Renewable Energy & Sustainable Development in NTT

Seminar & Workshop Objectives & Activities

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http://www.ceem.unsw.edu.au/content/RenewableEnergyinIndonesia.cfm?ss=1

Seminar & Workshop Objectives

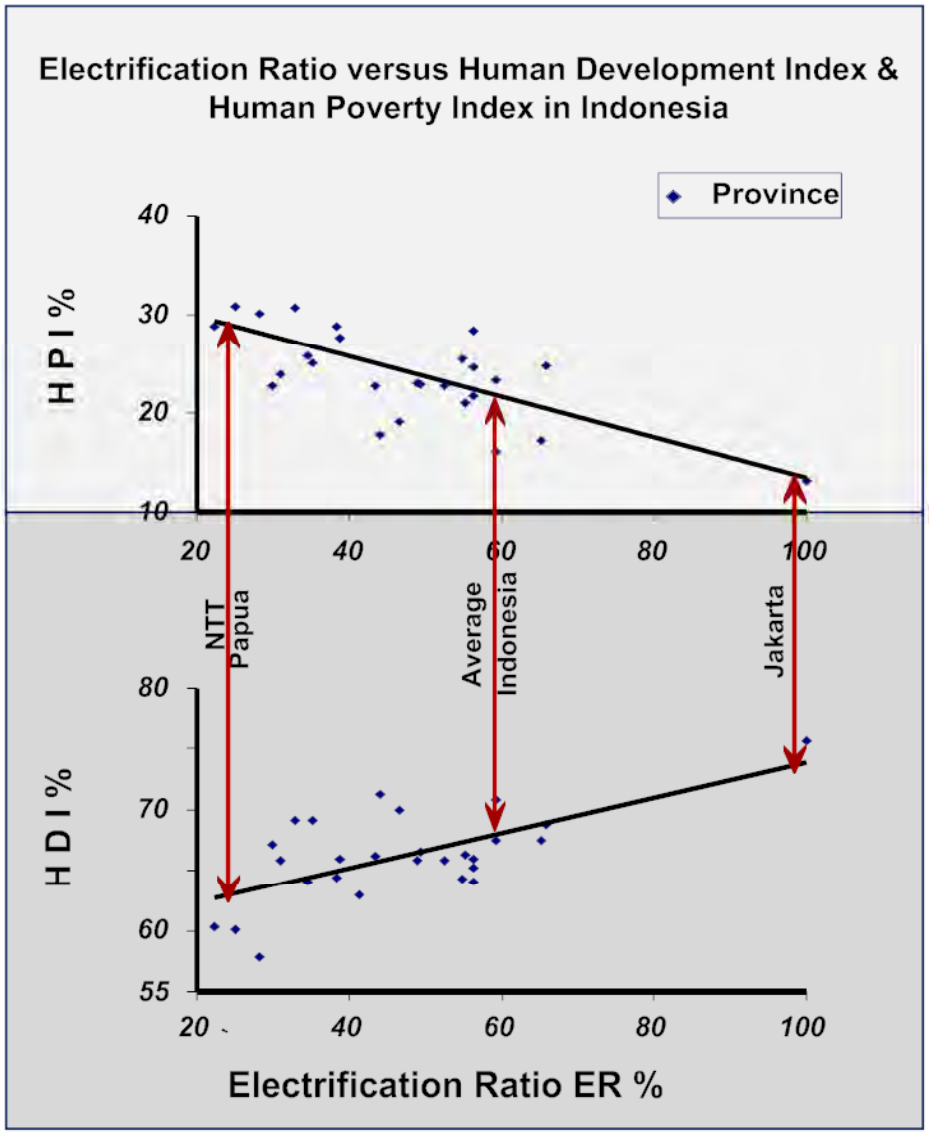
- Memfasilitasi komunikasi dan networking antar stakeholder EBT
- Berbagi informasi & pengalaman mengenai EBT, baik yang berhasil maupun tidak di NTT, Indonesia maupun dunia
- Melakukan update mengenai potensi EBT di NTT serta kendala yang dihadapi untuk implementasi dan pengembangannya, baik dari dimensi institusional, finansial, teknologi, sosial maupun lingkungan
- Memformulasikan rekomendasi strategi & kebijakan EBT untuk NTT
- Mendokumentasikan hasil diskusi agar bisa digunakan sebagai referensi untuk formulasi strategi & kebijakan EBT, serta untuk tujuan pendidikan EBT dan pembangunan sosioekonomi di NTT.

Presentasi & Pembahasan:

- Update mengenai masalah energi yang dihadapi oleh NTT saat ini, potensi yang dimiliki, kendala yang dihadapi, strategi implementasi & rencana kedepan untuk mencapai situasi pelayanan yang terjangkau, handal & bisa menjadi kunci untuk pembangunan NTT
- Mengenai potensi & kendala tersebut diatas, bahasan ditinjau dari dimensi **instutional** (regulasi, organisasi, administrasi dlll), **finansial** (anggaran, harga energi, investasi, subsidi, dll), **teknologi** (jenis teknologi yang sesuai/yang dipilih untuk situasi NTT dll), **sosial** (peran energi untuk pembangunan sosial di NTT, respon masyarakat terhadap EBT, pendidikan, training, pemberdayaan masyarakat, dll), **lingkungan** (manfaat & dampak)

Electrification Ratio & Socioeconomic Development in Indonesia

ER, HDI & HPI Correlation



Population 238m **Electrification Ratio:** 60%, **Average kWh/capita:** 564 (NTT- 74; Jak- 2077).

Current Situation: Demand growth 9%/year; Supply growth: 3-4%/year leading to electricity crisis; Oil share for electricity generation 63%

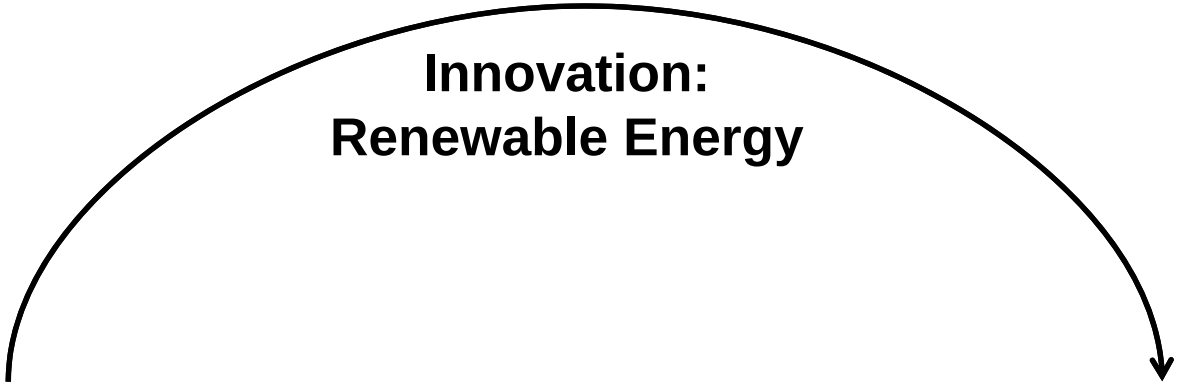
Future Target: 80% Electrification ratio (2014); no more black out (2010); decreased oil usage

HDI: Life expectancy, educational attainment, living standard
HPI: Poor health, illiteracy, poor access to clean water and earning below a dollar a day

(PLN 2008, UNDP 2008, CIA 2008, BP PEN 2006, Sulistomo 2010)

PLN 2008, Indonesian Electricity Statistics 2007 ; UNDP 2008 Human Development Reports, http://hdr.undp.org ; CIA, 2008, The World Fact Book, Indonesia, www.cia.gov

Change, Innovation & Diffusion of Innovation



Current Situation in NTT:
2008: Population 4.53 m
Eletrification Ratio 22.53%
Elc. 2 Hydro (1 MW), 335 Diesel (123 MW)

Expected Situation in NTT:
Electrification ratio ...
Oil Share ...
New & Renewable Energy ...

↓

Sustainable NTT

Diffusion of Innovation: "The process in which an innovation is communicated through certain channels over time among the members of a social system" *(Rogers, 2003, p5).*

Innovation: "An idea, practice or object that is perceived as new" by its adopters (*Rogers 2003*)

Rogers, EM., (2003), The Diffusion of Innovations, Fifth Edition (1962, 1971, 1983, 1995, 2003), Free Press, New York, ISBN 0-7432-2209-1.

Renewable Energy & Sustainable Development

A 120 kW Micro Hydro system in West Java (2005), a cross-flow MH turbine produced by Heksa Hydro in Bandung (2009), a PV-Wind-Diesel hybrid system in Rote Island, NTT (2005), PV entrepreneur in Lampung (2005), 60 MW Geothermal Power Plant in Kamojang (2009), STTNAS Study Tour to facilitate RE capacity building in Indonesia (2009)

Innovation (RE) Challenges

Wollongong 2008: Wave power at Wollongong harbor
West Timor 2009: Micro Hydro installation, wind power water pumping system

Innovation (RE) Challenges

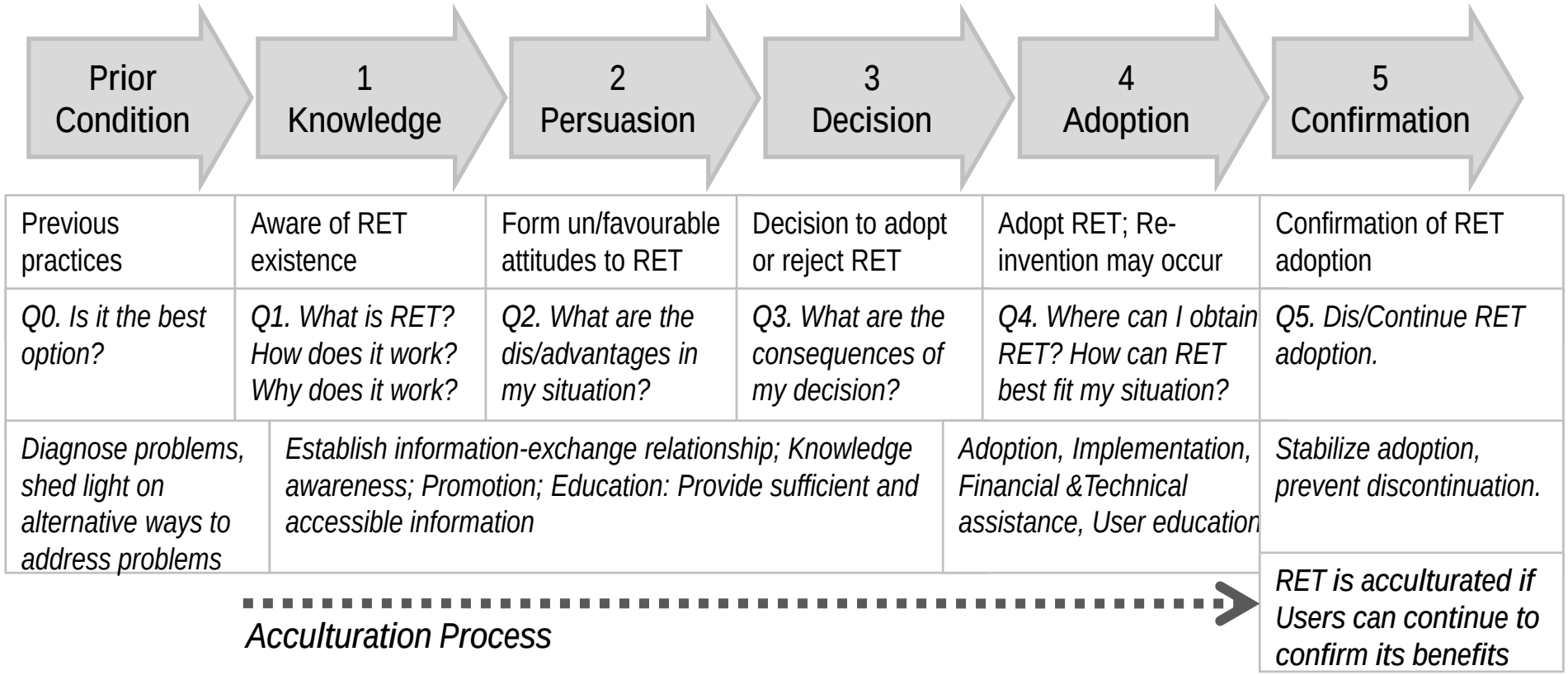
Photo: Courtesy of Azet Surya Lestari

Bjarnegard 2006

Photo: Courtesy of Claus Dauselt

Institutional: Lack of adequate after sales service infrastructure; **Financial:** Poor fund management; **Technological**: Lack of spare parts and technician availability; **Social**: Externally derived problems on rural communities leading to social fragmentation; **Ecological**: Inadequate RE waste handling, RE unsuitable in some local physical environments

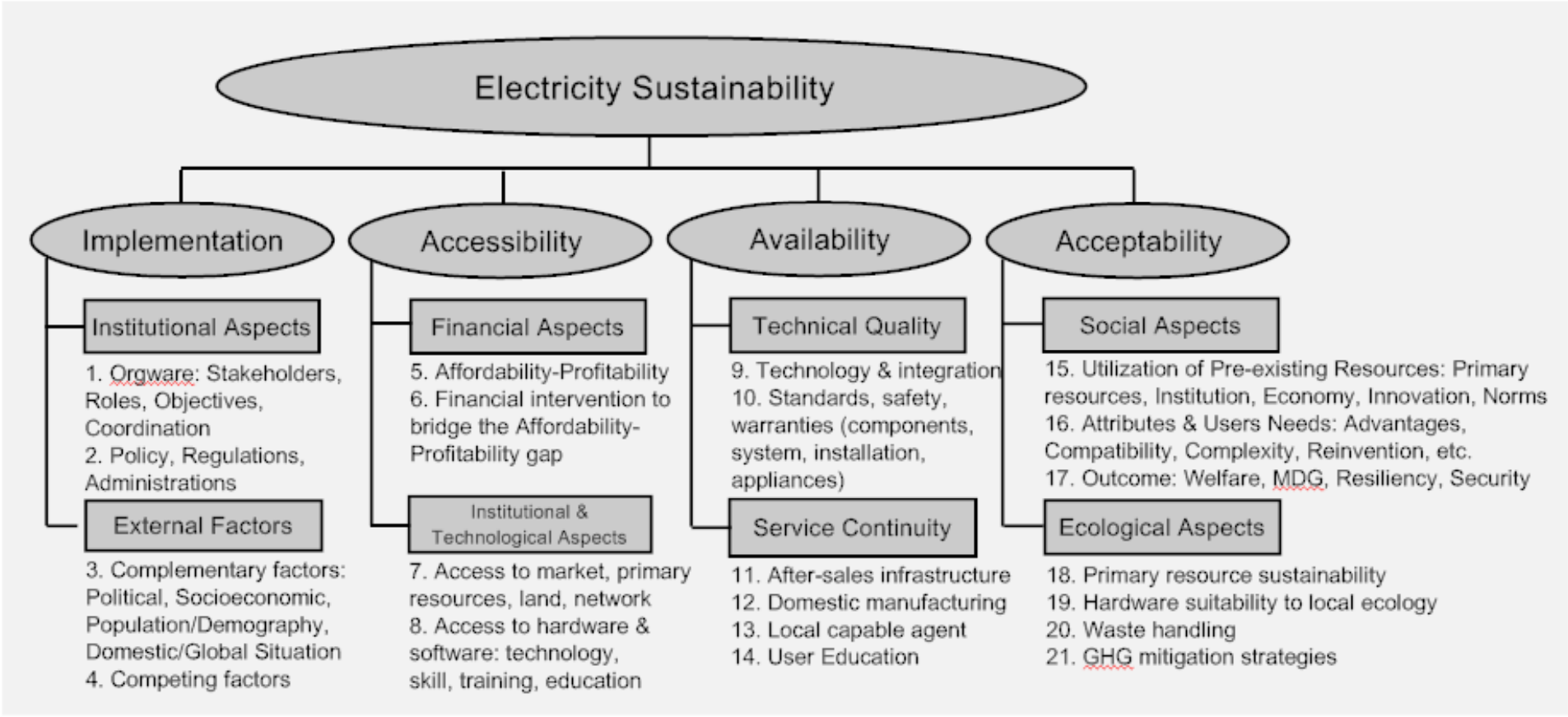
Exp: The KPDAC Continuum & Acculturation Process of RET



The KPDAC continuum:

- Interweaving of hardware-software-orgware that explains the what, why, who, how involved in the RET acculturation process, as well as its success or failure
- Hardware: Equipment, Software: Skill, information, Orgware: Institutional context

I3A Framework: Electricity Services Sustainability



I3A Framework: An **implementation** that maintains energy service **accessibility** (financial, institutional, technological), **availability** (technological, institutional) and **acceptability** (social, ecological), considering the hardware, software and orgware aspects of energy service delivery during & beyond initial project life *(Retnanestri 2007)*

Innovation Social System: Stakeholders Synergy,
Objectives, Roles, Relationships, Active Participation

Common goals: Sustainable electricity services

Social System: "A set of interrelated units that are engaged in joint problem solving to accomplish a common goal" (Rogers 2003, p23).

Stakeholders may have different objectives! Civic network imperative! Beware social field!

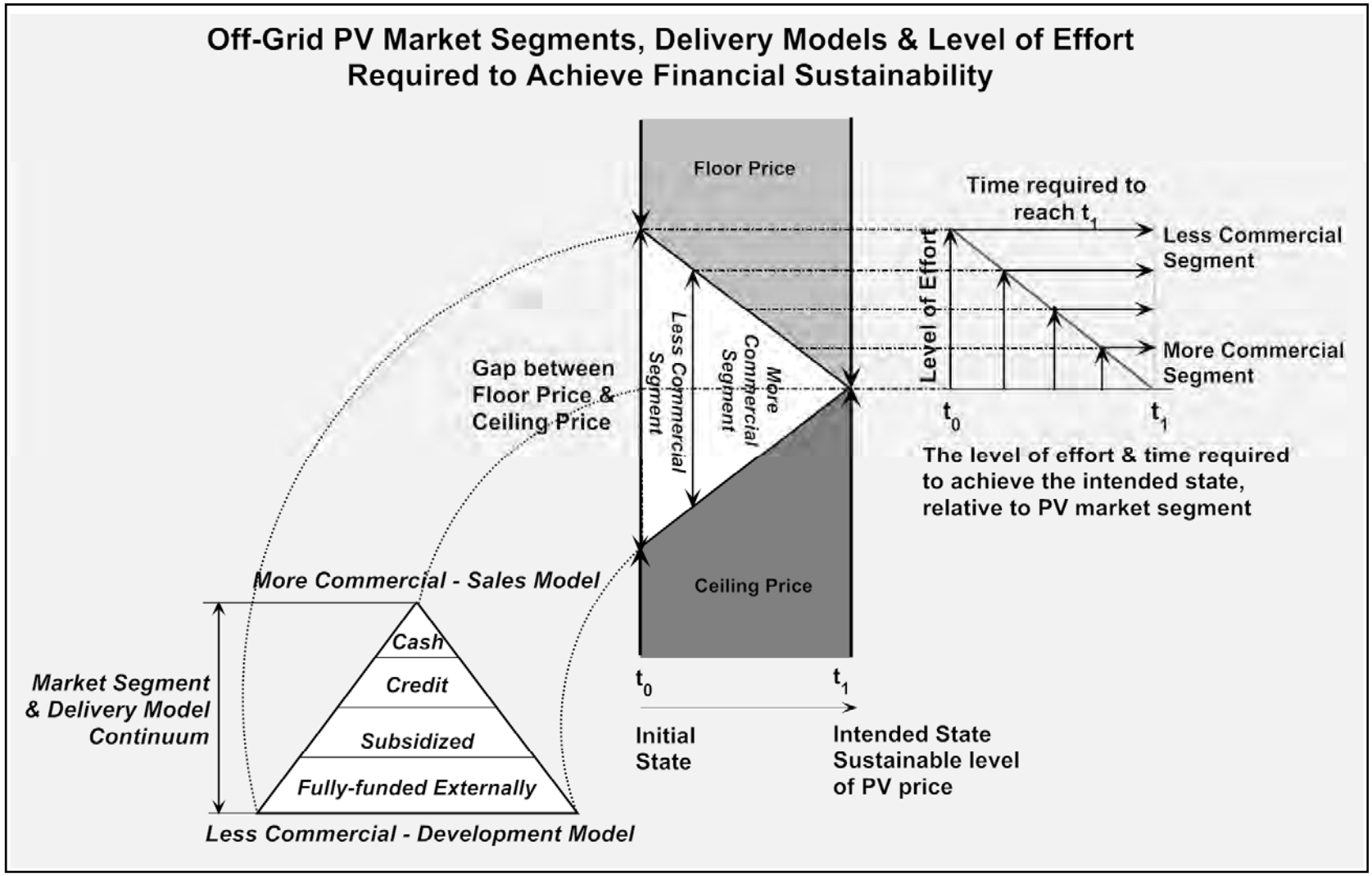
- **Civic Network** is characterized by consensus, active involvement of well-informed and capable participants, and good governance based on trust, norms and obligations among its members
- **Social field:** Battleground of differing interests

Role of facilitator as channel, linker, communicator, catalyst:

- Secure innovation adoption in the direction deemed desirable by Sponsor, balancing this with Users requirements
- Acknowledge all stakeholders interests, promote civic network, local governance, community autonomy (capacity building required)

Financial Accessibility & Community Empowerment

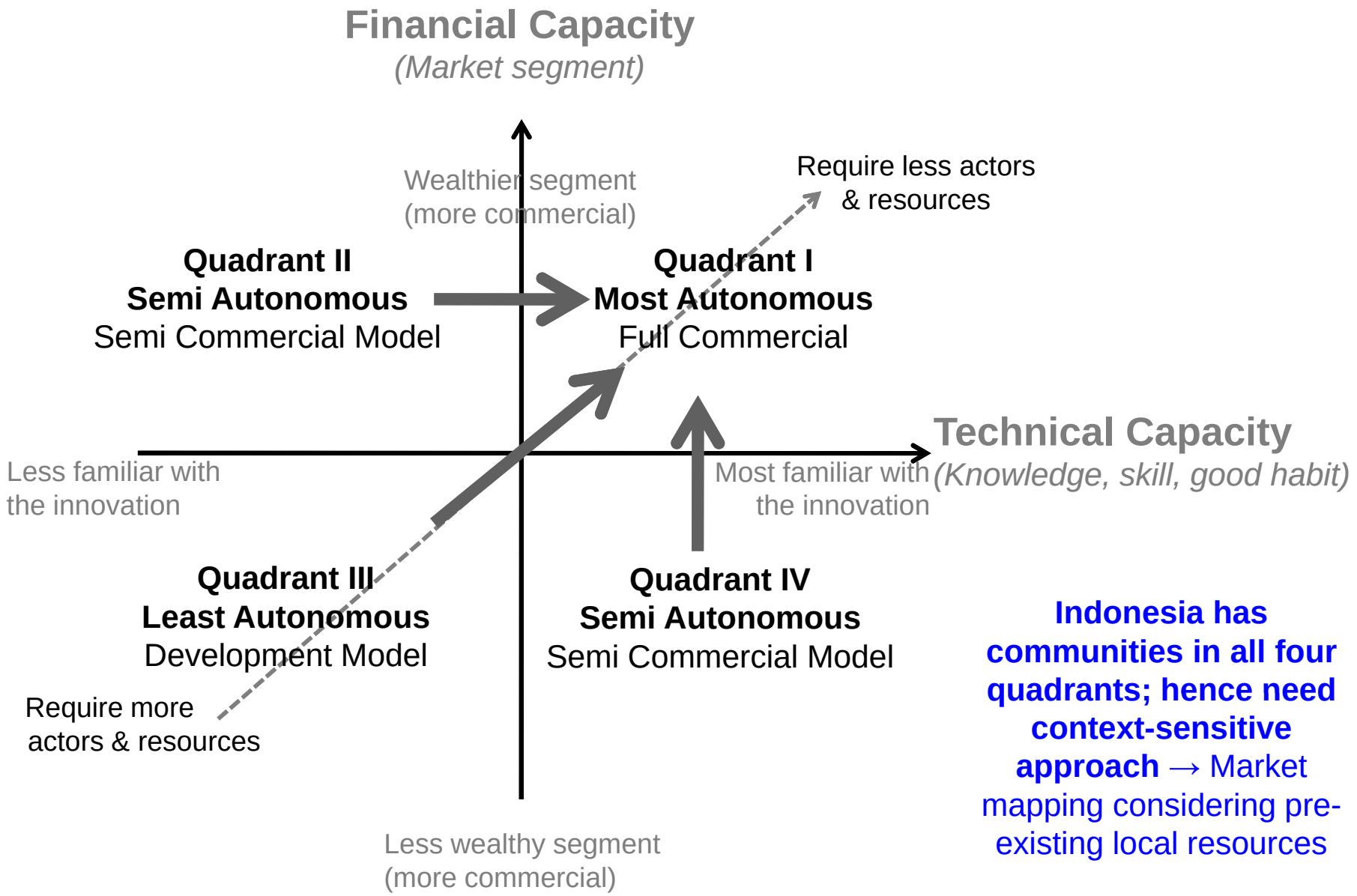
Bridging Affordability – Profitability Gap; Example Off-grid PV



Generalization: Need relevant delivery approach for different market segment, market mapping required:

- **Commercial:** Market facilitation to bridge the Affordability - Profitability gap
- **Less-commercial:** Community empowerment; Empower users to be able to become part of the merchant society; Active adopters rather than passive recipients of innovation

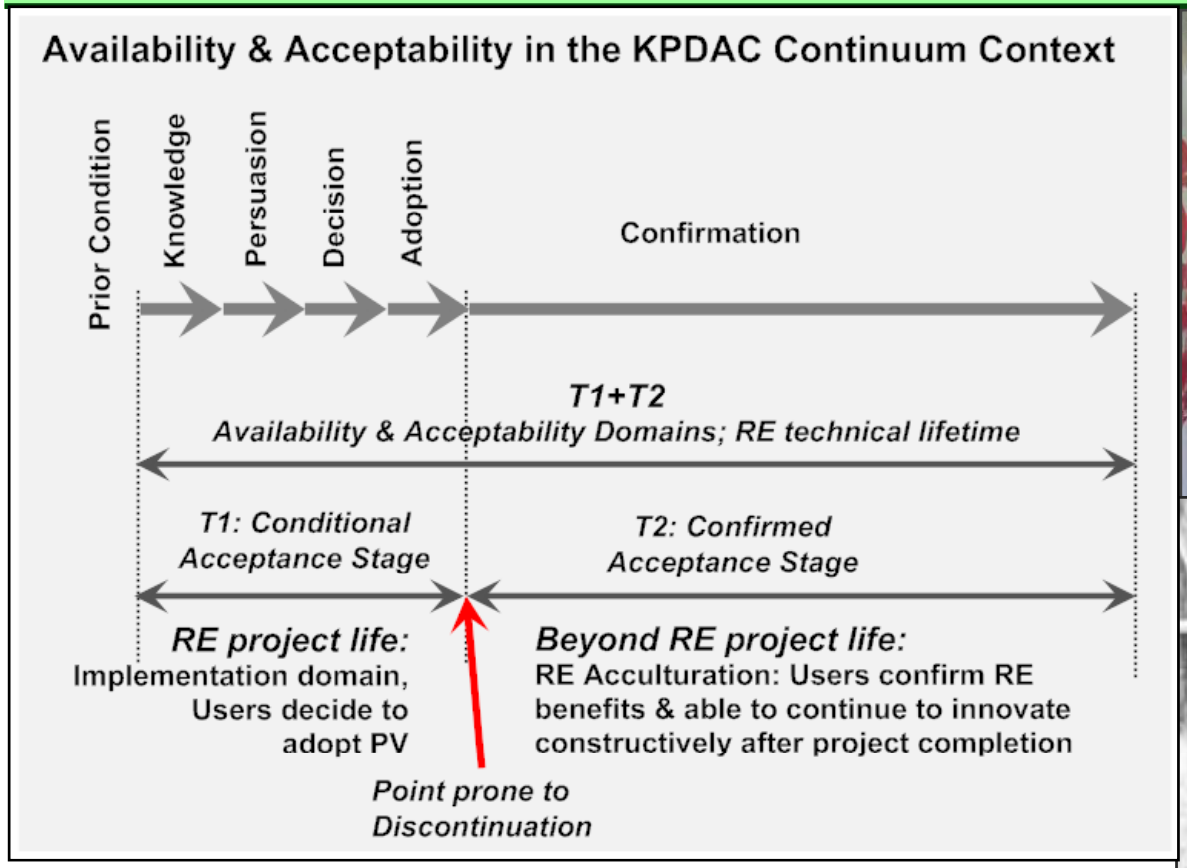
Community Empowerment & Autonomy Building



Indonesia has communities in all four quadrants; hence need context-sensitive approach → Market mapping considering pre-existing local resources

Availability & Acceptability: During & Beyond RE Initial Project Life

Example Off-grid PV & Micro Hydro



T1 & T2 Availability: Confidence in technical quality & continuity of energy service delivery (technical standards, after sales service infrastructure)

T1 & T2 Accessibility: Conditional & Confirmed Acceptance → Acculturation of energy service technology into local community's life

Workshop Activities

- Participants break into a group of up to fifteen people from mixed-background (government, academics, business, NGOs, etc). Each group is tasked with the following:
  - Identify the renewable energy resources in NTT
  - For each of the relevant resources & technologies, identify the institutional, financial, technological, social & ecological barriers to achieving energy accessibility, availability & acceptability and ways to overcome them
  - Work through the "Methodology for Developing a Plan to Enhance the Sustainability of Renewable Energy Service Delivery in NTT in 21 Steps" [link]
- After completing these tasks, a group representative will present the outcomes to the plenary audience
- All of the group task outcomes will be compiled and presented as the recommendations of the seminar & workshop, and will be disseminated through the following website:

  http://www.ceem.unsw.edu.au/content/RenewableEnergyinIndonesia.cfm?ss=1

Dr. Maria Retnanestri

Dr. Maria Retnanestri completed her undergraduate degree in Electrical Engineering at STTNAS Jogjakarta, Indonesia in 1991. Maria was awarded her Master of Engineering Science (MEngSc) and PhD degrees at the School of Electrical Engineering & Telecommunications, the University of New South Wales (UNSW), Sydney, Australia, in October 1999 and November 2007 respectively.

In her PhD research, Maria Retnanestri developed the I3A (Implementation, Accessibility, Availability and Acceptability) Framework to investigate overall sustainability of renewable energy projects, considering their institutional, financial, technological, social and ecological sustainability dimensions.

Currently she is on leave from STTNAS Jogjakarta College as a Postdoctoral Research Associate at UNSW funded by an Australian Development Research Award (ADRA) 2007 to identify ways to overcome barriers to renewable energy for sustainable development in developing countries.

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Research Project: http://www.ceem.unsw.edu.au/content/RenewableEnergyinIndonesia.cfm?ss=1