SMART VILLAGES
New thinking for off-grid communities worldwide

Philippine Center for Water and Sanitation
International Training Network Foundation, Inc.
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The energy and water nexus for off-grid communities in the Philippines and Southeast Asia

Workshop Report 21

PHILIPPINES AND SOUTHEAST ASIA

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Smart Villages

We aim to provide policymakers, 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. Our concern is to ensure that energy access results in development and the creation of "smart villages" in which many of the benefits of life in modern societies are available to rural communities.

PCWS

PCWS used to be known as International Training Network (ITN) when it started in 1990 as a project of the Netherlands-based International Institute of Infrastructure, Hydraulics and Environmental Engineering (IHE). From 1990 to 1998 ITN was funded by the Dutch Government. In 1998, the remaining personnel decided to register as a nongovernment organization (NGO) with the Securities and Exchange Commission as Philippine Center for Water and Sanitation – The ITN Foundation. Since 1998, PCWS has been supporting itself through its professional fees obtained through training, technical support, research and consultancy services provided to local governments, NGOs, national government agencies, corporations, and communities.

PCWS promotes sustainable water and sanitation programs through capacity building approaches that are gender sensitive, culturally acceptable, socially relevant and cost effective. PCWS works to improve the water supply, sanitation and hygiene (WASH) situation of the poorest communities in the Philippines. PCWS works with communities in developing low cost water supply and sanitation technology options, thereby enhancing local initiatives leading to benefits in health and livelihood. PCWS' mission is promoting the human right to water and sanitation through strategies, approaches and technologies that are respectful of ecosystems and empowering to people, especially the marginalized.

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MALAYSIAN COMMONWEALTH STUDIES CENTRE

CAMBRIDGE MALAYSIAN EDUCATION AND DEVELOPMENT TRUST

Contents

Summary

Water, sanitation, and hygiene (WASH), energy, and agriculture are topics of great importance to every rural community. In Southeast Asia, these issues overlap in many remote villages where lack of access to energy is often coupled with lack of access to clean drinking water or water for sanitation or agriculture. This report summarises the information presented at, and conclusions arising from, the workshop on issues related to energy, water, and food for rural communities held by the Philippines Center for Water and Sanitation (PCWS) and the Smart Villages Initiative. The workshop took place at the northern end of Luzon in Burgos, Ilocos Norte in the Philippines. It was part of an on-going programme of engagement by the Smart Villages Initiative in Southeast Asia. It brought together a diverse group of around 28 people working on WASH, energy, and agriculture in off-grid villages in Southeast Asia to review their experiences to date and to identify barriers to further progress and how they may be overcome.

The workshop was held over three days, from 1-3 June 2016. The first day consisted of a field trip to the Energy Development Corporation's wind and solar plants to gain insight into a renewable energy project connected to water and agricultural in the Philippines. The second day consisted of presentations from 11 people, beginning with an introduction to the Smart Villages Initiative and PCWS. There were presentations on WASH initiatives in the Philippines, renewable energy and rural energy development in the Philippines. Moreover, there were presentations on wide-ranging topics including off-grid agriculture, research methods for the energy-water-food nexus, and studies of gender in rural electrification. The day ended with a discussion of some key questions for the communities. Day three consisted of a final in-depth discussion of messages to send to policy makers and the energy, water, and food communities working in off-grid rural areas.

Key findings and recommendations of the workshop are summarised in the following 10 points:

1. Improved WASH practices can contribute to environmental conservation, community resilience, and enhanced livelihood opportunities, all of which can help alleviate poverty.

2. Combining energy and WASH rural development initiatives is an important aspect of development that needs to be further encouraged in Southeast Asia. Concrete examples of infrastructure can be a means of encouraging the energy and water communities to work together—such as biogas digesters running on human and animal waste and electric water pumps. This could also help raise the profile of rural WASH activities that need to attract more attention to secure funding.

3. In the Philippines, there are many fragmented initiatives from government; many different departments work on overlapping remits in energy and water. Efforts should be made to combine, and communicate between, these different initiatives.

4. Systems of water, energy, and food should be researched with multiple methods of nexus thinking, and policy decisions and interventions should be made that bear in mind trade-offs and complementarities in the different systems.

5. Demonstration projects that deal with both energy and water in rural villages, and which integrate social infrastructures, are needed to promote more widespread adoption of good practices in development and holistic development outcomes.

6. There should be more support for low-cost technologies and solutions, perhaps by en-

couraging universities and NGOs to work together, and by encouraging innovative community-based research, ideas and analysis that would benefit the poorest. The best solutions, particularly for low-income families with limited resources, should be piloted and scaled up, and awareness of innovative, affordable technologies should be raised.

7. In the Philippines, local governments should administer the provision of energy and water, and should ensure that enabling local policies are in place. The barangays should be coordinating places for rural development and collaborations across different energy and WASH communities.

8. The role of women and children in providing and maintaining WASH and energy services is very important, and efforts should be made to increase women's participation in community-level decision-making and labour related to rural infrastructure.

9. Revenue streams for maintaining WASH activities must be calibrated to individual contexts. Ideally, revenues should be raised from villagers to cover at least the maintenance costs of a water supply system. If water is given for free, due to villagers' inability to pay, there must be some means other than tariffs to control villagers' water management behaviour.

10. There needs to be an increased effort in fostering much higher frequencies of water quality monitoring checks in rural areas through new low-cost measurement technologies, government support, and public awareness raising.

The Energy Development Corporation (EDC) wind and solar farm in Burgos

Introduction

Over 120 million people in Southeast Asia still live without access to electricity; the majority of these people live in rural communities. This lack of energy impacts their capacity to develop and improve other aspects of their quality of life. At the same time, the number of people that lack access to improved drinking water sources in Southeast Asia is 61 million, with 8 out of 10 of these living in rural areas. 176 million people in the region do not have access to proper sanitation.

There are significant overlaps between projects that are focused on energy access, and those that are focused on water, sanitation, and hygiene (WASH). Water can be used for generating electricity, and equally, a nexus approach highlights that energy is required for pumping, moving, and distributing water. Energy and water are both critical for food production, processing, and transport. To meet some of the pressing challenges facing communities without access to modern energy, development solutions are required that maximise synergies and manage trade-offs between energy provision and access to water and food.

This report presents summaries of presentations and discussions at at a workshop held in Burgos, the Philippines from 1 to 3 June 2016 that involved an inter-regional group of 28 experts from the Philippines, Japan, Canada, and the United Kingdom. The experts work in government, local and international NGOs, and academia. The agenda for the workshop is presented in Annex 1, and a list of participants in Annex 2. Copies of the presentations are available on the Smart Villages website (www.e4sv.org). This report, together with an accompanying policy brief, can also be accessed on the website www.e4sv.org.

The EDC wind farm in Burgos

Day 1: Field trip to Energy Development Corporation (EDC) Burgos wind and solar plants

To begin the workshop with a real-world example of energy-water-food nexus considerations in a renewable energy project in the Philippines, the first activity of the workshop was a tour of the wind and solar plants on the coast of Burgos, located on the north coast of Luzon.

The Energy Development Corporation (EDC) wind farm in Burgos was commissioned in 2014. It generates 150 MW of power. With the Renewable Energy Act of 2008, the government has guaranteed a feed-in tariff of 8.53 Philippine Pesos (0.18 USD) per kWh for the next twenty years to the EDC. The EDC has had two consultations with the operators of the Clean Development Mechanism (CDM) but so far has received no funds.

The tour showed the participants around selected areas of the 200 acres of pastureland on which the wind turbines are situated. The wind farm has been designed with consideration for the farmers who graze their cattle freely around the wind turbines. The rolling terrain is very dry, and there are reports that wind turbine construction has impacted the local water provision for the cattle by impeding traditional water impounding wells used by farmers. There are now plans to work together with the farmers to improve crop grazing and water management, and there is consultation with the Philippines Center for Water and Sanitation to help EDC build some new rainwater catchments.

The whole project has so far contributed 80 million Philippine Pesos (US$1.7 million) in tax to the local economy in Burgos. It has generated local labour but only during the project construction phase. It also provides added tourism revenue. It is required that one percent of profits go to local corporate social responsibility initiatives.

There was also a visit to the EDC 4.2 MW solar PV farm near the wind turbines. One staff member is responsible for the maintenance of this solar farm. There are hopes to expand its capacity in the near future. It is monitored remotely and cleaned every three months. It took three months to construct.

Day 2: Morning Session

Introduction to the Smart Villages Initiative

John Holmes, Smart Villages Initiative

As an introduction to the workshop, John Holmes gave an overview of the smart village concept, outlined the Smart Villages Initiative, which is currently at the midpoint of a three-year funding period, and summarised findings to date. The main intended outcome of the Initiative is better informed, and hence more effective, policies, and interventions. The Smart Villages Initiative takes an integrated approach in which energy access is considered along with other key elements of village level infrastructure, and in which the uses of energy to provide key services and support productive enterprises is a central concern.

For rural communities, the water-energy-food nexus is a key issue: each of these elements is essential for human well-being and to meet the goals of sustainable poverty reduction and development. Demands for energy, water, and food are projected to increase, respectively, by 80%, 55%, and 60% by 2050. Such increases will challenge the capacity of the natural resource base to support the needs of rural communities. Nexus thinking requires an interdisciplinary approach that brings to the fore inter-linkages between each of these systems. Such an approach can have a positive impact on sustainability by reducing trade-offs, and help improve resource allocation and policy coherence.

Water, energy, and food in rural villages have many inter-linkages. Irrigation, water quality, and water storage require both energy and water, and they impact agriculture as well. Hydropower production, water purification and pumping, distribution and sanitation require both energy and water. And fertiliser production, biofuel production, and food transport, storage, and processing bring together energy and food.

John Holmes identified three key questions for the workshop to consider in respect of smart villages:

- What should be the objectives for water supply, sanitation and hygiene (WASH), and how can those objectives be met?
- What are the consequent energy needs and opportunities, and how can they be delivered?
- What are the potential synergies between water, energy, and food? How can an integrated approach be taken to realising them?

Introduction to the Philippine Center for Water and Sanitation (PCWS)

Lyn Capistrano, PCWS

Lyn Capistrano gave an introduction to the Philippine Center for Water and Sanitation (PCWS). PCWS is an NGO and consultancy that promotes access to water and sanitation as a human right. It works to improve water supply, sanitation and hygiene (WASH) in the Philippines, particularly for the poorest communities. It undertakes WASH projects at the village, regional and national levels, raising awareness, building capacity, and developing technical solutions. Policy recommendations are based on experience on the ground.

At the village level, PCWS introduces low-cost water supply and sanitation technologies applicable to the local situation and builds community capacity to care for and repair water and sanitation systems. Moreover, PCWS promotes wastewater treatment for communities and households, teaches communities to design, construct, operate, and maintain their WASH systems, and increases the participation of com-

munity members in decision-making on water resources management and environmental protection.

PCWS emphasises simplifying technologies so that they are affordable and fit for purpose. Lyn Capistrano gave examples of technologies including rainwater harvesting, a low-cost iron removal filter, sand filters and ferro-cement technologies for water supply, sanitation, and hygiene. A ferro-cement biogas digester septic tank has been developed that can serve six household toilets and generates clean gas for cooking. Other community wastes can be added to the digester. As part of an integrated system, wastewater from the digester is treated in a series of anaerobic and aerobic filters to support fish cultivation and irrigate vegetables, and the residue can be used as a fertiliser.

PCWS looks beyond the provision of WASH technologies to consider how they can be used to support livelihood development, political empowerment, and poverty reduction. Support is provided to villagers to discuss and learn from each other: much of the work of PCWS is concerned with engagement and advocacy. They engage with political candidates on WASH issues, making these issues an important consideration in gaining the electorate's support.

In the question-and-answer session, a participant asked whether there is sufficient human waste to support the needs of a community for gas for cooking. Lyn Capistrano responded that animal waste can also be added to the digester, increasing the volume of gas.

Another participant pointed out that an issue for communal septic tanks, and any communal facilities, is the availability of land. Substantial time and effort is required for engagement with the communities to arrive at agreed solutions. It is observed that funding from donors often does not provide for such engagement and negotiation activities.

Samahan ng mga Katutubong Tagbanua (Sanitation collaboration with the Tagbanua indigenous people of Malawig)

Cyrus Juntilla, Sakatag WASH Association

Cyrus Juntilla described a project undertaken in 2014 by PCWS with the Tagbanua indigenous people in Malawig Island of the municipality of Coron in Palawan province. The project was supported by the International Labour Organisation as part of its response efforts to the victims of Haiyan Typhoon, which had destroyed existing sanitation facilities and livelihood assets. It aimed to improve access to water and sanitation in the community while generating alternative livelihood opportunities for the disaster stricken villagers, in particular in respect of tourism, livestock, and manufacturing.

A participatory inventory and assessment was initially undertaken of water and sanitation resources. The approach was designed to encourage participants to become partners in improving the water supply and sanitation. Subsequently, low-cost WASH technology options were presented to the community, and discussions led to a consensus on preferred technologies and their location (on communal land).

60 villagers were trained in WASH technologies, including hands-on construction, operation, and maintenance training. Training was also provided on watershed protection, wetland conservation, community managed water supply and sanitation systems, integrated water resource management, climate change adaptation, and disaster risk reduction. WASH infrastructure created in the village included four biogas digester septic tanks, 14 communal toilets connected to the biogas tanks, three hand washing facilities, 60 bio-sand filters, and 21 rainwater harvesting tanks. The SAKATAG WASH Association has been created, composed initially of the 60 trained community members, which aims to improve access to water and sanitation

for vulnerable communities in the Calamianes group of islands.

Key learning points from the project include:

- Donor support and finance for scaling up practical WASH technologies and alternative energy sources are particularly useful to low-income communities with limited resources.
- Initiatives should be sensitive to the cultures of indigenous people, particularly on community-scale projects.
- Increasing the participation of community members in decision-making on water resources management helps to increase resilience to disasters and climate change.
- Improved WASH practices can contribute to environmental conservation, community resilience and enhanced livelihood opportunities, all of which can help alleviate poverty.

Wash Coalition Pilipinas

Apol Jimenez, WASH Coalition Pilipinas

The WASH Coalition Pilipinas started in 2004 as a loose coalition of partners concerned with improving access to water, sanitation, and hygiene. It is coordinated by PCWS at a national level and has local chapters in Luzon, Visayas and Mindano. Apol Jimenez explained that its objective is to improve the water supply and sanitation situation in urban and rural poor communities through advocacy, awareness raising, multi-stakeholder partnerships, action research, introduction of low-cost water supply and sanitation technologies, and capacity building for community managed WASH facilities. Local WASH taskforces enable broader citizen support for new initiatives on alternative, low-cost WASH technologies, expand the public's knowledge, and catalyse public support.

Coalition activities include introducing low-cost, culturally acceptable WASH technologies for schools, households and communities, working with the media, and constructing water supply

Workshop participants on Day 1 of the workshop

and sanitation facilities for communities and schools. The coalition provides for greater collaboration to enhance the WASH capacities of local governments, NGOs and communities. It works with national and local governments to promote greater transparency in government transactions relating to WASH, and increases awareness of environmentally friendly WASH technologies among policymakers, who otherwise have a low level of knowledge of these technologies.

Coalition members have diverse expertise, knowledge and experience. Having worked together over a 12-year period, they have built good levels of trust and friendship among the members.

WASH and renewables

Nancy Gilbert, Water and Sanitation Rotarian Action Group (WASRAG)

Nancy Gilbert opened her presentation with an account of the work of Rotary International on water and sanitation in developing countries. Rotary International has 1.2 million members in 35,000 clubs in over 160 countries. Water and sanitation is one of seven focus areas of its Rotary Foundation.

Rotary International is a global network of influence that can advocate for WASH through its membership, which includes leaders of civil society, industry and government, and with vocational expertise in water, sanitation and hygiene. Partnering with USAID, it is able to convene multiple participants and investors. WASRAG is the Water and Sanitation Rotarian Action Group that supports clubs and districts in their WASH work, provides expert assistance, helps find additional funds for programmes, and builds partnerships.

Nancy Gilbert discussed the Foundation for Partnership Initiative in the Niger Delta. An Appropriate Technology Enabled Development (ATED) demonstration centre has been constructed in the Niger Delta. It is the first green building in West Africa and has been designed to be 75% less costly to cool and to maximise the use of natural light. Passive design approaches have been used including roof overhangs to provide shading, a ventilated roof system, and Hydraform block construction of walls to improve heat insulation. Waste from toilets and sinks passes through a separation device that sends liquids to a sand filtration chamber and then a septic tank. Solids and food waste are sent to a bio-digester, expansion chamber, and composting chamber, which generate sufficient gas to support cooking in the centre for two hours each day.

In the final section of her talk, Nancy Gilbert described the work of TRANSFORM International which brings "community transformation centres" together in an international network. These centres support the transformation and sustainable growth of communities by providing:

- Awareness of innovative, affordable technologies
- Leadership, training, and guidance on the production and maintenance of technologies, sustainable economics, community health, climate change mitigation, and environmental conservation
- Research and marketing expertise
- Access to regional, national and international partners, funding, experts, and volunteers
- Collaboration skills
- Equitable opportunities for women, men, and youth

The initial group of centres are located in Malawi, Kenya, Nigeria, Bolivia, Mexico, and Papua New Guinea.

Nancy Gilbert closed with some reflections on the connections between WASH and renewable energy. In respect of the "hardware", there are

technology connections through solar pumps, bio-digesters, etc. There are also "software" similarities in respect of behaviour change, life cycle costs, financing, operation and maintenance, and advocacy issues.

Spring water project for indigenous community in Pampanga

Ronnie Mataga, Philippine Good Work Mission Foundation

Ronnie Mataga described the work of the Philippine Good Works Mission Foundation to bring a sustainable clean water source to an impoverished community of around 300 families in the province of Pampanga. This community was formerly nomadic, has low levels of literacy, and has limited sources of income such as harvesting of banana blossoms from the forest. The Philippine Good Works Mission Foundation funds a supplemental food and nutrition programme for the local school.

Several natural springs were considered as options for the water supply. In the end, a spring located 3.6 km from the village capable of delivering 10 litres of water per minute was chosen. It is higher than the village and hence supply can be through a gravity flow water system, an important consideration. The choice of water source was made in consultation with villagers. Construction was undertaken in the second half of 2015, but bad weather sometimes hampered delivery of materials from the nearest town some 12 km away. The project included 12 communal tap stands and the construction of a 10 m^3 water reservoir, which has been decorated with a mural to help promote the profile of the project.

To support the operation and maintenance of the system, each household is requested to contribute 20 pesos: so far only 4000 pesos have been collected, which is not enough. The utility in the local town has been approached to support the maintenance, but the system will need the support of the town's mayor. The community is eager to increase the water supply to be able to clean household items and other domestic applications. Alternative sources are being investigated, including springs at lower elevations that will need solar pumps to bring water to the village.

Panel discussion

An initial point made was that solar power has a lot of potential to support the WASH agenda, for example, through solar-powered water pumps. For the community in Pampanga consideration is being given to a solar water pump that can lift water from 40 metres below the village. Solar desalination may be an option for small island communities where there is no groundwater.

For renewable energy systems to support productive enterprises in villages, participants agreed that a strong community management system is needed. Community engagement in support of water and sanitation may create structures within the village that can also support energy access.

Questions were raised about whether water should be provided for free. It was proposed that revenues should be raised from villagers to cover at least the maintenance costs of a water supply system. However, in very poor communities, even this may not be possible. If water is given for free, everyone will take as much water as they want. Tariffs are needed to impose discipline on the use of water.

In an initiative in the late 1990s in Palawan, water supply schemes were established in 10 villages, in each of which a community association was established to manage the system. Five prospered and five did not. It is important to be strict with tariff collection. If incomes are received on a daily basis, for example, by fishermen, then tariffs should also be collected on a daily basis.

Concerns were expressed about the fragmented governance arrangements in the Philippines for WASH. 33 government offices have some

responsibility in respect of water issues. NGOs could undertake projects in collaboration with local government ensuring that they fit with the local master plan.

Discussion on the Burgos wind and solar plants visited on the previous day touched on the need for water to clean the solar panels. Rainwater harvesting is being installed on the substation and office buildings within the site. The company responsible for the Burgos site, the Energy Development Corporation, is intending to install washing facilities in local schools as part of its corporate social responsibility programme.

It was noted that while farming can continue when wind turbines are installed, this is not possible for solar panels. A problem at the Burgos site was that construction of the windfarm damaged the traditional water impounding systems in the pastureland area that used to serve as drinking water supply for livestock.

Participants looking at agricultural pasture underneath the EDC wind farm at Burgos

Day 2: Afternoon Session

The Philippines renewable energy situation

Carlos Gatmaitan PNOC Renewables Corporation

The Philippines National Oil Corporation (PNOC) Renewables Corporation is a government subsidiary of the National Oil Corporation. The renewables arm of the corporation is an off-shoot of the Renewable Energy Act of 2008, which aimed "to accelerate the development of the country's renewable energy resources by providing fiscal and non-fiscal incentives to private sector investors and equipment manufacturers / suppliers." Carlos Gatmaitan is the president of PNOC Renewables Corporation and shared some information about their projects, and his thoughts and expertise on the subject of the WASH and energy nexus in the Philippines.

One of the four main parts of the Renewable Energy Act of 2008 is a requirement that 5-10% of electricity supplies are from renewable sources. Mr Gatmaitan detailed the feed-in tariffs available for solar, wind, hydro, and biomass in the Philippines currently and likely feed-in tariffs in the future. He noted that to reach an extra 200 MW of solar PV capacity, the government will have to provide a third round of feed-in tariffs to have a competitive price of US$0.15 per kilowatt hour for PV generated electricity. This is still high compared to India, which has recently achieved a price of only US$0.06 per kilowatt hour for electricity generated from solar PV (this was an auction tender price recently bid for in the state of Rajasthan). Distribution utilities might be scared if renewables become so cheap, especially with increasingly lower-priced battery systems. Mr Gatmaitan thinks that the industry has the potential to be transformed in 10 years' time.

There are a lot of politics involved in hydro power, so projects take a long time. Work plans of up to five years are normal. This is compared to three months to build the solar farm at the EDC Burgos site for example. PNOC focuses on smaller hydro dams. They have a 1 MW plant. They have identified 250-300 sites which have the potential for installation of micro-hydro.

The renewable energy market (REM) will be a sub-market of the wholesale electricity spot market (WESM), which is an attractive way of insuring that the risk is lessened for renewable investments. Another way of encouraging renewable investment is providing fiscal incentives such as a 7-year income tax holiday.

Compared with its ASEAN neighbours, the Philippines is one of the top users of coal (98% of which comes from Indonesia). The Philippines has committed to lower emissions by 70% by 2050, but at the current rate of mitigation improvement, this will be impossible. Renewable energy is already 25% of the total energy sources in the Philippines, a large part of which is geothermal. This makes the Philippines the second largest geothermal energy producing nation behind the USA. There is a need to multiply by five the renewable energy development in the next 14 years.

PNOC Renewables Corporation wants to have social as well as economic benefits. Some communities are too poor to pay for energy. The first step for a PNOC project is to provide energy without tariffs, and at step 2 will get tariffs that the consumers will pay.

Carlos Gatmaitan talked of some example projects that the organization is involved in. One of these is a 100kW solar center at the "Philippine Heart Center", which consumes all the energy that is produced. The business development team is transitioning this so that in the next few months they will do projects with more social

benefits. It is important to develop business models with productive uses such as basket weaving. PNOC Renewables Corporation hopes to put its expertise to use in smaller towns. They have already signed agreements with 20 government agencies. This is good for government because it lessens their risk and enables access to technical expertise.

Carlos Gatmaitan foresees storage being integrated with planned solar farms. This could open the doors to independent power plants, which are especially important for islands. They have a biomass waste to energy project ongoing as well. He is hoping for a tsunami of investments in renewable energy, due to significant rates of return. By partnering with the private sector one can leverage and multiply, rather than only doing one project at a time. He concluded by noting PNOC Renewables Corporation's ability to integrate their plans with other initiatives. There is no point in providing energy if there is nothing to use it for. People who need the energy most should get it. PNOC would support projects from this Smart Villages discussion.

He introduced the room to Mario Tercero, a forester who is involved in Baranguy electrification projects. He has been involved with 92 Baranguy electrifications, but the success rate was not as high as hoped due to reasons such as lack of community ownership, and people not realising the ultimate benefits of energy provision. He proposed that women and youth may be better leaders of community-led projects. Mario Tercero noted one solution may be to put projects and items for productive use in communal areas rather than in individual homes.

Energy access initiatives in the Philippines

Emmanuel Talag, Philippines Department of Energy

Emmanuel Talag of the Philippines Department of Energy (DOE) outlined his views on rural electrification, and the DOE's philosophy on the topic. He started by noting that the Philippines is still a developing country. Energy access is related to equitable access to resources and poverty reduction. People should also look into alternatives to electricity, which is just a means to an end. Development paths should be explored which are less dependent on energy services.

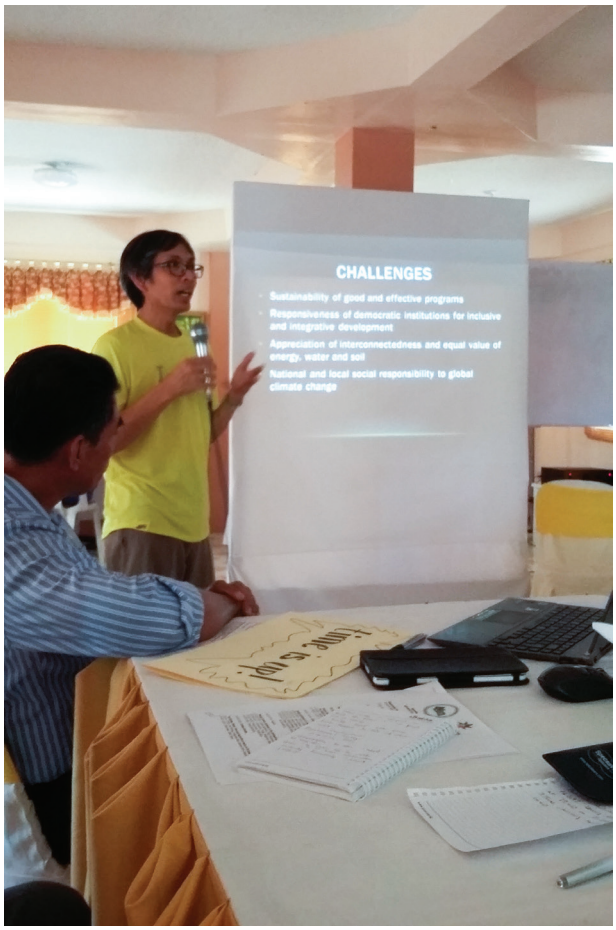
The DOE have a number of strategies to achieve energy access and development goals. A key feature is to always conduct consultations with communities. The DOE does not have a monopoly of knowledge so is always open to new ways of thinking. The DOE has programmes for energy development planning related to power, transmission, distribution, and household energy provision.

The DOE is involved in subsidy financing. In off-grid areas, consumers to do not pay the true cost of electricity and are subsidised. If consumers consume less than 100 kWh, they only pay half of their electricity bill. This is designed as an instrument of social justice. Communities hosting power generation services get a fund to support other development services, for example, some gain 1 centavo (0.01 Philippines Peso) for every kWh that they sell.

The DOE faces a number of challenges in implementing their vision, such as project sustainability, and responsiveness of democratic institutions. It also needs the political will of government to do the right thing.

Emmanuel Talag spoke of the need for interconnectedness. In the DOE, most renewable energy projects are sited on agricultural lands, so there is a need to balance what is more important: food production or energy stability. Small islands are mainly limestone based so have very thin soil, so it is important that the energy generation facility does not degrade the water's or soil's condition. Energy companies thus undergo competitive selection processes that include environmental

compatibility assessment. There are important questions such as whether local communities have a local social responsibility for dealing with climate change? There needs to be more education to make communities more aware of key issues.



Emmanuel Talag speaks about the challenges for renewable rural energy in the Philippines.

Philippines Renewable Energy Development Project (PH-RED): Intersection issues of gender and electric cooperatives

Karen Jacob, The World Bank

Karen Jacob explained her role working for the World Bank. She has not worked exclusively for the energy sector; she began working in the water supply and sanitation sector and has a specialisation in social safeguards and social developments. She then explained a study of the gender impacts within the Philippine Renewable Energy Development (PH-RED) project.

Karen Jacob detailed the situation in the Philippines. It currently has a rapidly growing electricity sector. The generation capacity is nearly 16,000 MW, and electricity demand has hit 80,000 gigawatt hours per annum, with per capita electricity consumption at only 800 kilowatt hours per annum. The government is pushing to reach 90% household electrification by 2017. The challenge is that the remaining unconnected households tend to be remote, dispersed, and poor.

The key electric power service providers are electric cooperatives which are still in the midst of a reform process that began 15 years ago. These electric cooperatives (ECs) serve about 12 million households, over half the households in the country. The remaining unconnected households will be served by the ECs, or joint ventures between ECs and private groups.

US$16 million is provided by the Global Environment Facility (GEF) for access to clean energy for households. Electric cooperatives will access these funds to leverage a total of 500 million US dollars for remaining unconnected households. The PH-RED program will facilitate the flow of affordable financing for electric cooperative network expansion. It will also finance renewable energy projects so that ECs can source more of their generation requirements from local sustainable resources, like micro-hydro. It will expand the capacity of the government electric cooperative partial credit guarantee (ECPCG) program, and support the expansion of government guarantee facilities that help enhance the flow of commercial credit to the ECs, both for network investment and for renewable energy projects.

The Access to Sustainable Energy Project, unlike PH-RED, is focused solely on solar energy, with a target of 40,000 solar systems installed in the next four years. In rural settings, however, rooftop PV is difficult. Houses can be made of

bamboo or grass, meaning the houses may not be approved for electrical connection.

Livelihood improvements are important for energy access. A gender study undertaken through electric cooperatives enabled the understanding of motivations within the household. If you ask women why they want electricity, they will say they need light for their children, men will say they need electricity for TV. Who will go to electric cooperative and apply for registration: men or women? How do the cooperatives respond? Does the cooperative investigate sources of income to see if they can pay monthly bills? There is a need for the ECs to better understand the market they serve. A study of the gender aspects behind EC operations can provide practical guidelines for how each EC can best service male and female customers.

Electric cooperatives are mostly run by men. Thus the national electric authority is also providing gender sensitivity training. There are numerous affordability issues: what does a mother sacrifice in her budget to have electricity?

Karen Jacob has already constructed a 12-page questionnaire by consulting with the Philippine center for women's studies to make it more user-friendly. Other examples of questions are: does the new energy technology access increase or decrease the workload on women? Can the ECs expand to livelihood provision?

If women have good income sources, that is an assurance that they will pay their bills on time. High wage jobs, e.g., meter reading, are given to men, but there is no reason women engineers cannot work in electric cooperatives in jobs that are not office jobs.

Three ECs will undergo the initial gender assessment in Benguet, South Cotobato, in some Muslim communities in Mindanao, and in communities of sugar cane farmers in Visayas.

There was a lively discussion in the question and answer session. It was remarked that gender roles in collecting water are always attributed to women and children from the very beginning. But men can do it, too. Researchers should have a "gender lens". How do we change the kind of perspective that cooking and collecting wood is purely for women and paid labour only for men?

A study was done in the 1980s in rural Philippines communities that gathered accounts of all of the women's activities during the day. Comparing these accounts to the men's activities, the men were able to rethink roles and gain appreciation for "women's tasks".

An observation was made that in Mindanao or Visayas there is no segregation of paying or non-paying work. Men wash clothing, for instance. Gender roles can be a regional issue. A participant remarked that there is also a need for women to stand up for their rights. A key solution is continuous education.

Panel discussion

Questions were directed at the PNOC Renewables Corporation regarding their heart center project and how it is financed. The heart center charges 9 pesos per kWh. They pay a monthly payment and PNOC makes a minimal return.

How can we get government agencies working together for development to provide social good and not just energy? It was again pointed out that there are a large number of government agencies with overlapping remits.

Philippines-New Zealand Dairy Project

Mary Jenlyn Hiloma, Philippines Departmet of Agriculture

Mary Jenlyn Hiloma started her presentation with the context that in the Philippines only three liters of milk are produced per cow per day compared with 15-25 in some countries. The

cows also have poor reproductive performance. This is largely due to insufficient feeding and poor quality of feeds. 20 million litres of milk, including goats milk, are produced in the Philippines per year. However, this only supplies 1% of Filipino dairy demand; the rest is imported from elsewhere.

As part of the Association of Southeast Asian Nations (ASEAN) treaty commitments, the Philippine-New Zealand dairy project was developed with the goal of an increased sustainable share of local dairy production. It targets small herds of less than 15 cows.

The project is using a strategic approach to demonstrate that dairy could be a competitive land use in suitable agro-ecological environments. It will implement limited grazing periods to allow pasture to recover: lands can take 60 days to recover after grazing. Many farmers attach sentimental value to their cattle, and it can be hard to let them go.

The project is using Mulato grasses to improve outputs. It is also using legumes (mani mani), and "cut and carry" systems. These plants can be inter-planted with other crops. Mombasa grasses are good in shaded areas, e.g., under coconut trees. They are working on new developments in heat-tolerant cattle.

There have been 24 "focus farms" established to trial the new techniques. The focus farms are provided with equipment to improve milking facilities and irrigation, e.g., windmills, solar pumping, and solar powered milking facilities. Pasture management has been aided by solar powered electric fences for off grid farms. Barbed wire is not good for dairy cattle; they can lead to infections and unsafe milk. Focus farms also serve as learning centers for other farmers. They regularly open their farms to other farmers or potential new dairy farmers.

The Philippine-New Zealand dairy project works with various stakeholders, for example, for water impounding and composting. Some large farms are considering biogas digesters using cattle manure. They are also looking at refrigeration systems for milk. For off-grid farms, the milk has to be immediately transported because they lack refrigerators.

In the question and answer session, it was asked if the pregnant cows are affected by electric fences, but they are not. In focus farms, people are using the water for cleaning milking units to irrigate the forage (grasses) to put the nutrients back into the soil. In response to a question on why cows are so thin in the Philippines, it was pointed out that this is due to a combination of adaptation to hot climates, and feed grasses being low in nutrition.

Human-environmental security in Asia-Pacific ring of fire: Water-energy-food nexus

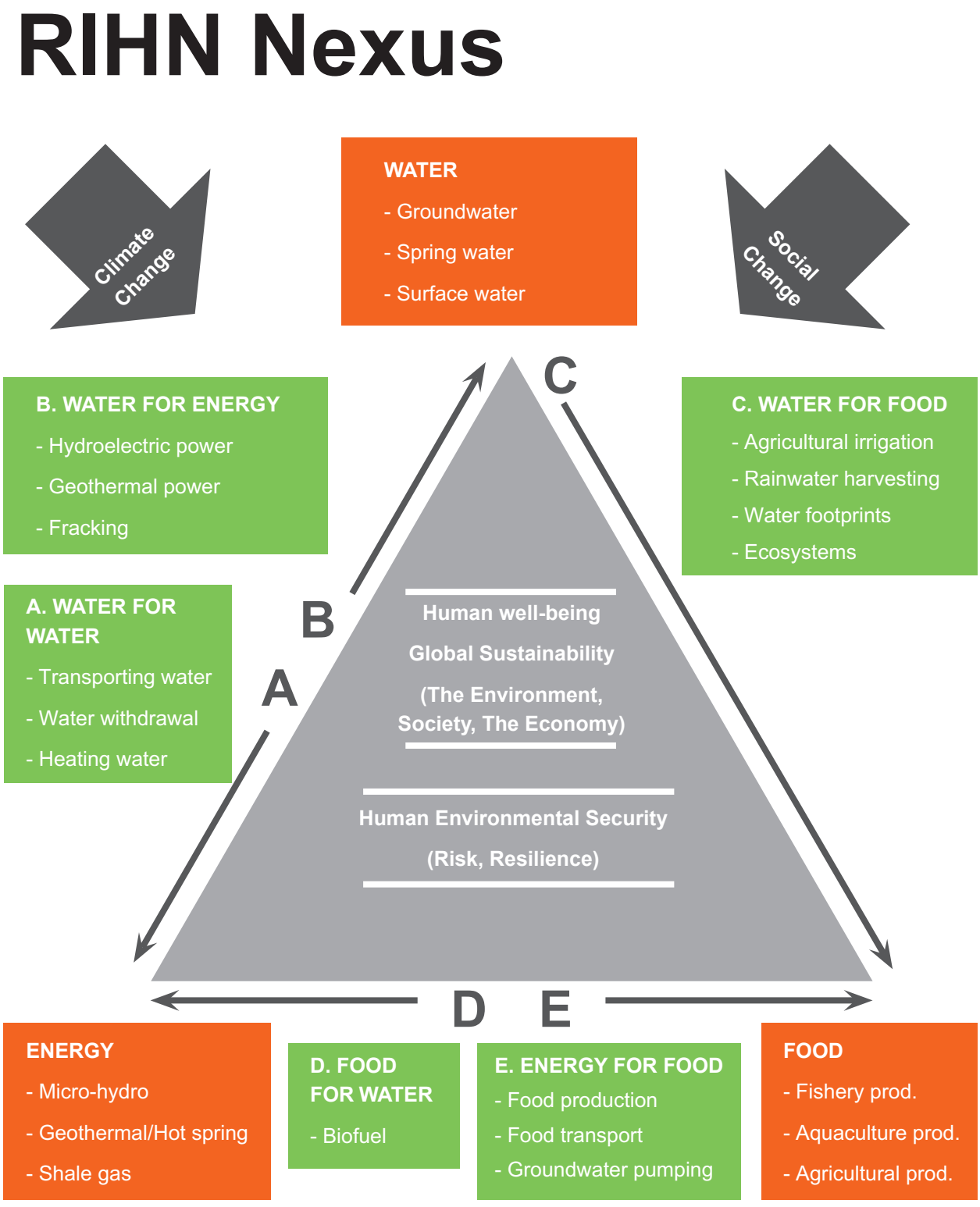
Aiko Endo, Research Institute for Humanity and Nature, RIHN, Kyoto

Aiko Endo introduced her research on issues to do with the water-energy-food nexus in the Asia-Pacific region and briefed the participants on some of the methods used to quantify and research nexus issues. She spoke about her current five-year project, with six examples of nexus activities across five countries: Japan, Canada, the Philippines, the USA, and Indonesia.

The purpose of the multidisciplinary project is to maximise human environmental security by analysing cases through a comprehensive water energy food nexus research methodology. She is currently working with 60 researchers from five countries.

The project roadmap begins with identifying tradeoffs and conflicts in the areas chosen. There is a need to understand the complexity of each system. The goal is to ultimately create well-in-

formed policy options and scenarios to solve problems. Aiko Endo spoke of a number of general problems and questions that they are looking at in their case studies such as: How might water use for producing or consuming food or energy on land affect fisheries? How much energy is it possible to produce per kilogram of water for different energy generation methods? How should one then consider the social and environmental impacts of energy and food related activities?



One example focused on hot spring drainage water in Japan, where the water has been used for both energy production and drainage water. She also noted that another important element is submarine groundwater discharge into the ocean, which can lead to too much phosphorous entering the sea.

The team uses an integrated method for an interdisciplinary and transdisciplinary approach. This includes questionnaires, integrated maps, physical models of the system, optimised management models, and index approaches. There are pros and cons of using each method to look at a system, which is why multiple methods are used.

In the question and answer session, Aiko Endo was asked how she managed to get scientists to work together from many different disciplines. She replied that they all try and meet every two months with members of the team, and she is having some success with these regular meetings.

Discussion session 1

The first discussion session aimed at delving more deeply into a series of questions outlined in bold below. The participants were split into two groups to discuss responses for each question. A summary of the discussion, and key points from both groups, is presented below.

- **What should be the WASH objectives for rural development, and how can we achieve them?**

  - We must view WASH access as a human right.

  - The specifics of any particular system should be dictated by consumer choice, but it must provide adequate access to safe drinking water. It must be able to separate human waste from the environment and deal with waste throughout its whole lifecycle.

  - There should be an appreciation of the benefits of WASH forged through proper education, leading to discipline in water management, as well as appropriate tariffs or some form of financial sustainability, including making use of low-cost technologies to do this.

- **What are the consequent energy needs and opportunities, and how can we deliver them?**

  - Energy is needed for the supply, distribution, and recycling of water.

  - In island communities, energy can be used for desalination.

  - Energy can be used to deliver better health outcomes through water purification.

  - Energy is needed to pump water uphill.

  - Producing fertilizer from biodigesters can save time, money, and energy.

  - Households need to use energy efficiently such as through improved biomass cookstoves, low-cost small refrigeration systems especially for island communities, and processing agricultural products to add value and reduce wastage.

  - Energy is needed to power efficient communication systems such as early warning systems, public address, charging stations, energy and water supply for evacuation centres and schools.

- **How can WASH technologies be delivered to rural communities?**

  - Through low-cost technology development, e.g., there are context-specific technologies for particular scenarios like floating sceptic tanks or floating biodigesters for seaside communities. Rainwater should be harvested whenever possible.

  - There must be an interdisciplinary approach with an understanding of community engagement.

  - Through communication and education (e.g., painting murals on project infrastructure) one can make WASH an aspirational goal to promote behavior change.

  - Local government units should coordinate and spearhead all WASH efforts to achieve harmonisation.

  - Partnerships should be established with the private sector, for example through corporate social responsibility funding.

- **What are the potential synergies between the water, energy, and food spheres?**

  - Biodigesters are a technology that covers the energy, water, and food spheres. Other technologies that use energy for productive uses - for example, products for drying agricultural products; gasification products; rice granaries, lighting for productive activities - also do this.

  - Laguna de Bay is an example of water infrastructure providing hydroelectricity and drinking water.

  - An example was given of a hot spring in Obama, Japan that now uses the water run-off from the spring to produce energy as well as extra drainage water.

- **How can we develop an integrated approach and use that to realise synergies between water, energy, and food?**

  - Partners can be found through conferences, and then it is key to continue to communicate through follow-up activities.

  - How did past coordinating mechanisms work? One needs to have institutional memory and learn how to sustain participatory governance.

  - By engaging local government, one can institutionalise collaborations. WASH and energy are their mandate, and they can sustain the projects.

Day 3: Concluding discussion session

The concluding session on the morning of Day 3 was aimed at finding key messages to send to policymakers, funders, and the practitioners in the energy, water, and food communities. This second discussion session involved all workshop participants speaking in plenary.

Messages for policymakers

For WASH, people know what the technologies and the "software" are, but they want a clear initiative from government. How do you bring local governments on board? Laws mean that local government has to do WASH in the Philippines. Incentives are in place but corruption exists. There is a need to politicise water issues. An example was given of a mayor and vice mayor quarrelling and using WASH as a political bargaining tool. Some local governments are good, but others may need to become more effective. There are examples of good and bad government and donor initiatives. For example, the Department of Health distributed toilets that ended up being used as flower vases.

Consideration was given to what the Department of Interior and Local Government could do to support the deployment of WASH technologies. Some level of coordination and standardisation should be put in place across the 33 agencies with responsibilities for water supply, each with their own financing and methodologies.

From a local government perspective, they see that some NGOs are going straight to the higher levels of government. But it is the barangays, a lower level of government, that truly do the work. There is a need for better communication: the barangays should know what the NGOs are doing. There needs to be an increase in awareness (more aggressive approach) among government bodies.

PCWS is working with UNICEF for WASH in daycare centers. UNICEF requires that PCWS has memoranda of understanding with city and municipal mayors. But this leads to delays and alterations. Some barangay heads do not entertain NGOs without the mayor's blessing. It may be the best solution to do things on a case-by-case basis.

True scale up will require the participation of higher levels of government. NGOs need to do their groundwork. Karen Jacob used the example of a previous monthly meeting she arranged while working for the World Bank with government, academia, and NGOs to talk about issues. Maybe something similar could be useful for the energy and WASH communities.

One can get the support of academia without incurring extra costs. To do this one needs to make connections with university professors. One can do a lot of things at the barangay level, but a higher level is required for showing other barangays what can be done.

Water quality monitoring is seen as a responsibility of governments and NGOs. Sometimes certain fees must be paid for water monitoring. Water is costly to test at 1000 pesos (US$20) per parameter tested. Hence local level monitoring is not going on very much, and sometimes, a few local governments only test water when an outbreak happens.

Workshop participants called for cheaper technologies to be made available. School groups can do testing, which would boost education and maybe help reduce cost. An interesting example was given of metropolitan Manila, where the water is potable, but no one is promoting it due to the proliferation of bottled water sales.

Each village needs a source of water supply at the very least, and government should develop a central database of which villages do and do not have water. Funds should be prioritised for those villages without water.

Donors are seen as often having narrowly biased mindsets, for example towards only helping children, rather than the whole village. Agencies with tight remits miss the whole picture. Children learn to wash their hands but in dirty water.

Messages for water, sanitation, and energy communities

There are similarities in financing issues between the water, sanitation, and energy communities. A cross-cutting approach to financing may therefore be appropriate, but agencies like the World Bank mostly do things sectorally. There was a time in the World Bank where there were four different water projects that would compete with each other.

Funding should be increased to promote gasification technology for producing biogas from waste. Organisations like SNV can help with technical capacity building, but another tranche of donor money is needed to support relevant initiatives. But one needs to be careful not to have too many giveaways.

People should influence behavior change by setting up smart villages as aspirational goals, which can in turn be used to influence politicians. Donors should fund demonstration village level projects which combine water, energy, waste, and food such as a project on rainwater capture combined with waste treatment and fish feeding. These can then be upscaled, but there needs to be money to do this. There is much relevant knowledge within villages.

Donors such as the Asian Development Bank and World Bank cannot finance pilot projects (they do loans instead). For financing, NGOs must go to bilateral funding organisations, for example, the United Nations agencies or the United Kingdom's Department for International Development (DfID). For upscaling, national governments should recognise the need and then go to the international community for loans. NGOs need to sell success stories to governments who can then look for financing. Corporate social responsibility funding is also an option for some initiatives. PCWS, for instance, is only looking for small amounts of money. Perhaps there needs to be a donor-NGO dating agency allowing relationships to form.

One example of a successful sanitation programme from a pipeline sanitation fund is in Vietnam. Loans were provided to local households and women's unions to get septic tanks. When loans were paid back, the money went into different houses and this was a successful and widely applied process. It has now become a standard procedure for funding sanitation. Could that be applied in Philippines and elsewhere?

There are dam projects in the Philippines that are multipurpose and that deal with power, irrigation, land, and water supply. A big component is community consultation. Perhaps one can combine the other aspects with WASH as well to achieve a balanced large scale water-energy nexus. The larger scale means financing exists since more money tends to be available for these large projects.

Annex 1: Agenda

The energy and water nexus for off-grid communities in the Philippines and Southeast Asia
1-2 June 2016
Palalay Hotel
Burgos, Ilocos Norte, Philippines

Wednesday 01 June:

1500 **Field trip** to EDC Burgos Wind Power Corporation Wind and Solar plants

1930 **Welcome Dinner and Reception**
Palalay Hotel

Thursday 02 June:

0800 **Breakfast**

Scene setting and introduction to Smart Villages and Philippines Center for Water and Sanitation

0900 **Introduction to the Smart Villages Initiative**
Dr John Holmes, The Smart Villages Initiative

0940 **Introduction to the Philippine Center for Water and Sanitation (PCWS)**
Lyn Capistrano, PCWS

1010 **Coffee**

WASH Initiatives in the Philippines and SE Asia

1040 **Samahan ng mga Katutubong Tagbanua (Sanitation collaboration with the Tagbanua indigenous people of Malawig)**
Cyrus Juntilla, Sakatag WASH Association

1100 **Wash Coalition Pilipinas**
Apol Jimenez, WASH Coalition Pilipinas

1120 **WASH and renewables**
Nancy Gilbert, WASRAG

1140 **Spring water project for indigenous community in Pampanga**
Ronnie Mataga, Philiippine Goodwork Mission Foundation

1200 **Panel Discussion**

1230 **Lunch**

Energy Access Initatives in the Philippines and SE Asia

1340 **The Philippines renewable energy situation**
Carlos Gatmaitan, PNOC Renewables Corporation

1410 **Energy access initiatives in the Philippines**
Emmanuel C. Talag, Philippines Department of Energy

1430 **Philippines Renewable Energy Development Project (PH-RED): Intersection issues of gender and electric cooperatives**
Karen Jacob, World Bank

1450 **Panel discussion**

1510 **Coffee**

The energy, water, and food nexus in Southeast Asia

1540 **Human-environmental security in Asia-Pacific ring of fire: Water-energy-food nexus**
Aiko Endo, RIHN, Kyoto

1610 **Philippines-New Zealand Dairy Project**
Mary Janelyn Hiloma, Philippines-New Zealand Dairy Project

1630 Breakout discussion session

1730 **Breakout session reporting and concluding comments**

1900 **Dinner**

Friday 03 June

0800 Breakfast

Breakout Final Discussion Session and wrap Up

0900 Messages for policymakers and messages for water, sanitation, and energy communities

1030 **Coffee**

Annex 2: List of Participants

Agnes Ramos	Philippines Center for Water and Sanitation
Aiko Endo	Research Institute for Humanity and Nature, Kyoto
Apolonio Jimenez	Philippines Center for Water and Sanitation
Carlos Catigay	Barangay Local Government of Ibayo, Tipas
Carlos Gatmaitan	PNOC Renewables Corporation
Cyrus Juntilla	SAKATAG WASH Association
Deborra Sabarre	EDC Burgos Wind Power Corporation
Emmanuel Talag	Department of Energy
Erwin Mendiola	Barangay Local Government of Ibayo-Tipas
Galileo Dacumos	PNOC Renewables Corporation
Jansen Chano	EDC Burgos Wind Power Corporation
Jenlyn Hiloma	Philippines-New Zealand Dairy Project
John Holmes	Smart Villages
Jose Rodriguez	Barangay Local Government of Ibayo-Tipas
Joyce Anne Lee	Philippines Center for Water and Sanitation
Karen Jacob	World Bank
Lyn Capistrano	Philippines Center for Water and Sanitation
Mario Tercero	PNOC Renewables Corporation
Melanie Egnacio	Philippines Center for Water and Sanitation
Michael Price	Smart Villages
Mitch Doren	WASH Coalition Pilipinas
Nancy Gilbert	WASRAG (Water and Sanitation Rotarian Action Group)
Noel Guillan	PNOC Renewables Corporation
Ronnie Mataga	Philippine Good Works Mission Foundation
Zenaida Ugat	Society for the Conservation of Philippine Wetlands

SMART VILLAGES

New thinking for off-grid communities worldwide

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