-electrified villages, especially retail stores, weaving and knitting shops, and rice mills, averaging 30 new businesses per village since electricity arrived. "My life is normal now, not like in the past when we couldn't see well. Since we've had electricity, we can save 40,000 to 50,000 Kip (around US\$5-6) a month because we can make more mats and fishing nets. Before, we couldn't make any more money but now we can do whatever we want whenever we want to do it." says a widow Ms. Pan.

### INDONESIA

With over a third of the population in Indonesia lacking grid electricity, off-grid hydro schemes are bringing its benefits – including good quality light, TV and power tools – for the first time to remote village communities. This is creating new livelihood, leisure and educational opportunities, as well as a window on the wider world. The not-for-profit People Centred Economic and Business Institute (Institut Bisnis dan Ekonomi Kerakyatan, IBEKA) is responsible for developing the schemes, which are owned and managed by communities. IBEKA also develops on-grid schemes, which provide an income to communities from selling electricity to the grid. With 61 hydro schemes installed so far, 54,000 people currently benefit. The project received an Ashden award in 2012.



[www.e4sv.org](http://www.e4sv.org)

 @E4SmartVillages



# SMART VILLAGES

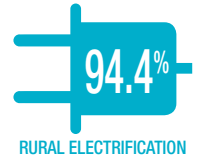
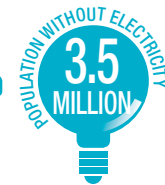
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# 50%

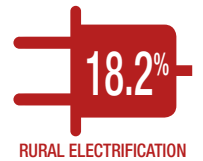
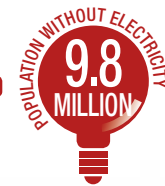
AMOUNT OF REGION'S POPULATION STILL RELYING ON TRADITIONAL USE OF BIOMASS FOR COOKING, WHICH POSES A SERIOUS RISK OF PREMATURE DEATHS FROM INDOOR AIR POLLUTION



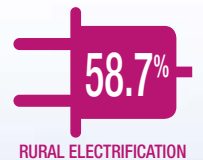
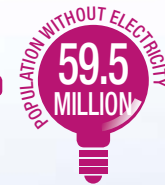
## VIETNAM



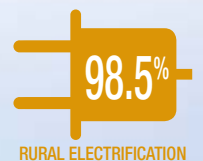
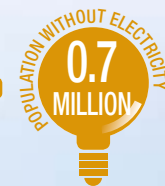
## CAMBODIA



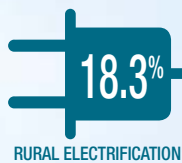
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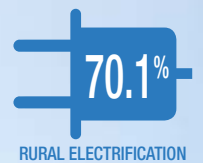
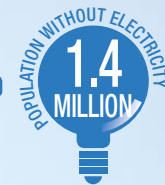
## THAILAND



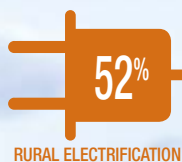
## MYANMAR



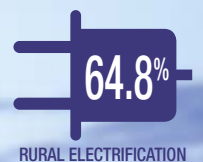
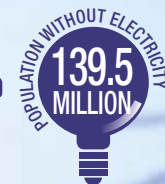
## LAOS



## PHILIPPINES



## ASEAN



The Smart Villages Initiative aims to provide policy makers, donors and development agencies concerned with rural energy access with new insights on the real barriers to energy access in villages in developing countries - technological, financial and political - and how they can be overcome. We have chosen to focus on remote off-grid villages, where local solutions (home- or institution-based systems, and mini-grids) are both more realistic and cheaper than national grid extension.