



# Energy Efficiency and Demand Side Management – Closing the Gap on Potential and Practice

The Fundamentals of Energy Systems for Program Managers



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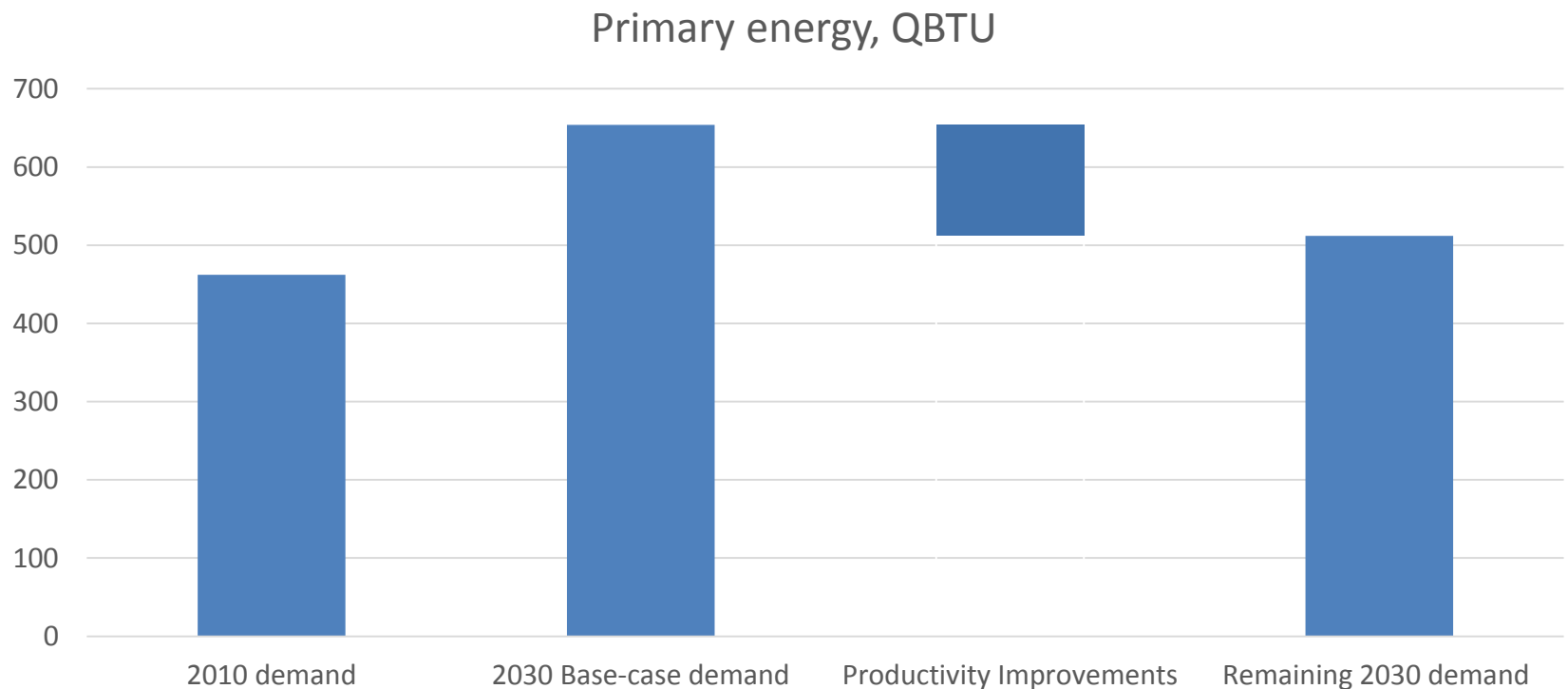


**USAID**  
FROM THE AMERICAN PEOPLE

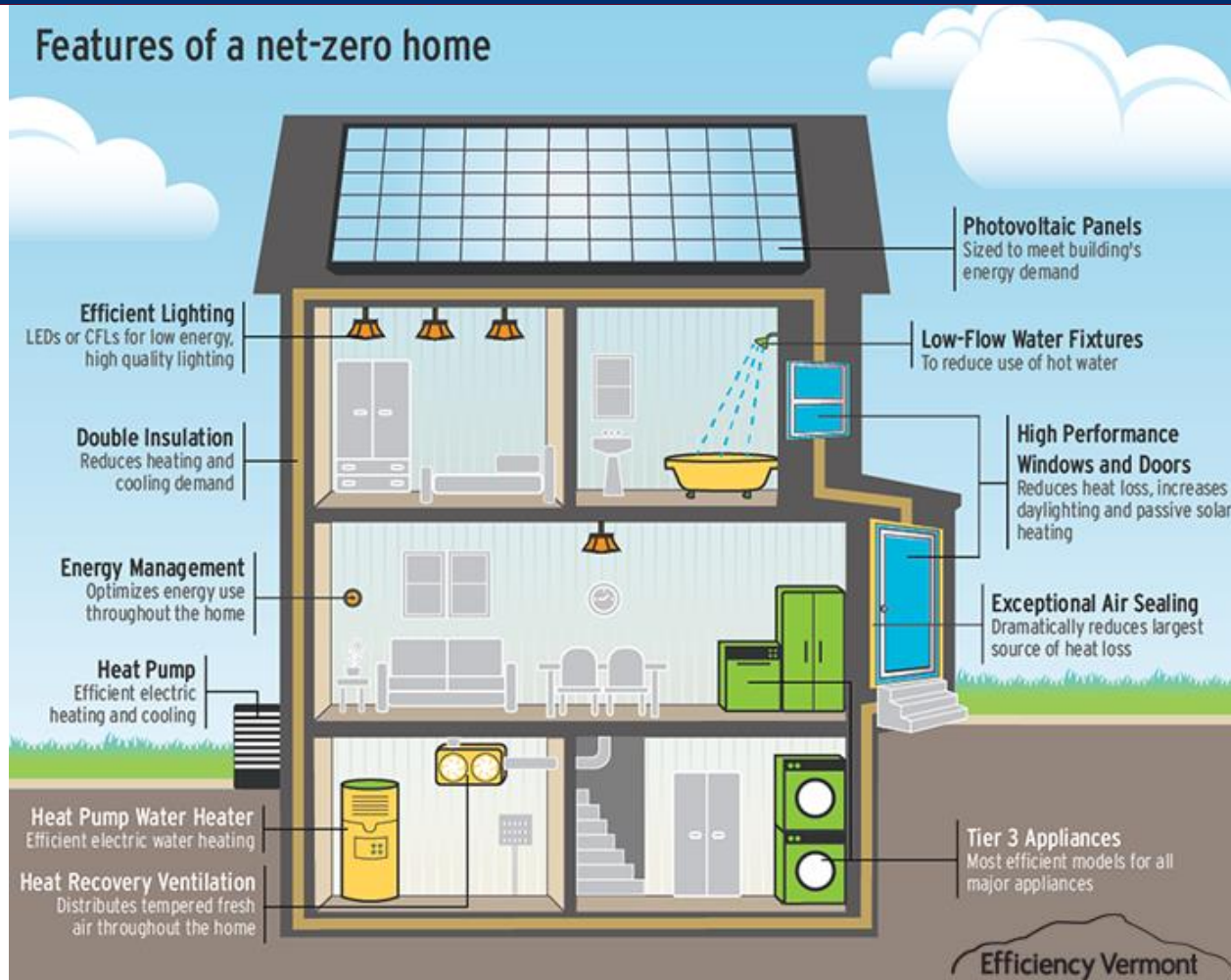


# The Gap Between Potential and Practice

## Resource Productivity Opportunity – McKinsey Global Institute, 2011



# Energy Efficiency → Renewables → Conventional Power



# Objective

## ✓ Close the Gap

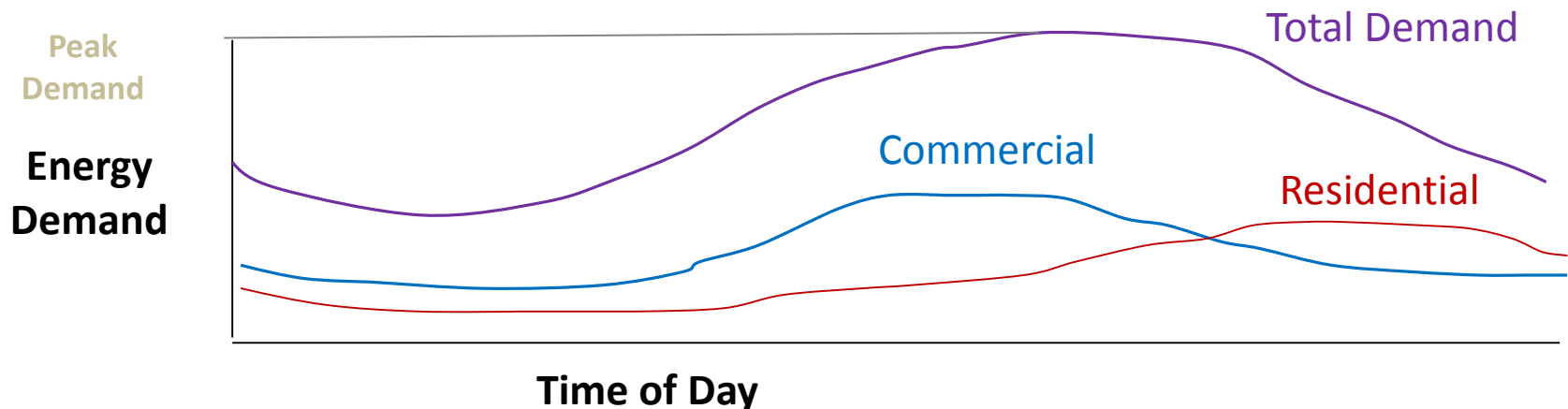
Understand strategies to achieve the potential and overcome the challenges for energy efficiency, to support greater deployment of programs in developing countries.

# Overview

1. Energy Efficiency Background
2. Achieving the Potential of Energy Efficiency
3. Overcoming the Challenges
4. Discussion: Effective Strategies

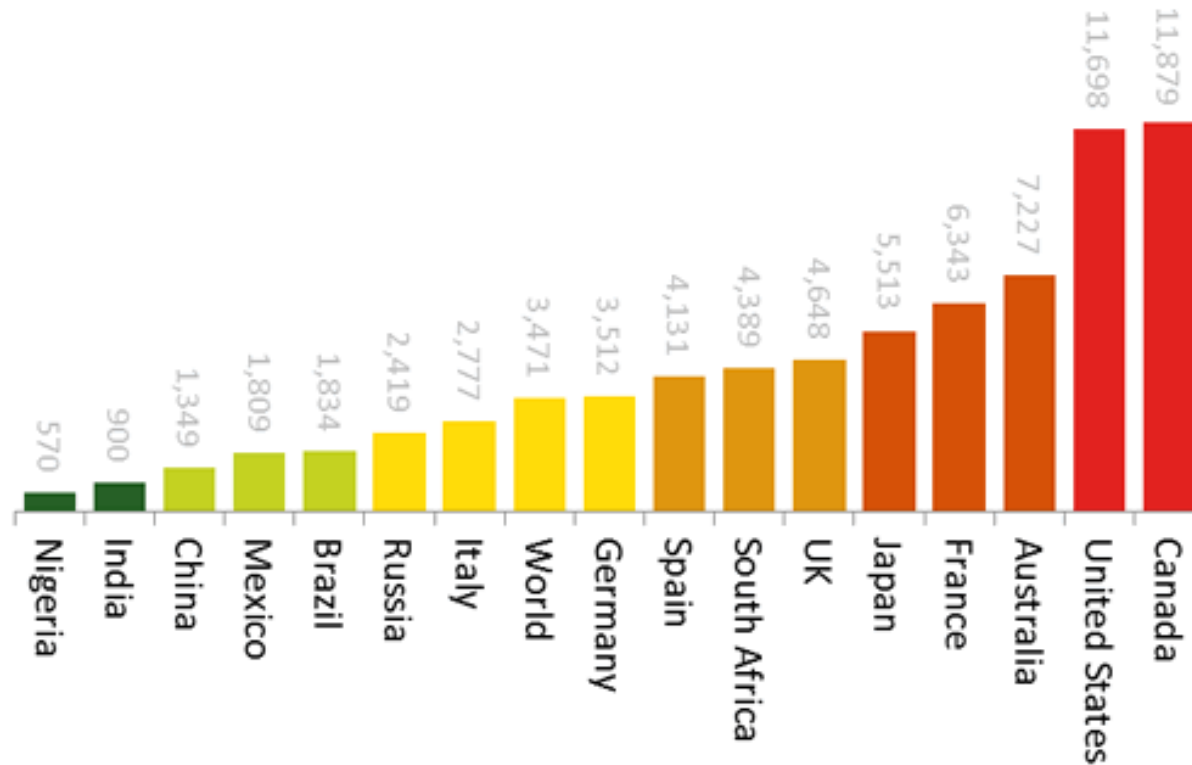
# Energy Efficiency Background

- Energy Efficiency (EE) = Using less energy to provide the same level of services
- Demand Side Management (DSM) = Targeting end use energy consumption to manage overall energy demand
- Demand Response = Targeting peak energy demand



# Country Comparison

## Household Electricity Consumption (kWh/year)

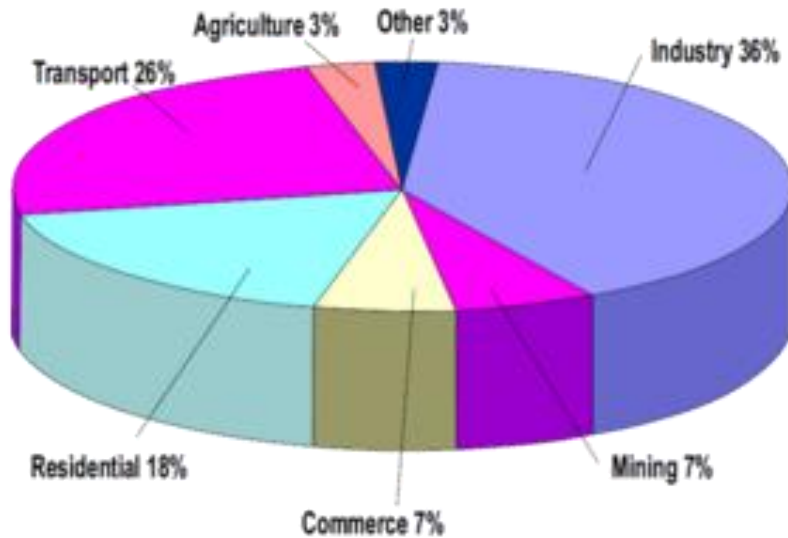


Note: Figures are 2010 averages for electrified households

Source: Enerdata via World Energy Council

Shrink That Footprint

# Country Comparison

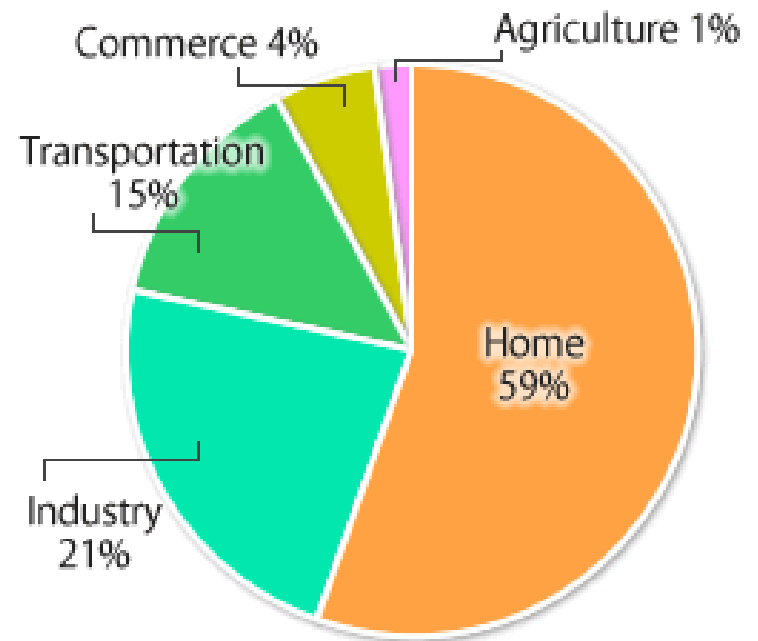


## Energy consumption in South Africa, 2010

Dept. of Energy, South African Energy Synopsis

## Energy consumption in Indonesia, 2006

Asia Biomass Office





# Discussion: what are potential activities?

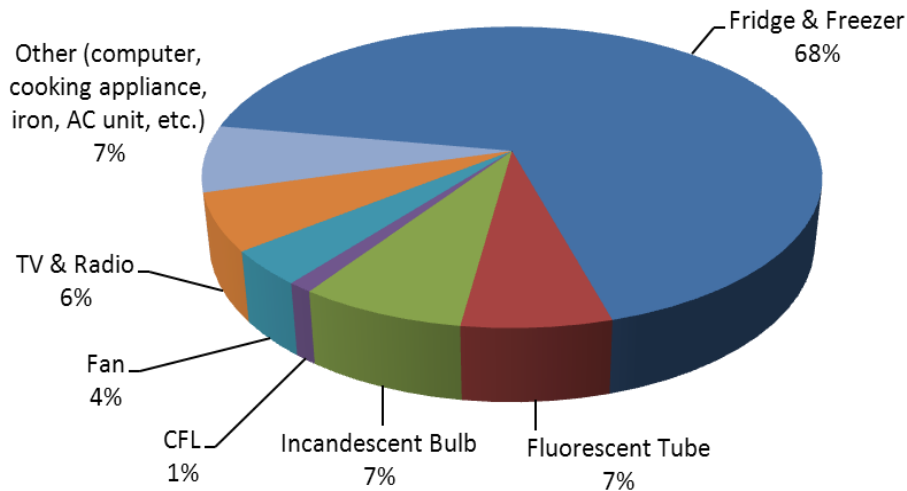
- Industrial
- Commercial
- Residential
- Transportation
- Agriculture



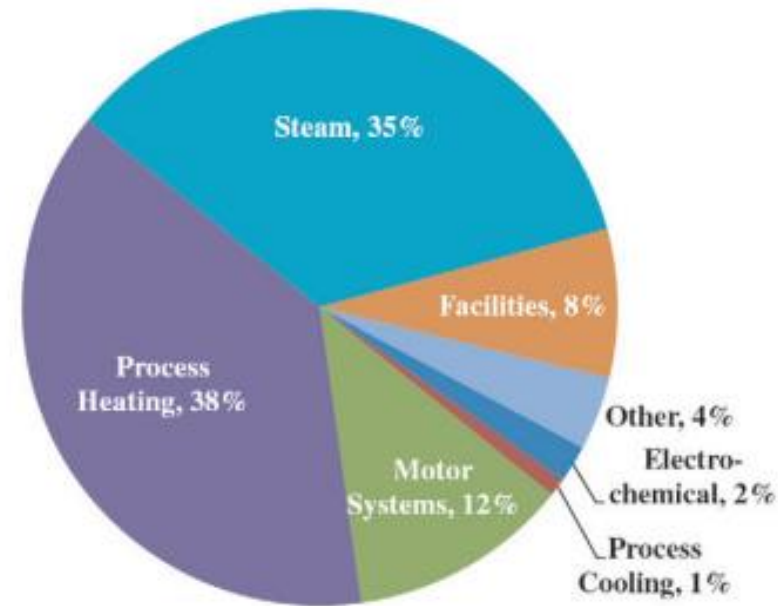
Credits: ICF for USAID CAEESP,  
Kazakhstan

# Tanzania: Customer Classification – Energy End-Use Disaggregation

## D1 Residential Customer



## T3 Industrial Customer



### Sources:

- Hatch report for D1, T1 residential, and T1 commercial
- GEA, 2012: Global Energy Assessment - Toward a Sustainable Future, Cambridge University Press, Cambridge, UK and New York, NY, USA and the International Institute for Applied Systems Analysis, Laxenburg, Austria.

# Reaching Potential



- ❑ First Fuel (fuel substitute)
- ❑ Reduced stress on T&D system
- ❑ Clean “power” (no emissions)
- ❑ IAQ, income benefits
- ❑ Jobs

## EXAMPLES

- Lighting in India
- Low-income housing in South Africa

# India CFL household exchange program

BEE = Coordinating & Managing Entity

- CFL performance verified and products labeled
- Avoided generation capacity of 415 MW through program
- Model for LED distribution



**Ms. P. Samal, Asst. Energy Economist, BEE,  
2013**

# *Kuyasa Low-Income Energy Efficiency Housing Project*

## **Results:**

- 7.4 million KWh energy reduction (34%), annually
- 6,437 tons of CO<sub>2</sub> emissions reductions (33%), annually
- IAQ
- Jobs



Credits: City of Cape Town

# Overcoming Challenges in the field



- Choosing the Best Opportunities**
- Building the Market**
- Understanding the Business Case**
- Measuring Performance**
- Mobilizing Finance**

# Refrigerator Energy Efficiency Project - Ghana

<https://www.youtube.com/watch?v=vVTACdpqizw>

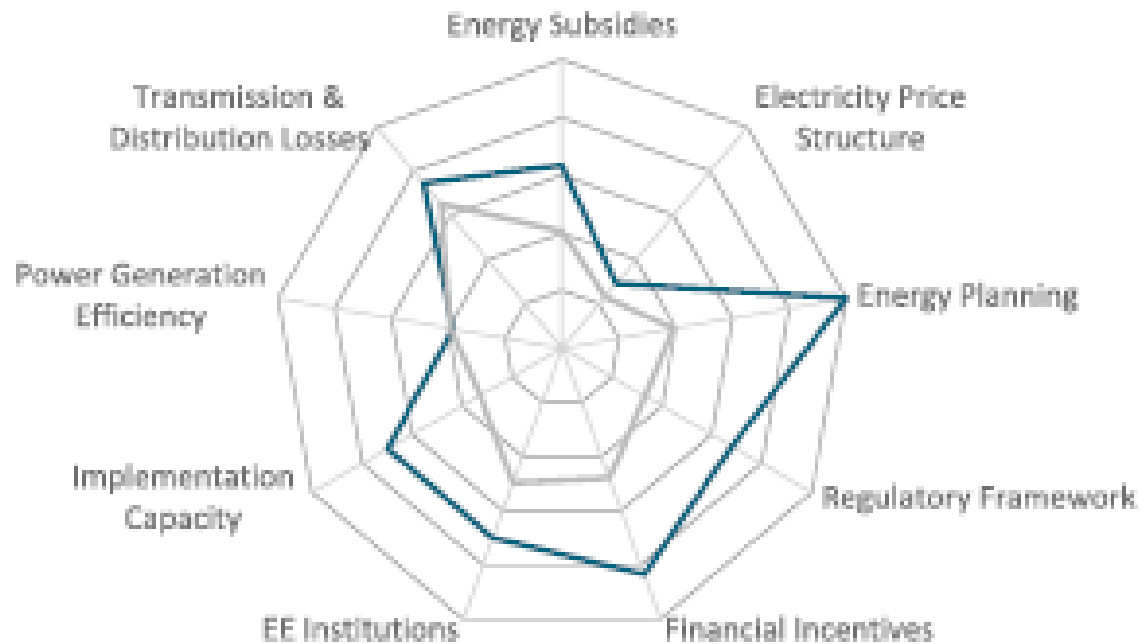


# Tunisia Policy Framework for Energy Efficiency



TUNISIA

SCORE 66





# *Kiev Public Buildings Energy Efficiency Project*

- Capital Cost/Initial Investment: USD 27.4 million
- 1,270 public buildings, including healthcare, educational, and cultural facilities: retrofit following a heating tariff policy
- Audits, retrofit design and bidding docs
- 9 cost-effective measures



Credits: USAID

# Overcoming Financing Challenges

- **Low-income housing in South Africa**
  - Financed partially through the National Government Expanded Public Works Program to create employment
- **Lighting in India**
  - Financed (pilot) through sale of GHG emission reductions/  
Certified Emission Reductions (CERs)



# *Bureau for Energy Efficiency (BEE) - India*

## **Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)**

- ✓ ESCO applies for loan from participating Financial Institution (FI)
- ✓ FI submits documents to BEE (Project Appraisal Unit)
- ✓ Supervisory Committee (BEE, Ministry of Power, Ministry of Finance, Other) approves/rejects
- ✓ If approved, FI provides loan to ESCO

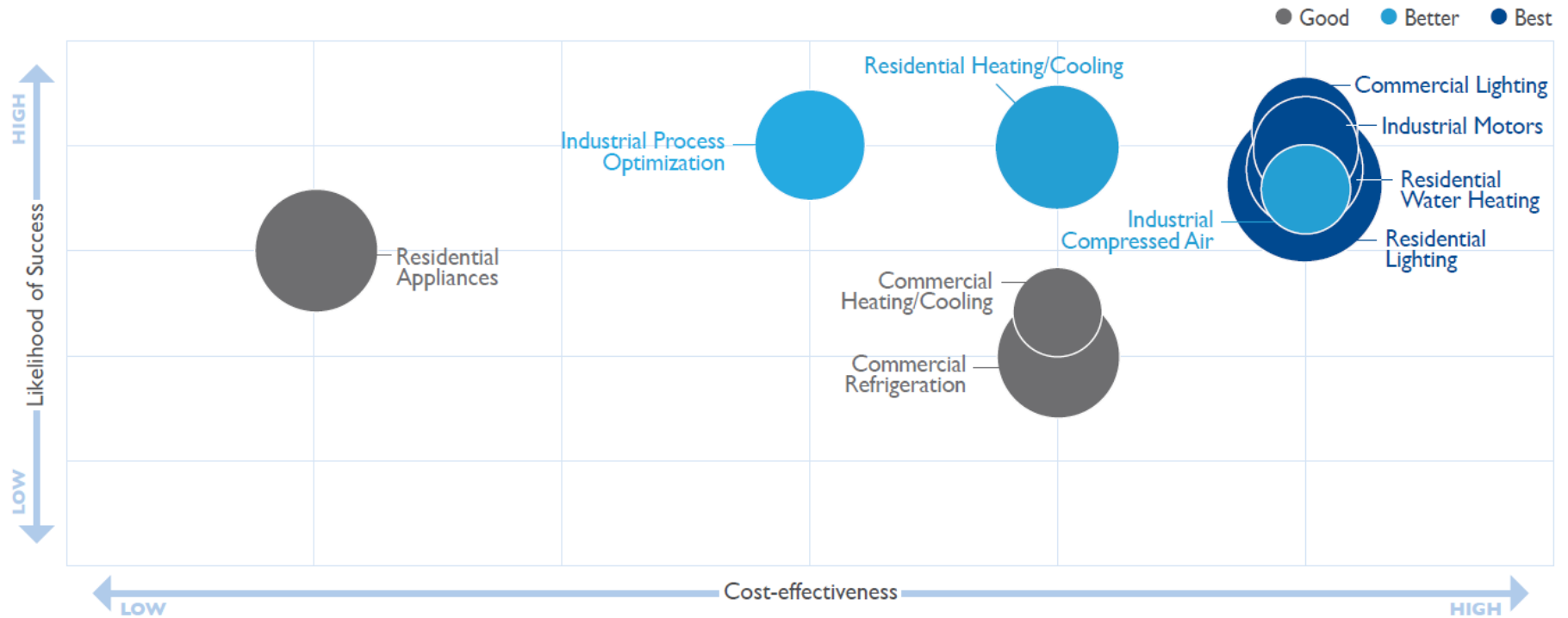


# Bangladesh Industry – EE Opportunities Assessment

USAID, Energy Efficient for Clean Development Program

Bankable Project Bundle	Capital Cost (BDT)	Financing Required (BDT)	NPV (BDT)	ROI	Discounted Payback
<b>#1 - Textile Sector - Total</b>	3,489,784,818	9,448,049,113	2,138,121,718	23%	12
<b>#2 - Textile Sector - Total</b>	2,657,813,812	8,356,369,278	4,030,065,033	48%	11
<b>#1 - Steel Sector - Total</b>	932,154,044	2,313,629,009	12,196,775,738	527%	2
<b>#2 - Steel Sector - Total</b>	3,247,465,752	9,881,283,726	36,512,837,780	370%	3

# Preliminary Results – Top 10 Opportunities



# Wrap-Up

## What are the strategies to address EE challenges?

- ✓ Choosing the Best Opportunities
- ✓ Building the Market
- ✓ Understanding the Business Case
- ✓ Measuring Performance
- ✓ Mobilizing Finance

... What else is needed?



# Thank you

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## ■ Key References:

- McKinsey Global Institute – “Resource Revolution”  
[http://www.mckinsey.com/insights/energy\\_resources\\_materials/resource\\_revolution](http://www.mckinsey.com/insights/energy_resources_materials/resource_revolution)
- RCREE – “Arab Future Energy Index” <http://www.rcreee.org/projects/arab-future-energy-index%E2%84%A2-afex>
- ESMAP – Cape Town-Kuyasa Settlement, South Africa, “Low-Income Energy Efficiency Housing Project” <http://www.esmap.org/node/1329>
- ESMAP – Kiev, Ukraine, “Energy Efficiency in Public Buildings”  
<http://www.esmap.org/node/656>
- Refrigerator Energy Efficiency Project, Ghana <http://www.energyguide.org.gh/>