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Assessment of Building Energy Policies in the IEA and the BRICS countries

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International Energy Agency



**International
Energy Agency**

IEA 25 EE Recommendations

1. Across sectors

- 1.1 Energy efficiency data collection and indicators;
- 1.2 Strategies and action plans;
- 1.3 Competitive energy markets, with appropriate regulation;
- 1.4 Private investment in energy efficiency;
- 1.5 Monitoring, enforcement and evaluation of policies and measures.

2. Buildings

- 2.1 Mandatory building energy codes and minimum energy performance requirements
- 2.2 Aiming for net zero energy consumption buildings
- 2.3 Improving energy efficiency of existing buildings
- 2.4 Building energy labels and certificates
- 2.5 Energy performance of buildings components and systems.

3. Appliances

- 3.1 Mandatory energy performance standards and labels for appliances and equipment;
- 3.2 Test standards and measurement protocols for appliances and equipment;
- 3.3 Market transformation policies for appliances and equipment.

4. Lighting

- 4.1 Phase-out of inefficient lighting products and systems;
- 4.2 Energy-efficient lighting systems.

5. Transport

- 5.1 Mandatory vehicle fuel efficiency standards;
- 5.2 Measures to improve vehicle fuel efficiency;
- 5.3 fuel-efficient non-engine components;
- 5.4 Improving operational efficiency through eco-driving and other measures;
- 5.5 Improve transport system efficiency.

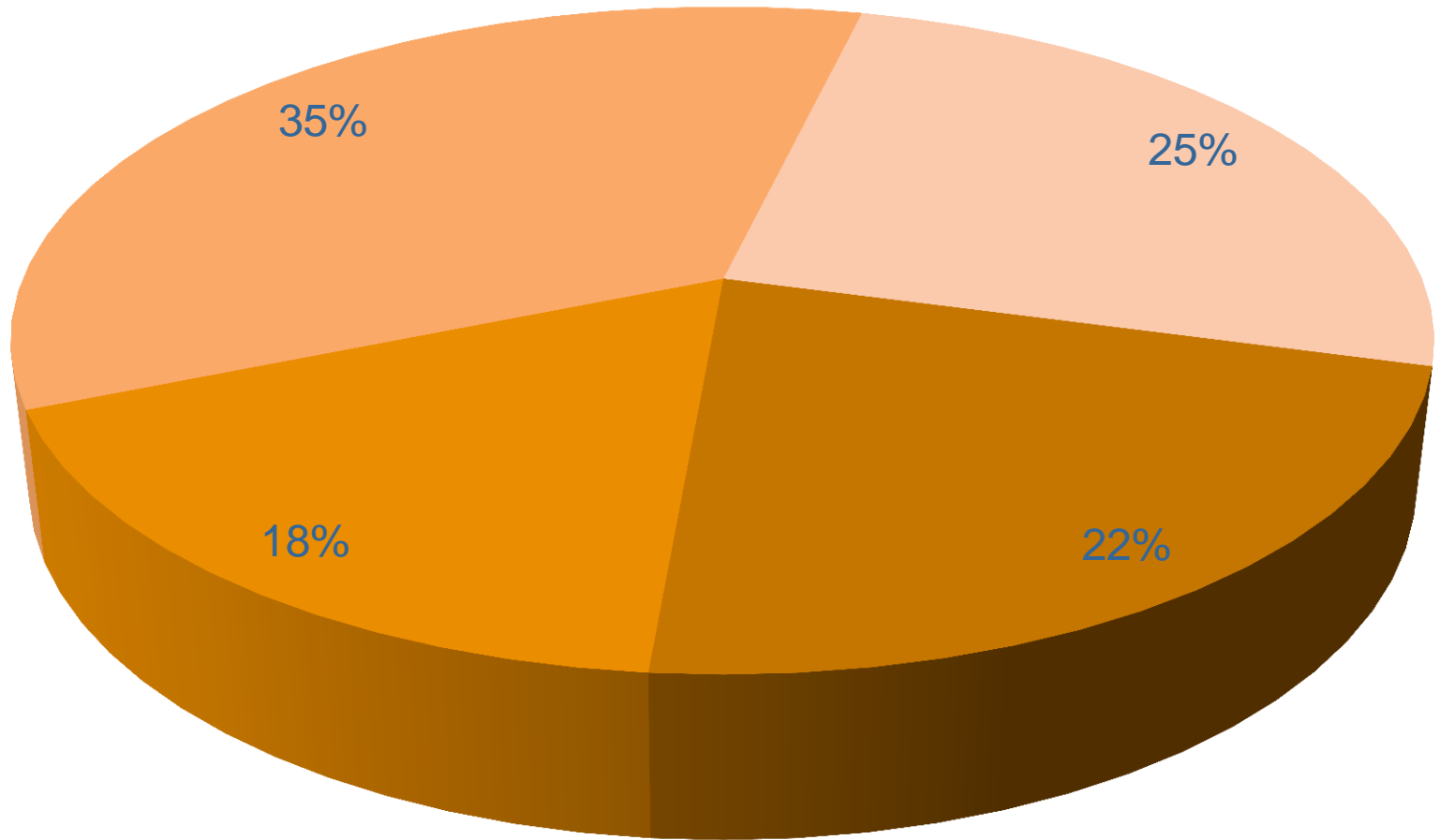
6. Industry

- 6.1 Energy management in industry;
- 6.2 High-efficiency industrial equipment and systems;
- 6.3 Energy efficiency services for small and medium-sized enterprises;
- 6.4 Complementary policies to support industrial energy efficiency.

7. Energy utilities

- 7.1 Energy utilities and end-use energy efficiency.

Share of buildings primary energy consumption in the IEA countries



■ Residential buildings
■ Industry

■ Non-residential buildings
■ Transport

Evaluation process

- **Theory-based policy evaluation approach**
- **For each policy instrument**
 - **Analysis criteria**
 - **Indicators (qualitative and/or quantitative)**
- **Comprehensive & generic questionnaire for each policy instrument developed with help from an international Steering committee**
 - **Building energy codes**
 - **Energy labelling scheme (Energy Performance Certificate)**
 - **Incentive schemes**
 - **Zero Energy Buildings**

Analysis criteria and indicators for building energy codes

Analysis criteria	Indicators
Legal status	Voluntary or mandatory
How often is the code revised?	Number of years between current and next revision
Governance structure	Responsibility for each step (development, implementation, verification, enforcement and evaluation)
Enforcement	Penalty type Number of times enforced Compliance rate since 2008
Technical assistance	Is there compliance software or not? If yes, is the compliance software available for free or not?
Scope	Residential (new and existing ones) Non-residential (new and existing ones)
Energy and or Carbon requirements	Energy requirements for the overall primary energy consumption or Carbon requirements End-uses included in the energy requirements Energy requirements for HVAC products and lighting Energy requirements for insulation Thermal comfort requirements

Evaluation process

- **Evaluate:**
 - the whole policy implementation process
 - Evaluate Interactions between different policy instruments
 - Factors of success and failures
- **IEA countries + South Africa+ Russia+ India+ China+ Tunisia**
- **Date collection from June 2011 to February 2012**
- **Literature review of existing evaluations**
- **Follow-up with phone calls and interviews with implementers**
- **Analysis and design of BEEP database**



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Buildings Energy Efficiency Policies Database

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Our key messages

It is important to get it right in the first place:

- Reducing energy consumption in buildings must start at the design stage for new buildings
- For all existing buildings the shell (roofs, walls and windows) must be addressed first to minimise heating and cooling demand

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Paris, March 16, 2012

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Legal status of building energy codes and labels

- **Mandatory codes in 19 countries of the 27 surveyed**
- **Mandatory energy label in the EU and Tunisia**
- **Regular update of building energy codes (every 4 to 5 years)**
- **No update yet on energy labels as the implementation is too recent**
- **No direct correlation between energy codes and energy labels when they are mandatory**
- **Comprehensive policy package in Tunisia only**

Governance structure and compliance

- **Clear governance structure in 18 countries but without a coordination body**
 - **Building energy codes are developed by National building bureau while energy label are developed by energy agencies**
 - **Local authorities are in charge of implementation, compliance checking and enforcement of building energy code but not reporting to national authority except in China**
 - **Enforcement of energy labels is not identified**
 - **Compliance is not conducted at the operation phase**
 - **Sanctions for non-compliance are not clearly defined except in China and Germany**

Scope

- **Building energy codes target new residential and non-residential buildings in 15 countries**
- **Building energy codes target existing buildings in 10 countries**

But only:

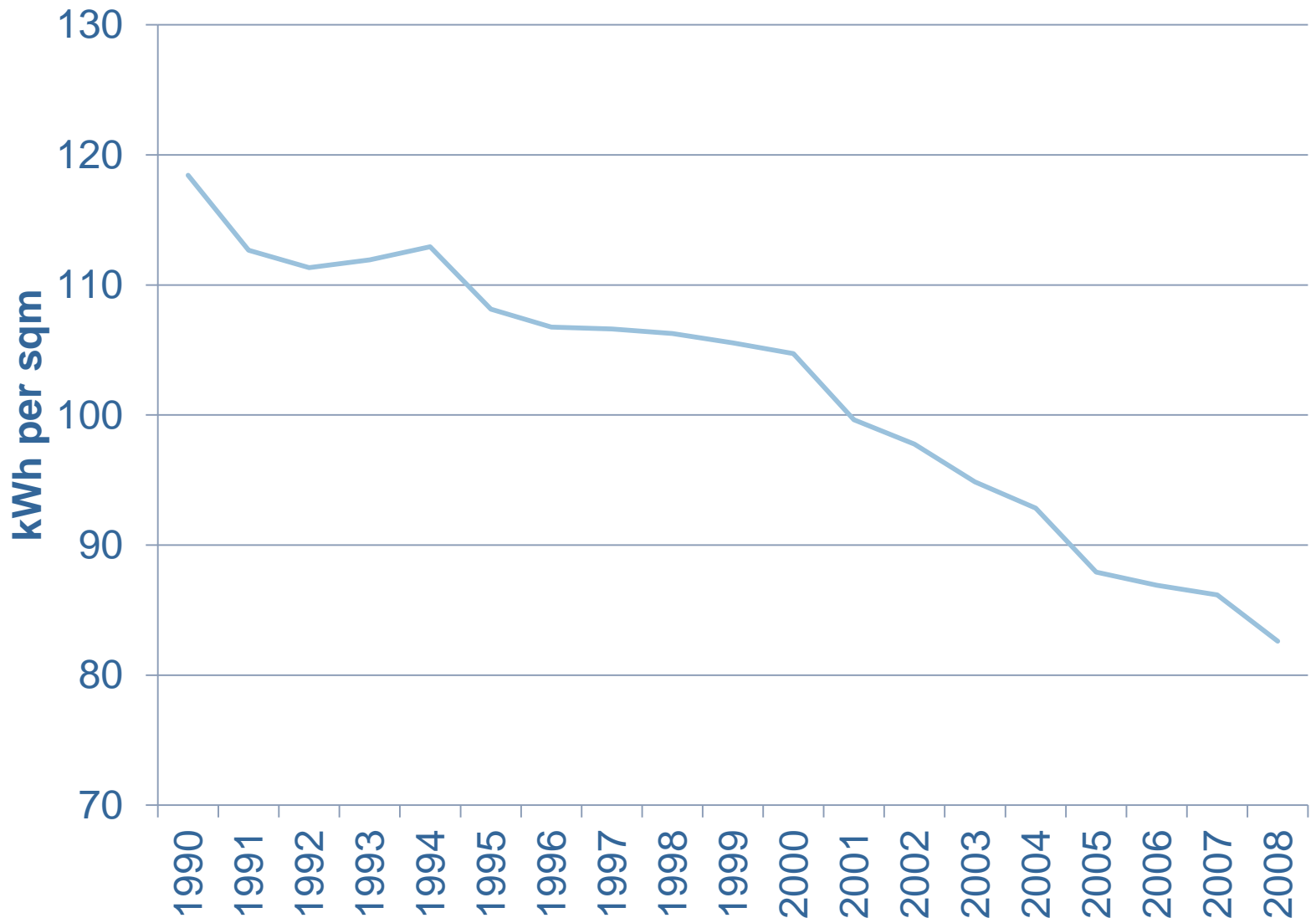
- **for large buildings (more than 1000m²)**
- **for major renovation**
- **for extension**

Energy requirements

- **Most countries still use prescriptive and/or model based approaches**
 - **2 countries use a prescriptive approach on building element only**
 - **4 countries allow trade-off**
 - **11 countries use a model based approach**

- **Only 3 countries use overall performance approach for five or four end-uses (heating, cooling, ventilation, lighting and hot water)**

Residential space heating final energy consumption in IEA countries



Incentive schemes

- Grants, taxes and short term loan with lock-in effect
- Short pay-back instruments for HVAC and windows replacement
- No explicit link to energy requirements in building energy codes and/or label
- KfW scheme is the only long term financial scheme for renovation with a clearly identified link to building energy codes requirements
- Difficult to evaluate the impact in terms of savings of the existing financial schemes

Conclusions

At least five areas of concerns:

- **Overall complex documentation to support building energy codes**
- **Misalignment between policy instruments, particularly with incentive schemes**
- **Lack of a comprehensive monitoring system**
- **Lack of ex-post evaluation**
- **Governance issue**

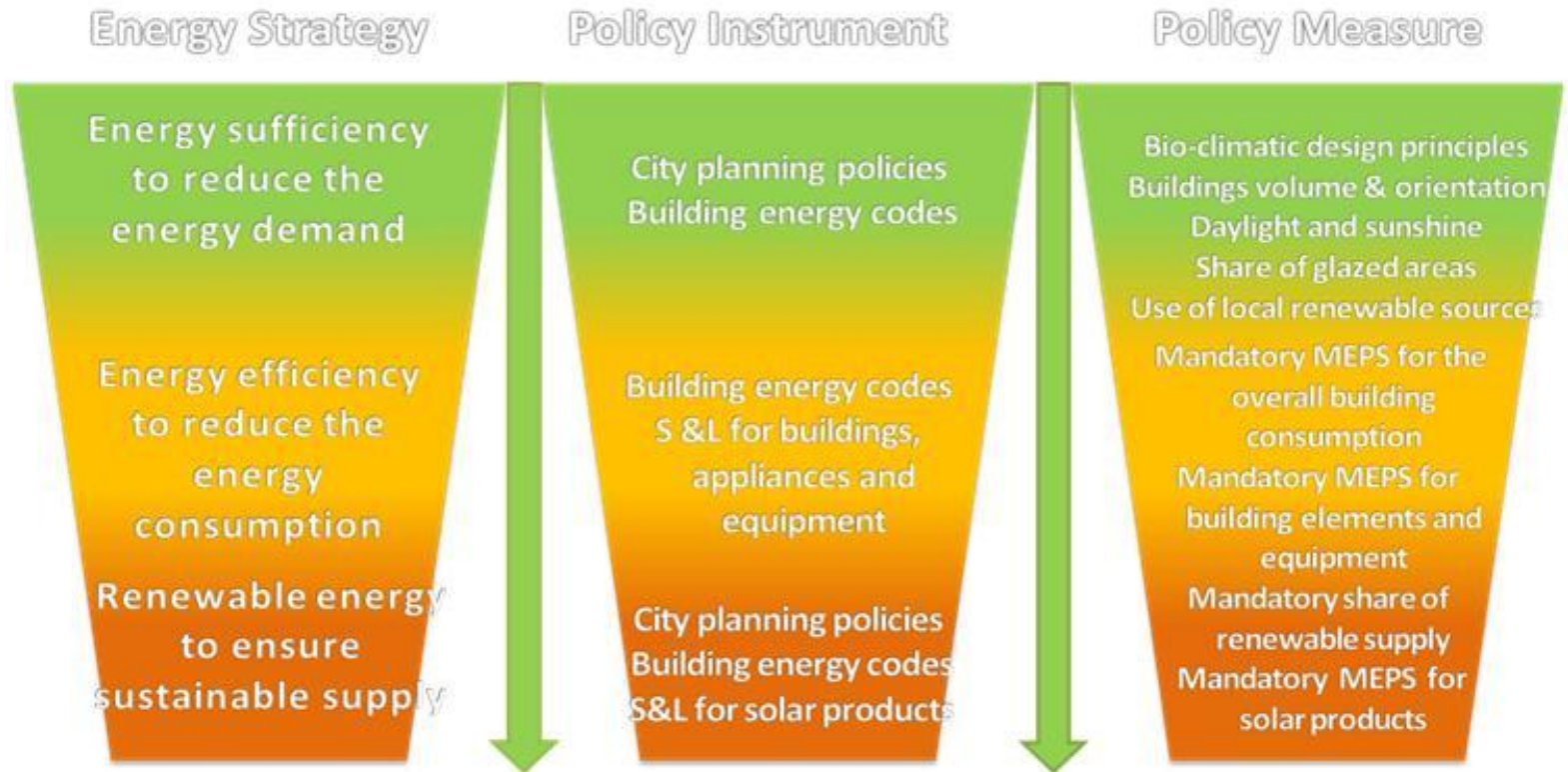
What do we need to do better?

- **Buildings Energy Efficiency Policies should be based:**
 - on a long-term ambitious strategy for reducing energy consumption
 - on holistic approaches that address indoor comfort, energy security, fuel poverty and climate change challenges
 - on sustainable policy commitments from all stakeholders
 - on energy requirements set at their cost optimum level
- **Learning curves and adaptation to the latest best practices are needed to gain confidence and support from building owners and operators**
- **National plans should be implemented to transform existing buildings to nearly Zero Energy Building whenever technically feasible and economically viable**

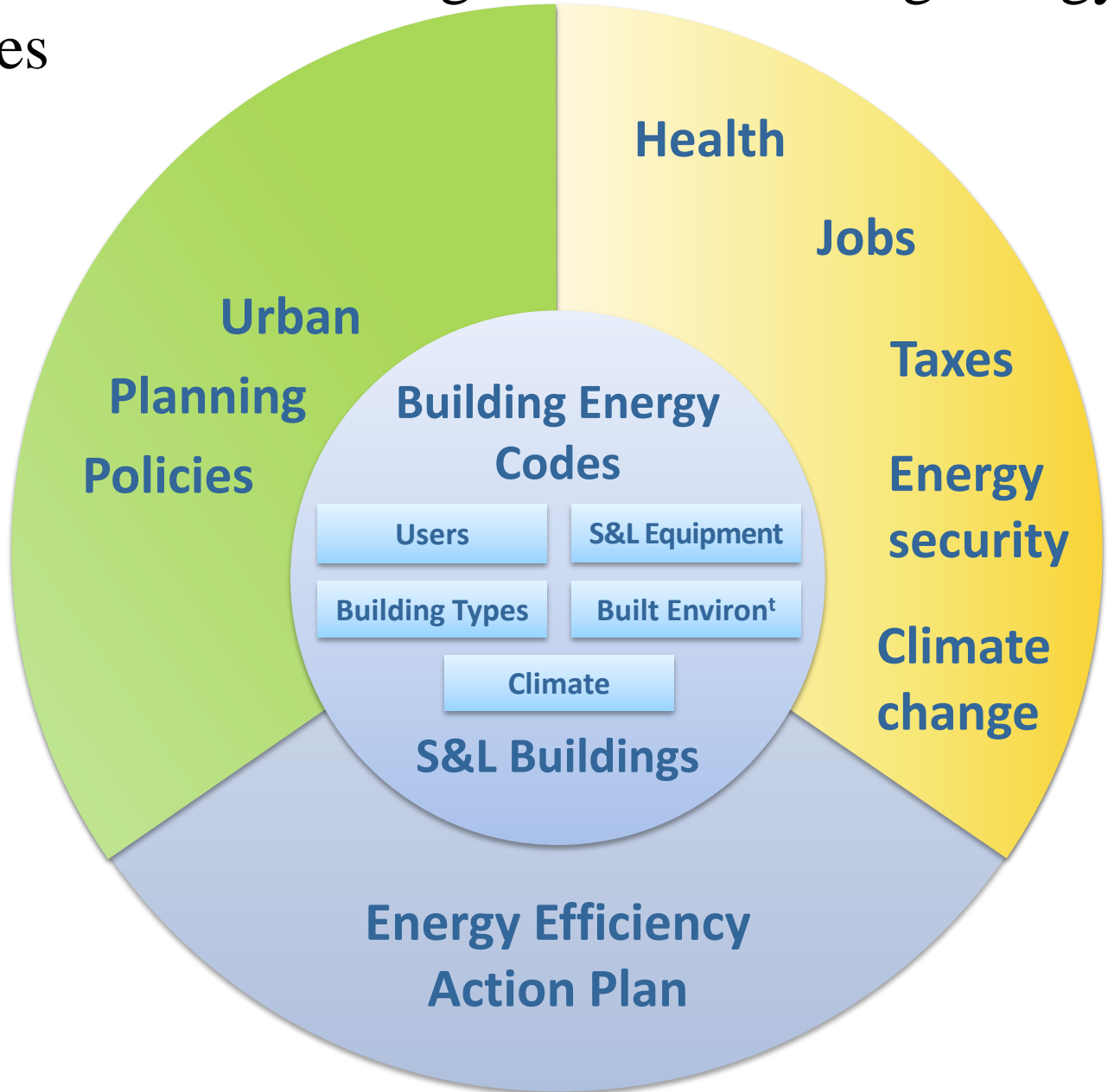
What do we need to do better?

- It is important to get it right in the first place:
 - Reducing energy consumption in buildings must start at the design stage for new buildings
 - For all existing buildings the shell (roofs, walls and windows) must be addressed first to minimise heating and cooling demand
- Public funding is needed for training, technical assistance and awareness campaigns and in some case to leverage private capital
- Retrofitting existing buildings requires mandatory renovation rate (regulation) and LONG-TERM FINANCING INSTRUMENTS

Negawatt funnel: The path to low energy buildings



Recommendations: Alignment of building energy policies





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