



Toolkit: Multiple Benefits of EE in buildings

Buildings: Maxine Jordan, IEA and Ian Hamilton, UCL Energy Institute

Pretoria, Wednesday 16th October 2019

Buildings energy efficiency sessions in partnership with:

UCL ENERGY
INSTITUTE



Energy Efficiency Training Week: Buildings programme

1. Where to start: Energy use in buildings
2. Where to start: Energy efficiency potential in buildings
Special session: GlobalABC Regional Roadmaps
3. Toolkit: Energy efficient building design technologies
4. Toolkit: Energy efficient building system technologies
Special session: Green Building in Africa – *Elizabeth Chege, KGBS*
Special session: The GlobalABC Africa Roadmap for buildings and construction
5. What are the steps? Determining the current status of policies
6. Toolkit: Energy efficiency policies and target setting *with guest speaker: Hlompho Vivian, GBC SA*
7. What are the steps? Implementing codes and standards
8. What are the steps? Building operations and procurement *with guest speaker: Christelle Van Vuuren, Carbon Trust*
Special session: The multiple benefits of energy efficiency
9. Did it work? Evaluation and energy efficiency indicators
Special session: Financing energy efficiency in buildings
10. Buildings quiz

Energy Efficiency Training Week: Buildings

Special session: The multiple benefits of energy efficiency

Trainers: Maxine Jordan and Ian Hamilton

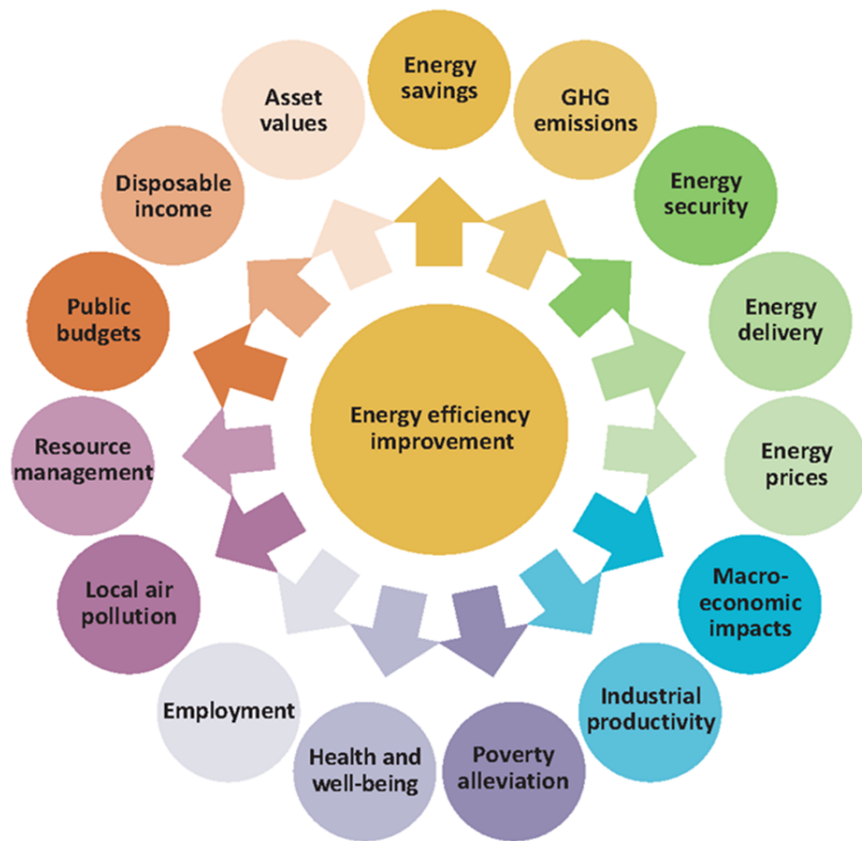
Purpose: To teach the fundamentals of how to evaluate both energy and non-energy benefits (the multiple benefits) of energy efficiency for buildings. This session will examine how to evaluate the monetised value of energy efficiency measures using numerous categories for multiple benefits.

Multiple Benefits of Energy Efficiency

The publication

Energy Efficient Prosperity

Multiple Benefits of Energy Efficiency



Energy Efficient Prosperity

Energy efficiency as a means to support economic and social development

The benefits by perspective

Owner and occupant

Societal / macroeconomic

City and national / public budgets

Industry / energy provider

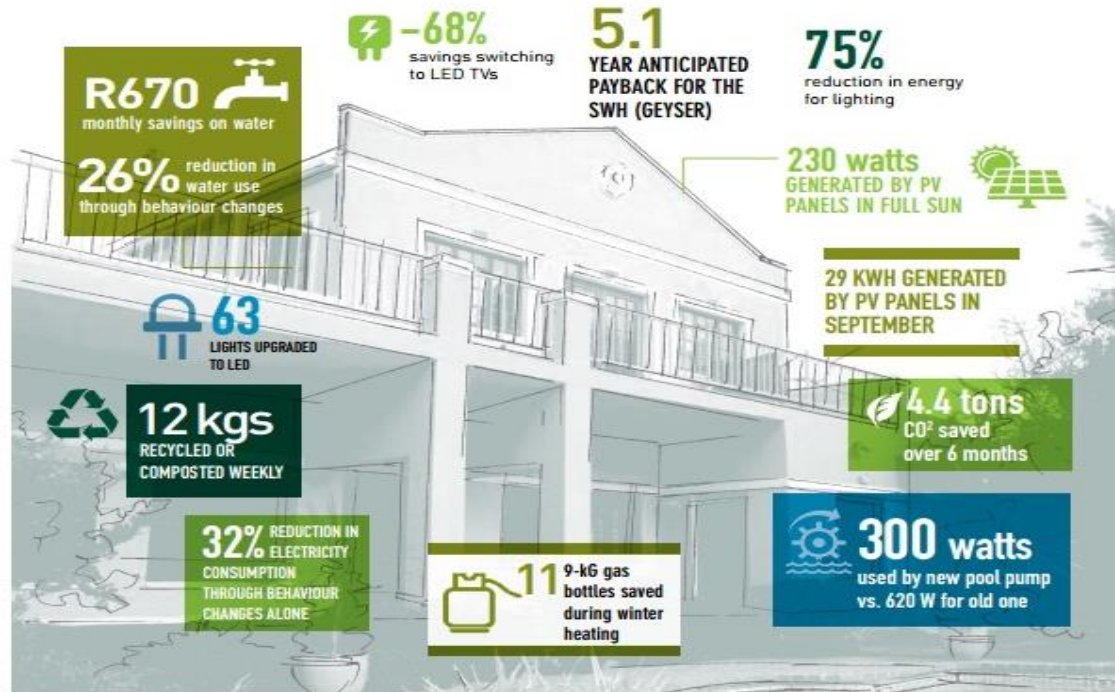
Multiple Benefits of Energy Efficiency: owner and occupant perspective

Comfort	Improved lighting comfort, thermal comfort and noise comfort
Health	Improved physical and mental health from indoor air quality and comfort.
Operations and maintenance	Improved building and systems durability with reduced need for maintenance.
Safety	Improved safety through lighting, controls and reduced chance of fire from gas leaks.
Property Value	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

Multiple benefits: for individuals



Overall 50% reduction in electricity consumption and a more comfortable place to live.

Multiple benefits: for students

Improved learning and test scores at schools



students' test scores: shows ~20–26% faster learning

Multiple benefits: safety and security

- 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).

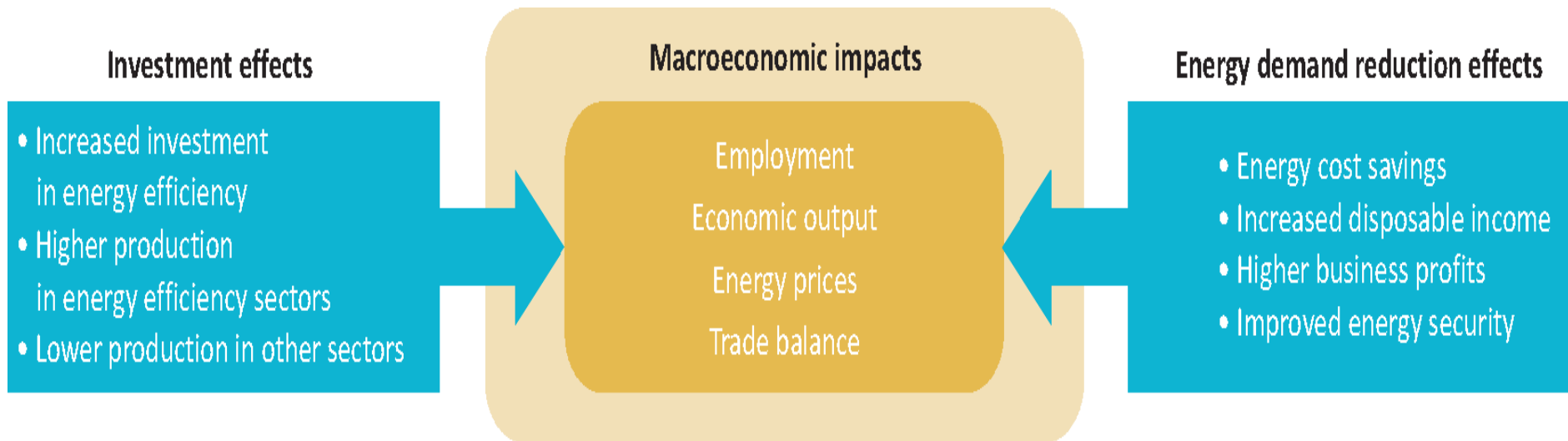


Multiple Benefits of Energy Efficiency: societal perspective

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

Benefits: broader benefits that last for many years.

Multiple benefits: 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

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

Benefits for cities and nations: supporting key government goals

Multiple benefits: 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

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

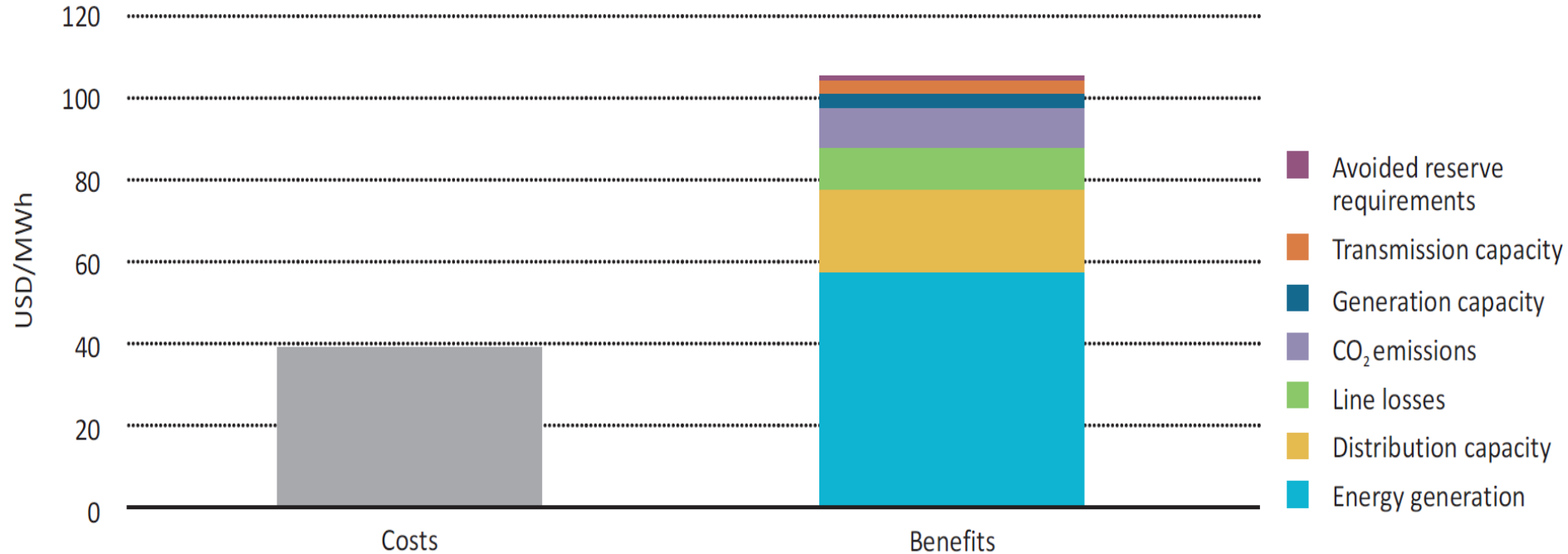
Multiple Benefits of Energy Efficiency: industry perspective

Competitiveness	Ability to enter new markets, reduced production costs, etc.
Production	Capacity utilisation, improved product quality, etc.
Operations and maintenance	Improved industrial and commercial operation; reduced need for maintenance, etc.
Working environment	Site environmental quality, worker health and safety, etc.
Environment	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: 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

Group discussion

Scenario:

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

What benefits do you think are most important to justifying the energy efficiency project or policy?

