Closing the Global Energy Efficiency Financing Gap:

International Experiences with Financing Approaches & Implementation Models

2016 ACEEE Energy Efficiency Finance Forum

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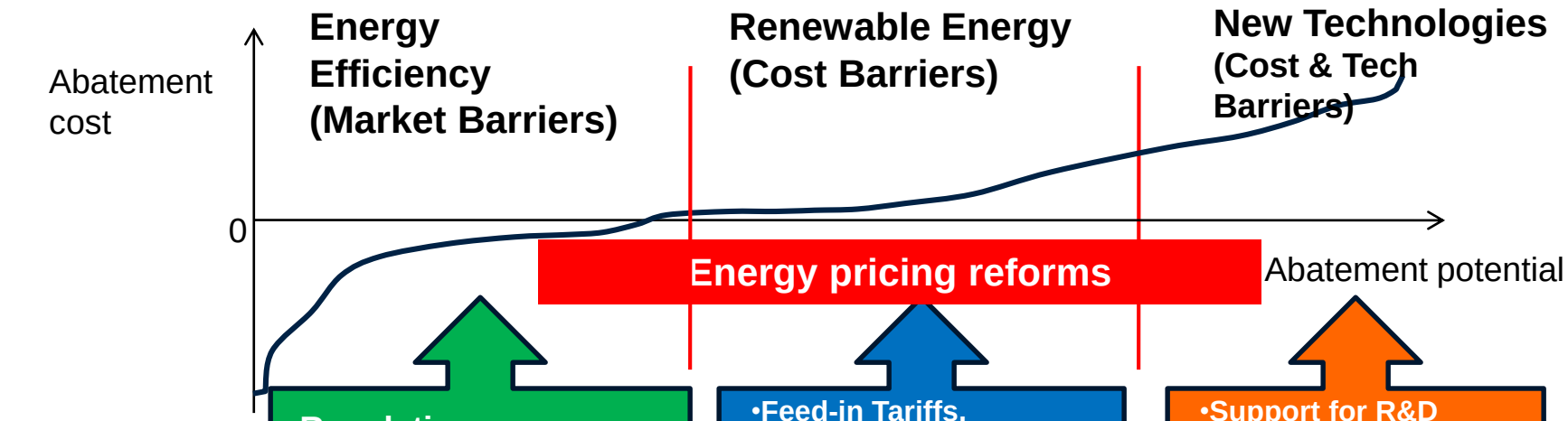
Washington D.C.

Energy Efficiency - The "First Fuel"?

But requires "innovative" financing…

in combination with policies and regulations and institutional reforms



Policy Tools

- •Regulations
- •Financial incentives
- •Institutional reform

- •Feed-in Tariffs, Renewable Portfolio Standards, or Tendering
- •Tax on fossil fuel

- •Support for R&D
- •Financing incremental cost
- •Transfer technologies

Financing Instruments

- Credit Line
- Guarantee
- Dedicated
- Equity Fund

EE Market Segments	RE Barriers	New Tech Risks
Traditional bank clients (large/medium)	Long-term tenure	Concessional loan
Borderline (mitigate perceived risks)	Mitigate technology risk s/extend tenure	Technology risk guarantee
SMEs & Public Sector	SMEs/immature financial market	Venture capital
SMEs, ESCOs, clean energy start-ups	SMEs and early-stage technology firms	

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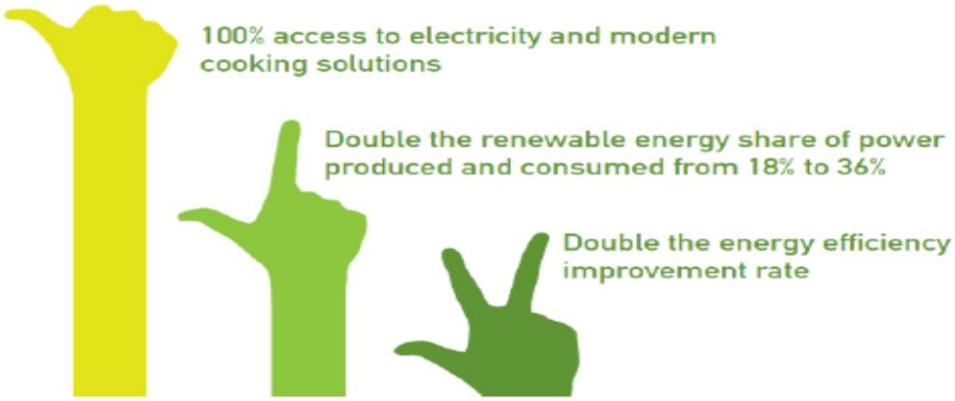
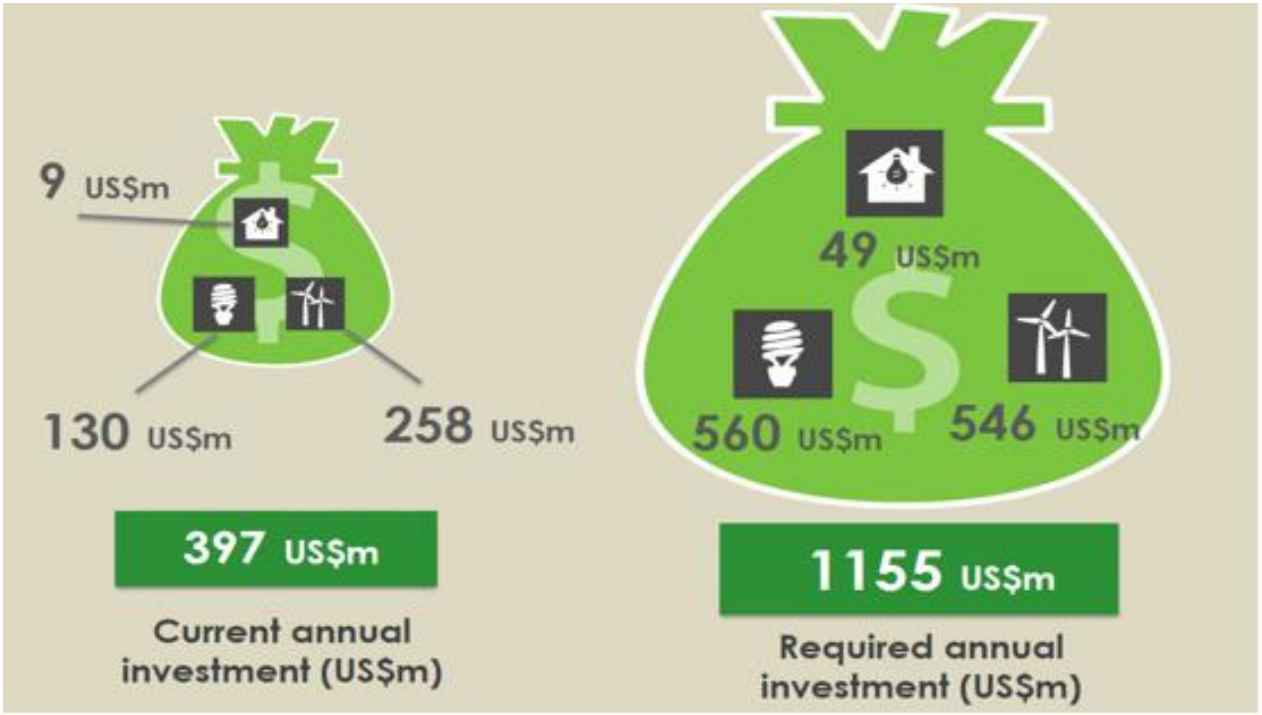
Source: World Bank (2012)

SE4ALL 2030 Targets and Financing Gaps





Source: SE4ALL- GTF (2015)

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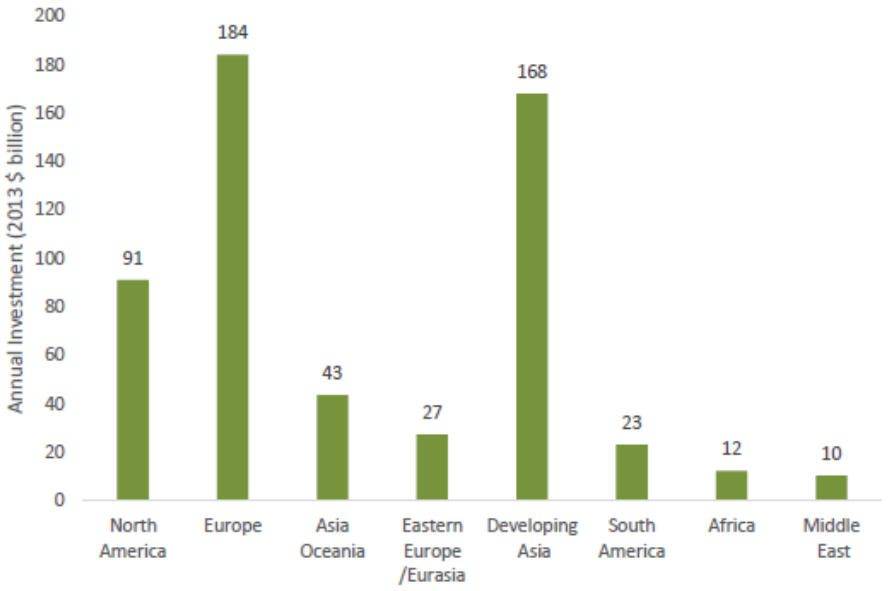
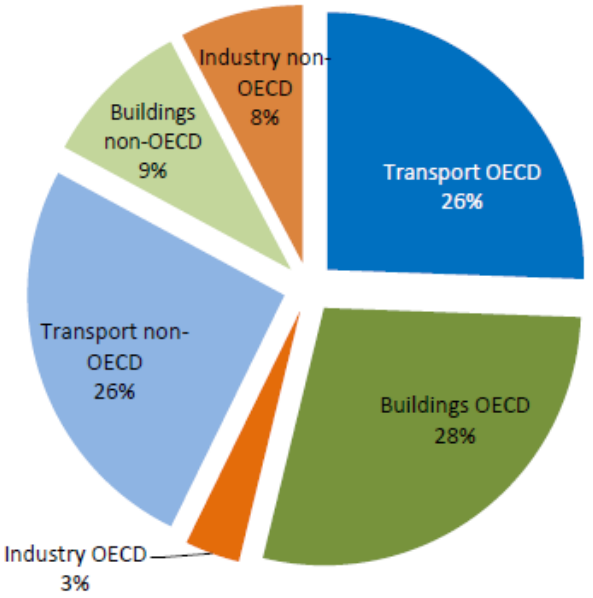
Where are Future Energy Efficiency Investments Required?

Annual average energy efficiency investment in the 450ppm Scenario by region, 2014-30



Share of annual average energy efficiency investment in the 450ppm scenario by sector and region, 2014-30



EE Investments need to increase by 4.3x of current levels
Most action will be in Europe, Developing Asia and North America

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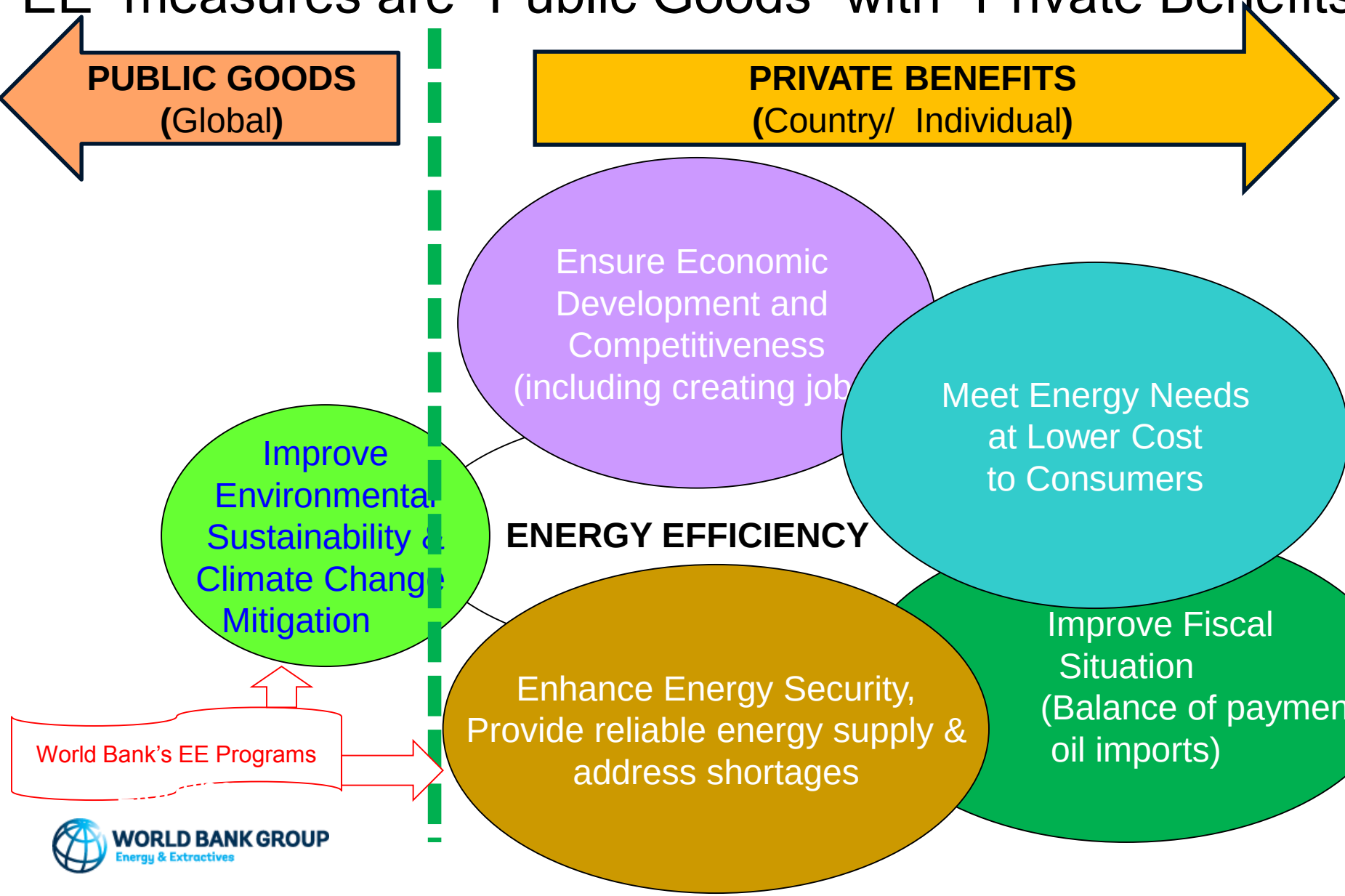
Source: SE4ALL- GTF (2015)

Global EE Financing Gaps: *What & How*

- Reaching the SE4ALL goal will require more than doubling the average annual investment in energy efficiency from now until 2030.
- Requirements and Gaps:
  - Average range of required EE investments of $500-600 billion per year through 2030 (for target: 450 ppm)
  - Average range of current EE investments of the order of US$130-150 billion.
  - Available Public and Climate public finance for EE → ~$50-60 billion
  - Investment Gap – annual >$400 billion
- Private sector investments is the key to the solution ~80%
- Public Finance should be used for leveraging private capital (including de-risking private investments)
- Public Finance should be used for creating enabling environment and better EE investment climate through removing barriers, policies
- Public Investments should be used for consumer awareness and capacity building, TA, standardization of tools and templates
- As urbanization takes place, focus will be on Financing at Urban/City/Sub-national levels

Objectives and Rationale for (WB) EE Programs

EE measures are "Public Goods" with "Private Benefits"



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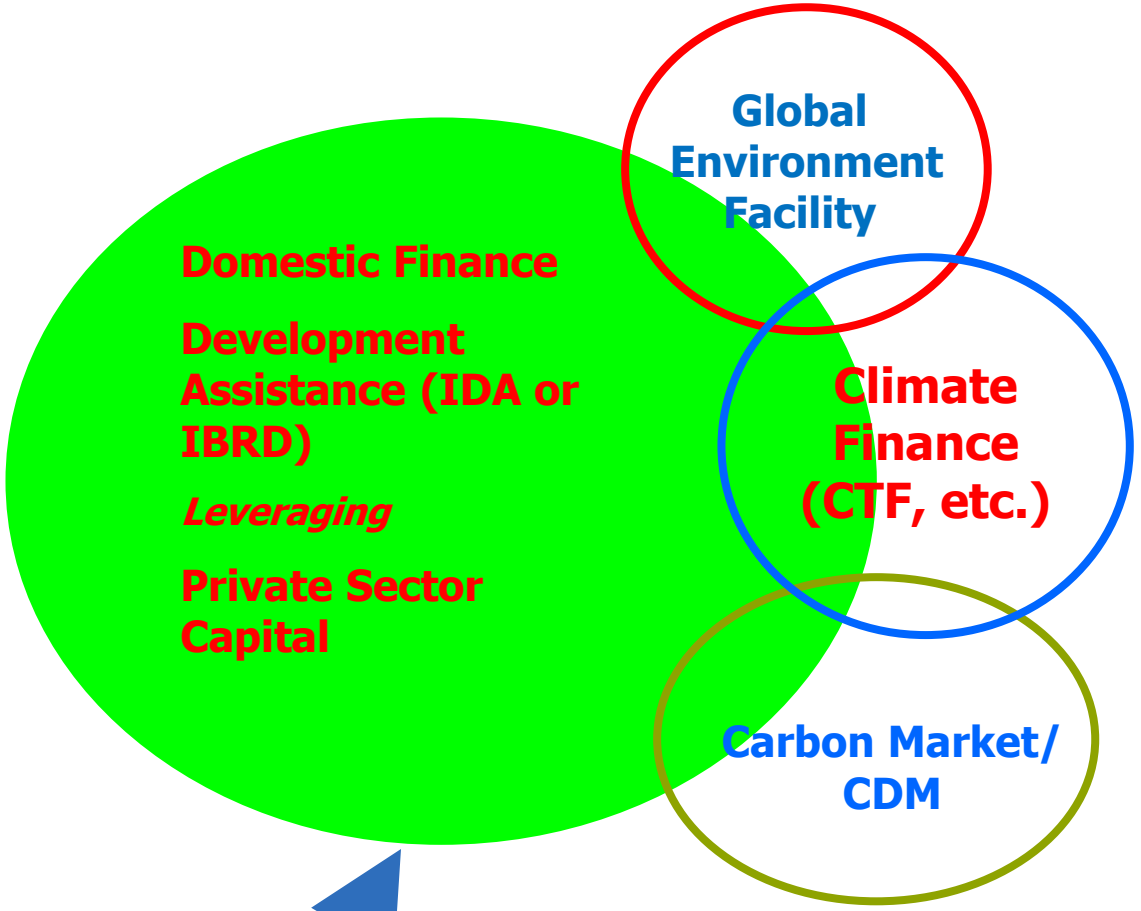
How World Bank Supports EE Programs
(Financing Sources & Technical Assistance)

Technical Assistance & Capacity Building/ Training

- **Utility Load Research**
- **Program Design and Implementation**
- **Consumer Surveys**
- **Technical Specifications**
- **Procurement**
- **Testing and Quality Issues**
- **M&V and Impact Evaluation**
- **Tariffs or Financial Policy Incentives (Taxes)**
- **Inefficient EE Lighting (IL) Phase Out Policies**



Institutions: Electric Supply/Distribution Utilities; Municipalities, etc

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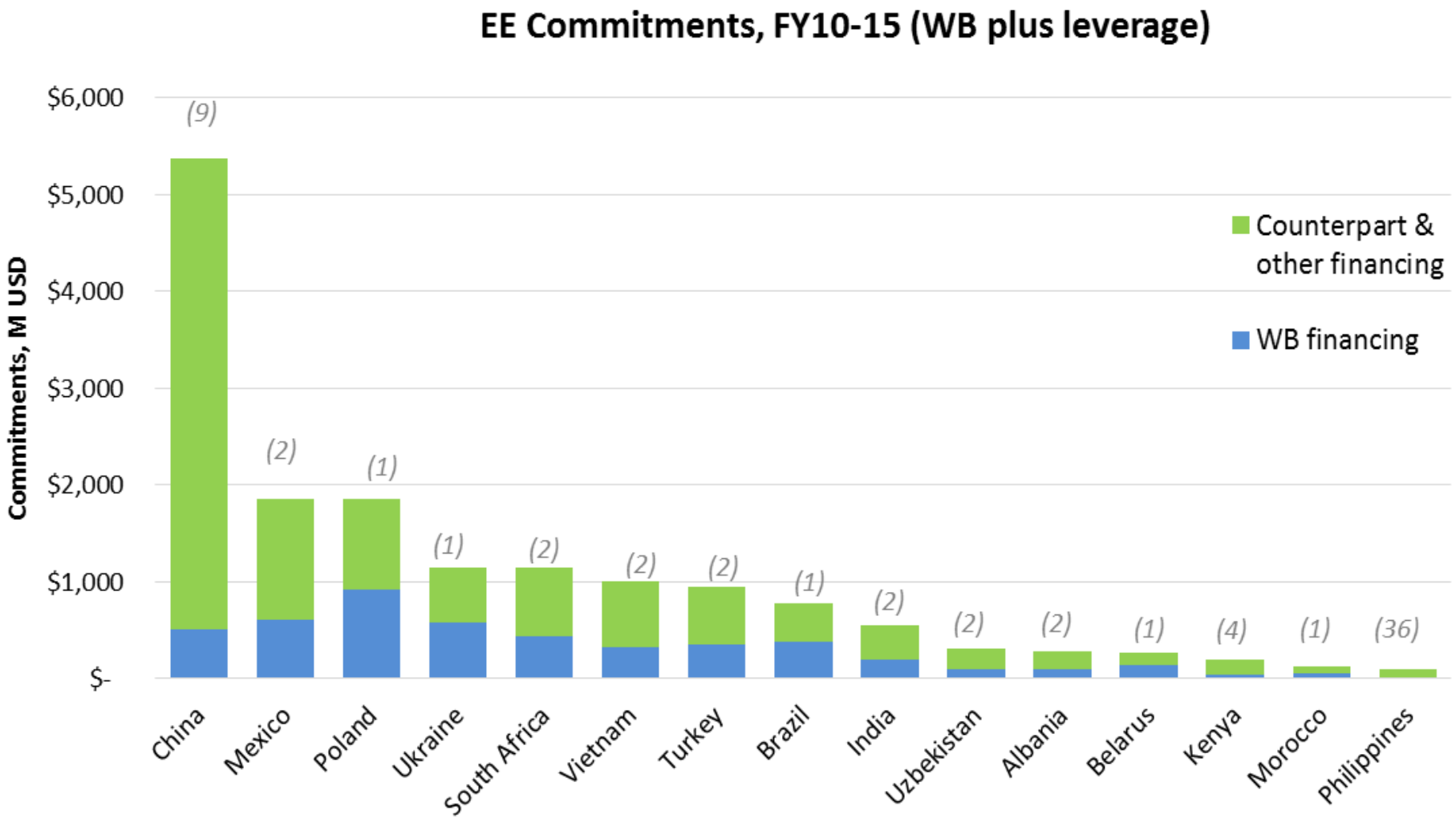
Financing Sources and Instruments for Large Scale EE Investment Programs

- Public Investments (by Government and electric utilities)
- Support from Development Finance Institutions such as the World Bank through following instruments:
  - Soft/low interest investment lending,
  - Grant finance, mostly for technical assistance,
  - Lending through utilities or financial intermediaries (incl. private capital leverage)
  - Development Policy Credit
- Support from Global Climate Finance Mechanisms
  - Carbon Finance – Clean Development Mechanism
  - NAMAs, NDCs, etc
  - Clean Technology Fund (CTF).....also GCF
  - Global Environment Facility (GEF)
- Modality of Finance
  - Stand –alone
  - Blended
  - PPPs

Energy Efficiency Financing and Leverage



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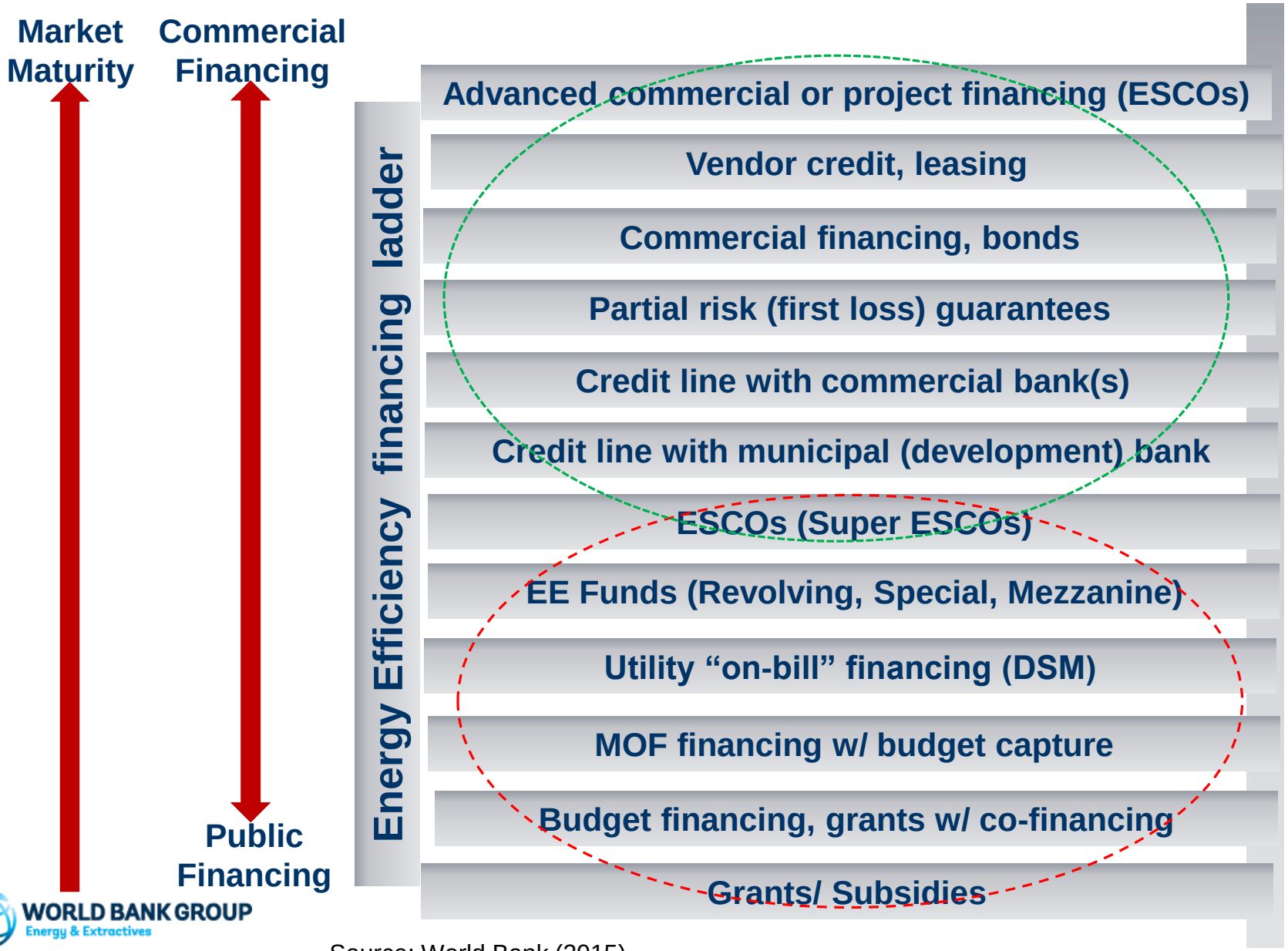
Sustainable EE Financing Mechanisms: Utilizing Public Finance to Mobilize Private Capital



Source: World Bank (2015)

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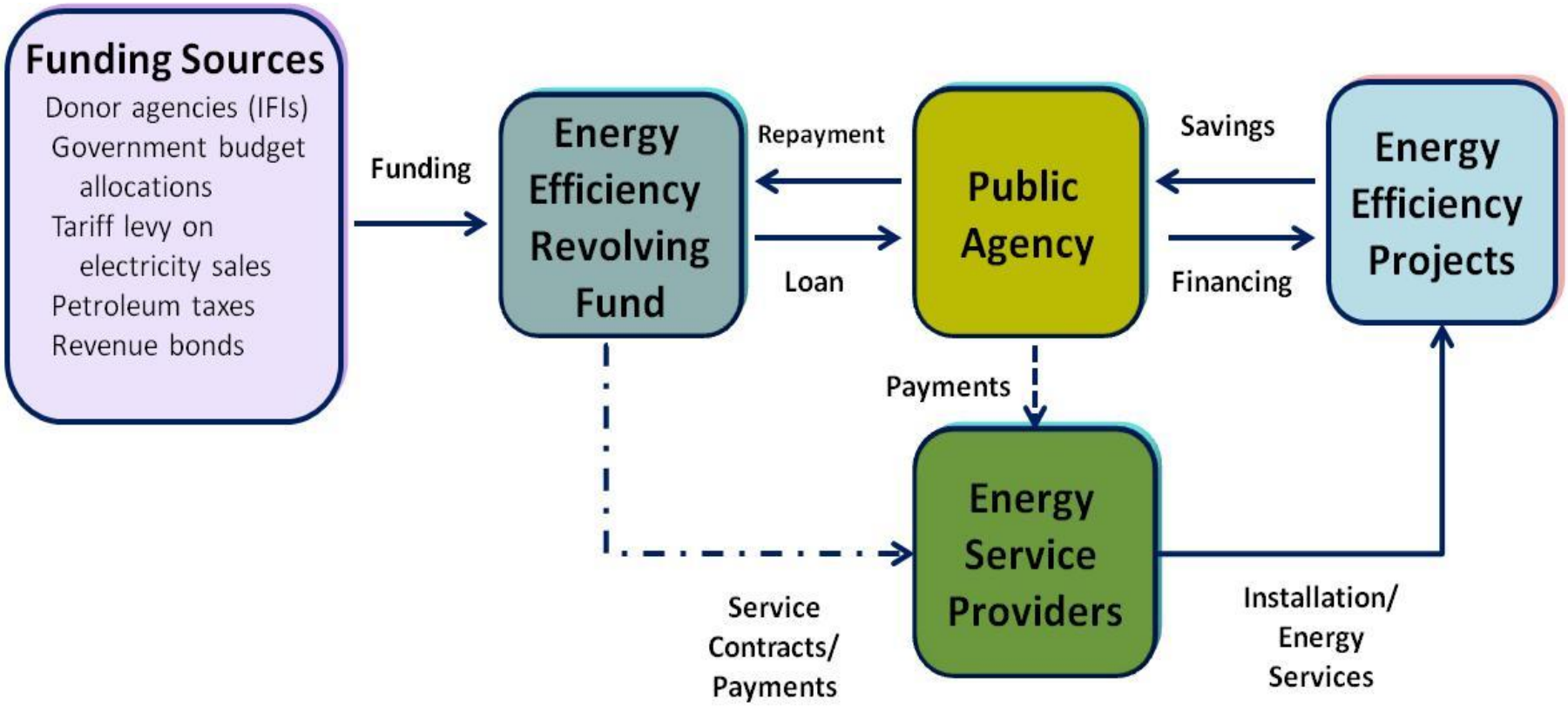
Examples from Different Countries

Typical Structure of Energy Efficiency Fund



Source: World Bank (2015)

Energy Efficiency Funds - Examples

- Bulgaria Energy Efficiency Fund
- Romania Energy Efficiency Fund
- Armenia Renewable Energy and Energy Efficiency Fund
- Thailand - Energy Conservation Fund (ENCON)
- Korea – Korea Energy Management Fund
- India – State Energy Conservation Funds
- Sri Lanka – Sustainable Energy Fund
- China - National incentive fund based on coal savings
- South Africa – Central Energy Fund

Armenia R2E2 Fund

- Renewable Resources and Energy Efficiency (R2E2) Fund established in 2005, started revolving mechanism in 2012 for public EE projects using ESAs
- Project targeted US$9 million (about 100 municipal street lighting and building retrofit projects) over 3 years
- To date, the R2E2 Fund has signed 55 ESAs totaling US$8.7 million
  - Average project size is about US$150,000 (one US$1.2 million project with a university)
  - All ESAs are being repaid on time (or early)
  - All projects are subcontracted to local construction firms under simplified performance contracts; to date, all have met or exceeded savings estimates
  - Many new technologies have been introduced, since procurement is based on highest NPV rather than lowest cost

Source: World Bank (2015)

Utility Demand Side Management (DSM)

- Utilities have many advantages for pursuing DSM but also mixed incentives
- Load management vs. energy conservation
- Recent proliferation of utility appliance programs, many on EE Lighting
- Post DSM models – DSM bidding, standard offer, EE power plant, white certificates

Examples

Argentina	Pakistan	Thailand
Brazil	Philippines	Uruguay
Burundi	Rwanda	Vietnam
India	South Africa	Bangladesh
Mexico	Sri Lanka	

Mexico Residential Sector CFL Program…1

Government of Mexi (SENER)

In urban areas, a turnkey bundled procurement implementation scheme used, targeting low-income families identified by electricity consumption data.

In rural areas, **SENER** will work with an **operator** (FIDE/FIPATERM) to bulk procure the CFLs, and work with **DICONSA** (store that reaches these areas) for CFL distribution and IL collection.

Source: Mexico EE Lighting and Appliances project of the World Bank

$$$ World Bank

$$$ Carbon Finance

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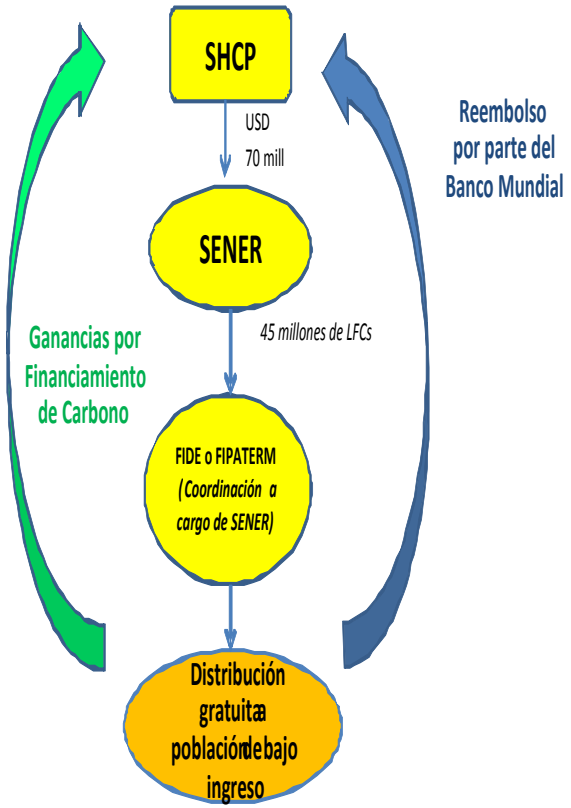
Mexico Residential Sector CFL Program…2

- 45 million CFLs, free distribution
- 1.4 million CFL pilots successful
- CDM funds along with World Bank funds (plus GEF and CTF support)
- Exchange of ILs for CFLs at approved retail stores (coupons)
- 10 million carbon credits - CERs (through 2021) generated
- First CFL CDM PoA registered
- Target of 11 million low income households, including 2 million in rural areas (4 CFLs each)



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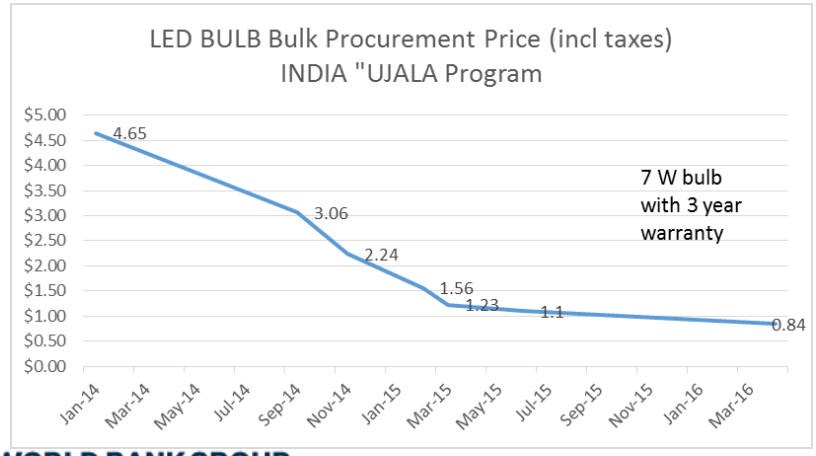
India's LED Lighting DSM Program (*UJALA*)

- Managed and Implemented by **Super ESCO** EESL in India, in collaboration with electric utilities (DISCOMs)
- Bulk public procurement : Price Reduction, Quality Assurance
- Targeted Replacement of 770 million incandescent bulbs with LED bulbs;
- >106 Million LED lamps already distributed and replaced in <2 years
- Payment upfront or "on-bill financing" in installments; 3-year warranty
- Expected savings of **100 billion kWh** annually
- Consumer Savings of **>$6 billion in consumer bills**
- Average **reduction of electricity bill of consumers** by **$2-6/year/LED**

Dramatic Reduction in price of LED bulbs



UJALA Dashboard
http://www.delp.in

http://iledtheway.in

Source: EESL Presentation (2015, 2016)

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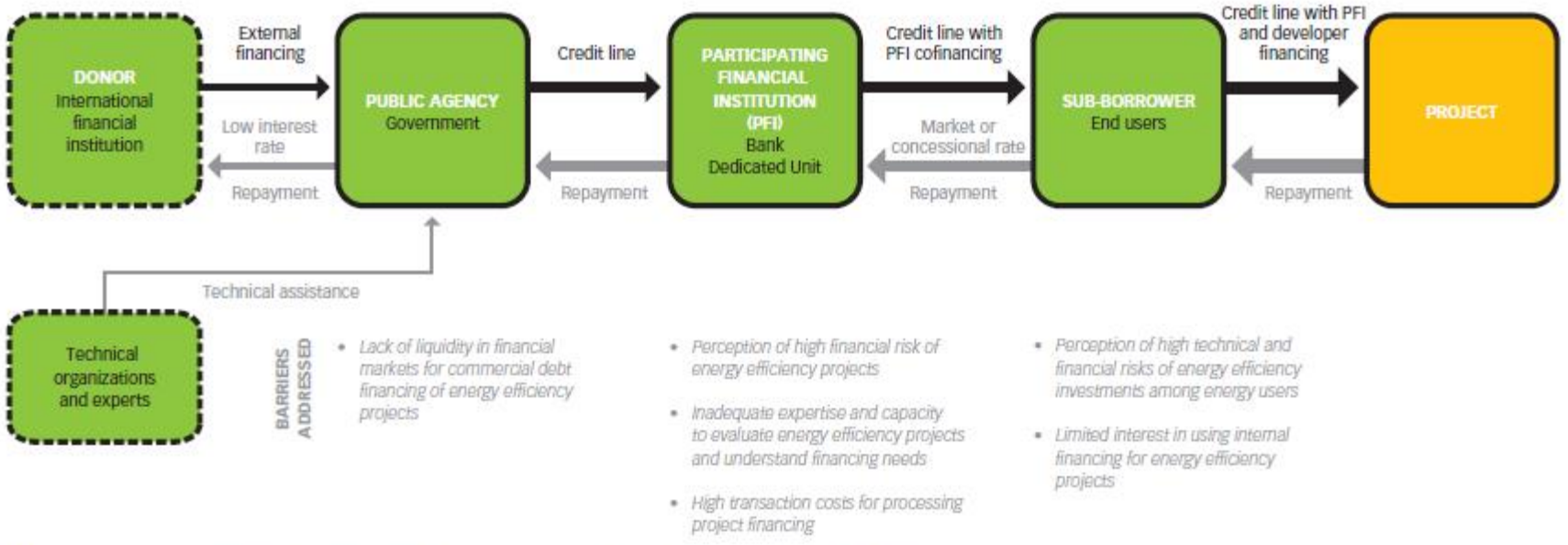
Typical Structure of Dedicated EE Credit Line

Figure 1. Typical design of an energy efficiency credit line



N.B. Thickness of arrow represents relative size of financial flows to depict leveraging. Public agencies may offer credit lines without the aid of external donors (dashed border).

- Create interest on the part of commercial banks in financing EE projects
- Enhance technical capacity of banks to scale up EE lending
- Leverage parallel financing from the participating banks for EE financing
- Strengthen the participating bank's capacity in identifying and managing project risks
- Assist banks in exploring business opportunities in other low carbon lending businesses.

Source: World Bank (2014), Designing Credit Lines for Energy Efficiency

Energy Efficiency Credit Lines - World Bank Examples

Table 1. World Bank energy efficiency credit lines

Country	Launch year	Close year	Number of PFIs	Is the line specific to energy efficiency?	Target sector	World Bank financing (US$ millions)	Cofinancing[a] (US$ millions)	Cofinancing (percentage World Bank financing)	Total financing (US$ millions)	Disbursement rate (percent)
China	2008	2013	2	Y	Large and medium industry	200	200	100	400	89
China	2010	2014	1	Y	Large and medium industry	100	500	500	600	20
China	2012	2016	1	Y	Industry, buildings, SMEs and ESCOs	100	200	200	300	0
China	2011	2016	3	Y	Industrial	133	134	101	267	11
China	2012	2018	2	Y	Buildings	100	100	100	200	0
Tunisia	2009	2014	2	Y	Industrial	40	80	200	120	18
Turkey	2009	2014	2	N	Industrial	600	550	92	1150	100
Turkey	2012	2016	2	N	Industrial	500	150	30	650	44
Ukraine	2011	2016	1	Y	Industrial, commercial and municipal	200	n/a	n/a	n/a	32
Uzbekistan	2010	2016	2	Y	Industrial	24	4.8	20	28.8	49
Turkey	2013	2018	3	N	Energy-intensive SME subsectors	201	50.25	25	251.25	7
Uzbekistan	2013	2016	3	Y	Industrial	99	43	43	142	14

Source: Limaye 2013.

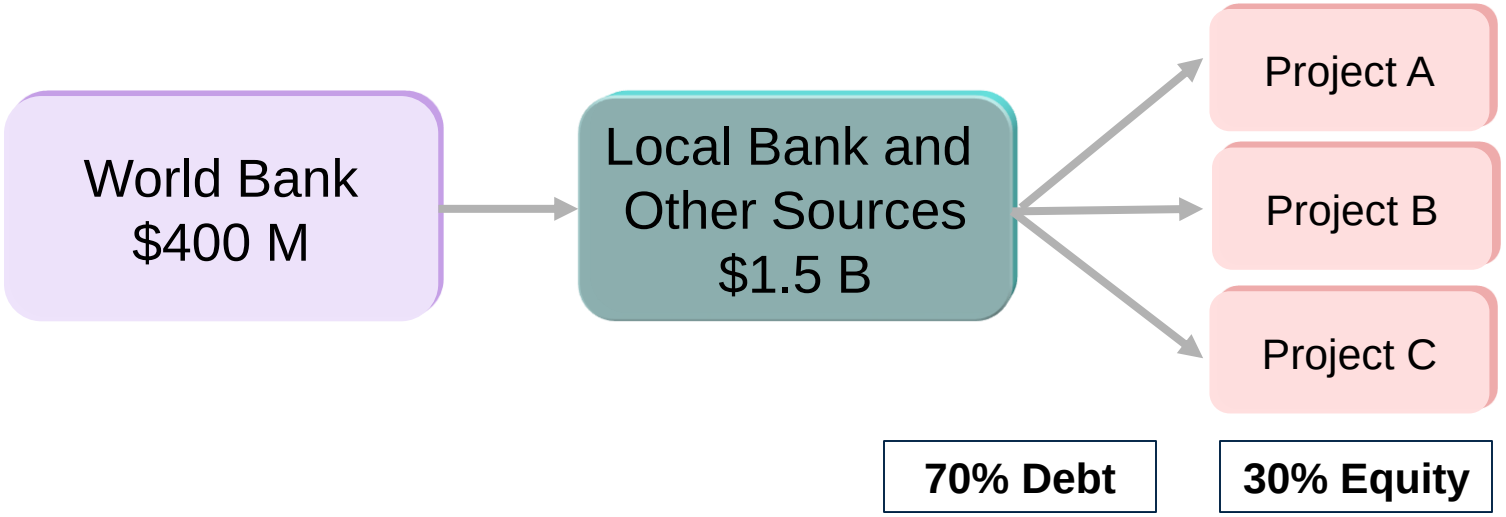
Note: PFI = participating financial institution; SME = small and medium-size enterprise; ESCO = energy service company

a. Excludes financing from end users.

Source: World Bank (2014), Designing Credit Lines for Energy Efficiency

Energy Efficiency Credit Line Example – China EE Financing Program (CHEEF)

World Bank China Energy Efficiency Financing Program
Credit lines from World Bank to 3 banks in China
Exim, Minsheng and Huaxia Bank



Source: World Bank

China Energy Efficiency Financing Program

China Energy Efficiency Financing Project I, II, and III:

- WB loan ($400M): **credit line** to three local banks for EE investment
- GEF grant ($13.5M): **capacity building** to banks and EE **policy support**
- Focus: **large and medium industrial enterprises**, recently expand to **ESCOs and building EE**
- **Achievements**:
- **$400M IBRD leveraged $1,900M**; Annual energy savings of 3 Mton of coal equivalent and CO_2 emission reduction of 7.3 Mtons
- Substantially increased PFI's interests, capacity, and confidence in EE lending

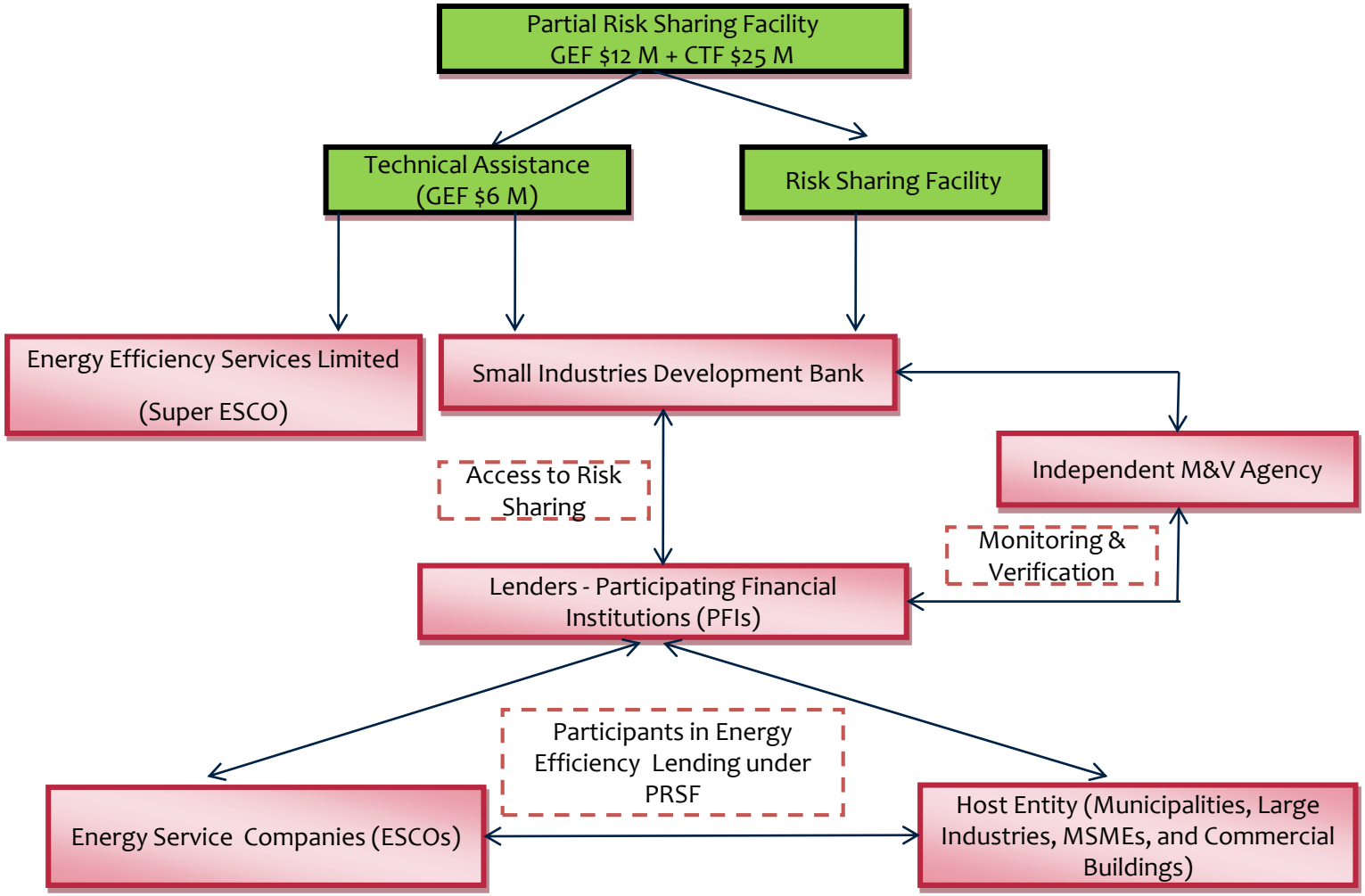
Lessons Learned:

- ***Participating banks' internal organization:*** Management commitment, dedicated teams, and incentives to staff are the most important success factor
- ***Technical Assistance*** to participating banks is critical with high pay-off
  - ***Generating sufficient deal flows*** has not been easy
  - ***New business model to bundle small-scale EE projects*****:** target at large enterprises, and aggregate small-scale EE investments at the subsidiaries
- Encouraging participating banks to expand ***support to SMEs has been a major challenge***

Partial Credit Guarantees (Risk Sharing) for Catalyzing EE Investments

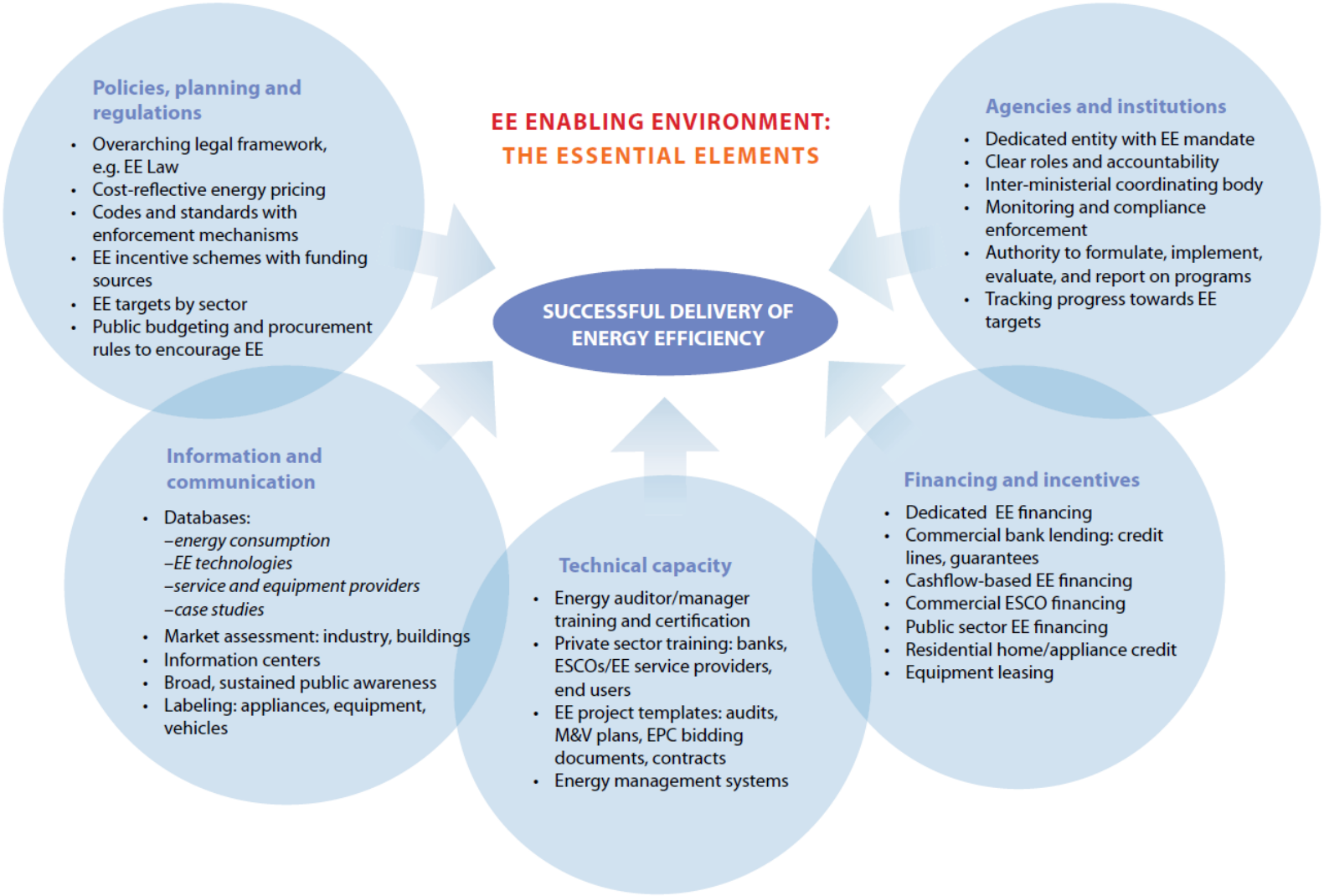
- Designed to address the problem of access to finance
- Risk perception of banks and financial institutions
- Government or donor agency provides a partial guarantee covering loan loss from default
- Participating banks sign agreements specifying loan targets and conditions
- Banks conduct due diligence and process loans
- In case of loan default the guarantee covers a portion of the loss – the program may also include a “first loss reserve”
- Substantial technical assistance also provided to banks, project hosts and project developers (ESCOs)

India Partial Risk Sharing Facility for Supporting EE Investments through ESCOs



Some Lessons Learned

Scaling Up EE Needs an Integrated Enabling Environment: *finance is one part of the puzzle*



Source: World Bank (2015)

Public EE Financing Mechanisms: Pros & Cons

Financing mechanism		Application	Advantages	Disadvantages
Public financing	**Investment subsidies**	Direct subsidies to customers or manufacturers to lower the appliance purchase or cost of production or to promote research and development.	Stimulates market demand by lowering first cost, and can help achieve market transformation.	Can distort market pricing. Appliance sales may go down when subsidy is phased out.
	Fiscal incentives	Provides tax incentives such as tax rebates on EE equipment, import duty concessions, tax holidays, tax credits, and accelerated depreciation for purchase of EE appliances.	Reduces the cost of installing EE appliances. Better option than direct subsidies.	Tax incentives need effective tax collection systems.
	EE funds	Dedicated EE fund to finance EE projects. Funded through public finance and/or MDB and donor funds.	Ideal for countries with weak banking systems. Financing can be a grant or loan.	Does not help create a sustainable financing mechanism for EE. Needs strong and transparent fund management.
	Concessional loans	Provides concessional finance for EE in countries with low market capitalization, high cost of financing, and/or short loan tenors.	Can stimulate financing for EE if on-lent through local FIs with a requirement to leverage additional commercial capital. Can help local FIs develop experience with EE.	Can distort market financing terms. Commercial financing may not take place after concessional terms are withdrawn. Works only in countries with functional banking systems.
	Lines of credit	Provides line of credit to commercial FIs to finance EE at concessional or market terms.	Can incentivize local FIs to finance EE and gain experience leading to sustainable commercial financing mechanisms.	Commercial financing may not take place after the credit line is exhausted or concessional terms are withdrawn. Works only in countries with functional banking systems.
	Revolving funds	Similar to concessional loans or line-of-credit, provides a source of funds in countries with illiquid capital markets.	Funds leveraged with commercial financing can sustain operations. Can incentivize local FIs to finance EE and gain experience leading to sustainable commercial financing mechanisms.	Works only in countries with functional banking systems.
	Risk mitigation products	Lowers the risk of financing EE projects through first-loss facilities, partial loan guarantees, etc.	Reduces real and perceived risks of EE; helps local FIs build capacity and establish commercial EE financing.	Works only in countries with functional banking systems. Additional fee adds to cost of financing.

Source: World Bank (2015)

Private EE Financing Mechanisms: Pros & Cons

Financing mechanism		Application	Advantages	Disadvantages
Private financing	**ESCO financing**	Finances EE through guaranteed-savings or shared-savings contract.	Financing can be channeled through ESCOs (shared savings) or through customers (guaranteed savings). Lowers performance risk.	FIs often reluctant to finance ESCOs, which may lack credit history or adequate collateral for traditional banking operations. ESCOs work better with strong enabling environments.
	Utility financing	Finances EE installation—financing could be through grants, customer charges, concessional financing or commercial financing.	Uses utilities' relationship with customers. Allows repayment in installments through customer bills.	Utilities reluctant to engage in financing operations. Repayment systems add complexity to billing.
	Customer financing	Traditional financing of projects.	Customer finances cost-effective projects through normal credit and debt channels of financing.	Customers rarely take on debt for EE projects. Cost-reflective energy prices and attractive financing terms help motivate customers.

Source: World Bank (2015)

Key Success Factors for EE Financing Programs

Build strong, stable demand

Examples

- Regulations
- Energy pricing
- Awareness raising and education
- Tools and guides
- Information and case studies
- Awards and recognition
- Incentives

Effective technical intermediation

Examples

- Energy auditing programs
- Energy managers
- EE equipment leasing/vendor financing
- ESCOs
- Benchmarking
- National standards

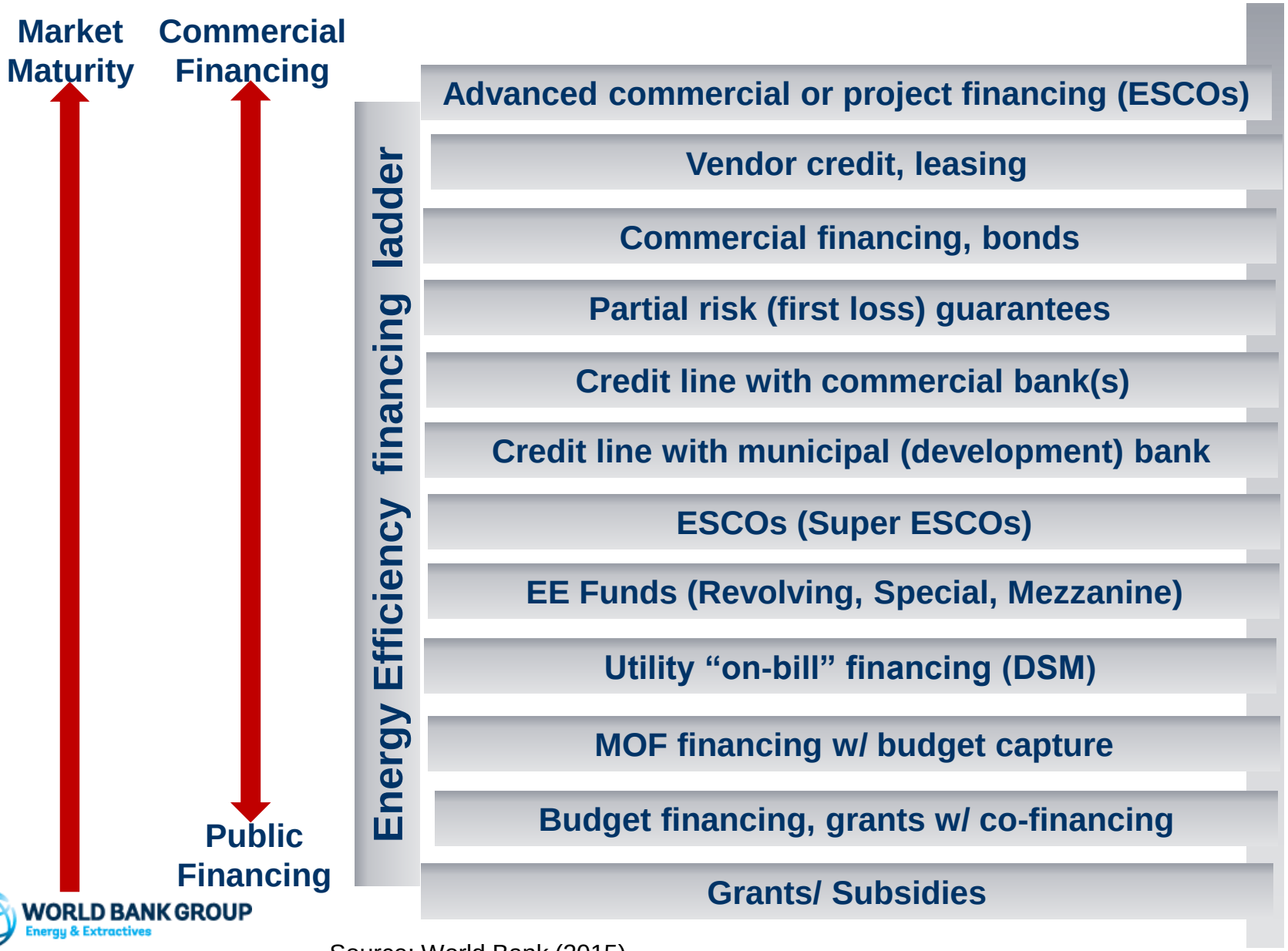
Good banking capacity

Examples

- Specialized EE financial products (e.g., cashflow-based financing)
- Procedures for technical/financial due diligence
- Loan officer EE training
- Loan officer awards, recognition

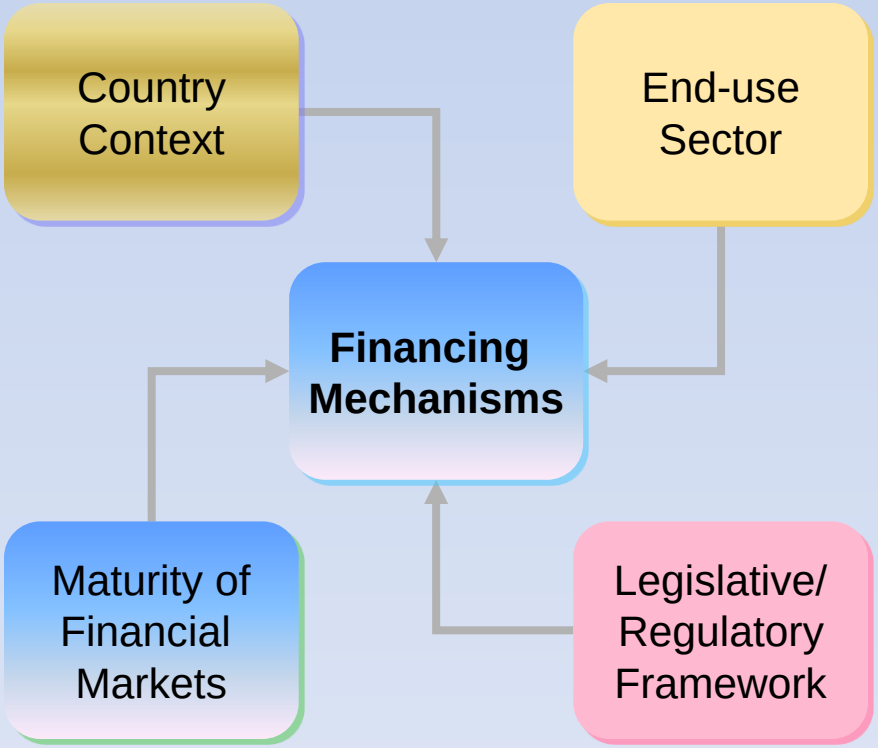
Source: World Bank (2015)

Sustainable EE Financing Mechanisms: Utilizing Public Finance to Mobilize Private Capital



Source: World Bank (2015)

Factors Determining Choice of EE Financing Mechanism



- Selection of mechanisms depends on local conditions
- Different mechanisms may be needed for different sectors
- Combinations of mechanisms may be more effective
- International experience provides useful information, but must be adapted to local conditions

Thank You

For questions, please contact:

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