The I3A framework:

A *diagnostic tool* to assess energy service / arrangement sustainability and a *design tool* to design a sustainable energy service arrangement

For detailed discussion on conceptual background, see:

Retnanestri, M., 2007, The I3A Framework – Enhancing the Sustainability of Off-grid Photovoltaic Energy Service Delivery in Indonesia, PhD Thesis, Submitted to UNSW, http://primoa.library.unsw.edu.au/primo_library/libweb/tiles/lrs/unsworks/datastream.jsp?pid=UNSWorks1598

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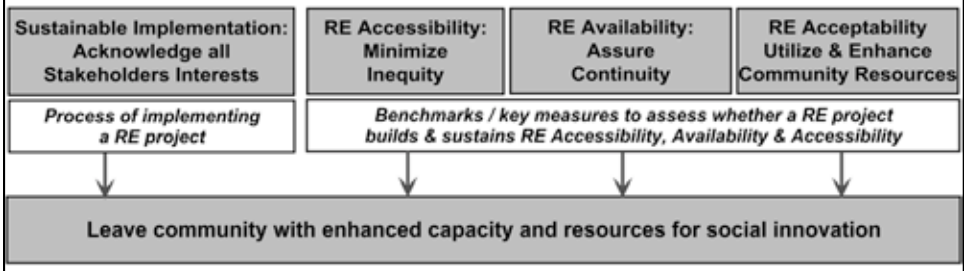
School of PV & Renewable Energy Engineering, UNSW Sydney 27 August 2012

What is I3A?

An **Implementation** that maintains RE service **Accessibility** (financing, skill, network, resources), **Availability** (reliability & security of supply) & **Acceptability** (social & ecological) considering the hardware, software & orgware aspects of RE service delivery during & beyond initial project life

A framework that is used as a **diagnostic tool** to assess energy service/arrangement sustainability or a **design tool** to design a sustainable energy service arrangement (scope: can be for country level or technology specific level)

What are the I3A objectives?



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The 21 steps of the I3A model to assess energy arrangement sustainability

I3A Energy Sustainability
Implementation that maintains energy Accessibility, Availability & Acceptability in short & long runs

Implementation Orgware & Enabling Factors	**Accessibility** Access to Financing & Resources	**Availability** Service Reliability & Resource Security	**Acceptability** Social & Ecological Improvement
1. Orgware: Stakeholders, objectives, interrelationships 2. Enabling factors: Policy, strategy, administration, coordination, governance 3. External factors: Other programs, socioeconomic, political, global situations	4. Affordability-Profitability (A-P) levels 5. Financial intervention to bridge the A-P gap 6. Access to energy financing, market, network 7. Access to energy education 8. Access to energy resources	9. Primary resource availability 10. Technical quality: Standards, safety, warranty 11. Energy system integration 12. Domestic manufacturing 13. After-sales infrastructure 14. Local capable agent 15. User education	16. Utilization of local resources (institutions, economy, norms) 17. Attributes vs User needs 18. Socioeconomic outcomes 19. Suitability to environment 20. Energy waste handling 21. Contribution to climate change mitigation effort

➔ I3A covers the Institutional, Financial, Technological, Social and Ecological aspects of RE service delivery

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Enhancing the sustainability of RE service delivery in 21 steps using I3A

Implementation *Orgware & Enabling Factors*	1. Orgware: RE stakeholders, objectives, roles, interrelationships 2. Enabling factors: Policy, regulations, administration, governance 3. External factors: Other programs, socio-economic/political situations
Accessibility *Access to Financing & Resources*	4. Affordability – Profitability (A-P) levels 5. Financial intervention to bridge the Affordability – Profitability gap 6. Access to RE financing, market, network 7. Access to RE education and training for non RE specialist 8. Access to RE resources
Availability *Service Reliability & Resource Security*	9. RE primary resources availability 10. RE technical quality: Standards, Safety & Warranties for components, system, installation, appliances 11. RE system integration 12. Domestic manufacturing 13. After-sales service infrastructure 14. Local capable agent 15. User education
Acceptability *Social & Ecological Sustainability*	16. Utilization of local resources: Norms, institution, economy, local innovation 17. RE attributes & Users requirements: Advantage, complexity, compatibility, reinvention, etc 18. Socioeconomic outcomes: Millennium Development Goals (MDG), socioeconomic improvement 19. RE suitability to local physical environment 20. RE waste handling 21. RE contribution to climate change mitigation effort

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Implementation: Process of implementing a RE project

Orgware & Enabling Factors	1. Orgware: RE stakeholders, objectives, roles, interrelationships 2. Enabling factors: Policy, regulations, administration, governance 3. External factors: Other programs, socio-economic/political situations

The RE Project Orgware

Provider interests/goals:
Governance responsibility, business goals, social goals, credibility, emission reduction target, public image

User interests/goals:
Energy service/energy benefits, resolve problems related to their energy needs

Common interests/goals:
Sustainable RE Service

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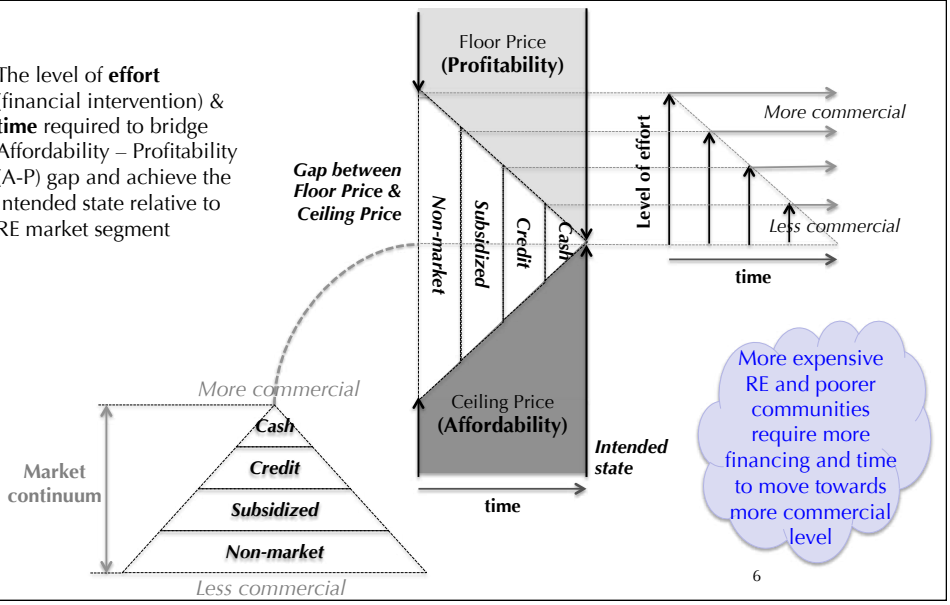
Accessibility – Financial Aspect

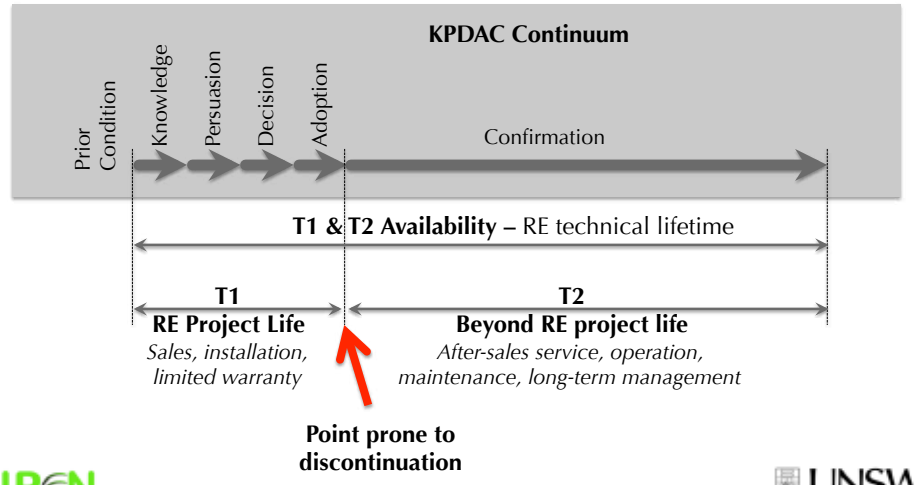
Accessibility *Access to Financing & Resources*	4. Affordability – Profitability (A-P) levels; 5. Financial intervention to bridge the Affordability – Profitability gap; 6. Access to RE financing, market, network; 7. Access to RE education and training for non RE specialist; 8. Access to RE resources

The level of **effort** (financial intervention) & **time** required to bridge Affordability – Profitability (A-P) gap and achieve the intended state relative to RE market segment



Availability: Assure continuity

Service Reliability & Resource Security	9. RE primary resources availability; 10. RE technical quality: Standards, safety, warranties for components, system, installation, appliances; 11. RE system integration; 12. Domestic manufacturing; 13. After-sales service infrastructure; 14. Local capable agent; 15. User education



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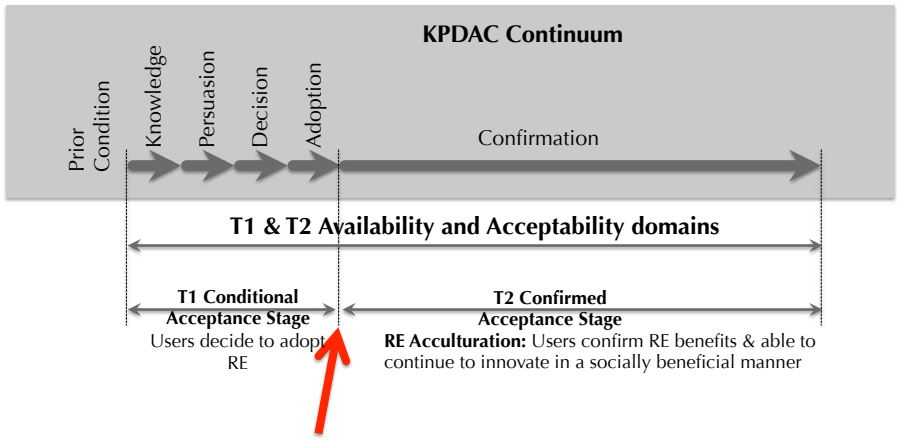
Acceptability: Utilize & enhance community resources

Social & Ecological Sustainability	16. Utilization of local resources: Norms, institution, economy, local innovation; 17. RE attributes & Users requirements: Advantage, complexity, compatibility, reinvention; 18. Socioeconomic outcomes: Millennium Development Goals (MDG), socioeconomic improvement; 19. RE suitability to local physical environment; 20. RE waste handling; 21. RE contribution to climate change mitigation effort



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Example of the use of I3A:

The I3A workshop in Kupang, NTT Province, Eastern Indonesia, 8/6/2010

- Assessment of RE progress and challenges in NTT Province
- Group of mix of different stakeholders discuss, analyze & report the discussion outcomes
- ABCG stakeholders: Academics, Business, Community and Government
- Demonstrated the use of I3A as a systematic diagnostic tool to identify RE potential and barriers
- Actively engaging diverse stakeholders, I3A can facilitate formation of consensus in identifying issues & formulating recommendations
- I3A qualitative outcomes can be complemented with quantitative enquiries

Group discussion followed up with report of discussion outcomes

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Outcomes of the NTT's I3A Workshop – Brief Summary

Implementation: Orgware & enabling factors

1. RE stakeholders: *Form **Forum Energi Daerah** & define roles, coordination & interrelationships among RE stakeholders (ABCG Academics, Business, Community and, Government in NTT)*
2. Enabling factors: *Relevant policy & strategies for mainstreaming RE in NTT, **accessible information** for all*
3. External factors: 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*

Accessibility: Access to Financing & Resources

4. Affordability – Profitability level: *Poverty level in NTT is high (24% in 2010), the A-P gap is significantly high*
5. Financial intervention: *Financing from state or regional budget, community fund, incentives for RE developers*
6. Access to RE financing, market, network: *Collaborate with NGO, donor institutions*
7. Access to RE education: ***Community training centre**, provision of RE training equipments, **field laboratory**, technology* transfer
8. Access to energy resource: *Land dispute may impede RE development*

Availability: Service Reliability & Resource Security

9. Primary resource availability: *Solar resource available across NTT, wind and hydro in certain areas; resource mapping required*
10. RE Standards, Safety, Warranties: *Use of appliances complying to accepted standards; Training on Standardisation & Certification*
11. RE system integration: *Experts & training are needed*
12. Domestic manufacturing: *Maximize local content, transfer of manufacturing capacities to NTT, use of local wisdom/innovation*
13. After-sales service infrastructure: ***Empower community & cooperatives** to sell spare parts & provide after sales service*
14. Local capable agent: *Design curriculum for **RE education** from **primary school** to **university** level**, workshop** at **kabupaten** level*
15. User education*: Trained community group (through TOT) to train RE users; **life skill training** eg. RE for agriculture*

Acceptability: Social & Ecological Sustainability

16. Utilization of local resources: *Need understanding on the natural and institutional resources capacities for appropriate project design*
17. RE attributes & Users requirements*: RE equipments made more affordable, **RE beyond lighting**, more user friendly*
18. Socioeconomic outcomes: *RE to create jobs & welfare in NTT, **RE** for **agricultural development** important for NTT*
19. RE suitability to local physical environment: *Need understanding on the impacts of the environmental conditions to RE equipment*
20. RE waste handling: *Need understanding on the impacts of RE waste to the environment, AMDAL assessment needed*
21. RE & GHG mitigation effort: ()

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