

Renewable Energy at RUPP

Professor Kamerane Meak

Sriv Tharith

Phillip Hamer

Welcome



- Thank you for attending
- We are establishing the first courses in renewable energy in Cambodia
- We aim to educate graduates who will drive the field in years to come





Renewable Energy for Cambodia

- Great Resources, in particular Solar, Biomass and Hydro power.
- Central Electricity Grid does not yet reach many remote communities. Less than 30% of the country Electrified. [1]
- Big Opportunities for Renewable Energy, very cost effective in many places



Barriers for RE in Cambodia



- Access to Technology
- New Industry
- Limited Capacity
- Lack of understanding in communities

Renewable Energy Undergraduate Course



- As part of the physics degree students will study three subjects in Renewable Energy
 - In year 2 Renewable Energy and Applications
 - Introduction to Renewable Energy Technologies
 - Potential Applications
 - In year 3 Renewable Energy Systems
 - Look at operation of Renewable Energy Technologies in the field
 - How Renewable Energy Systems Work



Undergraduate Course

- Year 4 Renewable Energy Design
 - Load and Resource Assessments
 - Design Principles for systems
 - Economic analysis



[2]

Practical Work as Part of Undergraduate Degree



- Setting up experiments and demonstrations to give students hands on experience of Renewable Energy
- Funding received from the world bank for laboratory and equipment purchases
- Potential for Internships with industry

Aims for Undergraduate Program



- Students to be employable in renewable energy industry
- Students to get hands on experience of renewable energy
- Students to return to their communities aware of renewable energy and possible benefits



Masters Research Projects

- Students to perform research projects as part of the requirements to obtain a masters of physics
- Opportunity for engagement with industry to conduct co-operative research

Partnerships



- Engineers without Borders Australia have sent 2 Volunteers so far to work as renewable course developers
- The University of New South Wales, Australia has provided source materials for course development



The Way forward for RUPP

- Develop Academic Links with other institutions
- Increased engagement with industry
- Research Projects in Renewable Energy as part of the Masters program
- 2015 Establish Institute of Renewable Energy at RUPP

Acknowledgements



UNSW
THE UNIVERSITY OF NEW SOUTH WALES



- This Program has been supported by the Australian Government through the Australian Renewable Energy Agency (ARENA). The Australian Government, through ARENA, is supporting Australian research and development in solar photovoltaic and solar thermal technologies to help solar power become cost competitive with other energy sources. The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

Introduction



- Mark Fogarty
 - Chairman of Renewable Energy and Energy Efficiency Partnerships (REEEP) for South East Asia and the Pacific
 - Lecturer in Renewable Energy at the University of New South Wales, Australia
 - Director ‘First Energy Asia’
 - Director CVC Sustainable Investments

Renewable Energy - Opportunities in Cambodia

Mark Fogarty UNSW – REEEP

1 March 2013



Background

- Acknowledge RUPP and EWBA
- Who – let me background –who I am ?
- ✓ RE – 20 Years , Public and Private, Funds Management
- ✓ REEEP
- ✓ UNSW
- ✓ Private Sector



This Presentation

- This presentation doesn't pretend to offer strong insight into the Cambodian Energy Economies – far more skill sets in the room who can share their experiences .
- This presentation does want to address what the opportunities and what will assist to facilitate them and they are strong –for proponents and investors
- They represent opportunities for the Government of Cambodia (GoC)
- Not going to focus on technology – ‘ *the hardware* ‘
- I am going to focus on ‘*the Orgware* ‘
- Conclude this presentation - the issue of support for the ‘*software*’ *needs* components. – so it's about RUPP and it's capacity building.

Theme



- 3 x Messages

- ✓ Cambodia has a lot of great opportunities on the clean energy front - opportunities which can contribute to growth - improve services
- ✓ Model maybe different it may be a decentralised model - where orgware issues are resolvable - should we question is it a good spend to push the grid expansion billions of dollars in investment .
- ✓ Increase skill sets created through education and on the job experience



Orgware 1

- Tis about ? Organisational issues which underpin successful energy deployment .
- Orgware is the economic policy and regulatory associated with development of clean energy initiatives.
- Orgware if you like is the glue that brings projects to fruition. Pivotal point for successful integration
- In most energy economies it is the national framework - that contributes to the economic/social /environmental success of the project.

Orgware 2



- Economics – it's broader macro contribution that comes with clean energy deployment .
GDP
- In a micro economic Cambodia case that is pretty stark – cost advantage – commercial and industrial opportunity in regional development sense.
- Social and environmental contribution
- It about market transformation

Market Transformation 1



- Market characteristics – energy security issues – access to energy issues – rural electrification – environmental issues – pollution
- Market participants – we have the demand – suppliers
- Available resource – solar/biomass/small hydro.
- Market transformation – usually driven from a top down approach – maybe Cambodia will be a good working model for the reverse.

Market Transformation 2



- Need a framework Energy Act – its going to take time to secure a national framework
- Logically we need a stable clean energy policy
- Policy that addresses security of supply
- Policy that acknowledges and addresses the key social advantage
- Policy that acknowledges and addresses the key environmental challenges
- For Cambodia maybe the outcome could be the transformation away from traditional centralised power sources to a progressive de-centralised model

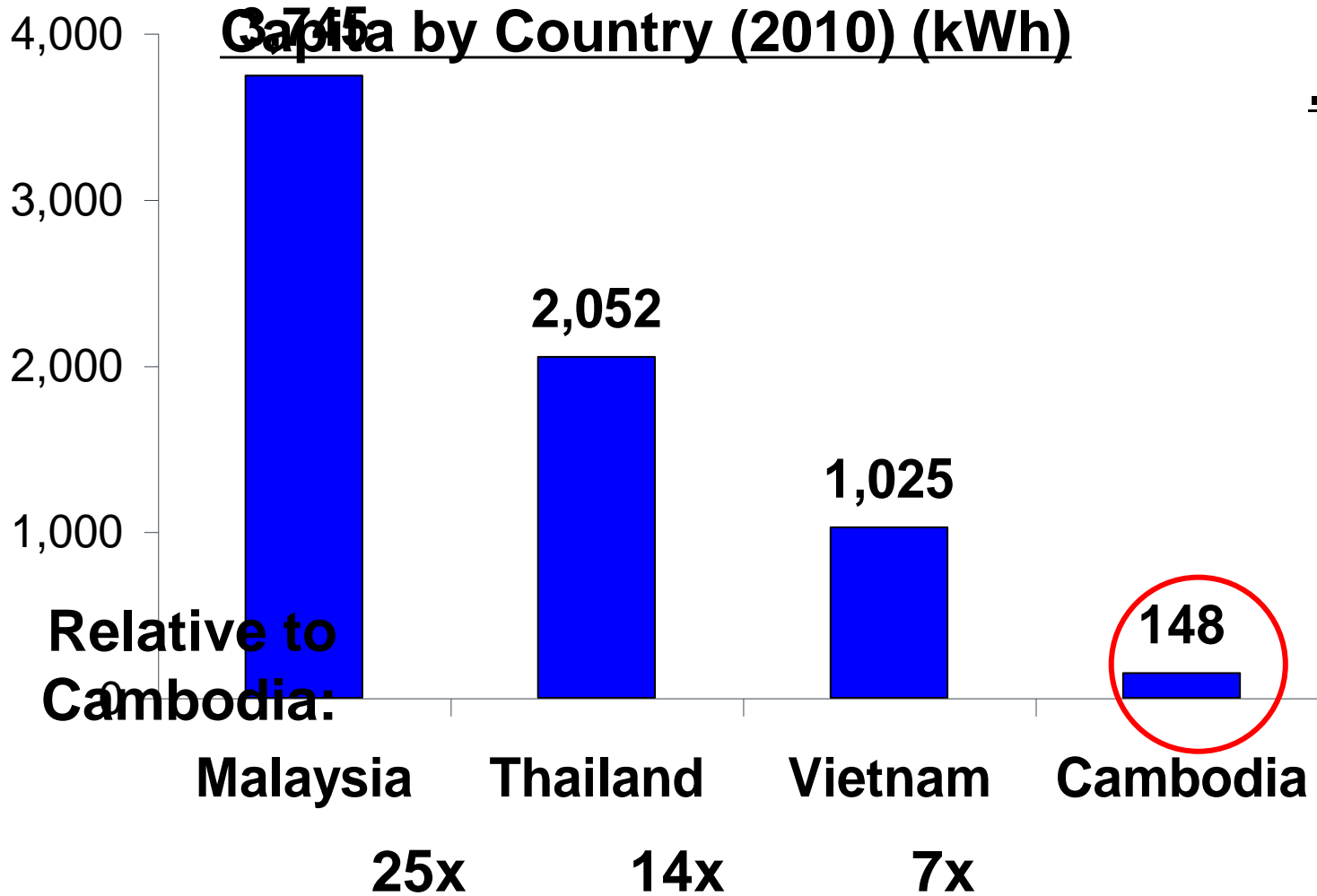


Role of the Private Sector

- De – centralised model needs the private sector - IPPs
- IPPs need some certainty –this can be achieved at a regional level
- Models are out there which can drive this market
- Price point is there - \$0.40c -\$0.85c US
- Missing is equity/cash to provide funding to create some scale
- Missing ‘Software’ – the skill sets to develop and run the systems
- Missing ‘Hardware’ –cost of kit – import duties are a ‘killer’

Low electricity usage, but set to accelerate

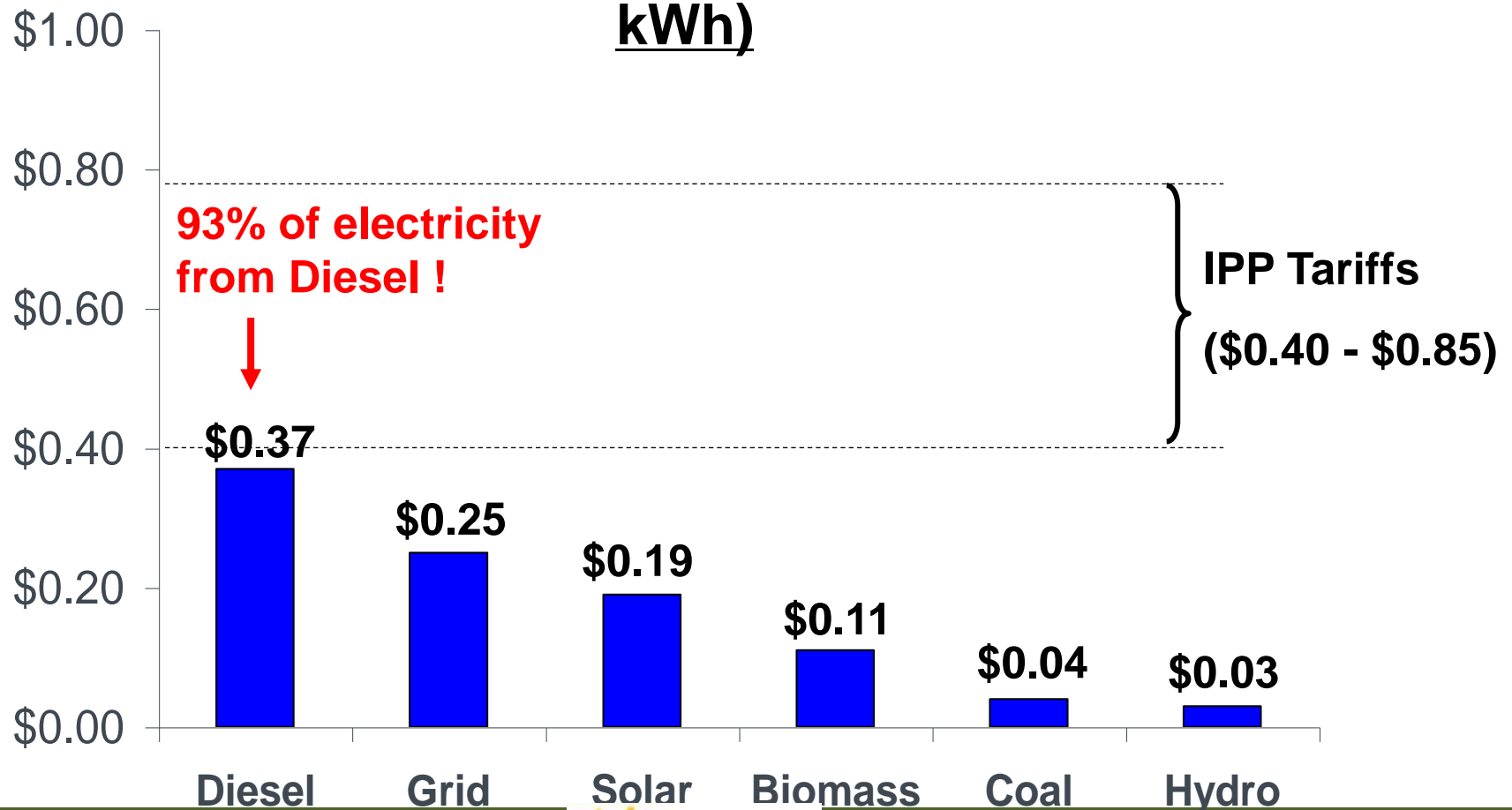
**Annual Electricity Consumption per
Capita by Country (2010) (kWh)**



Renewable energies are cheaper than incumbent diesel power



Cost of Production by Source of Energy (per kWh)



Conclusions



- Importance of Getting some balance Hardware/Software/Orgware
- ‘Orgware’ may take a little more time and may need to be driven from bottom up – rural electrification.
- ‘Hardware’ need to address the import duty issue with Government. Makes little sense.
- ‘Software’ critical RUPP/EWBA

Great consolidation opportunity in fragmented private sector



ELECTRICITY AUTHORITY OF CAMBODIA

- Exclusive license in a territory
- Generation + Distribution License
- Regulator

Electricite du Cambodge (EDC)

- 6 largest cities
- Transmission lines from Thailand and Vietnam
- 48% of Power

290 IPPs

- 290 territories
- 52% of Power