Toolkit:

Energy efficiency policies and target setting

Buildings

Buildings energy efficiency sessions in partnership with:

BEEP

INDO-SWISS BUILDING ENERGY EFFICIENCY PROJECT

IEA #energyefficientworld

Energy Efficiency Training Week: Buildings programme

1. **Where to start:** Energy use in buildings
2. **Where to start:** Energy efficiency potential in buildings
3. **Toolkit:** Energy efficient building design
4. **Toolkit:** Energy efficient building technologies

   Special session. Technology demonstration

   Where do I get help? IEA's Technology Collaboration Programmes
5. **Toolkit:** Energy efficiency policies and target setting
6. **What are the steps?** Enabling investment with energy efficiency policies
7. **What are the steps?** Implementing building energy codes and standards
8. **What are the steps?** Building operations and procurement

   Special session. The multiple benefits of energy efficiency
9. **Did it work?** Evaluation and energy efficiency indicators

   Where do I get help? International and regional energy efficiency initiatives
10. **Energy efficiency quiz:** Understanding energy efficiency in buildings

5. Toolkit. Energy efficiency policies and target setting

Trainers: Brian Dean and Pierre Jaboyedoff

Purpose: To teach the fundamentals of how energy efficiency targets and policies can be used in tandem to reduce energy use in buildings and meet energy and development goals.

Scenario: There has been a change of government and the incoming government wants a range of options for interventions to rapidly increase energy efficiency. *How do you identify, prioritise and quantify these policy options?*

Why do we need policies

Bridging the gap

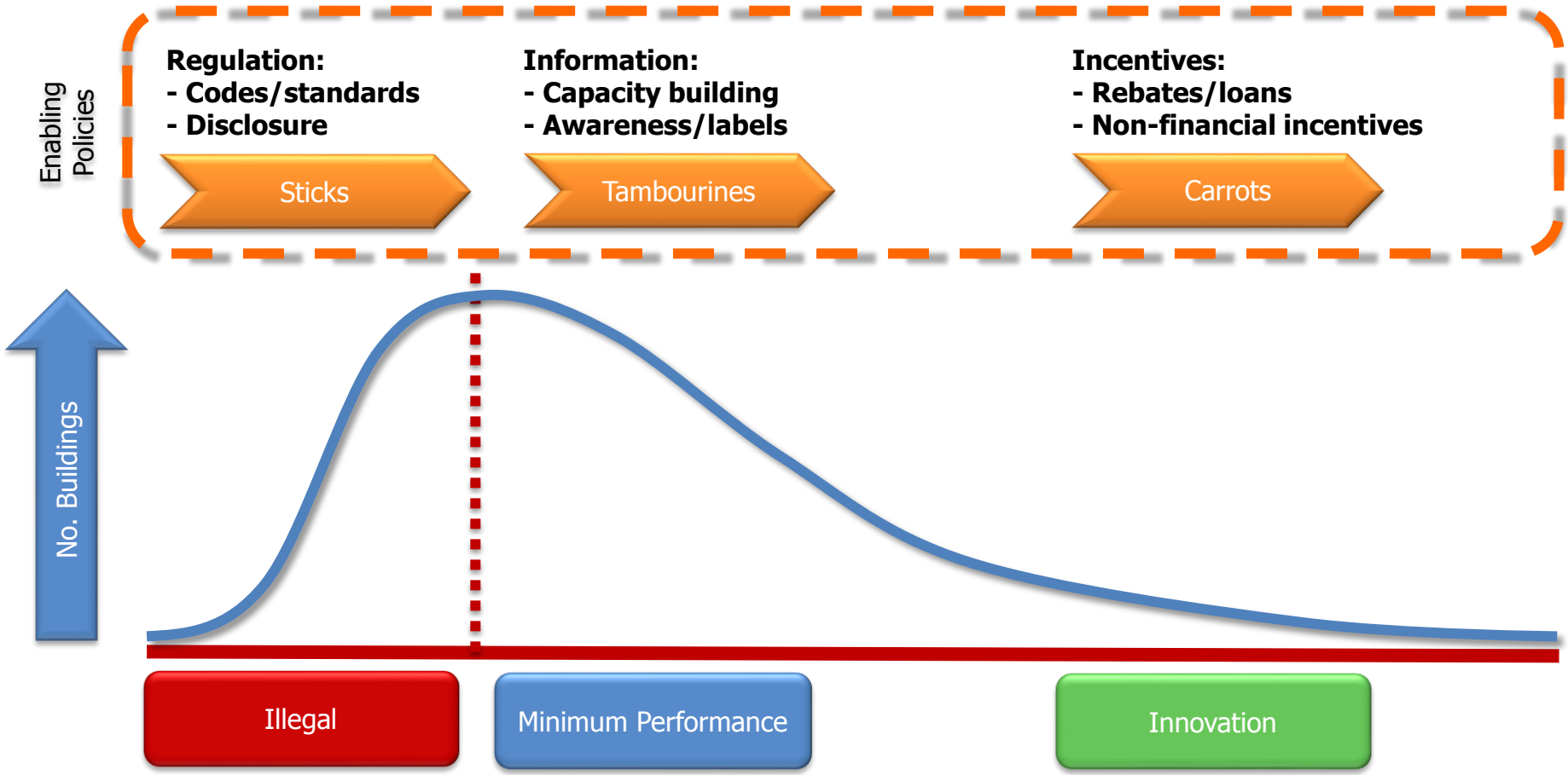
Enable market transformation

Why do we need policies?

Why do we need policies? Bridging the efficiency gap

Source: Institute for Building Efficiency, WRI

Why do we need policies? Market transformation



Source: adapted from GBPN

Energy efficiency regulations

Mandatory regulation

- **Codes:** regulation for energy efficiency and sustainability for a whole building.
- **Standards:** regulation for individual products or services, often referenced within a building code for individual building components.
- **Mandatory disclosure:** regulation that requires organisations or individuals to report or disclose how their building is performing, such as disclosing the energy performance certificate or energy usage.

Obligations

- **Utility obligations:** rules for regulated utilities that enable increasing investment in energy efficiency and passing the costs system-wide in the energy prices
- **Public procurement:** rules for government organisations to purchase products and services that meet certain criteria, such as energy performance or certification.

Energy efficiency information

Data and information

- **Energy performance certificates:** documentation of basic building information plus energy performance
- **Building passport:** documentation of most buildings data and information, including basic information, construction materials, systems, renovations and energy use.

Awareness

- **Labels and branding:** easily identifiable visual that enables consumers to recognise product or service as efficient.

Capacity building

- **Education and training:** learning efforts to increase the knowledge of building sector professionals or general population.
- **Labour certification:** searchable documentation of professional expertise in delivering energy efficiency.

Energy efficiency incentives

Non-financial incentives

- **Time:** expedited approval for permits
- **Scope:** increased floor area, building height or number of floors

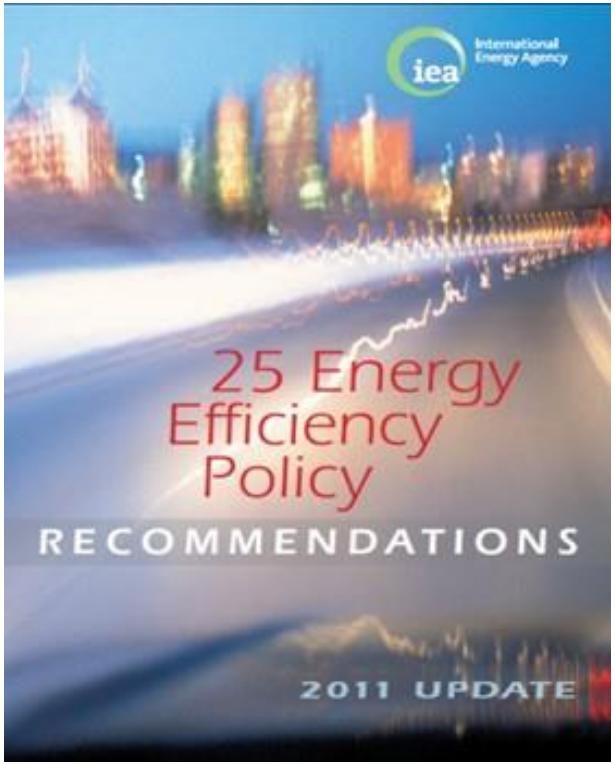
Financial incentives

- **Finance:** enabling private investment ,including through loan guarantees, preferential loan terms or increased access to funds
- **Direct fiscal credit:** improving the cost of energy efficiency to consumers through rebates, tax credits and discounts

Policy Recommendations

25 Energy Efficiency Policy Recommendations

Energy efficiency policy recommendations



Buildings

6 Mandatory building codes and MEPS

7 Net-zero energy consumption in buildings

8 Improved energy efficiency in existing buildings

9 Building energy labels or certificates

10 Energy performance of building components and systems

Cross-sectoral

Buildings

Appliances and equipment

Lighting

Transport

Industry

Energy utilities

25 energy efficiency policy recommendations

Cross-sectoral

1. Energy efficiency data collection and indicators
2. Strategies and action plans;
3. Competitive energy markets with appropriate regulation;
4. Private investment in energy efficiency
5. Monitoring, enforcement and evaluation of policies and measures.

Buildings

6. Mandatory building energy codes and minimum energy performance requirements;
7. Aiming for net zero energy consumption in buildings;
8. Improving the energy efficiency of existing buildings;
9. Building energy labels or certificates;
10. Improved energy performance of building components and systems.

Appliances and Equipment

11. Mandatory MEPS and labels for appliances and equipment;
12. Test standards and measurement protocols for appliances and equipment
13. Market transformation policies for appliances and equipment

Lighting

14. Phase-out of inefficient lighting products and systems;
15. Energy efficient lighting systems

Transport

16. Mandatory vehicle fuel efficiency standards;
17. Measure to improve vehicle fuel efficiency;
18. Fuel-efficient non-engine components
19. Improved vehicle operational efficiency through Eco-driving and other measures .
20. Transport system efficiency

Industry

21. Energy Management in industry;
22. High efficiency industrial equipment and systems;
23. Energy efficiency services for small and medium enterprises;
24. Complementary policies to support industrial energy efficiency

Energy utilities

25. Energy Utilities and end-use energy efficiency.

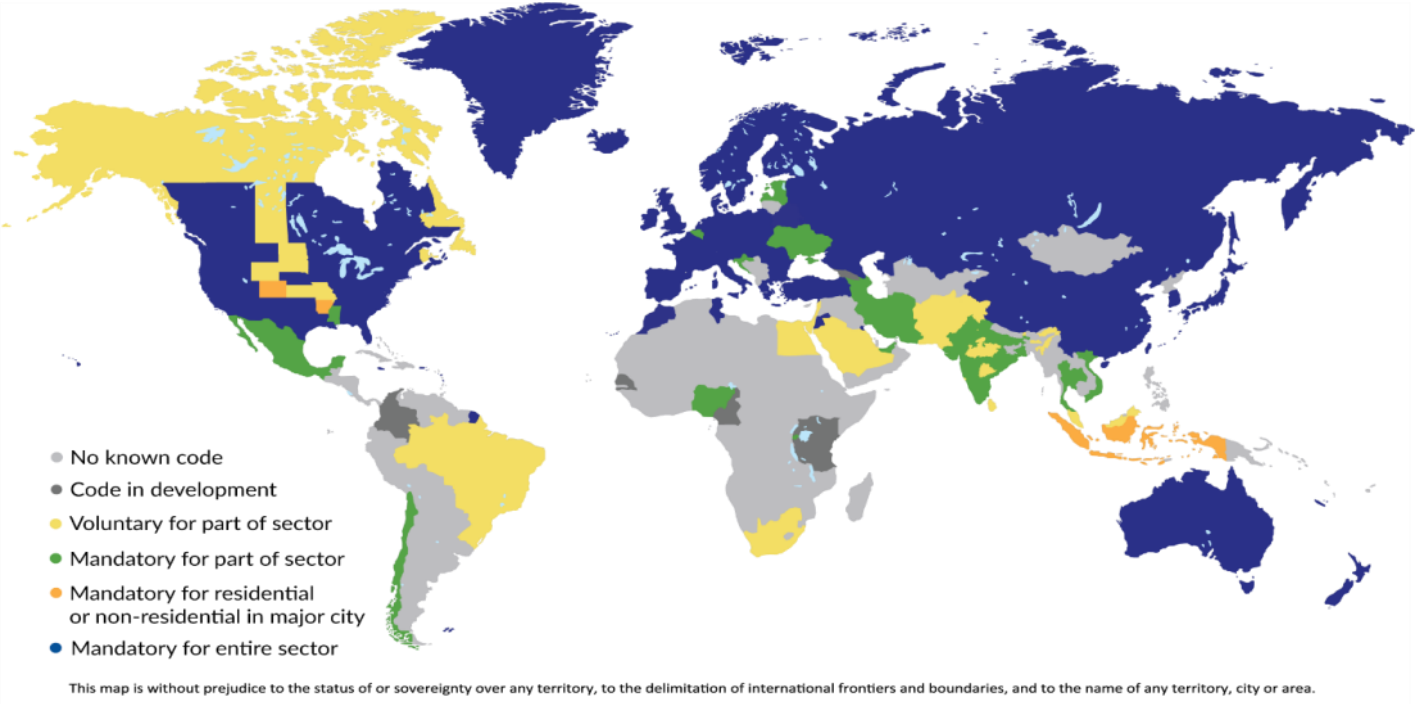
Energy efficiency policy recommendations

#6 Mandatory building energy codes and minimum energy performance standards

- New buildings & buildings undergoing renovation
- Building envelope and equipment
- Energy codes and minimum energy performance standards (MEPS)
- Enforced and regularly strengthened
- To minimise life-cycle costs.

Energy codes for buildings

Building energy codes by country, state and province, 2016-2017



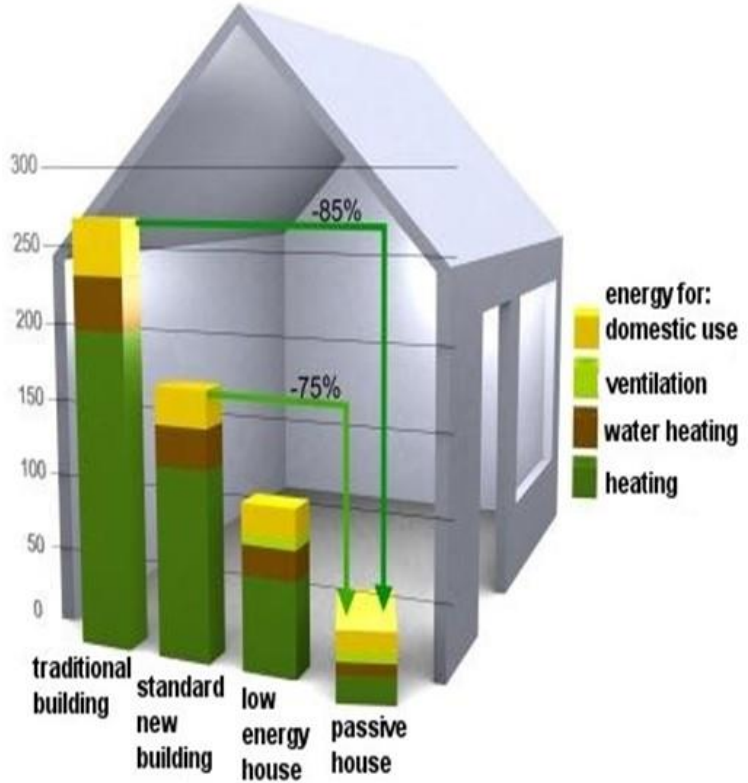
Nearly two-thirds of countries do not have mandatory building energy codes in place today.

Source: GlobalABC 2017 Global Status Report

Energy efficiency policy recommendations

#7 Aiming for net-zero energy consumption in buildings

- Governments should support and encourage
- Make commonly available, when economically viable on a life-cycle cost basis
- Set targets for market share for new construction by 2020
- Set future building codes and MEPS based on net-zero building standards



Energy efficiency policy recommendations

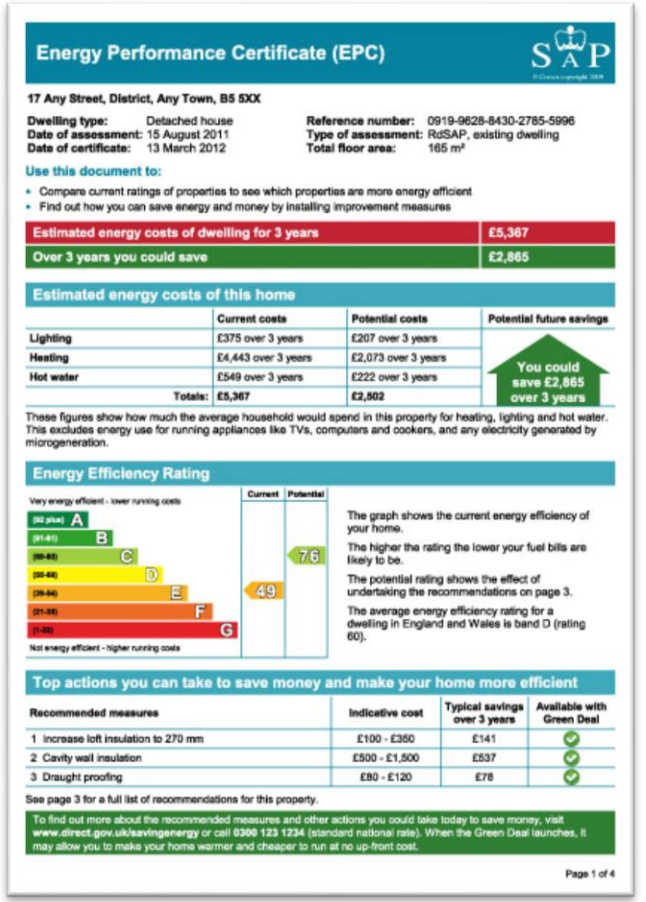
#8 Improving the energy efficiency of existing buildings

- Ambitious timeline and renovation rate
- MEPS for and significant improvements to building envelopes and systems during renovations
- Energy audits, energy ratings and energy performance certification
- Finance and incentives to encourage investment to increase market penetration of long-lasting high efficiency improvements
- Training to improve building retrofit services
- Improvements to the efficiency of public-sector buildings

Energy efficiency policy recommendations

#9 Building energy labels or certificates

- Governments should require building energy performance labels or certificates
- To provide information to owners, buyers and renters.
- At sale or rental



Energy Performance Certificate (EPC) — SAP

17 Any Street, District, Any Town, B5 5XX

Dwelling type:	Detached house	**Reference number:**	0919-9628-8430-2785-5996
Date of assessment:	15 August 2011	**Type of assessment:**	RdSAP, existing dwelling
Date of certificate:	13 March 2012	**Total floor area:**	165 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years	**£5,367**
Over 3 years you could save	**£2,865**

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£375 over 3 years	£207 over 3 years	You could save £2,865 over 3 years
Heating	£4,443 over 3 years	£2,073 over 3 years	
Hot water	£549 over 3 years	£222 over 3 years	
Totals:	£5,367	£2,502	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating

	Current	Potential
Very energy efficient - lower running costs		
(92 plus) A		
(81-91) B		
(69-80) C		76
(55-68) D		
(39-54) E	49	
(21-38) F		
(1-20) G		
Not energy efficient - higher running costs		

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Increase loft insulation to 270 mm	£100 - £350	£141	✓
2 Cavity wall insulation	£500 - £1,500	£537	✓
3 Draught proofing	£80 - £120	£78	✓

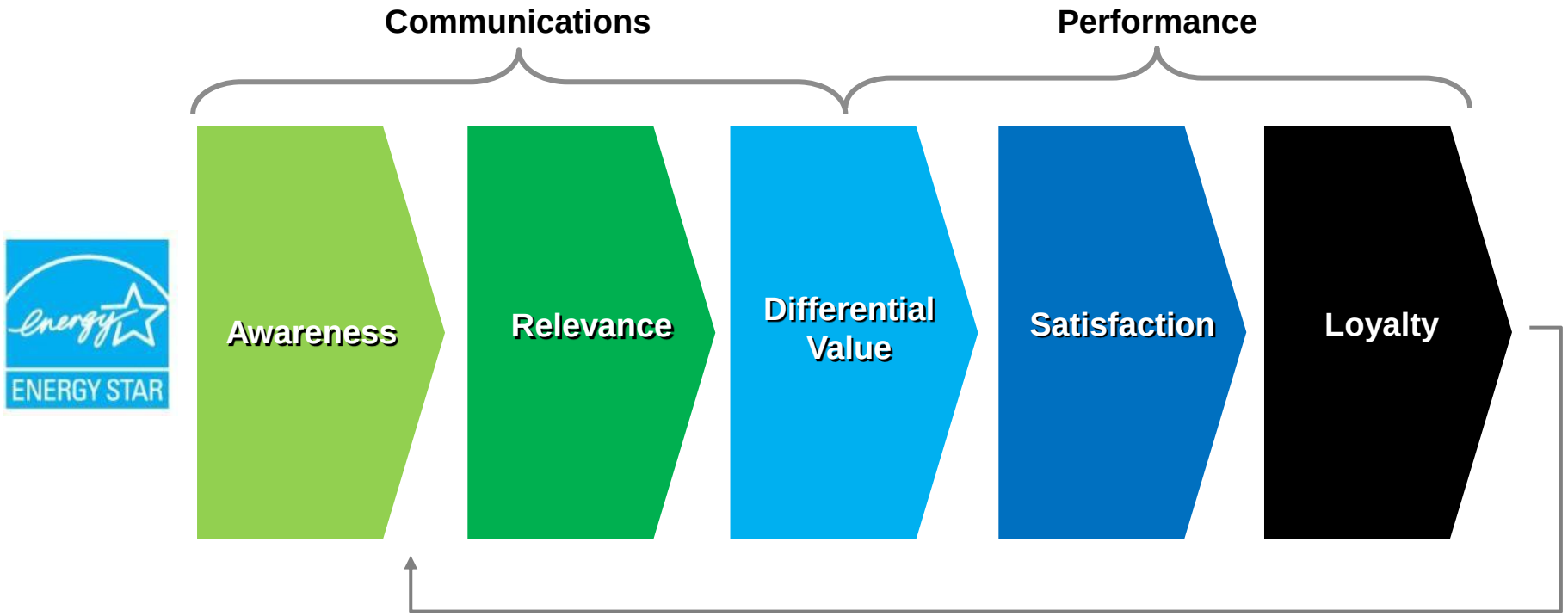
See page 3 for a full list of recommendations for this property.

To find out more about the recommended measures and other actions you could take today to save money, visit www.direct.gov.uk/savingenergy or call 0300 123 1234 (standard national rate). When the Green Deal launches, it may allow you to make your home warmer and cheaper to run at no up-front cost.

Page 1 of 4

Energy efficiency policy recommendations

ENERGY STAR is a voluntary label for market transformation that has been developed as a brand.



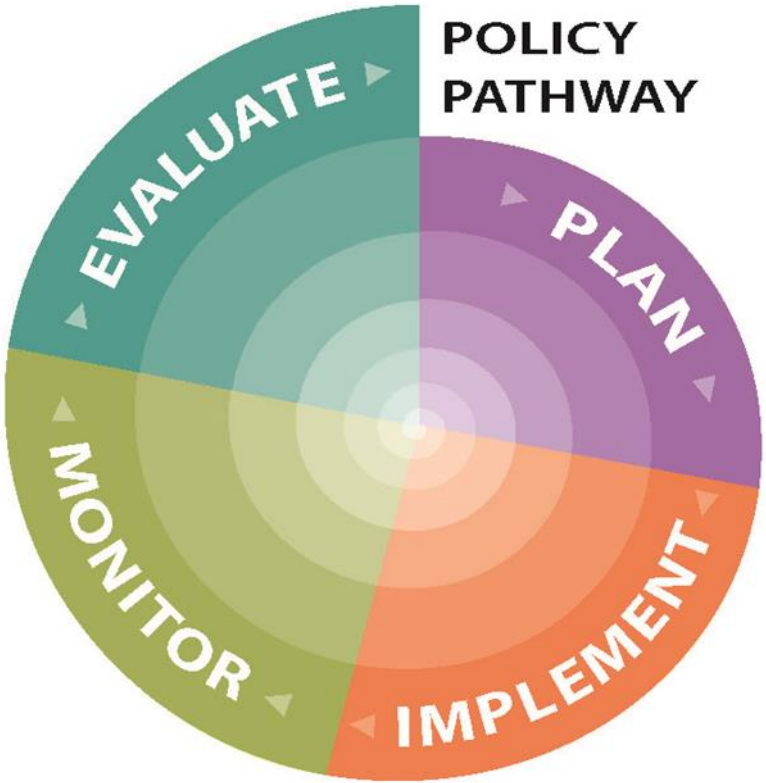
Source: US DOE ENERGY STAR

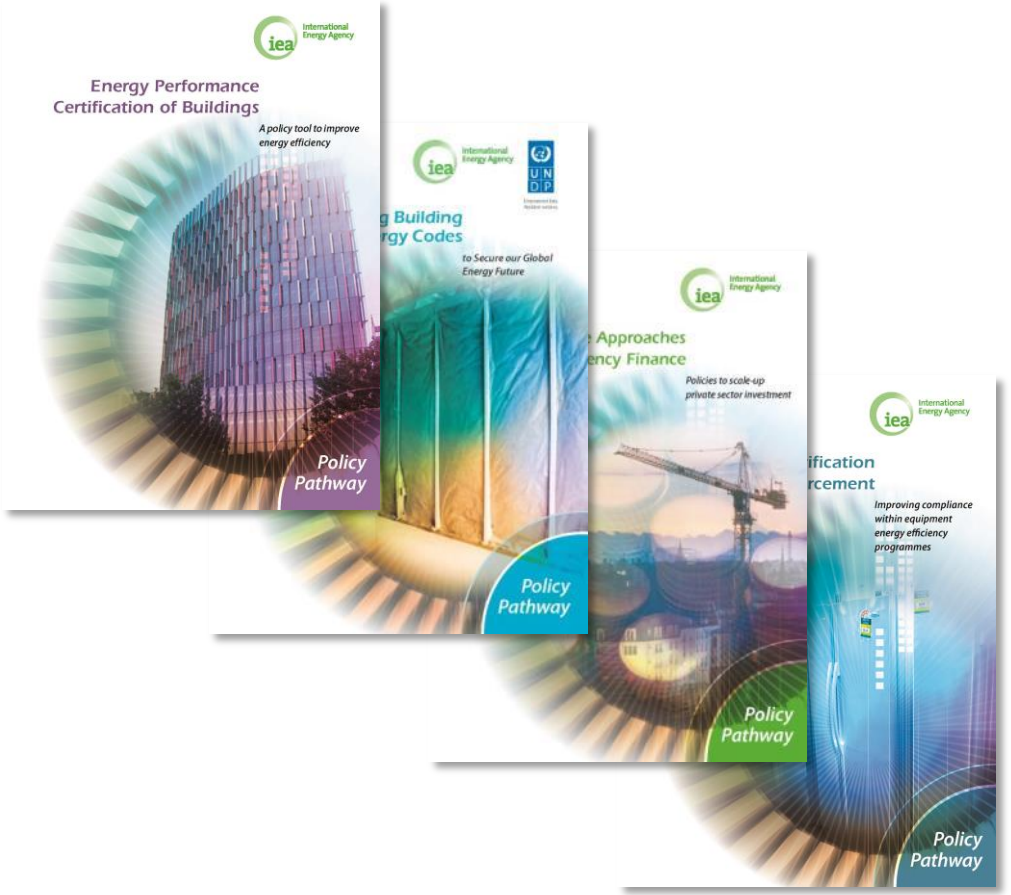
Energy efficiency policy recommendations

#10 Improved energy performance of building components and systems to improve the energy performance of all buildings

- Windows and other glazed areas
  - Maximum share of glazed area
  - MEPS for windows to minimise life-cycle costs
  - A requirement for performance labelling
  - Standard test protocols and certified product testing
- HVAC systems
  - MEPS for HVAC systems to minimise life-cycle costs
  - A requirement for energy efficiency labelling
  - Information and training for building designers, owners and others
  - HVAC systems size, installation, testing and maintenance
- Energy management and control systems

Online resource: IEA's Policy Pathway series





www.iea.org/publications/policypathwaysseries/

Target Setting

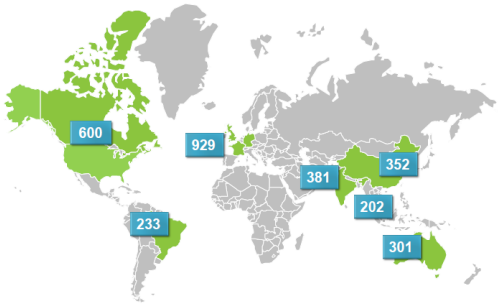
Targets matter

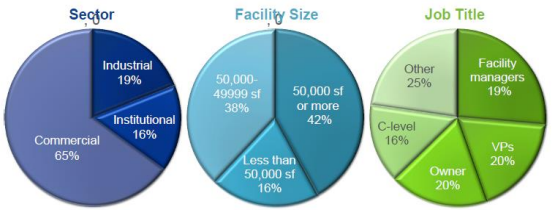
Using roadmaps

National targets

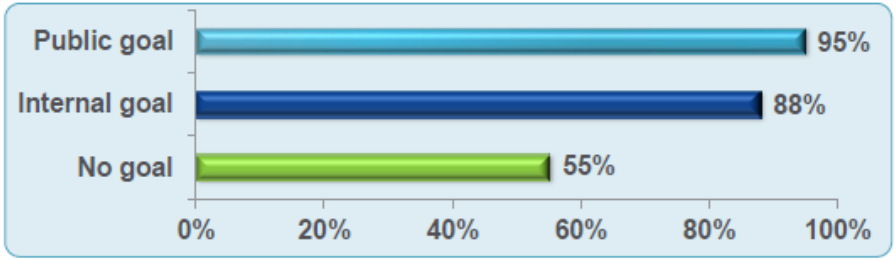
Targets Matter – What is committed (and visible), gets managed

Of over 3,000 respondents from 10 countries….

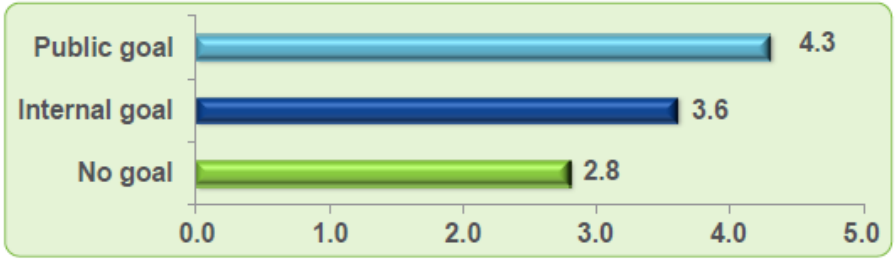




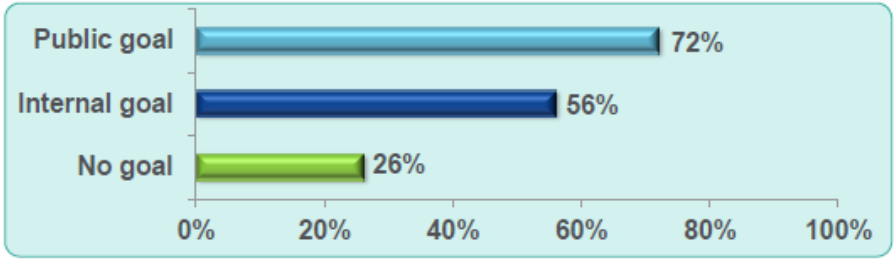
Percent that **have invested** in energy efficiency or renewable energy in past 12 months:



Average number of energy efficiency **measures adopted** in the last 12 months:



Percent that **plan to increase investment** in energy efficiency or renewable energy in next 12 months:



Source: Johnson Controls, 2013 Energy Efficiency Indicator Survey

Target setting process

Stakeholders engagement

- **Information collection:** opportunity to gain feedback on needs and goals
- **Consensus building:** while not everyone will agree, effective stakeholder engagement processes will build trust

Data and information

- **Information collection:** building on the information from stakeholders
- **Market analysis:** to understand the current market conditions and opportunities

Develop a roadmap

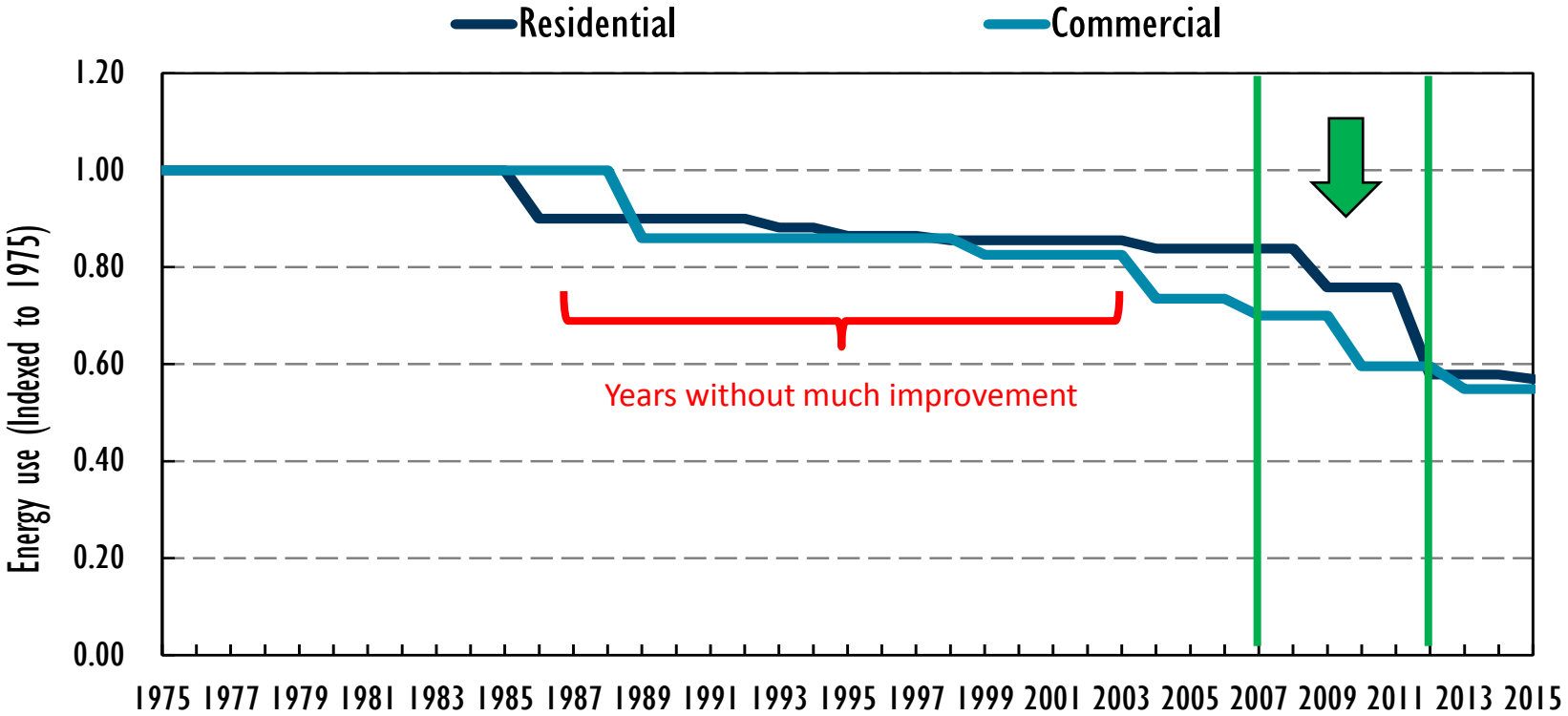
- **Targets and timelines:** setting achievable and aspirational targets and timelines to progress on energy efficiency policies
- **Methods and key actions:** identifying the tools and resources to make the targets achievable

Target setting: example in Jakarta, Indonesia

Source: http://greenbuilding.jakarta.go.id/index-en.html

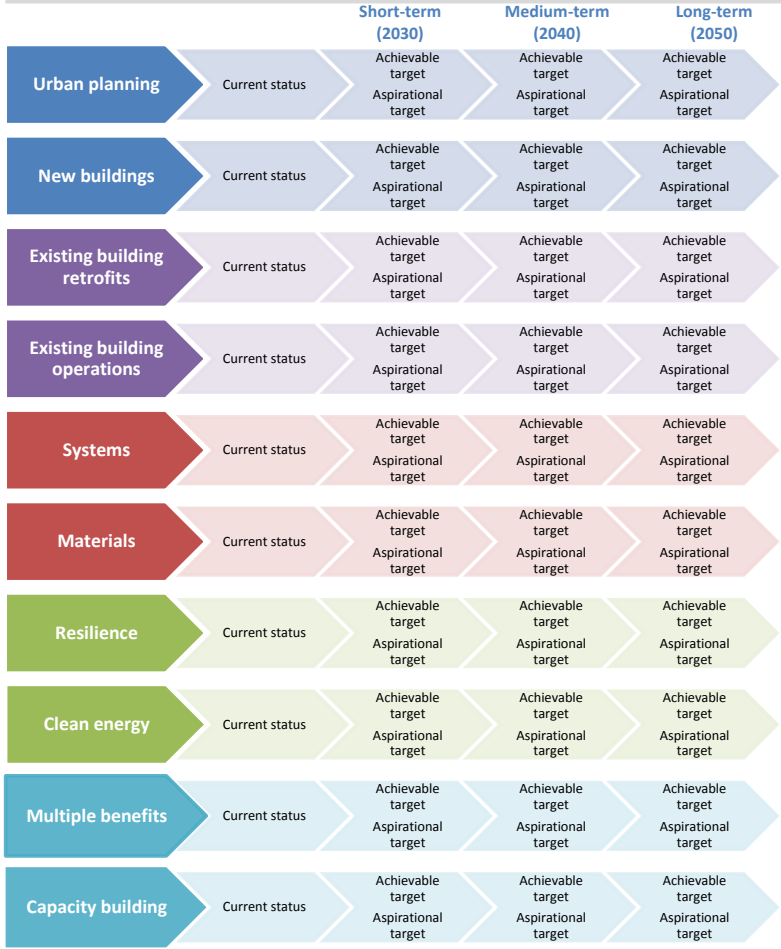
Target setting: Building code targets in the United States

2007 Target: **resulted in 32% improvement** over two code cycles. More energy savings than any period since 1975.



Source: US DOE and IEA Energy Efficiency Market Report

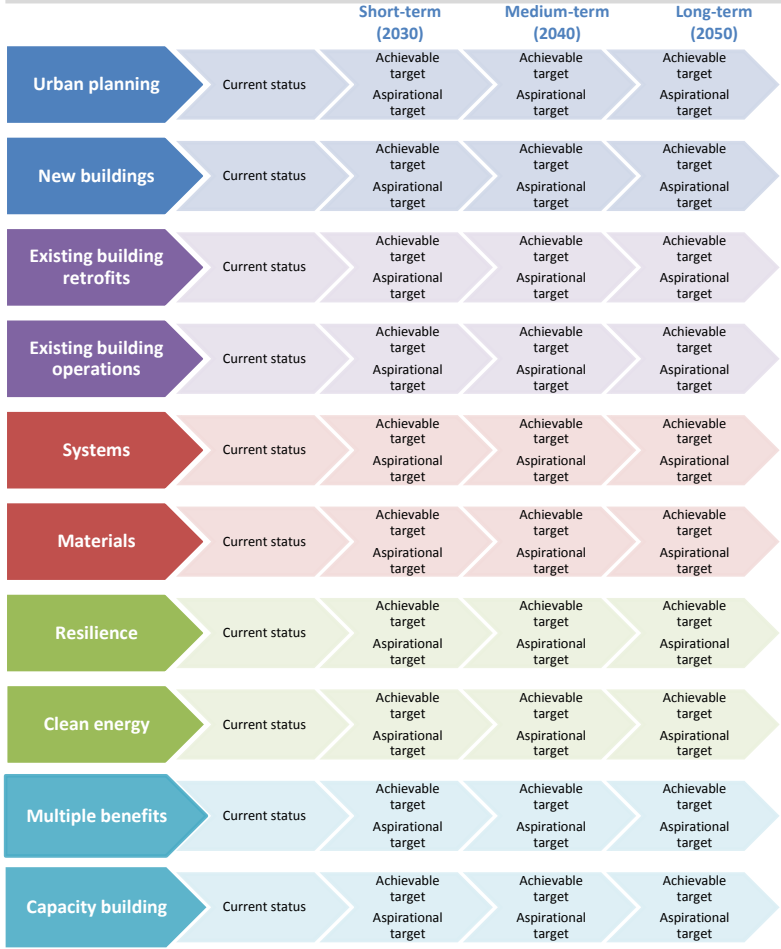
Buildings and Construction Roadmap template



Methodology and template:

- A template has been created for use by any organisation or government.
- Based on work through the Global Alliance for Buildings and Construction (GlobalABC).
- To enable the development of meaningful targets and timelines to achieve low-emission, efficient and resilient buildings and construction.

Buildings and Construction Roadmap template



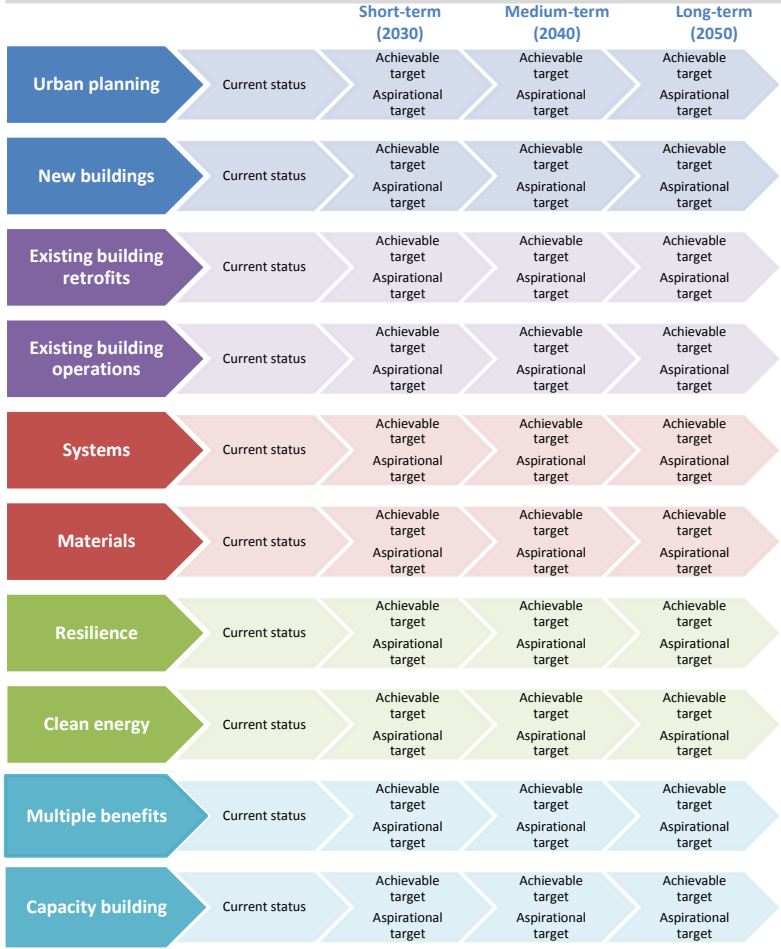
8 main actions:

- Urban planning
- New buildings
- Existing building retrofits
- Existing building operations
- Systems
- Materials
- Resilience
- Clean energy

2 supporting sections:

- Multiple benefits
- Capacity building

Buildings and Construction Roadmap template



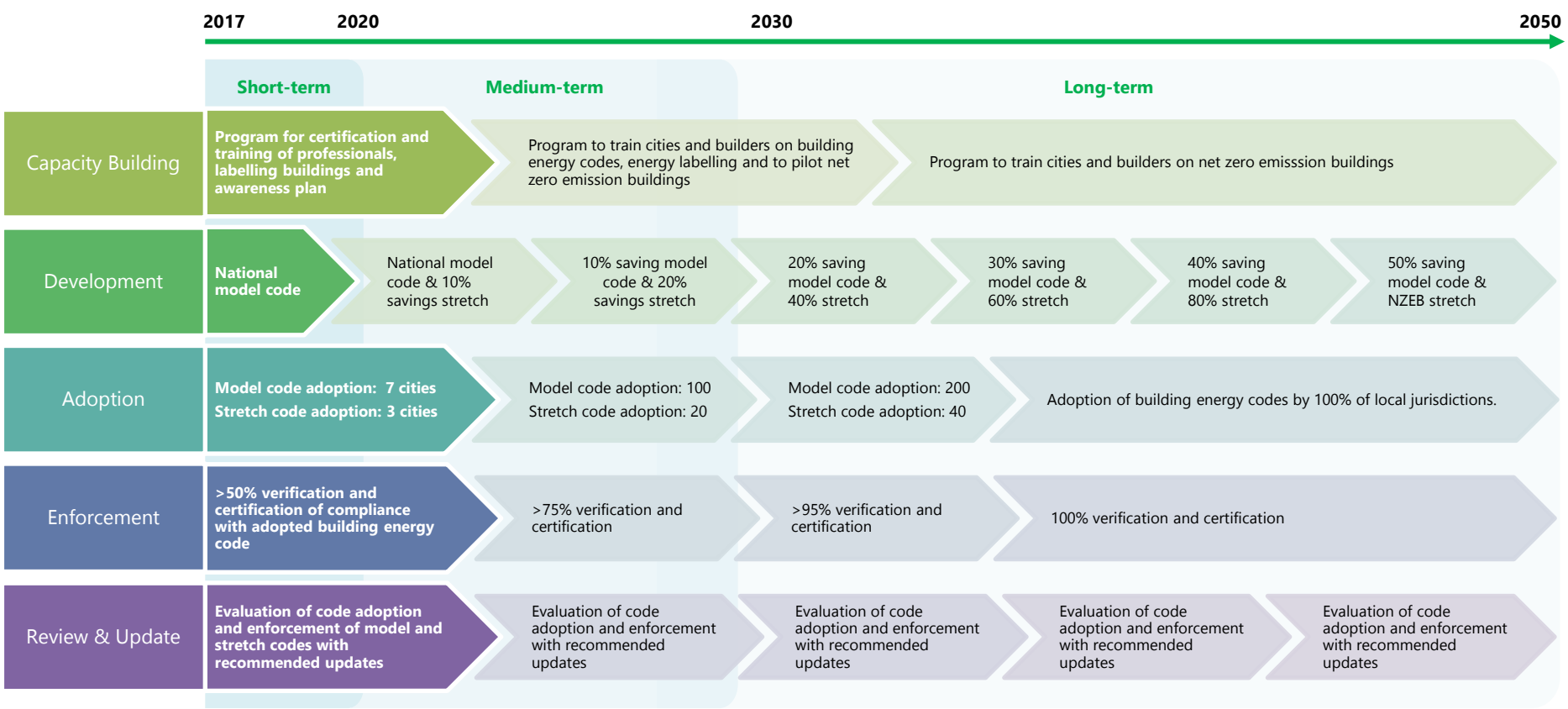
Each of the 8 main actions include:

- Key actions
- Stakeholders
- Policy
- Technology
- Finance
- Capacity building
- Multiple benefits

Each category includes:

- Current status
- Achievable targets
- Aspirational targets

Building energy codes roadmap: example from Mexico



Source: Mexico and IEA

Policy Making

Stakeholders

Group exercise

Who: Stakeholders involved in governance of buildings

Source: WRI, 2016, Accelerating Building Efficiency: Eight Actions for Urban Leaders

Who: Stakeholders influence action across building lifecycle

NEW BUILDINGS			EXISTING BUILDINGS				
 Land Use/ Planning	 Design	 Construction	 Sale or Lease	 Tenant Build-Out	 Operations & Maintenance	 Retrofit	 Demolition & Deconstruction
Local governments Developers and self-help builders	Design & construction professionals National and provincial governments Local governments	Design & construction professionals Building investors Suppliers & manufacturers	Buildings owners and managers Developers and self-help builders Building occupants	Buildings owners and managers Building occupants Design & construction professionals	Buildings owners and managers Energy utilities Building occupants	Buildings owners and managers Building investors Building occupants Design & construction professionals	Design & construction professionals Buildings owners and managers

Source: WRI, 2016, Accelerating Building Efficiency: Eight Actions for Urban Leaders

Stakeholder engagement tools

- **Responsibility matrix:** also known as the RACI (Responsible, Accountable, Consulted, Informed) matrix. This tool can be used with stakeholders to clearly identify which roles are appropriate for each stakeholder throughout the roadmap development and implementation process

- **Gap analysis:** can be used to identify where there is potential for improvement to move from the current situation to the desired market for energy efficiency

- **SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis:** building on the gap analysis, a SWOT analysis can be done in a collaborative setting with stakeholders to better understand what opportunities can drive energy efficiency and what weaknesses can be addressed with further capacity building

- **PIE (Progress, Impact, Effort) multi-matrix:** such as the Building Efficiency Policy Assessment Sheets developed by the Building Efficiency Initiative at Johnson Controls, can be used to enable stakeholder discussion on the current level of progress with a policy, technology or programme approach and then to identify how important the impact can be for each approach and the level of effort needed to make the approach successful. This information can then be used to recommend targets and timelines.

Group discussion and exercise

Scenario:

There has been a change of government and the incoming government wants a range of options for interventions to rapidly increase energy efficiency.

How do you identify, prioritise and quantify these policy options?

Group Exercise:

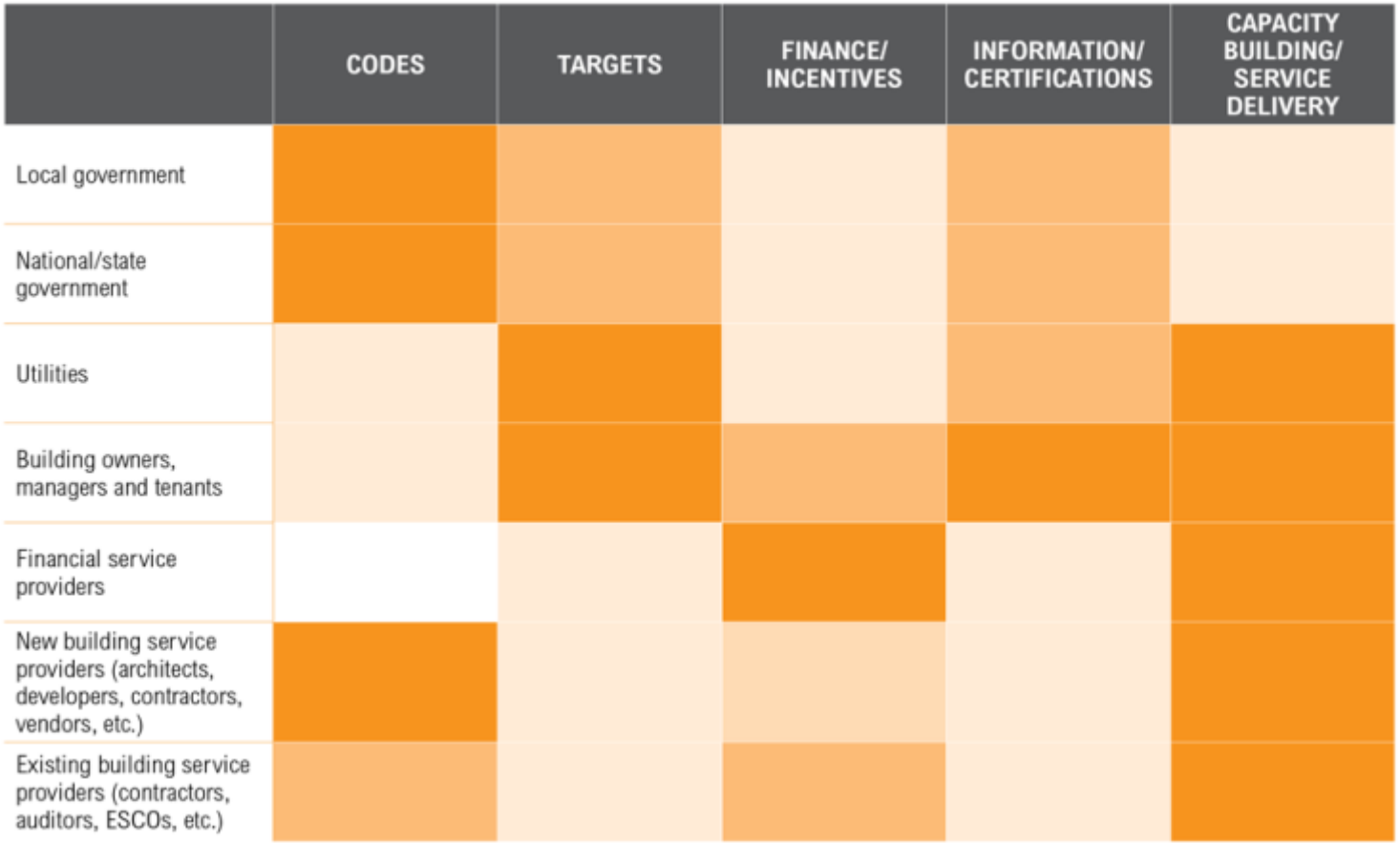
- *You have the opportunity to consult with key stakeholders on prioritising energy efficiency policies for buildings.*
- *We do an online version of a platform created to engage stakeholders on energy efficiency.*

Stakeholder engagement tools: Responsibility Matrix

- **Responsibility matrix,** also known as the RACI (Responsible, Accountable, Consulted, Informed) matrix.

	Country	City	Architect	Engineer	Developer	Manu-facturer	Owner	Installer
Codes	R	A	C	C	I	C	I	C
Design		I	R	A	C		C	I
Construction		I	A	A	R		I	R
Technologies	A		I	I	I	R	I	C
Operations			A	A	R	A	R	A
Retrofit			C	C	R		R	A

Stakeholder engagement tools: Responsibility Matrix



Source: WRI, 2016, Accelerating Building Efficiency: Eight Actions for Urban Leaders

Stakeholder engagement tools: Gap analysis

- **Gap analysis:** can be used to identify where there is potential for improvement to move from the current situation to the desired market for energy efficiency

	Current	Goal
Codes	Voluntary	Mandatory and enforced
Design	Inefficient	Efficient
Construction	Inefficient	Efficient
Technologies	Inefficient	Efficient
Operations	Inefficient	Efficient
Retrofit	No efficiency	Deep efficiency

Stakeholder engagement tools: SWOT analysis

Strengths

- Strong political will
- Technologies are available

Opportunities

- Aligning with global targets
- Efficiency is very cost effective

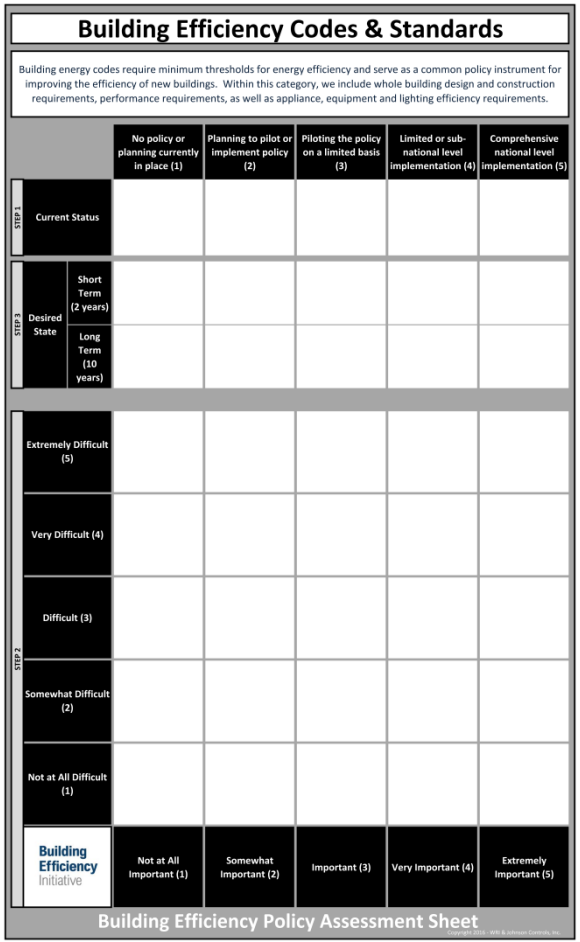
Weaknesses

- Poor data
- Poor knowledge of the benefits

Threats

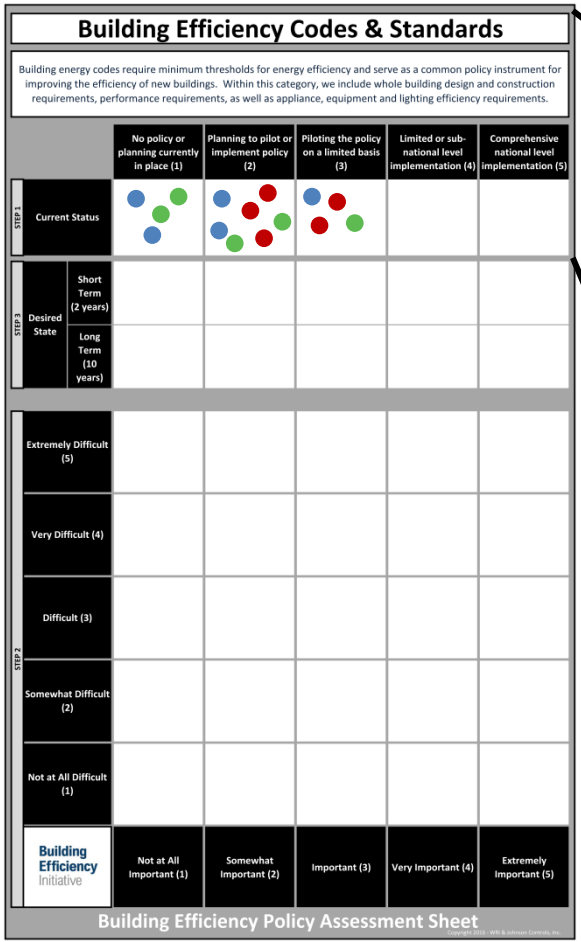
- Upcoming election
- Continuous turnover

Stakeholder engagement tools: PIE (Progress, Impact, Effort) multi-matrix

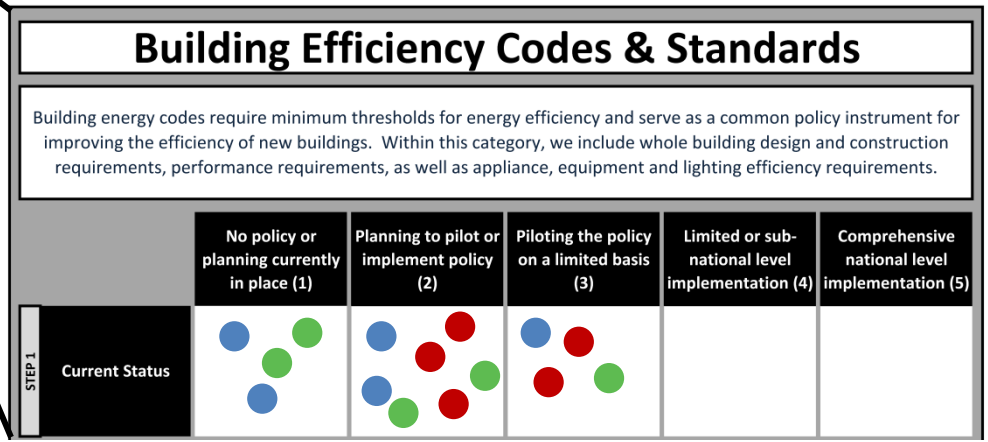


Source: Institute for Building Efficiency, WRI

Stakeholder engagement tools: PIE (Progress, Impact, Effort) multi-matrix



Step 1: identify the current status (progress)



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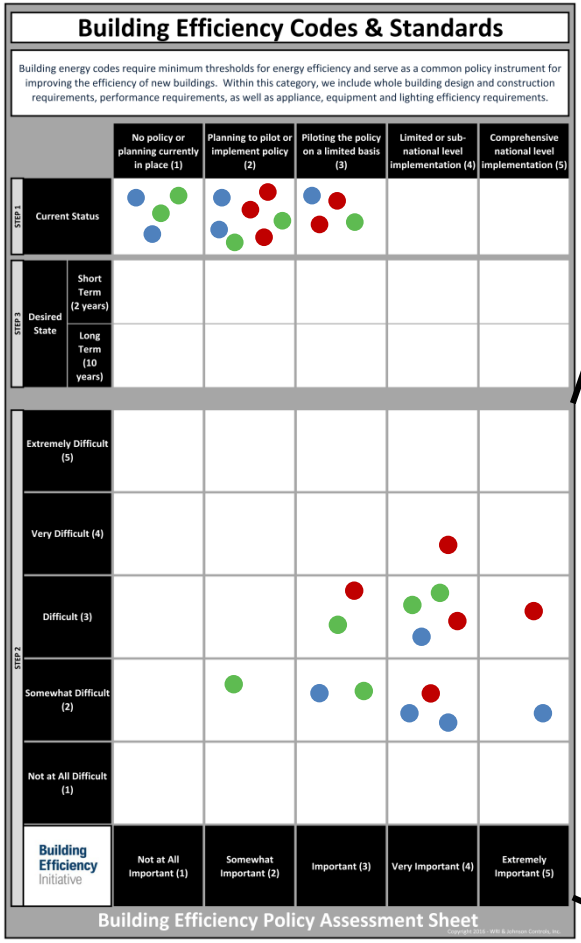
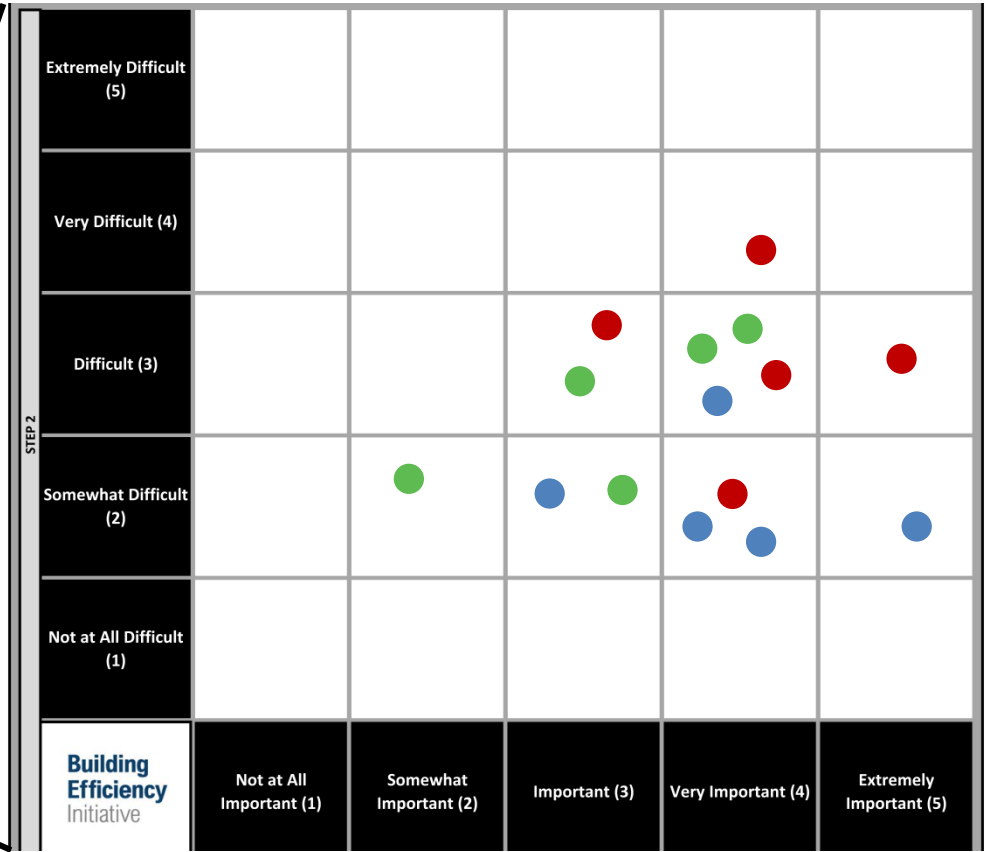
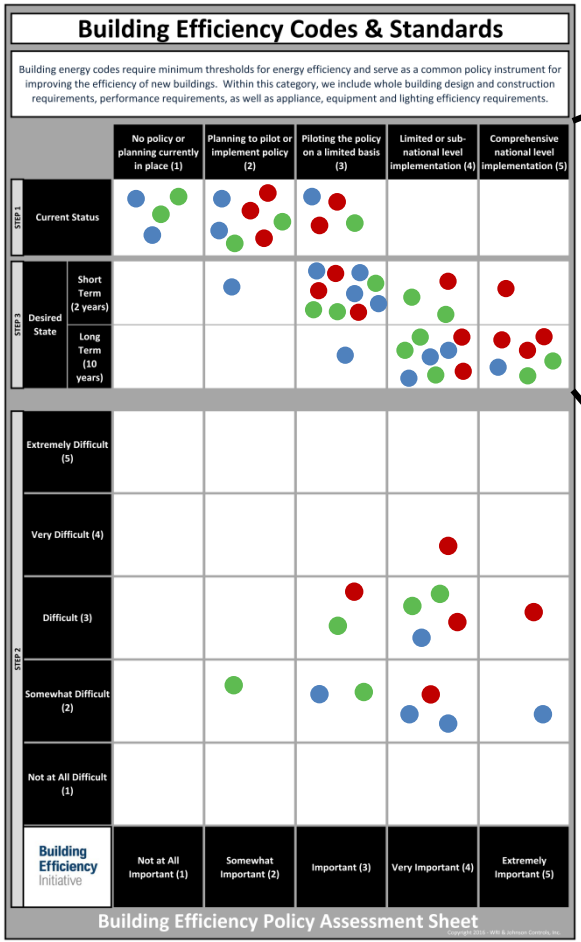
Stakeholder engagement tools: PIE (Progress, Impact, Effort) multi-matrix



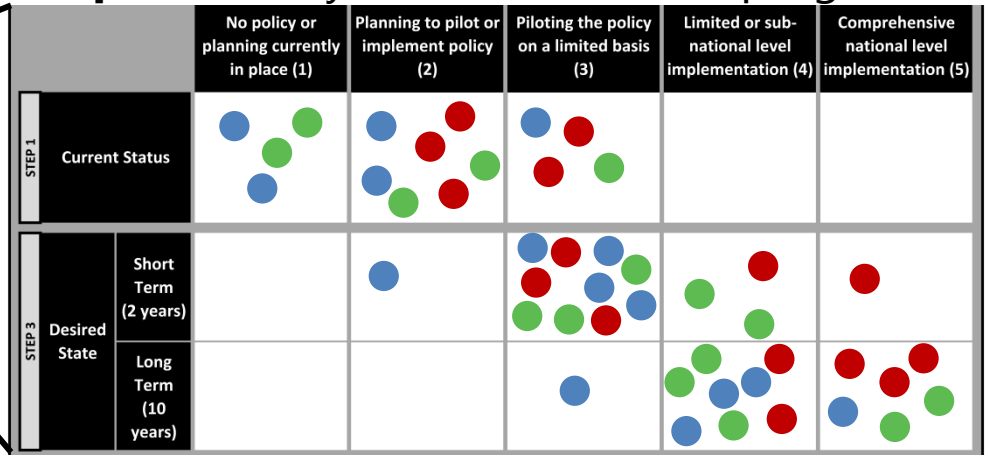
Step 2: identify impact and effort



Stakeholder engagement tools: PIE (Progress, Impact, Effort) multi-matrix

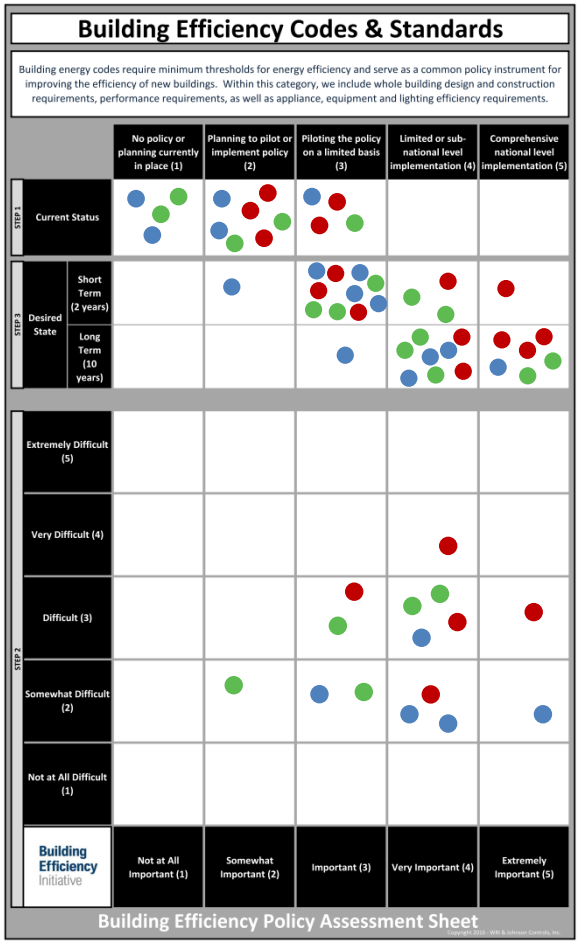


Step 3: identify the desired state (progress)

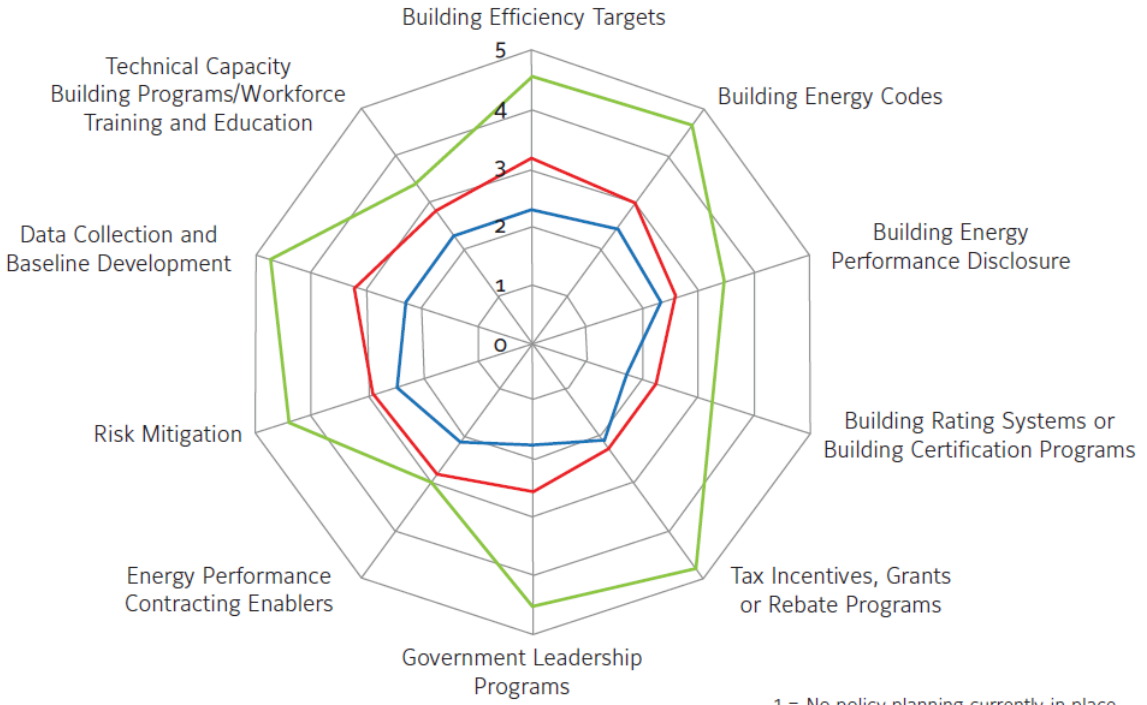


Source: Institute for Building Efficiency, WRI

Stakeholder engagement tools: PIE (Progress, Impact, Effort) multi-matrix



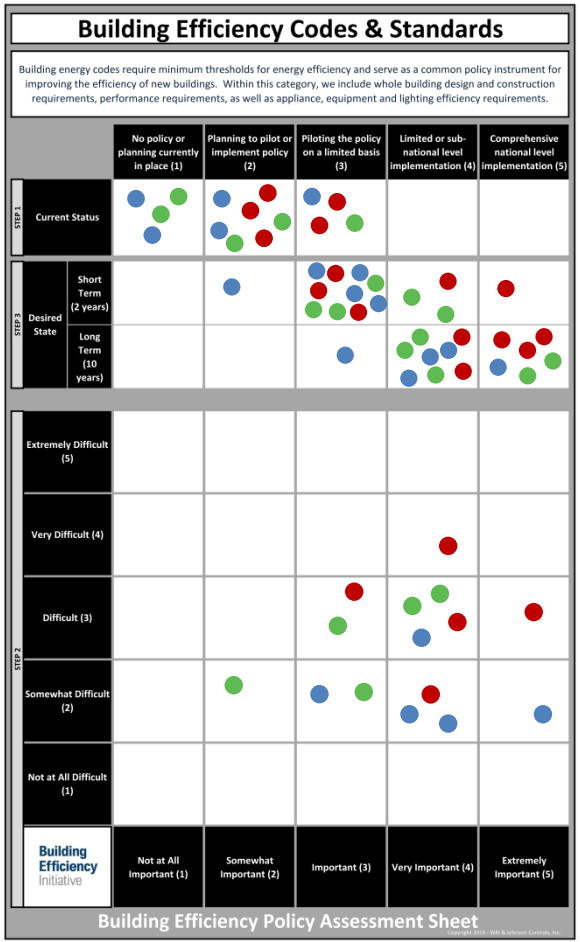
Reporting back: compare progress



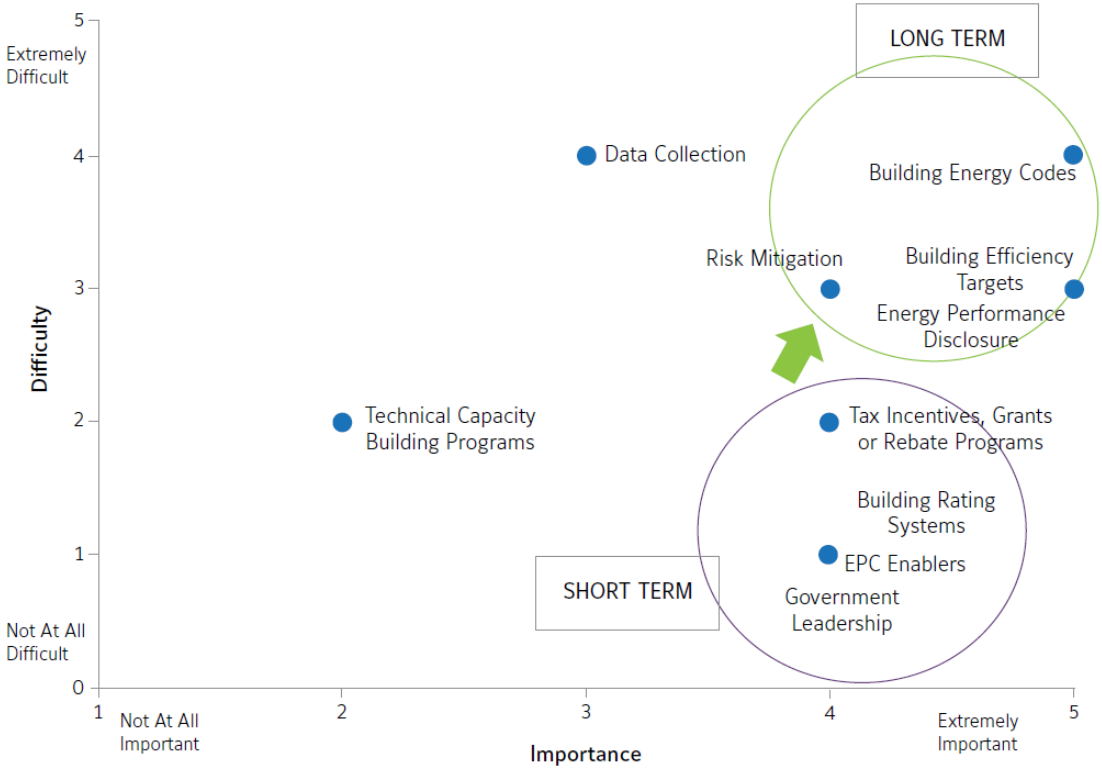
1 = No policy planning currently in place
2 = Planning to pilot or implement policy
3 = Piloting the policy on a limited basis
4 = Limited or sub-national level implementation
5 = Comprehensive national level implementation

Source: Institute for Building Efficiency, WRI

Stakeholder engagement tools: PIE (Progress, Impact, Effort) multi-matrix



Reporting back: compare impact and effort



Source: Institute for Building Efficiency, WRI

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App results websites

- **Policy 1: Building Energy Codes:**
  - Current status https://api-eur.cvent.com/polling/v1/api/polls/sp-msh793
  - Importance https://api-eur.cvent.com/polling/v1/api/polls/sp-j6077m
  - Difficulty https://api-eur.cvent.com/polling/v1/api/polls/sp7g1phk
  - Desired status in 2 years: https://api-eur.cvent.com/polling/v1/api/polls/sp-atgjsn
  - Desired status in 10 years: https://api-eur.cvent.com/polling/v1/api/polls/sp-qje3xv

- **Policy 2: Building Energy Labels:**
  - Current status https://api-eur.cvent.com/polling/v1/api/polls/spb1szc0
  - Importance https://api-eur.cvent.com/polling/v1/api/polls/spocef2p
  - Difficulty https://api-eur.cvent.com/polling/v1/api/polls/sp-tvar62
  - Desired status in 2 years: https://api-eur.cvent.com/polling/v1/api/polls/sp-tsa7qt
  - Desired status in 10 years: https://api-eur.cvent.com/polling/v1/api/polls/spvo1uhb

- **Policy 3: Energy Efficiency Incentives and Finance:**
  - Current status https://api-eur.cvent.com/polling/v1/api/polls/sp-yzzpsv
  - Importance https://api-eur.cvent.com/polling/v1/api/polls/sp-31d897
  - Difficulty https://api-eur.cvent.com/polling/v1/api/polls/sp6p89u3
  - Desired status in 2 years: https://api-eur.cvent.com/polling/v1/api/polls/spatedv2
  - Desired status in 10 years: https://api-eur.cvent.com/polling/v1/api/polls/speaqxmg