ASSESSMENT OF RENEWABLE ENERGY SUSTAINABILITY IN NTT PROVINCE USING THE I3A FRAMEWORK IN 21 STEPS

(Retnanestri & Outhred, 2011)*

On 8-9 June 2010, in collaboration with the Kupang-based University of Nusa Cendana (UNDANA www.undana.ac.id), the NTT regional government and NTT PLN (the NTT electricity utility), we ran a two-day seminar and workshop attended by participants from government, utility, business, academic and NGOs, in which local stakeholders made presentations looking at the potential, progress, challenges and perception of RE in NTT (Figure 1). Focused group discussions followed in which participants were divided into three diversified groups of government officials, utility representatives, academics and NGO personnel. Each group discussed NTT's situation using the I3A (Implementation, Accessibility, Availability, AcceptabilitY Framework as a 21-step methodology (Figure 2) for developing a plan to enhance the sustainability of RE service delivery in NTT. The premise of the I3A framework is that to be sustainable and equitable, RE projects should be implemented in an institutional framework that addresses RE accessibility (financial, institutional and technological), availability (technical quality and continuity) and acceptability (social and ecological). At the end of the discussion session each group reported to a plenary session the final outcomes, which were later compiled as workshop findings. Table 1 presents an extract from the findings, which are discussed in the following sub-sections.

Figure 1: The workshop in Kupang, NTT province, to identify barriers to RE in NTT using the I3A framework in 21 steps, June 2010

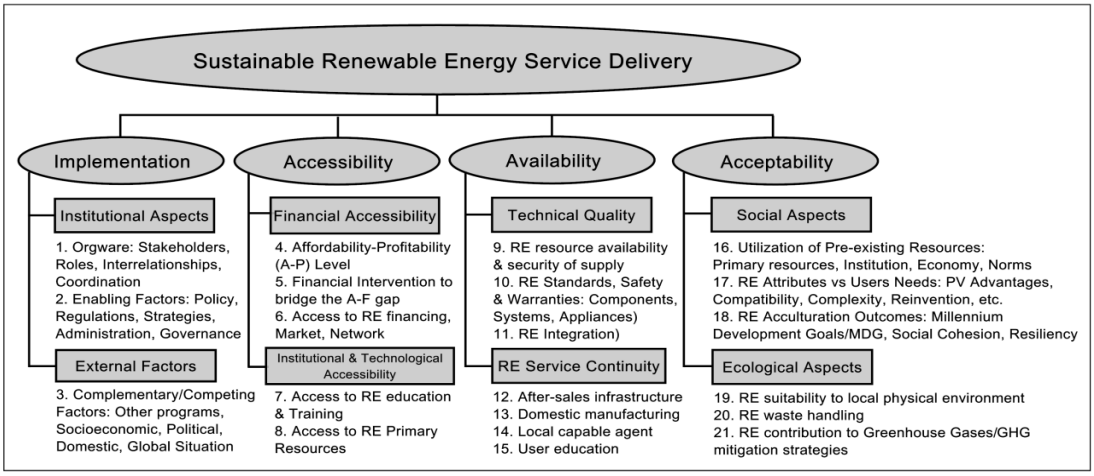

Figure 2: The I3A Framework in 21 steps.

Table 1. Extract of the NTT workshop findings and recommendations

I.	**IMPLEMENTATION: Institutional aspects &enabling factors**
1.	Orgware & RE stakeholders: *Form **Forum Energi Daerah** (Regional Energy Council) & define roles, coordination & interrelationships among RE stakeholders (PEMDA local government, DPRD local parliament, departments, educational institutions, private companies, NGOs, associations, cooperatives, community)*
2.	Enabling factors: *Relevant policy & strategies for mainstreaming RE in NTT, **accessible information** for all*
3.	Complimentary factors: *Existing programs and strong commitments from outside NTT to assist RE development in NTT* Competing factors*: People in remote NTT are **not open to external ideas** for change*
II.	**Accessibility: Financial & Institutional aspects**
4.	Affordability – Profitability level: *Poverty level in NTT is high (24% in 2010), the Affordability-Profitability gap is high*
5.	Financial intervention: *Financing from state or regional budget, community funds, incentives for RE developers*
6.	Access to RE financing, market, network: *Collaborate with NGO, donor institutions*
7.	Access to RE education: ***Community training centre**, RE training equipment, **field laboratory**, technolog*y transfer
8.	Access to RE primary resources: *Land dispute can be an issue*
III.	**Availability: Technological aspects**
9.	Primary resources availability & security of supply: *Solar, Wind, Biogas, Micro Hydro, Biomass, resource mapping needed*
10.	RE Standards, Safety: *Use appliances that comply with appropriate standards; Training on Standardisation & Certification*
11.	RE Technology integration: *Experts & training are needed*
12.	After-sales service infrastructure: ***Empower community & cooperatives** to sell spare parts & provide after sales service*
13.	Domestic manufacturing: *Maximize local content, transfer manufacturing capacities to NTT, use local wisdom/innovation*
14.	Local capable agent: *Design curriculum for **RE education** from **primary school** to **university level**, **workshop** at **kabupaten***
15.	User education*: Train community groups (through TOT) to train RE users; **life skill training** eg. RE for agriculture*
IV.	**Acceptability: Social & Ecological aspects**
16.	Utilization of local resources: *Survey needed to understand the local resource capacity for appropriate project design*
17.	RE attributes & Users requirements*: RE equipment made more affordable, **RE beyond lighting**, more user friendly*
18.	RE acculturation outcomes on welfare: *RE for **agricultural development** to create jobs & welfare in NTT & reduce dependency on PLN for electricity supply*
19.	RE suitability to local physical environment: *Improve understanding of the impacts of local environment on RE equipments*
20.	RE waste handling, RE resource sustainability: *Improve understanding of the impacts of RE waste on the environment, use of AMDAL environmental assessment*
21.	RE & GHG: (not discussed due to time constraint)

Implementation: Orgware and enabling factors

The workshop concluded that in order to deal with the energy situation in NTT province, NTT should form a *Forum Energi Daerah* or Regional Energy Council comprising various stakeholders from the NTT government, parliament, relevant government departments, educational institutions, business sectors, NGOs, cooperatives and community associations. The roles of stakeholders and their interrelationships need to be defined, and coordination is required. Enabling factors such as defining relevant policies and strategies are imperative for mainstreaming RE in NTT in which information that is available and accessible to all is of key importance. Federal, provincial and local governments, and local and international NGOs have run many RE programs in NTT with strong commitment but varying degrees of success.

Workshop participants noted that remote NTT communities are not open to external advocacy for change, which has been a barrier to RE acculturation in NTT. They felt that strengthening RE orgware and building a local RE stakeholder network would help to overcome such barriers to successful RE project implementation.

Accessibility: Financial, technological and resource accessibilities

Given that 24% of NTT people are poor and RE prices are high by their standards, the gap between RE affordability and RE profitability is large. Thus it is not yet possible to rely on unsubsidised commercial delivery of RE projects. Participants considered that Federal or Provincial financial subsidies, the formation of community funds and incentives for RE developers were important options to consider. They identified a need for RE education and training to support technology transfer, for example by establishing community training centres, and providing RE training equipment and field laboratories. They also identified the possibility of land-use conflicts over access to renewable energy resources (for example water for a micro hydro system) and thus a need for conflict resolution procedures.

Availability: Primary resource availability, RE hardware & service reliability

NTT has solar, wind, biogas, micro hydro, biomass and geothermal resources, however resource mapping is required to quantify these resources and ensure long-term security of supply. RE equipment should comply with appropriate standards to ensure safety and longevity. Training is required on standards and testing and certification procedures as well as on grid integration requirements and procedures. Local cooperatives could provide after sales service but they will need training on technical and organisational skills. Policies should be implemented to create or strengthen local manufacturing capability, transfer know-how, maximize local content and benefit from local wisdom and innovation. Educational institutions should design curricula from primary to tertiary level to educate local capable agents, supplemented by short-term activities such as workshops and short-courses at *kabupaten* (regency) level. There is also a need for "train the trainer" programs to develop community-level knowledge and skills in RE technologies and associated income generating activities, for example in agriculture and crafts.

Acceptability: Social acceptance and environmental aspects

Participants identified the use of local resources (natural resources, local institutions, customs) as key to RE acceptance; however surveys are needed to establish inventories of such resources. RE equipment should have attributes that meet local requirements. It should be affordable, user friendly, support a range of end-use activities as well as lighting, and thus boost job opportunities and welfare in NTT's agricultural communities. If operating well, RE could reduce community dependency on PLN for electricity supply. Environmental impact studies (AMDAL – *Analisa Mengenai Dampak Lingkungan*) should assess the impacts of RE systems on the local environment and vice-versa (for example, the effect of salty coastal environments on RE equipment and the environmental impacts of RE wastes, for example batteries). Due to time constraints, RE resource sustainability and GHG (greenhouse gases) reduction potential were not discussed.

*Retnanestri, M., & Outhred, H., 2011. ***Outcomes of an ADRA Research Project to Overcome Barriers to Renewable Energy in Rural Indonesia by Community Capacity Building***, Solar2011 – the 49th Australian Solar Energy Society Conference, Sydney 30 Nov–2 Dec 2011, Proceeding, ISBN 978-0-646-56699-3.