BỘ XÂY DỰNG

Project on Energy Efficiency Improvement in Commercial and High-Rise Residential Buildings in Viet Nam

Towards Nearly Zero Energy buildings

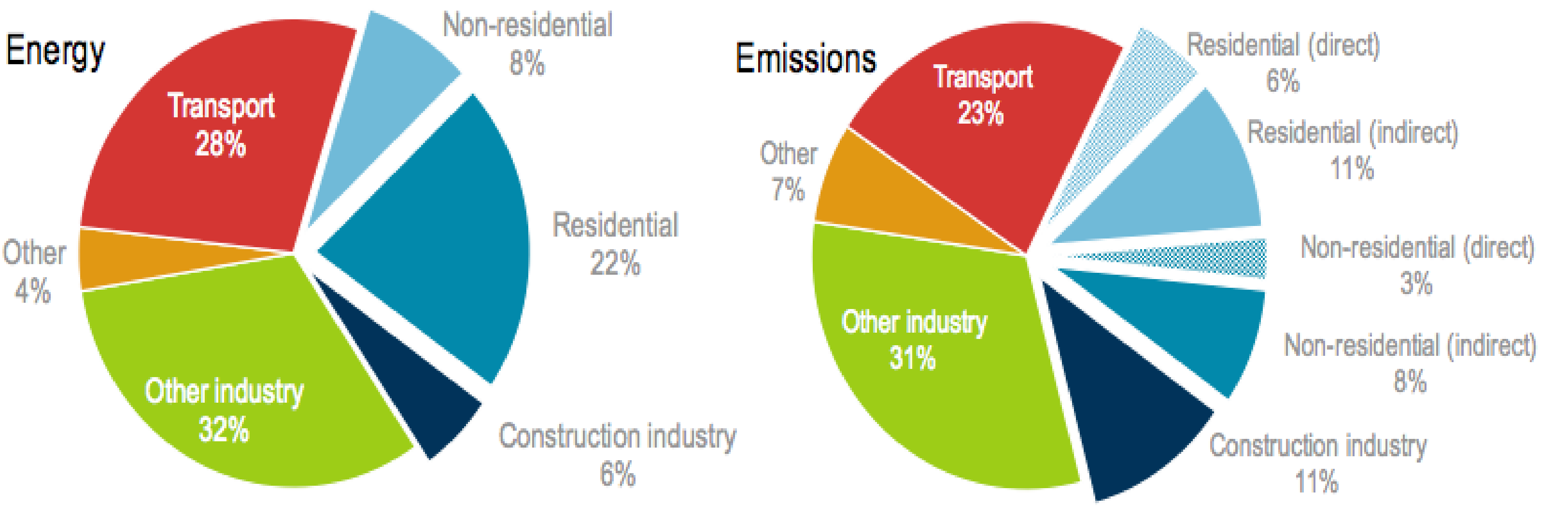
22 October 2020

Main Content

- Context
- Definition and Key principles
- Challenges
- Roadmap and stakeholders' respective role

General Context

Global share of buildings and construction in final energy and emissions



Cities are responsible for 70% of energy consumption and GHG emissions

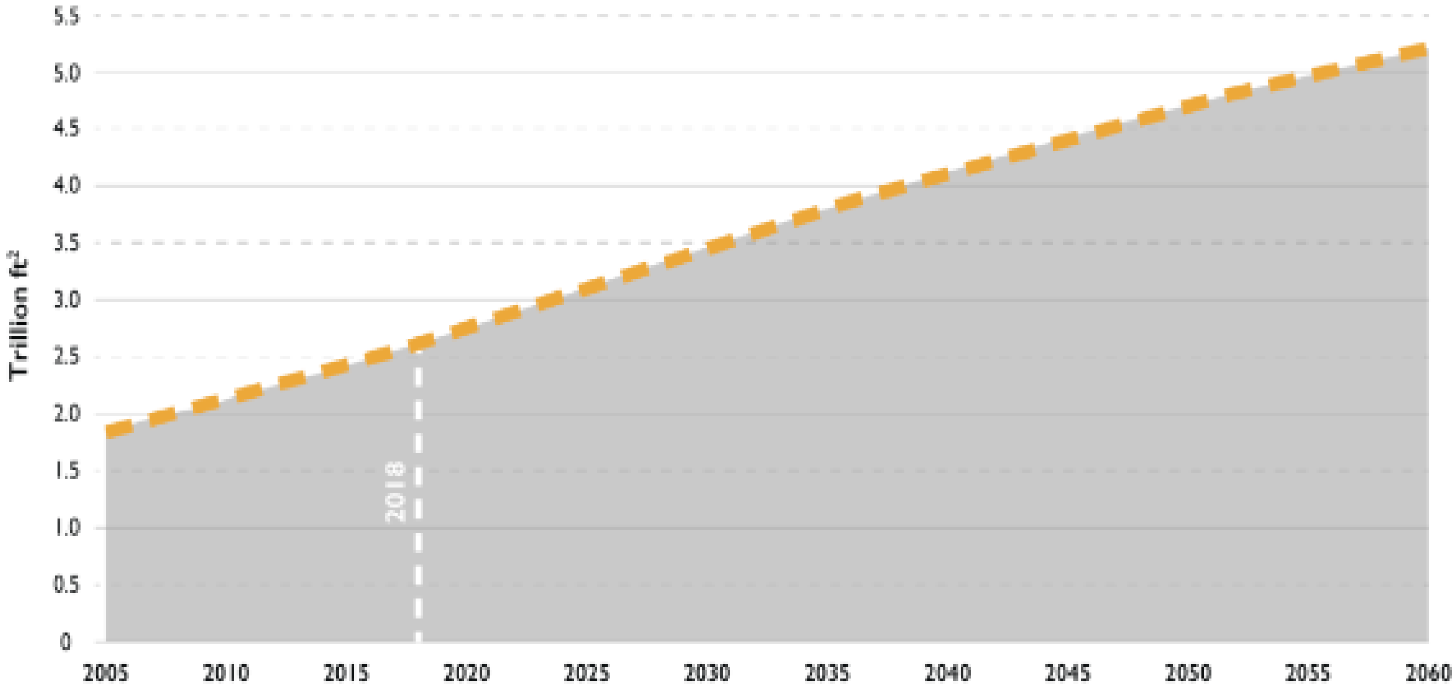
Buildings consume 30% of final energy and emit 28% of GHG

Source: Architecture 2030

General Context

Booming urbanization. Building stock to double by 2060!

Every 5 days, a surface equivalent of Paris is added to the world existing floor area.



Global Floor Area Growth

Source: Architecture 2030

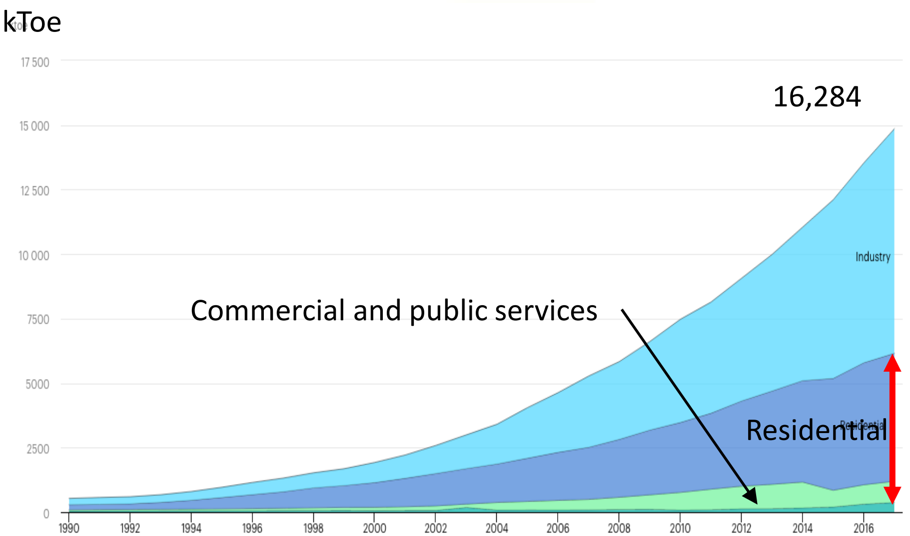
Vietnam context

General figure of the Vietnamese Construction industry in 2019

(Source: vietnamconstruction.vn)

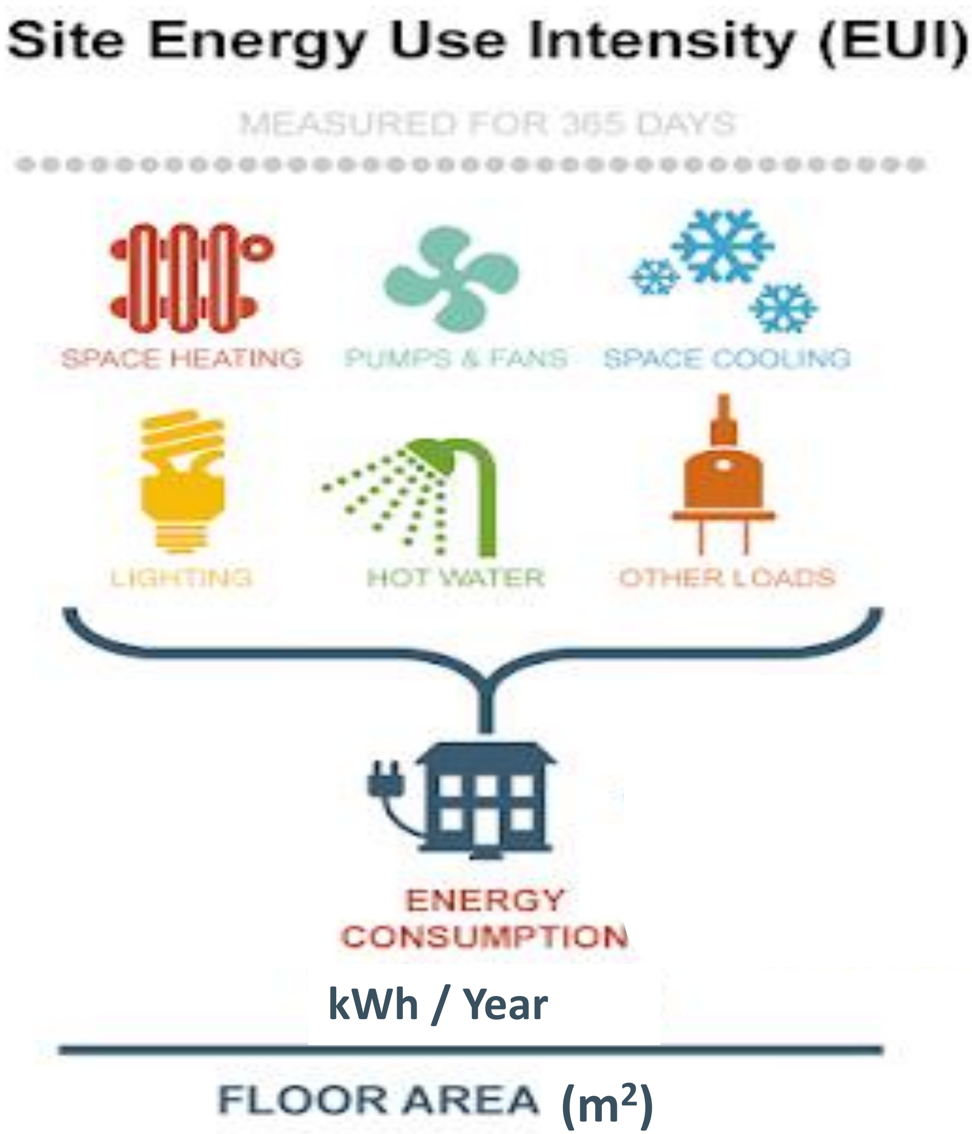
- Total Final Energy Consumption (TFEC) (households, industry and agriculture) increased by ~4% p.a. during 2007-2017.

- Electricity consumption of Residential, Commercial and public services sectors represent 38% of total.



(Source: IEA)

Definition: EUI



Expressed by a ratio between:

- the **energy consumption** over one year (kWh/year)
- Over the **Floor Area** (m^2)

Specific to:

- building types
- climate and location.

Key principles

1.
Net-zero
Energy

Terminology

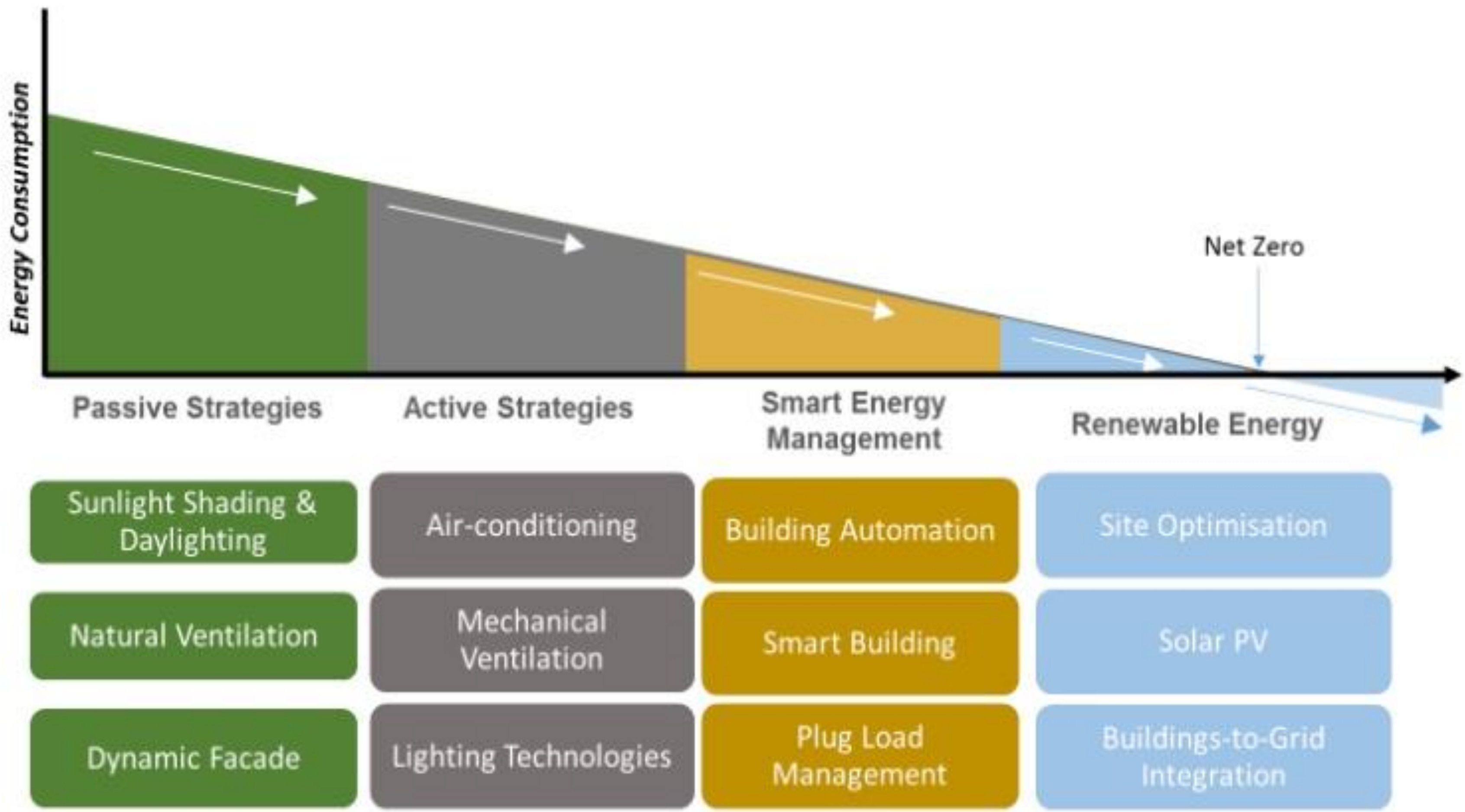
Nearly Zero Energy

- Annual energy demand partially met through on-site RE sources, but still require connection to the grid .

Source: World Green Building Council

Design Principles

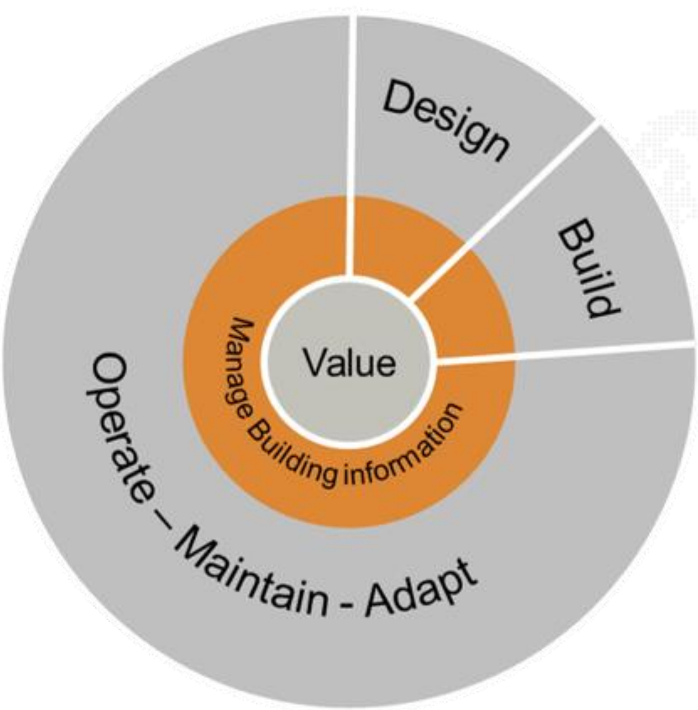
Energy Reduction Strategy: **Brainpower rather than Technology!**



Source: BCA Singapore

Involved stakeholders

Building Life Cycle Management



Government

Design stage

- Developers
- Architects
- Design Engineers
- QS

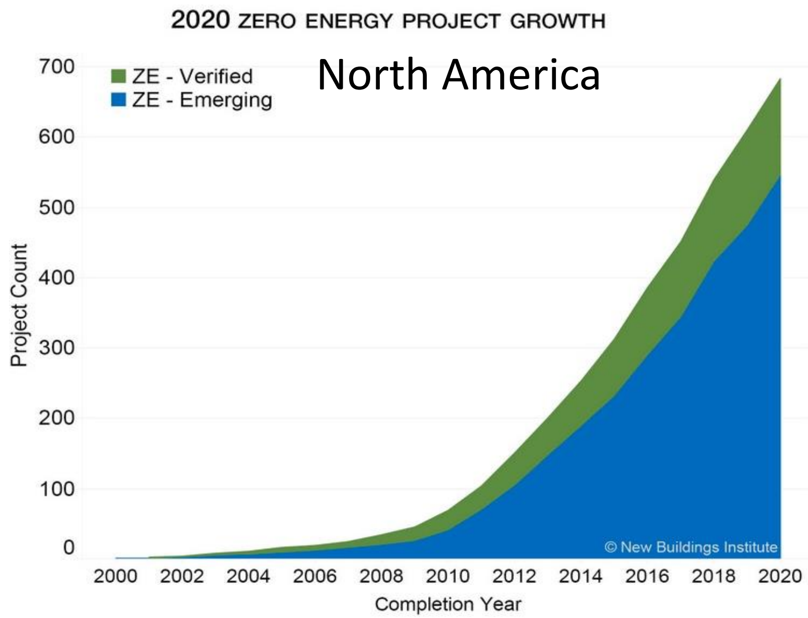
Construction stage

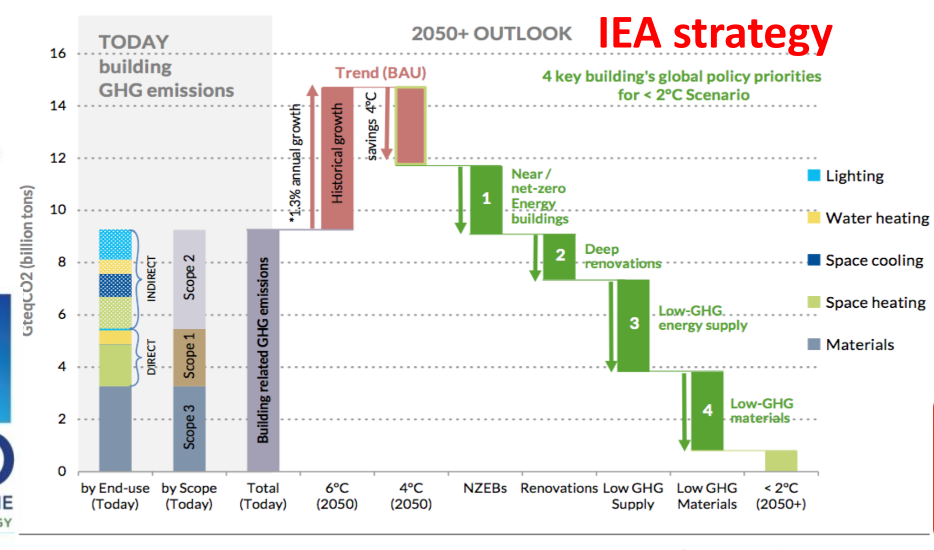
- Developers
- Designers
- Builders
- Equipment / material Suppliers
- PM / CM / QS
- Commissioners

Operations

- Building owner /developer
- Building manager
- Maintenance
- Building users
- ESCO

Current development





Examples of NZEBs

Elithis Nearly ZEB office tower

"We didn't draw the building; we wrote it down for the architect."

"Energy savings are driven by brainpower rather than by technology."

Thierry Bievre, CEO Elithis

- 5000 m2 of office space
- Operational since 2009 in Dijon, France
- Design and construction cost: 1600 €/m2
- R.E.: 560 m^2 PV, wood boiler
- Primary energy consumption < 11 kWh_{PE}/m^2 /y, and 39 kWh_{FE}/m^2 /y

Elithis Danube, positive energy residential tower

- 6300 m2, 16 stories, 67 units, France
- Operational since 2018, in Strasbourg
- Design & construction cost= 1409 €/m2
- R.E.: 1220 m^2 PV, dist. biomass boiler
- Energy consumption : -11 $kWh_{PE}/m^2/y$ (RE covers 110% of annual demand)
- Zero energy bills for residents

Challenges

Outreach

- Severe lack of awareness of costs and benefits from average consumers,
- Lack of demonstration projects

Governance

- Need for long term budget commitment, lack of clarity in its role an responsibilities
- Lack of financial and fiscal incentives

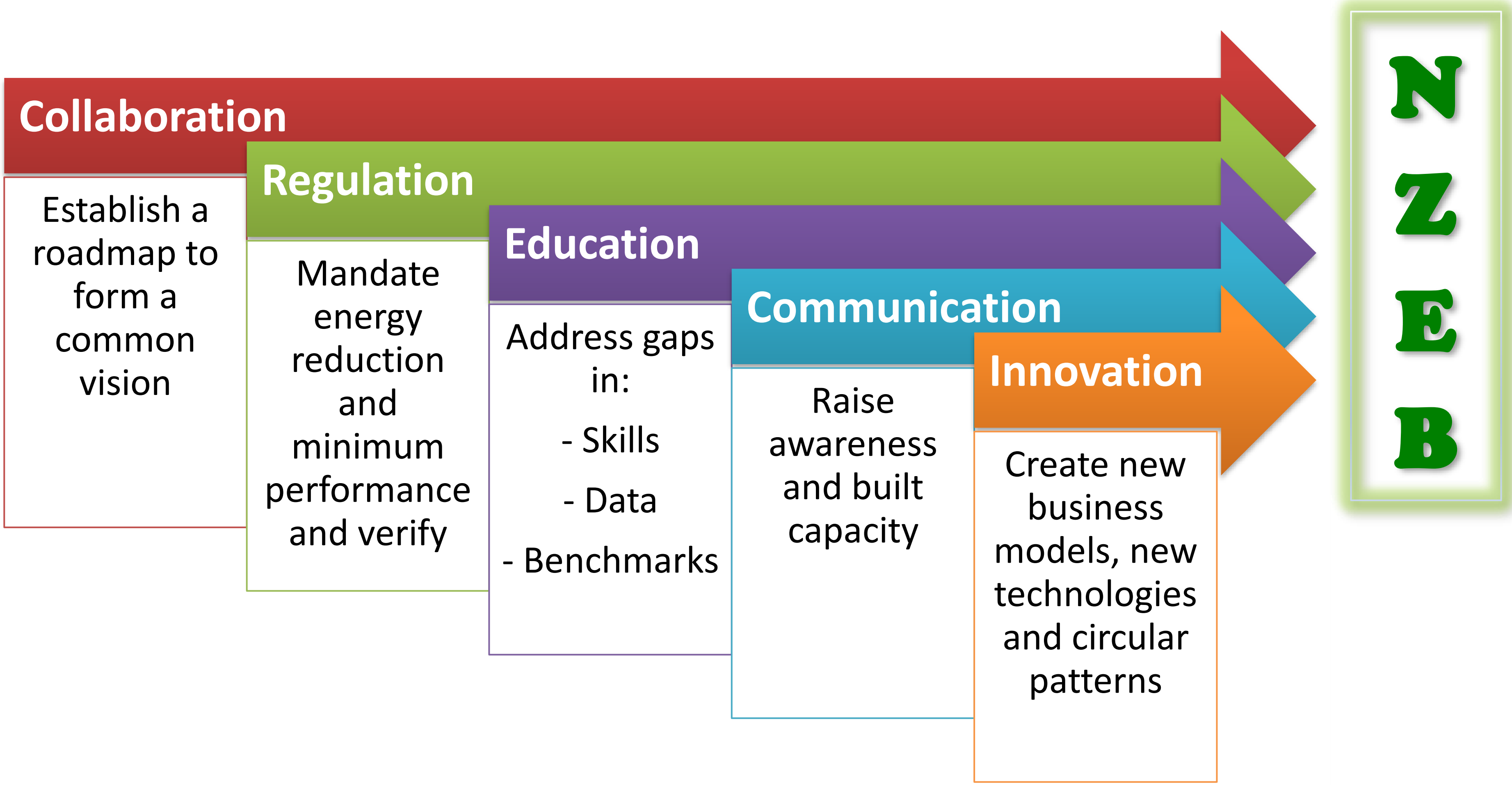
Costs

- High perceived costs
- Few available (or not shared) costs
- High consultancy fees due to limited actors on market
- Cost to be borne by building owners, benefits accrued to tenants in terms of energy costs

Challenges

Lack of Human Resources	• Few architects, technical experts and builders have sufficient knowledge and expertise
Technical	• Need to mainstream Integrated Energy Design practices • Limited space for PV on roof top • Plug load and cooling loads tend to be over-designed • Not feasible for some renovation projects
Behaviour	• Challenge for all stakeholders to coordinate and colaborate • Drastic behaviour changes are needed to ensure EE operations
Regional difference	• Developing world most concerned by energy use increase • Developed countries more concerned by retrofitting, • Need to address both urban and rural areas

NZEB development Roadmap



Government's role

General policy

- Set a long-term target of ZEB dissemination to provide a shared vision among diverse stakeholders and market certainty
- Streamline the policy-making process with a clear division of roles and responsibilities among relevant ministries.
- Create demand for ZEB and lead by example through public procurement policy
- Mandate utilities to offer prices that reward owners/tenant
- Lead the development of expertise required to achieve ZEB
- Incorporate ZEB into urban planning in achieving community-based energy efficiency at municipal level

Raising awareness

- Provide information to consumers about benefits of ZEB and available support mechanisms, as well as about existing schemes
  - Mandate appliance and building providers to disclose the energy performances of products to consumers
  - Promote energy-efficient behavioral change

Provide incentives

- Provide financial support for demonstration projects
- Provide financial / fiscal incentives for new buildings, retrofitting of existing buildings, to train employees
- Promote R&D in the private sector and academia through financial and fiscal incentives

Codes

- Set mandatory EE building codes with labelling system and strengthen these codes over time.
- Create methodologies for evaluation, measurement and verification of the energy performance of ZEB
- Set mandatory EE standards for appliance and establish test facilities

Source: zero energy building/ home roadmap - technology and institution report– institute of Applied Energy

Other actors' role

Utilities

- Measure and quantify the positive impact of ZEB on the electric grid.
- Provide pricing that rewards ZEB owners/tenants
- Provide consumers with energy performance data to stimulate EE behavior.

Developers

- Conduct R&D for ZEB and the relevant technology
- Incorporate energy efficiency from the design stage.
- Conduct trial/ demonstration projects and participate in voluntary certification / labelling programs.
- Measure and quantify the benefits through lifecycle assessments.
- Disclose energy performance of buildings to the owners and tenants
- Raise awareness of customers about benefits of ZEB and promote EE behavioral change
- Train employees and engineers for implementation and operation of ZEB

Finance

- Provide financing to ZEB developments
- Consider the lifecycle costs of ZEB when assessing provision of loans

Source: zero energy building/ home roadmap - technology and institution report– institute of Applied Energy

Other actors' role

Academia

- Conduct research on advanced and more affordable technologies
- Participate in demonstration projects as experts
- Provide expertise in evaluation of ZEB and standardization
- Monitor and assess actions by government and business and make recommendations
- Educate students, Outreach citizens and engineers

Civil Society

For Non-Profit Organizations

- Lead voluntary efforts to improve energy efficiency through certification of ZEB
- Lead communication among stakeholders, assess efforts and make recommendations
- Outreach citizens regarding the benefits of ZEB and EE behavior

For Citizens

- Create a culture of energy efficiency
- Gain knowledge of ZEB through participation in education and information campaigns
- Incorporate EE behavior into every aspect of their lifestyle.

For Building Owners and Tenants

- Communicate with each other regarding energy-efficient construction projects.

Source: zero energy building/ home roadmap - technology and institution report– institute of Applied Energy

What about Vietnam?

As a first priority:

Government to lead by example:

- Form inter-ministerial committees to coordinate complementary actions
- Establish a NZEB competence / training centers and national build capacity.
- Strengthen EE codes by mandating energy performance

- Select and implements a national Energy Monitoring and Verification system
- Implement EE labelling and certification systems
- Define Incentive schemes.
- Develop ZEB demonstration buildings

From micro to macro level ->

ZEBs set to become key elements of smart cities!

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THANK YOU FOR YOUR ATTENTION!