Energy Efficiency Policy Training Week: Buildings – Day 4 - Introduction

Energy Efficiency Training Week: Buildings trainers

Ksenia Petrichenko
Energy Efficiency in Emerging
Economies (E4),
International Energy Agency

Cornelia Schenk
Energy Efficiency in Emerging
Economies (E4),
International Energy Agency

Ian Hamilton
UCL Energy Institute,
*University College London
EREDA Consultants Inc.*

CAF DEVELOPMENT BANK OF LATIN AMERICA

MINISTERIO DE LA PRESIDENCIA
SECRETARÍA DE ENERGÍA
REPÚBLICA DE PANAMÁ
— GOBIERNO NACIONAL —

ESMAP
Energy Sector Management Assistance Program

WORLD BANK GROUP

iea

Energy Efficiency Training Week: Buildings facilitators

Estefania Mello
Architect and Urban
Planner,
Procel, Brazil

Elisete Cunha
Architect and Urban
Planner,
Procel, Brazil

María Mora
Coordinator,
*Technical Board of Engineering
and Architecture of Panama*
Supervisor,
*Panama Canal Authority,
Panama*

Liliana Campos
Coordinator,
*Programme for Energy
Efficient Buildings,
Mexico*

Energy Efficiency Training Week: Buildings Content Programme

Training Day 4:

Part A: Zero-carbon buildings strategies and action areas

- What are the Roadmaps for Buildings and Construction
- Building collaborations to enable strategies
- International examples

Part B: Zero-carbon buildings indicators and evaluation

- Data and indicators for tracking building energy efficiency and zero-carbon adoption
- Approaches to evaluation for assessing policy and programme progress and direction

Part C: Financing energy efficiency and zero-carbon buildings

- Types of financing for efficient and zero-carbon buildings
- Incentives (financial and non-financial) for efficiency and zero carbon

Breakout group activities

- Each day we will split into three Breakout groups

- Groups are defined in advance (you will be automatically assigned into the Breakout during the session)

- Group leads are:
    1. Group 1: Ian Hamilton & Estefania Mello & María Mora
    2. Group 2: Ksenia Petrichenko & Elisete Cunha
    3. Group 3: Cornelia Schenk & Liliana Campos

- In each group, you will discuss the self-assignment and your reflections on a series of questions.

Energy Efficiency Training Week: Buildings Content Programme

Be sure to:

- Participate

- Share your experience

- Ask questions

- Have fun!
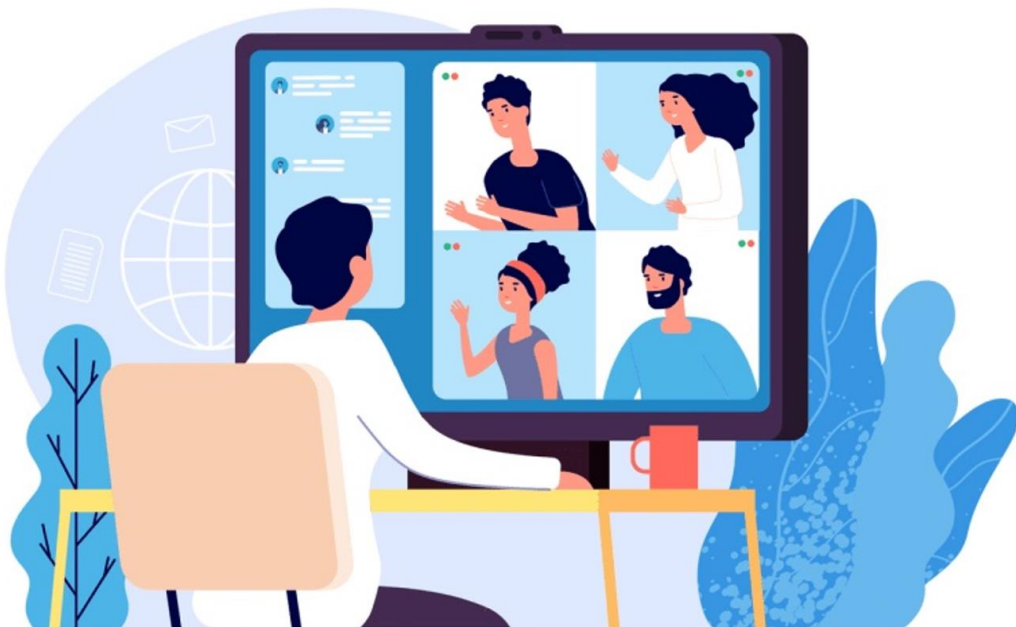
Energy Efficiency Policy Training Week:
Buildings – Day 4 – Part A - Zero Carbon Strategies

Energy Efficiency Training Week: Buildings Content Programme

Training Day 4:

Part A: Zero-carbon buildings strategies and action areas

- What are the Roadmaps for Buildings and Construction
- Building collaborations to enable strategies
- International examples

Part B: Zero-carbon buildings indicators and evaluation

- Data and indicators for tracking building energy efficiency and zero-carbon adoption
- Approaches to evaluation for assessing policy and programme progress and direction

Part C: Financing energy efficiency and zero-carbon buildings

- Types of financing for efficient and zero-carbon buildings
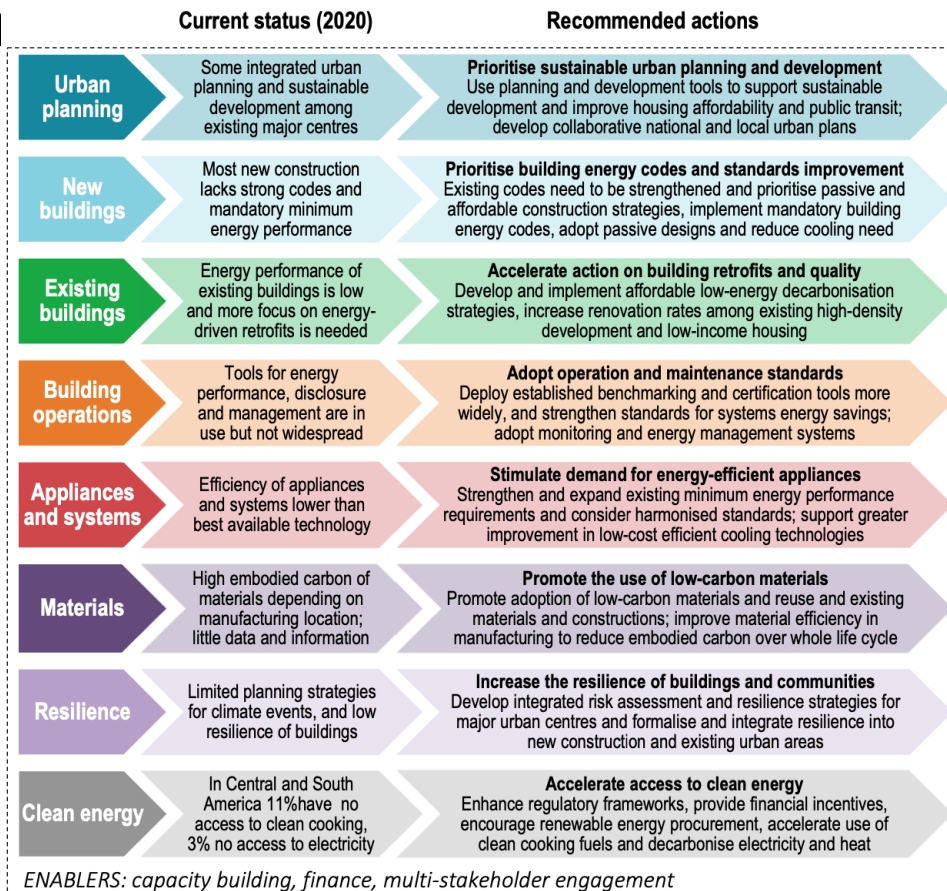- Incentives (financial and non-financial) for efficiency and zero carbon
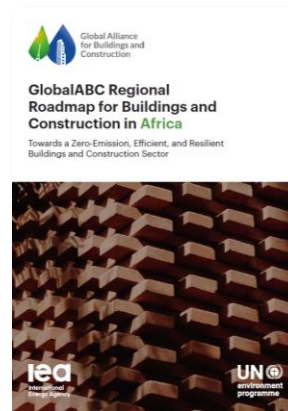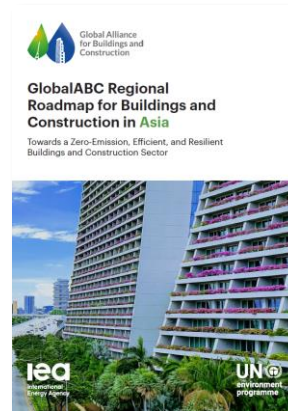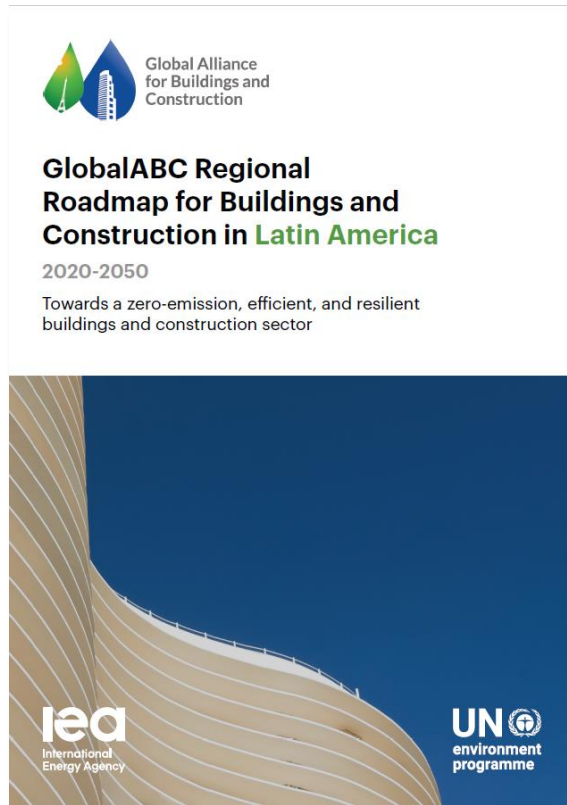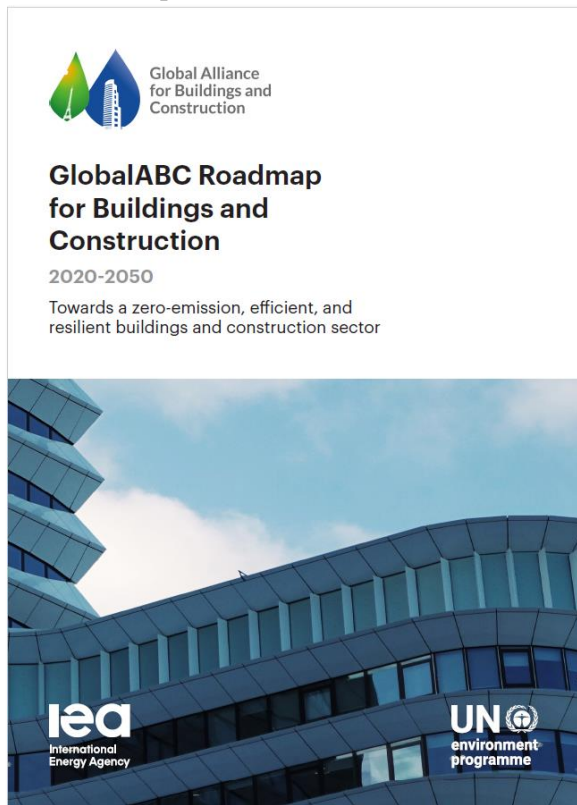
Zero-carbon buildings strategies and action areas

Roadmaps for buildings and construction

Roadmap for Latin America

- Getting to zero-emission, efficient and resilient buildings by 2050

- To support decarbonising new and existing buildings, effective policies and regulations need to cover the entire building life cycle, including the design, development, operation and decommissioning stages, and also act beyond site boundaries through neighbourhood planning and clean energy.
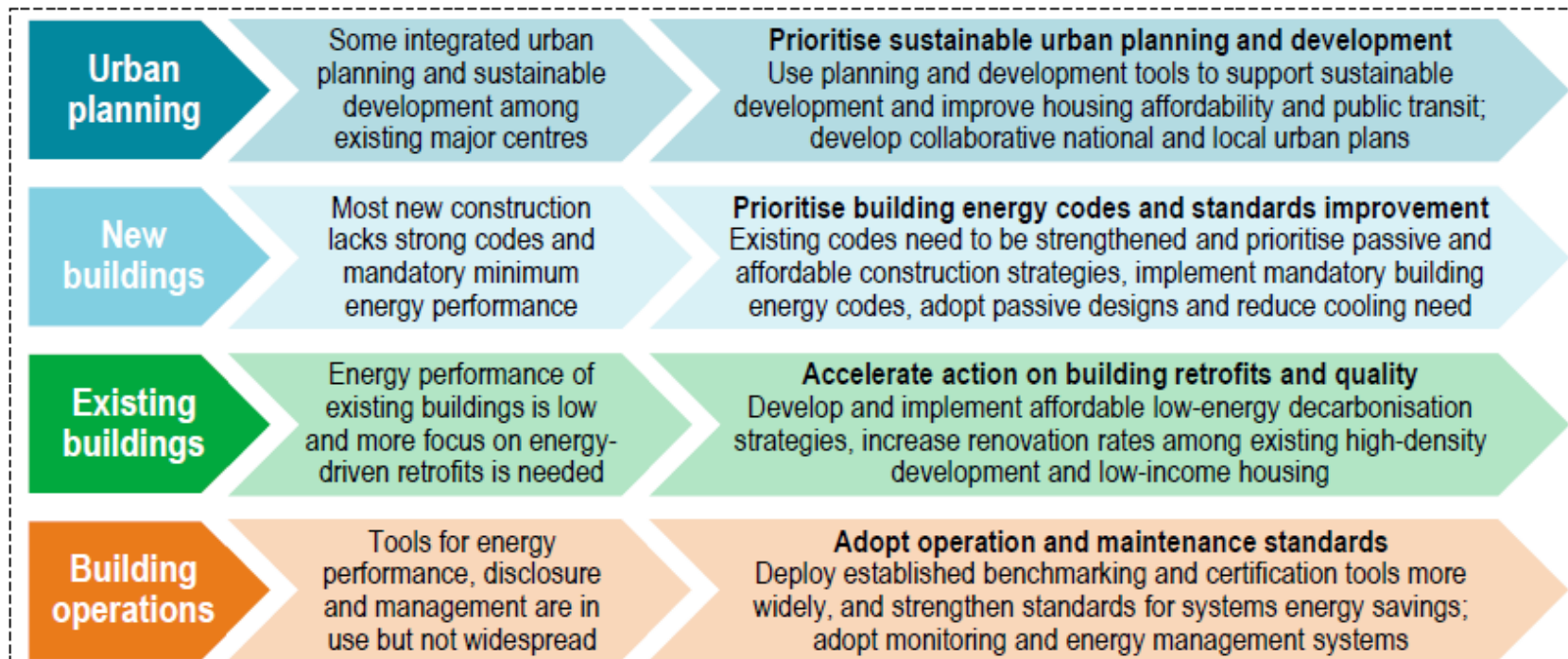
	Current status (2020)	Recommended actions
Urban planning	Some integrated urban planning and sustainable development among existing major centres	**Prioritise sustainable urban planning and development** Use planning and development tools to support sustainable development and improve housing affordability and public transit; develop collaborative national and local urban plans
New buildings	Most new construction lacks strong codes and mandatory minimum energy performance	**Prioritise building energy codes and standards improvement** Existing codes need to be strengthened and prioritise passive and affordable construction strategies, implement mandatory building energy codes, adopt passive designs and reduce cooling need
Existing buildings	Energy performance of existing buildings is low and more focus on energy-driven retrofits is needed	**Accelerate action on building retrofits and quality** Develop and implement affordable low-energy decarbonisation strategies, increase renovation rates among existing high-density development and low-income housing
Building operations	Tools for energy performance, disclosure and management are in use but not widespread	**Adopt operation and maintenance standards** Deploy established benchmarking and certification tools more widely, and strengthen standards for systems energy savings; adopt monitoring and energy management systems
Appliances and systems	Efficiency of appliances and systems lower than best available technology	**Stimulate demand for energy-efficient appliances** Strengthen and expand existing minimum energy performance requirements and consider harmonised standards; support greater improvement in low-cost efficient cooling technologies
Materials	High embodied carbon of materials depending on manufacturing location; little data and information	**Promote the use of low-carbon materials** Promote adoption of low-carbon materials and reuse and existing materials and constructions; improve material efficiency in manufacturing to reduce embodied carbon over whole life cycle
Resilience	Limited planning strategies for climate events, and low resilience of buildings	**Increase the resilience of buildings and communities** Develop integrated risk assessment and resilience strategies for major urban centres and formalise and integrate resilience into new construction and existing urban areas
Clean energy	In Central and South America 11% have no access to clean cooking, 3% no access to electricity	**Accelerate access to clean energy** Enhance regulatory frameworks, provide financial incentives, encourage renewable energy procurement, accelerate use of clean cooking fuels and decarbonise electricity and heat

ENABLERS: capacity building, finance, multi-stakeholder engagement

Roadmaps available to download

GlobalABC Roadmap for Buildings and Construction
2020-2050
Towards a zero-emission, efficient, and resilient buildings and construction sector

GlobalABC Regional Roadmap for Buildings and Construction in Latin America
2020-2050
Towards a zero-emission, efficient, and resilient buildings and construction sector

GlobalABC Regional Roadmap for Buildings and Construction in Asia
Towards a Zero-Emission, Efficient, and Resilient Buildings and Construction Sector

GlobalABC Regional Roadmap for Buildings and Construction in Africa
Towards a Zero-Emission, Efficient, and Resilient Buildings and Construction Sector

https://www.iea.org/areas-of-work/promoting-energy-efficiency/global-alliance-for-building-and-construction

Summary of findings

Current status (2020)   **Recommended actions**

Urban planning — Some integrated urban planning and sustainable development among existing major centres

Prioritise sustainable urban planning and development Use planning and development tools to support sustainable development and improve housing affordability and public transit; develop collaborative national and local urban plans

New buildings — Most new construction lacks strong codes and mandatory minimum energy performance

Prioritise building energy codes and standards improvement Existing codes need to be strengthened and prioritise passive and affordable construction strategies, implement mandatory building energy codes, adopt passive designs and reduce cooling need

Existing buildings — Energy performance of existing buildings is low and more focus on energy-driven retrofits is needed

Accelerate action on building retrofits and quality Develop and implement affordable low-energy decarbonisation strategies, increase renovation rates among existing high-density development and low-income housing

Building operations — Tools for energy performance, disclosure and management are in use but not widespread

Adopt operation and maintenance standards Deploy established benchmarking and certification tools more widely, and strengthen standards for systems energy savings; adopt monitoring and energy management systems

ENABLERS: capacity building, finance, multi-stakeholder engagement

New buildings – key actions

Where the activity is today (2020)	Necessary actions towards long-term goal	Long-term goal (2050)
New buildings → 27 countries with no code for minimum energy performance requirements of new buildings	Increased adoption, implementation and enforcement of mandatory building codes and policies	Most new buildings operating at net-zero carbon emissions

- Key actions for new buildings:
  - Developing a roadmap strategy
  - Development and implement mandatory energy codes
  - Strengthen building energy codes
  - Avoid the need for space conditioning where feasible

- Governments lead by example
- Increase the use of building design optimization tools
- Reduce embodied carbon
- Increase awareness and information (e.g. labels and certificates)

Summary of findings - continued

Current status (2020)	Recommended actions
Appliances and systems — Efficiency of appliances and systems lower than best available technology	**Stimulate demand for energy-efficient appliances** Strengthen and expand existing minimum energy performance requirements and consider harmonised standards; support greater improvement in low-cost efficient cooling technologies
Materials — High embodied carbon of materials depending on manufacturing location; little data and information	**Promote the use of low-carbon materials** Promote adoption of low-carbon materials and reuse and existing materials and constructions; improve material efficiency in manufacturing to reduce embodied carbon over whole life cycle
Resilience — Limited planning strategies for climate events, and low resilience of buildings	**Increase the resilience of buildings and communities** Develop integrated risk assessment and resilience strategies for major urban centres and formalise and integrate resilience into new construction and existing urban areas
Clean energy — In Central and South America 11%have no access to clean cooking, 3% no access to electricity	**Accelerate access to clean energy** Enhance regulatory frameworks, provide financial incentives, encourage renewable energy procurement, accelerate use of clean cooking fuels and decarbonise electricity and heat

ENABLERS: capacity building, finance, multi-stakeholder engagement

Materials – technology and regional examples

	Current status (2020)	Short term (2030)	Medium term (2040)	Long term (2050)
Reduce embodied carbon	Minimal assessment of total embodied carbon of building projects	Increased tools for assessment. Strategies for net-zero embodied carbon identified	40% reduction from baseline. Net-zero embodied carbon for some new buildings	Net-zero embodied carbon for most new buildings
Material efficiency	Minimal use of low-carbon alternatives for main construction materials	Develop alternative design and construction methods for optimising material use and prioritising lower-carbon materials. Develop design guidelines for designers and guidelines for manufacturers on alternative materials or processes		Widespread adoption of low-carbon alternatives
Energy efficiency in manufacture	Little knowledge of specifc consumption of different materials	Adoption of current BAT in all sectors, as well as EMS and energy networks to share knowledge and experiences. Specific targets set for key subsectors		-10% energy use for cement and -20% for steel
Decarbonise manufacture	Manufacturing processes energy-intensive and reliant on fossil fuels	Develop biomass and waste heat recovery for processes, electrification of processes, use of cleaner fuels including hydrogen. Targets set for the decarbonisation of heat and electricity		90% reduction in CO_2 from energy use in material production from current levels
Local material alternatives	Minimal use of local low-carbon techniques or materials	Development of low-carbon local alternatives for materials using local resources and techniques. Aim at 30% of project products by 2040. Use incentives to encourage the use of local materials rather than imports, where appopriate		Widespread adoption of low-carbon techniques for 60% of project products
Tools for resource efficiency	Minimal use of tools for standardisation and evaluation to reduce waste	Harmonisation of tools and strategies. Harmonised targets and tools at regional and national level	Widespread use of standardised tools and methods	Widespread use of tools such as BIM, standardisation, prefabrication, etc.

Box 18 • Regional examples of policy action for materials

Peru

In Peru, standards for bricks and cement, particulate, and gas emissions are formulated by the Ministry of Environment. The National Protocol for Continuous Emission Monitoring Systems is a proposal which seeks to standardise the process of continuous monitoring of emissions from stationary sources, establishing procedures for quality control and data transmission, in order to ensure the reliability and traceability of results.

Initiatives to promote circular design principles are being co-ordinated by the Ministry of Production, which through the National Innovate Peru Programme (Programa Innóvate Peru) has been co-financing projects related to the treatment of effluents and waste and to "green" industry and eco-innovation.

Argentina

The Argentine government has been focused on developing a local market for timber house construction using sustainable forest management practices, and mobilising the forest, wood processing and prefabrication industries

Box 19 • Examples of regional action on technology for sustainable materials

Argentina

HENIA, a company from Argentina, develops panels using straw bales, the residual material of crops which is usually burnt. The reuse of the straw avoids the CO_2 emissions into the atmosphere, and this new material has a thermal insulation which is seven times greater than double hollow brick wall. The panels are also fire- and earthquake-resistant.

Uruguay

A Sustainable School is an initiative from the Uruguayan non-profit organisation Tagma, in partnership with Earthship Biotecture, that aims to build a sustainable public school in every country in Latin America to create a network of symbolic examples in the region. The first one was constructed in 2016 in Uruguay. It is made up of 60% of recycled materials including plastic and glass bottles, tyres, cans and cardboard.

Colombia

Colombia uses thermoelectric power plants' ashes to replace cement during the manufacture of concrete.

Excellence in Design for Greater Efficiency (EDGE) uses the properties of the materials used in the building to calculate the embodied energy in materials. The materials considered include masonry, concrete, tiles, insulation, gypsum products, metal, timber, glass and windows. Grupo Bancolombia's headquarters in Colombia predicted 44% less embodied energy in materials for the EDGE certification. The six-story office building was built using precast concrete double-tee units for floor slabs and roof construction, honeycomb clay blocks and 3-D wire panels for external walls, and medium-weight hollow concrete blocks for internal walls.

Mexico

The 2017 earthquake in Mexico led to the loss of housing of several citizens. The community gathered together to initiate Bio Reconstruct Mexico, which used bio-construction to rebuild a more efficient, resistant and environmentally inclined community. The rubble was reused wherever possible and materials such as bamboo and earth were used for construction.

Summary of findings - continued
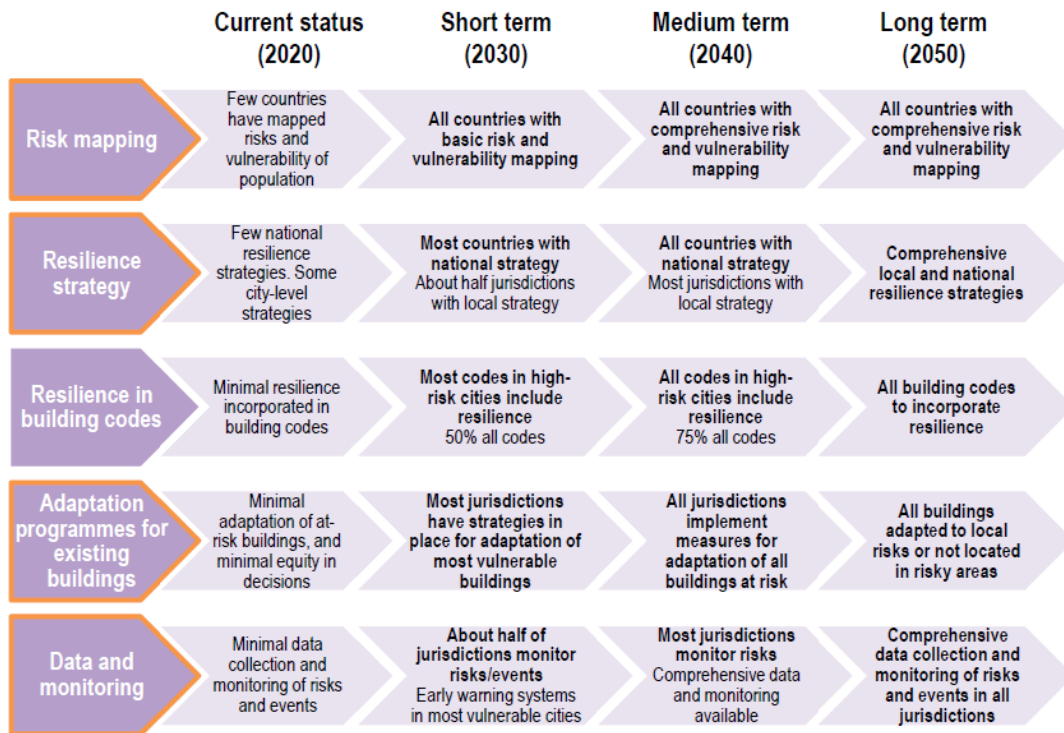
Current status (2020)	Recommended actions
Appliances and systems — Efficiency of appliances and systems lower than best available technology	**Stimulate demand for energy-efficient appliances** Strengthen and expand existing minimum energy performance requirements and consider harmonised standards; support greater improvement in low-cost efficient cooling technologies
Materials — High embodied carbon of materials depending on manufacturing location; little data and information	**Promote the use of low-carbon materials** Promote adoption of low-carbon materials and reuse and existing materials and constructions; improve material efficiency in manufacturing to reduce embodied carbon over whole life cycle
Resilience — Limited planning strategies for climate events, and low resilience of buildings	**Increase the resilience of buildings and communities** Develop integrated risk assessment and resilience strategies for major urban centres and formalise and integrate resilience into new construction and existing urban areas
Clean energy — In Central and South America 11%have no access to clean cooking, 3% no access to electricity	**Accelerate access to clean energy** Enhance regulatory frameworks, provide financial incentives, encourage renewable energy procurement, accelerate use of clean cooking fuels and decarbonise electricity and heat

ENABLERS: capacity building, finance, multi-stakeholder engagement

Resilience – trends and challenges, and policy timelines

Trends and challenges – Resilience in Latin America

- Risks of flooding and sea level rise, landslides, some areas vulnerable to drought
- At least 15 cities in 9 countries in Latin America have a resilience strategy
- Difficulty in institutional coordination for setting resilience strategies. Need for whole-of-society and holistic approaches recognised by some countries.
- Coordination across civil society organisations, academia and the private sector
- Information, awareness campaigns, and data collection required
- NDCs are a potential entry point for integrating resilience into the built environment
- Upgrading informal settlements recognised as part of climate change adaptation

	Current status (2020)	Short term (2030)	Medium term (2040)	Long term (2050)
Risk mapping	Few countries have mapped risks and vulnerability of population	All countries with basic risk and vulnerability mapping	All countries with comprehensive risk and vulnerability mapping	All countries with comprehensive risk and vulnerability mapping
Resilience strategy	Few national resilience strategies. Some city-level strategies	Most countries with national strategy About half jurisdictions with local strategy	All countries with national strategy Most jurisdictions with local strategy	Comprehensive local and national resilience strategies
Resilience in building codes	Minimal resilience incorporated in building codes	Most codes in high-risk cities include resilience 50% all codes	All codes in high-risk cities include resilience 75% all codes	All building codes to incorporate resilience
Adaptation programmes for existing buildings	Minimal adaptation of at-risk buildings, and minimal equity in decisions	Most jurisdictions have strategies in place for adaptation of most vulnerable buildings	All jurisdictions implement measures for adaptation of all buildings at risk	All buildings adapted to local risks or not located in risky areas
Data and monitoring	Minimal data collection and monitoring of risks and events	About half of jurisdictions monitor risks/events Early warning systems in most vulnerable cities	Most jurisdictions monitor risks Comprehensive data and monitoring available	Comprehensive data collection and monitoring of risks and events in all jurisdictions

Enablers: capacity building, finance, stakeholder engagement

Figure 39 • Key actions for capacity building in Latin America

Key actions for capacity building in Latin America include:

- **Data collection, analysis and reporting**. Enable robust data collection where it is scarce, including data on the value of sustainable buildings investments, and address concerns about privacy and consequences for reporting high energy consumption as barriers to accurate data collection. Develop programmes to either make data sh… collecting data on the value of susta… facilitate data analysis.
- **Institutional co-ordination**. Engag… co-ordination, clarify meaningful rol… approach to reach them (see Box 3…
- **Government training**. Increase tr… to improve awareness and code co…

Figure 41 • Key actions for finance in Latin America

Key actions for finance in Latin America include:

- **Implementing financial tools**: Expand use of the financing mechanisms best suited to Latin America, which are already being used, by encouraging developers and other industry stakeholders to consider green buildings to be the norm, rather than the exception. Implementing a suite of financial tools – for example, revolving loan funds, grant… in zero-emission, resilient and efficie…
- **Rating tools and labelling**: Rating t… and incentive programmes, as they p… (which provide incentives linked to e…
- **Data collection and reporting**: Bui… unreliable data availability lowers tr… construction projects.
- **Sharing regional best practice**: Sh… learned to accelerate the growth of k…

Box 30 • Examples of mechanisms to facilitate institutional co-ordination

The "green building" community has a powerful part to play in convening the relevant stakeholders and actors including academia, the private sector and civil society; providing training; and generally raising awareness of the benefits of green buildings. Green building communities are present and growing in many of the countries across the region. Two examples of these types of communities are described below:

Green building councils

Green building councils (GBCs) facilitate institutional co-ordination of public, private and civil society by advocating for a more sustainable built environment, developing the capacity of the industry to build better buildings and raising awareness of the benefits of green buildings. The global GBC network is developing tools, programmes and resources to accelerate uptake of net-zero carbon buildings towards sector decarbonisation goals.

Across Latin America, established GBCs include: Argentina, Brazil, Colombia, Costa Rica, Guatemala, Mexico, Panama and Peru. Emerging and prospective GBCs include Bolivia, Chile, El Salvador, Paraguay and Uruguay. (https://www.worldgbc.org/our-regional-networks/americas)

National alliances

The GlobalABC helps promote national alliances that bring together key public, private and civil society stakeholders, to overcome the fragmented value chain and jointly work towards a zero-emission, efficient, and resilient buildings and construction sector.

National alliances offer recommendations for policy makers and actively work to enhance economic activity. Typical pursuits range from awareness raising, training sessions and project assistance to legislative lobbying.

National alliances have been successfully established in France, Germany, Mexico, Morocco and Tunisia, in many cases inspired by GlobalABC. (https://globalabc.org/our-work/fostering-collaboration-national-alliances)

What does this mean for designers?

- Efficient and zero-emission buildings can bring a host of benefits to society, the environment, and the economy

- These benefits are particularly relevant today

- The key to achieving these goals at least cost is in the design stage, which can be most influenced by building codes

- Using and specifying low carbon materials, higher performance technologies, and low energy designs will support resilient buildings for a generation

- Buildings will increasingly need to interface with the energy grid
  - On-site renewables, digital technologies for load management and system flexibility

What does this mean for policymakers?

- **Building codes:** implement, enforce, strengthen mandatory building codes
  - Passive design to reduce cooling demand
  - Resilience
  - Life cycle analysis
  - Low-carbon materials

- **Appliances and systems:** implement, enforce, strengthen MEPS and labelling
  - Incentives for consumers and manufacturers
  - Industry transformation grants
  - Green public procurement, bulk procurement
  - Low GWP cooling

- **Operations:** monitor operational performance
  - Audits, EMS, digital technologies, capacity building

Map of building codes coverage in 2018, Latin America

- Mandatory for entire sector
- Mandatory for part of sector
- Mandatory for part of sector in major city
- Voluntary for part of sector
- Code in development
- No known code

Source: GlobalABC/UNEP/IEA, (2020), *GlobalABC Regional Roadmap for Buildings and Construction in Latin America*

Key actions – continued

- **Enhance the sustainability of cities:** through integrated urban planning
  - Integrate mobility, energy planning, spatial planning and zoning regulations
  - Digital tools and data collection to improve decision-making
  - Increase the resilience of cities through planning, mapping and monitoring

- **Reduce the embodied carbon of building materials:**
  - Increase availability of data and information to enable life cycle analysis of embodied carbon
  - Optimise design, material choice, material manufacturing, building lifetime

- **Develop a strategy; make a commitment; set targets.**

CAF DEVELOPMENT BANK OF LATIN AMERICA

REPÚBLICA DE PANAMÁ — GOBIERNO NACIONAL —

MINISTERIO DE LA PRESIDENCIA
SECRETARÍA DE ENERGÍA

ESMAP
Energy Sector Management Assistance Program

WORLD BANK GROUP

iea

Building collaborations

Building collaboration and tools

• Building on the Latin America Roadmap: Actions to build regional collaborations include:

• National ministries and city agencies should develop ambitious, comprehensive strategies and roadmaps to outline the pathway to a zero-emission, efficient and resilient buildings and construction sector.

• Governments and large organisations can take leadership in zero-carbon procurement and standards to promote investment in low-carbon building construction and renovation and encourage the adoption of efficient technologies at scale.

• Governments, industry coalitions and civil society should promote the multiple benefits that zero-emission, energy-efficient and resilient buildings have for different stakeholders.

Enabling stakeholders

- Capacity building

- Capacity-building activities can increase overall awareness, improve the decision-making process and encourage more sustainable choices.

	Training within government	Training of professionals	Training of product and materials manufacturers	Training financiers and developers	Training of the general public (incl. owners and occupants)
Urban planning					
New buildings					
Existing buildings					
Building operations					
Appliances and systems					
Materials					
Resilience					
Clean energy					

Note: The darker the colour, the higher the impact that capacity building type has for that activity.

National Alliances

- National alliances play a central role in mobilising real estate actors towards the energy transition. They have great potential for uniting different professions through common goals, lead to a better regulatory framework through fostering public private dialogue, support the development of highly innovative industry products, contribute to and drive voluntary commitments, and support and initiate capacity development.
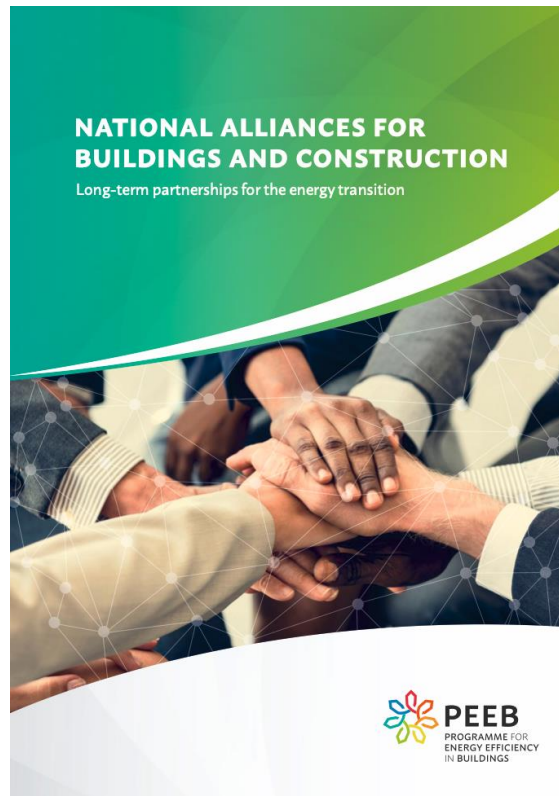
International Example: ASEAN Roadmap

Next steps in developing a Roadmap of strategies and actions

ASEAN Buildings Roadmap vision and Actions

URBAN PLANNING

Cities are developed using integrated approaches and policies to be more sustainable, resource-efficient, compact, connected, and livable

- Improve coordination and policy alignment for low-carbon development
- Boost low-carbon urban infrastructure and construction
- Expand capacity to deliver low-carbon urban development

NEW BUILDINGS

New buildings are designed such that they enable higher levels of thermal comfort and energy efficiency, resulting in comfortable, affordable and low carbon buildings

- Strengthen the adoption and compliance of mandatory building energy codes
- Boost market demand for efficient, low carbon buildings
- Boost capacity for delivery of efficient, low carbon buildings

EXISTING BUILDINGS

Existing buildings are retrofit to achieve high levels of energy performance and lower levels of embedded carbon to reduce fuel costs and improve thermal comfort

- Promote utilization of high-performance fabric systems
- Boost the rate of energy efficiency retrofits
- Boost the quality of energy efficiency retrofits
- Promote the adoption of building performance standards

MATERIALS

Materials and construction techniques that lower embodied carbon and improve energy performance are commonly applied in construction of new buildings and renovation of existing ones

- Promote new design and construction practices for material efficiency
- Collect data and promote disclosure of embodied carbon
- Decarbonise production of carbon intensive materials
- Governments leading by example to create demand for low carbon materials

SYSTEMS AND OPERATIONS

Energy efficient systems and modes of operations that reduce energy use, energy bills and emissions, while increasing comfort are dominant on the market

- Improve quality, availability and efficiency of appliances and systems
- Encourage uptake of sustainable energy devices and systems
- Improve efficiency of building operation
- Promote awareness of system and operational energy performance

SUSTAINABLE ENERGY

Buildings are powered by integrated and sustainable energy systems enabling buildings to provide flexibility to the power system supported by an effective policy package

- Promote the uptake of sustainable distributed energy resources
- Promote grid interactive energy efficient buildings

RESILIENCE

Cities are planned to limit construction in risk areas, ensuring critical urban infrastructure services, including vulnerable populations, and integrating resilience attributes in building design

- Improve climate change resilience of built environment
- Integrate climate change resilience in building energy codes and materials regulations
- Enhance data monitoring of disaster risks and their impacts on built environment

Roadmap Milestones and Strategy: New Buildings

Milestones for New Buildings

Current status

By 2025

By 2030

Towards net-zero carbon

NEW BUILDINGS

Adoption of mandatory building energy codes for all building types is lacking; capacity for their implementation is limited; adoption of building performance certification, labelling and disclosure is limited or absent

Building energy codes, standards, certification and labeling with requirements for net-zero carbon building performance are adopted across AMS

Most new buildings meet zero-carbon-ready level of building performance

All new buildings meet life-cycle zero-carbon-ready level of building performance

VISION New buildings are designed as comfortable, affordable and low-carbon resulting in higher levels of thermal comfort and energy efficiency

Roadmap Strategy for New Buildings

NB.1 Strengthen the adoption of compliance with mandatory building energy codes

NB.1.1 Increase strength and coverage of building energy codes

NB.1.2 Strengthen implementation capacity for building energy codes

NB.2 Boost market demand for efficient, low carbon buildings

NB.2.1 Increase adoption of building energy certification

NB.2.2 Enhance awareness of consumers and private sector on benefits of low-carbon buildings

NB.2.3 Facilitate access to finance and development of business models for low-carbon buildings

NB.3 Boost capacity for delivery of efficient, low carbon buildings

NB.3.1 Build capacity on integrated passive building design

NB.3.2 Mainstream lifecycle analysis tools for design of new buildings

NB.3.3 Increase availability of key materials and components for low-carbon buildings

Roadmap Action Areas: New Buildings

Current context:

Strategy elements to meet desired outcome eg. NB1

Define milestones vs dates, to serve as indicators for tracking progress

Targeted actions to support strategy element, by group of countries where relevant

NB.1.1 Increase strength and coverage of building energy codes	**Current status:** Across ASEAN, only Singapore has mandatory building energy codes (BECs) covering all sectors (residential, commercial and public). Some AMS have voluntary or mandatory codes for certain parts of the sector (often for buildings with the floor area above a certain threshold), and in others - BECs are still under development		
	By 2025:	**By 2030:**	**Towards net-zero carbon**
	All AMS have mandatory BECs covering all sectors. National governments provided guidance to subnational and local governments on implementation of BECs. Most AMS have national standards for net-zero carbon buildings	All AMS included requirements for embodied carbon, urban planning, resilience, clean energy in their BECs at least for new buildings. Na~~...~~ provided guidance to subna~~...~~ governments on implementati~~...~~ requirements. All AMS have standards for net-zero carbon buildings at the national and subnational levels	All AMS, subnational and local jurisdictions have adopted net~~...~~
NB.1.2 Strengthen implementation capacity for building energy codes	**Current status:** Low implementation capacity for BECs at the national and local levels is a barrier to adoption and enforcement of mandatory BECs. Low adoption of voluntary standards across many AMS		
	By 2025:	**By 2030:**	**Towards net-zero carbon**
	Tools developed to facilitate compliance checking and implementation of BECs at the subnational and local levels Training programmes on BECs implementation and compliance are rolled for national, subnational and local governmental officials Most subnational jurisdictions adopt mandatory building code for public buildings	Continuation of capacity building and accreditation programmes to support the roll-out of BECs All subnational jurisdictions adopt mandatory BECs for public buildings Most local/municipal jurisdictions implement BECs in line with the national guidance and requirements	Ongoing capacity building at all levels of governance and implementation chain. Full enforcement and

Stakeholder mapping: New Buildings

As multi-stakeholder collaboration is one of the overarching principles of this Roadmap it is important to consider which stakeholder groups should be involved into the delivery of each activity.

Action Area
2. New Buildings

Key
- High
- Medium
- Low

	National government	Subnational government	Utility companies	Property and project developers	Financial institutions	Architects and engineers	Manufacturers, retailers and suppliers	Labourers and installers	Building owners and occupants	Civil society
NB.1.1 Increase strength and coverage of building energy codes										
NB.1.2 Strengthen implementation capacity for building energy codes										
NB.2.1 Increase adoption of building energy certification and labelling										
NB.2.2 Enhance awareness of consumers and private sector on benefits of low-carbon buildings										
NB.2.3 Facilitate access to finance and development of business models for low-carbon buildings										
NB.3.1 Build capacity on integrated passive building design										
NB.3.2 Mainstream lifecycle analysis tools for design of new buildings										
NB.3.3. Increase availability of key materials and components for low-carbon buildings										

Energy Efficiency Policy Training Week: Buildings – Day 4 – Part B – Indicators

Zero-carbon buildings indicators and zero-carbon adoption

Energy efficiency data

Indicators manuals

Indicators data pyramid

CAF DEVELOPMENT BANK OF LATIN AMERICA

REPÚBLICA DE PANAMÁ — GOBIERNO NACIONAL
MINISTERIO DE LA PRESIDENCIA
SECRETARÍA DE ENERGÍA

ESMAP
Energy Sector Management Assistance Program

WORLD BANK GROUP

iea

Data is essential at all stages of the policy cycle

- Each step requires appropriate data to be effective
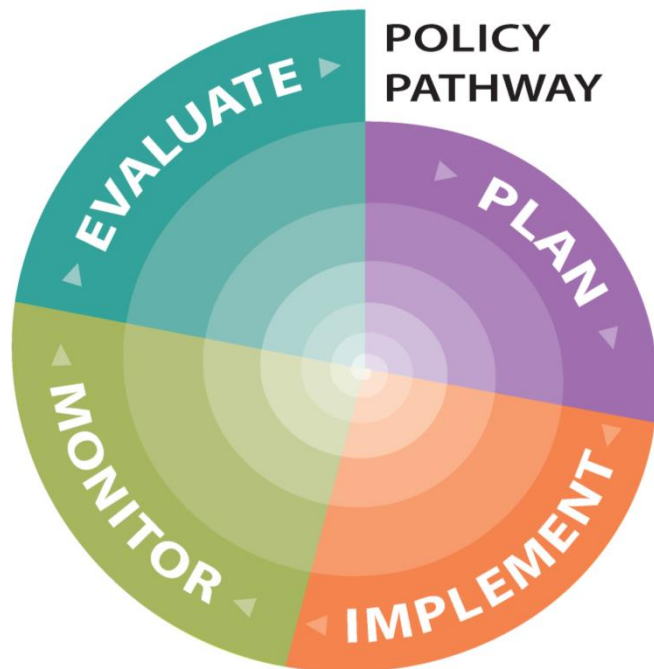
- **Plan**: Inform policy design based on current state and ambition

- **Implement**: Adapt the policy during adoption and enforcement stages

- **Monitor**: Track how the policy is performing

- **Evaluate**: Use the data to see what happened and why

Monitoring and Evaluation

- **Monitoring** provides headline data on policy performance
  - What happens as a result of the policy?

- **Evaluation** provides an understanding of what is happening / has happened
  - Why and what can be done about it?

- **Why is monitoring and evaluation needed?**
  - Understand what happens as a result of the policy
  - Verify the policy is performing as expected
  - Ability to change policy during its implementation
  - Learn for other policies
  - Understand the energy efficiency and energy market more
    - What drives changes in the market?
    - How do energy consumers react?

Main sources of data, information and indicators

- Management information/reporting

- Measurement e.g. meter readings, compliance data

- Experiments/testing

- Modelling

- Surveys

- Interviews and focus groups

Resource of methods for capturing data, information and indicators

Home » ClassicStats » Topics » Energy efficiency » EE Indicators Manual

Energy Efficiency Indicators Statistics: Country Practices Database

A supplement to the publication Energy Efficiency Indicators: Fundamentals on Statistics, this database presents practices on collection of data for developing efficiency indicators from a variety of OECD Members and non-Members.

Practices are searchable by country and territory, sector, methodology and type of available documentation. By sharing these experiences, we hope to help countries and organisations to develop their own energy efficiency indicators programmes.

Countries, territories and economies	Sector	Methodology	Available content	Search by keywords
☐ Albania	☐ Industry	☐ Administrative sources	☐ methodology	
☐ Australia	☐ Residential	☐ Measuring	☐ project web site	
☐ Austria	☐ Services	☐ Modelling	☐ questionnaire	
☐ Belarus	☐ Transport	☐ Surveying	☐ report	
☐ Belgium			☐ results	
☐ Bosnia and Herzegovina				
☐ Brazil				
☐ Bulgaria				
☐ Canada				

Reset   Search
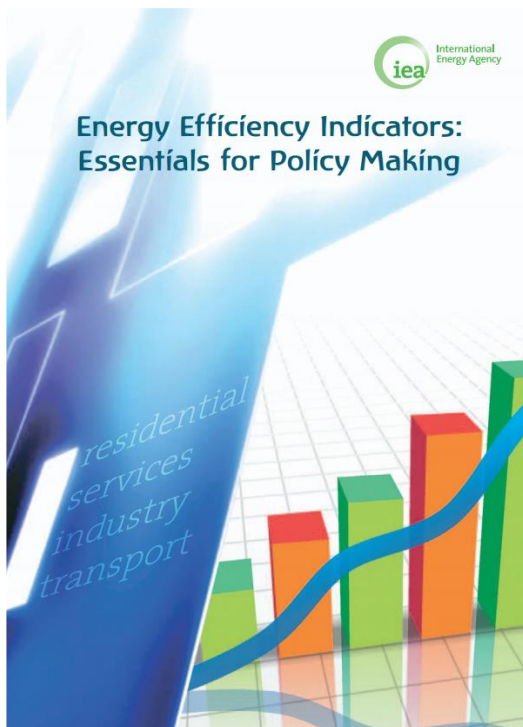
Energy efficiency indicators: manuals

Energy efficiency indicators pyramid

• More detailed data is required to get to Level 3 indicators

Level of aggregation (vertical axis)

Level 1
Aggregate indicators

Level 2
Sub-sector indicators

Level 3
End-use indicators

Data requirement (horizontal axis)

- Step-by-step and sector-by-sector through energy efficiency indicators.

- Self-paced and interactive.

- No set time limit to complete the course, to fit into your professional and personal lives.

Energy efficiency indicators online course:

Energy performance metrics

Limitations

Energy consumption

Energy per person

Energy per floor area

Evaluation: choosing the right metric

+15%

-35%

Residential

Residential/capita

Residential/dwelling

Space heating TC/dwelling

Space heating TC/floor area
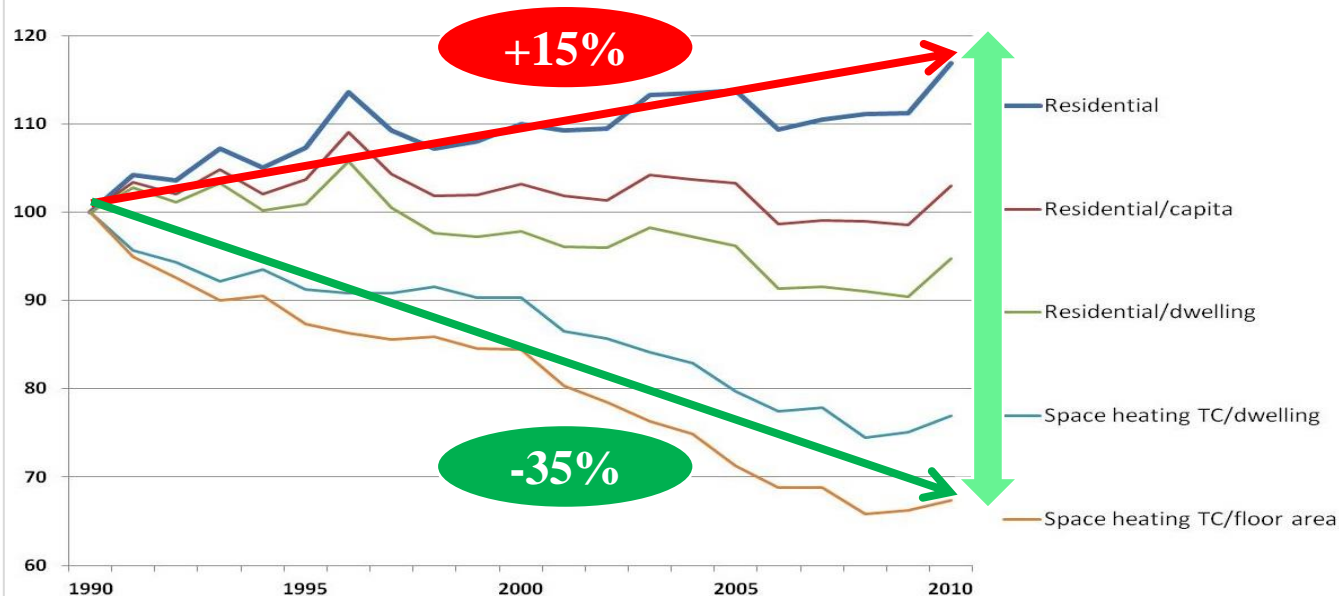
What are these types of energy performance metrics not telling us about energy demand and efficiency progress?
Behaviour?
Technology?
Efficiency?
Income?

Index: 1990=1. Data for IEA18 (Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Slovakia, Spain, Sweden, Switzerland, UK, USA). TC: Temperature Corrected.

The right energy performance metric is crucial to understanding & tracking progress over time.

Source: IEA energy efficiency indicators database

Evaluation: Building energy performance metrics

Limitations of Energy Performance Metrics

- Metrics cannot predict variation in overall energy consumption or quantify the impact of individual components or factors on overall energy consumption.

- It is often necessary to undertake more detailed analysis to fully understand the combined impact of a number of different factors or driving forces on overall energy consumption.

Building Energy Performance Metrics

Supporting Energy Efficiency Progress in Major Economies

BUILDING ENERGY EFFICIENCY TASKGROUP

Source: IEA Building Energy Performance Metrics 2015

Indicators for Tracking Progress

Key steps in the process

Examples

Tracking progress: Key steps in the process

Step 1: Identify what needs to be tracked

- What story should be told?
- What were the objectives?
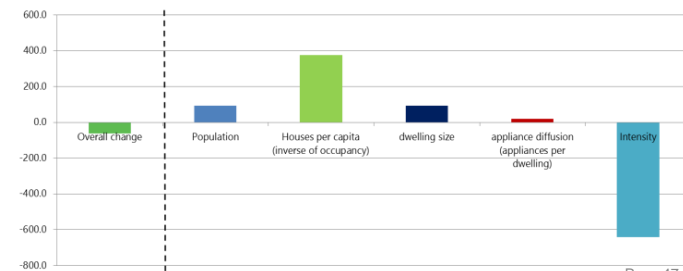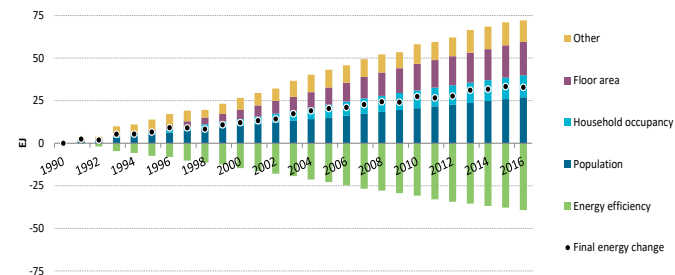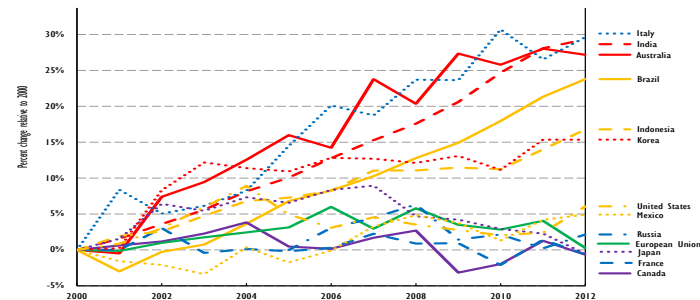- What are the risks?

Step 2: Define the tracking indicators

- What performance metrics can you use?
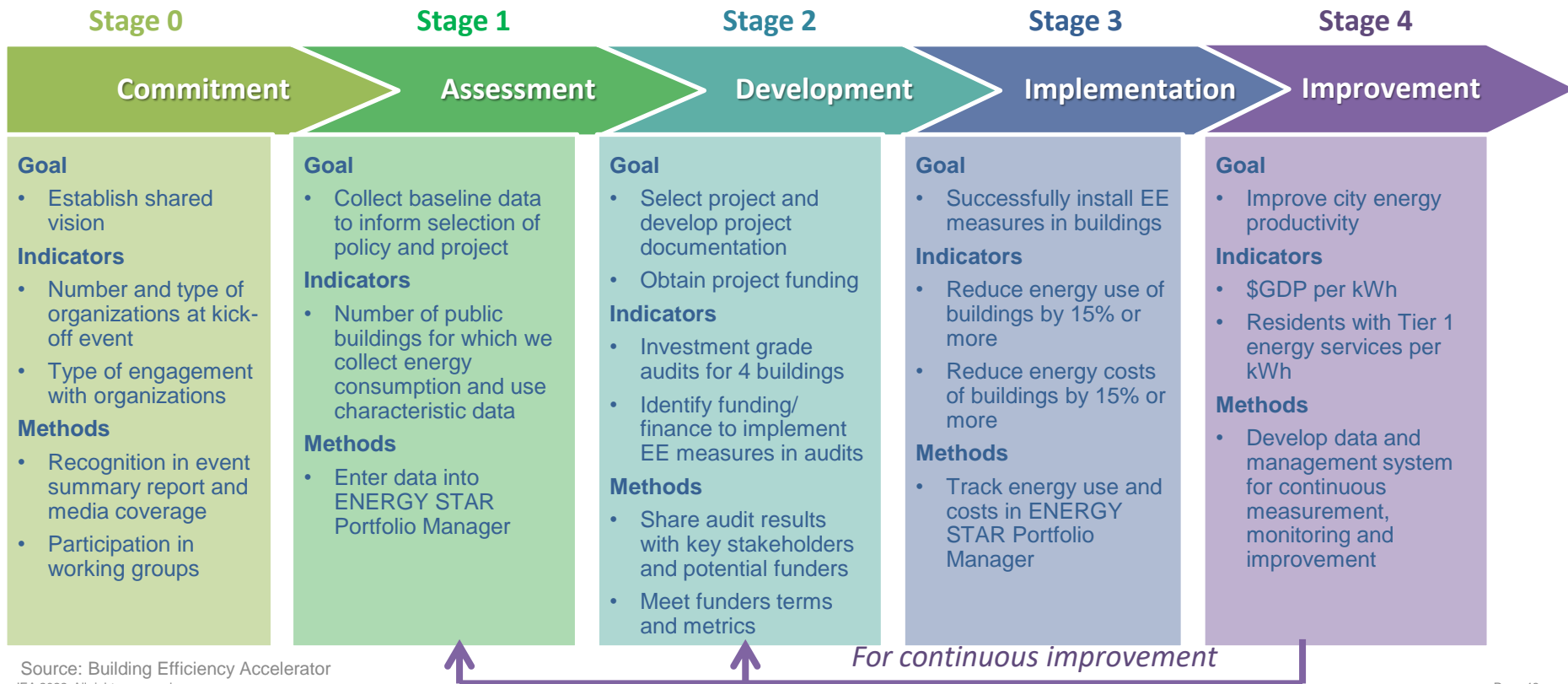- What data is needed?

Step 3: Assess the data

- What analysis method should you use?

Step 4: Tell the story

- How do you visualise the results?
- How would it vary across countries?

Example: Tracking progress in the Building Efficiency Accelerator

Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
Commitment	**Assessment**	**Development**	**Implementation**	**Improvement**

Goal
- Establish shared vision

Indicators
- Number and type of organizations at kick-off event
- Type of engagement with organizations

Methods
- Recognition in event summary report and media coverage
- Participation in working groups

Goal
- Collect baseline data to inform selection of policy and project

Indicators
- Number of public buildings for which we collect energy consumption and use characteristic data

Methods
- Enter data into ENERGY STAR Portfolio Manager

Goal
- Select project and develop project documentation
- Obtain project funding

Indicators
- Investment grade audits for 4 buildings
- Identify funding/finance to implement EE measures in audits

Methods
- Share audit results with key stakeholders and potential funders
- Meet funders terms and metrics

Goal
- Successfully install EE measures in buildings

Indicators
- Reduce energy use of buildings by 15% or more
- Reduce energy costs of buildings by 15% or more

Methods
- Track energy use and costs in ENERGY STAR Portfolio Manager

---

Goal
- Improve city energy productivity

Indicators
- $GDP per kWh
- Residents with Tier 1 energy services per kWh

Methods
- Develop data and management system for continuous measurement, monitoring and improvement

For continuous improvement

Source: Building Efficiency Accelerator

Tracking progress example: cooling

Step 1: Identify what needs to be tracked

- What story should be told about the impact of cooling?
    - What objectives could be achieved through policies on cooling?
    - What are the risks and threats from increasing cooling energy use?

Potential issues related to cooling

- Demand for and access to cooling thermal comfort

- Energy used for cooling based on AC efficiency levels

- Peak electricity loads, grid stability and power sector investments

- Job creation through design, manufacturing, selling or installing ACs

- Sales tax and public budgets financial impacts

- Market availability of efficient products

Tracking progress example: cooling

Step 2: Define the tracking indicators

- What performance metrics can you use?

- What data do you have on cooling and buildings?

Issues with metrics and indicators

- How do you separate the influences? (Income; demand; population; climate; efficiency)

- What options are there for metrics?
    - Final energy use for cooling
    - Final energy use for cooling per square meter cooled per cooling degree-day
    - Change in average efficiency of ACs (stock, sold, manufactured, imported, exported)
    - Share of products covered by labels or MEPS policies

Tracking progress example: cooling

Step 3: Assess the data

- What analysis method can you use?
- Which method will provide the information needed?

Step 4: Tell the story

- How do you visualise the data?
- What part of the story is important for your country?

Issues with metrics and indicator analysis methods

- What results will be compelling and told with simple visuals or statements?

- What options are there for methods?
    - Energy performance metrics
    - Bars held analysis
    - Energy decomposition (LMDI)

Evaluation

What is evaluation?

Ex-ante evaluation

Ex-post evaluation

What is evaluation?

Evaluation is an objective process of understanding how a policy or

programme was implemented, what effects it had, for whom and why.

It leads to more effective policies and programmes

When should you evaluate?

Ex-ante evaluation

Ex-post evaluation

RATIONALE

FEEDBACK

OBJECTIVES

POLICY/ PROGRAM

EVALUATION

APPRAISAL

MONITORING
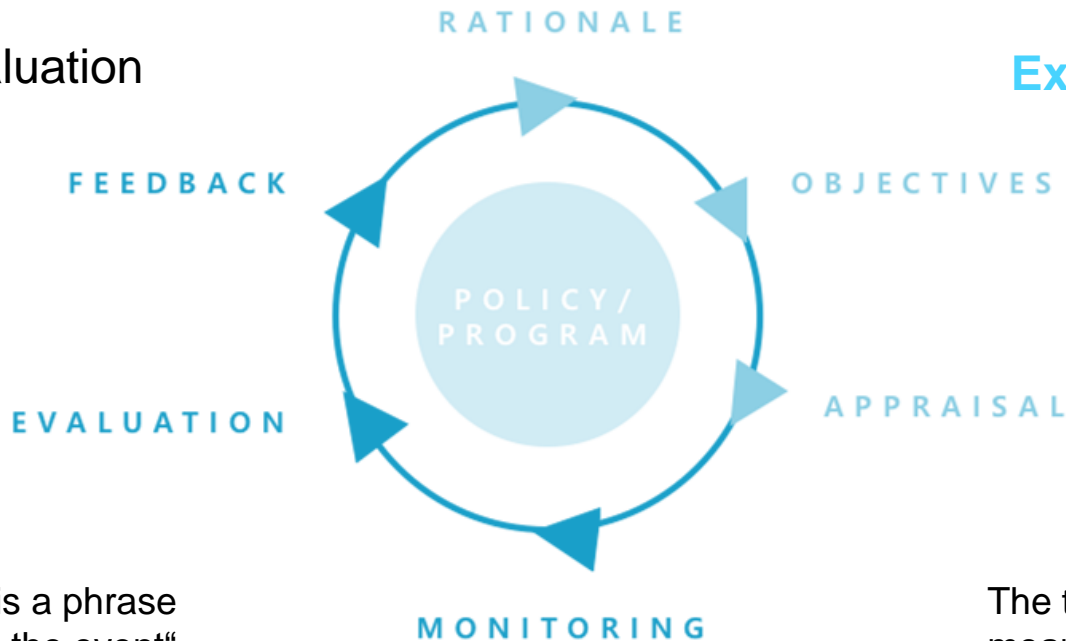
The term **ex-ante** is a phrase meaning "before the event"

The term **ex-post** is a phrase meaning "after the fact"

Ex-ante evaluation analysis approaches

- Technical potential: analysing the total energy efficiency potential without any economic or market constraints (e.g. analysing the energy savings potential if all buildings used best available technology)

- Economic potential: analysing the energy efficiency potential assuming economic constraints for cost effectiveness (e.g. analysing the energy savings potential if buildings used the most-efficient cost-effective technology)

- Market potential: analysing the energy efficiency potential assuming market constraints in implementing energy efficiency (e.g. analysing the energy savings potential using a adoption curve to estimate typical market implementation given the available policies and technologies)

Ex-post evaluation: did it work?

Measuring activities and outputs is straightforward, if not simple. Outcomes / impacts are more difficult…

The policy → **The outcomes**

Why is it more difficult?

Ex-post evaluation: did it work?

Measuring activities and outputs is straightforward, if not simple. Outcomes / impacts are more difficult…

```
┌─────────────────────┐                    ┌─────────────────────┐
│    The policy       │ ─────────────────▶ │   The outcomes      │
└─────────────────────┘                    └─────────────────────┘
                    ┌─────────────────────┐        ▲
                    │    Other factors    │ ───────┘
                    │    and influences   │
                    └─────────────────────┘
```
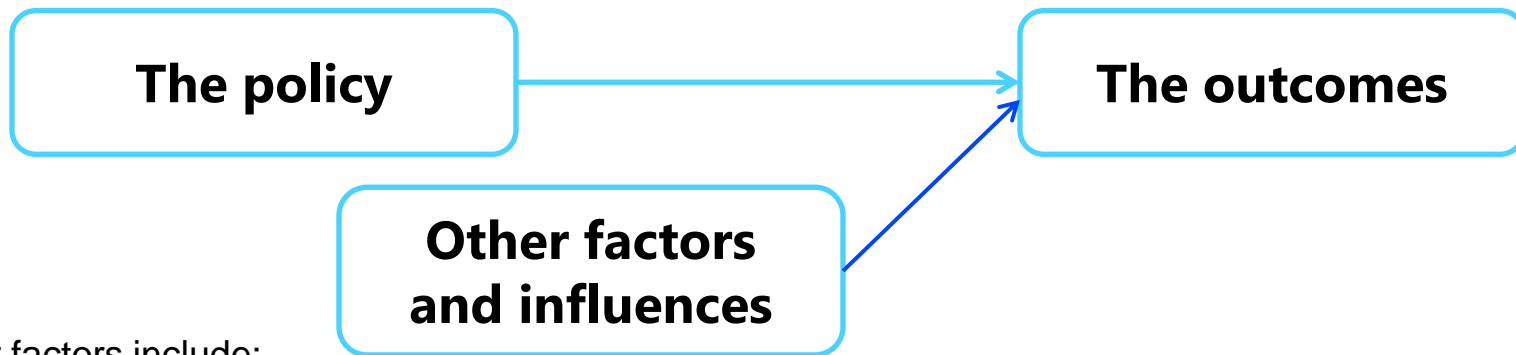
Other factors include:

Global, national, local trends / events

Other policies

Something you haven't even thought of…

Energy Efficiency Policy Training Week: Buildings – Day 4 – Part C – Investment & Finance

CAF DEVELOPMENT BANK OF LATIN AMERICA

REPÚBLICA DE PANAMÁ
— GOBIERNO NACIONAL —

MINISTERIO DE LA PRESIDENCIA
SECRETARÍA DE ENERGÍA

ESMAP
Energy Sector Management Assistance Program

WORLD BANK GROUP

iea

Economy, jobs and the climate: how an investment in green buildings can deliver it all

Buildings are critical to climate action

CO2 emissions from the use phase of buildings by sub-sector and region in the Sustainable Development Scenario, 2019-70
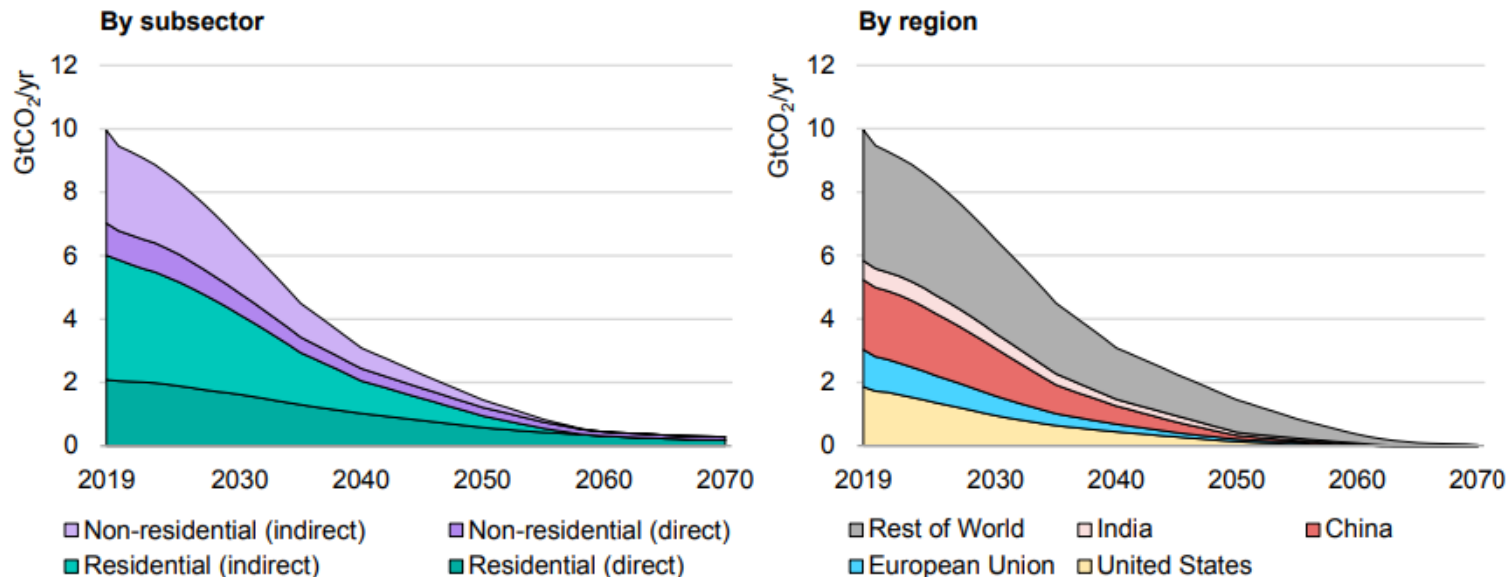
CO2 emissions in the buildings sector fall to net-zero by 2070 through measures such as high efficiency electric equipment, phasing out fossil fuel use and decarbonisation of heat and power supply

The technologies to drive CO_2 reductions exist today

Global cumulative CO2 emissions reductions in the buildings sector by mitigation lever and technology readiness level in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2020-70
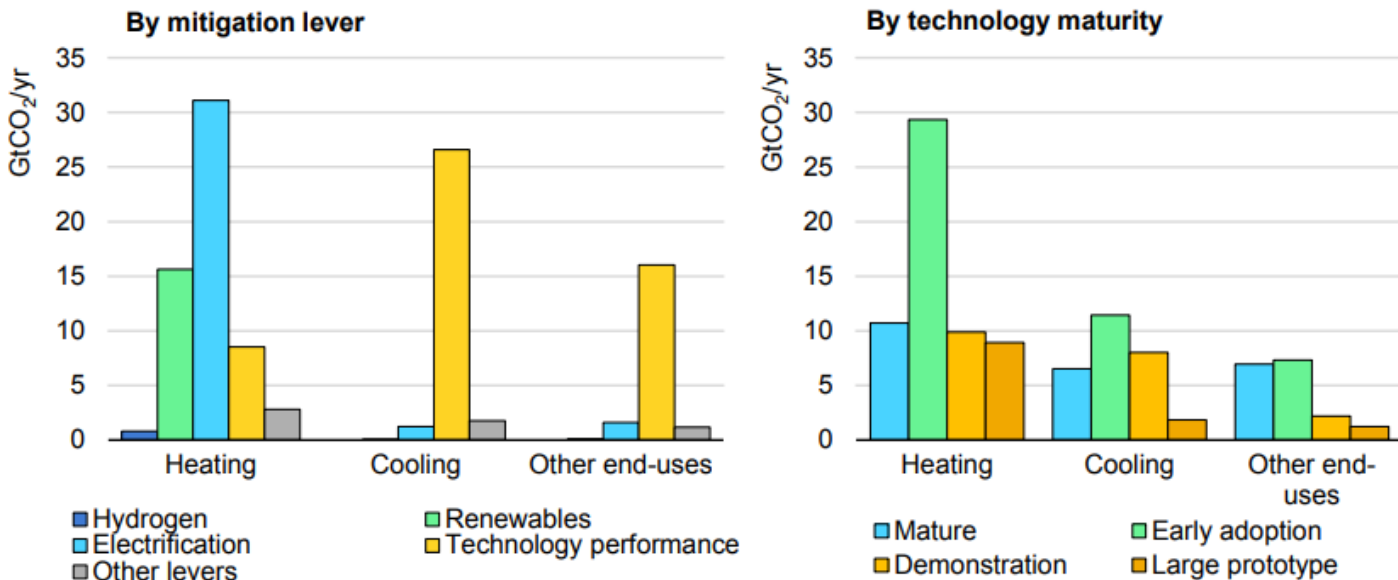
Three-quarters of what is needed to decarbonise the buildings sector could be achieved through the use of mature and early adoption technologies: further innovation would bring additional gains.

Investing in buildings to drive the economic recovery

Sustainable Recovery Plan's average annual: spending by sector and measure (Left) and construction and manufacturing jobs created (Right)
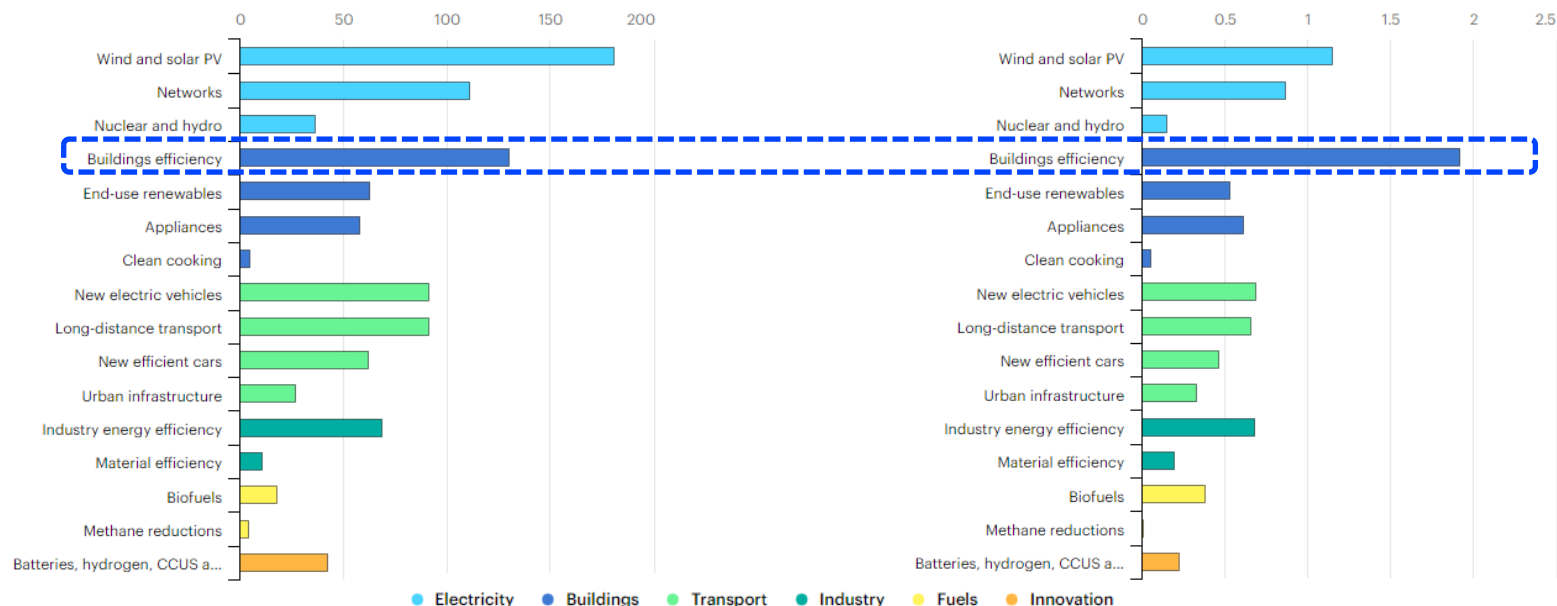
An average annual investment of 130 million dollars in buildings efficiency can deliver 1.9 million jobs a year over under the 3-year Sustainable Recovery Plan

What can we learn from past programmes?

- **Consider shovel-ready options**
  - deep retrofits of government buildings can deliver improvements to hospitals, schools, social housing and offices.

- **Leverage existing programmes**
  - supercharging existing programmes and leveraging their administration, contracts, guidelines and delivery partners for faster and safer programmes.

- **Standardise**
  - whether contracts, designs, or lists of approved technologies reduce costs and risks and can make for a simpler customer journey.

- **Set the right level of ambition**
  - don't let perfect be the enemy of the good – set the energy efficiency requirements as high as possible while remaining realistic about considerations such as price, supply and demand side constraints.

- **Get the level of incentive right**
  - Find the right balance between a high enough incentive to drive uptake without introducing significant programme risks or creating boom-bust cycles.

- **Address regulatory barriers**
  - consider removing or simplifying unnecessary red-tape to support fast rollout of green building stimulus programmes.

- **Turn short-term impacts into long-term transformations**
  - harness the investment from stimulus programmes to lock-in changes through improvements to building energy efficiency codes.

Where to learn more

IEA Energy Efficiency in Buildings MOOC

- Find more on the above topics in the MOOC here: https://elearning.iea.org/courses/course-v1:IEA+BUILDINGS1+Open/about

    - Module 3 – Measuring energy efficiency

        - Lesson 1 – Data and energy efficiency indicators

        - Lesson 2 – Evaluation of energy efficiency

    - Module 4 – Enabling investment in energy efficiency

        - Lesson 1 – Energy efficiency investment

        - Lesson 3 – Enabling investment through policy

        - Lesson 5 – Enabling investment through funding, finance and fiscal instruments

Energy Efficiency Policy Training Week: Buildings – Day 4 – Self-study

Self-study activity

- For one of the Roadmap Action Areas, describe at least **three critical actions** that should be undertaken by 2025, by 2030 and towards net zero-carbon buildings in your country/jurisdiction.

- For your selected Action Area, **evaluate the importance of involvement** for each stakeholder group for each of your proposed critical actions on the scale from 1 (not important at all) to 5 (extremely important).

Please use the Form here: Google Form Here

Self-study activity

- Rank the following barriers in terms of their impact on limiting the uptake of energy efficient and low-carbon buildings in your country.

- In your opinion, explain why your top-three Menti poll choices for barriers are the most impactful ones? Feel free to discuss importance of other barriers that are not included in the ranking question.

Buildings – Day 4 – Breakout Session

Breakout group activity

- We will now be split into three groups:

1. Group 1: Ian Hamilton & Estefania Mello & María Mora
2. Group 2: Ksenia Petrichenko & Elisete Cunha
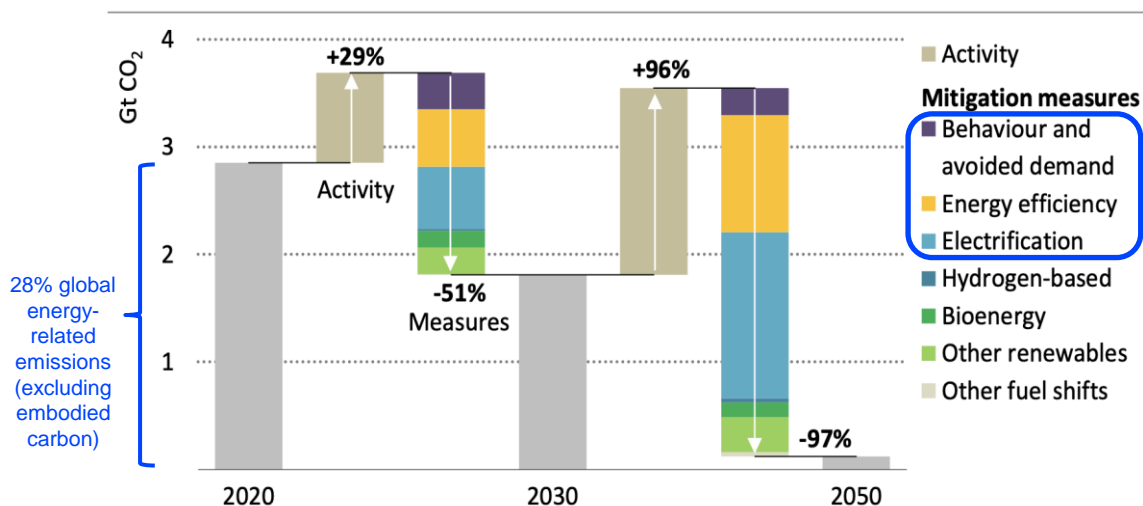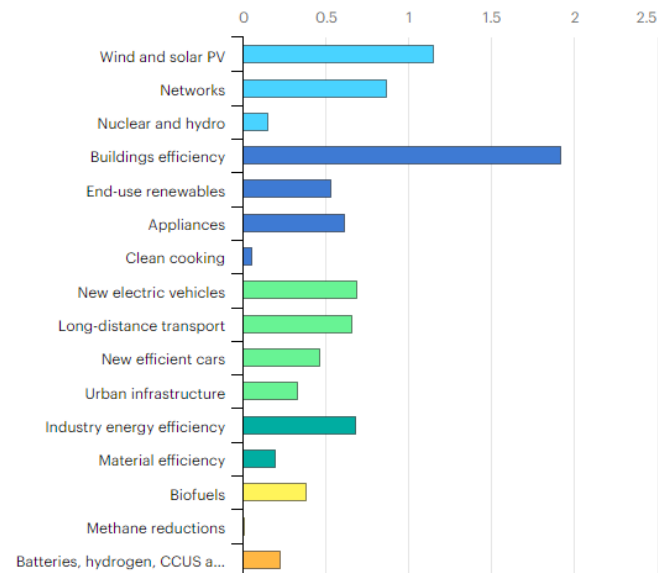3. Group 3: Cornelia Schenk & Liliana Campos

Okay – now to your groups!

Energy Efficiency Policy Training Week: Buildings – Day 4 - Closing

Key learning points of Day 4 for breakout discussion

Source: IEA (2021), Net Zero by 2050, IEA, Paris https://www.iea.org/reports/net-zero-by-2050

Energy Efficiency Training Week: Buildings Content Programme

Training Day 4:

Part A: Zero-carbon buildings strategies and action areas

- What are the Roadmaps for Buildings and Construction
- Building collaborations to enable strategies
- International examples

Part B: Zero-carbon buildings indicators and evaluation

- Data and indicators for tracking building energy efficiency and zero-carbon adoption
- Approaches to evaluation for assessing policy and programme progress and direction

Part C: Financing energy efficiency and zero-carbon buildings

- Types of financing for efficient and zero-carbon buildings
- Incentives (financial and non-financial) for efficiency and zero carbon

Energy Efficiency Training Week: Day 4 Learning Objectives

Key Learning Objectives:

• Understanding ways of developing strategies and the types of action areas needed to support energy efficient and zero-carbon buildings

• Understanding integrated policy development approaches and stakeholder engagement

• Understanding the types of indicators used to track building efficiency improvements

• Understanding how to evaluate policies

• Understanding the types different ways of supporting investment and financing approaches for energy efficient and zero-carbon buildings