



# Special session:

## The multiple benefits of energy efficiency

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Buildings

*Buildings energy  
efficiency sessions  
in partnership with:*



**INDO-SWISS BUILDING  
ENERGY EFFICIENCY PROJECT**



**WORLD  
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# Energy Efficiency Training Week: Buildings Program

1. **Where to start:** Energy use in buildings
2. **Where to start:** Energy efficiency potential in buildings
3. **Toolkit:** Energy efficient building design
4. **Toolkit:** Energy efficient building technologies  
**Where do I get help?** IEA's Technology Collaboration Programmes
5. **Toolkit:** Energy efficiency policies and target setting
6. **What are the steps?** Enabling investment with energy efficiency policies
7. **What are the steps?** Implementing building energy codes and standards
8. **What are the steps?** Building operations and procurement

**Special session.** The multiple benefits of energy efficiency

9. **Did it work?** Evaluation and energy efficiency indicators  
**Where do I get help?** International and regional energy efficiency initiatives
10. **Energy efficiency quiz:** Understanding energy efficiency in buildings

## Special session: The multiple benefits of energy efficiency

**Trainers:** Brian Dean

**Purpose:** To teach the fundamentals of how to evaluate both energy and non-energy benefits (the multiple benefits) of energy efficiency for buildings. This session will examine how to evaluate the monetised value of energy efficiency measures using numerous categories for multiple benefits.

# Multiple Benefits of Energy Efficiency

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The publication

Energy Efficient Prosperity



# Multiple Benefits of Energy Efficiency

## International

- Energy price reduction
- Greenhouse gas emissions reduction

## National

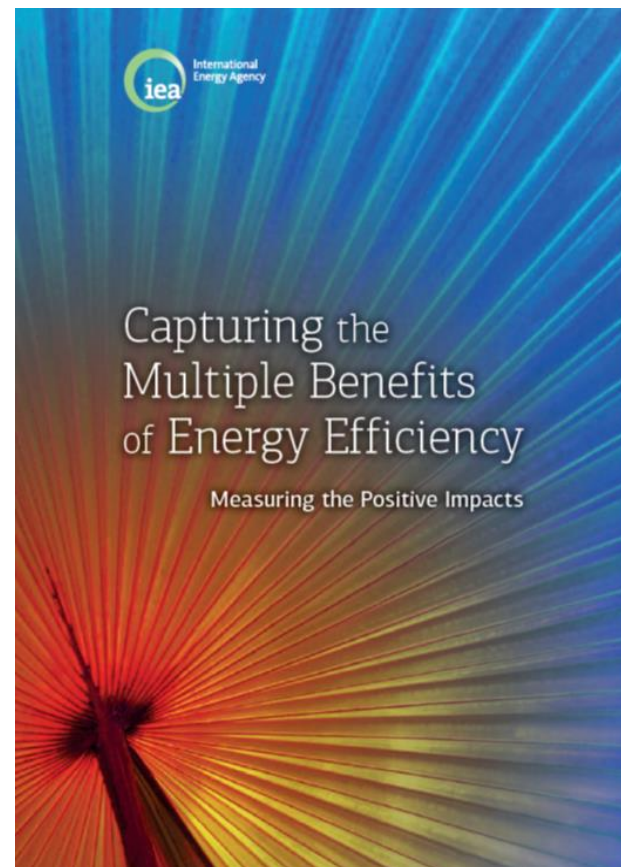
- Reduced energy demand and local price reduction
- Reduced public health spending
- Energy security
- Potential net increase in employment

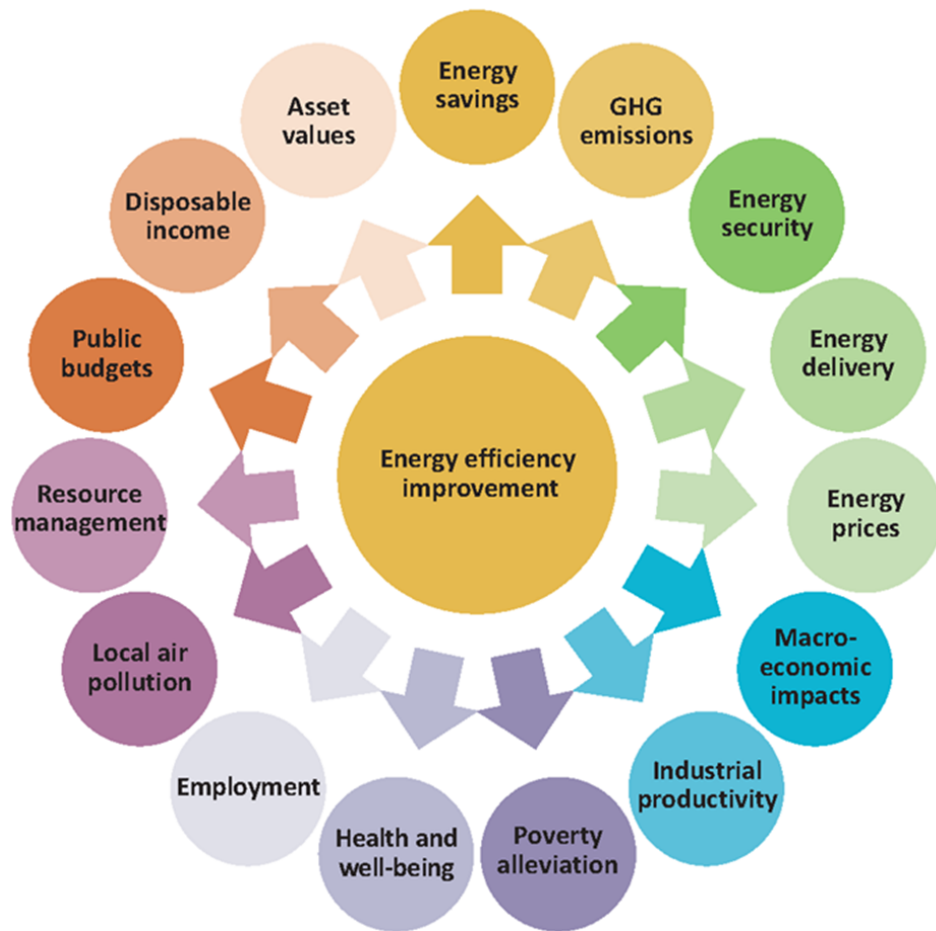
## Sectoral

- 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





## *Energy Efficient Prosperity*

Energy efficiency as  
a means to support  
economic and social  
development.

# The benefits by perspective

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Owner and occupant

Societal / macroeconomic

City and national / public budgets

Industry / energy provider



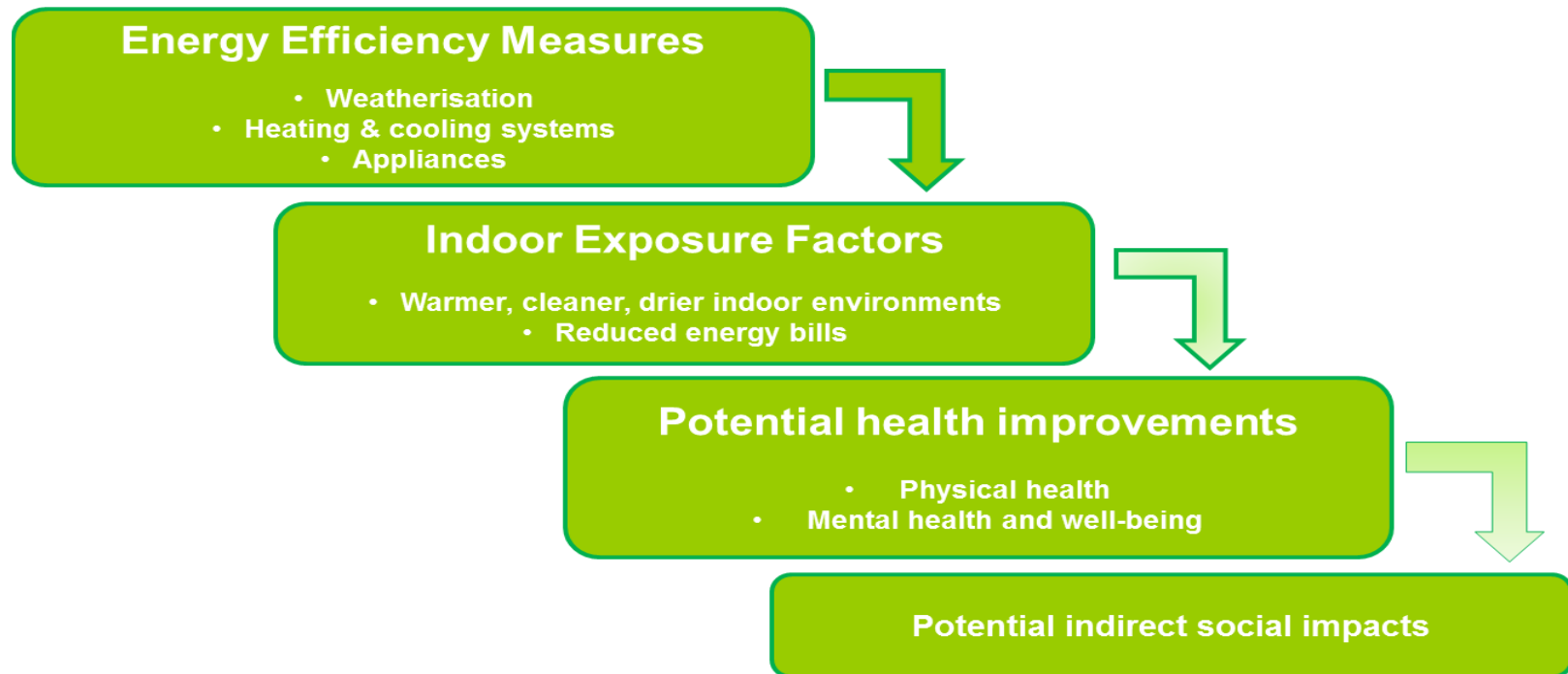
# Multiple Benefits of Energy Efficiency: owner and occupant perspective

<b>Comfort</b>	Improved lighting comfort, thermal comfort and noise comfort
<b>Health</b>	Improved physical and mental health from indoor air quality and comfort.
<b>Operations and maintenance</b>	Improved building and systems durability with reduced need for maintenance.
<b>Safety</b>	Improved safety through lighting, controls and reduced chance of fire from gas leaks.
<b>Property Value</b>	Increased rental income, reduced tenant turnover, increased habitable floor area.

**Benefits for owners:** increased quality & property value

**Benefits for occupants:** increased health, comfort, safety and affordability





**Example: Carefully executed energy efficiency can deliver USD 99 billion in annual savings for Europe's public health sector by 2020**

# Multiple Benefits of Energy Efficiency: lighting

*Poor visibility*



*More energy use*

*Better light quality*



*Less energy use*

**Improved lighting has improved safety in Nova Scotia, Canada**

## Based on existing studies and best estimates:

- **Increased** lighting levels by **up to double** has limited effect – best estimate 5% reduction but not statistically significant
- **Increased** lighting levels **two and five times** the original level – number of accidents occurring in the dark is reduced by 10%
- **Increased** lighting levels **by more than five times** the original level, the effect on accidents is as great as when an unlit road is lit, reduction in the number of accidents involving personal injury in the dark of around 30%

**At the building level, lighting can improve safety, increase security and improve the value of the building.**

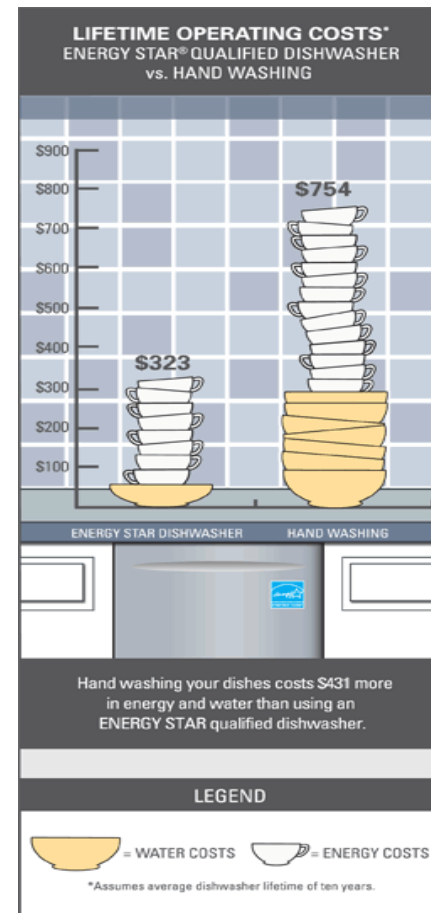
**Lighting controls and sensors can further increase security while reducing energy use and light pollution**

# Multiple Benefits of Energy Efficiency: washing equipment

**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



# Multiple Benefits of Energy Efficiency: to occupants

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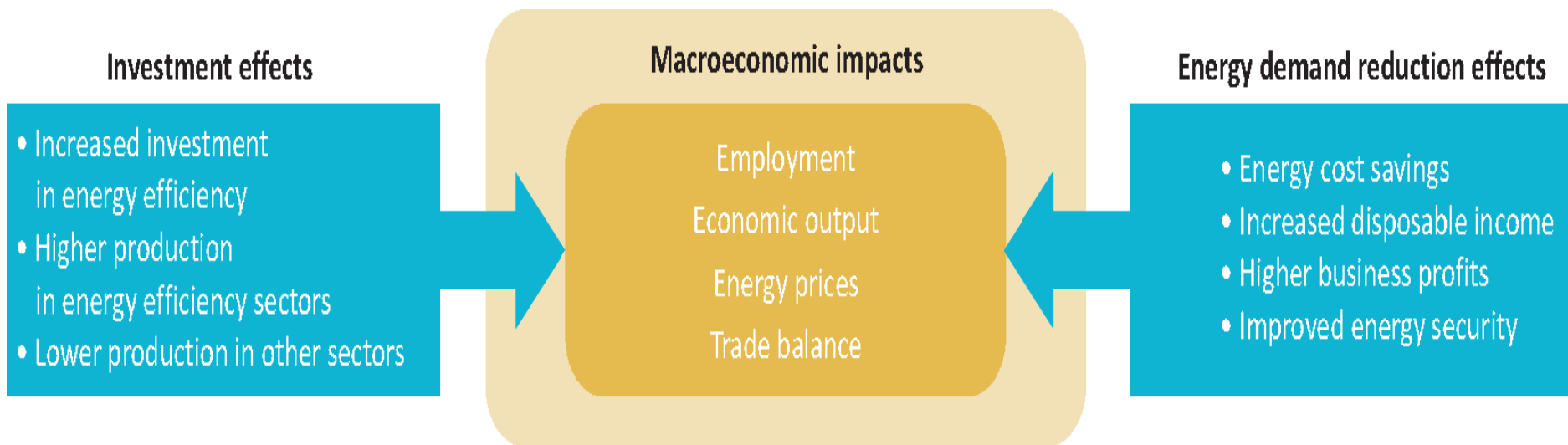
- **labor productivity:** increase by 6–16%
- **students' test scores:** shows ~20–26% faster learning
- **Influenza and cold rates:** can decrease by as much as 20%, resulting in a USD10 bln/yr savings in US alone
  - reduced respiratory disease;
  - reduced allergies and asthma;
  - reduced sick building syndrome;
  - direct improvements in worker performance unrelated to health
- **Employment (local job creation):** Danish trade union study finds 100% increase in employment intensity than for other mitigation options

# Multiple Benefits of Energy Efficiency: societal perspective

<b>Jobs</b>	Shifting from global to local jobs and from polluting to green jobs
<b>Economic</b>	Investment that provides economic benefit for many years.
<b>Emissions</b>	Reduced direct and indirect emissions from efficiency, refrigerants and reduced product size / quantity.
<b>Energy</b>	Energy use benefit from improved efficiency and reduced embodied energy from increased durability
<b>Environmental</b>	Air pollution, solid waste, wastewater, and reduced input materials

**Benefits:** broader benefits that last for many years.

# Multiple Benefits of Energy Efficiency: macroeconomic impacts



**Moving away from the traditional view that economic performance is always linked to increased energy consumption – the reverse can also be true!**

# Multiple Benefits of Energy Efficiency: cities and national perspective

<b>Energy access</b>	Expand access to supply power to more people through the existing energy infrastructure.
<b>Economic development</b>	Supporting economic growth including through industrial productivity and reducing fuel import bills.
<b>Poverty alleviation</b>	Increasing the affordability by reducing the per-unit cost of lighting, heating, refrigeration, etc.
<b>Combatting local pollution</b>	Reducing direct and indirect emissions through energy efficiency on supply side and demand side.
<b>Climate change resilience</b>	Reducing vulnerable energy infrastructure and improving the durability of buildings.

**Benefits for cities and nations:** supporting key government goals



# Multiple Benefits of Energy Efficiency: impacts on public budgets

**Sales tax revenue from sales of energy efficient products and services**

Income



**Sales tax revenue from other goods when crowded out by energy efficiency**

Income



**Initial costs of public investment in energy efficiency products and services**

Expense



**Expenditures on health, social welfare and unemployment benefits**

Expense



**Revenues from real estate transactions if properties become more valuable**

Income



**Energy efficiency can be both a expense and income for public budgets**

# Multiple Benefits of Energy Efficiency: impacts on public budgets

**Expenditures on public sector energy consumption**

Expense



**Energy subsidies to final consumers**

Expense



**Energy excise duty, emissions trading, and carbon tax revenues**

Income



**Sales and income tax revenues from sales of goods and services**

Income



**Public investment in energy supply infrastructure and subsidies**

Expense



**Energy efficiency can be both a expense and income for public budgets**

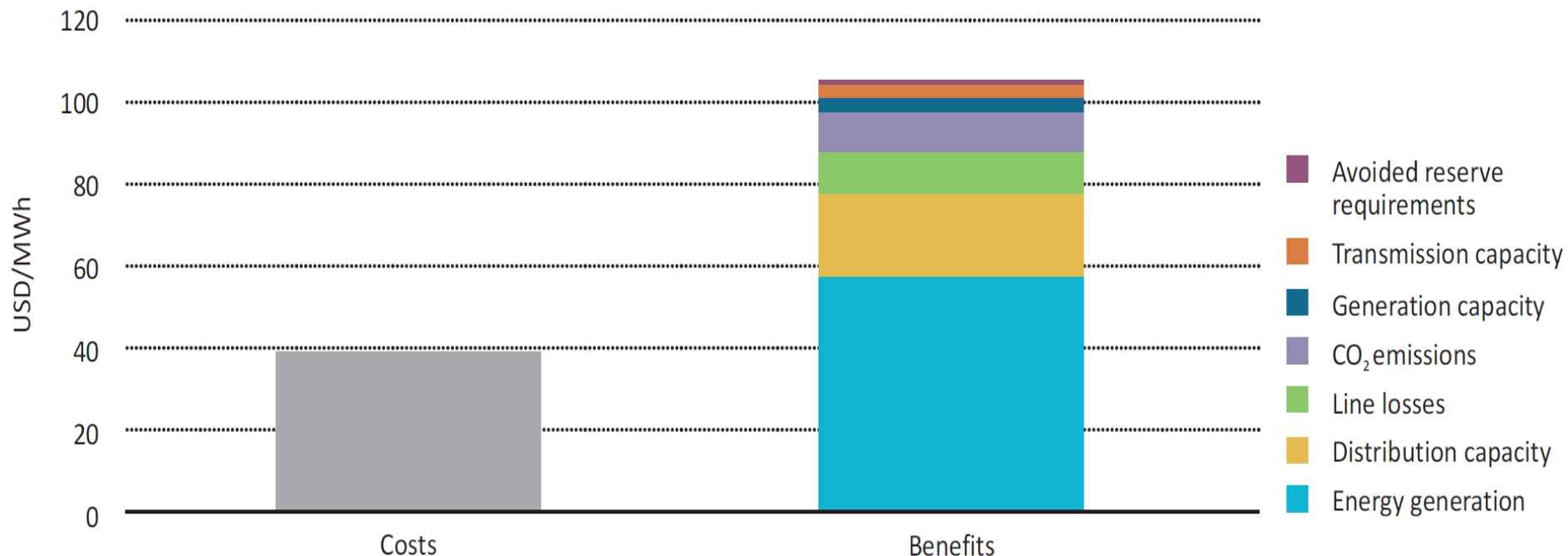
# Multiple Benefits of Energy Efficiency: industry perspective

<b>Competitiveness</b>	Ability to enter new markets, reduced production costs, etc.
<b>Production</b>	Capacity utilisation, improved product quality, etc.
<b>Operations and maintenance</b>	Improved industrial and commercial operation; reduced need for maintenance, etc.
<b>Working environment</b>	Site environmental quality, worker health and safety, etc.
<b>Environment</b>	Air pollution, solid waste, wastewater, reduced input materials, etc.

**Benefits for industry:** increased productivity & value creation

**Benefits for consumers/indirect benefits for industry:** increased affordability and access to products and services

# Multiple Benefits of Energy Efficiency: energy provider perspective



**Benefits for utilities:** cost and operational benefits in a resource constrained operating context  
**Benefits for consumers/indirect benefits for utilities:** increased affordability reduces customer default

## Scenario:

You understand that there are more benefits to energy efficiency beyond just the energy savings.

*How do you determine the benefits of your policies and programmes?*



[www.iea.org](http://www.iea.org)

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