



WORLD BANK GROUP

World Bank Energy Efficiency Financing Models: Effective Mechanisms and Key Recommendations

**COP13 & MOP 36 (of the Montreal Protocol) Side Event:
"Back to the Future: Approaches to Operationalizing Energy
Efficiency for Sustainable HFC Phase-down"**

Bangkok, October 2024

Energy Efficiency is a “Win-Win” Value Proposition: Sustainability, Mitigation and Resilience

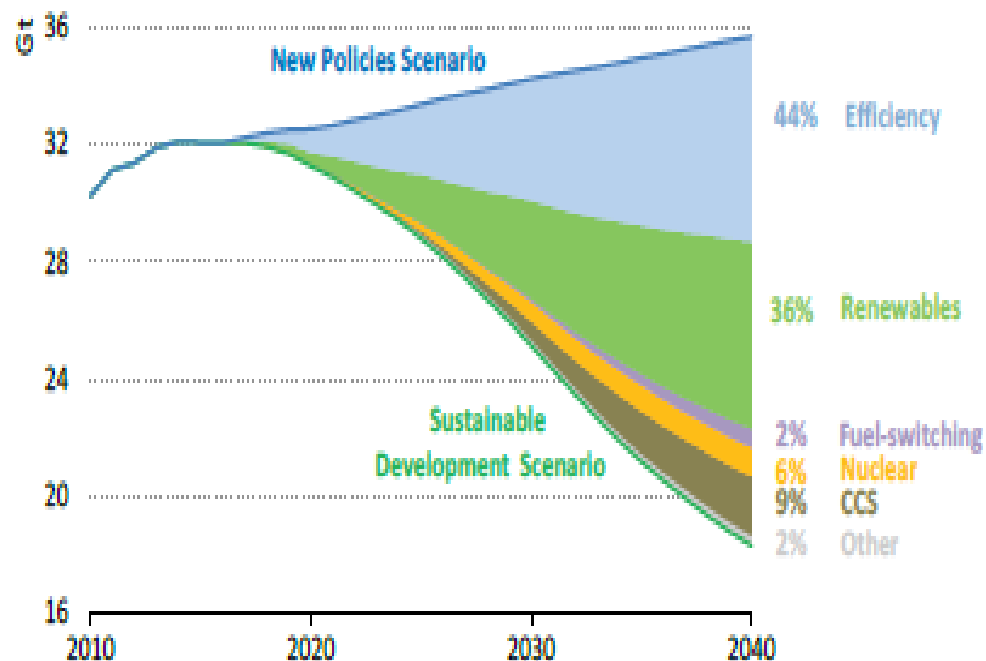
Sector challenge

- Energy security
- Energy affordability
- Energy transition

Energy efficiency contribution

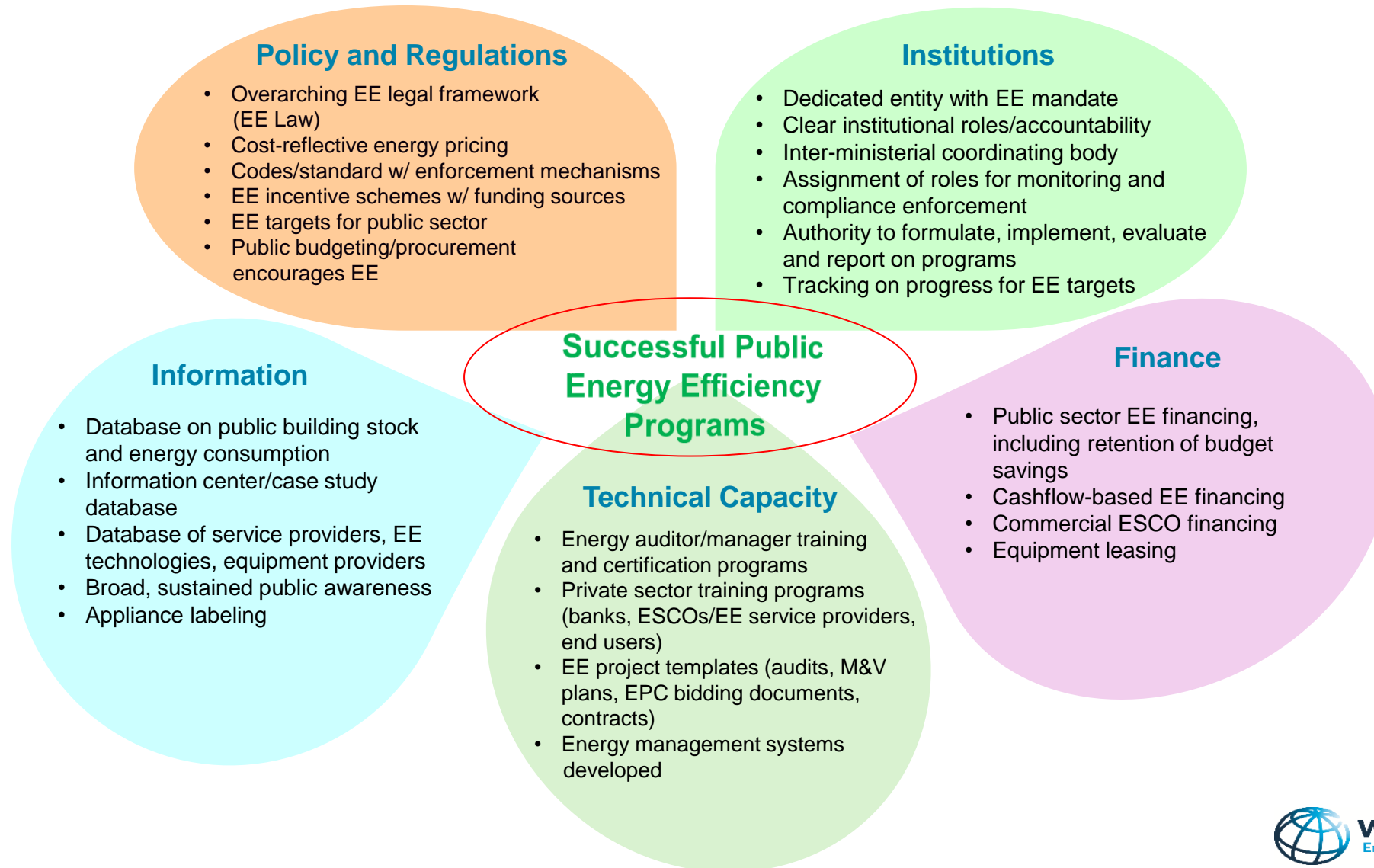
- Reduced demand lowers dependence on energy imports
- Lower energy bills can mitigate impacts of rising energy prices, improve quality of life
- EE is least-cost resource to support the energy transition to net zero, scale-down coal and other fossil fuels

Highest Contribution of EE in Global CO₂ emissions in IEA NP and SD Scenario



Source: IEA Energy Efficiency Market Report.

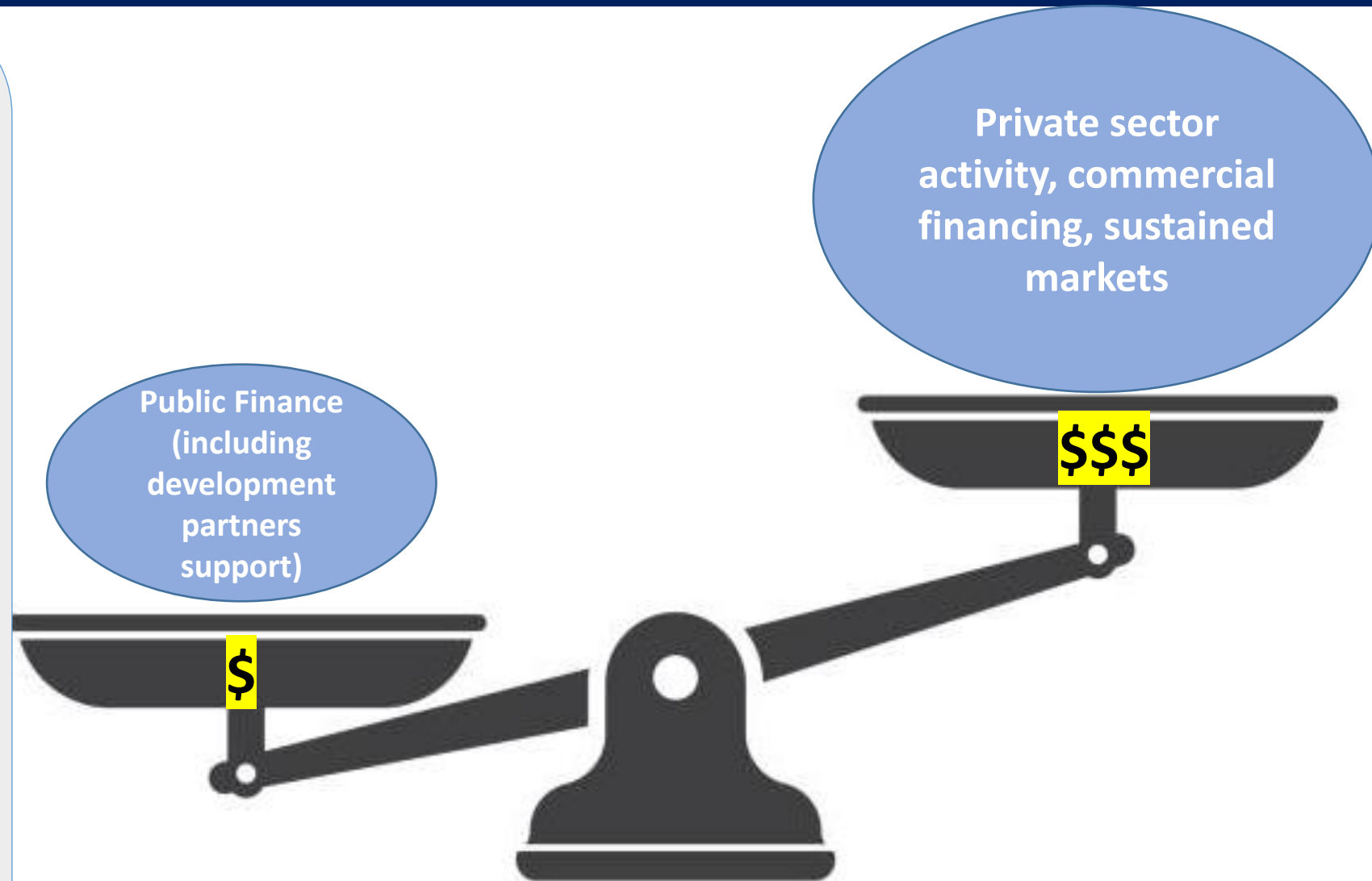
Key Elements of a Successful Demand Side Energy Efficiency Implementation Framework



EE Market Transformation Through Unlocking Private Sector and Commercial Financing

Examples of World Bank EE Market Leverage

- ✓ **India EE Scale-Up** supports super ESCO (EESL) to deploy efficient products through bulk purchasing and market aggregation with a US\$220 million IBRD loan and \$80 million guarantee and expects to leverage *over US\$1.0 billion in EE investments*
- ✓ **China Air Pollution Control in Jing-Jin-Ji** financed pollution prevention, EE and RE with a US\$500 million IBRD loan and leveraged *over US\$815 million in commercial financing and private capital*
- ✓ **Poland Clean Air Program** includes a US\$291 million IBRD loan to support clean heating and EE in homes and expects to leverage *US\$1.5 billion in commercial bank financing and over US\$6.1 billion in total program costs*



Energy Efficiency Financing Models: Climbing Up the “EE Financing Ladder”

Energy Efficiency “Financing Ladder”

Higher Private
Capital
Mobilization



Potential for commercial financing

Advanced commercial or project financing (ESCOs- shared savings)

Vendor credit, leasing

Commercial financing, bonds

Partial risk guarantees

Credit line with commercial bank(s)

Credit line with development bank

Public or Super ESCOs

Energy efficiency revolving fund

Utility (on-bill) financing

Budget financing, grants with co-financing

Grants

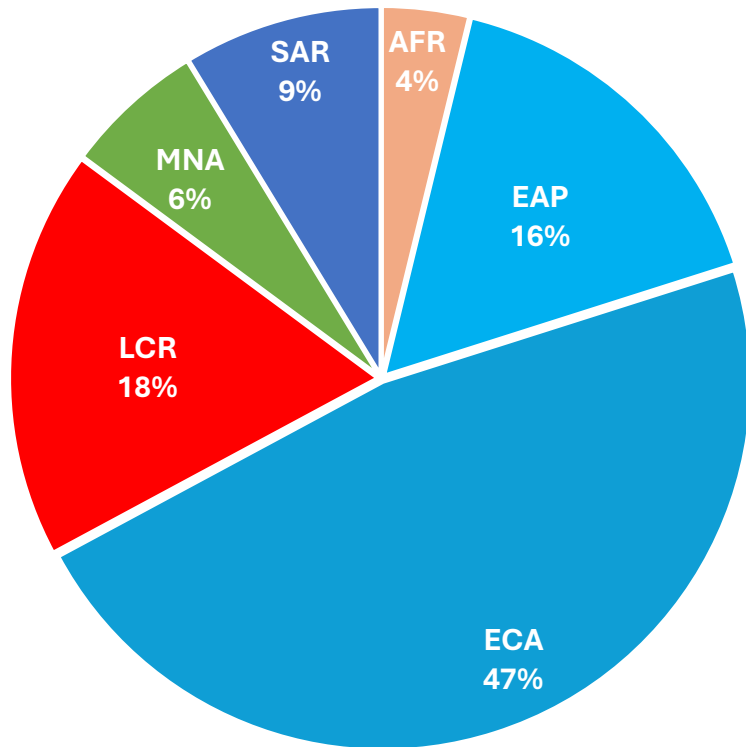
Higher Public
Financing Support

Key principles

- Financing mechanisms should be selected based on **stage of market** development and financing gaps
- Public financing should be used judiciously to develop markets and **crowd-in commercial financing**
- Over time, programs should seek to climb the ladder to more **sustainable and commercial models**
- World Bank lending has evolved over the past decade **from grants and budget financing to revolving mechanisms** using revolving funds and budget capture schemes, sometimes with performance-based provisions in contracts

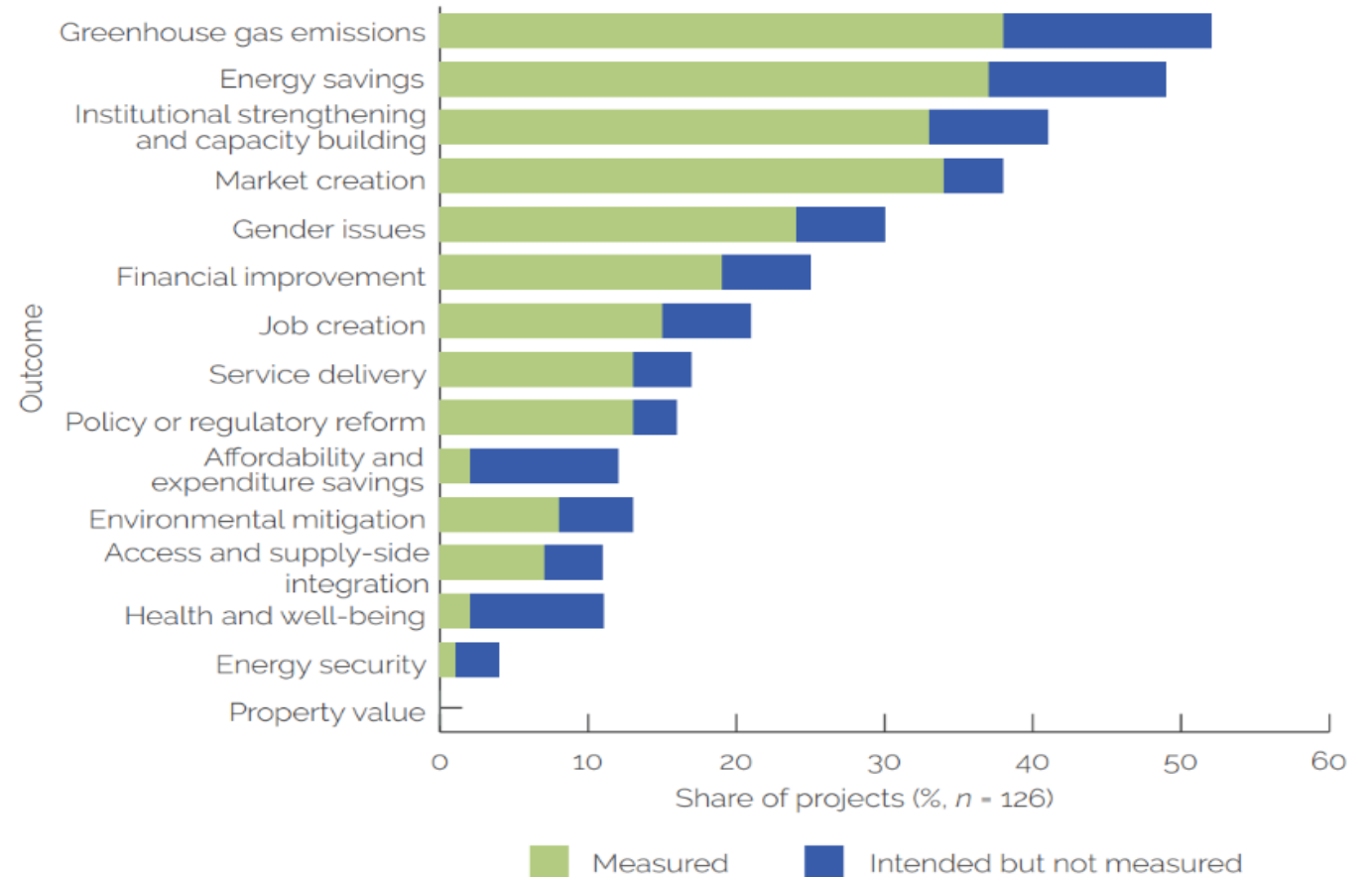
WB EE Portfolio. Wide experience in EE investments

(FY15-24) demand side EE Investments by regions



✓ Demand Side EE: USD 6.7 billion

Various outcomes / cobenefits



Source: Independent Evaluation Group.

EE financing models: WB portfolio. Some examples

✓ **Specialized EE Funds**

- Armenia, Bulgaria, Mexico, Romania, Kosovo, India (through Super ESCO), Macedonia, Turkey, Caribe

✓ **EE Credit Lines (through financial intermediary banks, mostly for industry)**

- China, Tunisia, Turkey, Vietnam, Ukraine, Uzbekistan, Russia

✓ **EE Risk Sharing Mechanisms/Guarantees (through Financial Institutions, some targeted to ESCOs)**

- Bulgaria, China, Croatia, India, Poland, Colombia

✓ **Utility EE/DSM Programs (mostly EE Lighting programs, some with carbon finance)**

- Brazil, Bangladesh, Ethiopia, Mexico, Rwanda, South Africa (standard offer), Vietnam, Uganda, Uruguay

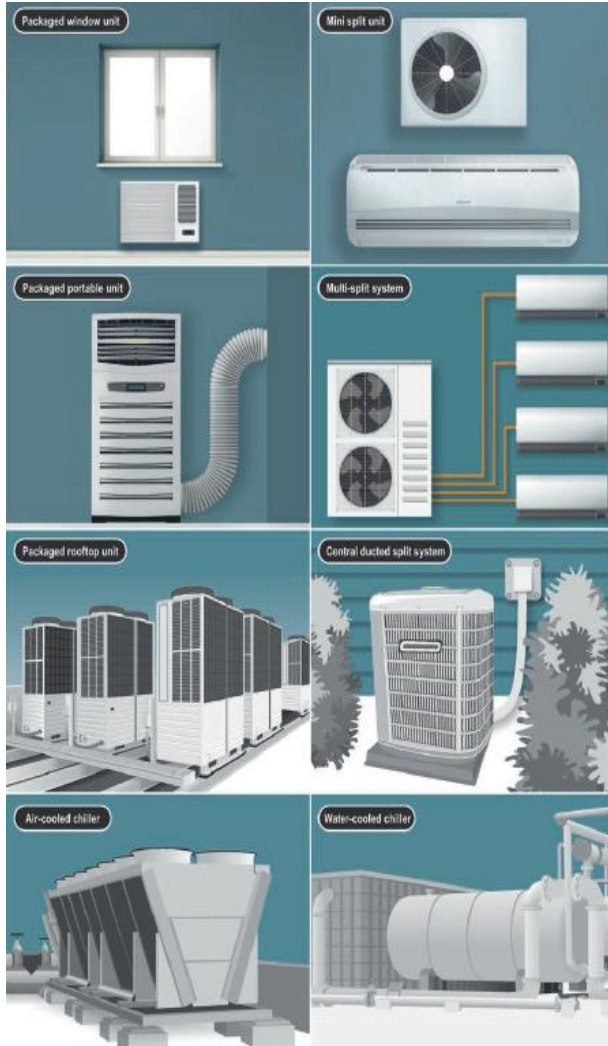
✓ **EE-related Program-for-Results loans**

- China, Serbia, Bulgaria, India

✓ **EE-related Development Policy Operations**

- Indonesia, Mexico, Poland , Turkey, Vietnam

Sustainable and EE Cooling Landscape is Heterogenous... ... Complexity of Drivers, Challenges and Solutions



End Uses/ Users are very heterogenous:

- Space Cooling (Residential, Commercial, Public Buildings, Grid/Off-Grid)
- Industrial Process Cooling, Transportation
- Refrigeration (Stationary/Buildings, Mobile/Food Cold Chain)

The Menu of Technology Interventions is Diverse (Active and Passive):

- Ceiling Fans
- Evaporative Coolers (Desert Coolers)
- Air Conditioners (Room AC- Windows and Split, Chillers, Vapor Compression, Vapor Absorption, Heat Pumps, Solar Cooling, Liquid Air, etc.)
- District Cooling
- Building Envelope- Insulation, Windows, Cool Roofs
- Smart Controls (Thermostats, Building EMS, etc)
- DC Appliances (Off-Grid)

Climate Change Incentives, Actions and Implications:

- Direct (refrigerants) → MP → Manufacturers
- Indirect (energy use) → CC Mitigation → Demand Side (End Users)

Promoting MP Controlled Substances-Climate-EE Synergies



India/South Asia: Fisheries Cold Chain

Revealed significant opportunities to implement EE and climate friendly cooling technology and practices in the fisheries sector.

West Bengal, India: Temperature Controlled Logistics

Developed 2 pilot models with significant promise to shift temperature-sensitive goods from road to IW transport using integrated cold chain solutions

El Salvador & Costa Rica: Energy Efficiency Standards

Identified economic and climate benefits through enhanced energy standards for appliances, recommending revisions to building and equipment codes

Dominican Republic: Energy-Efficient Cooling Roadmap

Created a sustainable cooling roadmap, outlining financing and delivery mechanisms for the deployment of energy-efficient cooling equipment using low GWP refrigerants.

Pakistan: Fisheries: Energy Efficiency Analysis

Supported the optimization of the fisheries sector efficiency through supply chain improvements, energy-efficient technologies, upgraded ice-making technology, and HFC-free solutions.

Global: Financing with Cooling Bonds

Explored how sustainable cooling investments can be financed by issuing green bonds

Objectives

Upstream support for cooling market transformation

Strategies and business models to operationalize national cooling plans

Knowledge products (guidance/toolkit/others) on operationalizing MP-EE linkages



Demand Side (Super ESCO-EESL + Public Bulk Procurement Model): India's Super Efficient Air Conditioners Program

Challenge: Growing demand for AC (4.5 m unit sales in 2015...expected sales of 19 m in 2030) directly leads to increased electricity demand but there is high cost to supplying peak power. To meet future demand need to ratchet up efficiency standards at affordable costs.

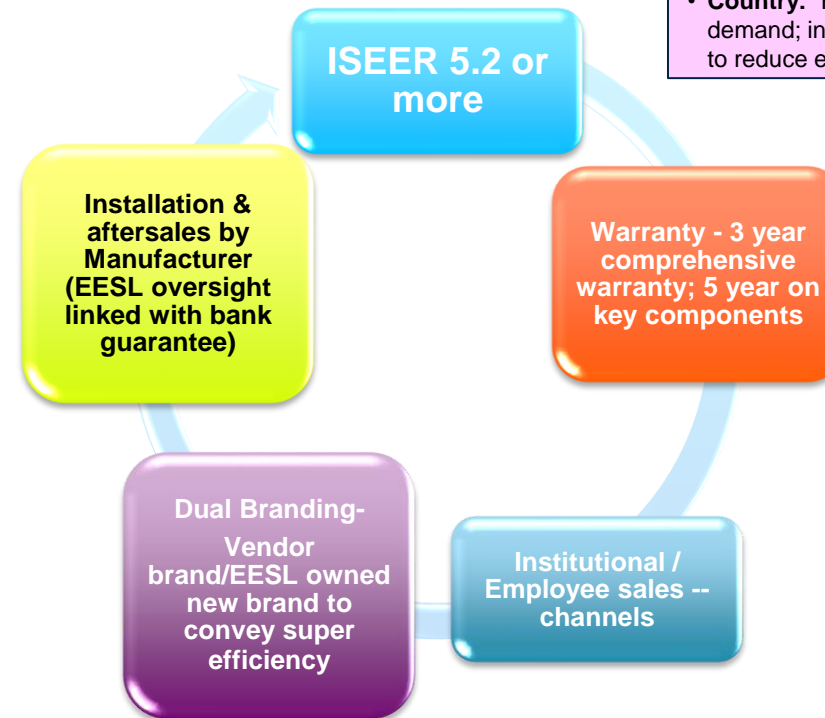
Project Design Approach: ESCO, Bulk Procurement, Warranty

- Energy Efficiency Services Limited (EESL) fills the gap in the Indian EE market
- EESL acts as a "Super ESCO" – bulk Public Procurement
 - Aggregation of demand leading to cost reduction affordability
 - High quality technical specs with 3 yrs warranty
 - Awareness creation
 - Strong Measurement and Verification
 - Integrating MP & EE (WB support)

Outcome and Results

- Improvement of energy efficiency in AC by at least 30%.
- In the first round, affordable hi-efficient AC units made available by suppliers (500,000 units)

- **Manufacturers:** Firm demand for super-efficient AC; brand building; profitability and market expansion
- **Customers:** Access to superior "green" product (not avail. off market); affordable prices for more "access to cooling;" reduced electricity bills
- **Country:** Reduced energy demand; international obligations to reduce emissions intensity met



Saudi Arabia: High Efficiency Room Air Conditioner Deployment in Residential Sector

Saudi Efficient Air Conditioner market transformation through Integration of MEPS (and Labeling) + Incentives

REGULATIONS: MEPS and EE Labeling

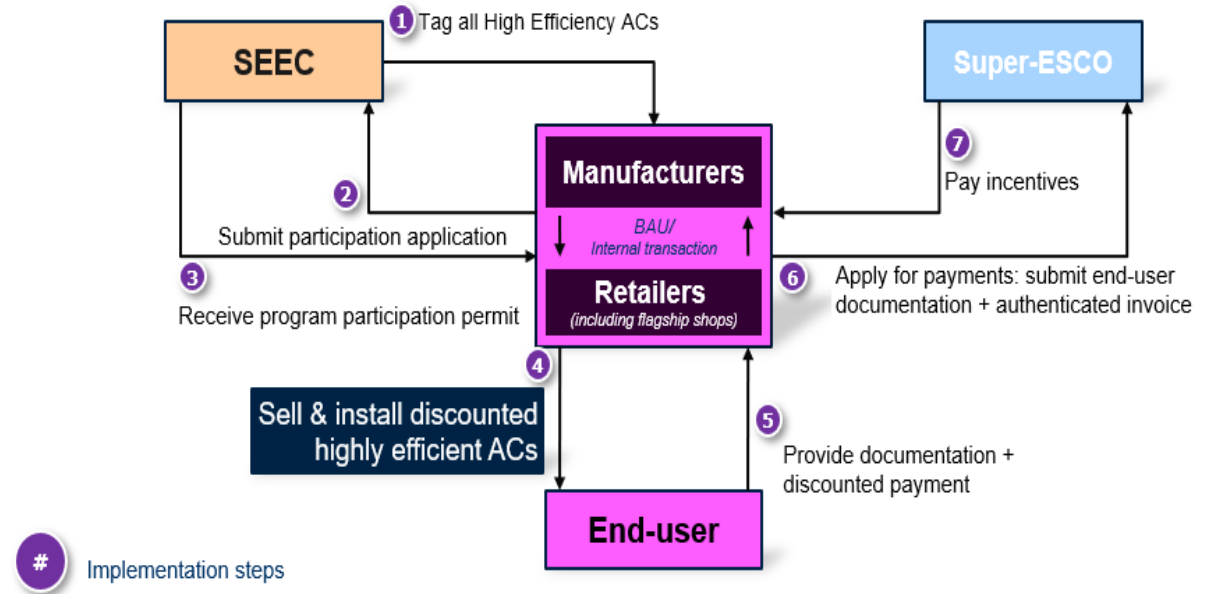
Energy Efficiency Cards for Air Conditioners



The Ministry of Commerce and Industry officials while destroying air-conditioners from stores that didn't meet the country's energy saving requirements. (Source: www.mci.gov.sa)

Incentive Program for New EE Air Conditioner Purchases (initial design by World Bank TA Project, 2014-16)

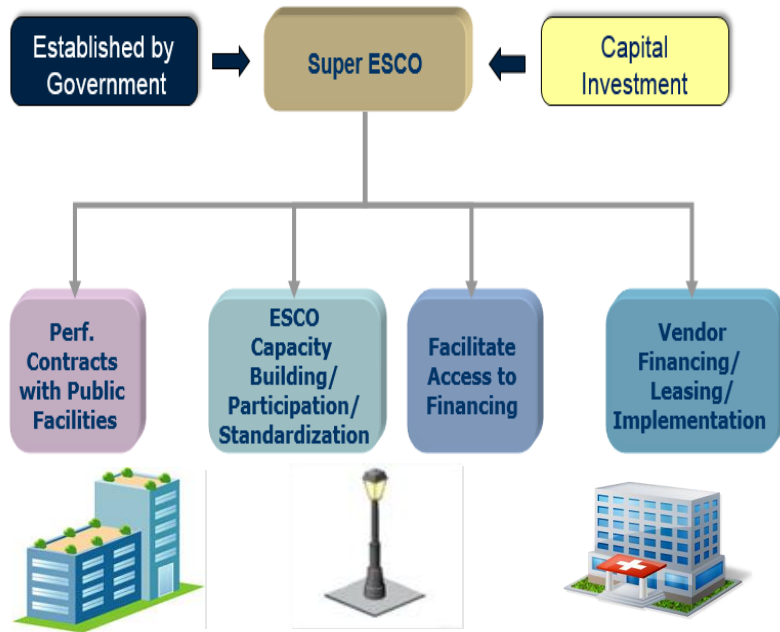
- 2016: Started raising MEPS for RACs from ~5/6 to 11
- 2018-2019: Riyadh Pilot- For purchasing High Efficiency Room AC; 10,000 high efficiency room ACs; Financial Incentive of up to SAR 500 per AC (6 per Household)
- 2019: Saudi National Program Rollout – Fin. Incentive of up to SAR 900 per AC



Saudi Arabia: Public Super ESCO for Public Building Projects Energy Efficiency Financing and Implementation Solutions

TARSHID

Saudi National Energy Services Company (Super ESCO)



World Bank Technical Cooperation Partnership for Energy Efficiency in Saudi Arabia

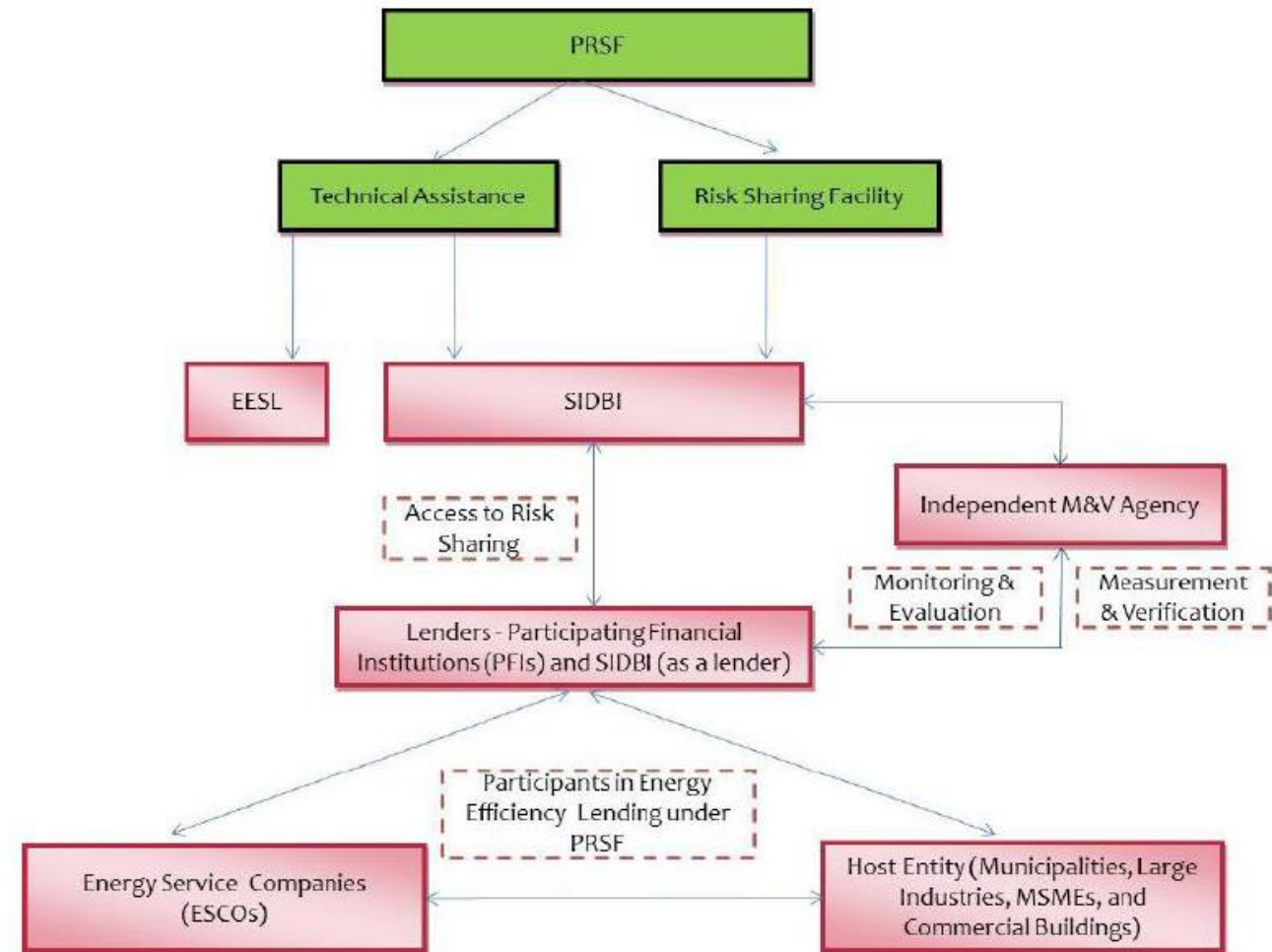
1. 2014-2016: Developing Business Plan of [Saudi Super ESCO Company \(Tarshid\)](#); [Established in late 2017](#) (Budget: > US\$500 Million).
2. 2016-2017: Developing ESCO Industry Tools and Templates (eg., [Development of Saudi Energy Savings Measurement & Verification Guide](#))
3. 2016-2017: Developing the Super ESCO Operational Framework and Facilitating Global [Partnerships](#)
4. 2017 onwards: Implementing Energy Efficiency in Public Buildings throughout the Country through ESCOs
 - **Target:** 70% of Buildings in Saudi Arabia
 - **Total Potential:** \$11 billion
 - **Achieved (mid-2020):** cooling in public buildings and LED street lighting in several cities



India Partial Risk Sharing Facility for Energy Efficiency

India Partial Risk Sharing Facility for Energy Efficiency

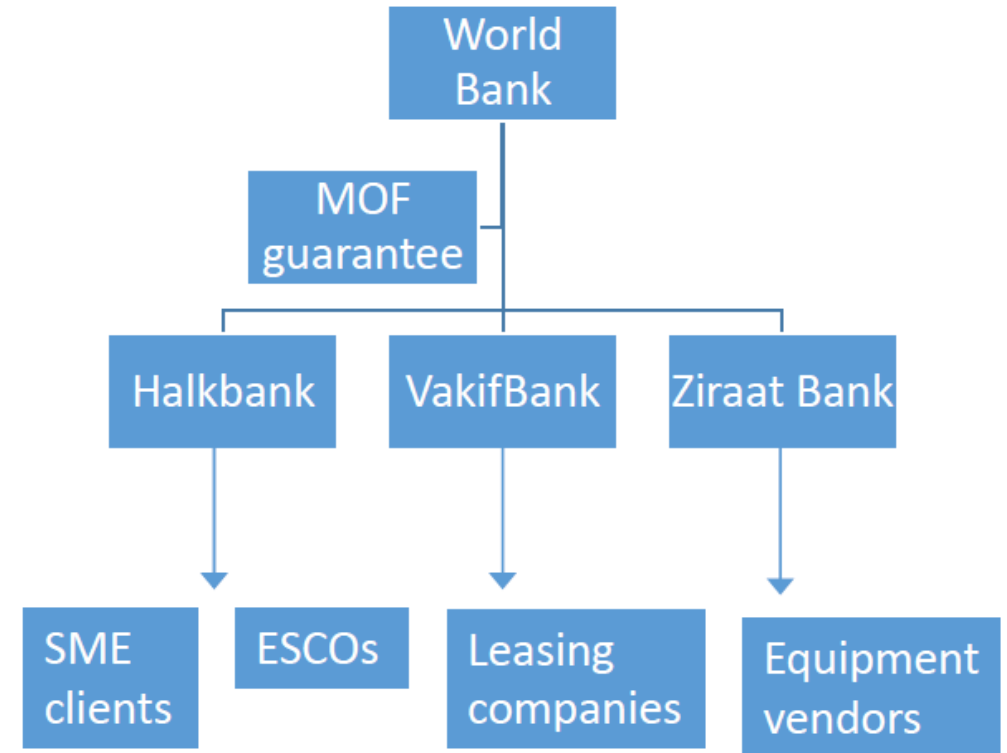
- US\$25m guarantee from CTF, US\$18m grant from GEF
- Under implementation August 2015-present (closing March 2025)
- US\$12m GEF grant as first loss to CTF funds
- EE loans using ESCOs receive 40-75% guarantee coverage by SIDBI through participating financial institutions
- US\$6m GEF grant for TA to support pipeline development, independent measurement and verification, standard documents, market development



Türkiye SMEs Energy Efficiency Credit Line

Türkiye Small and Medium Enterprise Energy Efficiency Credit Line

- US\$201m line of credit to three public, commercial banks, \$3.6m GEF grant
- Under implementation May 2013-Sept 2019
- SME loans supported standard 'product lines' in common areas – e.g., furnaces/kilns, boilers, machinery, refrigeration, cooling, lighting
- Promotion of alternative financing modalities – vendor credit, equipment leasing, simplified ESCO contracts
- 325 subprojects supported, 110 using alternative financing models



Key Recommendations on Sustainable Cooling: Energy Transition and EE Perspective

Energy price reforms are a critical step in the transition

Gradual phase out of direct/indirect subsidies are necessary to provide proper price signals and incentivize switch to sustainable fuels, technologies and energy efficiency.

Countries to prepare plans for sustainable cooling transition

Governments need a clear vision and coordination with line ministries, local governments, businesses, households, utilities, and others to ensure optimal investment decisions regarding meeting their cooling needs.

Public sector planning and regulations, programs

Incentives and financing, communications and outreach and training are all important elements for a holistic government response; judicious use of public funds is needed to enable the private investment and sustainable cooling markets.

Energy efficiency measures – both active and passive - to reduce cooling demand is necessary to optimize the cost of the transition and ensure affordability.

Investments in the public sector and leverage private sector

Government investments can help stimulate private markets, demonstrate new technologies, and approaches. Including training energy auditors and designers, develop new financing and implementation models, provide stable demand leading to more competition, lower prices, etc.

Tailored sustainable cooling programs

Market surveys can help understand local conditions and behaviors, programs can address market barriers, drawing from international experiences, and developing specific provisions for the poor and for gender differences.

Technical standards should be raised

In order to increase efficient cooling (with low GWP refrigerants) equipment in the market and remove less efficient technology from the market through regulatory standards.

THANK YOU

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Energy and Extractives Global Practice, Infrastructure Department



ANNEX

Scaling Up Demand-Side EE Has Been and Implementation Challenge

Supply Side Options (Conventional Supply & Large Scale RE)



- Large Investments
- Fewer Stakeholders
- Standardized Solutions
- Less Transaction Costs
- Homogenous Market

Demand Side EE Measures



- Small and Dispersed
- Multiple Stakeholders
- No “One Size Fits All” Solutions
- High Transaction Costs
- Heterogenous Market

But solutions have been developed and are being applied...



Enabling Environment for EE Investments: Tracking Progress of Planning & Policies

World Bank's Regulatory Indicators for Sustainable Energy (RISE) 2022: Building Resilience: <https://rise.esmap.org/>

ENERGY EFFICIENCY: PROGRESS BY RISE INDICATOR, 2010, 2019, AND 2021

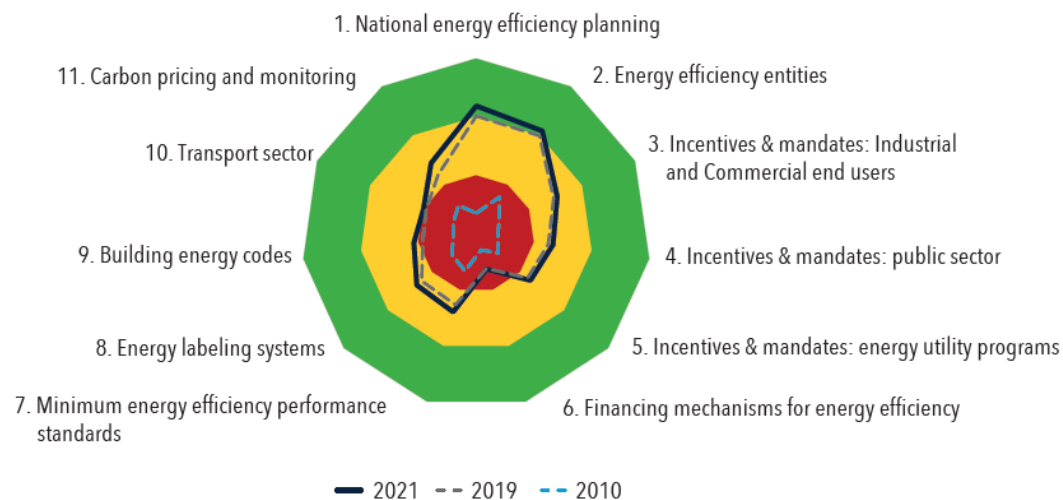


FIGURE 31. ENERGY EFFICIENCY: PROGRESS IN RISE SCORES FOR PILLAR, 2010-21

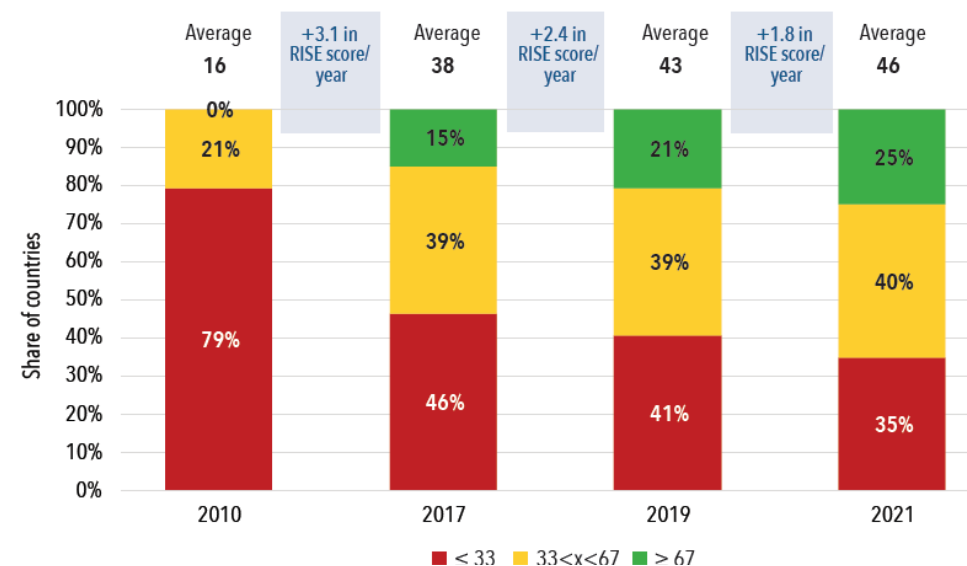
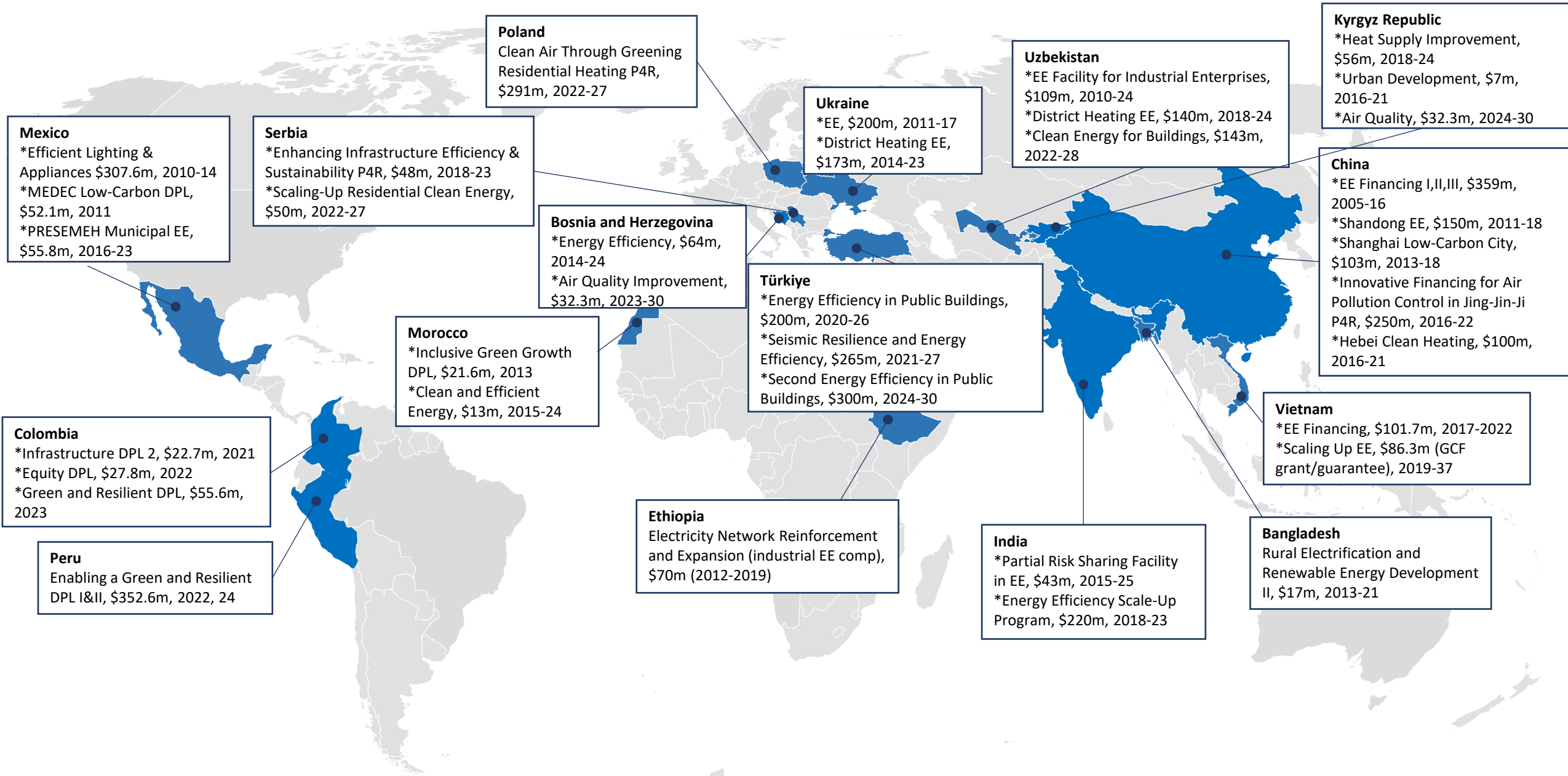


TABLE 5. ENERGY EFFICIENCY: FASTEST IMPROVERS, BY REGION

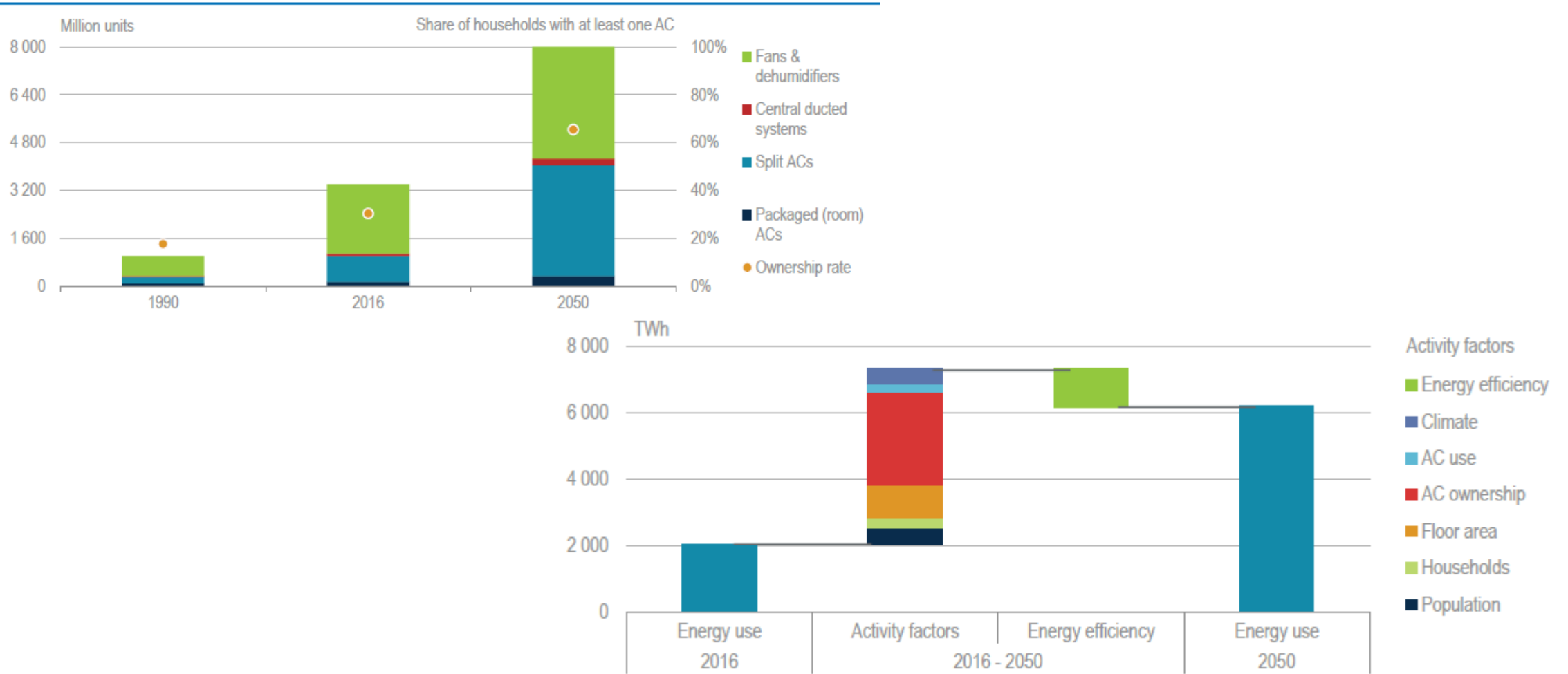
(RISE score on pillar in 2022, annual rate of improvement in RISE score 2019-21)

East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	OECD High Income	South Asia	Sub-Saharan Africa
Singapore (76, 78)	Moldova (50, 65)	Colombia (43, 56)	Saudi Arabia (38, 68)	Chile (56, 74)	Pakistan (29, 36)	Côte d'Ivoire (24, 57)
China (70, 72)	Russian Federation (41, 52)	Mexico (54, 64)	Bahrain (31, 46)	France (61, 69)	Sri Lanka (37, 42)	Zambia (18, 37)
Lao PDR (13, 14)	Belarus (48, 58)	Guatemala (5, 13)	Iran (61, 69)	Poland (51, 55)	India (81, 85)	Senegal (21, 39)

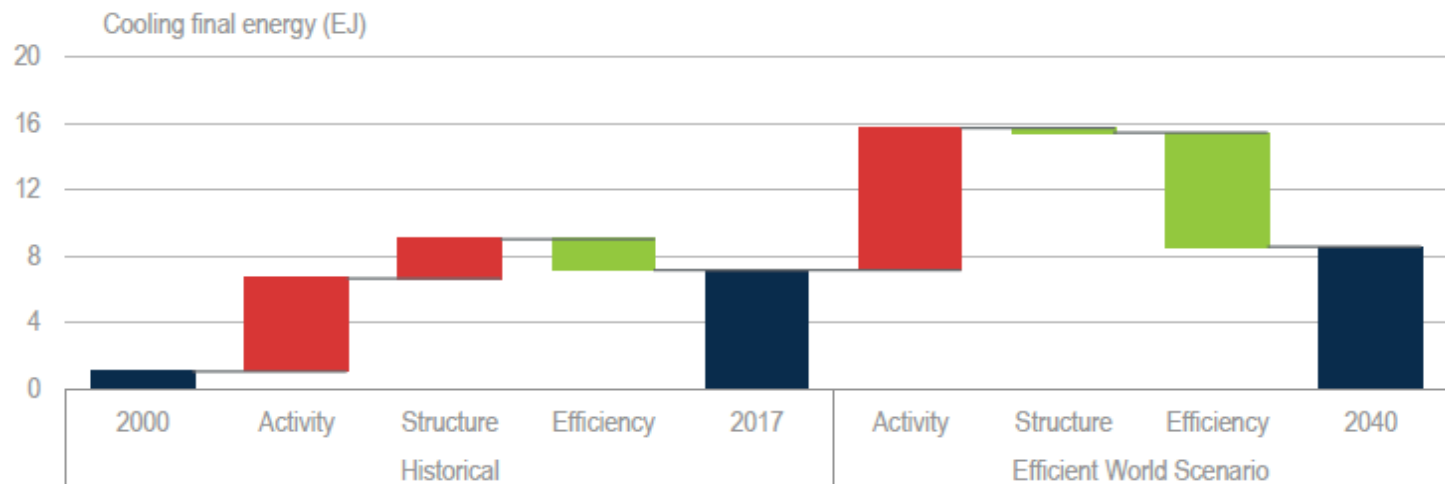
World Bank Energy Efficiency Portfolio: Snapshot of Demand-Side EE Projects



Rapidly Growing Cooling Market: An Opportunity for a Resilient Future - From Mitigation to Adaptation



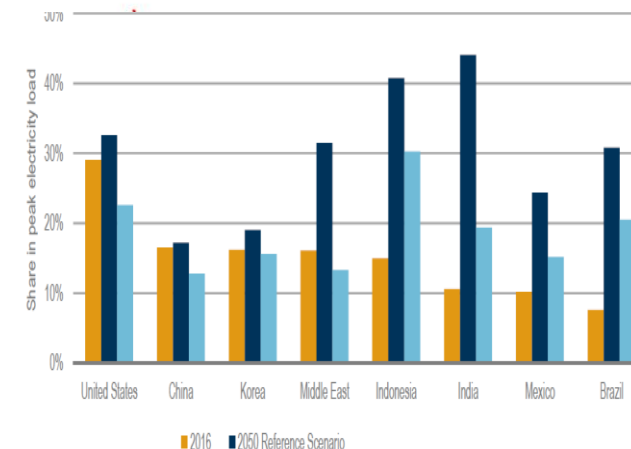
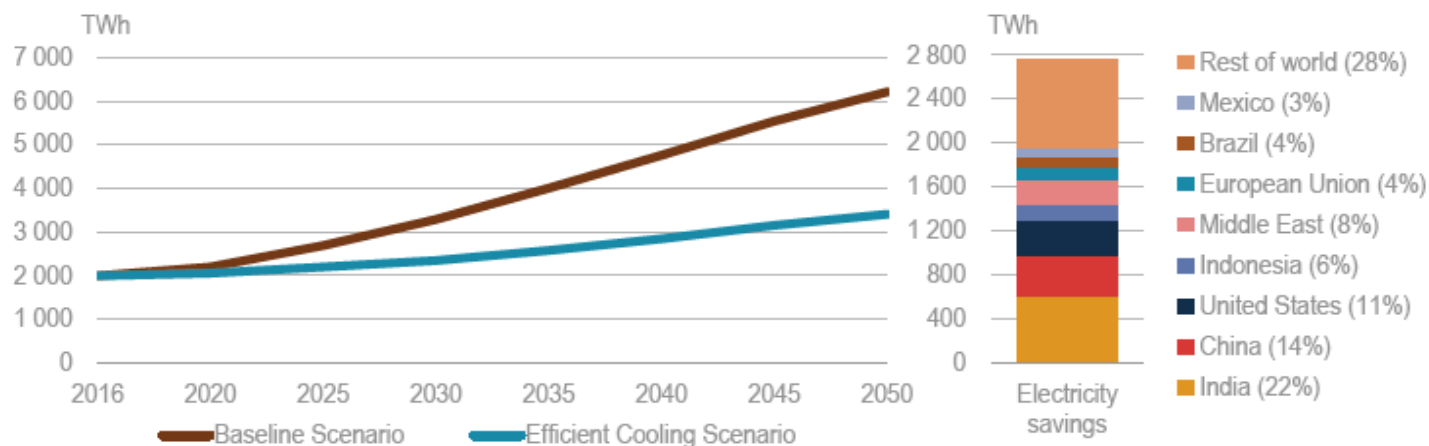
Global Buildings Space Cooling Energy Use Decomposition, Trends and Potential (through 2050)



Efficient Cooling is not just about energy (KWh) and GHG emissions reduction.....
...It's about peak load (kW) avoidance

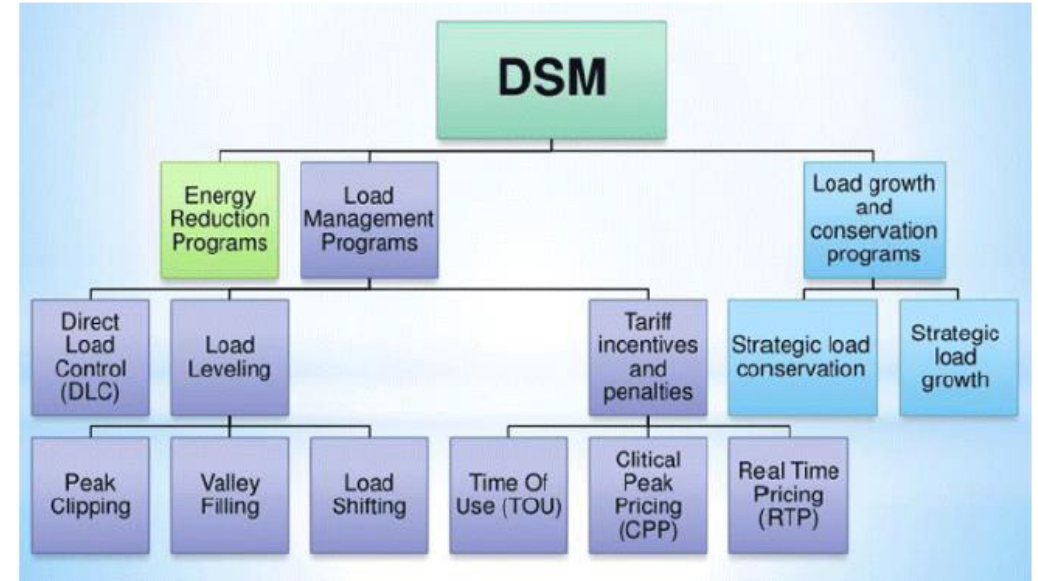
ELECTRICITY FOR AIR CONDITIONING ACCOUNTS FOR APPROXIMATELY:

30% OF SUMMER LOAD IN WARM CLIMATES (E.G. CALIFORNIA, US) & UP TO **60%** OF SUMMER LOAD IN HOT CLIMATES IN METROPOLITAN AREAS (E.G. DELHI, INDIA)



Utility Demand Side Management for EE - Overall Framework

- ✓ DSM/Demand response (DR) can help utilities manage loads, peak shortages, high peak generation cost and balancing of RE integration
- ✓ DSM/DR can lower supply costs by avoiding dispatch of high peaking plants, defer new power plants and help customers manage bills
- ✓ Incentives to encourage supply-only business must be addressed through regulatory mechanisms, utility incentives, tariff formulation, etc.
- ✓ Utilities can also offer on-bill financing with relatively low cost

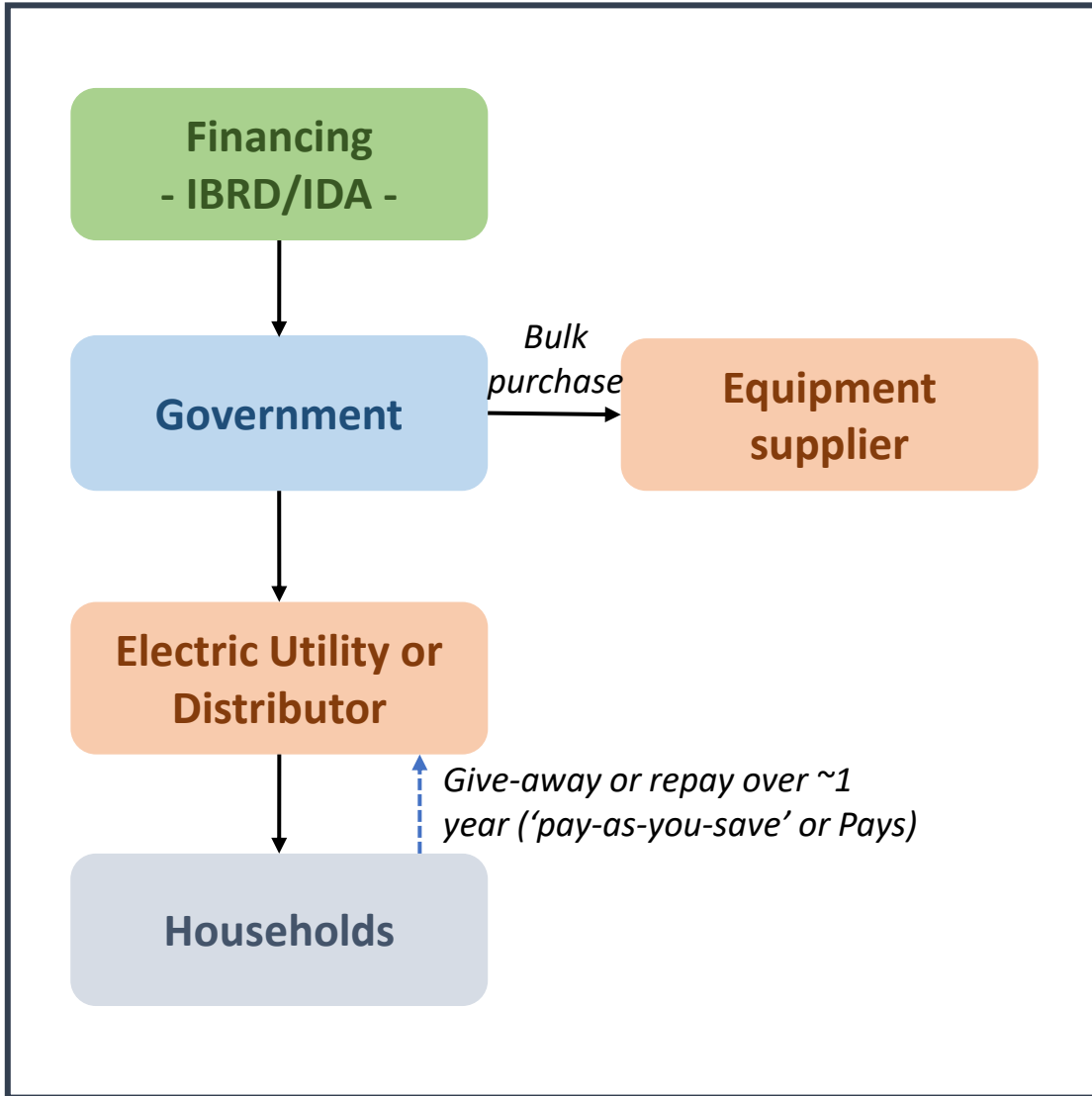


Conditions for success

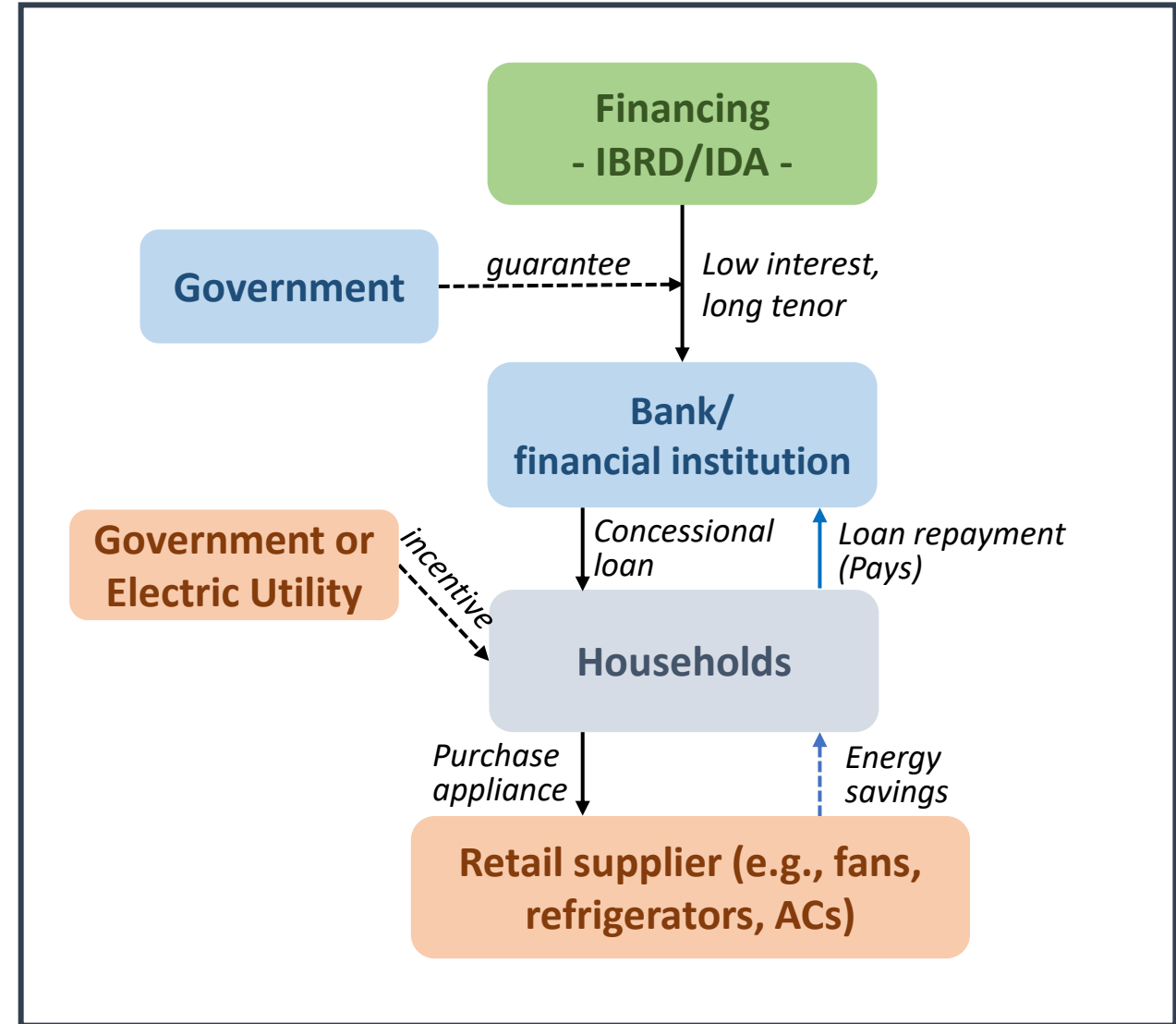
- Proper regulatory mechanisms and incentives for utilities to pursue DSM/DR programs
- Utility management commitment to design and implement DSM programs
- Robust system for customer data collection, strong program planning, implementation, measurement and verification and evaluation systems in place
- Trust with customer, effective communications and customer outreach

Large-Scale Shift to Sustainable Cooling: Implementation Structures & Financing Mechanisms

Equipment Bulk Purchase Scheme

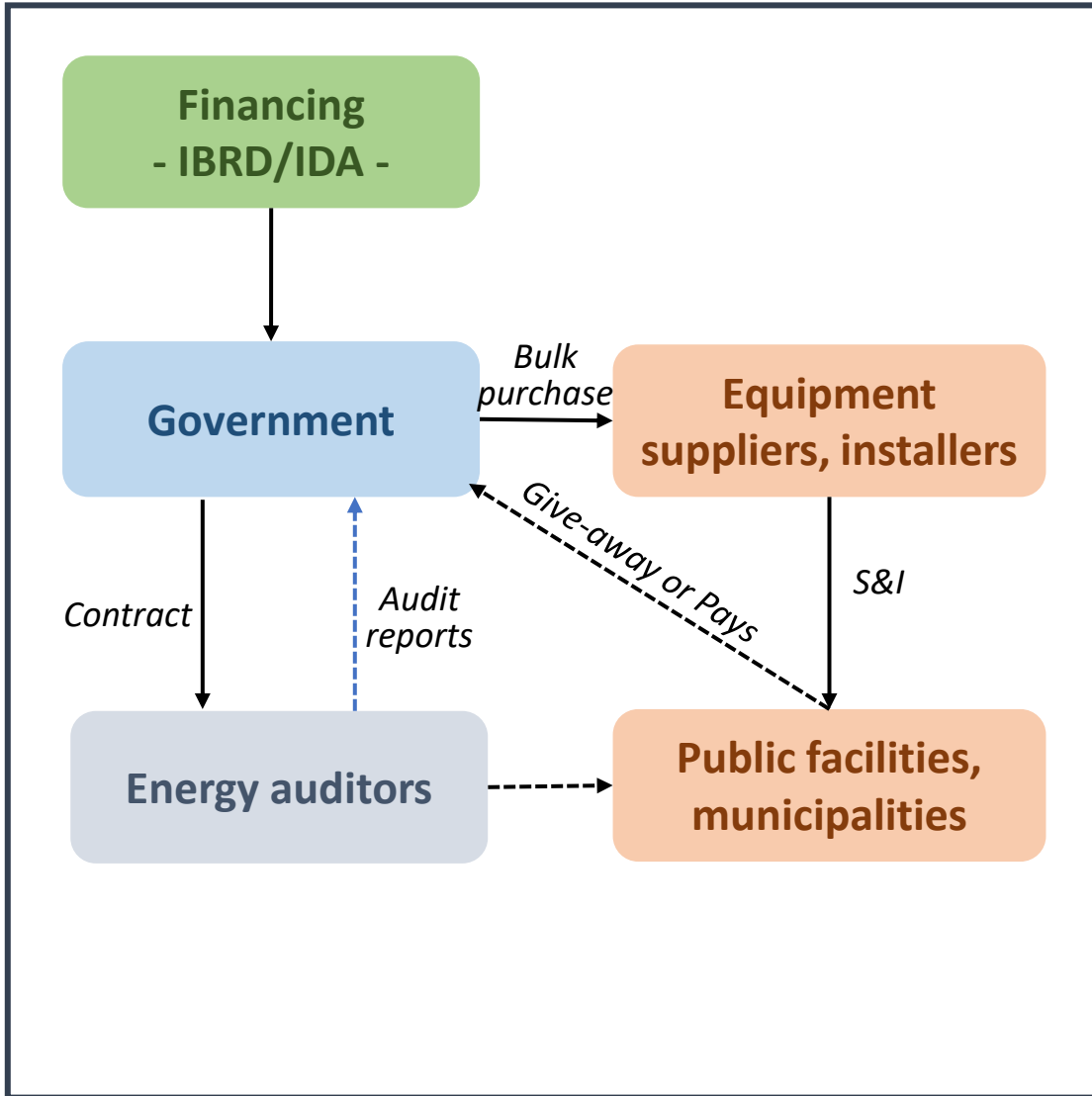


'Cool' Credit Lines

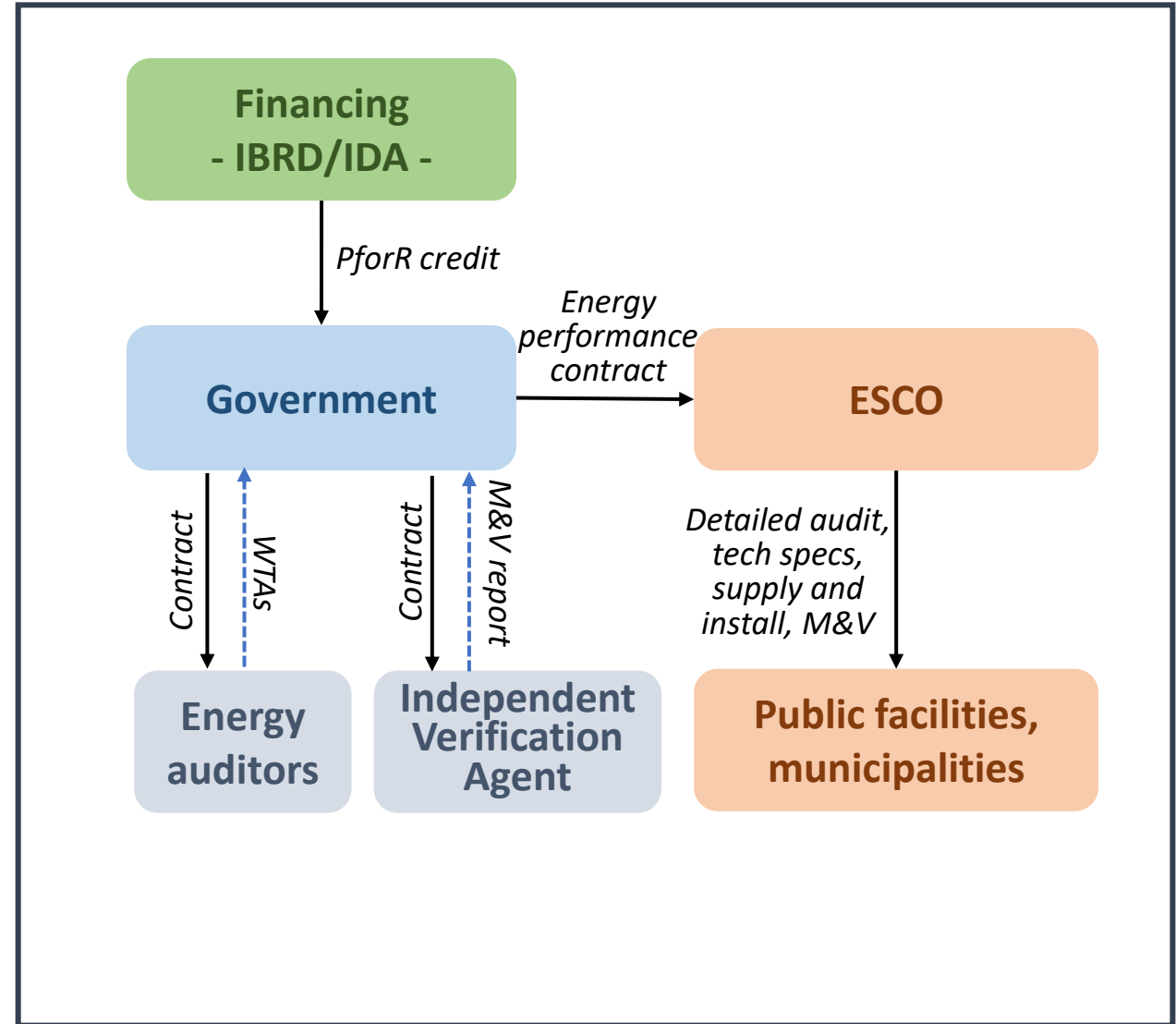


Large-Scale Shift to Sustainable Cooling: Implementation Structures & Financing Mechanisms

Traditional Bulk Supply and Install Contracts

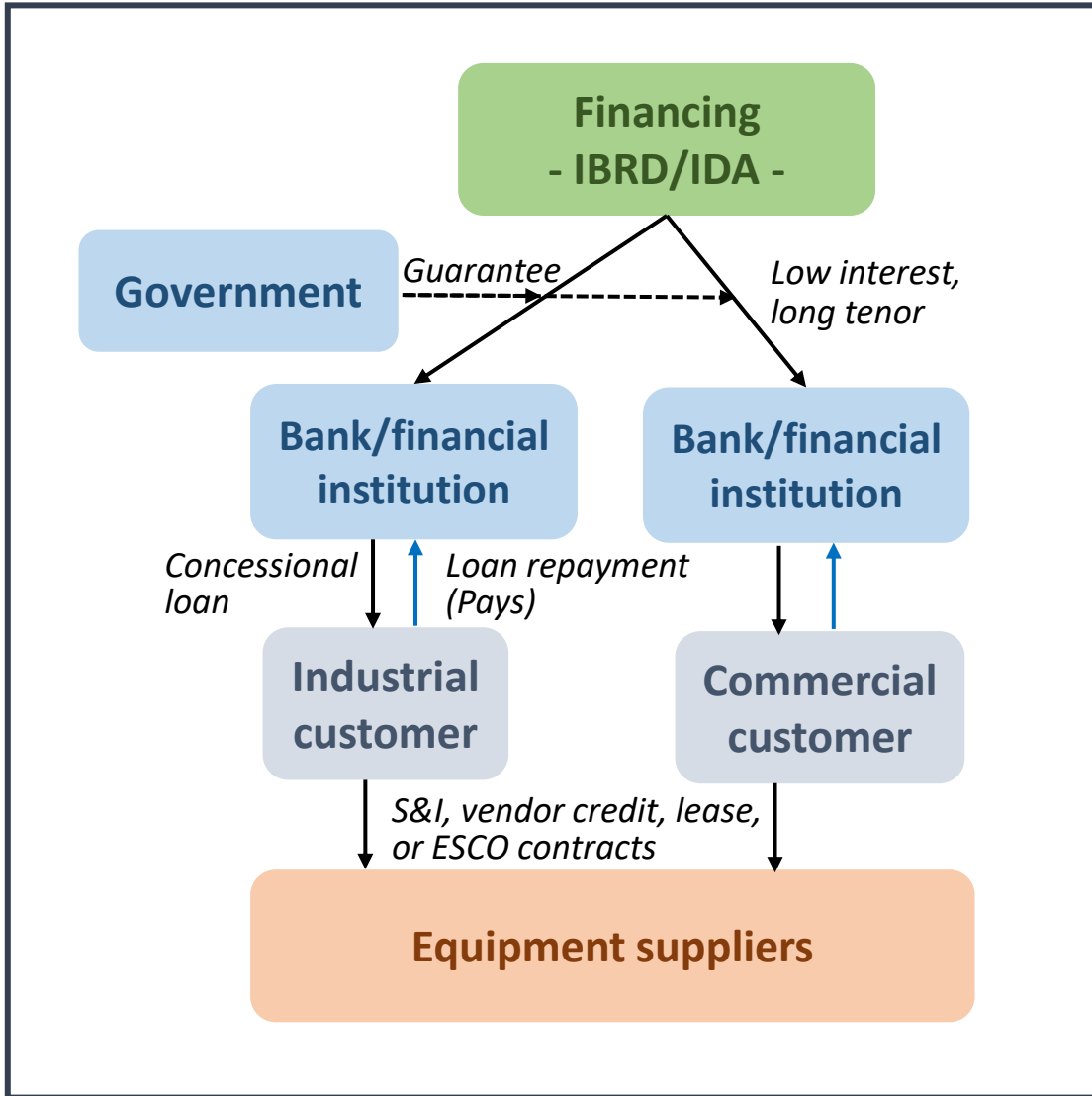


Energy Savings Performance Contracting (through ESCOs)



Large-Scale Shift to Sustainable Cooling: Implementation Structures & Financing Mechanisms

Traditional EE Credit Line



Loan Guarantee Program

