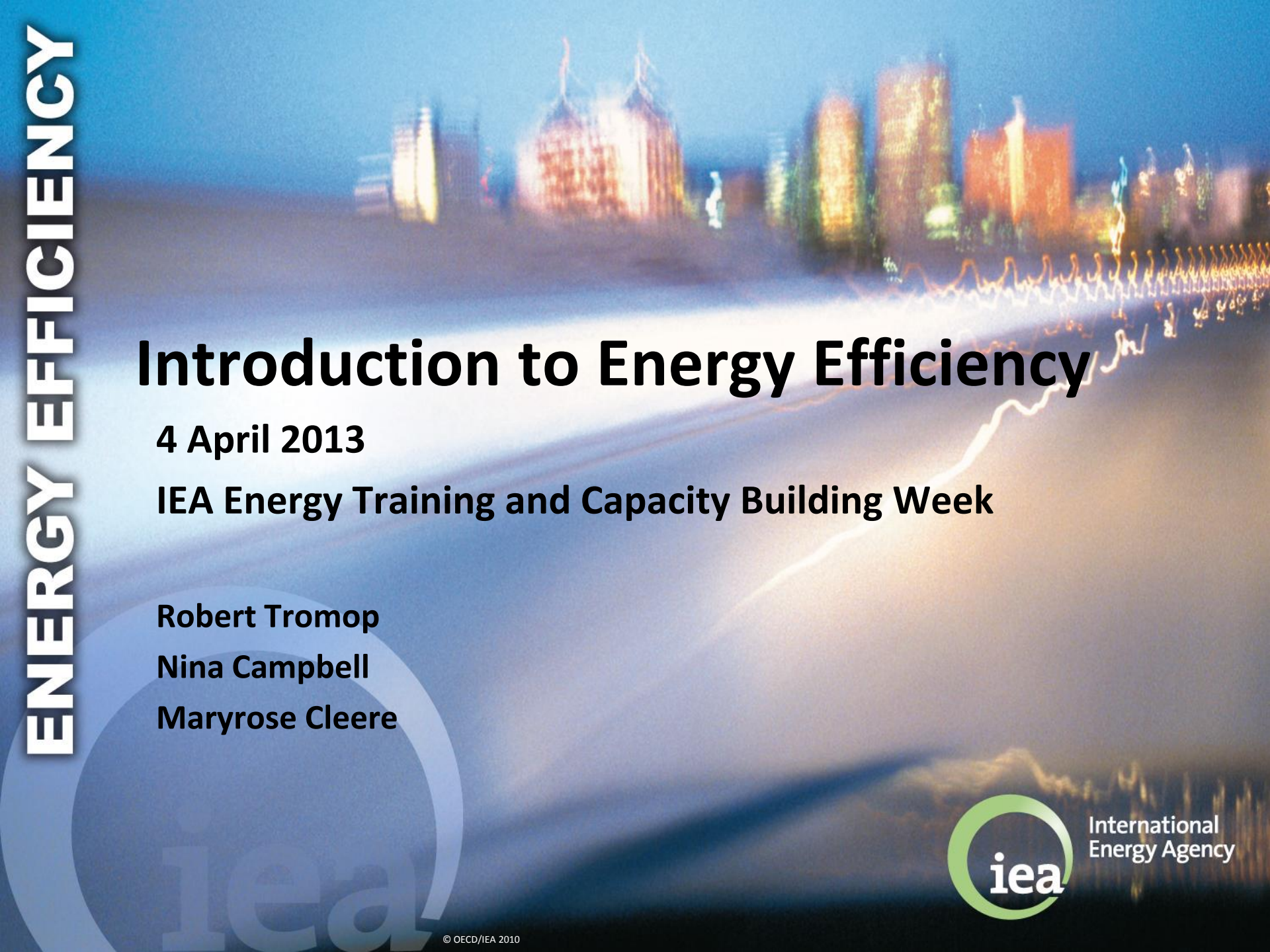


Introduction to Energy Efficiency

4 April 2013

IEA Energy Training and Capacity Building Week

Robert Tromop

Nina Campbell

Maryrose Cleere

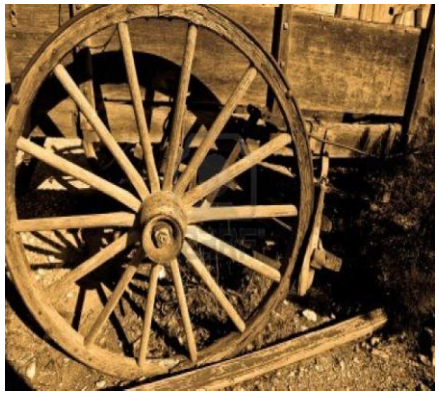
International Energy Agency

Agenda

1. **The big picture:**
   - What is Energy Efficiency? Where does it come from and why is it important?
2. **What can energy efficiency deliver?**
   - The multiple benefits
3. **Why do governments promote energy efficiency?**
   - The barriers
   - The policy
4. **How do governments formulate energy efficiency policy?**
   - Governance
   - Evaluation

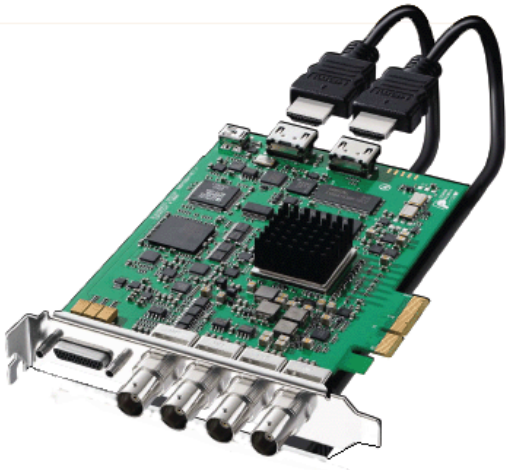
What is Energy Efficiency?

= Delivering the same, with less (or more with the same)



From the invention of the wheel…

…to steam & electricity…



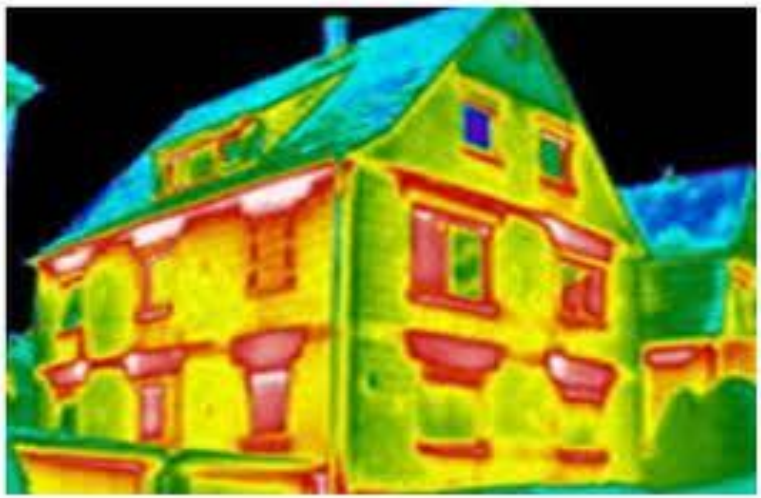
…to modern machines

Unlimited resources? Low prices

Oil Shocks of the 1970s – a realisation

Energy Efficiency Today

- Buildings
- Appliances (& Lighting)
- Transport
- Industry
- Energy Utilities
- Cross Sectoral



How can we improve energy efficiency?

- **Through technology:**
  - **design of houses, equipment & appliances etc.**

- **Through behavior:**
  - **how we shop**
  - **how we use energy: energy conservation**
  - **how we organise processes: energy management**

Group discussion

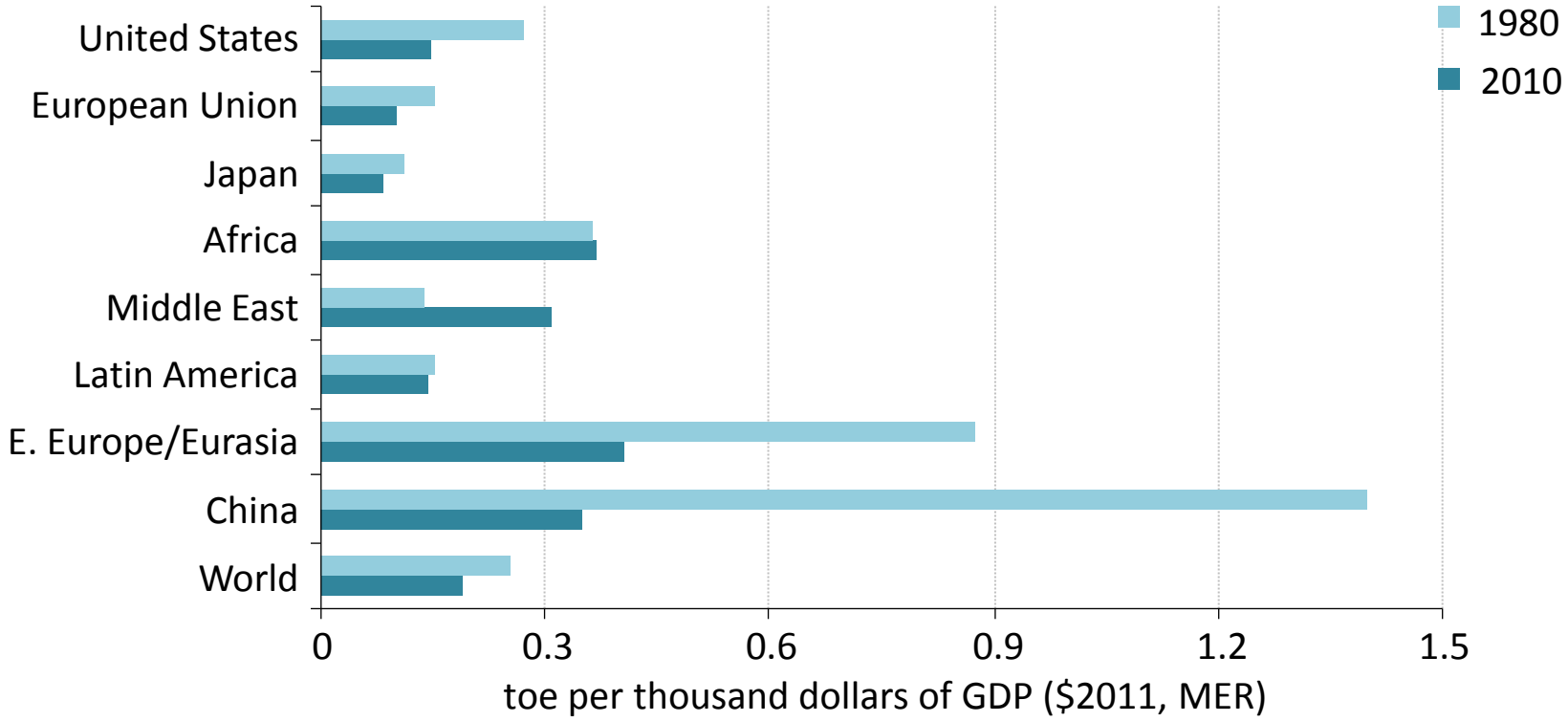
- *IEA Energy Efficiency Video:*
  - What energy efficiency actions were shown in the video?
  - What else could you do to improve energy efficiency and save energy?
    - In your house?
    - In your appliances?
    - In your transport?
    - In your office?

25 bright ideas

from the IEA's 25 Energy Efficiency Recommendations

http://www.iea.org/topics/energyefficiency/25brightideas/

Energy intensities by region



Global energy intensities are converging

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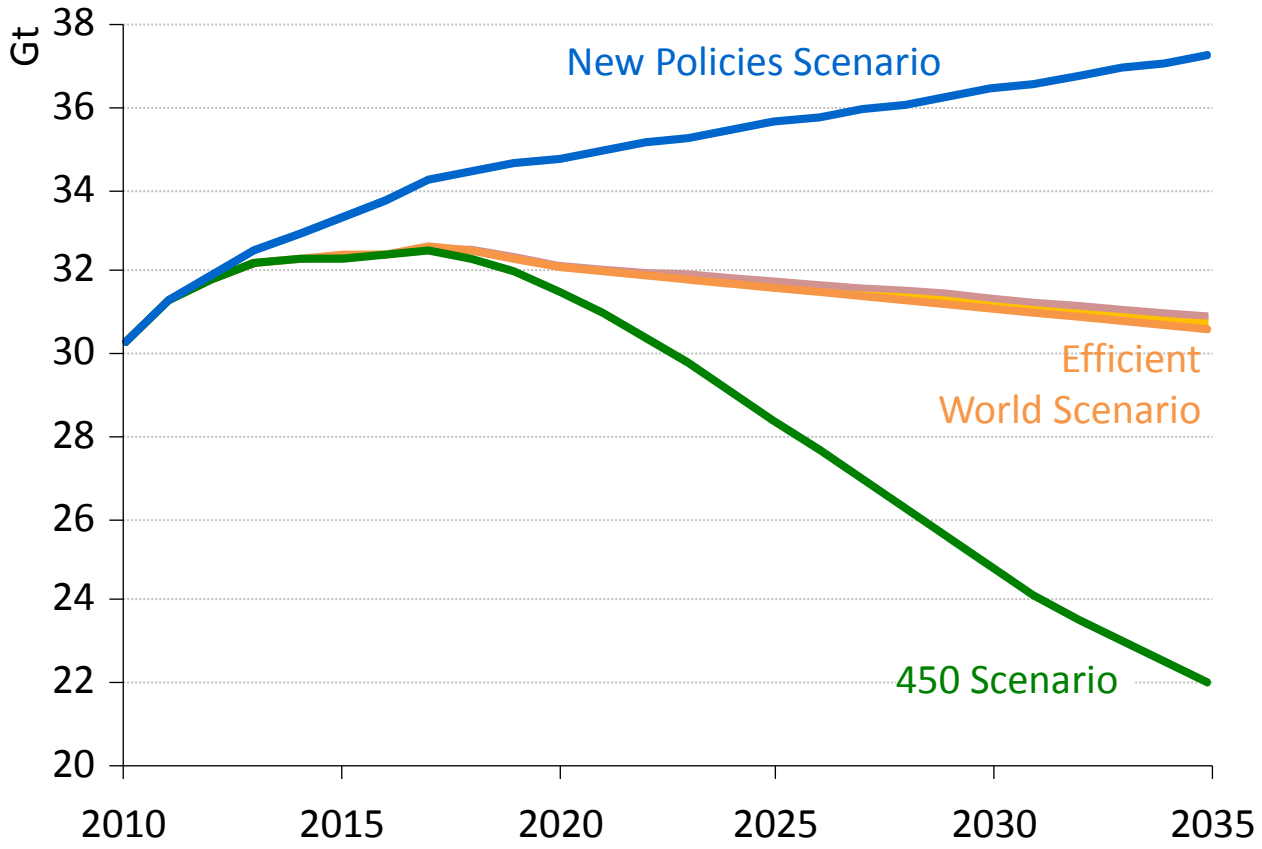
What can energy efficiency deliver?

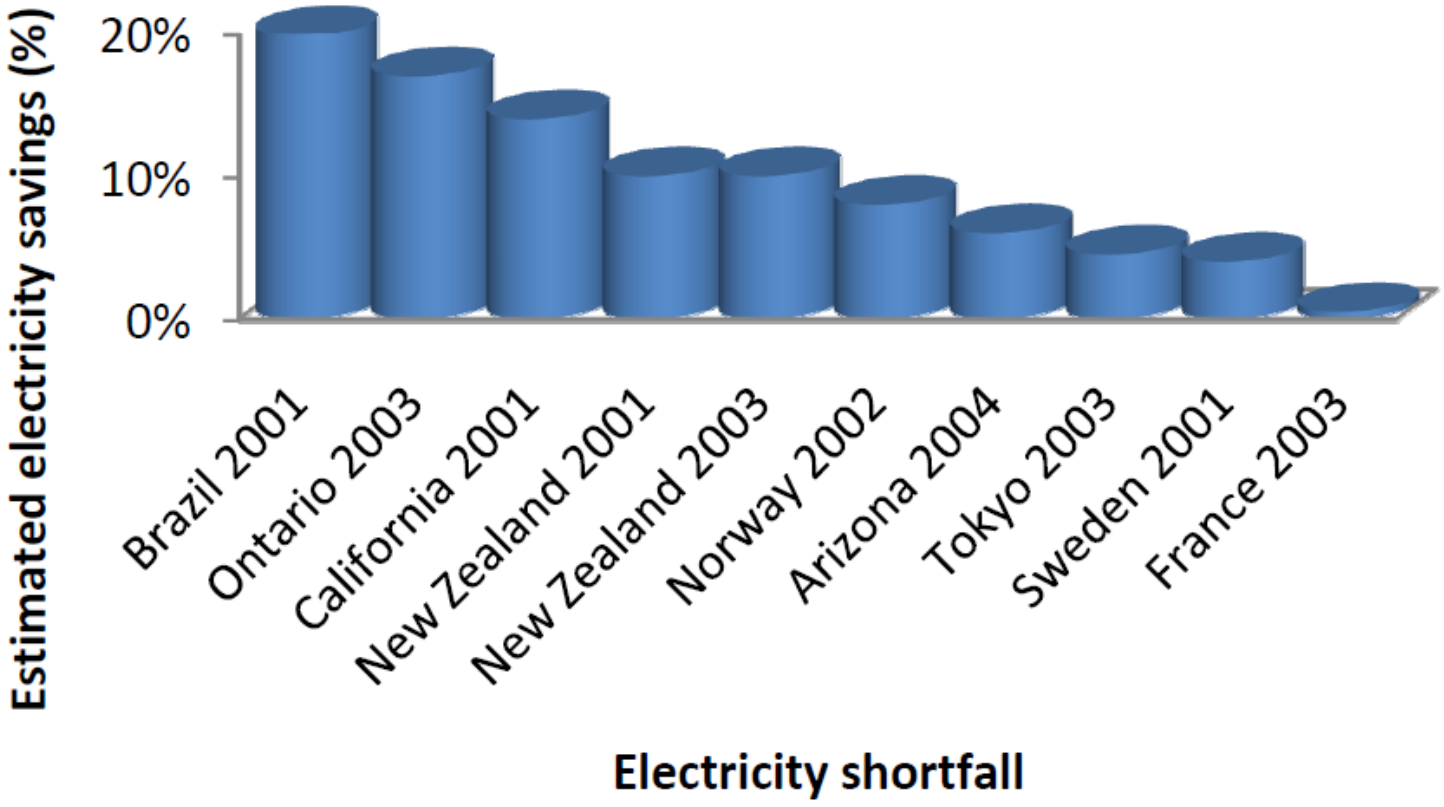
- **Limit demand growth**
- **Increase energy security**
- **Climate change mitigation**
- **Additional non-energy benefits for economy and society**

An Efficient World Scenario



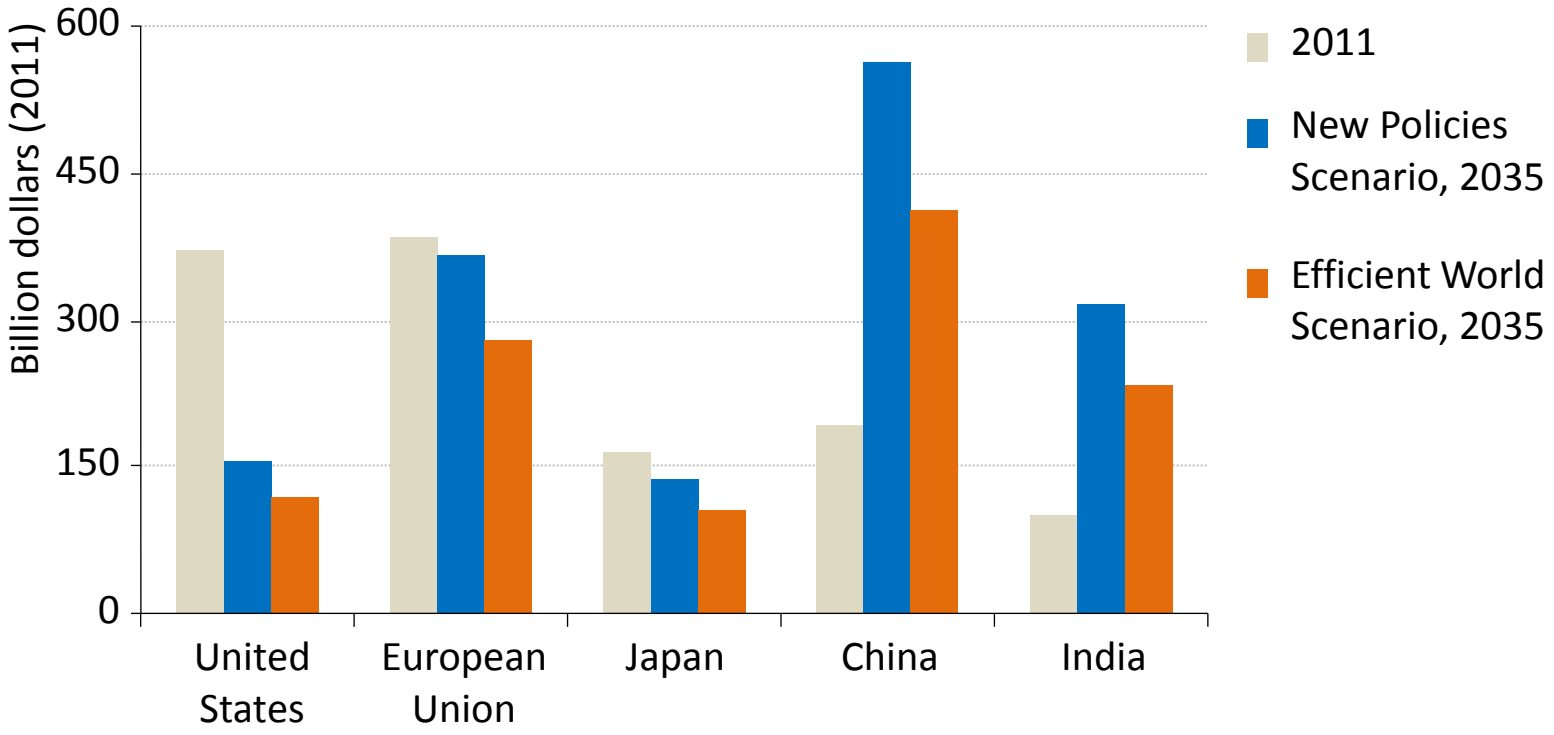
Economically viable energy efficiency measures can halve energy demand growth to 2035

Estimated savings achieved through emergency energy-saving programmes



Source: IEA (2005) *Saving Electricity in a Hurry*, OECD/IEA, Paris

Energy efficiency lowers oil import bills



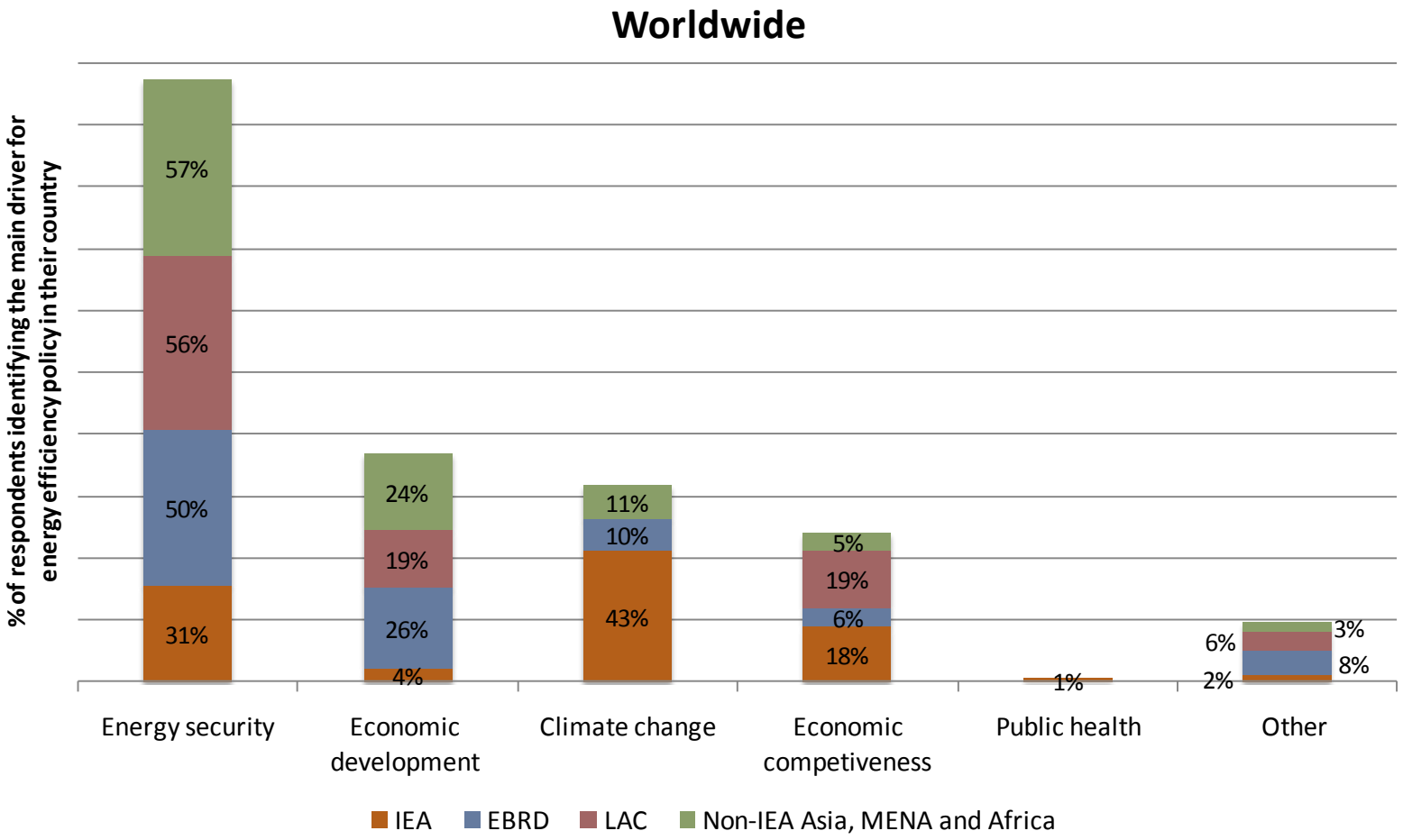
Energy efficiency cuts fossil fuel import bills by $570 billion in the Efficient World Scenario.

Multiple benefits of energy efficiency

Discussion

- What is the # 1 driver of EE policy in your country?
- Has climate change increased/decreased its importance?
- Report back to the group!

Energy Efficiency Drivers: IEA Survey Results



The Rebound Effect

- **Positive welfare or utility gains from energy efficiency can increase energy consumption = rebound effect**

- **If primary objective of EE policy is economic development - Different interpretation of rebound effect?**

Rebound Effects	Consumer		Producer	
	Income	Substitution	Output	Substitution
Direct	Turning up the heat, driving more	Buying a bigger house	Increasing production	More energy use relative to other factors
Indirect	Taking a holiday		Lower cost cars lead to more transport consumption	
Macro-economic	Lower prices for energy services boost demand for all goods and services economy-wide; increased employment		Increased productivity, higher profits/dividends implies investment in the economy	

Coffee Break!

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Why governments do energy efficiency? The Barriers

- **Efficiency improvements are often held back by barriers**
- **Overcoming these barriers is the reason for government action**
- **Types of barriers:**
  - ***Market Barriers***
  - ***Financial Barriers***
  - ***Information and awareness barriers***
  - ***Regulatory and Institutional Barriers***
  - ***Technical Barriers***

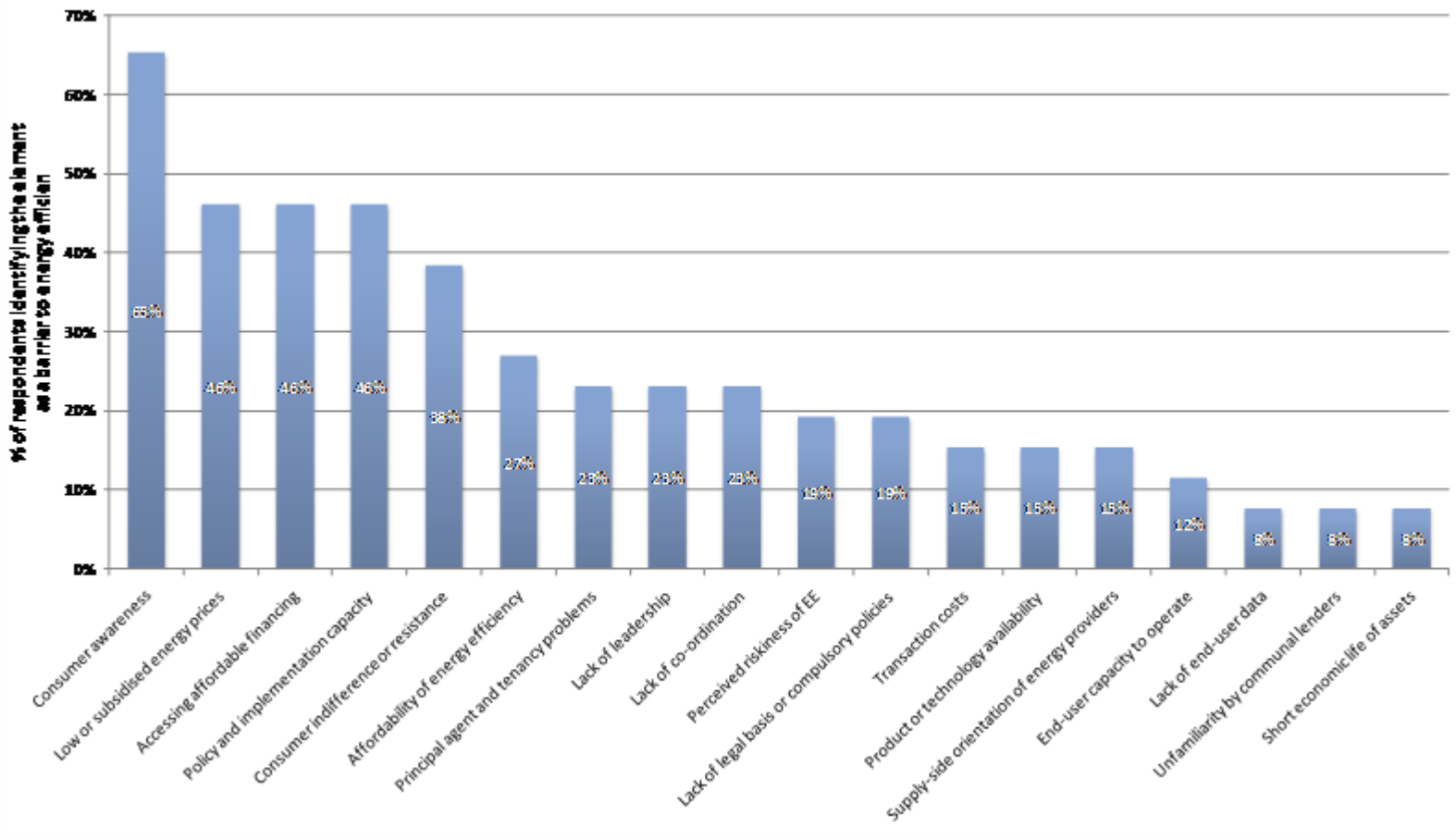
Barriers to energy efficiency uptake

Barrier	Examples
Market	• Market and price distortions that prevent customers from appraising the true value of energy efficiency. • The principal agent or split incentives problem, in which the investor does not reap the rewards of improved efficiency • Transaction costs (project development costs are high relative to potential energy savings).
Financial	• Lack of understanding of EE investments, or aversion to perceived risk on the part of financial institutions.
Information and awareness	• Lack of sufficient information to make rational consumption and investment decisions.
Regulatory and institutional	• Energy tariffs discouraging EE investment • Incentive structures that discourage investment in cost-effective energy efficiency. • Institutional bias towards supply-side investments.
Technical	• Lack of affordable or suitable EE technologies • Insufficient local capacities for identifying, developing, implementing and maintaining EE investments.

Quick take discussion

- **What are the biggest barriers to saving energy in your country?**

Barriers to energy efficiency: IEA survey results



How to governments promote energy efficiency? The Policies

When choosing a policy approach, consider:

- **Will it work?**
- **How much will it cost?**
- **Who will pay?**
- **How long will it take?**
- **Will there be unintended impacts?**
- **Does the capacity exist to implement?**

Policy Targets

- **Building:** existing buildings; new buildings; energy class; building code type; building types
- **Appliances:** residential; commercial; lighting
- **Transport:** scope; vehicle type; fuel type; non-engine components; vehicle operation; transport systems
- **Industry:** energy management; processes; equipment; products; sectors
- **Energy Utilities:** Combined heating & power (CHP); electricity; demand-side management; fossil-fuel production; heating

25 Energy Efficiency Recommendations across 7 Sectors

Worldwide **I**mplementation **N**ow

Cross-sectoral 

Buildings 

Appliances and equipment 

Lighting 

Transport 

Industry 

Energy utilities 

Policy Types

- **Information and education:** Advice/aid in implementation; labelling; professional training and qualification
- **Economic instruments:** fiscal incentives; market-based instruments; direct investment
- **Regulatory instruments:** codes & standards; auditing; monitoring; obligations schemes
- **Research, Development &Deployment (RD&D)**
- **Voluntary approaches:** public/private sector agreements; public voluntary schemes
- **Policy support measures:** strategic planning

Will it work?: Matching Interventions to Barriers

Barrier	Policy Intervention
Limited Information	Pilot Programs Awareness Campaigns
Perceived Risk	Market transformation Public Sector Procurement Fiscal policies
Customer Awareness	School curricula
Price or market distortion	Minimum Efficiency Efficiency Stds
Technology Availability	Industry formation Utility Programs
Transaction Costs	Audit requirements Audit grants
Access to financing	Revolving funds

Quick take discussion:

- What types of energy efficiency policies are most popular in your country?
- What drives the choice of policy approach?

International Energy Agency

Energy Efficiency

Policies and Measures Databases

www.iea.org/textbase/pm/index.html

Provides free, up-to-date data on national policy packages and latest policy developments in renewable energy, EE and climate change worldwide.

- **Advanced user-driven search**
- **Analytical tables showing key policy trends**
- **Expanding geographical scope to IEA non-member countries**
- **In collaboration with Clean Energy Solutions Centre, UNEP Risoe Centre and European Commission**

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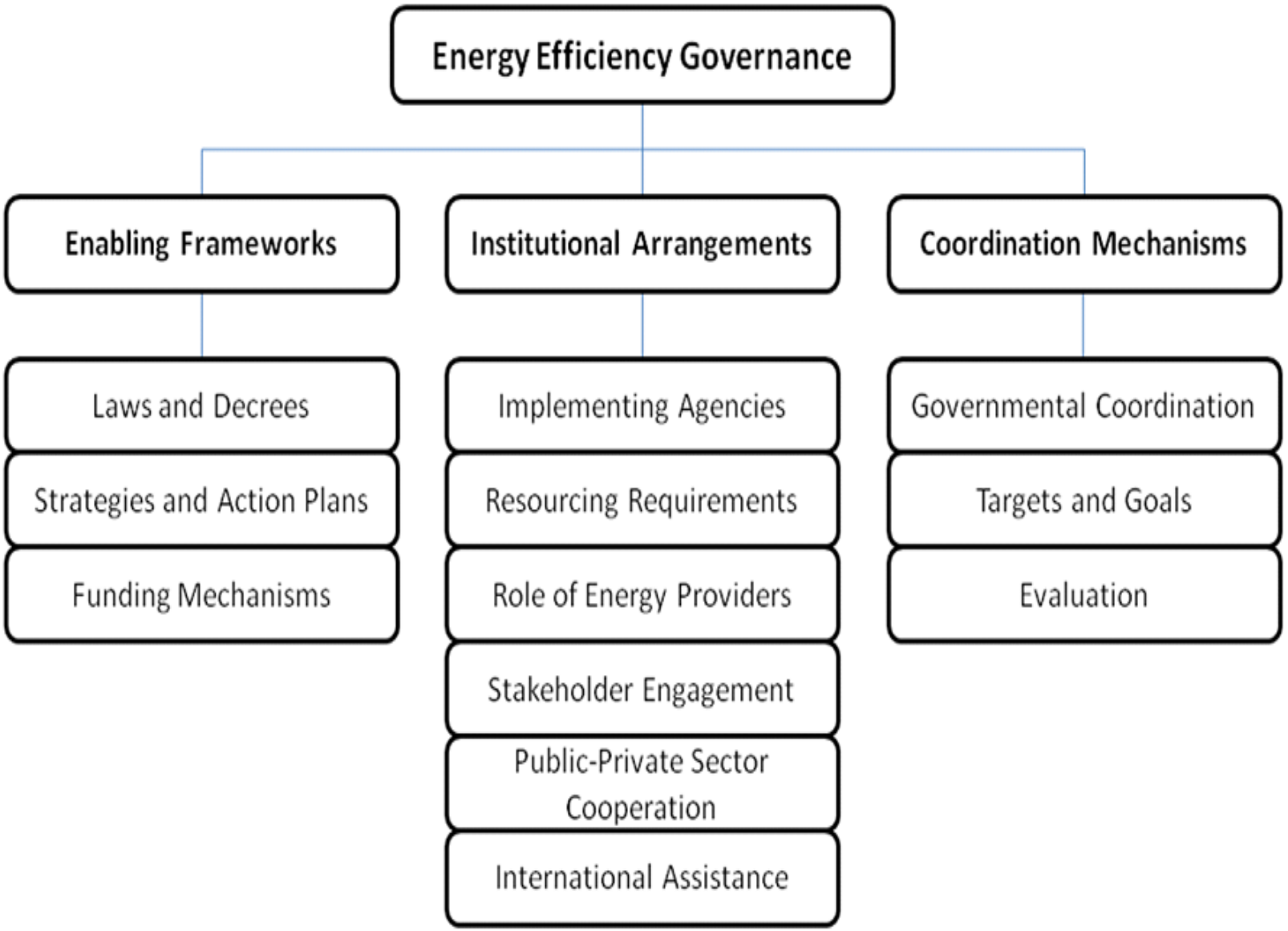
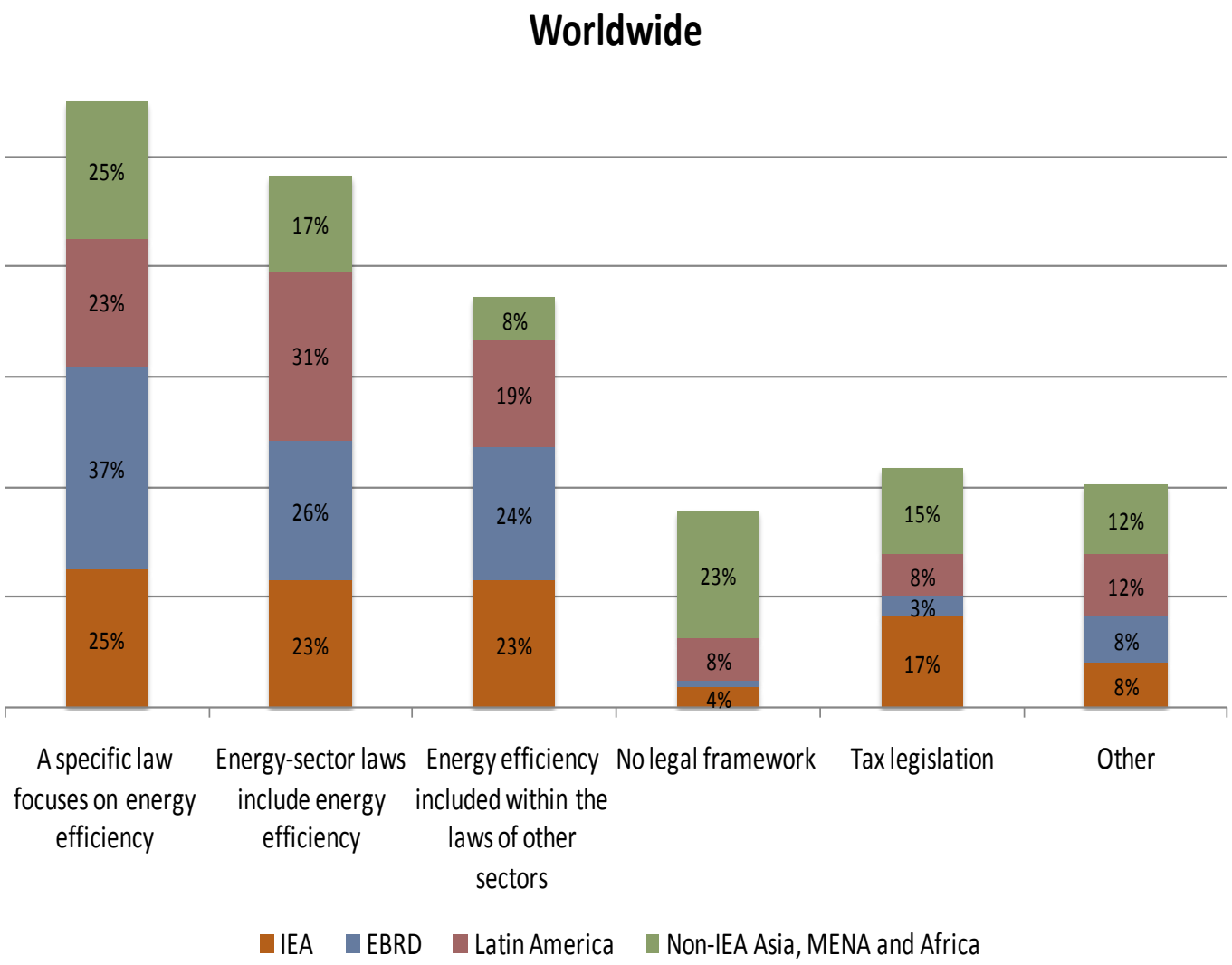
5. Discussion

What is *Energy Efficiency Governance?*

Energy efficiency governance combines legislative and regulatory frameworks, institutional arrangements, funding provisions, and coordination mechanisms that enable the implementation of energy efficiency policy



Energy Efficiency Laws and Decrees



Issues in developing energy efficiency laws

- Scope: Comprehensive or Narrow?
  - Comprehensive laws can take years to enact
  - Narrow laws can be quickly enacted but have less impact
- Soft law – hard law
  - Soft laws articulate objectives without specifying policies
  - Hard laws convey authority and specify obligations
- Laws should:
  - Balance 'carrots' and 'sticks
  - Assigning implementation responsibility
  - Include resources and capacity building
  - Taking on difficult sectors (transport, public sector)

Funding Mechanisms

- Need reliable and adequate funding

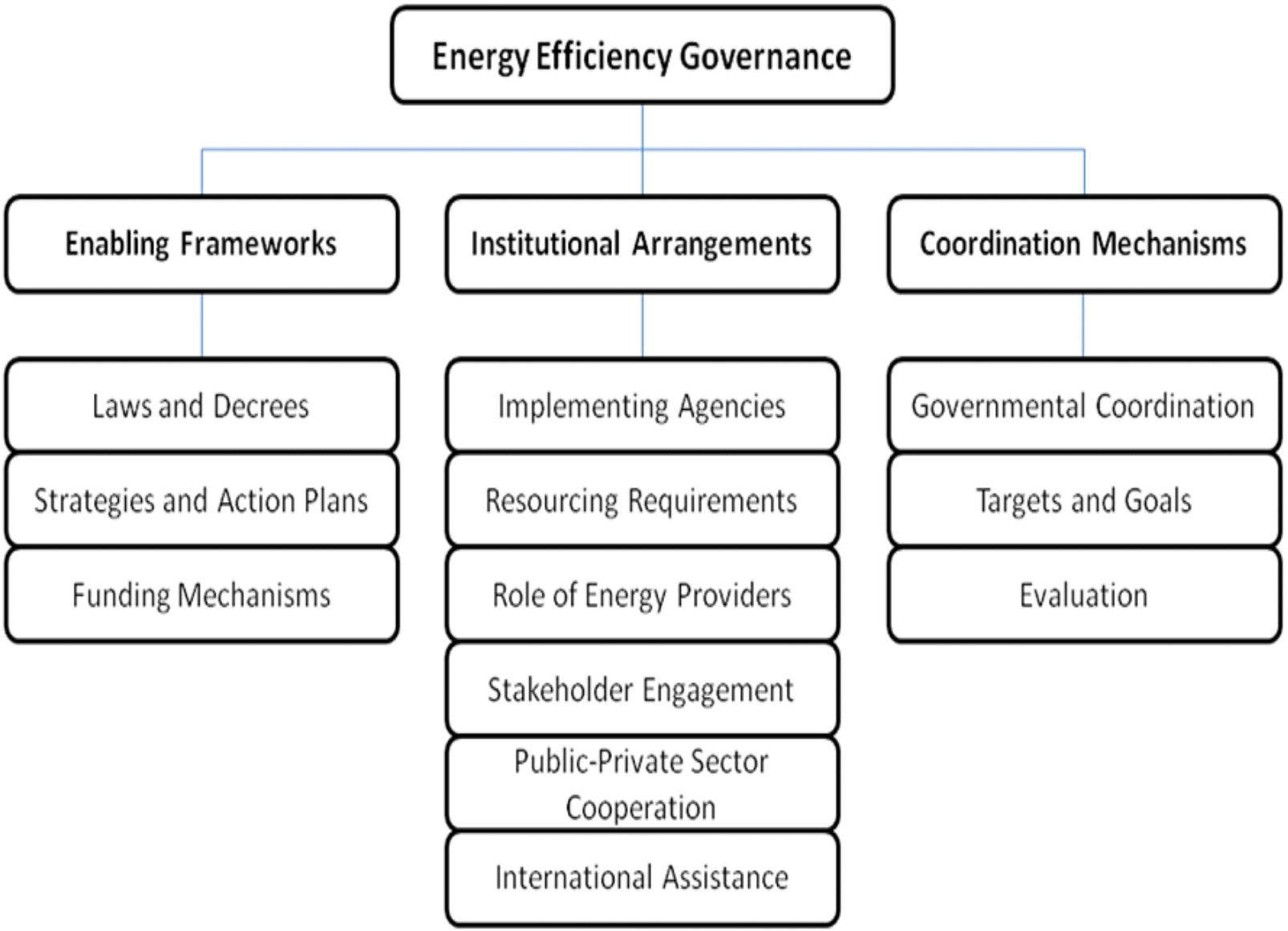
- Typical funding sources
  - General Budget Appropriations
  - Energy & Environment Taxes
  - Network or System Public Benefit Charges
  - Donor funding
  - Carbon financing
  - Licensing, permitting fees, & fines
  - Fee for Service arrangements

EE Funding Mechanisms

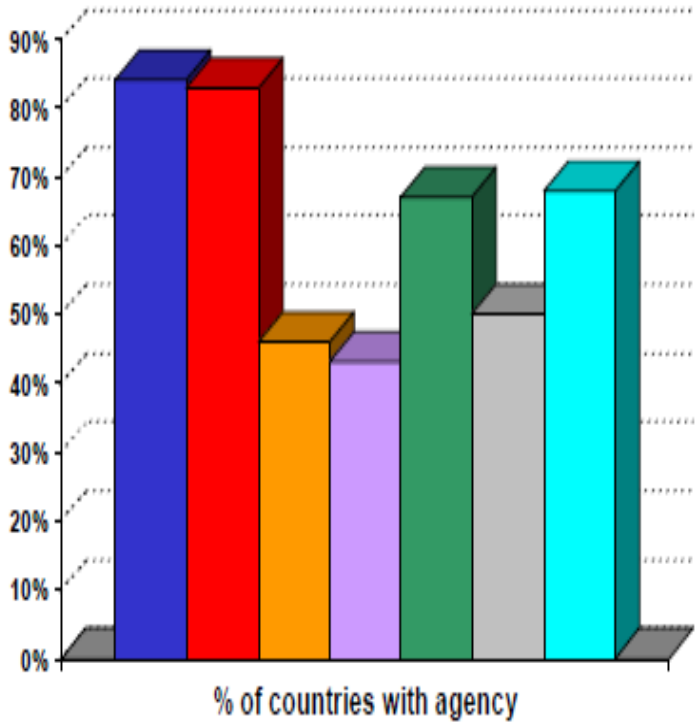
Funding mechanism	Funding good governance score				
	Adequacy	**Stability**	**Autonomy**	**Origin**	Distortive Effect
Government budgets	√				√
Grants from other government agencies	√				√
Energy or environmental taxes	√	√	√ (if earmarked)	√	
System public benefit charges	√	√	√	√	
Stimulus funds	√				
Licensing and permitting fees		√	√		√
Carbon finance	√			√	√
Donor funding	√				
Fee-for-service arrangements		√	√	√	√

Small Group Break-out Exercise

- You have been assigned to develop an energy efficiency law
- Discuss and decide what are the three most important things to include in your law
- Brainstorm the steps required to enact the law
- Prepare a 1 minute report for the entire group



EE Institutional Arrangements



Source: WEC/ADEME Survey

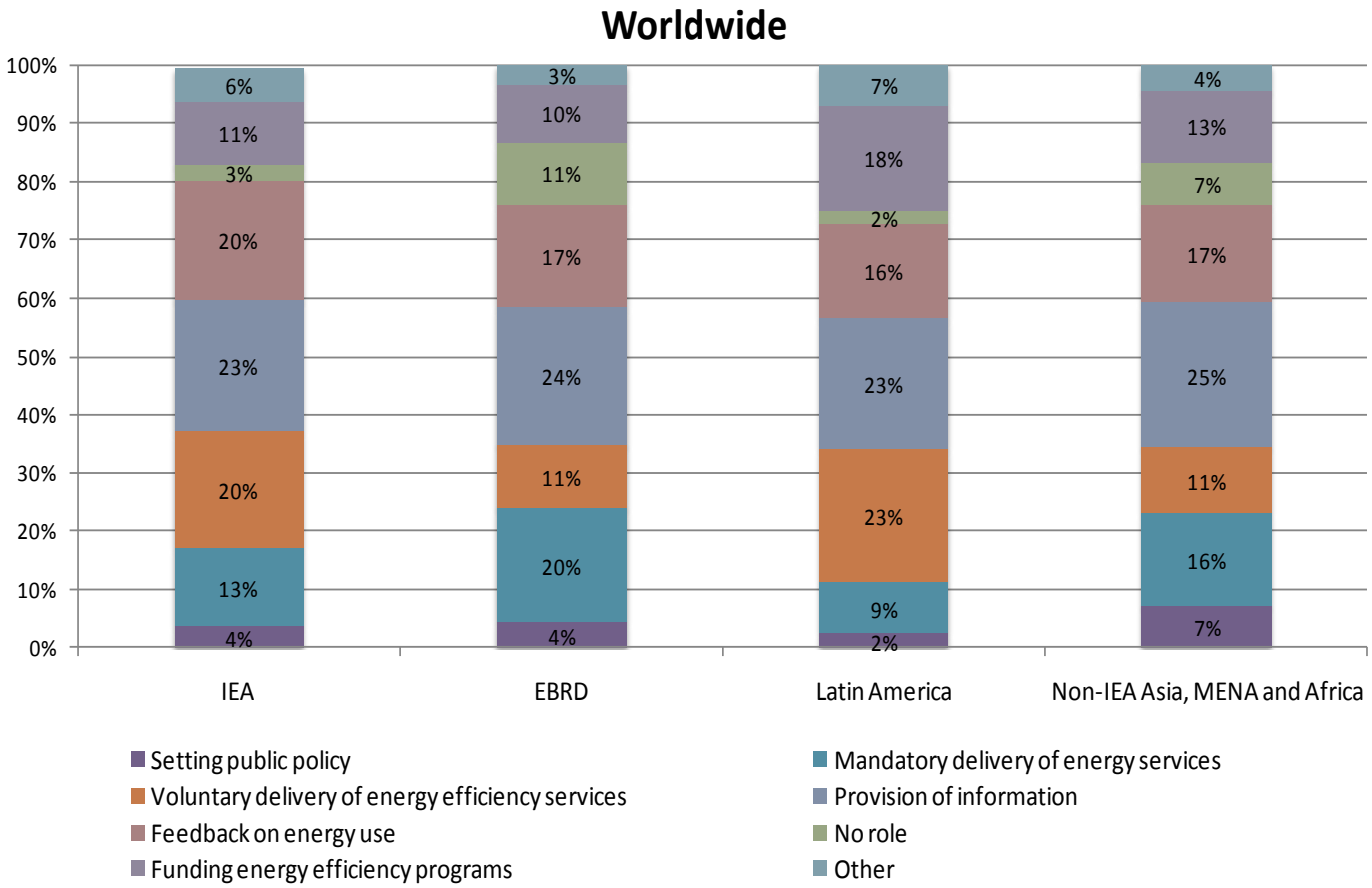
Examples of energy efficiency agencies

Organizational Type	Examples	
	Country	Organization
Department within a Government energy agency	Canada	Natural Resources Canada
	China	National Development & Reform Commission
	Indonesia	Ministry of Energy and Mineral Resources
	Russia	Russia Energy Agency
	Singapore	National Environment Agency
	Sweden	Swedish Energy Agency
	Thailand	Ministry of Energy
	Turkey	Ministry of Energy and Natural Resources
Specialized Governmental energy efficiency and clean energy agencies	Brazil	Procel
	Czech Republic	ICE Group
	Hungary	The Energy Centre
	India	Bureau of Energy Efficiency
	New Zealand	Energy Efficiency and Conservation Authority
	Tunisia	National Agency for Energy Management (ANME)
	Ukraine	National Agency for Efficient Use of Resources (NAER)
Independent energy efficiency and clean energy Statutory Authority or Corporation	Costa Rica	ICE Group
	Finland	Motiva Oy
	Korea	Korea Energy Management Corporation
	Norway	ENOVA
Energy efficiency and clean energy NGO or public benefit organization	Jordan	National Energy Research Centre
	United Kingdom	Energy Trust and the Carbon Trust
Energy efficiency and clean energy Public/private partnership	Chile	Chilean Energy Efficiency Agency

Energy Providers as EE Implementers

- **Advantages:**
  - Ready access to capital
  - Commercial relationship with end users
  - A familiar brand name
  - Widespread service and delivery network within their jurisdiction
  - Responsible for meeting energy demand growth.
- **Disadvantages:**
  - Overlap in commercial and societal interests
  - Incentive to sell, not conserve, energy
  - Need for regulatory oversight

IEA Survey Results: What Role do Energy Providers Play in Implementing EE?

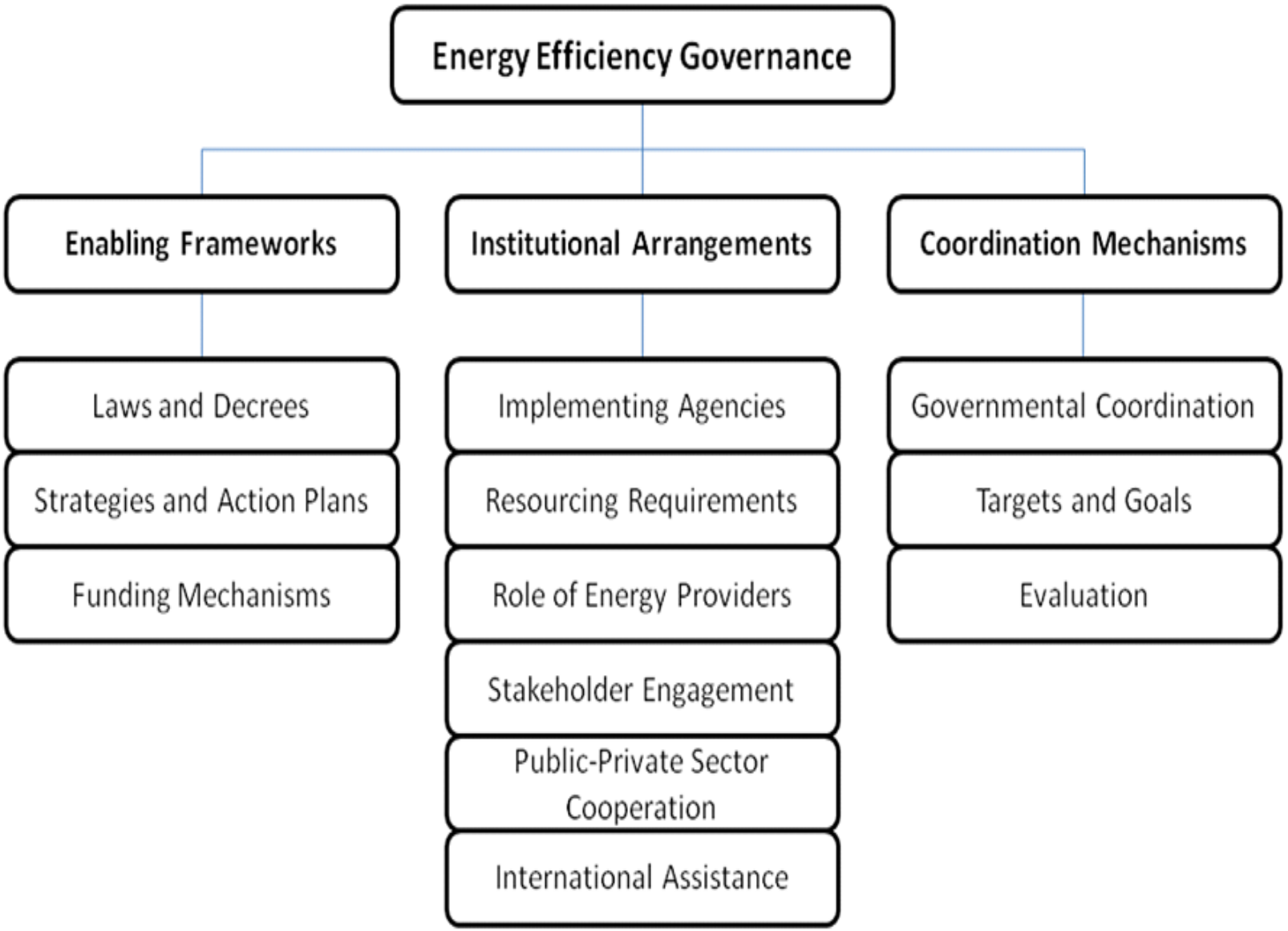


Other institutional arrangements

- Stakeholder engagement
  - Useful in building consensus
  - Improves policy quality
  - Often leads to energy efficiency legislation
- Public-private cooperation
  - Public-private partnerships
  - Voluntary energy efficiency agreements
  - ESCOs
- International donor assistance
  - Useful in creating initial interest in energy efficiency
  - Creating regional networks is an effective approach
  - Focus on creating sustainable results

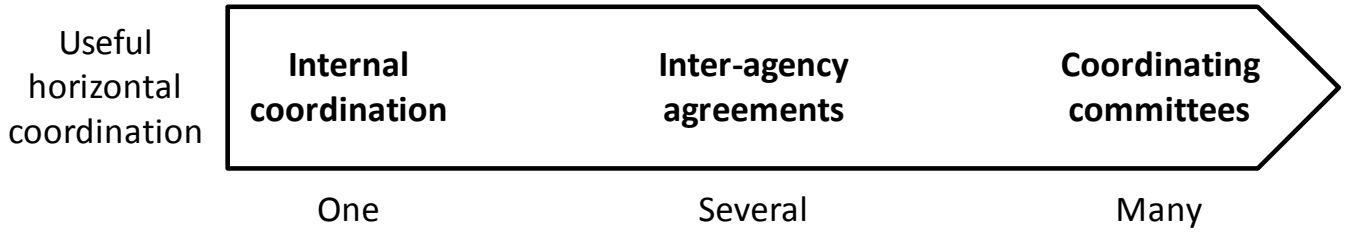
Quick take discussion: institutional arrangements

- Which is the most common type or EE implementing organization?
- What role do energy utilities play in your country and could they do more?
- How about new types of EE organizations?

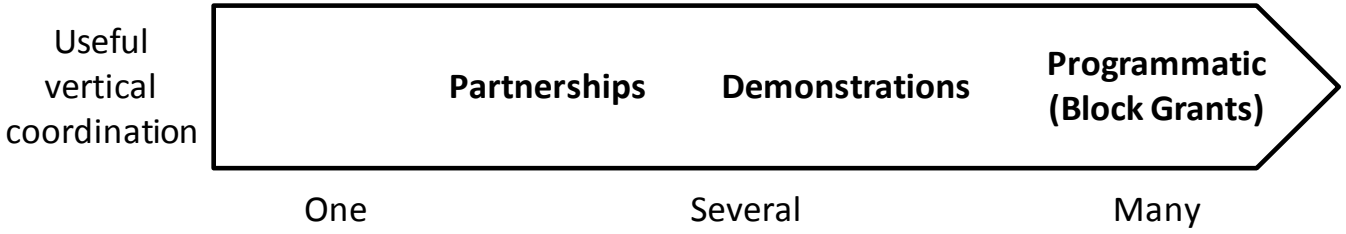


Gov't Coordination Mechanisms

- Intra-Governmental (Horizontal) — Cooperation among national government ministries and agencies



- Inter-Governmental (Vertical) — Cooperation across levels of government, including national, regional and local government entities



Energy Efficiency Targets

- **Targets and goals have real utility**
  - Motivate, challenge and direct EE policy
  - Facilitate results monitoring & policy adjustments
  - Basis for planning, funding, & staffing-up.

- **Targets should be carefully formulated**
  - Strong analytic foundation
  - Should not stretch credibility
  - Should not be too long-term w/o interim targets

Energy efficiency target examples

Country	Target description*				
	Sector	Type and description	Target	Baseline year	Target year
China	Economy-wide	Reduced energy intensity relative to a baseline year	20%	2005	2010
European Union	Economy-wide	Reduced energy consumption relative to a baseline year	9%	2008	2016
Indonesia	Economy-wide	Elasticity	Less than 1.0**		2025
Mexico	Buildings Transport Appliances and lighting Industry	Reduced energy consumption relative to a baseline year	16% 26% 52% 12%	2009	2030
Russia	Economy-wide	Reduced energy intensity relative to a baseline year	40%	2007	2020
Turkey[17]	Buildings	Transactional	10 million buildings	N/A	2020
Vietnam	Economy-wide	Reduced energy consumption relative to a baseline year	5% to 8%	2011	2015

Notes: *Most of these countries have more than one target. Country names provide links to more complete information, with the exception of Turkey as this target was reported in interviews. ** An elasticity of less than 1 means that the energy demand growth rate is less than the GDP growth rate.

Coordinating EE and GHG reduction targets

- Many governments have dual EE & GHG reduction targets
  - EU CO2 target: 20% by 2020 compared to 1990 levels.
  - EU EE target: Usage in 2016 lower by 9% relative to 2008

- Coordination solutions:
  - Use a common analytic foundation
  - Show linkages in national plans for EE and GHG reductions
  - Subsume EE plans within broader climate strategy
  - Consolidate responsibility for EE and climate change

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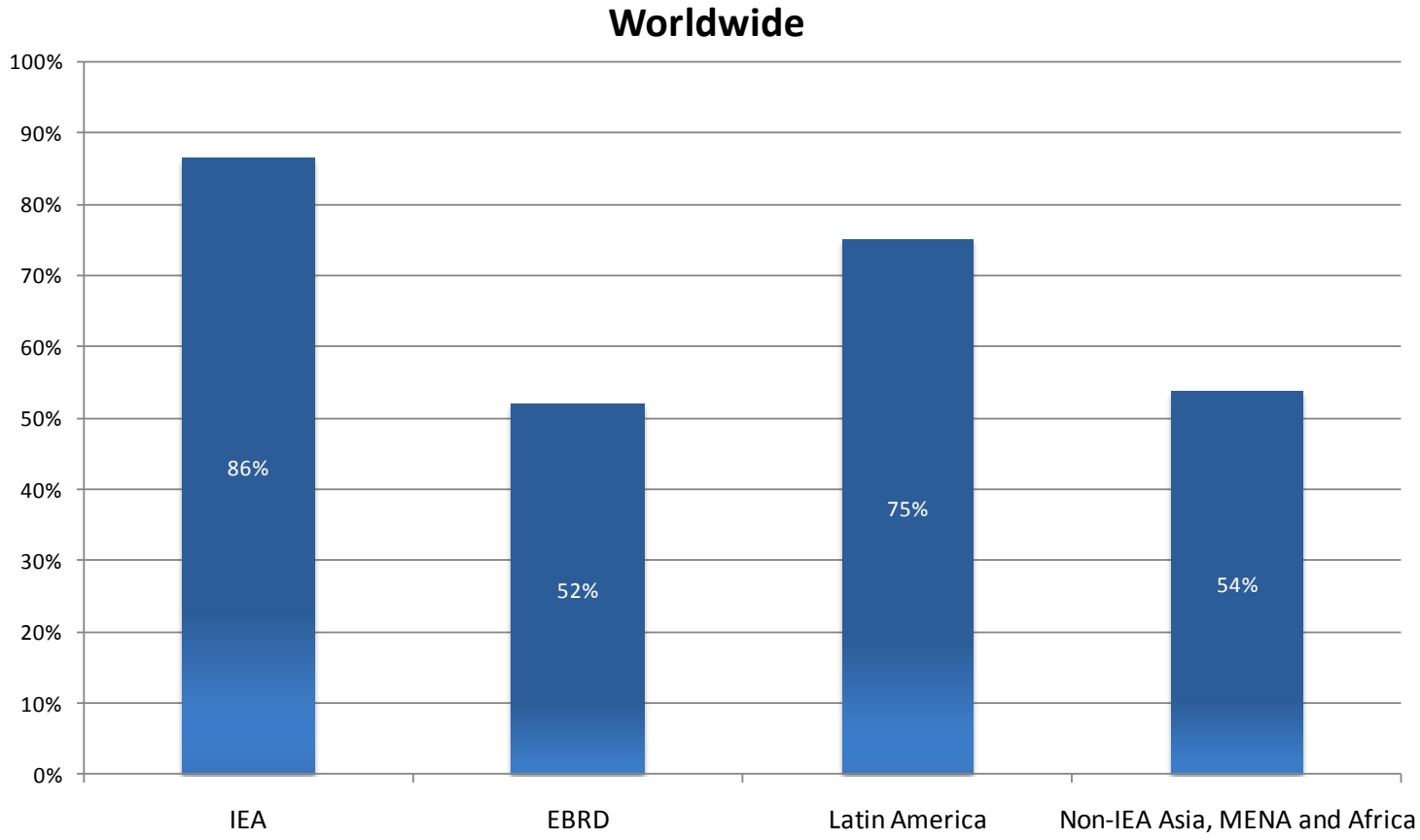
Evaluation

- **Evaluation important in all phases of EE policy:**
  - **Learning from previous EE policy and programs**
  - **Process and market evaluation during implementation helps assists EE managers to make needed corrections;**
  - **Checking progress towards overall targets and goals**
- **Although critically important, evaluation often not done**

IEA Survey: Does Your Country Conduct Evaluations of EE Policies and Programs?



Guidelines for Effective EE Evaluation

- Success factors for effective EE evaluation
- Create an “evaluation culture”, evaluation is woven into the fabric of EE policy implementation
- Make evaluation integral to the oversight of EE policy
- Adopt “good governance” especially for evaluation

Wrap Up

- *What* is Energy Efficiency?
- *Why* Energy Efficiency: What can it deliver?
  - The benefits
- *How* do governments promote energy efficiency?
  - The barriers
  - The policy
- *How* do governments deliver energy efficiency policy?
  - Governance
  - Evaluation

❖ ***What stood out for you?***

❖ Talk to your neighbour and report back