



Centre for Energy and
Environmental Markets

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SYDNEY • AUSTRALIA



Enhancing the Sustainability of Off-grid PV Energy Service Delivery in Indonesia

Solar PV Roundtable Meeting, Jakarta, 15/11/2007

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Solar PV energy systems (PVES): an example of technology (www.iiasa.ac.at)

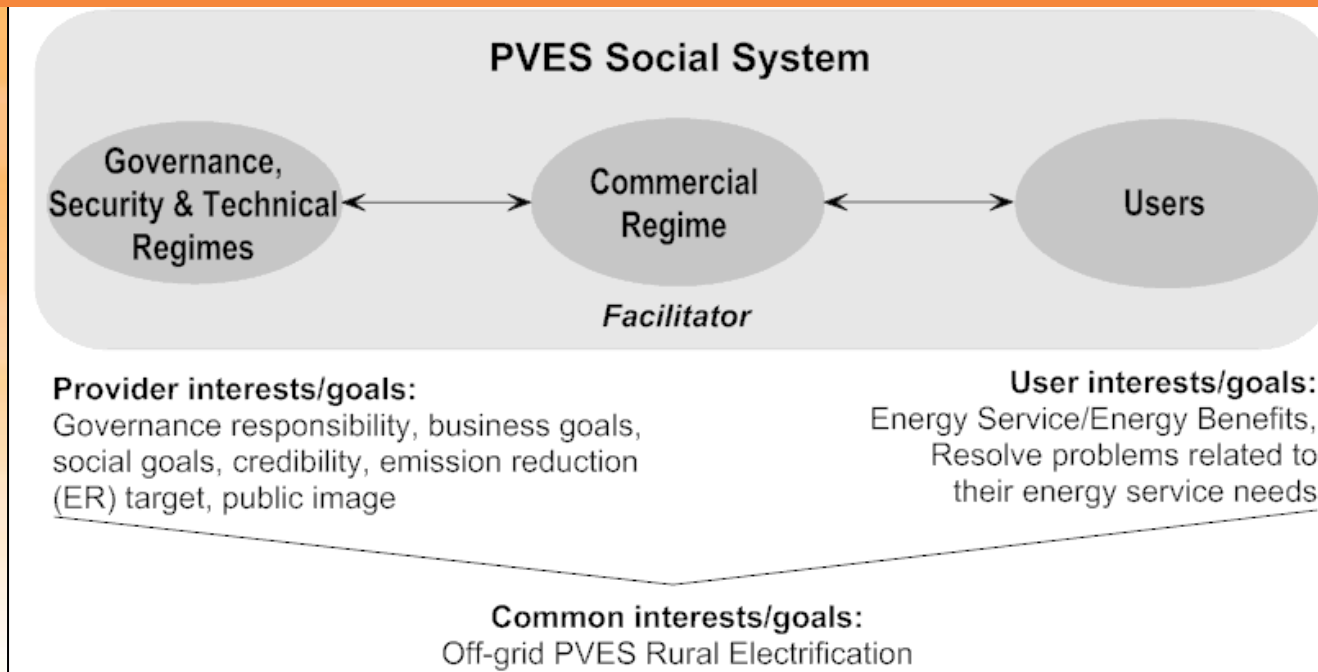
- Technology: *the art of knowing and doing*
- Dimensions of technology:
 - Hardware: *manufactured objects capable of producing a desired purpose*
 - Software: *the knowledge required to design, manufacture & use the hardware*
 - Orgware: *the societal & institutional context in which the hardware & software are organised & implemented*
- Rural PVES technology can use simple hardware & software but can't avoid complex orgware



Decision-making framework for rural PVES

Governance regime <i>(orgware)</i>	<ul style="list-style-type: none">■ Formal institutions, legislation & policies to create context for the other regimes below■ <i>Informal social context including politics</i>
Security regime <i>(orgware)</i>	<ul style="list-style-type: none">■ Responsible for overall integrity of rural energy supply, with authority to override commercial regime if necessary
Technical regime <i>(hardware)</i>	<ul style="list-style-type: none">■ Pre-determined technical standards to ensure that hardware is capable of delivering acceptable energy services
Commercial regime <i>(software & orgware)</i>	<ul style="list-style-type: none">■ Supplies, installs and maintains PVES according to commercial criteria

Decision-making framework for rural PVES

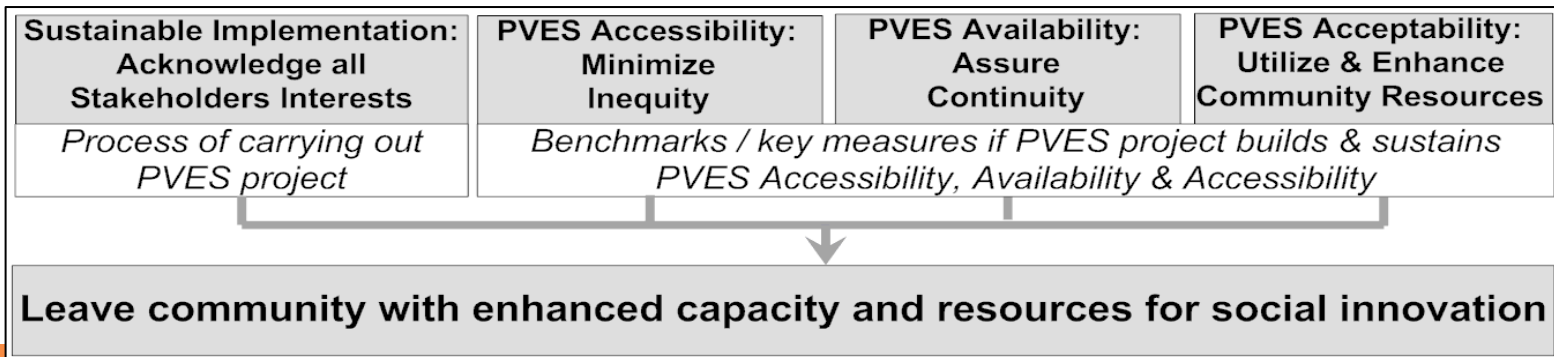
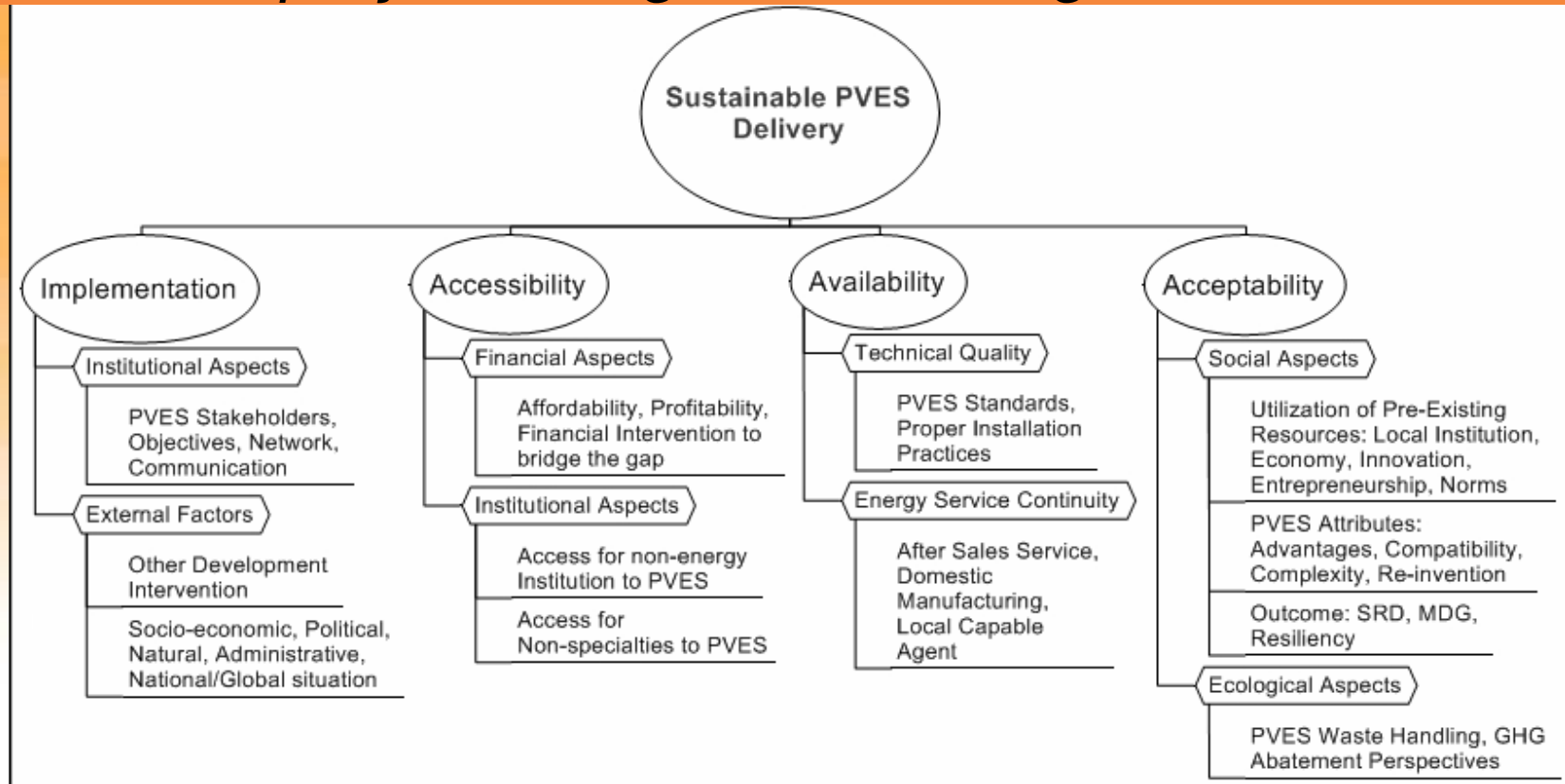




Key issues requiring careful management

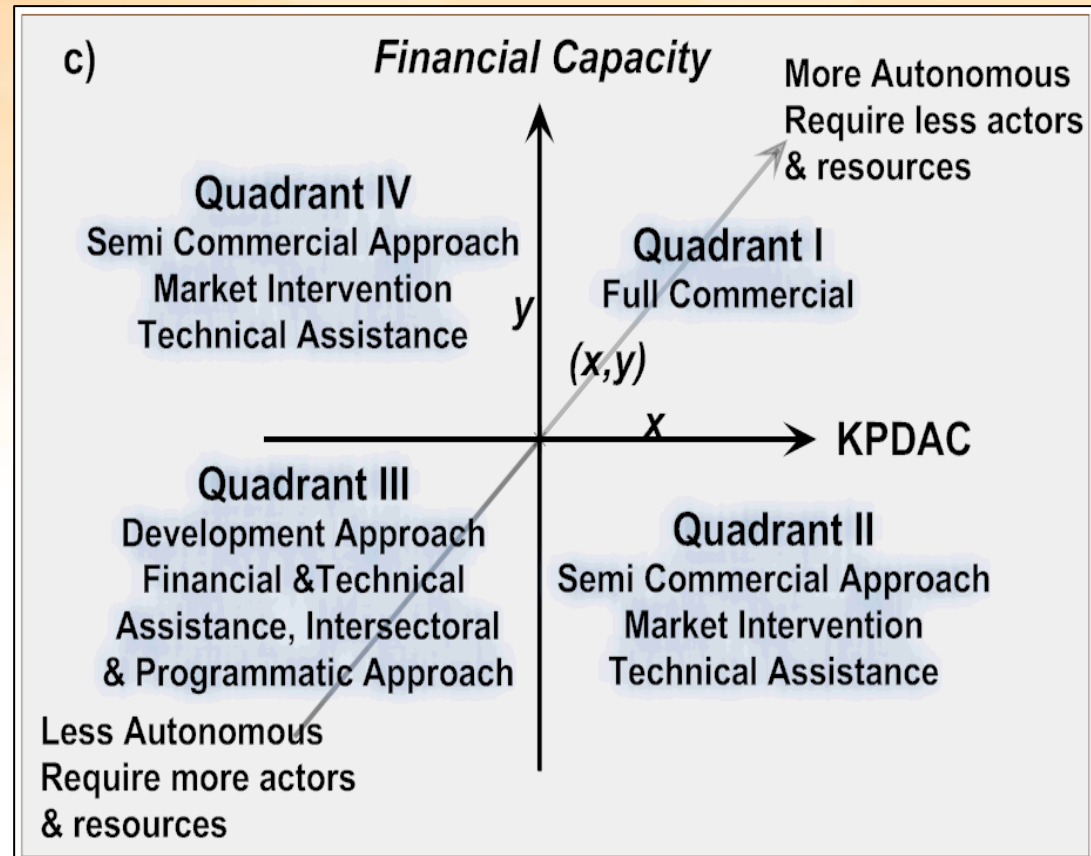
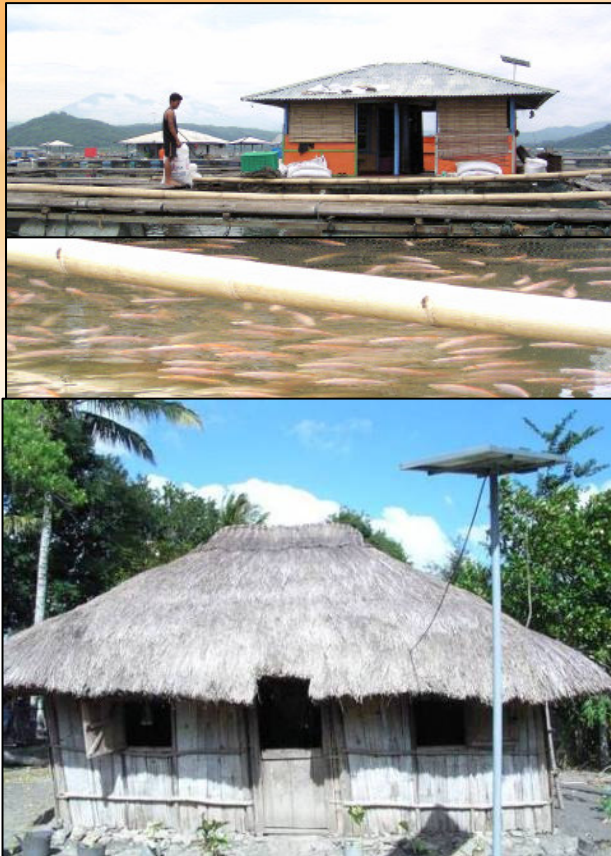
- Careful allocation of roles & interfaces:
 - Governance, security, technical, commercial
- Project planning & implementation timeframes:
 - Compliance with technical standards
 - Degree of autonomy of target communities:
 - Facilitating effective community participation
 - Rural communities have multiple objectives, eg:
 - Water for irrigation; biofuels as well as food
- Following project completion (failure prevention):
 - Monitoring, evaluation & intervention if necessary by security regime

The I3A Framework: A systematic approach to PVES project design, monitoring & evaluation

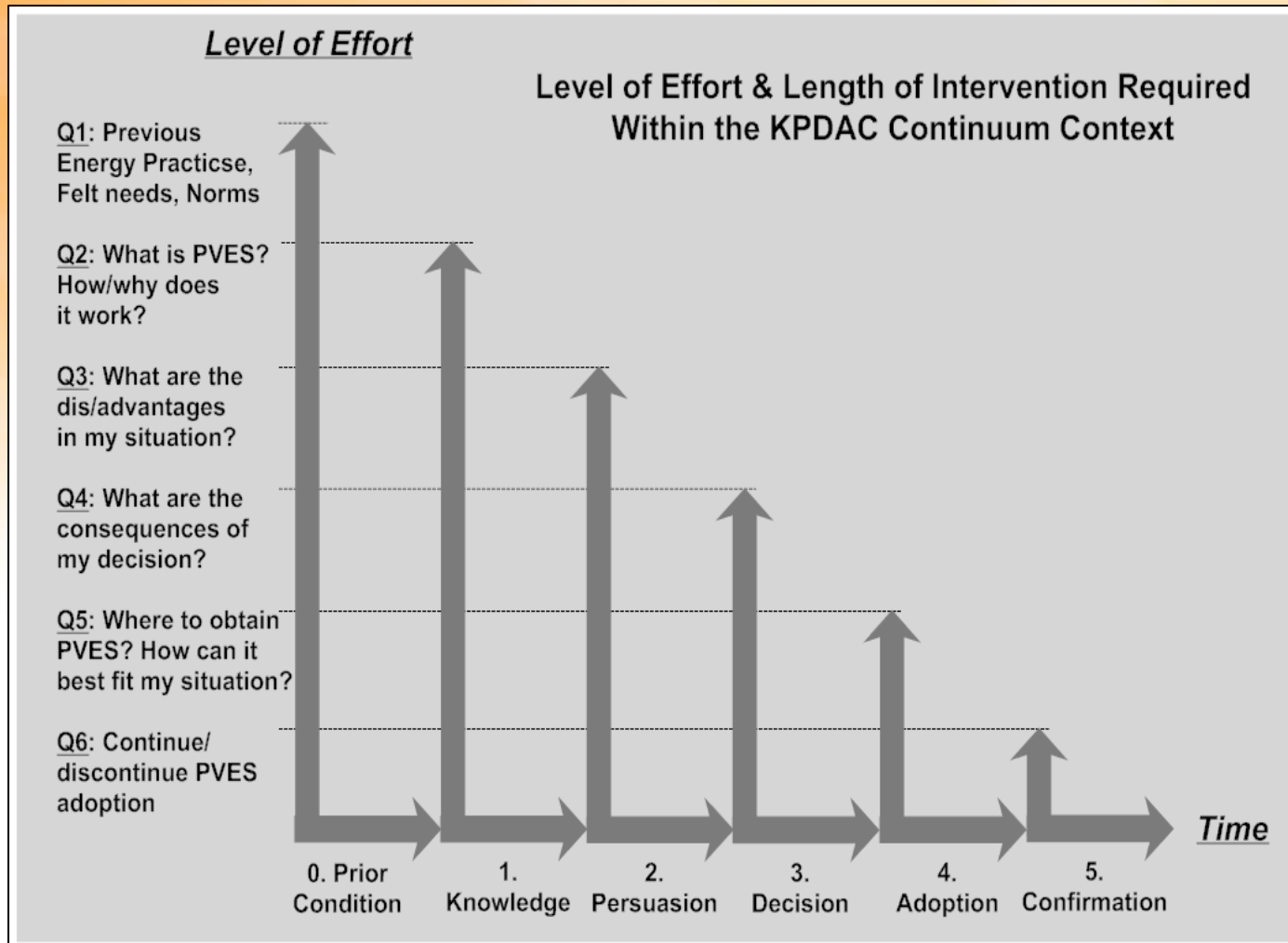




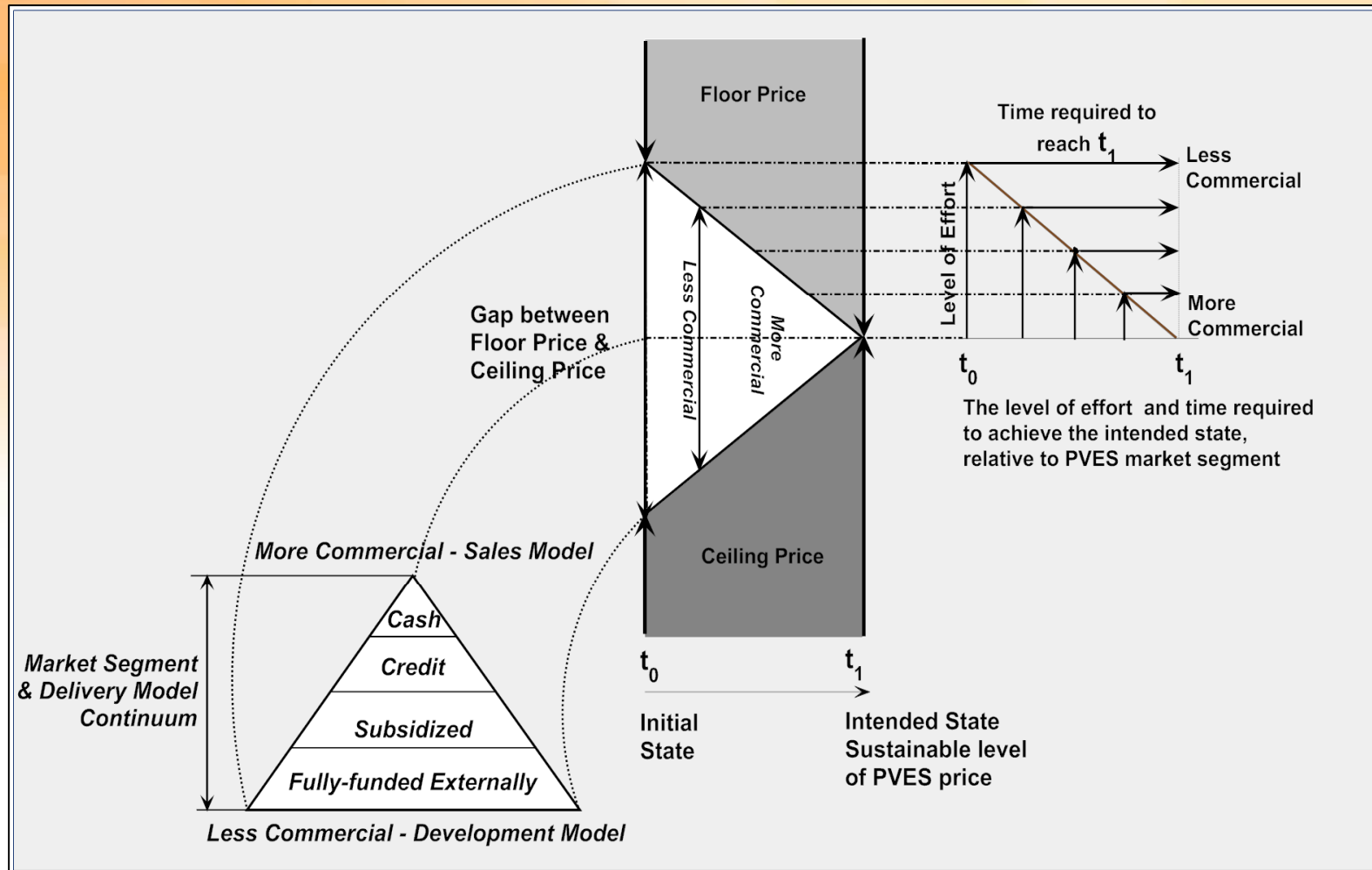
Degree of Autonomy of Target Communities



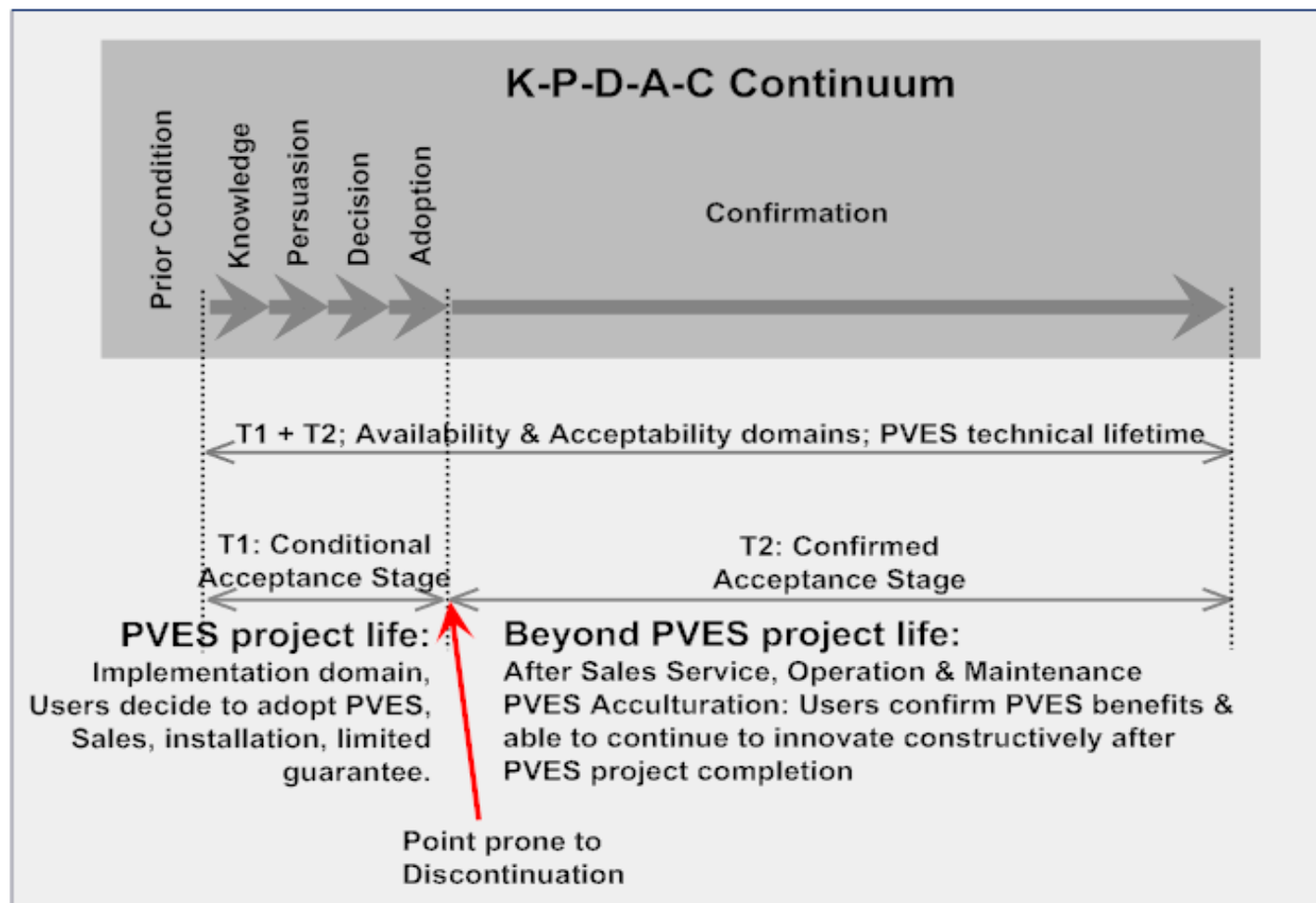
Technological Capability & Level of Effort



Financial Capability & Level of Effort

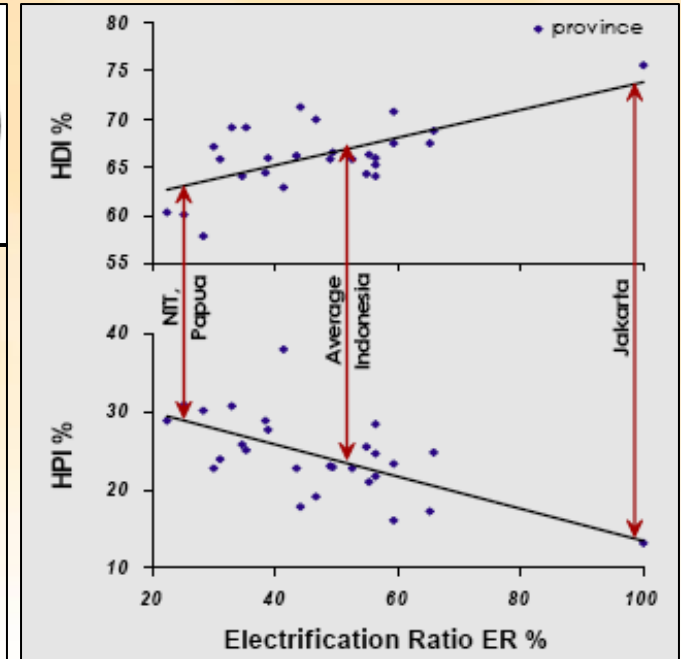
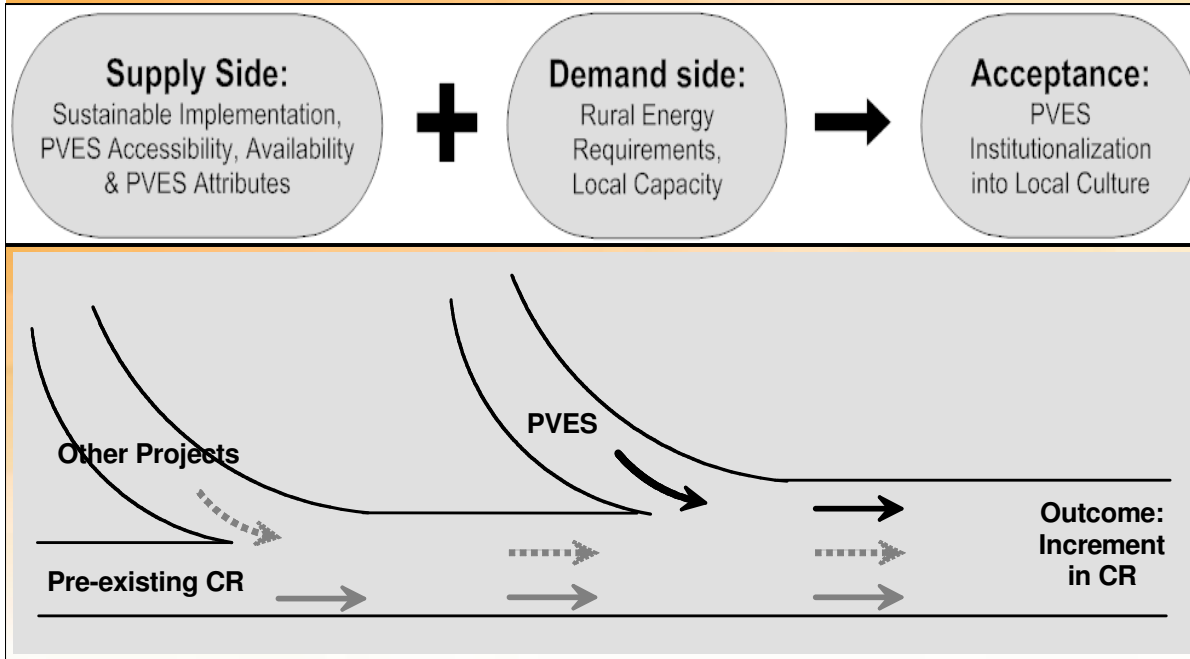


PVES Project Timeframe





Acceptability



Enhancing the sustainability of off-grid PV energy service delivery in Indonesia



The Council of Australian Governments: *Governance in the context of a federation*

- COAG's role:
 - To initiate, develop & monitor policies that are of national significance & that require cooperative action by Australian governments
- COAG members:
 - Prime Minister of Australia
 - Premiers of NSW, Victoria, Queensland, South Australia, Western Australia, Tasmania
 - Chief Ministers of the ACT & Northern Territory
 - President, Local Government Association
- COAG secretariat & committee of senior officials

Bushlight Project (Centre for Appropriate Technology)

(www.bushlight.org.au)



A hand-drawn energy budget chart on a whiteboard, detailing power consumption for various household and agricultural activities. The chart is organized into several sections:

Activity	Power Consumption
WASHING CLOTHES	2 hours (OR) 10 hours (DEPENDS ON BATTERIES)
ENTERTAINMENT	2 hours, 10 hours, 3 hours, 3 hours
COOKING	gas burner, 30 minutes per day
HAIR CLIPPERS	20 minutes per day
HEATING	30 minutes per day
NEBULISER	30 minutes per day
CHRISTMAS LIGHTS	4 hours per day
KEY BOARD	1 hour per day
SEWING MACHINE	20 minutes per day
POWER TOOLS	Various tools and equipment
COOLING HOUSE	Bedroom 1: 8 hours, Bedroom 2: 8 hours, Bedroom 3: 8 hours, Paddock Fan: 4 hours
FOOD COOL	Refrigerator, Freezer, etc.
LIGHTS	Bedroom: 3 x 1 hour, Verandah: 1 x 2 hour, 1 x 2 hour, Kitchen: 1 x 1 hour, 1 x 2 hour, Memento: 2 x 6 hour, Paddock bathroom: 2 x 20 minutes



Indigenous communities in Australia

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.



Bushlight Project Objectives (www.bushlight.org.au)

- Objectives for remote indigenous communities:
 - Improve reliability of renewable energy systems
 - Improve community capacity & confidence in using them
 - Establish technical network to service & maintain systems
- Objectives for products & services:
 - Rugged, pre-tested hardware
 - Techno-economic feasibility studies
 - Collaborative project planning & system design involving host communities
 - Culturally appropriate educational resources for host communities



Bushlight project organisation: *Governance & security regimes*

- Managed by Centre for Appropriate Technology:
 - CAT located in Alice Springs, Northern Territory:
 - Near to host communities not government departments
- Funding provided by Australian Government:
 - Department of Family & Community Services:
 - \$0.4M over 5 years
 - Australian Greenhouse Office
 - \$8M over 5 years
- CAT runs Bushlight on a quasi-commercial basis:
 - As a separate business unit accountable to stakeholders



Bushlight stakeholders: *Interface between host communities, governance & commercial regimes*

- Australian government:
 - Department of Family & Community Services
 - Australian Greenhouse Office
- State Government Agencies (NT, Qld, WA)
- Indigenous Australians' Regional Councils
- Indigenous Australians' rural community councils & funding bodies
- Renewable energy industry participants:
 - Hardware & software providers (*commercial regime*)



Centre for Energy and
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Bushlight Evaluation Final Report, 2005

(www.bushlight.org.au)

*Note that Dept of Family
& Community Services is
the key Govt stakeholder*

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Recommended next steps for Indonesia

- Establish effective governance structure for rural PVES, involving:
 - Central, regional & local governments
- Establish committees to develop proposals for each decision-making regime:
 - Governance, Security, Technical, Commercial
- Evaluate past project performance & develop best-practice guidelines for future projects