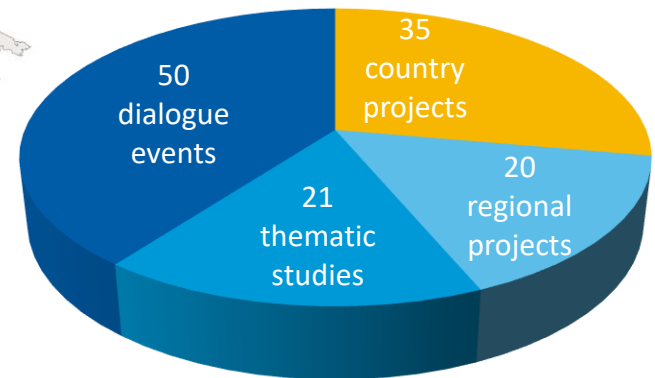
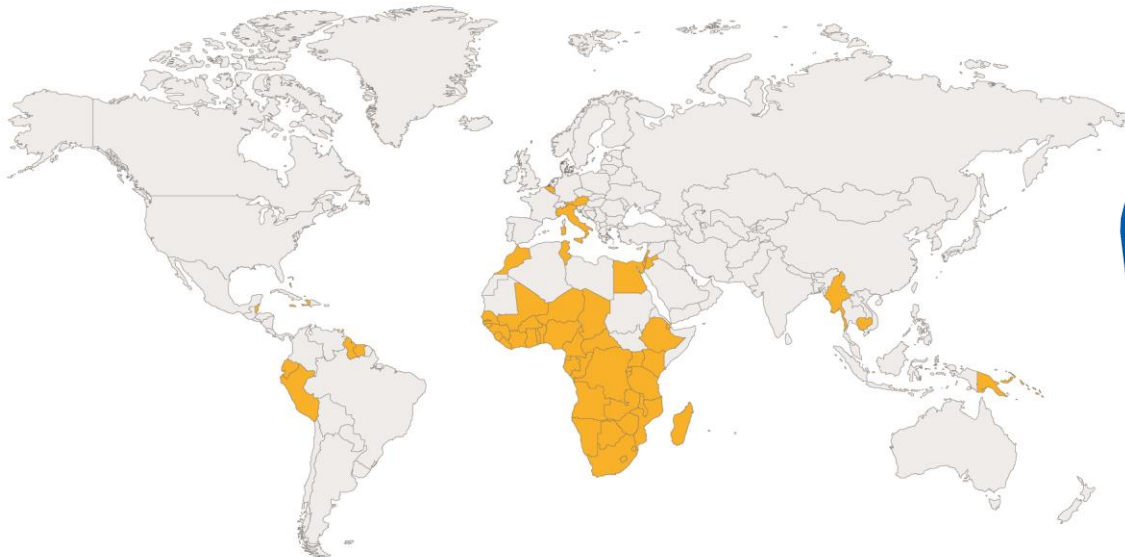


# Systematic Analysis of National Electrification Approaches

EUEI PDF, EnDev in collaboration with Practical Action

## EUEI PDF at a glance:

- ▶ Created in 2004 as a **flexible, demand-driven multi-EU donor facility**
- ▶ **More than 120 activities in 26 countries across three continents**
- ▶ **Mandate:** Technical assistance for energy policy and strategy development, capacity building and institutional strengthening to improve the environment for sustainable energy



## Energy Policy and Strategy Advisory Services

### Policy, Strategy & Regulation

- **Advisory services** for developing **energy policies, regulations, laws, strategies**, etc.

### Institution Building & Strengthening

- **Support** for establishment / strengthening of **energy specific institutions** (RE Center etc. )

### Capacity Building

- Development of **knowledge and skills** (trainings, workshops etc.)

### Knowledge Sharing

- **Thematic studies** and **dialogue events**

## Objective of *National Electrification Policy Options Tool*

- Improve electrification planning at the national level by providing a one-stop resource on all national electrification approaches and technologies presented in a systemized manner
  - Intended as a starting point for rural electrification planning
  - Bringing on and off-grid under the same framework
  - Demonstrate key dimensions of policy options

# **Rural electrification policy approaches and experiences - An Introduction to the National Approaches to Electrification Option Review Tool**

**Presented by Mary Willcox**

**at the Club-ER General Assembly, Lusaka, 4<sup>th</sup> Sept 2017**



# Structure of this Training Session

- Introduction to National Electrification Approaches
- Focus on Tariff Regulation
- Demonstration of how to use the Review Tool
- Breakout Session – Opportunity to Explore the Review Tool
- Discussion of Next Steps

# National Approaches to Electrification

## – Option Review Tool

- An easy-to-use electronic guide, available on-line
- Provides a comprehensive, systematic overview and information across the full range of Approaches to Electrification
- Allows different Approaches to be compared and contrasted
- Illustrates Approaches with case studies from around the world
- Provides links to further information and guidance

# Why is a new Option Review Tool needed?

- Over a billion people still lack access to electricity
- Without more effective approaches Universal Access by 2030 will not be achieved
- No comprehensive overview of Approaches available
- Existing guidance focusses on individual technologies delivery models or policy approaches and doesn't provide an overall framework



# What is a National Approach to Electrification (NEA)?

**“Approach adopted by national authorities to increase electricity access”**

- May:
  - Cover the whole country or a just part of it;
  - Address one or several technologies and delivery models;
  - Be active/explicit or passive/implicit;
  - Form an over-arching, comprehensive programme, or consist of individual policies or interventions
- Must be driven by government policy - An initiative by a business or NGO will not qualify
- May be several NEA within a country at any time
- Approaches are likely to change over time, resulting in a series of NEA

# Why is a Categorization Framework needed?

- To understand the range of options
- To compare approaches on a systematic, country-neutral basis,

Up to now, NEA have most frequently been categorized by :

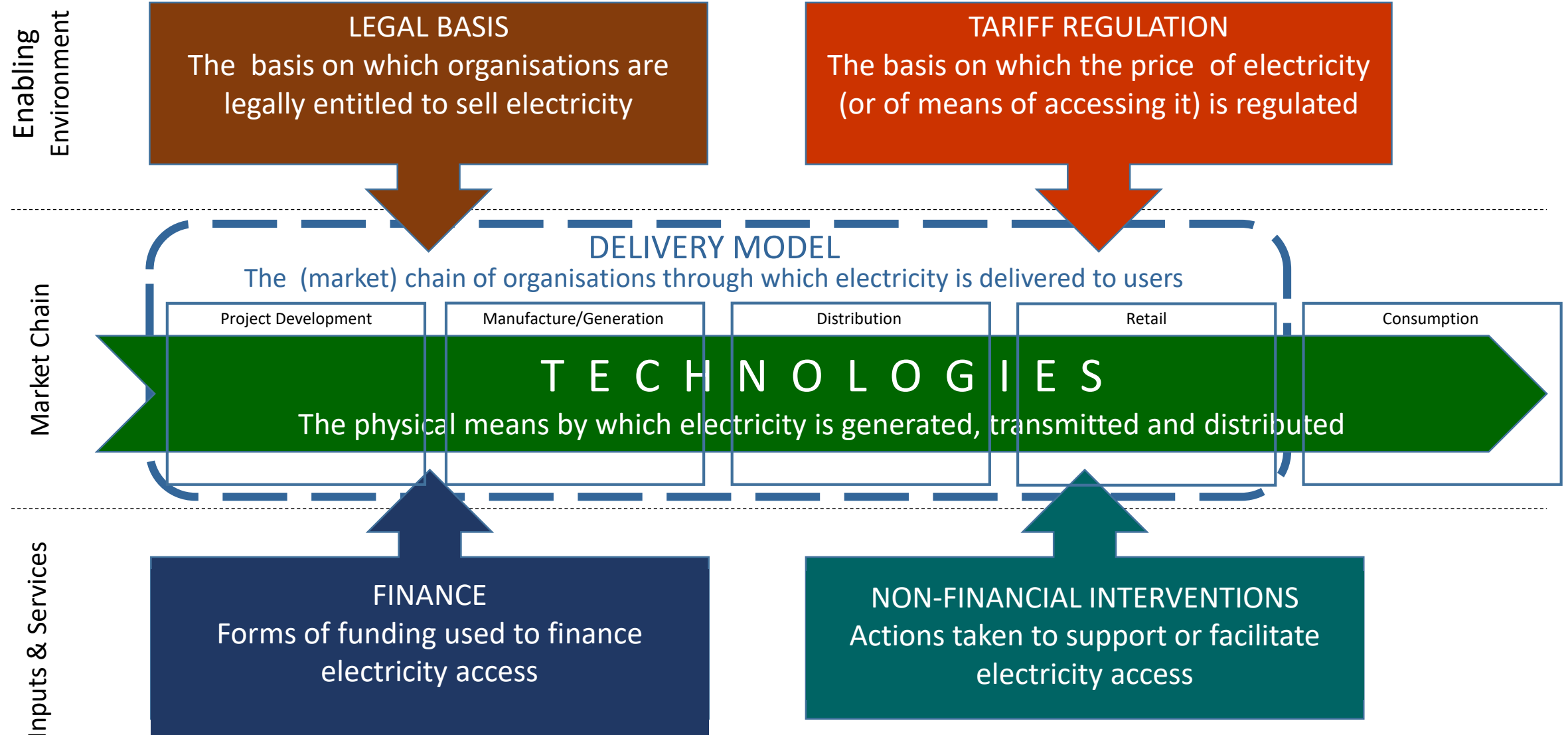
- Technology or form of electrification eg grid, mini-grid or standalone
- Delivery model – generally government vs market or centralized vs decentralized
- Form of policy or intervention

These categorization frameworks:

- Address only a single aspect of the NEA
- Those based on policies/interventions are inconsistent and generally cover only one form of electrification (eg mini-grids, or pico-solar).

**A new categorization system which encompasses all forms and aspects of NEA is needed.**

# Any NEA is made up of several elements:



# Proposed Categorization Framework:

Technology	Delivery Model	Legal Basis	Tariff Regulation	Finance	Non-Financial Interventions
Grid Extension	Public	Concession	Uniform	Private	Direct Energy Access Provision
Grid-connected mini-grid/ Distribution system	Private (non-Government)	License	Individual	User	Institutional Restructuring
Isolated mini-grid				Grants/Subsidies	Regulatory Reform
				Cross-Subsidies	Policy & Target Setting
					Quality/Technical Standards
					Technical Assistance
					Capacity Building/ Awareness Raising
					Market Information
					Demand Promotion
					Technology Development/Adoption
					National Energy Planning
Standalone systems	Public-Private Partnership	Unregulated		Tax Exemptions	
				Guarantees	

# Review Tool provides:

## Information on each Category including:

- A definition and discussion of the Category
- An outline of how it may interact with other Categories within an NEA
- A summary of its advantages and disadvantages
- Links to other information and guidance

## Case Studies of NEA in 15 Countries with a brief outline of:

- National context;
- Institutions involved, their roles and responsibilities ;
- Objectives;
- Legal basis;
- Interventions;
- Impacts achieved;
- Lessons Learned; and
- Effectiveness

(Case studies were chosen through a literature review and consultation with stakeholders to represent the widest possible range of Approaches across developing countries in Asia, Africa and Latin America.)

# Categorization Example - Bangladesh, IDCOL SHS

## Categories

Technology	Delivery Model	Legal	Tariff Regulation	Finance	Non-Financial Interventions
Grid Extension	Government/ Public Utility	Concession	Uniform Regulated Tariff	Private/Market	Direct Energy Access Provision
Grid-connected Minigrid/ distribution system				User Finance	Institutional Restructuring
				Grants/Subsidies	Regulatory Reform Policy & Target Setting
Isolated minigrid	Private Sector (non-Government)	License	Individual Regulated Tariff	Cross-Subsidies	Quality/Technical Standards
					Technical Assistance
				Tax Exemptions	Capacity Building/ Awareness Raising
					Market Information
Standalone systems	Public-Private Partnership	Unregulated			Demand Promotion
				Guarantees	Technology Development/ Adoption
					National Energy Planning

**Description** - IDCOL started its Solar Home System (SHS) program in January 2003 to supply off-grid rural people that are beyond the convenient reach of the PBSs (rural electricity cooperatives). IDCOL sets technical standards, certifies products and provides loans and grants (funded by multilateral agencies through the Government) to selected Programme Operators (POs), thereby reducing SHS costs and building local capacity. IDCOL also provides soft loans (through refinancing 70% of the full loan for the system), provides training and promotional support, and monitors the implementation undertaken by POs. The POs identify customers, install SHSs, extend micro-credit to households and provide after sales services. Each household receiving a SHS is obliged to maintain the system and to make loan repayments in monthly instalments over a period of 3-10 years, depending upon affordability.

# Focus on Tariff Regulation

# Tariff Regulation Categories:

<b>Uniform</b>	A (regulated) tariff (price) or set of tariffs <b>applied to all electricity providers of a given type.</b>	<ul style="list-style-type: none"> <li>- <b>May cover one, several, or all technologies</b> eg just solar home systems, or tie off-grid to grid prices (a grid-parity tariff), <b>across all providers</b></li> <li>- Could be based on an assessment of the average cost of provision, on existing grid prices, or on estimates of the avoided cost of grid extension</li> <li>- <b>Can encompass a set of tariffs for different classes of user or for different levels of provision</b>, as long as these are applied to all <u>providers</u> within the category</li> </ul>
<b>Individual</b>	A (regulated) tariff (price) or set of tariffs <b>applied to a single electricity provider</b>	<ul style="list-style-type: none"> <li>- <b>May cover one, several, or all technologies</b>, as long as these are <b>provided by a single entity</b></li> <li>- Can cover a single unit within the provider's operation (eg a single mini-grid) or the entirety of the provider's operation</li> <li>- <b>Usually based on the provider's average or incremental costs</b>, net of any subsidy (<b>cost-recovery tariffs</b>) or on estimates of the avoided cost of grid extension</li> <li>- <b>Can encompass a set of tariffs for different classes of user</b> (eg household, commercial and industrial) or for different levels of provision (eg size of SHS)</li> </ul>
<b>Unregulated</b>	A regime under which electricity may be sold <b>without any control of tariffs</b>	<ul style="list-style-type: none"> <li>- <b>May cover one, several, or all means of electricity provision</b> (eg mini-grids &lt;100kW)</li> <li>- May be <b>explicit</b> (ie set out in law or regulation), or <b>implicit</b> (in that there is no legal or regulatory requirement)</li> <li>- Can cover the <b>entire country or a specific area</b> (eg the area more than a certain distance from the national grid)</li> </ul>



# Interactions with other NEA Categories:

	Technologies
Uniform	<p><b>Grid systems usually have a uniform tariff structure</b>, relying on the cross-subsidies inherent in a single unitary system with a single owner to balance differences in cost of provision in different areas.</p> <p><b>Grid connected mini-grids and distribution systems</b> sell electricity to and buy it from the grid, as well as selling direct to users. <b>Import of electricity from and export to the grid will usually be on a uniform tariff basis.</b></p>
Individual	<p><b>Tariffs for sales from mini-grids to users are usually set individually for each mini-grid or distribution area</b> (or mini-grid company) to reflect their specific costs. <b>If uniform tariffs are imposed on mini-grids</b>, which are not owned by the national utility, subsidies or <b>cross-subsidies between providers will be needed</b> to balance differences in costs.</p>
Unregulated	<p><b>Tariffs for small mini-grids and standalone system prices are more likely to be unregulated</b>, unless their provision is significantly subsidized, on the grounds that they do not create an effective monopoly and so users do not require the protection provided by tariff regulation. <b>If prices are regulated, it's more likely to be on a uniform than an individual basis</b>, since standalone system businesses are not usually tied to a location and so differences in costs are likely to be linked to their business rather than factors outside their control, and the costs and bureaucracy of agreeing individual tariff levels for are unjustified.</p>

# Interactions with other NEA Categories:

	Delivery Models
Uniform	<p>A <b>uniform regulated tariff structure</b> is consistent with a <b>public delivery model</b>, with cross-subsidy between publically-owned entities and subsidy from wider public resources being relatively straightforward. <b>Combining uniform tariffs with a private delivery model is problematic</b>, since this model precludes public financial support, leaving cross-subsidies between providers as the only option for balancing differences in costs. The <b>need for subsidy to support a uniform tariff structure is thus likely to result in a public-private partnership</b> model rather than pure private sector delivery.</p>
Individual	<p>An individual regulated tariff structure may be used with a public delivery model where multiple public entities are involved in electricity provision. It is <b>in the context of a private or a public-private delivery model, particularly, that individual regulated tariffs are most likely to be needed</b>, since this offers the private sector element both clarity and the opportunity to recover costs.</p>
Unregulated	<p>Public delivery model based electrification may not be formally regulated but <b>even where there is not explicit regulatory framework, public electricity providers will often be controlled through the state organisational structure</b>. Private and public-private delivery models which use infra-structure based means of providing electricity (ie mini-grids) are generally subject to regulation in order to protect users under what is often effectively a monopoly even if no formal concession has been granted. <b>Only where the means of electricity provision are very dispersed, as with very small mini-grids or standalone systems, is it usually regarded as appropriate to leave private or public-private electricity providers unregulated.</b></p>

# Interactions with other NEA Categories:

	Legal Basis
Uniform	<b>Both uniform and individual tariffs may be established through either concessions or a licensing system.</b> In principle uniform tariffs may be set through general legislation without licensing electricity providers. (Enforcement will then rely on prosecution of any providers who exceed set tariffs.) <b>Without some form of licensing it is impractical to regulate individual tariffs.</b>
Individual	
Unregulated	

# Interactions with other NEA Categories:

	Finance
Uniform	<p>Regulated tariffs give private investors confidence while protecting users. Uniform tariffs can attract investment into easier to access areas and potentially enable providers businesses providing these to make high profits, but exclude those living in smaller communities in more remote areas. Private financiers may also see uniform tariffs as arbitrary, inflexible and non-cost reflective, thus presenting a risk to future revenues and so discourage investment. Individual tariffs are more attractive to private investment, particularly if calculated on a cost-recovery basis.</p>
Individual	<p>Any tariff regulation will directly affect user charges and so the need for users to be able to access finance, or pay-as-you-go arrangements, to cover any up-front element of these costs.</p> <p>Any tariff framework must factor in grants or subsidies received by the electricity business Regulation also serves to ensure proper use of public funding and so where grants and subsidies are made available, tariffs are more likely to be regulated. (Some more indirect forms of public financial support, such as import tax exemptions, may be viable in the absence of regulation).</p>
Unregulated	<p>Cross-subsidies are used to transfer income from providers who face lower costs to those with higher costs, and so are likely to be combined with uniform tariffs. Cross-subsidies between electricity providers are generally impracticable outside a regulatory framework.</p> <p>Where there is no monopoly and privately-financed providers are not looking for protection from other providers (eg grid extension), and there is no concern that later introduction of tariff regulation might threaten returns on investment, tariff regulation may be considered unnecessary.</p>

# Interactions with other NEA Categories:

	Non-Financial Interventions
Uniform	<b>Establishing any tariff regulatory regime will require regulatory reform and capacity building or technical assistance may be required</b> if the key actors lack the capacity to undertake this reform. If regulation is deemed unnecessary, regulatory reform is unlikely to be required, which would appear to imply little need for capacity building or technical assistance to policy makers and regulators. However, <b>lack of regulation is itself a regulatory choice and its implications must be understood if unforeseen and unwanted consequences are to be avoided.</b>
Individual	<b>Other non-financial interventions</b> , such as policy and target setting, establishment of quality and technical standards, awareness raising and demand promotion amongst users and service providers, provision of market information and training (capacity building) for businesses and workers, <b>may be beneficial regardless of the tariff regulation system (or in the absence of regulation).</b>
Unregulated	National energy planning will be key to establishing the optimum mix of technologies to meet electrification needs across the country and should feed in to design of the tariff regulation system.

# Tariff Regulation Advantages and Disadvantages:

	Advantages	Disadvantages
Uniform	Uniform tariffs offer <b>equity</b> – allowing all users to access electricity at the same cost so those in more remote, low demand areas are not penalised by having to pay more. Uniform tariffs also avoid the need for tariffs to be calculated and agreed for each scheme or business.	Uniform tariffs <b>benefit providers operating in areas where costs of provision are lower, while effectively excluding provision to higher cost areas</b> . This issue is exacerbated if uniform tariffs are extended across multiple technologies, typically by requiring grid-parity.
Individual	Can <b>reflect underlying differences in costs</b> and so enable economically sustainable electricity provision and <b>attract private finance and businesses, while also protecting users from over-charging</b> , particularly in monopoly or quasi-monopoly situation, and ensuring that <b>public financial support is properly used</b> and benefits users by increasing affordability	<b>Differences in tariffs</b> between users in different areas can lead to “ <b>tariff envy</b> ”– and hence <b>political pressure</b> to move away from cost-recovery. Calculation and agreement of tariffs for multiple providers on an individual basis is <b>costly and resource intensive</b> .
Unregulated	<b>Absence of bureaucracy, costs and delays</b> and the opportunity this provides to businesses to move swiftly and innovate. It also <b>avoids the burden on state institutions</b> of designing and managing a regulatory system.	<b>Lack of clarity and protection from competition for private investors</b> , which may lead to reluctance to invest, while <b>users will rely solely on market competition</b> for protection from over-pricing and poor quality and even unsafe products and services.

# Tariff Regulation Examples

National Electrification Approach	Uniform Regulated Tariff	Individual Regulated Tariff	Unregulated
Bangladesh, IDCOL Solar Home Systems			
Brazil, Luz para Todos (Light for All)			
Cambodia “Light Touch” Regulation			
Costa Rica, Distribution Cooperatives			
Ethiopia, Solar Market Development			
Kenya, Off-Grid for Vision 2030			
Mali, Rural Electrification Programme			
Nepal, Rural Energy Development Programme			
Peru, Concession Model for Standalone Systems			
Philippines, Islanded Distribution by Cooperatives			
Rwanda, Sector-Wide Approach to Planning			
South Africa, Integrated National Electrification			
Tanzania, mini-grids Regulatory Framework			
Tunisia, Low Cost Distribution Technology			
Vietnam, Rapid Grid Expansion			

# Using the Review Tool – Demonstration using the Tool itself



# To Summarize

- A categorization framework is needed to allow information on NEA to be presented systematically and comparisons to be made between different Approaches
- Any NEA combines technologies, delivery models, regulation, finance and other interventions
- The most effective National Approaches include actions in all these areas
- There is no ideal approach to electrification, what is important is that the various elements align with each other and the national context
- Any NEA will be affected by existing levels of electrification, and so should change over time as these increase
- Experience demonstrates that very significant advances in electrification can be achieved in just a few years given commitment from policy makers and engagement from users

# Break-Out Session:

1. Please team up with any others from your country:

Country	Number of Delegates	Country	Number of Delegates	Country	Number of Delegates
Burkina Faso	1	Ghana	1	Niger	1
Burundi	2	Kenya	4	Sénégal	2
Cameroun	2	Madagascar	3	Somalia	1
Centrafrique	2	Malawi	1	Tunisie	1
Côte d'Ivoire	3	Mali	1	Uganda	1
DR Congo	2	Mauritanie	2	Zambia	4

(Delegates from non-African countries, please join the team from a country you are familiar with)

2. Select a National Electrification Approach from your country and categorize it using the categorization system and information from the Review Tool – we have copies of the Tool on USB sticks here, and we asked you to bring your laptops so you can run it

# Break-Out Session:

3. Could you fill in one of these forms to record your categorization:

Country.....

Title of National Electrification Approach .....

Technology	Delivery Model	Legal Basis	Tariff Regulation	Finance	Non-Financial Interventions
Grid Extension	Public	Concession	Uniform	Private	Direct Energy Access Provision
				User	Institutional Restructuring
Grid-connected mini-grid/ Distribution system				Grants/Subsidies	Regulatory Reform
					Policy & Target Setting
Isolated mini-grid	Private (non-Government)	License	Individual	Cross-Subsidies	Quality/Technical Standards
					Technical Assistance
				Tax Exemptions	Capacity Building/ Awareness Raising
					Market Information
Standalone systems	Public-Private Partnership	Unregulated		Guarantees	Demand Promotion
					Technology Development/Adoption
					National Energy Planning

If you have any questions about the tool or the categorization – I'll be here to try and help

4. At the end of the exercise I'm going to ask you to hand in your completed forms so that we can bring them together to get a more complete picture of NEA across Africa

# Discussion of NEA Review Tool & Next Steps

Now you've had an opportunity to try out the NEA Review tool, we'd really welcome **any questions or feedback** you may have on it?

In particular, a second phase of the Review Tool's development is planned – This is your opportunity to influence its focus.

Options include:

1. Additional country case studies at current level of detail?
2. More information on existing 15 case studies?
3. How-to guidance on designing and implementing NEAs, bringing together all the different aspects?
4. How-to guidance designing and implementing specific elements of NEA?
5. Other improvements?

**What would be your priorities?**

# Thank You!

Mary Willcox – Practical Action Consulting



# Technology Categories

<b>Grid Extension</b>	Establishment and extension to new users of a system that connects electricity generation plants to consumers via a transmission and distribution network across the country.
<b>Grid-connected mini-grid/ Distribution system</b>	An electricity system connected to, but owned and/or separately managed from, the main grid system which supplies electricity to users within a local area.
<b>Isolated mini-grid</b>	A system for generation and distribution of electricity to multiple users which is not connected to the main grid system.
<b>Standalone systems</b>	A system for generating and supplying electricity to a single user (separate from any distribution system)

# Delivery Model Categories

<b>Public</b>	Delivery of electricity access by an entity or entities all of which are publically owned and managed, using purely public finance.
<b>Private (non-Government)</b>	Delivery of electricity access by an entity or entities none of which are owned and managed by the state, using purely private finance.
<b>Public-Private Partnership</b>	Delivery of electricity access by an entity which is part publically and part privately owned or by a mix of publically and privately owned entities or using a combination of public and private finance.

# Legal Framework Categories

<b>Concession</b>	An exclusive right (monopoly) granted by government to a sell electricity or the means of accessing electricity
<b>License</b>	A non-exclusive permission granted by government (or regulator) to sell electricity (or the means of accessing electricity).
<b>Unregulated</b>	A regime under which anyone may sell electricity (or the means of accessing electricity) without any license or other permission, beyond that required for any business to operate.



# Tariff Regulation Categories

Uniform	A (regulated) tariff (price) or set of tariffs applied to all electricity providers within a given category.
Individual	A (regulated) tariff (price) or set of tariffs applied to a single electricity provider
Unregulated	A regime under which electricity may be sold without any control of tariffs

# Finance Categories

Private	Finance provided by investors or lenders in the expectation of financial returns (profit).
User	Finance from charges paid by users for electricity or purchase of electricity systems, and finance made available to users to pay these charges.
Grants/Subsidies	Funding provided without requirement for repayment, interest or return on investment.
Cross-Subsidies	Funds drawn from charges on one (usually existing or high income) group of users and used to subsidize provision to another (usually new or low-income) group of users
Tax Exemptions	Waivers granted by government on taxes on electricity; equipment used in generating or distributing electricity; or on electricity businesses
Guarantees	A promise from an institution (the guarantor) with sufficient resources to assume the financial obligations of one party to a contract if that party defaults

# Non-Financial Intervention Categories

<b>Direct Energy Access Provision</b>	Direct action by an implementing authority (such as a Rural Energy Agency or national utility) to provide or take part in the provision of electricity directly, rather than by funding, incentivizing or facilitating provision by others.
<b>Institutional Restructuring</b>	Reorganising and reassigning responsibilities between government departments, agencies, utilities and other organisations charged with managing the sector and delivering electricity access
<b>Regulatory Reform</b>	Reform of laws and regulations governing generation, distribution and sale of electricity, and of related processes and procedures.
<b>Policy &amp; Target Setting</b>	Establishment of Government policy for the expansion of electrification and definition of targets for achievement of electricity access provision over a defined timeframe.
<b>Quality/ Technical Standards</b>	Rules or guidelines for suppliers and installers (of products and services related to electrification) that ensure safety, compatibility and that performance meets user expectations. Technical standards apply to the performance of equipment installed, while quality standards also relate to the overall customer service experience.
<b>Technical Assistance</b>	Advice and practical support on any aspect of electrification provided by external experts.

# Non-Financial Intervention Categories continued

<b>Capacity Building/ Awareness Raising</b>	Capacity building refers to increasing the knowledge, skills and understanding of stakeholders involved in electrification, often through training. Awareness raising, as part of capacity building, refers to educating stakeholders about opportunities, benefits and issues related to increased electrification.
<b>Market Information</b>	Making available information useful to a business that is considering entering an electricity market.
<b>Demand Promotion</b>	Measures implemented to encourage the demand-side opportunities that are enabled by electricity access, and so stimulate increased power consumption.
<b>Technology Development/ Adoption</b>	The process of engineering a new means of electricity provision, demonstrating it, and bringing it into use; or adoption of a technology in use elsewhere and its adaptation to local conditions.
<b>National Energy Planning</b>	Bringing together information on costs and performance of electricity technologies with data on energy access needs, preferences and willingness to pay and the availability of energy resources for electricity generation, on a geospatial basis to determine how needs can best be met.