# Energy for Development Conference: Promoting a Gender Inclusive and Pro-Poor Sector

*September 10, 2015*

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## Session 2 Presentations

**Title: Lowering Barriers to Electricity Access, Uptake and Usage**

- ***Session Chair: Himesh Dhungel,*** *Country Director, Nepal (MCC)*
- **Douglas F. Barnes,** Consultant
- **Sophia Georgieva,** Social Development Specialist (World Bank)
- **Daniel Waddle,** Senior Vice President of International Programs (NRECA International)

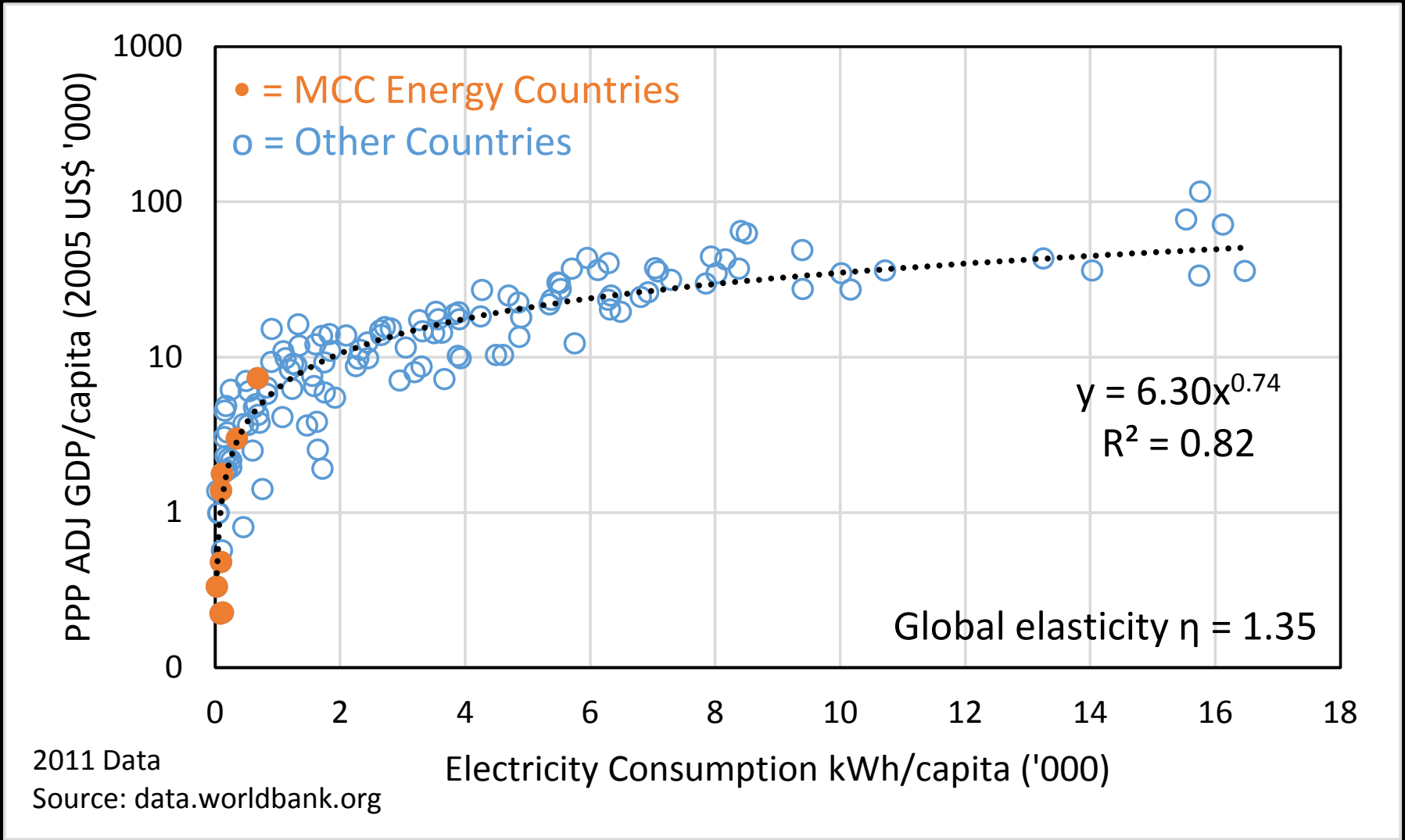
# Electricity:
# Balancing growth, poverty, gender and economic efficiency goals

Himesh Dhungel

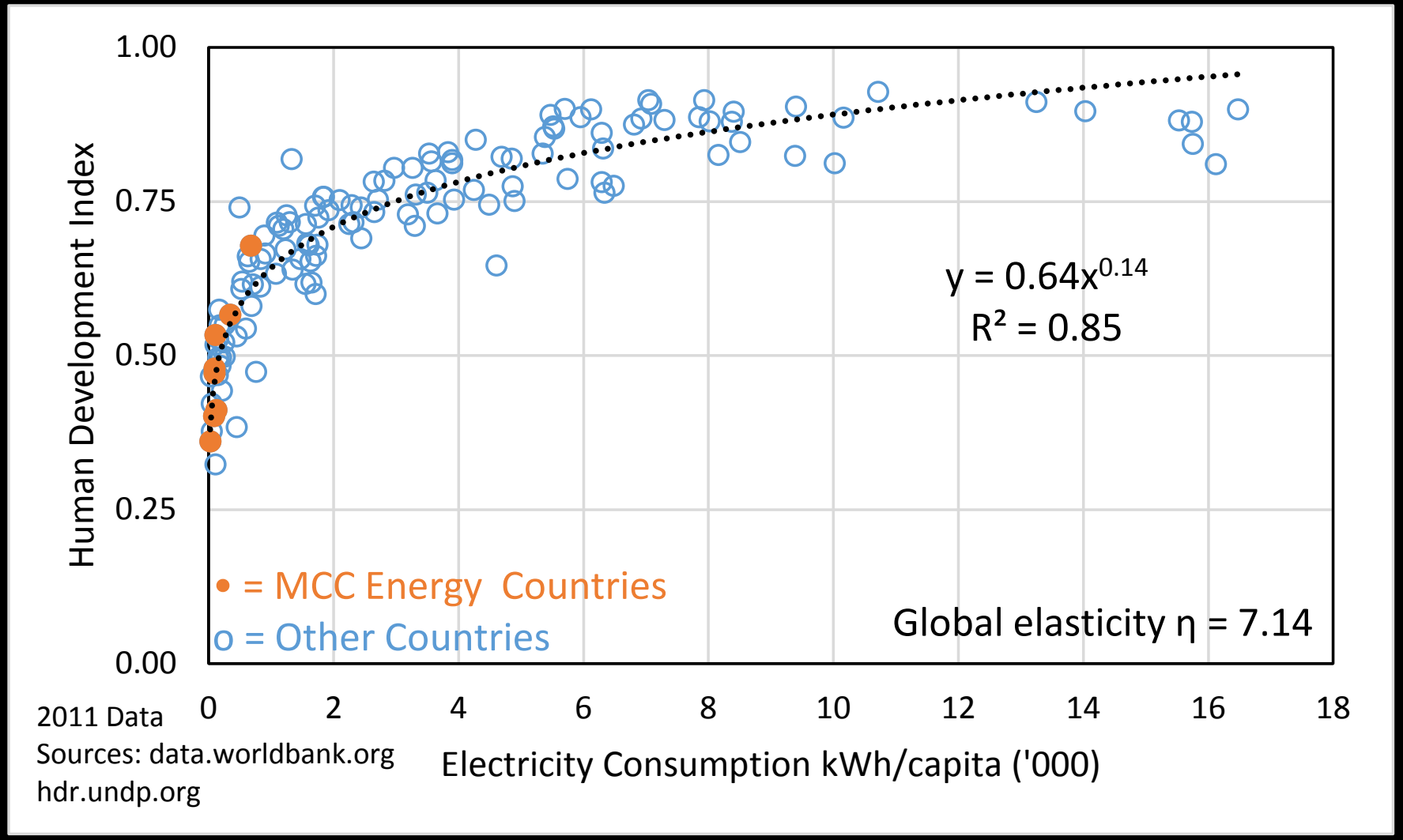
10 September 2015

Washington, D.C.

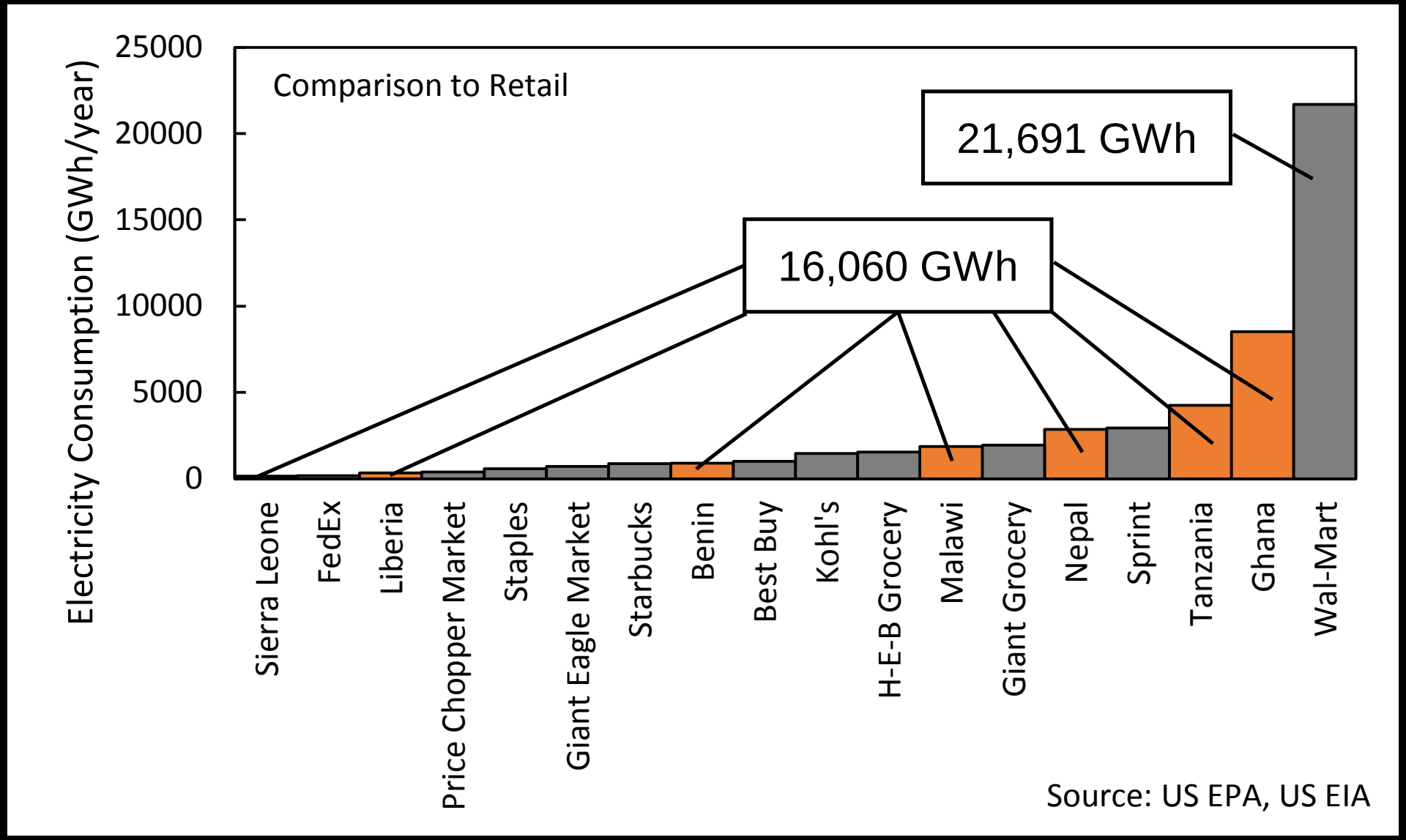
# Electricity is key to a modern economy



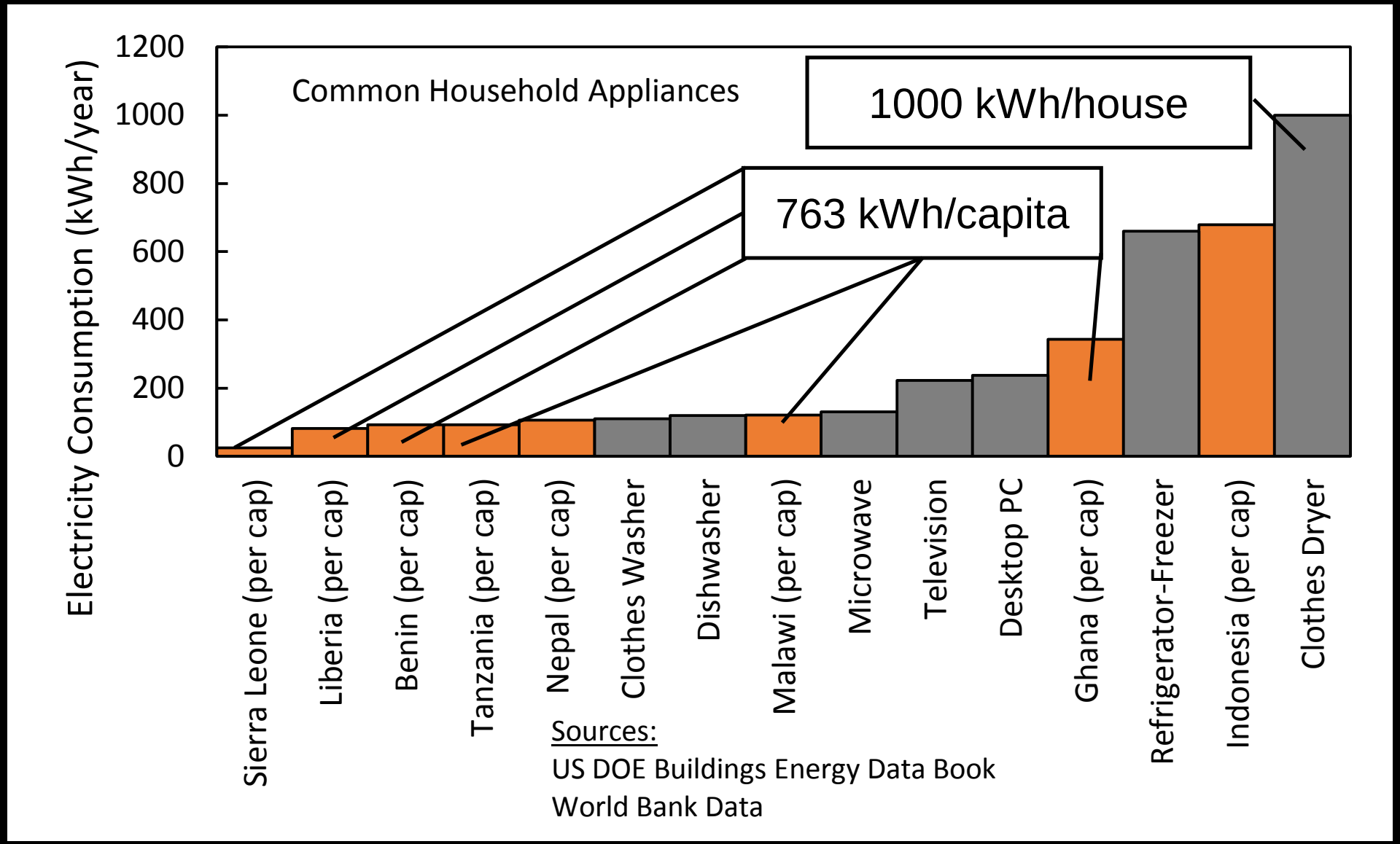
# Electricity also improves quality of life



# Yet, electricity poverty is common …

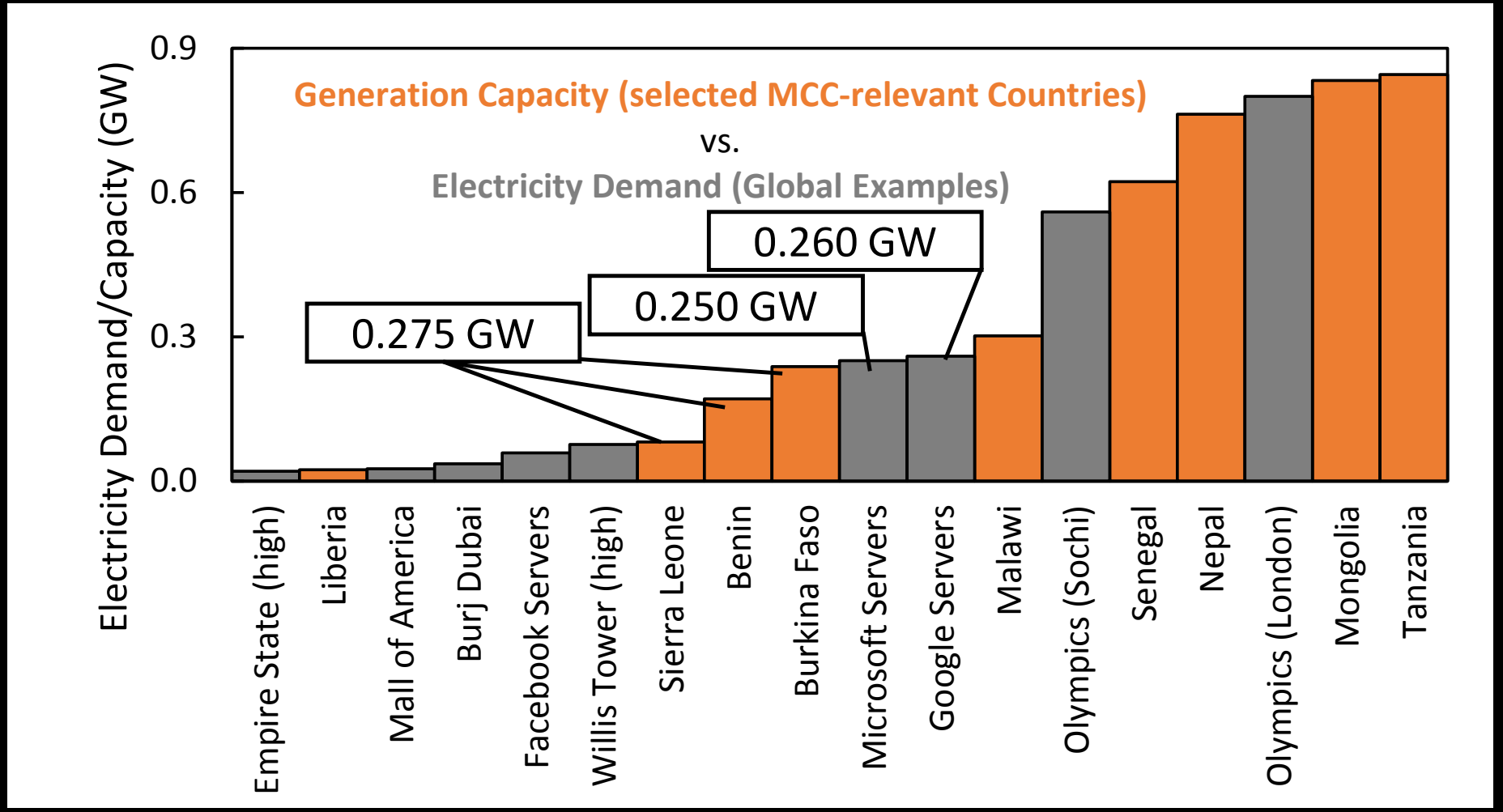


# No matter which way you look at it …



# MW capacities of Google and Microsoft servers are comparable to Benin, Burkina and SL combined

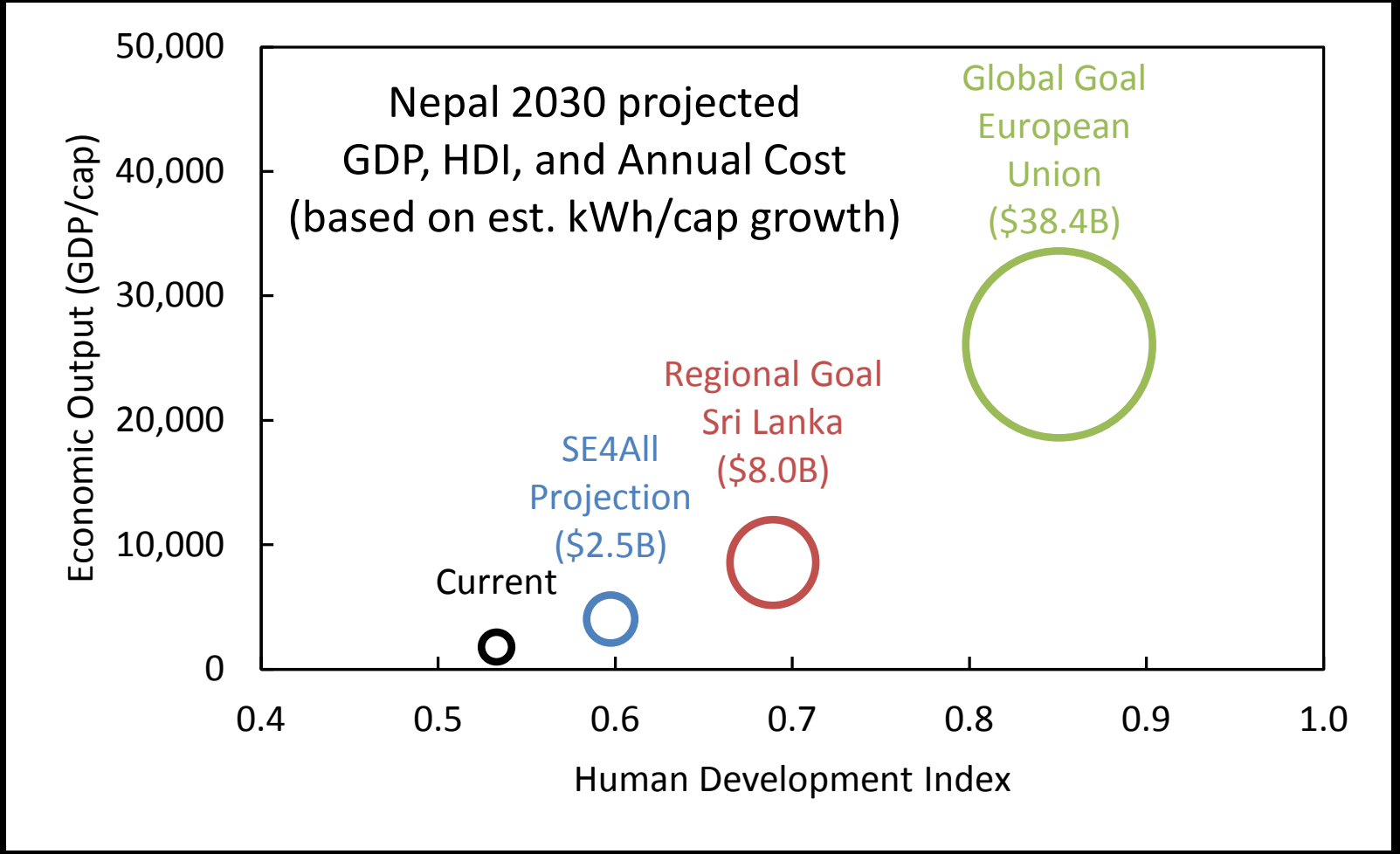
**Mall of America (MN) has higher demand than the entire operating capacity of Liberia**



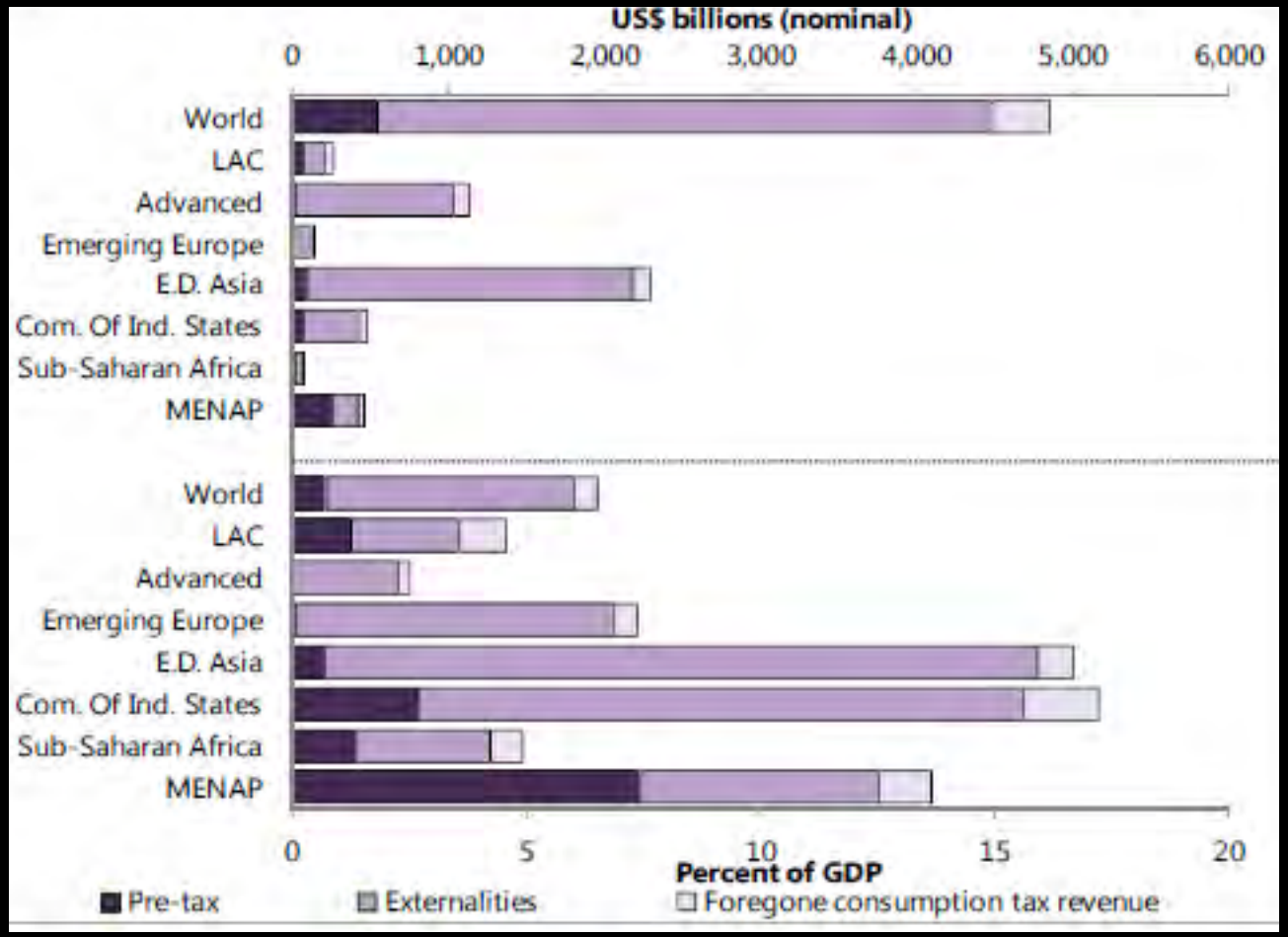
# Power sector's investment needs are staggering

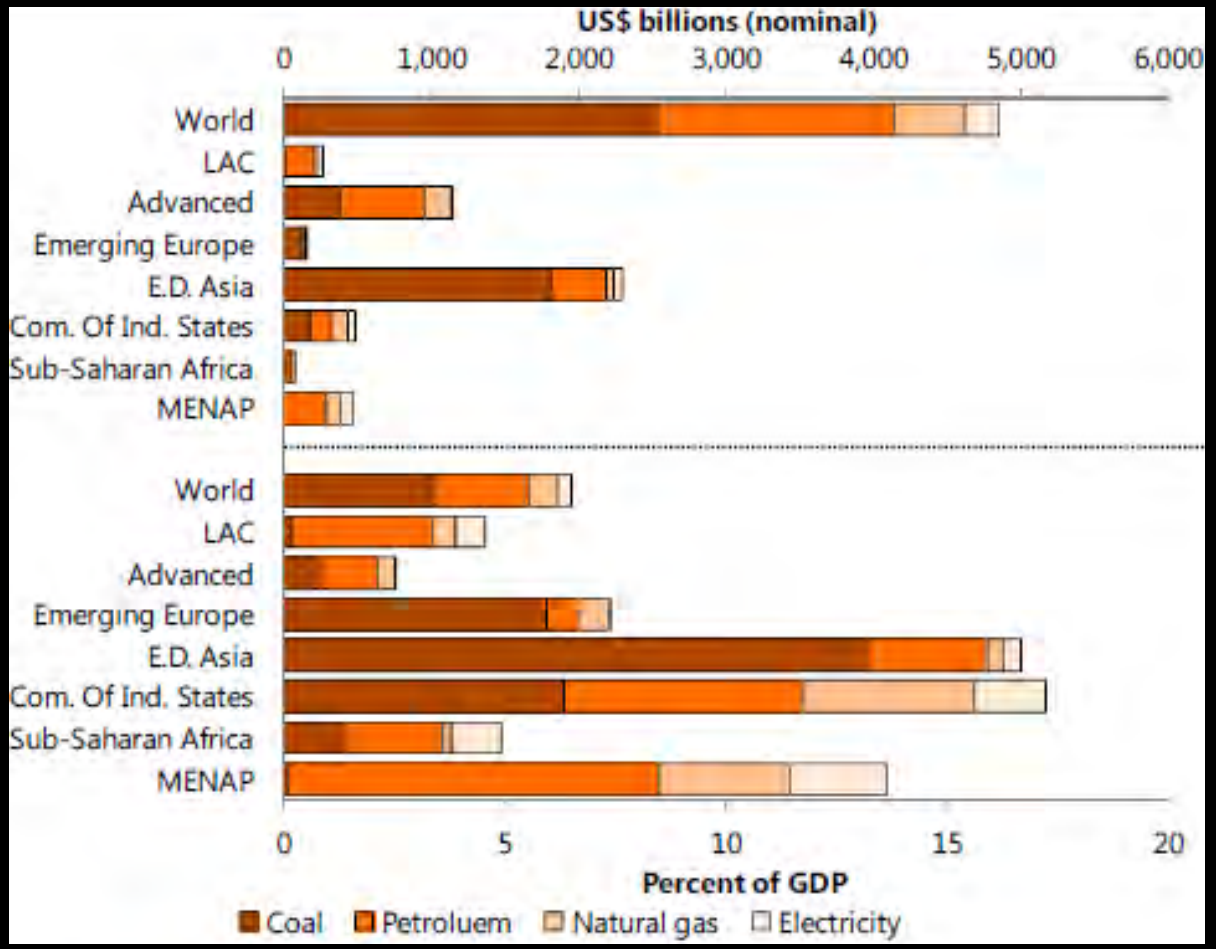
**Estimated Annual Investment Need ($ billion)**

| | |
|---|---|
| **Sub-Saharan Africa** | **$40** |
| **South Asia** | **$68** |



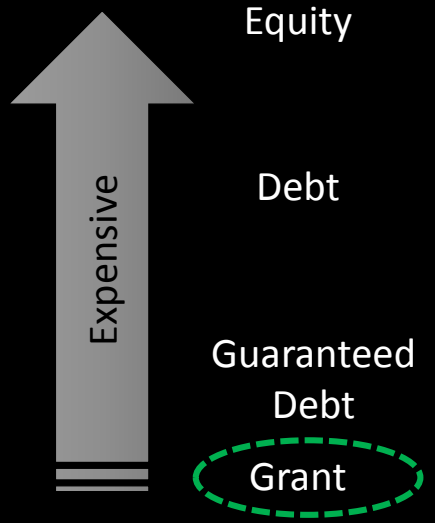
# Yet subsidies sap already limited government resources



# MCC grant financing can play an important role in leveraging private sector to increase access

- Approx. 60% of our ~$10 billion is in infrastructure
- Current energy portfolio is ~10%
- Additional $1+ billion in the pipeline
- Enabling environment key to success:
  - Financial, operational and governance of utilities
  - Policy, legal, and regulatory reforms
  - Investment in public infrastructure
- Private sector to invest in and around MCC programs
- Introduce discipline of private sector to public sector operations



# How to maximize impact of MCC investments?

- How can you increase access while meeting rate of return, economic efficiency, poverty reduction and gender balance goals?
- How can poverty-focused projects meet ERR and economic efficiency goals?
- How can electricity projects be designed to break down cultural biases and gender imbalances?

# Thank you

September 10,  2015

# Lowering the Barriers of Access to Electricity

**Douglas F. Barnes**
**Energy For Development**

Millennium Challenge Corporation
Energy for Development Conference:
Promoting a Gender Inclusive and Pro-Poor Sector

# Introduction

People often think of energy as wires, poles, power plants, oil wells & pipelines, PV panels,

**They often ignore the demand side: nexus between poverty, energy, health, education, institutions & gender empowerment**

# RE Progress: A Different Take

- **In 1970 :** only about 2 billion rural people in developing countries, and **1.75 billion people were without electricity**.
- **In 1970:** the rural electrification rate in developing countries was **only 12 percent, compared to more than 60 percent today.**
- **In the 1990s** there were **2 billion people** without electricity, and in 2010 the number was **1.3 billion**
- **Between 1970 and 2010** populations grew at about 2% per year. So the above does not mean that only 0.7 billion new households have been provided with
- **Between 1970 and 2010, over 2 billion people have gained access to electricity.**
- **Countries now over 95%.** China, Thailand, Brazil and Mexico.

**Source: *Electric Power for Rural Growth,* Second Edition 2014.**

***Rural Energy and Development: Improving Energy Supplies for 2 Billion People.*** **1996.**

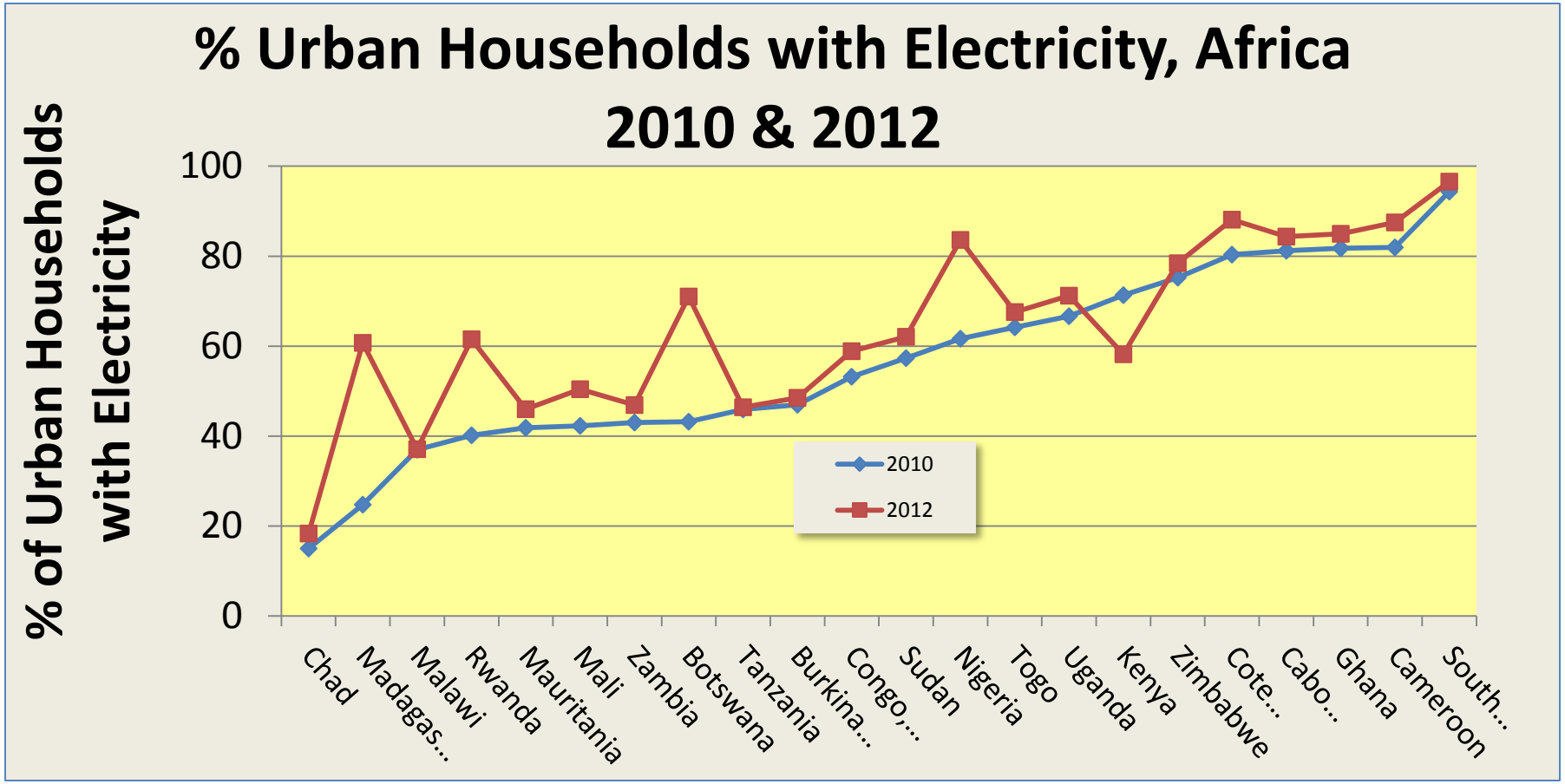
# Africa a Different Story

- **Only 1 in 8 rural households** in Africa have grid electricity
- **Even urban rates** are quite low in many countries
- **Main power companies have been very conservative** in system expansion, focusing on rich urban areas
- **Many countries have relied on donor aid** to finance program, but free funds mean no commitment to do job themselves.
- **Connection costs are high** compared to the rest of the developing world.
- **Best practice principles are available,** but for most part they have not been followed in Africa.
- **No quick fixes;** most programs take 20 to 30 years

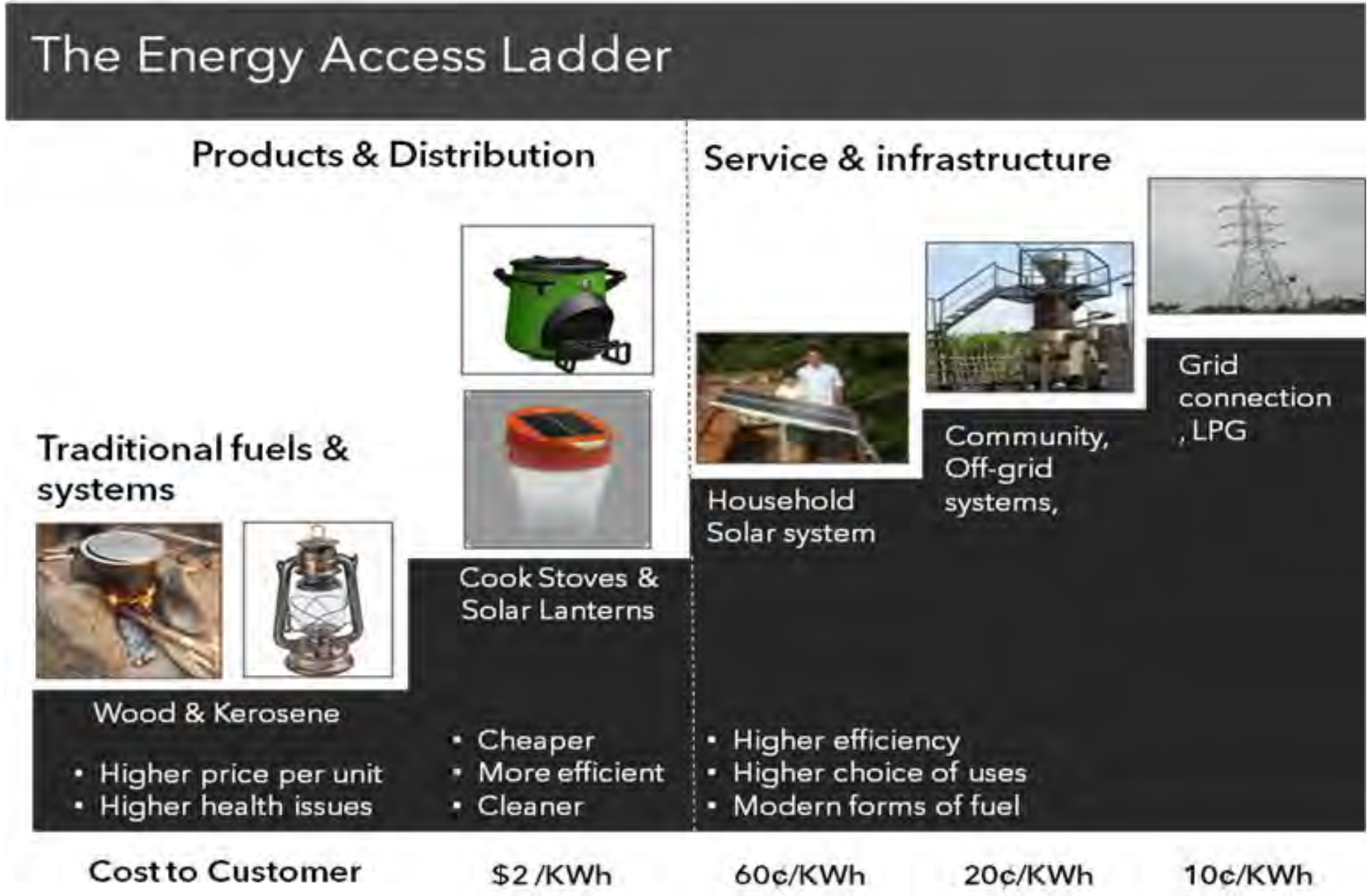
Golumbeanu and Barnes. ***Connection charges and electricity access in Sub-Saharan Africa*** World Bank Publication 2013

# Even Urban Africa Lacks Electricity

**Only 3 of 5 rural households** in urban Sub-Sahara Africa in 2010 had grid electricity

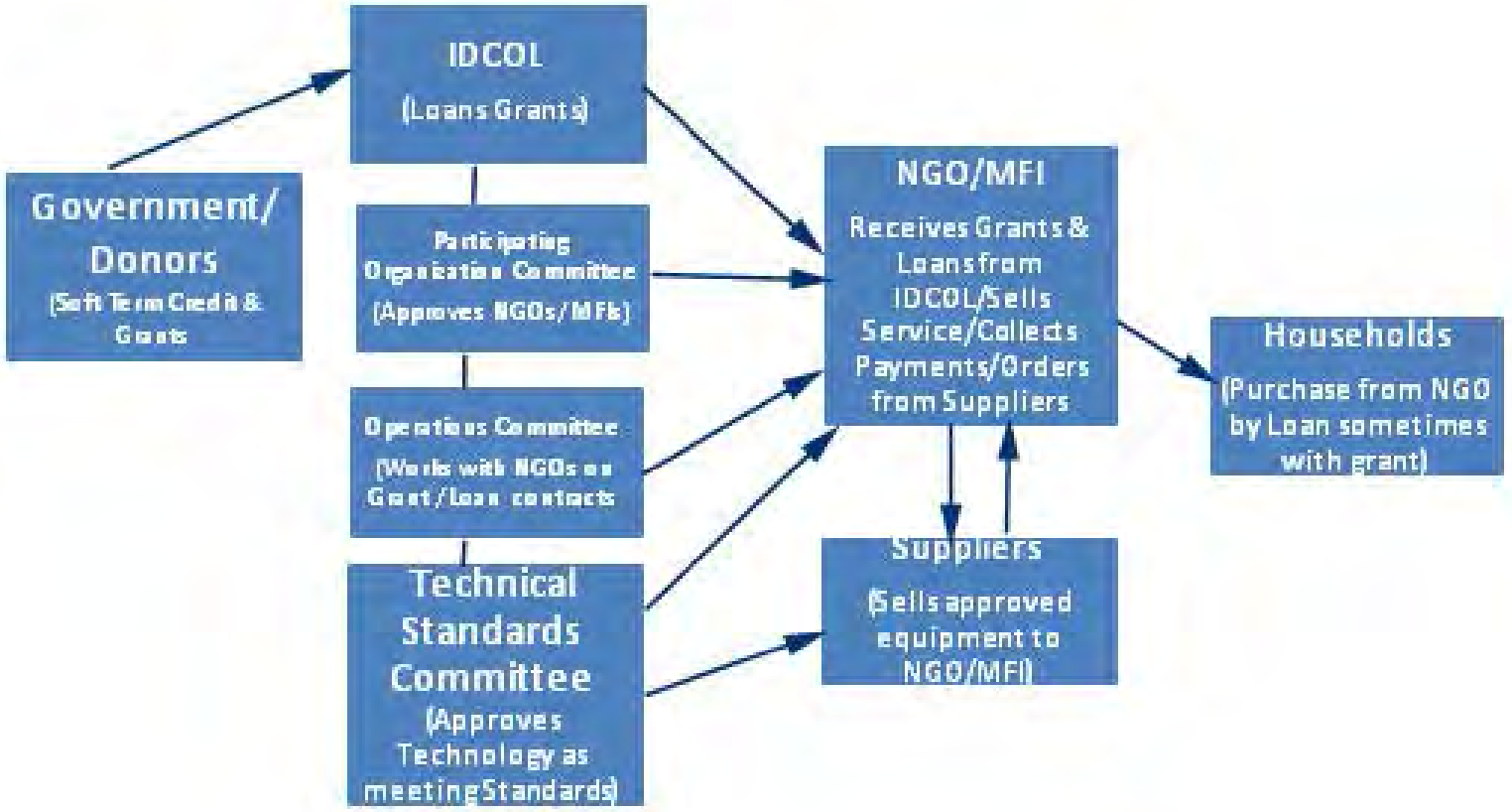


# The Energy Ladder: Off Grid ↔ Grid



# Offgrid Challenges: Bangladesh

**Over 3 million household systems** disseminated through microfinance organizations (IDCOL)




Khandker et. al. ***Surge in solar-powered homes : experience in off-grid rural Bangladesh.*** World Bank Publication 2014.

# Summary:
# Grid Rural Electrification: What You Should Not Do!

- **Rely on main utility without specialized institution to** manage program. Rural electrification requires specialized institution for success
- **View rural electrification as constructing wires and poles** Greater local involvement and many other factors necessary.
- **Finance piecemeal projects.** Such projects should fit into rural electrification master plan advocated by country or similar planning capability
- **Ignore political interference:** Politicians can be main ally in successful programs.
- **Assume getting prices right will solve all problems.** Find right balance. Subsidies are part of rural electrification.
- **Ignore financial viability of utility:** Financial viability a key to success

# Ethiopia Example: Beyond Electricity Access : Small GPOBA Connection Cost Project

***The Good***

- ***Accelerated Rate of Rural Electrification.*** The GPOBA project accelerated the rate of rural electrification in limited areas.
- ***High Number of Indirect Connections.*** The project M&V survey found a large number of indirect household. High willingness to pay
- ***Business Adoption of Electricity Immediately.*** All businesses adopted electricity once a community had access to power service.
- ***Household Appliance Adoption okay,*** but Could Be Better. Credit lines could be extended

Barnes, Golumbeanu and Diaw, ***Beyond Electricity Access: Output-Based Aid and Rural Electrification in Ethiopia*** (Fortcoming).

# Ethiopia Example: Beyond Electricity Access : Small GPOBA Connection Cost Project

**The Bad**

- ***Delayed Electricity Adoption due to Meter Shortage.*** Sole-sourcing of meters to a local manufacturer.
- ***Cost of Internal Wiring High.*** One option is the use of ready boards for poor households.
- ***Low Price of Electricity.*** At 2 cents per kWh O & M cost not covered by price. EEPCo expressed reservations about expending significant resources on bill collection.
- ***No specialized group within EEPCo.*** Lack of specialized group to deal with rural electrification issues.

# Public Policies--Guiding Principles

- **Set up effective institutional structures** mandated to deal with rural electrification (cooperatives, agencies, institutions to extend the grid, focal centers within utilities)
- **Address political temptation to pork barrel** and impact on utility financial viability
  (Thailand example of use of social funds)
- **Have a rational expansion plan** based on revenue growth and expansion costs
  (Build load and revenue to support expansion)

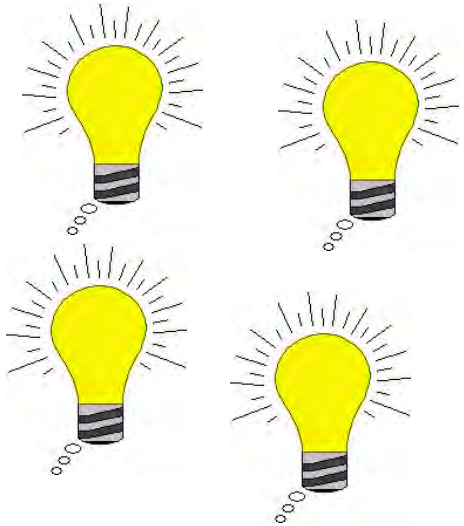
Barnes, 2007. ***The Challenge of Rural Electrification.*** (10 Case Studies of Successful Programs).

# Public Policies--Guiding Principles

- **Importance of cost recovery:** subsidies should encourage not destroy business incentives (To serve consumer rather than government)
- **Charge a cost recovering price** for electricity after the subsidy, but help with service connection costs (delicate balance)
- **Foster community involvement** (Increase the likelihood of bill payment versus cutting off non-paying households creating ill will)
- **Reducing construction and operating costs** (Single Phase in Tunisia reduced 30% of distribution capital cost)

# A Recipe for Rural Electrification

## Cookie Cutter



## Rural Electrification Stew

# Diverse Ways of Making Stew:
# Country Economic, Political and Cultural Context

- Buy a low cost pot (most programs have rural standards lower than urban ones)
- Subsidies generally are necessary to make the pot affordable (capital costs)
- For broth cook up a rich stock of financial viability to provide the base for the stew (after subsidies for capital costs)
- Add a pinch of long term financing. Two to five years just is not enough

# Recipe for Rural Electrification

- Put in a handful of local cooperation and sometimes you can mix this with a bit of bill collection
- Simmer for 20 years or more, as patience is necessary
- Taste often and make adjustments
- For selling this stew, make sure the cook makes a profit after subsidies
- The sustenance from the stew will make you strong and healthy

# Thank You!

Doug Barnes
Energy for Development

Blog: Energyfordevelopment.com
New Book: Electricity Power for Rural Growth
Second Edition

# Gender Sensitivity in Energy Subsidy Reforms: Findings from Europe and Central Asia

September 10, 2015

# Rationale for Gender and Energy Research in ECA

- World Bank providing advice to over 14 states in Europe and Central Asia on implementing subsidy and tariff reforms.
- Scarce research in the region on gender issues related to energy policy overall, and subsidy reforms in particular.
- Gender issues are examined, in order to:

…effectively mitigate poverty and social implications of these reforms, specifically the consequences of rising energy costs;

…better monitor gender impacts in all World Bank operations, including energy investments.

# Methodology: objectives and research questions

Objectives are to understand:

- What do we mean by ‘gender sensitive energy subsidy reforms’?
- What about ‘inclusive energy subsidy reforms’ ?

The research looks into:

- country wide gender discrepancies that affect adaptation to subsidy reforms;
- household behaviors and social norms;
- social exclusion/inclusion issues that affect adaptation to reforms (e.g. location, age belonging to a minority group, etc.);
- not an assessment of specific policies or programs

# Methodology: evidence

- Qualitative data: FGD, KII;
- Gender issues are highly contextual: intra-household dynamics may not be captured in household surveys;
- Targeted questions on gender + comparing trends in responses of men and women;
- Goal is to provide an overview of the range of gender issues in energy reforms (not project-specific recommendations)

# Key Findings: Gender vulnerabilities in energy reforms are related to all of the following

1) **energy affordability**

→ related to income, age, migration, labor market participation;

2) **energy access and use**

→ ability to access cheaper sources, switch between sources)

3) **household coping strategies**

→ who is impacted most when households strive to save energy)

4) **interaction with institutions**

→ social norms affect access to services for men and women)

# 1) Vulnerabilities related to affordability

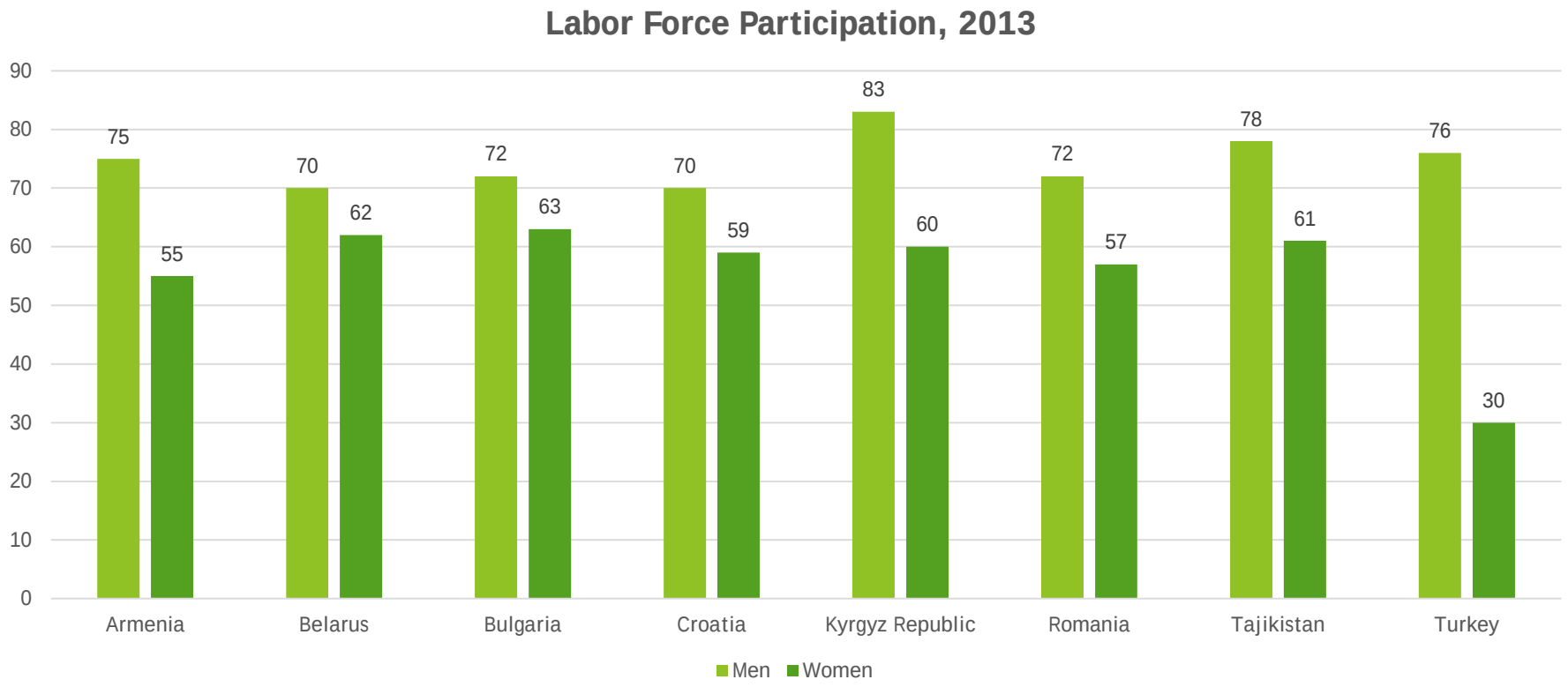
Women-headed households more vulnerable due to lower:

- Incomes;
- Pensions;
- Income security;
- Ability to generate additional income to cope with seasonal expenses;
- Remittances/migration incomes, which are strongly linked to energy payments;

Women in the household often face stronger pressures to provide funds for payment of bills.

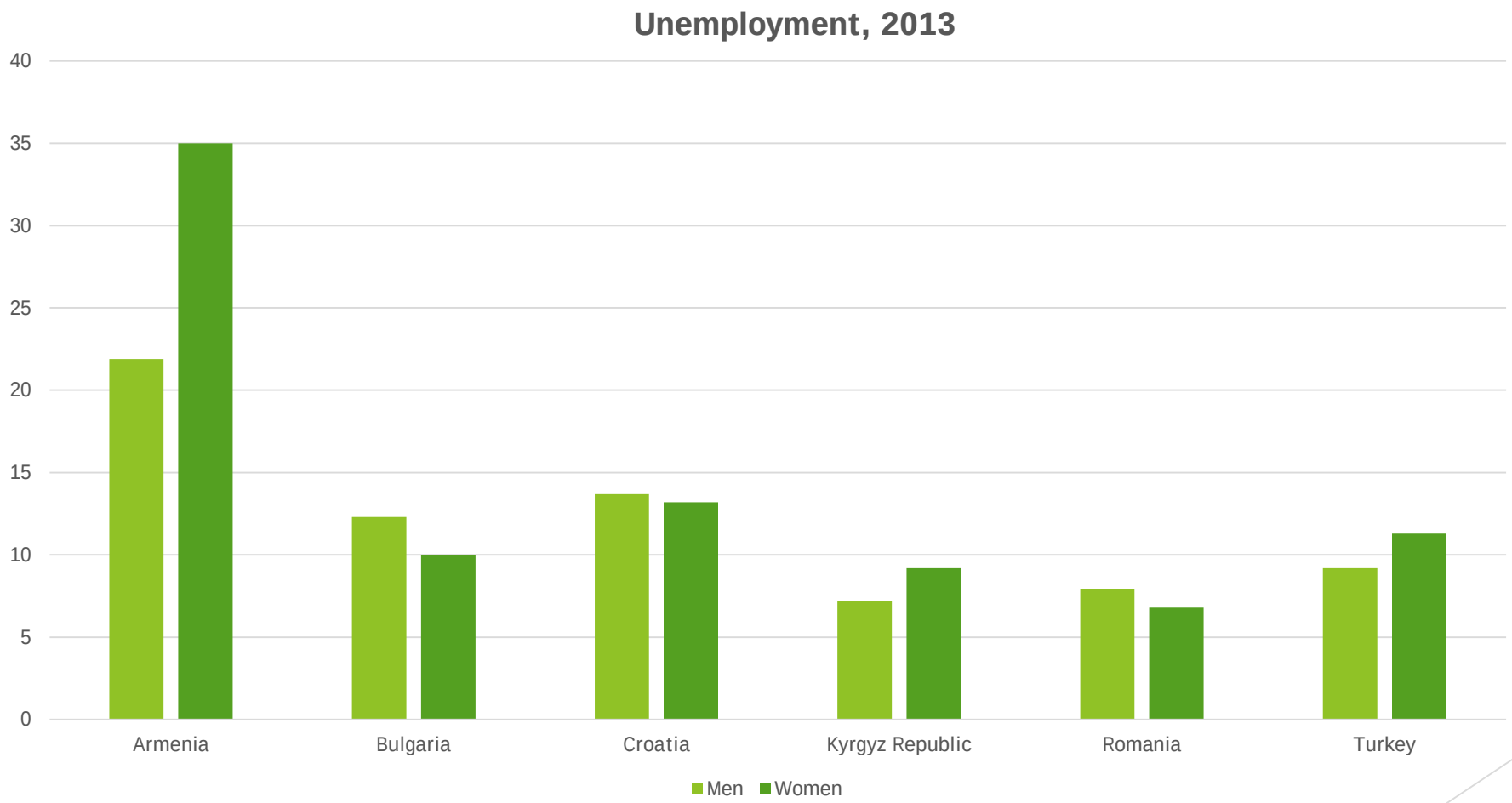
"*He avoids responsibility when he leaves all decisions on me. He doesn't work for 20 leva/day, but I have to work and find a solution*." – urban woman, Bulgaria

# Gender differences in labor force participation



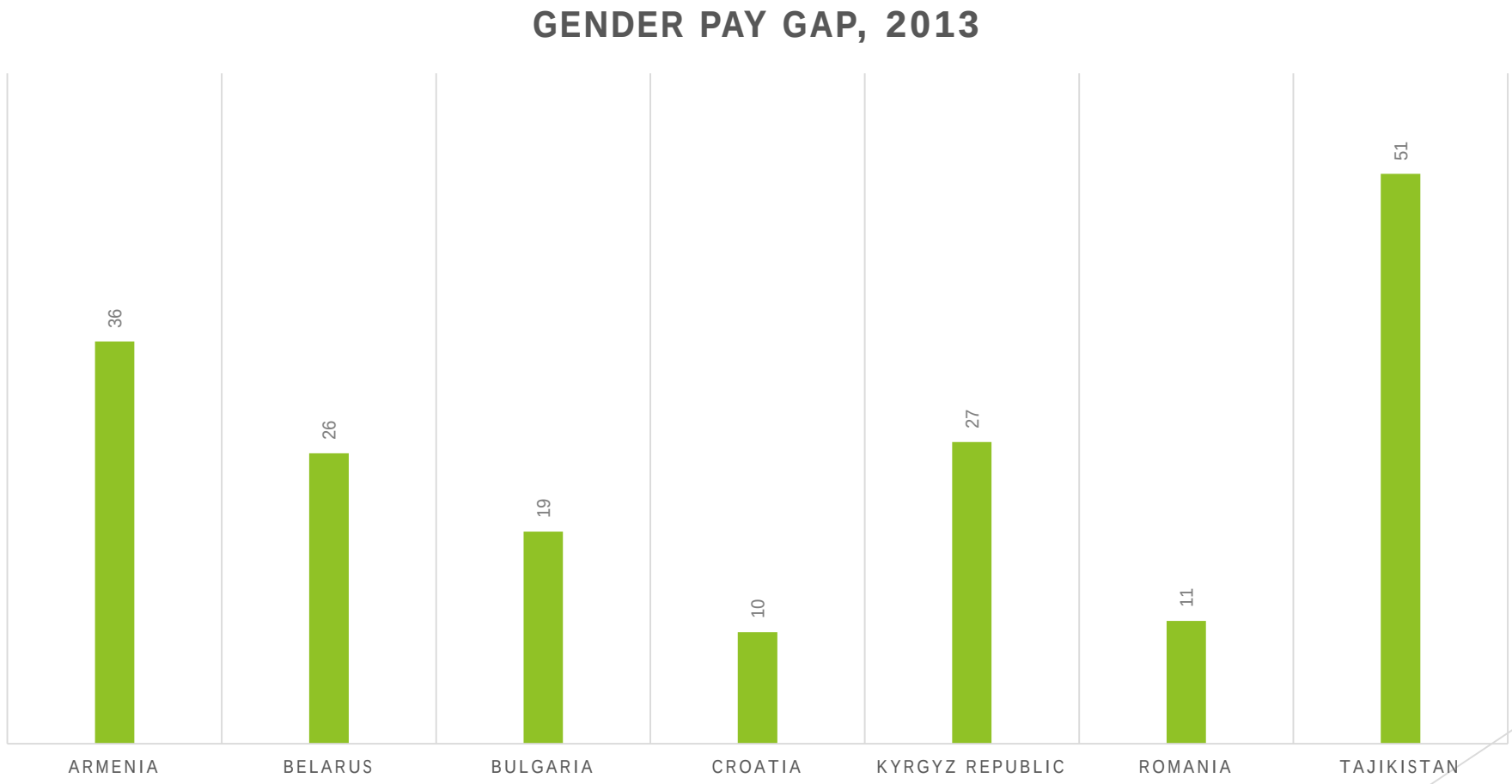

*Source: World Bank. 2015. Gender At a Glance: Europe and Central Asia*

# …in unemployment




*Source: World Bank. 2015. Gender At a Glance: Europe and Central Asia*

# ...in wages




*Source: World Bank. 2015. Gender At a Glance: Europe and Central Asia*

# 2) Energy Access and Use

- Women-headed households:

  - are less likely to use fuels that require physical labor or specific social network to procure, even if they are cheaper, such as bottled gas, wood, coal, installing independent gas heating, etc.

  - may face extra costs to use certain fuels (cost for chopping wood, transporting and storing wood and coal)

# 3) Coping Strategies Within the Household

- Women are both more aware of and more heavily impacted by coping measures to manage higher energy bills:
  - Not heating the house during the day;
  - Saving on food;
  - Cutting more personal expenses (clothing, cosmetics, social activities);
  - Reducing use of appliances in household work and doing it by hand;
  - Using electricity during cheaper night tariff;
  - In rural contexts: relying more heavily on secondary collected fuels (brushwood, manure, cotton stalks, etc.) collected by women.

# Who makes decisions…

- on switching to cheaper sources?
- on more efficient energy use?

It varies … but very much related to information **and social networks**.

**Men**: more informed of energy efficiency methods - due to the nature of available information and sources (specialized contractors, stores);

**Women**: tend to be more interested in cost and savings potential. This information not as readily available.

# 4) Interacting with Institutions: Energy Providers

Norms play a strong role in the absence of clear grievance mechanisms.

Men are generally seen as more successful in seeking their rights as consumers, seeking information, resolving grievances. In other contexts, men can be a disadvantage.

"*He would not leave the building until he received a clear explanation. I could go as well but it would be best if he went.*" – young woman, Romania

"*I ask them to tell me how they compute the bill. They say it's very complicated, you will not understand. I say, I am an engineer, I will understand*" – middle-aged woman, Bulgaria

*"A man would rather send a woman there because it is mostly women who work in the service sector. A man cannot argue with a woman, if she raises her tone the man will step back. Men are afraid to brawl with stranger women.*" – woman, Kyrgyz Republic

# Interacting with Institutions: Social Assistance

- Most ECA states have dedicated programs to help with energy payments;
- Access of men and women to social assistance opportunities is treated differently at social assistance offices: Greater stigma for men;
- What has worked well:
  - heating benefit programs putting strong attention on simplifying access, controlling for fraud and leakages.
  - Question whether moving away from categorical programs (e.g. for single mothers) can help eliminate gender stigma?

# Gender Impacts are more pronounced for Roma/Minorities

In Bulgaria, Romania, Croatia (within the sample of this study) Roma women were found to be:

- More economically disadvantaged
- More likely to experience gender discrimination
- Significantly less informed about reforms
- Less likely than non-Roma women to interact with public institutions
- Targets of specific ethnic prejudice (for example, for seeking social assistance)

# Policy Implications(1)

- Gender in energy not isolated from broader gender equality environment in the country
  - Energy affordability relatively more problematic and requires further support for women-headed households, for broader reasons related to incomes and income-generating opportunities;
- Coping with higher energy costs affects women disproportionately
  - These ‘hidden’ impacts should be taken into account in designing mitigation policies/additional support;
- Cultural norms affect men and women’s ability to get information, resolve grievances with providers, access support programs
  - Stronger administrative mechanisms/rules e.g. for grievance redress can reduce institutional discretions, chance for discriminatory attitudes;
- These norms can be more pronounced in minority communities (e.g. Roma)
  - Requiring targeted outreach and training among relevant institutions

# Policy Implications (2)

- Gender-sensitive communications:
  - Be aware how information needs and grievances differ across sub-groups – men and women, urban/rural women; elderly women
  - Targeted outreach and GRM channels to reach different audiences.

- Better use of social networks to promote energy efficiency, understanding of reforms, claiming of consumer rights
  - Women less aware about EE opportunities; More information needed on economic aspects of energy efficiency;
  - Men able to name more reasons for energy reforms, not because of technical knowledge but also social networks;

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*Energy for Development Conference: Promoting a Gender Inclusive and Pro-Poor Sector*

# Barriers to Access and Strategies to Lower Infrastructure & Entry Costs

Dan Waddle
NRECA International
September 10, 2015

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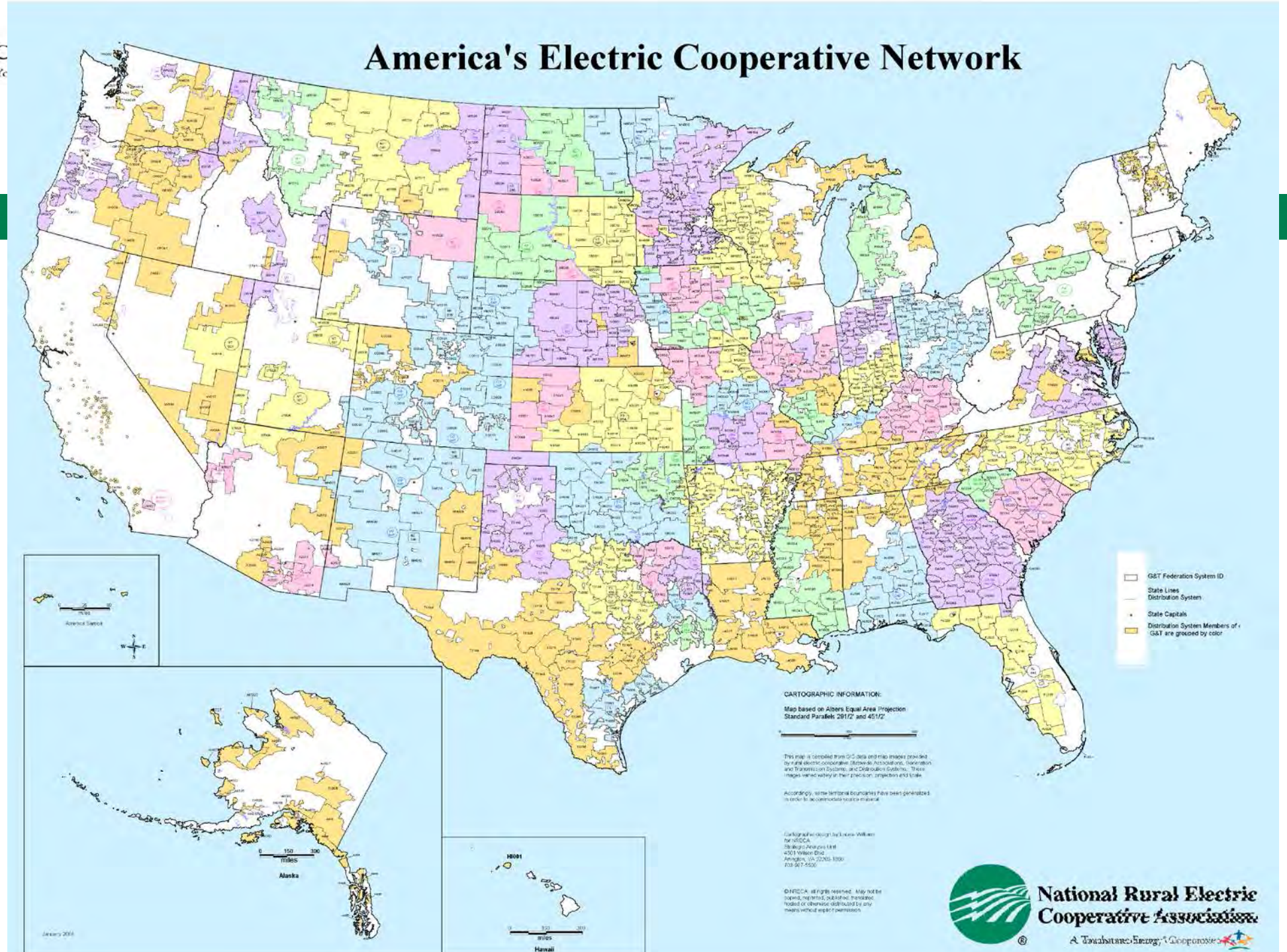
# NRECA International Programs

- **Wholly-owned subsidiary of NRECA.**
- **Established in 1962 as a founding partner with USAID**
- **Programs have contributed to electrifying over 110 million consumers in countries served**
- **RE programs designed by NRECA have achieved remarkable commercial success – extremely high collection rates, low losses, on-going expansion in the most problematic of environments**
- **These successes have occurred in low income, extremely challenging environments**


America's Electric Cooperative Network
G&T Federation System ID
State Lines
Distribution System
State Capitals
Distribution System Members of
G&T are grouped by color
CARTOGRAPHIC INFORMATION:
Map based on Albers Equal Area Projection
Standard Parallels 29 1/2° and 45 1/2°
Alaska
Hawaii
National Rural Electric
Cooperative Association

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# Electrification Program Goals

- **Economic development: expanding access to electric service is a key contributing factor**
- **Area coverage: maximize access by serving all willing consumers in served communities at an affordable, uniform cost – seek to minimize cost through low-cost design principles.**
- **Maximize penetration rates: In many electrification projects, connection rates are very low often due to connection fees that are needlessly high.**
- **Practical design: Lowering costs while maintaining service quality and safety requires practical and innovative engineering to reduce connection fees and tariffs to achieve affordable service**

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# Electrification Program Reality

- **Public investment programs are allocated fixed budgets on an annual basis**
- **Lowering capital costs means greater impact -- more communities can receive service for a fixed amount of money**
- **Connection charges and tariffs – the two most significant factors affecting affordability, are strongly correlated to capital cost**
- **Many utilities choose to require new consumes to pay low voltage capital costs through connection fees. These costs could be capitalized and included in the tariff base.**

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# Nomenclature

**Distribution systems are composed of**

- **Medium voltage usually means 11,000 to 33,000 volts (11-33 kV) and includes poles, conductor and hardware**
- **Low voltage (220- 400 volts) includes distribution transformers, low voltage lines and poles**
- **Services (smaller gage conductor, hardware and meters) that connect the low voltage line to the consumers**
- **House wiring: distribution panel, lighting circuits and wall outlets**

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# Capital Costs Can Vary Significantly

- **Capital cost of medium voltage systems vary widely from region to region, country to country**
  - **Latin America: 34.5 kV costs ~$ 14,000/km**
  - **Bangladesh: 33 kV costs ~$ 12,000/km**
  - **Tanzania: 33 kV costs ~$23,000/km**
- **Costs vary not only for medium voltage, but also for low voltage & service connections:**
  - **Latin America: 400 volt costs ~$8,000/km**
  - **Tanzania: 400 volt costs ~$17,000/km**
  - **TANESCO standard service drop: $255/connection**
  - **TANESCO proposed low cost service drop: $144/connection**

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# Tanzania Low Cost Study

| | Design for Rural Low Density Population | |
|---|---|---|
| Approaches | Cost (%) | Cost $/Consumer |
| TANESCO Standard | 100% | $2,727 |
| TANESCO modified | 72% | $1,976 |
| 33 kV 2 phase | 37% | $1,022 |
| 19 kV single phase | 44% | $1,196 |
| 19 kV SWER | 31% | $844 |

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# Strategies to Improve Affordability: Three Levels of Intervention

**Medium Voltage:**

- **Reducing medium voltage design standards can result in significant cost reductions – up to 60% of traditional construction costs**

**Low Voltage & Services**

- **Low voltage costs can also be reduced primarily by using small distribution transformers, shorter circuit lengths – reducing costs by up to 30%**
- **Service costs can be reduced by as much as 40% with simple modifications of design & construction materials**

**Cost Recovery**

- **Perhaps the most significant change would be for utilities to recover low voltage & service costs via depreciation charges rather than connection fees**

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# In Summary

- ✓ **Lower connection charges are extremely important to facilitate increased connections for all electrification programs**
- ✓ **Lowering capital costs means that programs can have greater impact – more communities served and more households in those communities**
- ✓ **Affordability analyses are an essential part of program design to leverage policy changes prior to program implementation – understanding what households can afford and how to design programs to fit their needs**