International Energy Agency

Energy Efficiency Policy Training Week: Buildings – Day 3 - Introduction

Energy Efficiency Training Week: Buildings trainers

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Energy Efficiency Training Week: Buildings Content Programme

Training Day 3:

Part A: Policies and regulations

- What is a policy package and how to construct it
- Policy package approach to supporting energy efficiency and zero-carbon buildings performance
- Building codes and standards: what are they, how do they work, how to develop and adopt
- Targets, information instruments, incentives – what they are and why are they important?
- Regional and international examples

Part B: Multiple benefits of energy efficiency

- Type of multiple benefits
- Methods and indicators
- Regional and international examples

Self-study assignment

Buildings
Breakout Group Materials

Day 2, Tuesday
Presentation, Buildings
Click here

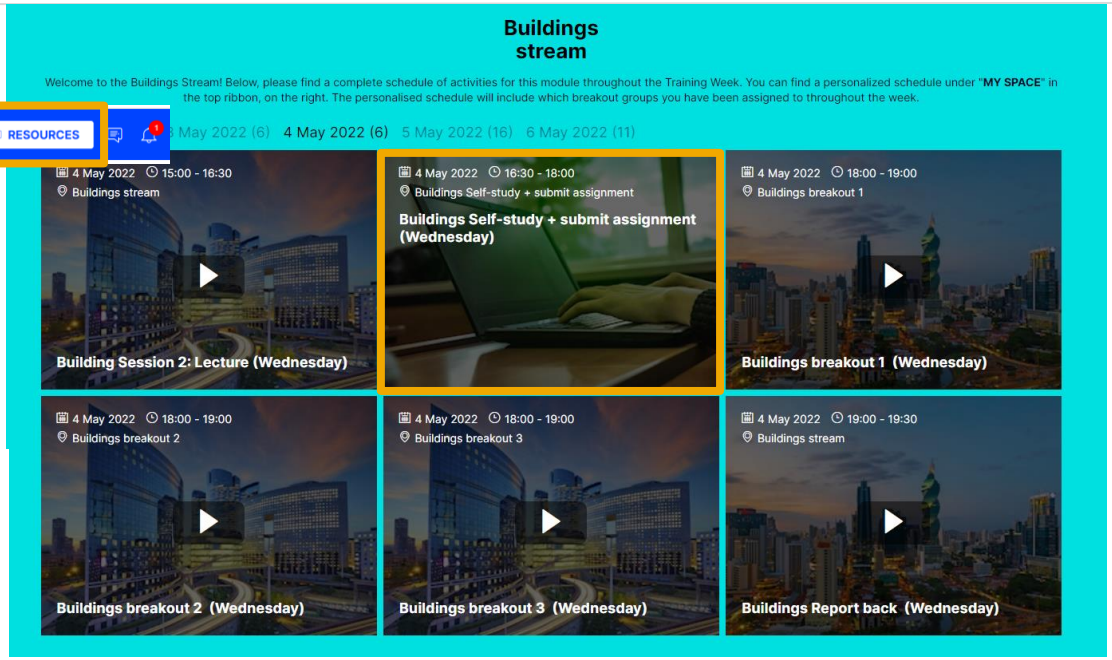
Day 2 - 4
Buildings Breakout Session Information
Click here

Lecture Sessions Materials

Appliances and Equipment Stream
Day 2, Tuesday 3 May
Click here

Buildings Stream
Day 2, Tuesday 3 May
Click here

Indicators and Evaluation Stream
Day 2, Tuesday 3 May
Click here



Your Assignment

To access your assignment, please click on the link below. This will take you to a document with instructions on the assignment, including any relevant links, information and directions on how to submit materials.

Homework for Tuesday **Homework for Wednesday** **Homework for Thursday**

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: Engagement

Be sure to:

- Participate
- Share your experience
- Ask questions
- Do the assignments
- Have fun!

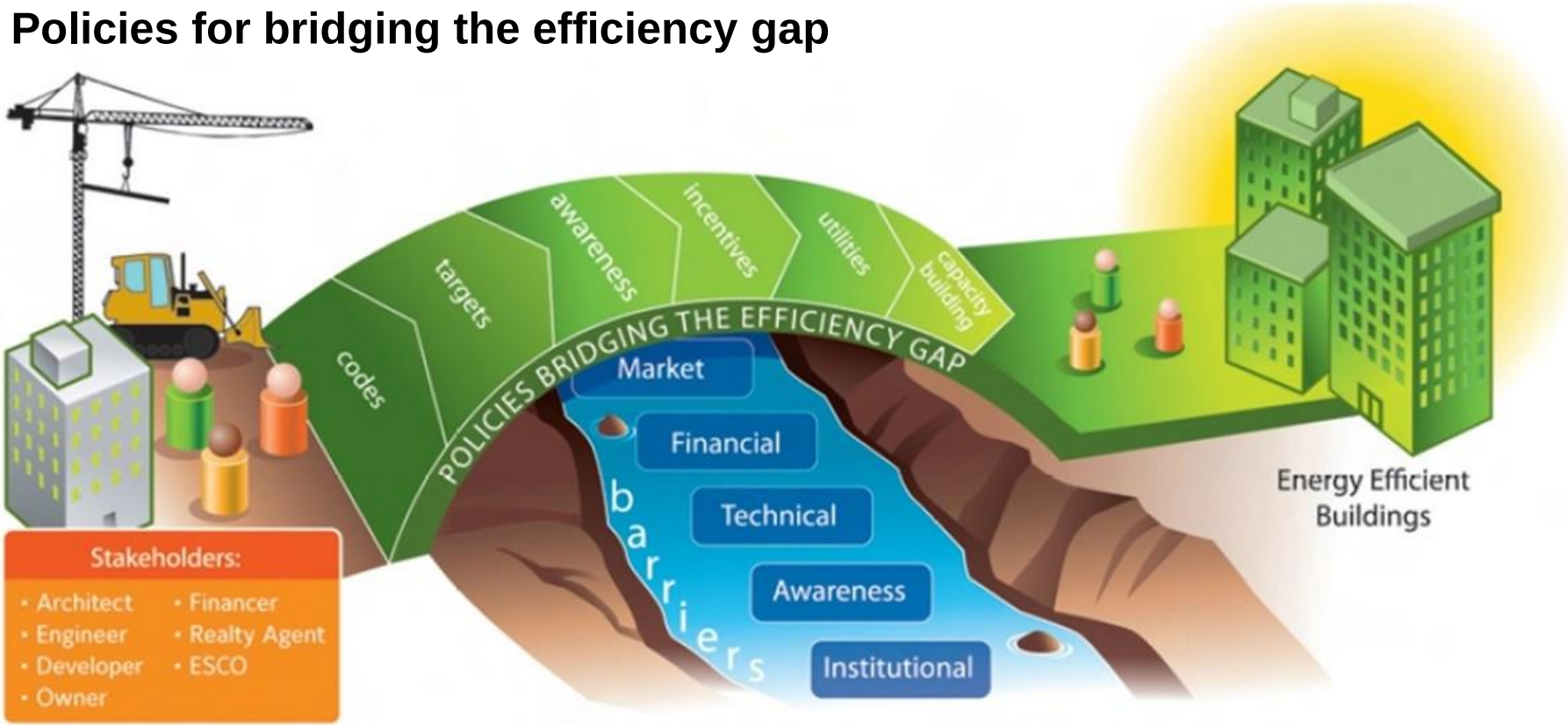
Source: People matter, 2022

Energy Efficiency Policy Training Week: Buildings – Day 3 – Part A – Policies for advancing to zero-carbon buildings

International Energy Agency

Why do we need policies?

Policies for bridging the efficiency gap



Source: Institute for Building Efficiency, WRI

Policies for market transformation

Enabling Policies

Regulation:
- **Codes/standards**
- **Disclosure**

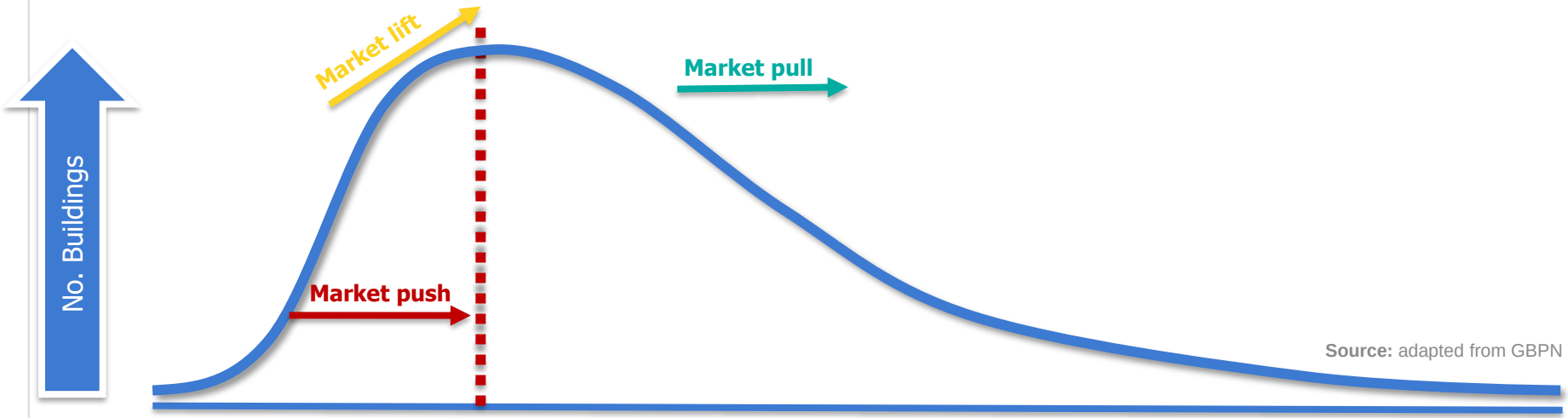
Sticks

Information:
- **Capacity building**
- **Awareness/labels**

Tambourines

Incentives:
- **Rebates/loans**
- **Non-financial incentives**

Carrots



Source: adapted from GBPN

Policy package for buildings

	New buildings	Existing buildings
Incentives	Green mortgages, performance-based preferential loans, tax rebates for efficient equipment and low-carbon materials; non-financial incentives: awards, expedited development review and approvals, fee reductions, performance-based density bonuses and development allowances	Financial incentives and financing for deep renovation, performance-based preferential loans and low-carbon materials; non-financial incentives: expedited administrative procedures and approvals, fee reductions, performance-based awards
Information	Energy performance certificates, labelling, energy performance disclosure at the point of occupancy, smart metering, smart heating and cooling, training and education programs for construction professionals	Energy performance certificates, labelling, energy performance disclosure at the point of lease, smart metering, smart heating and cooling, training and education programs for construction professionals, one-stop shops
Regulations	Building energy codes with minimum requirements for buildings energy performance, electrification readiness, low-carbon materials and integration of on-site renewables with compliance tied to building and occupancy permits	Minimum requirements for buildings energy performance, low-carbon materials and integration of on-site renewables to be achieved after renovation with on-site compliance checks

Enabling institutional framework and governance

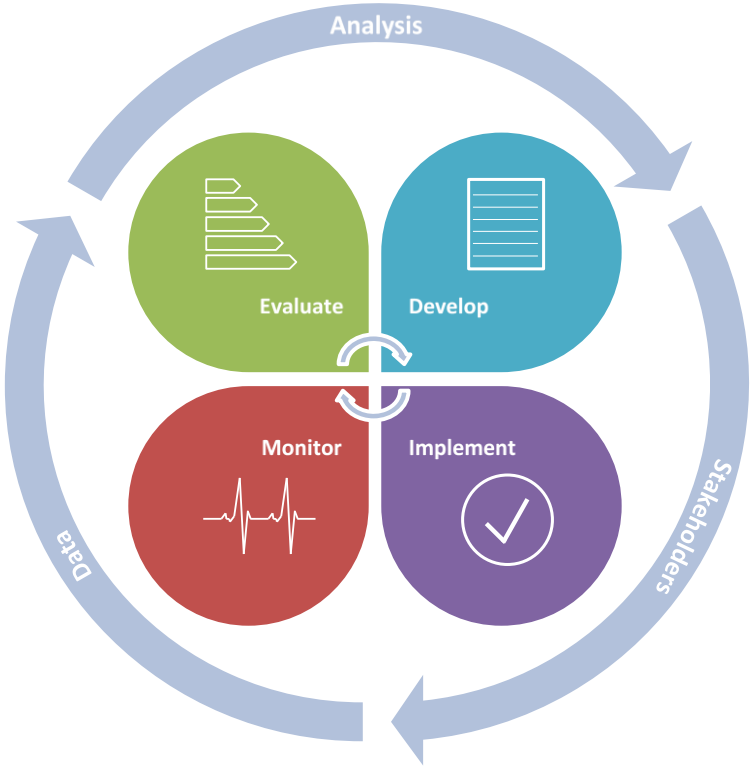
Long-term plans
targets, plans, strategies, voluntary agreements, monitoring and verification schemes

Capacity
Institutions, agencies, centres of excellence, certification of energy auditors and managers, international collaboration

Financing
reflective energy pricing, EE obligations, utilities policies, budgetary policies, public and private finance, funding for clean energy R&D

Digitalisation
Demand-side management, smart grids, smart meters rollout, grid interconnection rules, distributed energy resources management

The policy implementation cycle



Key stakeholders in the policy process include:

- ✓ national and sub-national governments;
- ✓ product manufacturers,
- ✓ suppliers and installers;
- ✓ building designers,
- ✓ constructors, owners and operators;
- ✓ financial lenders and guarantors;
- ✓ data collectors, evaluators and statisticians;
- ✓ and sustainability researchers, advocates and advisors.

Need a plan of goals and indicators to measure progress

Targets

For more information on target setting see
IEA Buildings MOOC

Target setting: definition and characteristics

- **Targets:** the desired level of performance you want to see, as measured by indicators, that represents success at achieving your outcome.

- **Stretch Target:** challenging but realistic target should be able to reach with some effort

- **Specific:** what you plan to achieve is clear
- **Measurable:** there is a way to determine whether or not you have achieved it
- **Attainable**
- **Relevant**
- **Timeframe** is specified

Target setting: the process

Step 1: Define where you are now

- **Method 1 — Use Historical Data**
  - It can be helpful to use data that your unit has already gathered to establish a baseline, or starting point, for your target.

- **Method 2 — Use External Sources**
  - When you do not have historical data, you might consider using information from outside data sources to benchmark, or compare your performance data with those of other comparable settings / sectors. Then set targets that seem reasonable in light of the benchmarking information you've gathered.

EFFECTIVENESS TARGET	OUTCOME TARGET
Within two years, 80% of building permits issued will be offered incentives for **achieving a stretch code**.	**90% of buildings** will implement the latest green building standards **by beginning of the next code improvement cycle**.

Target setting: the process

Step 2: Define what you want to achieve and by when

- Setting a target and its timeline is a delicate balance between **challenging and realistic**.

- A stretch target is intended to "**raise the bar**" so as to inspire people, but must also be capable of being met with through skills, knowledge, and resources.

*N.B. It's important to **carefully evaluate the historical data** you're considering using as your target baseline. Review past data and drivers that influenced those trends. Consider any circumstances that should inform your target.

Target setting: the process

Step 3: Things to consider

- **Timeline:** Be clear about how long you need to achieve your target. Will you need to set intermediary targets?
- **Scenario:** Conditions will be changing over the course of the policy development cycle and this will be important for setting the recent trends and baselines in the preceding years
- **Possible Target:** Set the target as it relates to change you are focused on achieving and by what end point (e.g. X% of appliance sales achieving best available technology (BAT) by 2025
- **Resources:** Do you have the necessary resources needed (funding, staff, processes, buy-in, etc.) to achieve the target?
- **How can it be achieved?** Can it be achieved by incentives, regulations, standards or certificates, more resources, improving a process, an investment in technology?

Regulations and Standards

For examples on regulations in different countries see
IEA Buildings MOOC

Mandatory regulation

Example

- **Codes:** regulation for energy efficiency and sustainability for a whole building.

Example

- **Standards:** regulation for individual products or services, often referenced within a building code for individual building components.

Example

- **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

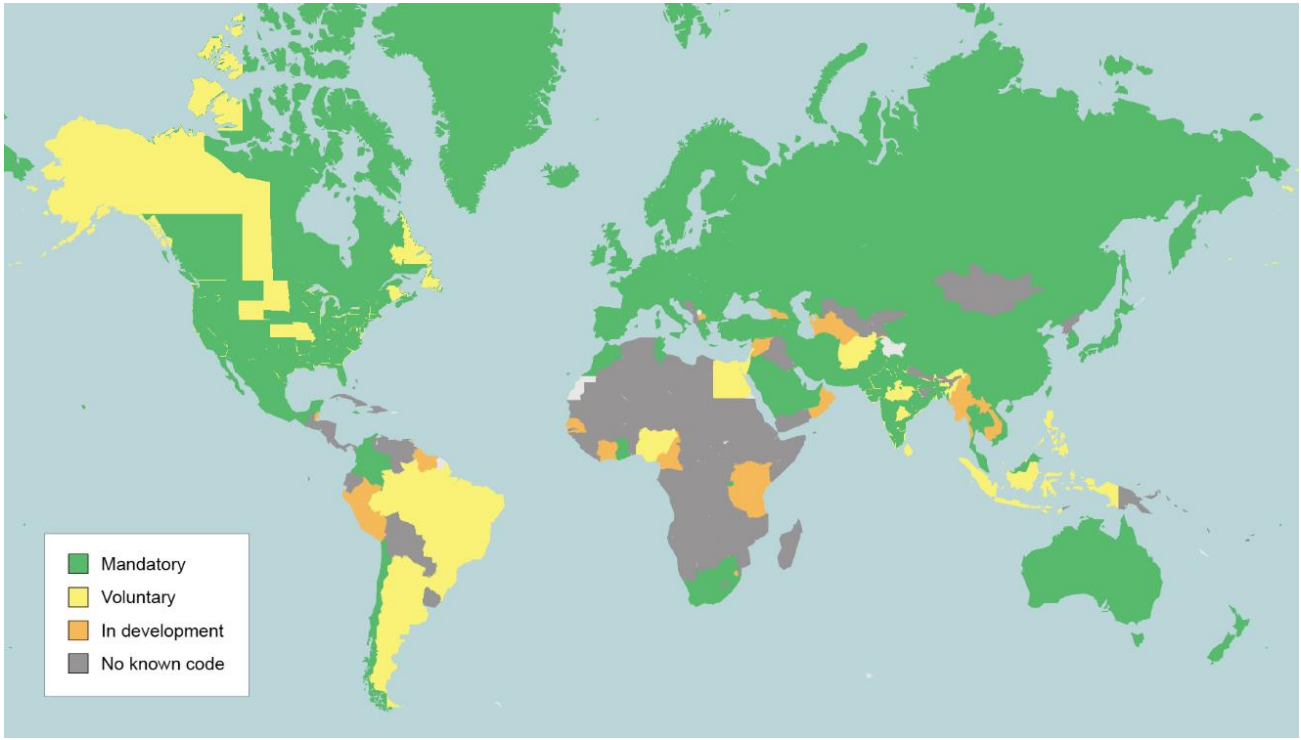
Example

- **Utility obligations:** rules for regulated utilities that enable increasing investment in energy efficiency and passing the costs system-wide in the energy prices

Example

- **Public procurement:** rules for government organisations to purchase products and services that meet certain criteria, such as energy performance or certification.

Energy codes for new buildings around the world, 2021



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

Source: IEA Energy Efficiency Market Report 2021

Types of building energy codes

Prescriptive codes

Specify requirements for key elements such as wall and ceiling insulation, window and doors, roofs, foundations, heating, ventilation air-conditioning, equipment efficiency, water heating, lighting fixtures, and controls.
Compliance with these codes is commonly assessed by checking the list of prescribed requirement

Simple trade-off codes

Allow for trade-offs between similar building components.
For example, less efficient insulation for more efficient windows in the building envelope

Performance codes

Specify a minimum required level of energy consumption or intensity for the whole building. They require energy modelling to be conducted at design stage.
Compliance is commonly checked by comparing the modelled energy performance of the design with a reference building of the same type

Outcome-based codes

Demonstration of performance during the operation of buildings.
Compliance is typically possible through energy performance certificates or with energy disclosure policies

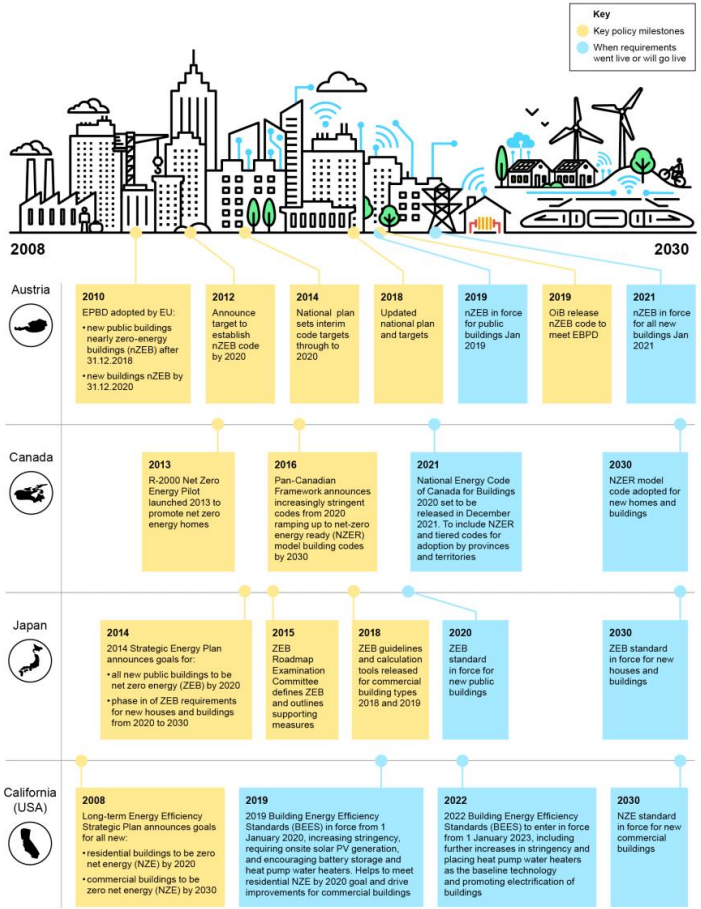
Model code: a code document that is designed to be copied and adopted for implementation by multiple jurisdictions.

- To enable increased consistency across multiple jurisdictions
- To simplify the code adoption and implementation process

Regulation: a code becomes a regulation when it is legally adopted for implementation by a jurisdiction.

- A legal regulation that has been notified or adopted by a government
- Binding requirements that are able to be enforced by the government

For more information see IEA EE in Buildings online course

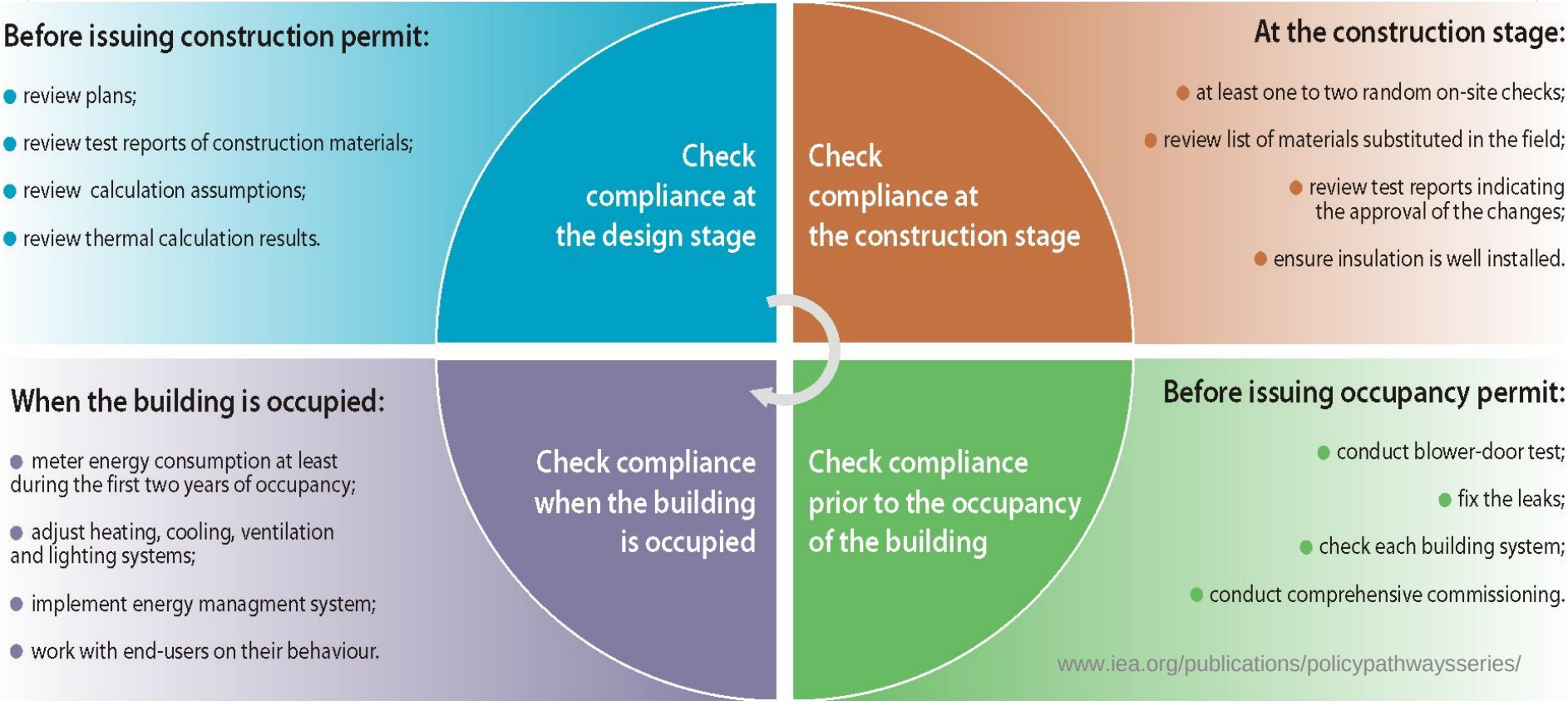


- It could take from 6 to 22 years from the announcement of net zero goal for buildings to development and implementation of the relevant building energy code

- To develop a zero carbon ready building code that comes into force by 2030 – and the necessary supporting policies, tools and capacity building measures – a one- to three-year window currently exists

Source: IEA Energy Efficiency Market Report 2021

Implementation of building energy codes



Example: *Código de Conservación de Energía para las Edificaciones de México (IECC)*

OBJECTIVE

Provide a guideline for energy-efficient buildings construction in Mexico, integrating existing and new standards together with recommendations into a single document. Moreover, the codes establish the national baseline for the deployment of energy efficiency programs.

BACKGROUND

Based on the International Energy Conservation Codes developed in the US, the Mexican building code *Código de Conservación de Energía para las Edificaciones de México (IECC)* was released in 2016. The document is an evolution of the Sustainability chapter of the *Código de Edificación de Vivienda* from 2009, and contains minimum energy efficiency requirements for energy conservation of commercial and residential new buildings and renovations, including air conditioning and water heating systems, appliances consumption, solar gains and envelope.

While in Federal level, the code is voluntary. However, once adopted by a local government, it becomes mandatory. The code will be updated every three years, addressing developments in technology and the evolution of energy efficiency standards.

México developed its code based on the US Buildings code, IECC. First version released in 2016, with updates every three years.

Standards

“What’s the difference between a code and a standard?”

As we saw previously, codes are comprehensive legal documents that enable energy efficiency for buildings as a whole.

Often, building energy codes include requirements from or refer directly to a range of standards, such as specific standards for equipment, products or materials.

Standards for new buildings

Standards can be integrated into mandatory building energy codes or complement them with minimum energy requirements

- New buildings & buildings undergoing renovation
- Building envelope and equipment
- Developed and adopted to set the minimum standards
- Enforced and regularly strengthened
- To minimise life-cycle costs.

Standards for existing buildings

Minimum energy performance standards are key for improving 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

Standards for building components and systems

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

Information instruments

For examples on information instruments in different countries see
IEA Buildings MOOC

Data and information

Example

- **Energy performance certificates:** documentation of basic building information plus energy performance

Example

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

Awareness

Example

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

Capacity building

Example

- **Education and training:** learning efforts to increase the knowledge of building sector professionals or general population.

Example

- **Labour certification:** searchable documentation of professional expertise in delivering energy efficiency.

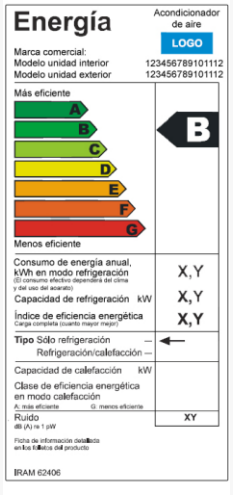
www.iea.org/topics/energyefficiency/

Example: labels in selected countries

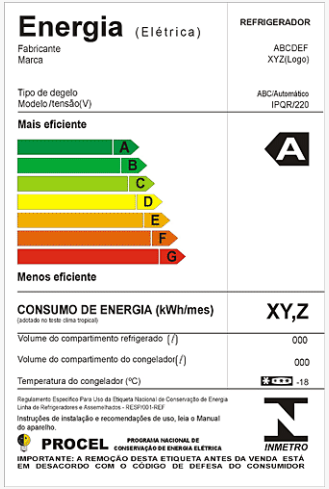
LABELS OF APPLIANCES

The energy efficiency of appliances can also be **labelled according to standards which are set differently according to each country.** Their general design is based on the European Union energy label, originally conceived in 1992 where the grading is given in terms of letters, being A the most efficient. Several Latin American countries have deployed energy labels, with some developing their own standards while others using international performance rates.

ARGENTINA



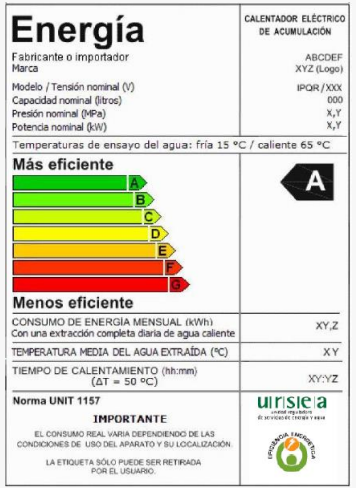
BRAZIL



PERÚ

MEXICO

URUGUAY



Incentives

For examples on incentives in different countries see
IEA Buildings MOOC

Non-financial incentives

Example

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

Financial incentives

Example

- **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

Example: expedited permitting

EXPEDITED PERMITTING

Example of non-financial incentives for efficient buildings is expedited permitting. Buildings have to apply for permits in order for the buildings to be habitable and in operation, but this process may take a long time since it is a fairly complex and some times bureaucratic process. However, different American cities have opted to offer a quicker process for issuing the permits whenever the projects meet specific green standards. Some examples of expedited permitting incentives are:

- **Houston, TX:** expedited permitting to commercial buildings that meet LEED standards;
- **Miami-Dade County, FL:** the county has a program called Green Building Expedited Plan Review, where different criteria must be met such as a minimum value of USD 50,000 for the project and also a certification from the Green Building Council attesting the register of the building;
- **San Francisco, CA:** priority is given to all new and renovated buildings with LEED Gold certification or other pre-approved high sustainability ratings;
- **San Diego, CA:** expedited permitting available to residential and commercial construction which meet green building standards. Projects achieving LEED Silver have their processes reviewed in 75% of the standard time;
- **Seattle, WA:** the city offers expedited permitting to green building projects through its Priority Green Expedited program. Accepted green building certifications are Built Green, LEED, LBC or Passive House Institute scores.

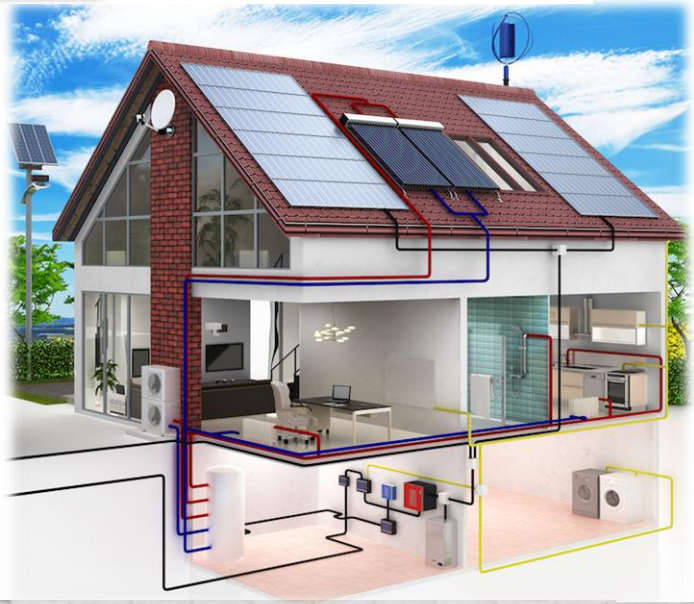
Policy package example for Australia

Policy package for buildings

New buildings

Existing buildings

- **Incentives**
- **Information**
- **Regulations**



Enabling institutional framework and governance

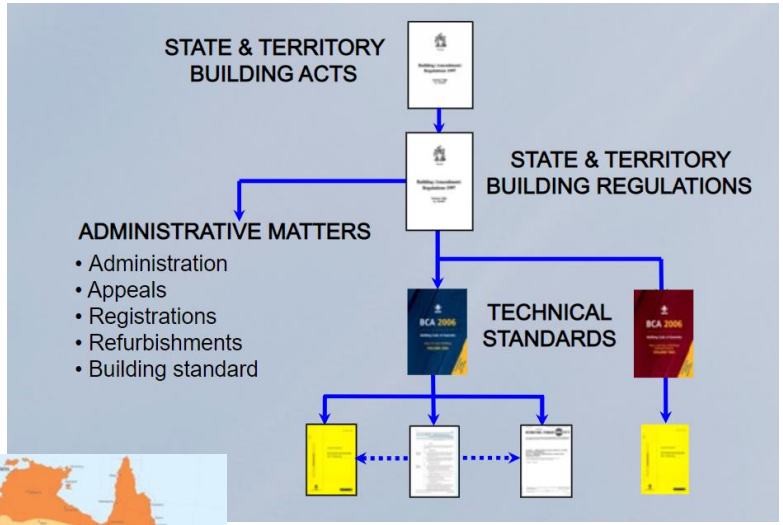
- **Long-term plans**
- **Capacity**
- **Financing**
- **Digitalisation**

Keep in mind the structure of the policy package

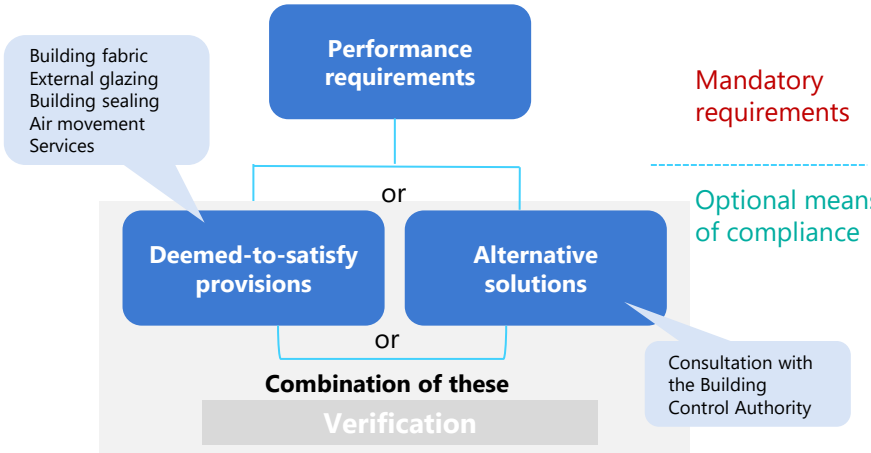
Regulation: Building Energy Code

Building Code of Australia (BCA)

2003: Energy efficiency provisions for houses were introduced were enhanced in 2005: Measures for multi-residential buildings were introduced
2006: Measures for public and commercial buildings were then introduced;
Amendment for residential buildings increased the range of options for complying with the requirements
2009: Stringency of energy efficiency requirements for both residential and commercial buildings were increased
2019: Stringency of energy efficiency provisions for commercial buildings by up to 30 %
2021: Further updates for energy efficiency requirements for residential buildings towards low-energy homes

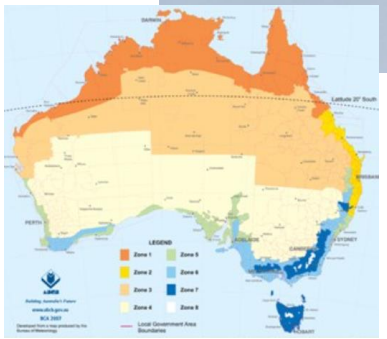


Flexibility of compliance paths within BCA



Mandatory requirements

Optional means of compliance



8 climate zones

Specific energy efficiency requirements vary depending on the use of the building and the climate zone in which it is located

The primary intent of the BCA provisions is to reduce operational energy required for cooling services in warmer climate zones and heating services in cooler climate zones without reducing comfort

Regulation & information: mandatory disclosure, certification & labelling

National Australian Built Environment Rating System (NABERS)

COMMERCIAL BUILDING DISCLOSURE

Sample BEEC

BUILDING ENERGY EFFICIENCY CERTIFICATE

BUILDING DETAILS

Building name: Sample Plaza
Owner's name: TRUSTEE FOR EXAMPLE PROPERTY TRUST
Building address: 123 Sample Street, City, STATE, 9000
Net Lettable Area of the building 33,600.0 m²
Certificate no.: B9999-2016/1
Current from: 15 Jul 2016
Current to: 15 Jul 2017
CBD assessor name: CBD Assessor
CBD assessor no.: CBDA9999

PART 1 - NABERS ENERGY RATING

This building has achieved

5.0 STAR NABERS ENERGY RATING

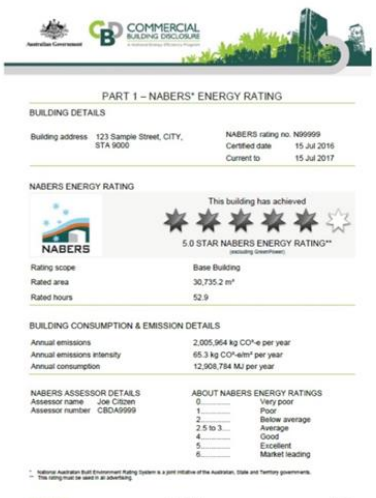
HOW DOES YOUR BUILDING COMPARE? The highlighted building on the adjacent graph compares the NABERS Star rating of your building to other buildings that were issued a BEEC nationally in 2015.

PART 2 - TENANCY LIGHTING ENERGY EFFICIENCY ASSESSMENT

An assessment of the buildings lighting energy efficiency is contained in part 2 of this certificate.

ENERGY EFFICIENCY GUIDANCE

Guidance on how building energy efficiency might be improved for building owners and tenants may be found at www.cbd.gov.au/get-and-use-a-rating/what-is-a-beec



PART 1 – NABERS* ENERGY RATING

BUILDING DETAILS

Building address: 123 Sample Street, CITY, STA 9000
NABERS rating no. N99999
Certified date: 15 Jul 2016
Current to: 15 Jul 2017

NABERS ENERGY RATING

This building has achieved

5.0 STAR NABERS ENERGY RATING**

Rating scope: Base Building
Rated area: 30,735.2 m²
Rated hours: 52.9

BUILDING CONSUMPTION & EMISSION DETAILS

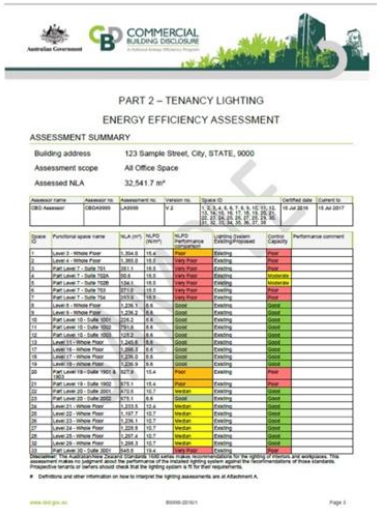
Annual emissions: 2,005.964 kg CO²-e per year
Annual emissions intensity: 65.3 kg CO²-e/m² per year
Annual consumption: 12,908,784 MJ per year

NABERS ASSESSOR DETAILS

Assessor name: Joe Citizen
Assessor number: CBDA9999

ABOUT NABERS ENERGY RATINGS

0 Very poor
1 Poor
2 Below average
2.5 to 3 Average
4 Good
5 Excellent
6 Market leading



PART 2 – TENANCY LIGHTING ENERGY EFFICIENCY ASSESSMENT

ASSESSMENT SUMMARY

Building address: 123 Sample Street, City, STATE, 9000
Assessment scope: All Office Space
Assessed NLA: 32,541.7 m²

Australian Government
Department of the Environment and Energy

www.cbd.gov.au

NABERS offers a package of policies – a proven effective combination of regulatory and information instruments

Regulation & information: mandatory disclosure, certification & labelling

OBJECTIVE

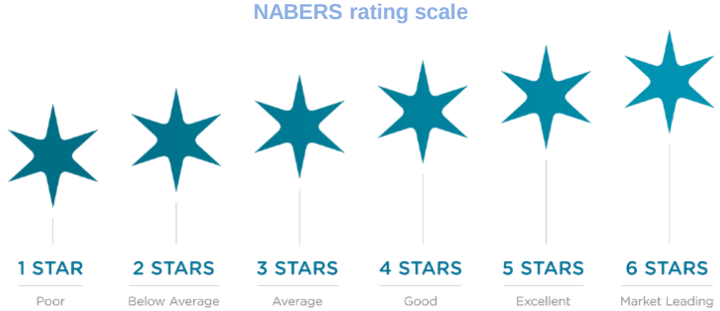
Require sellers and lessors to disclose information regarding energy efficiency of commercial buildings with over 1,000 m² of floor area, improving transparency on real estate transactions. Not all buildings are affected, requiring accredited assessors for compliance requirements.

BACKGROUND

The **Commercial Building Disclosure (CBD)** came to force in 2010, requiring commercial buildings to **have a Building Energy Efficiency Certificate (BEEC)**, being the BEEC necessarily provided to potential buyers or lessees when requested at the time of sale, lease or sublease. **Such certificates are composed by two parts**: (i) a star-score from a national rating system that measures the environmental performance of buildings, tenancies and homes, called **National Australian Built Environment Rating System (NABERS),** and (ii) a Tenancy Lighting Assessment, which measures the power density of the installed general lighting systems and its performance level. **BEEC's must be issued every 12 months**, ensuring compatibility to the latest energy efficiency improvements.

ACTIVITIES AND RESULTS

- **7,773 BEEC's had been issued** until 2018, with 2,162 unique buildings certified;
- The initial threshold was 2,000 m², which led to an average of 200 new buildings acquiring the BEEC yearly. In 2017-2018, when the threshold was lowered to 1,000 m², **312 buildings obtained a BEEC**;
- On the NABERS scale from 0 to 6, buildings, **CBD participants score an average of 3.7**. Larger buildings generally present higher scores.



Government 4.5 star office lease requirement (government purchasing power)

Disclosure program for commercial buildings (CBD) based on EE certificates (BEEC) which have a score from 0 to 6 stars based on their performance (NABERS)

Regulation: NABERS-based minimum energy performance standards

Energy Efficiency in Government Operation (EEGO)

EEGO policy includes energy intensity targets and minimum energy performance standards (MEPS) to ensure departments and agencies progressively improve their energy performance and consider energy use when purchasing or leasing buildings and appliances

MEPS apply to government office buildings that:

- are new
- have undergone major refurbishment (affecting their energy performance)
- have been leased for more than 2 years

Additional instruments:

- Green lease requirements
- Energy management plan
- Annual energy consumption reporting

EEGO policy requires agencies to report their energy consumption against core performance indicators to their portfolio minister

Element	>= 2000 m2 net lettable area			< 2000 m2 net lettable area
	100% of total building area	50% to 99% of total building area	< 50% of total building area	
Base building	>= 4.5 stars NABERS Energy, or equivalent, level of energy efficiency for whole building	>= 4.5 stars NABERS Energy, or equivalent, level of energy efficiency	No requirement	No requirement
Tenanted area	>= 4.5 stars NABERS Energy, or equivalent, level of energy efficiency for whole building	>= 4.5 stars NABERS Energy, or equivalent, level of energy efficiency	>= 4.5 stars NABERS Energy, or equivalent, level of energy efficiency	Separate digital metering and max 8W/m2 for lighting
Lease	To include a Green Lease Schedule	To include a Green Lease Schedule	To include a Green Lease Schedule	No requirement
Appliances	US EPA 'Energy Star' compliant with power management features enabled at the time of supply			

Source: https://www.energy.gov.au/government-priorities/buildings/government-buildings

Information: certification & labelling for residential buildings

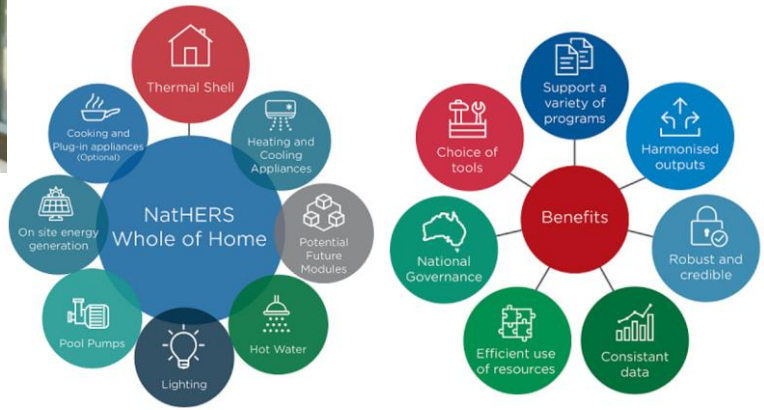
Nationwide House Energy Rating Scheme (NatHERS)

Voluntary 'in home' assessment of thermal performance based on BCA
NatHERS measures a home's energy efficiency to generate a star rating since 1993
NatHERS Assessors currently use the house plans and building specifications of a home to measures the home's thermal performance with an accredited software tool.
NatHERS tools estimate the amount of heat that needs to be added or removed to keep that home comfortable and generate a star rating out of 10 and a Certificate.

For construction of new homes there are 7 Star house free-to-download designs showcasing the use of sustainable design principles and construction techniques for a range of climate zones across Australia.

Rating is used in the requirements of BCA to set min.requirements

Work is underway to expand NatHERS to assess and rate the energy performance of the whole home, including appliances and equipment, which will result in a number of benefits



Nationwide House Energy Rating Scheme
NatHERS Certificate No. 0004466397
Generated on 22 Feb 2020 using CSIRO AccuRate Sustainability V2.4.3.13

6.0
NATIONWIDE HOUSE ENERGY RATING SCHEME
119.0 MJ/m²
www.nathers.gov.au

Property
Address: Unit 1, 37 Graham Road , Highett , VIC , 3190
Lot/DP: Lot gf DP 442528, loy Y
NCC Class*: 1a
Type: New Home

Plans
Main Plan: rtr
Prepared by: d

Construction and environment
Assessed floor area (m²)*
Conditioned*: 250.0
Unconditioned*: 0.0
Total: 250.0
Garage
Exposure Type: Suburban
NatHERS climate zone: 62

Thermal performance
Heating: 106.7 MJ/m²
Cooling: 12.3 MJ/m²

Accredited assessor
Name: John Smith
Business name: NA
Email: john.smith@na.com.au
Phone: 03 955 5555
Accreditation No.: 3333
Assessor Accrediting Organisation: HERA
Declaration of interest: Yes - managed

About the rating
NatHERS software models the expected thermal energy loads using information about the design and construction, climate and common patterns of household use. The software does not take into account appliances, apart from the airflow impacts from ceiling fans.

Verification
To verify this certificate, scan the QR code or visit hstar.com.au/QR/Generate?p=BrHnboVGP.
When using either link, ensure you are visiting hstar.com.au

National Construction Code (NCC) requirements
The NCC's requirements for NatHERS-rated houses are detailed in 3.12.0(a)(i) and 3.12.5 of the NCC Volume Two. For apartments the requirements are detailed in J0.2 and J5 to J8 of the NCC Volume One.
In NCC 2019, these requirements include minimum star ratings and separate heating and cooling load limits that need to be met by buildings and apartments through the NatHERS assessment. Requirements additional to the NatHERS assessment that must also be satisfied include, but are not limited to: insulation installation methods, thermal breaks, building sealing, water heating and pumping, and artificial lighting requirements. The NCC and NatHERS Heating and Cooling Load Limits (Australian Building Codes Board Standard) are available at www.abcb.gov.au.
State and territory variations and additions to the NCC may also apply.

* Refer to glossary.
Generated on 22 Feb 2020 using CSIRO AccuRate Sustainability V2.4.3.13 for Unit 1, 37 Graham Road , Highett , VIC , 3190
Page 1 of 6

Source: https://www.nathers.gov.au/

Incentives: variety of national, state and city programs

The Retailer Energy Productivity Scheme (REPS) supports households and businesses in South Australia to reduce their energy costs while improving energy efficiency in buildings.
Households and businesses may be able to receive free or discounted energy efficiency and energy productivity activities from energy retailers participating in the REPS.
Typical activities include installing energy efficient lighting, water efficient shower heads, helping save water heating costs.

Sustainability Incentive Scheme
The City of Adelaide provides financial incentives for sustainable technology installation in apartments, houses and commercial buildings, to improve energy and water performance

Rebates for commercial properties and apartments:
•Up to $5,000 for **commercial solar systems**
•Up to $20,000 per site ($500 per premise) for **shared solar** systems that provide electricity to multiple spaces
•Up to $5000 for **electric vehicle charging** equipment (cars and bikes)
•Up to $10,000 available for advanced electric vehicle charging technology providing virtual power plant capability
•Up to $5,000 for greenhouse gas inventory (plus additional up to $2,500 for other steps) towards **carbon neutral certification** for organisations, precincts, buildings or events
•Up to $5,000 for **NABERS** or **Green Star Ratings**
•Up to $500 for smart **electricity management systems** that optimise solar power or access 'off peak' tariffs.

The Energy Savings Scheme
The scheme can assist eligible NSW businesses with incentives to reduce energy use in office buildings. The incentives are available for office buildings that expect to get a NABERS energy rating of:
•at least 0.5 star higher than that of average office building stock, or
•at least 1 star higher than the building's historical NABERS energy rating
Incentives are site specific and depend on the size of your building and your NABERS star rating.

Rebates & training for 7-star homes
Rebates of $4,000 per home are available for builders to develop 7-star NatHERS rated homes in Victoria
Builders can collaborate with Sustainability Victoria to build up-to four new homes, with the rebate available per home built. Only 80 rebates available under the scheme.
In addition to 7-star NatHERS requirement a whole-of-home assessment to the program criteria is being introduced

A number of incentive programs are linked to NABERS or NatHERs and capacity buildings creating policy package synergies

Policy package for buildings

	New buildings	Existing buildings
Incentives	Financial incentives to develop buildings with higher ratings	Financial incentives to for energy efficiency upgrades, equipment and appliances
Information	Certification and labelling for residential (NatHERS) and non-residential (NABERS)buildings Capacity building programmes and accreditation for assessors	Certification and labelling for residential (NatHERS) and non-residential (NABERS)buildings Capacity building programmes and accreditation for assessors
Regulations	Building Energy Code and standards Mandatory disclosure of energy performance	Building Energy Code and standards – requirements vary by state MEPS, green lease and reporting requirements for government buildings Mandatory disclosure of energy performance

Enabling institutional framework and governance

- Long-term plans
- Capacity
- Financing
- Digitalisation

Think from the policy package point of view

- **Is the package effective? Why do you think so?**
- **Is there something missing?**
- **What instruments in this package would work well and not so well in your country? Why do think so?**

Energy Efficiency Policy Training Week: Buildings – Day 3 – Part B – Multiple benefits of energy efficiency

International Energy Agency

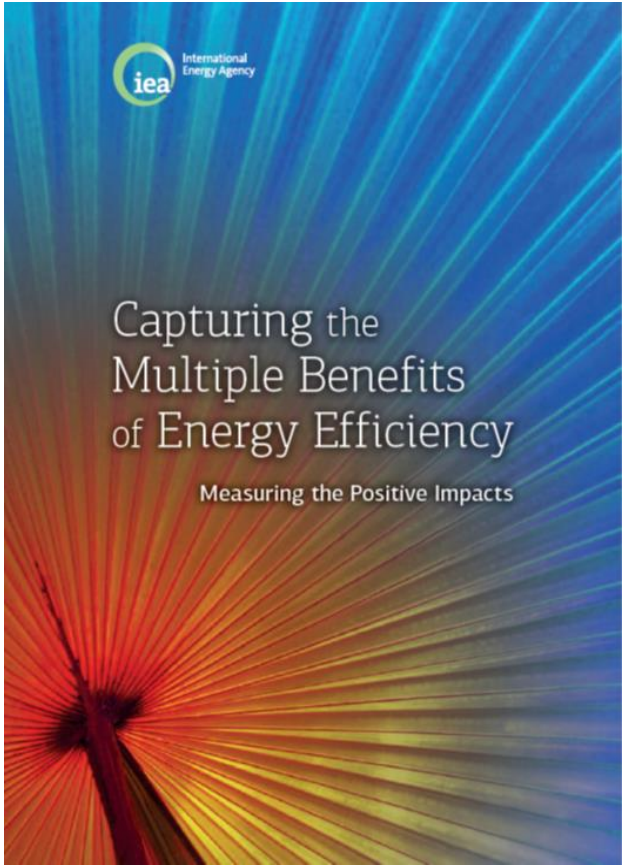
Multiple Benefits of Energy Efficiency

International
- Energy price reduction
- Greenhouse gas emissions reduction

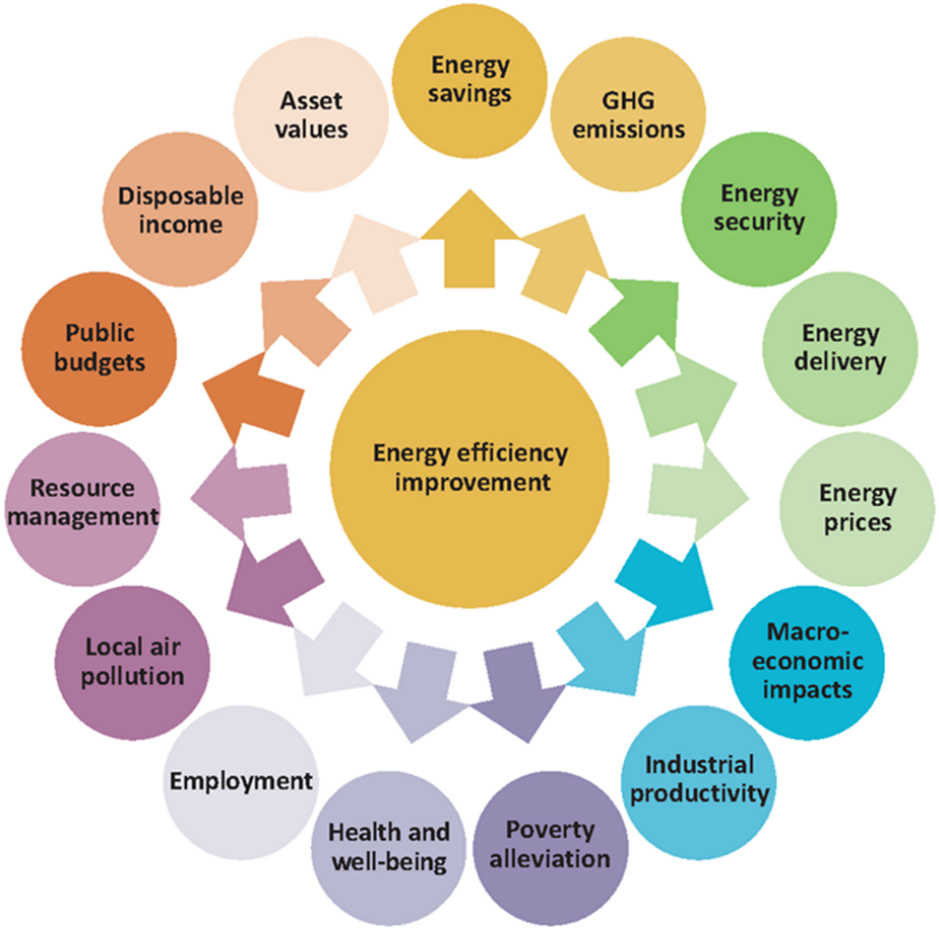
National
- Reduced energy demand and local price reduction
- Reduced public health spending
- Energy security
- Potential net increase in employment

Sectoral
- Increase in re-sale value of home
- Improved bill payments for energy providers
- Jobs in installation and production of insulation materials

Individual
- Lower energy bills (discretionary)
- Increased disposable income
- Warmer, drier, more comfortable home
- Improved health and well-being potential



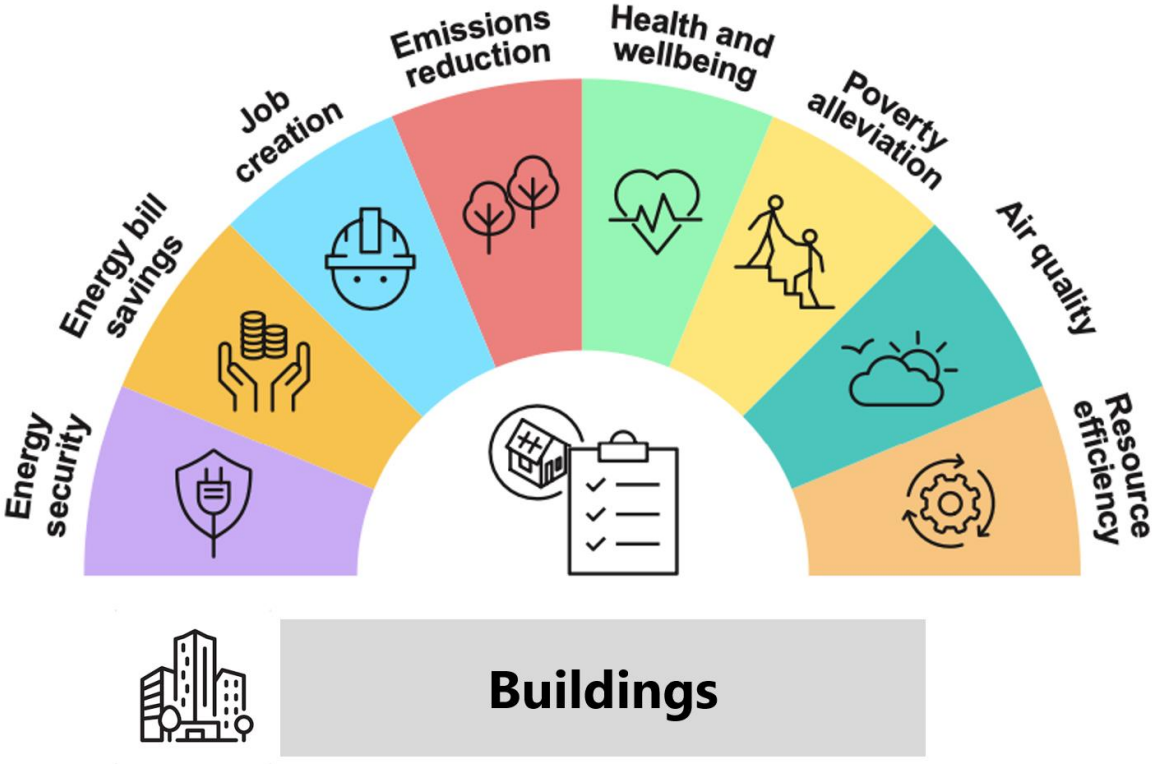
https://www.iea.org/reports/capturing-the-multiple-benefits-of-energy-efficiency

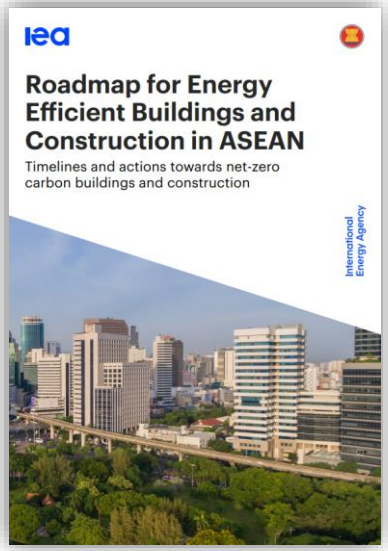


Energy Efficient Prosperity

Energy efficiency as a means to support economic and social development

Multiple Benefits of Energy Efficiency in Buildings





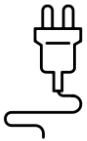
See for more information:
[Roadmap for energy efficient buildings and construction sector]

Multiple benefits of energy efficiency in buildings

Environment

- **Emissions reductions –** sustainable new buildings deliver GHG reductions because they consume less, and cleaner, energy.
- **Air quality** – sustainable new buildings and zero-emission buildings reduce air pollution.
- **Resource efficiency** – sustainable buildings reduce the use of materials for construction and increase the useful life of buildings and their components.

Energy



- **Energy savings** – sustainable new buildings are more energy-efficient.
- **Energy security** – sustainable new buildings use less energy and put less strain on energy systems.
- **Energy prices** – sustainable new buildings reduce energy consumption and peak loads, lowering network infrastructure and system costs.

Multiple benefits of energy efficiency in buildings

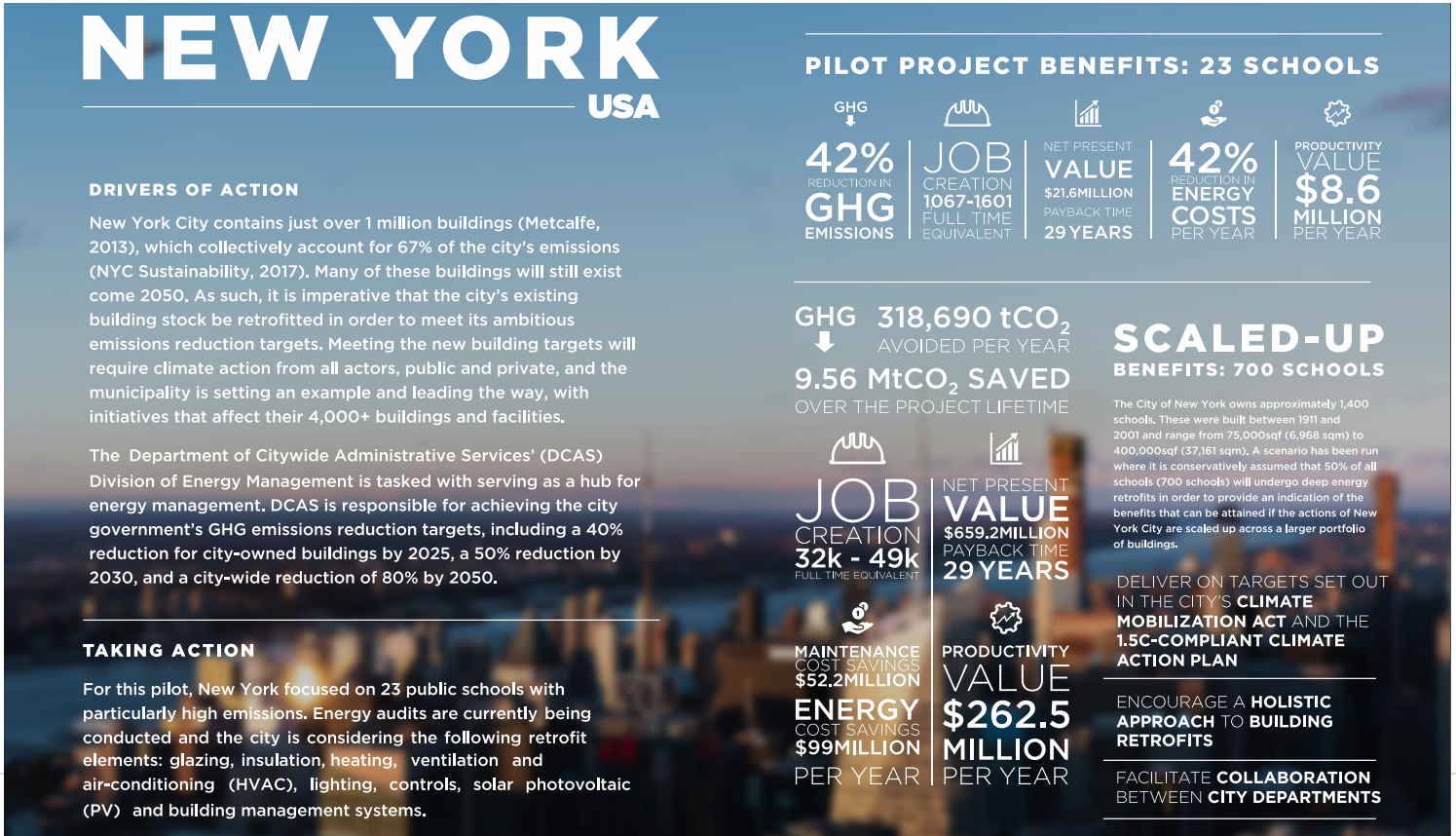
Economy

- **Economic performance** – sustainable new buildings create employment for sustainability services and reduce building operation costs, freeing up resources to invest in other parts of the economy.
- **Productivity** – sustainable new buildings can increase the productivity of students and employees through improved thermal comfort, lighting and acoustic comfort.
- **Asset value** – sustainable new buildings have strong asset values and flow on effects for nearby properties and investment attraction.

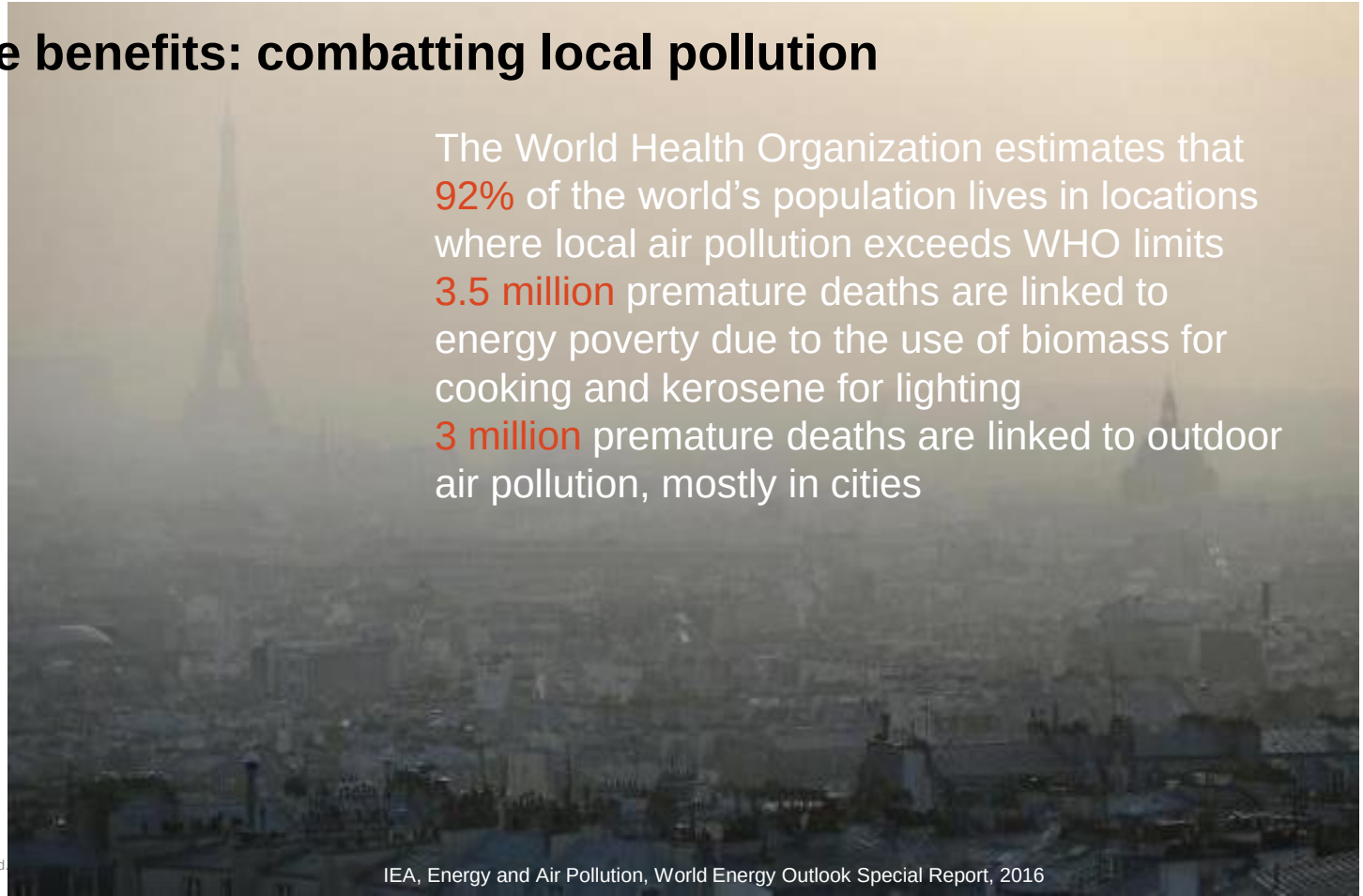
Society

- **Poverty alleviation** – sustainable new buildings reduce building operation costs.
- **Health and well-being** – sustainable new buildings deliver increased thermal comfort, light, noise and indoor air quality, improving physical and mental health and well-being.

Multiple benefits: Case example



Multiple benefits: combatting local pollution

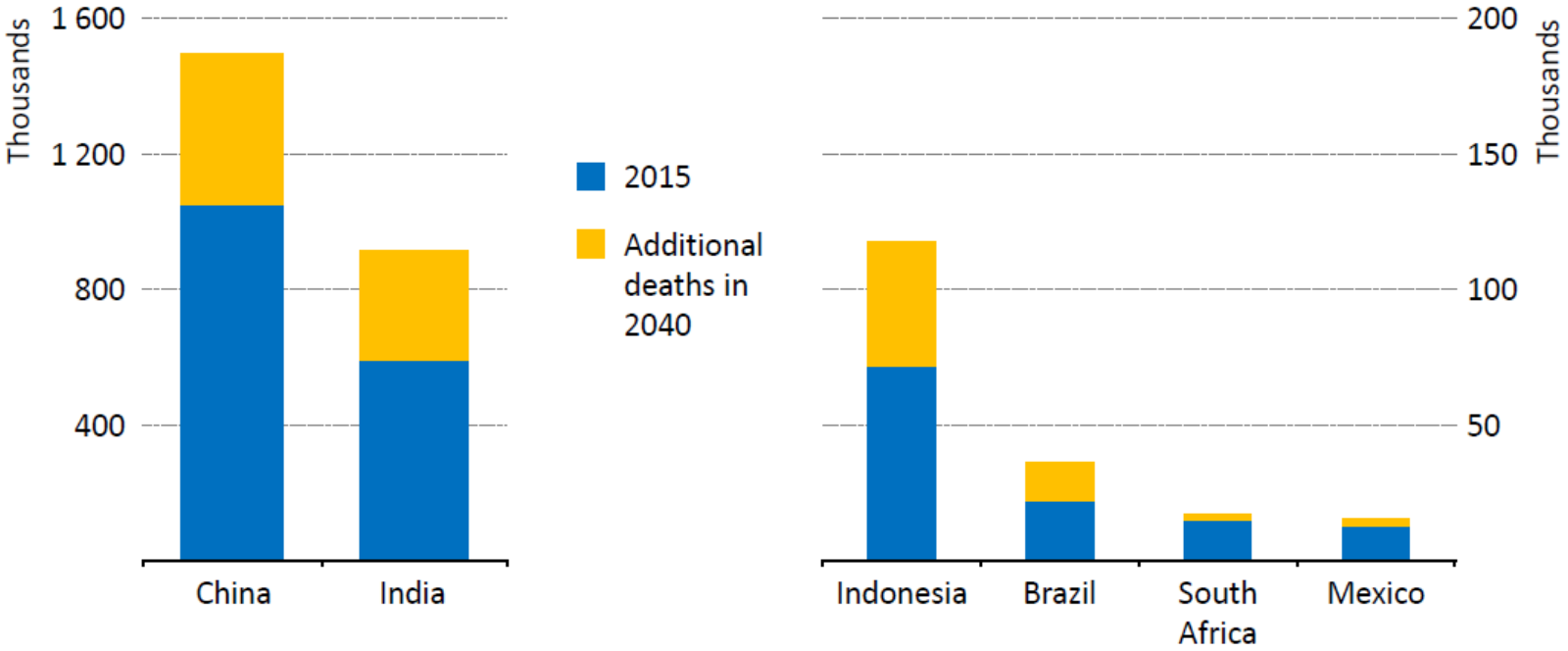


The World Health Organization estimates that 92% of the world's population lives in locations where local air pollution exceeds WHO limits
3.5 million premature deaths are linked to energy poverty due to the use of biomass for cooking and kerosene for lighting
3 million premature deaths are linked to outdoor air pollution, mostly in cities

IEA, Energy and Air Pollution, World Energy Outlook Special Report, 2016

Multiple benefits: combatting local pollution

Estimates of the premature deaths caused by outdoor air pollution in a group of G20 countries



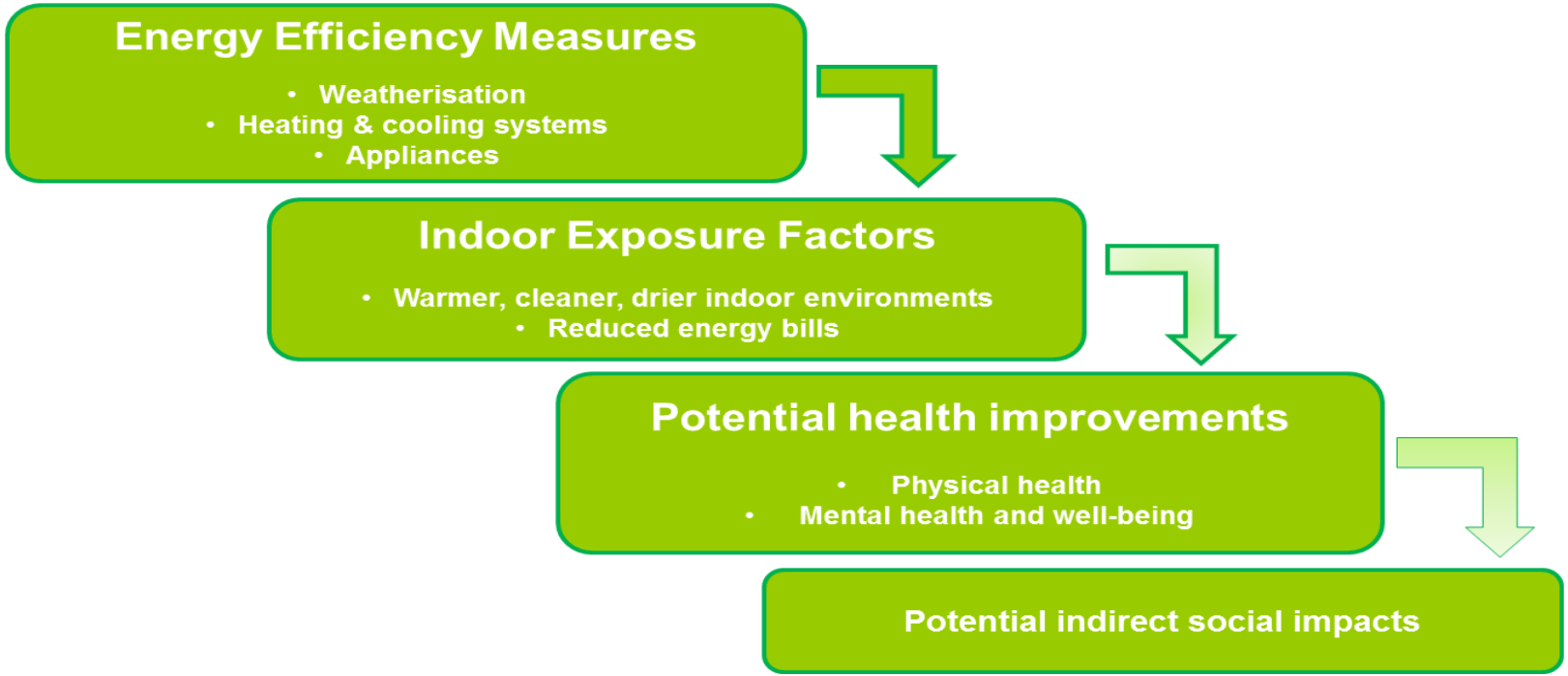
More efficient energy consumption reduces pollution-related deaths

Multiple benefits: productivity

Example from a public school in Mexico City where students' test scores showed ~20–26% improvement after installation of energy efficient lighting

Improved learning and test scores at schools

Multiple Benefits: health



Warmth as medicine example: Carefully executed energy efficiency can deliver significant annual cost savings for public health sector in many countries – particularly crucial during global health crisis

Latin America and the Caribbean: More than 65 million at high risk due to lack of access to cooling

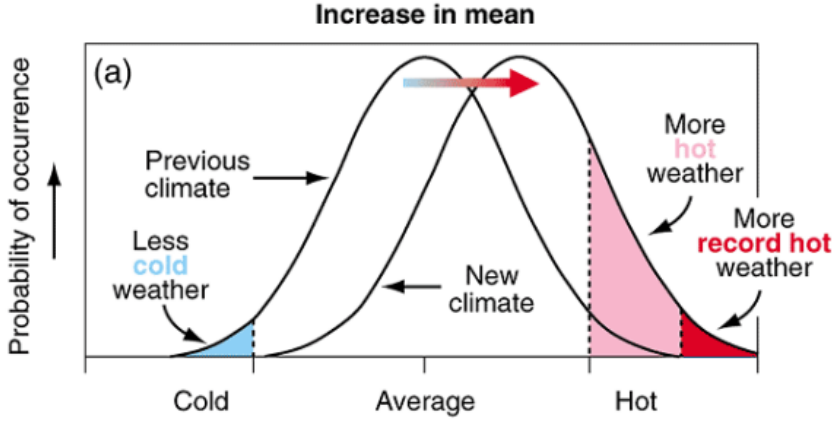
Source: SEforALL

WHO estimates on the health impacts of lack access to cooling:

- Heatwaves already kill an estimated 12,000 people annually across the world, related death toll is estimated to reach 260,000 by 2050
- Only around 8% of the 2.3 billion people living in hot climate zones have access to air conditioning
- 600 million people – almost 1 in 10 worldwide – fall ill after eating contaminated food and 420,000 die every year
- Nearly 25% of liquid vaccines are wasted each year primarily because of broken cold chains. An estimated 1.5 million people die each year from vaccine-preventable diseases

- Passive cooling strategies in buildings, including shading, white and green roofs, natural ventilation, etc. can reduce cooling load of buildings and increase indoor comfort
- Energy efficient cooling appliances reduce related electricity costs making thermal comfort, lighting comfort and food refrigeration more affordable

The effect on extreme temperatures when both the mean and variance increase for a normal distribution of temperature



Source: IPCC Third Assessment Report: Climate Change 2001. Working Group I: The Scientific Basis

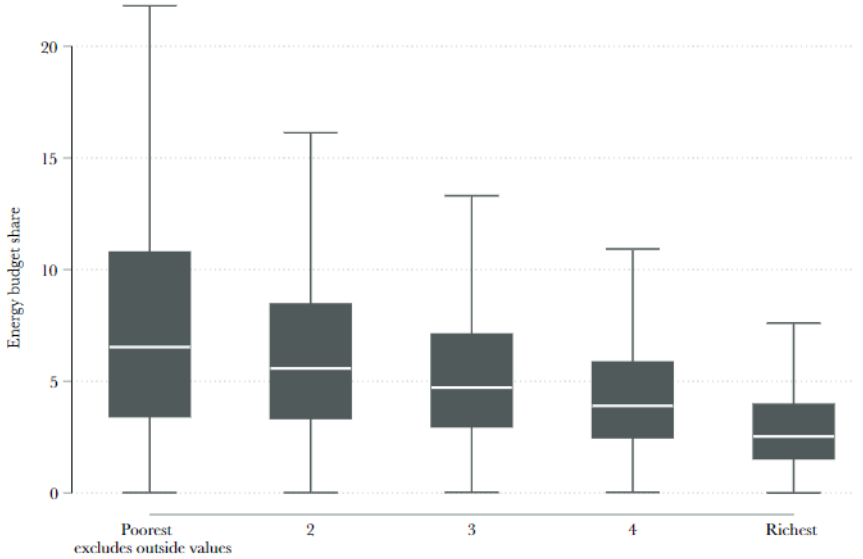
Multiple benefits: disposable income

Refrigerators are the most widely owned appliances among households in developed countries.
In developing countries, the ownership is still low. They have significant impacts on the energy bills of households, especially as they typically run and consume electricity all the time

Some super-efficient refrigerators are now being designed explicitly for off- and weak-grid settings to consume less energy, some as low as 0.1 kWh per day

Recent technology advancements and design improvements could cut fan energy consumption (and therefore related electricity spending) by 50%

Source: https://efficiencyforaccess.org/themes/access-to-cooling



Source: analysis based on harmonized collection of official household surveys from 13 Latin American countries. Energy budget includes: domestic fuels, electricity, gas, transport fuels, and others

Disposable income of the poorest population in Latin America is the disproportionally affected by lack of energy efficiency in buildings

Multiple benefits: economic development

In Mexico, replacing 1.6 million inefficient refrigerators led to…

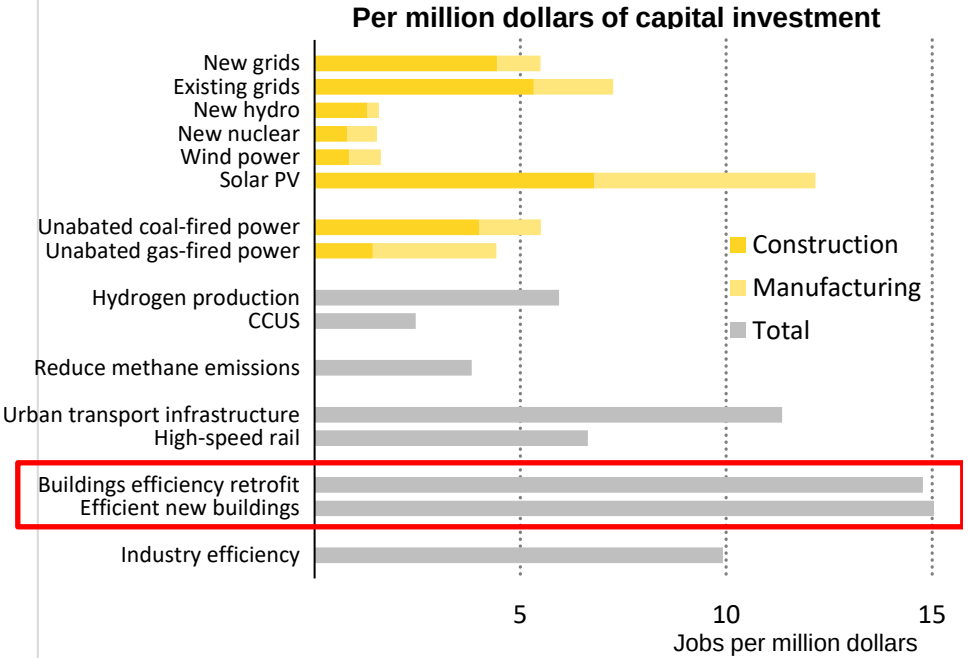
$22.4 million / year in avoided energy subsidies saved

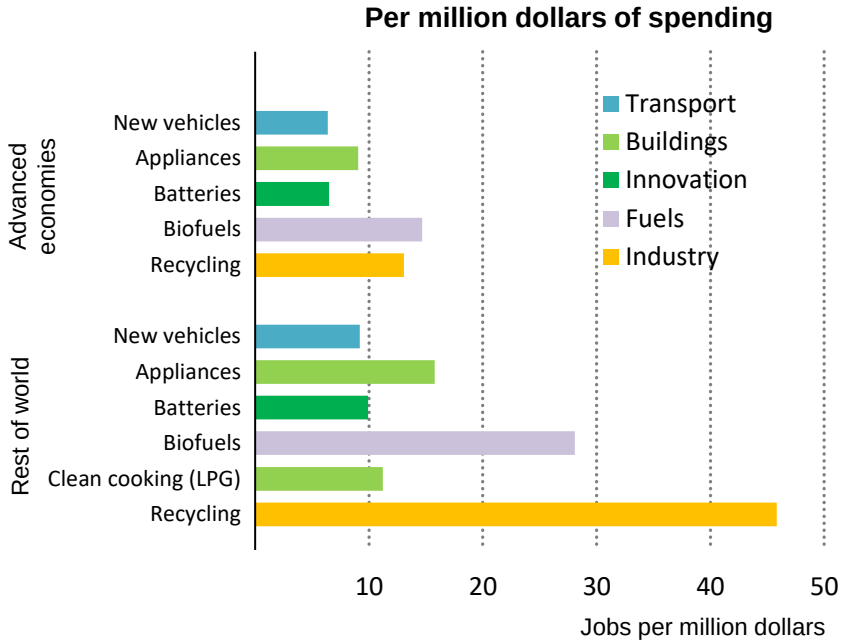
>1500 permanent jobs created in manufacturing and inefficient refrigerator destruction

$24.38 million in avoided energy use

Source: adapted from FIDE, presentation from 6 March 2018, Beyond energy savings: The Multiple Benefits of Mexico's Household Appliances Phase-out Scheme, https://www.iea.org/workshops/iea-multiple-benefits-workshop.html

Multiple benefits: job creation





Efficiency and solar PV create many jobs per unit of investment, with recycling and biofuels in developing and emerging markets. These align with other policymaker objectives for recovery.

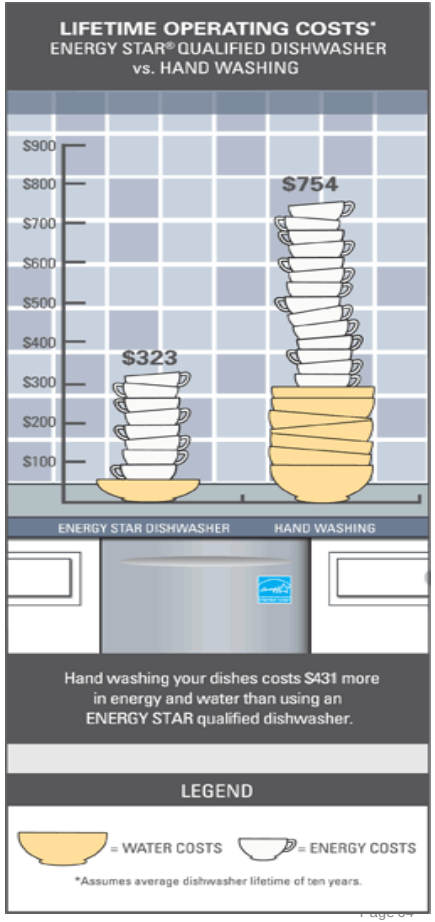
Sustainable Recovery Report, IEA, 2020

Multiple benefits: operations and maintenance

Energy efficient clothes and dishwashers can be better than hand washing…

Others Benefits:

- Reduction in electricity and water consumption
- Reduction in energy and time required for drying
- Extending clothes lifetime
- Higher capacity = saves time



Source: US EPA ENERGY STAR https://www.energystar.gov

Multiple benefits: safety

- At the building level, lighting and lighting controls can improve safety, increase security, improve the value of the building and reduce light pollution.
- Energy efficient equipment and system that comply with modern standards have reduced risk of fires and leaks

Example: Villa 31 in Buenos Aires

- **Increase the reliability of electrical systems**, reducing outages frequency and improving living conditions.
- **Existing electricity, water and gas connections will be set to standard**, reducing the possibility of accidents such as electrical fires or gas leakages;
- Substitution of older for more energy-efficient appliances (e.g. wood cooking stoves for electric ones).

Multiple benefits: energy security

A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas

International Energy Agency

Measures implemented this year could **bring down gas imports from Russia by over one-third,** with additional temporary options to deepen these cuts to **well over half while still lowering emissions.**

Action 1

No new gas supply contracts with Russia

Impact: Taking advantage of expiring long-term contracts with Russia will reduce the contractual minimum take-or-pay levels for Russian imports and enable greater diversity of supply.

Action 2

Replace Russian supplies with gas from alternative sources

Impact: Around 30 bcm in additional gas supply from non-Russian sources.

Action 3

Introduce minimum gas storage obligations to enhance market resilience

Impact: Enhances the resilience of the gas system, although higher injection requirements to refill storage in 2022 will add to gas demand and prop up gas prices.

Action 4

Accelerate the deployment of new wind and solar projects

Impact: An additional 35 TWh of generation from new renewable projects over the next year, over and above the already anticipated growth from these sources, bringing down gas use by 6 bcm.

Action 5

Maximise generation from existing dispatchable low-emissions sources: bioenergy and nuclear

Impact: An additional 70 TWh of power generation from existing dispatchable low emissions sources, reducing gas use for electricity by 13 bcm.

Action 6

Enact short-term measures to shelter vulnerable electricity consumers from high prices

Impact: Brings down energy bills for consumers even when natural gas prices remain high, making available up to EUR 200 billion to cushion impacts on vulnerable groups.

Action 7

Speed up the replacement of gas boilers with heat pumps

Impact: Reduces gas use for heating by an additional 2 bcm in one year.

Action 8

Accelerate energy efficiency improvements in buildings and industry

Impact: Reduces gas consumption for heat by close to an additional 2 bcm within a year, lowering energy bills, enhancing comfort and boosting industrial competitiveness.

Action 9

Encourage a temporary thermostat adjustment by consumers

Impact: Turning down the thermostat for buildings' heating by 1°C would reduce gas demand by some 10 bcm a year.

Action 10

Step up efforts to diversify and decarbonise sources of power system flexibility

Impact: A major near-term push on innovation can, over time, loosen the strong links between natural gas supply and Europe's electricity security. Real-time electricity price signals can unlock more flexible demand, in turn reducing expensive and gas-intensive peak supply needs.

Russian invasion of Ukraine put energy efficiency high on the energy security agenda due to high dependence of the EU on Russian oil and gas

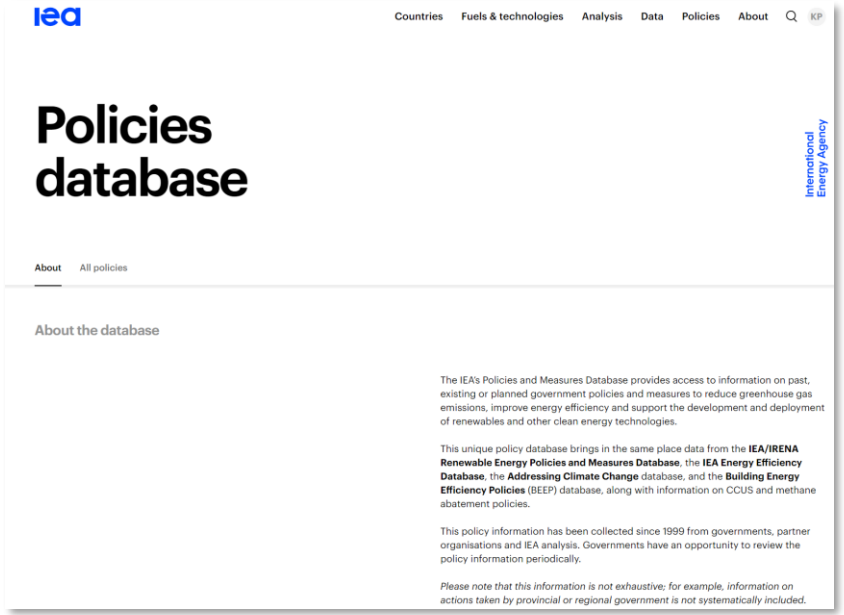
IEA published a 10-point plan with 3 out of 10 actions directly linked to energy efficiency improvements in buildings

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 2 – Implementing energy efficiency:
    - Lesson 1 - Energy efficiency policies
    - Lesson 2 - Target setting
    - Lesson 3 – Building codes and standards



https://www.iea.org/policies/about

Energy Efficiency Policy Training Week: Buildings – Day 3 – Self-study

International Energy Agency

Self-study activity

Question 1 – Written assignment

- Describe the policy package in your country (or country, region, or city you are familiar with) according to the provided template

Question 2 – Written assignment

- Describe strengths and weaknesses of this package, and provide recommendations for how it can be strengthened to support the transition of the building sector toward zero-carbon

Self-study activity

Question 3

- Which benefits do you think would motivate a household to invest in energy efficiency in your country?

Question 4

- Which benefits do you think would motivate a business to invest in energy efficiency?

Energy Efficiency Policy Training Week: Buildings – Day 3 – Breakout Session

International Energy Agency

Breakout group activity

- We will now be split into three groups:
- 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

Okay – now to your groups!

Energy Efficiency Policy Training Week: Buildings – Day 3 - Closing

International Energy Agency

Key learning points of Day 3

Regulation

Product standards | **Procurement regulation** | **Regulation on materials**

Framework regulations | **Building Energy Codes and Building Standards**

- Minimum energy and thermal performance requirements, requirements for renewable energy systems installation or utilisation, covering all building types, new and existing buildings.
- Mandatory minimum energy performance standards (MEPS) for all types of appliances and building systems that are progressively and regularly updated, etc.

Information

Certification | **Labelling** | **Disclosure & benchmarking** | **Training programs**

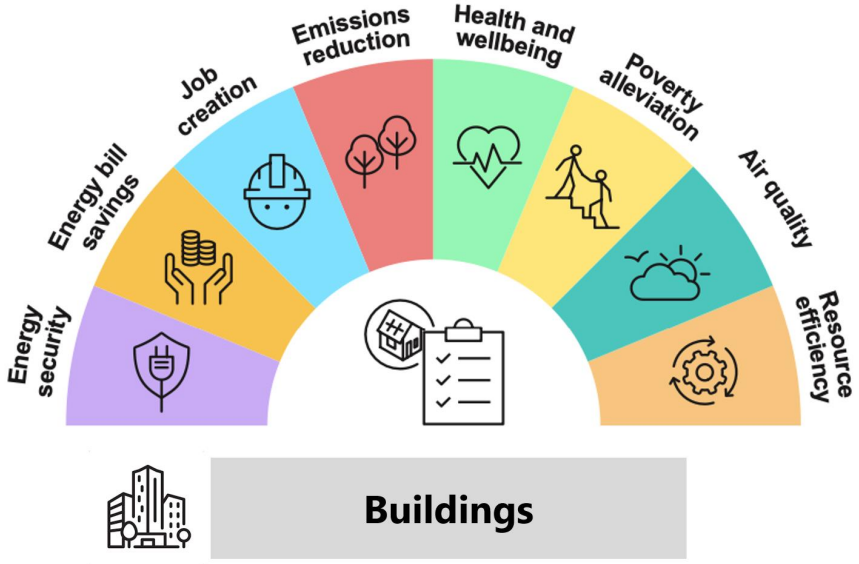
Education programs | **Awareness raising** | **Digital tools and data**

- Certification of energy and carbon performance for new and existing buildings; Mandatory rating labels, disclosure and benchmarking schemes for new and existing buildings based on energy and carbon performance.
- Mandatory labelling for appliances based on their energy efficiency
- Training on integrated policy portfolio and solutions for net zero carbon buildings; Accreditation systems for professionals; Awareness raising programs for consumers on benefits of net zero carbon buildings

Incentives

Financial incentives | **Non-financial incentives** | **Tariff policies**

- Grants, preferential loans, tax rebates, tied to energy and carbon performance levels of new or renovated buildings, building materials, systems, appliances, reflective energy pricing, etc.



Energy Efficiency Training Week: Day 3 Coursework

Buildings Training Activity:

Use Mentimeter.com and provide a few words on:

https://www.menti.com/izmgumsmf1

Results

Team starter activity

REMINDER: Buildings Training Session Assignment

By the end of **Day 3**, please take a photo of something in your home or place of work that you think most represents building energy efficiency!

Submit the photo here: Google Form Link

Energy Efficiency Training Week: Day 3 Learning Objectives

Key Learning Objectives:

- Understanding different types of policies and regulations for enabling energy efficient buildings
- Understanding integrated policy development approaches and stakeholder engagement
- Understanding multiple benefits of energy efficiency improvements in buildings