

Why are we here?

Tracing the path to low-emission, efficient and resilient buildings and construction

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

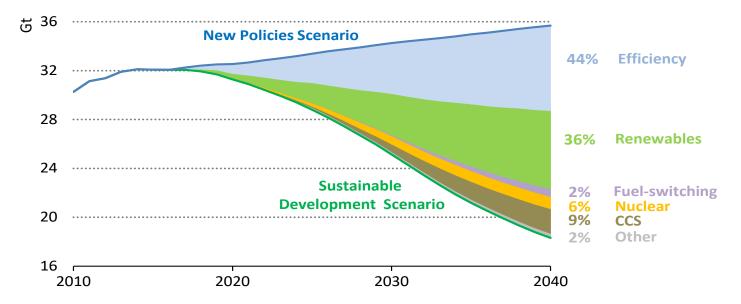
Pretoria, Monday 14th October 2019

Buildings energy efficiency sessions in partnership with



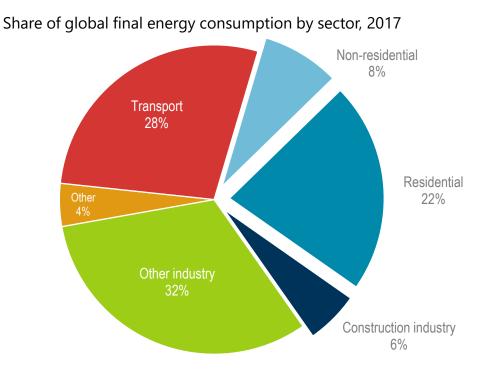
Energy efficiency in a secure, affordable & sustainable energy future





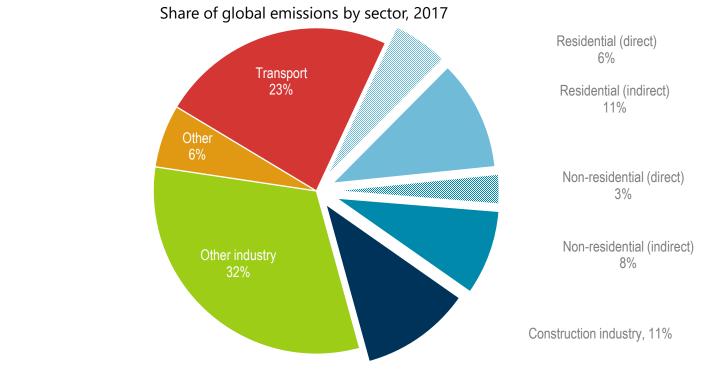
The IEA's World Energy Outlook 2017 provides the context

Global energy use



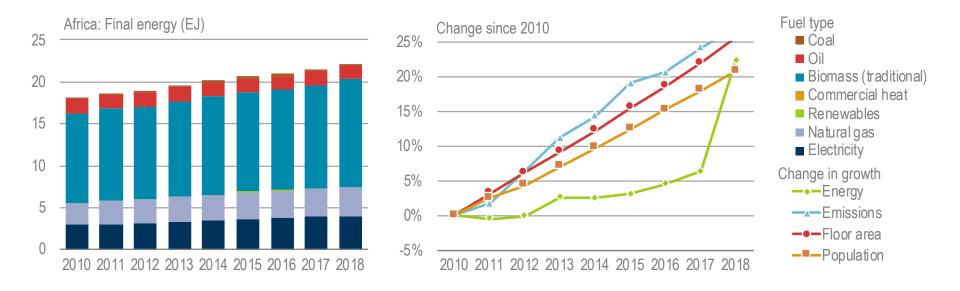
The buildings sector accounts for 36% of global energy use

Global emissions

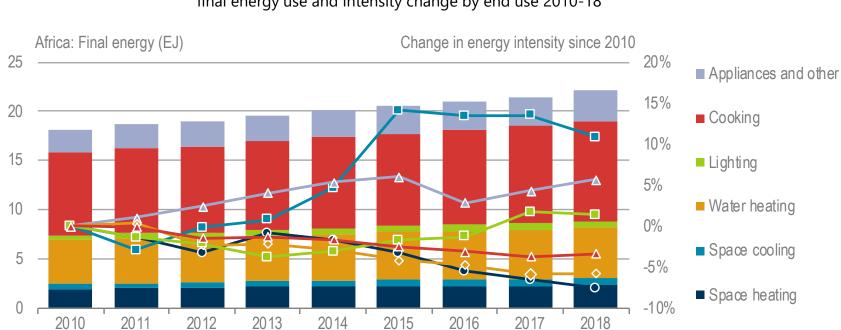


The buildings sector accounts for 39% of global energy-related emissions

Africa final energy use by fuel type and change in indicators, 2010-18



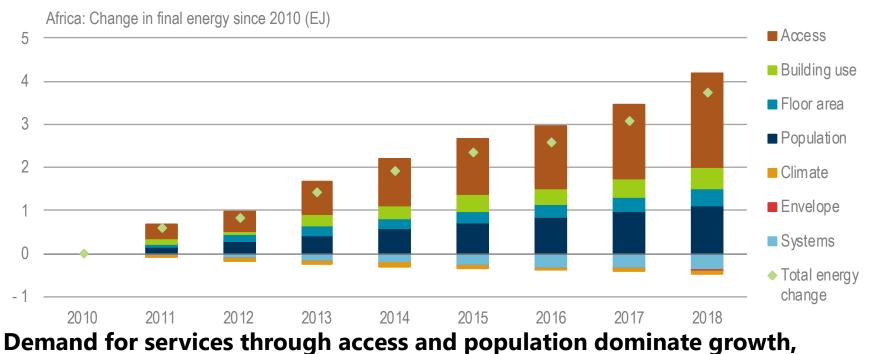
Growth in Biomass, natural gas and electricity



final energy use and intensity change by end use 2010-18

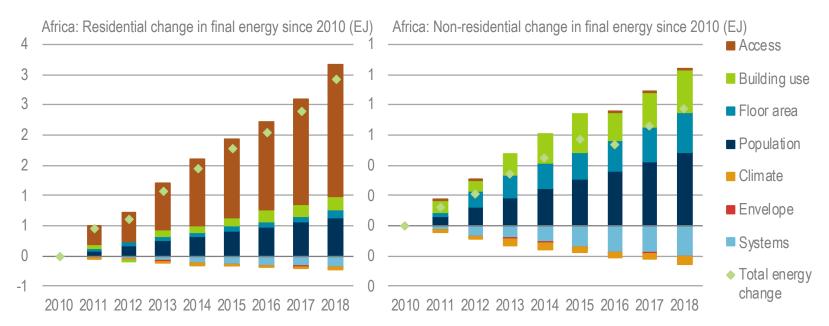
Growth in cooling, though small share, and appliance and lighting

Final energy use and intensity change by end use 2010-18



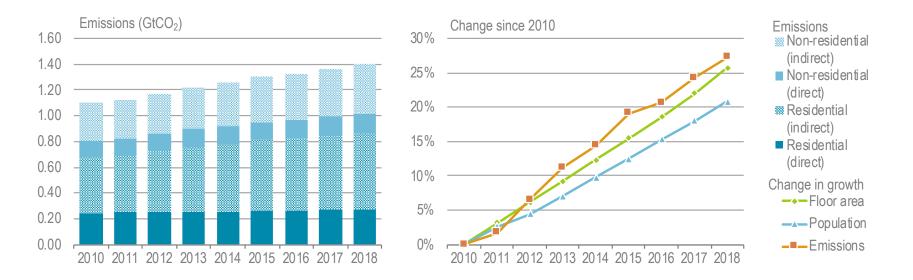
with small amount of system improvement change

Influence of factors buildings energy use by building type in Africa, 2010-18



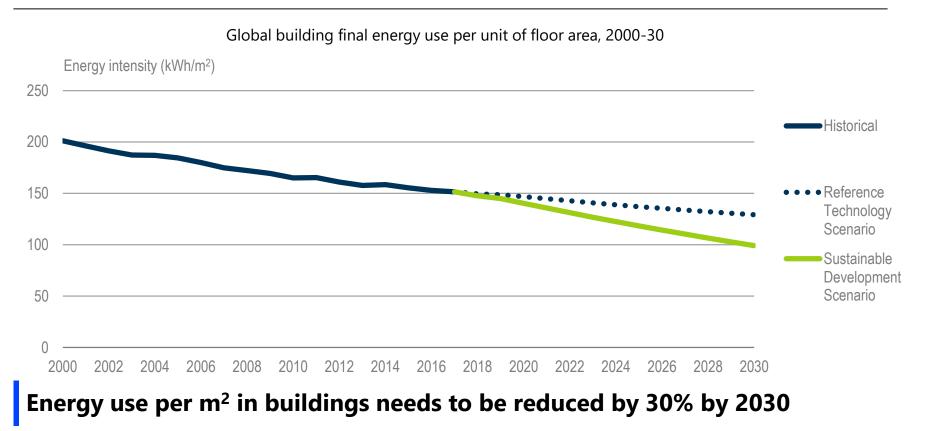
Growth in access in residential sector compared to population, more intense buildings and floor area growth in non-residential

Africa buildings energy-related emissions by building type and change in indicators, 2010-18

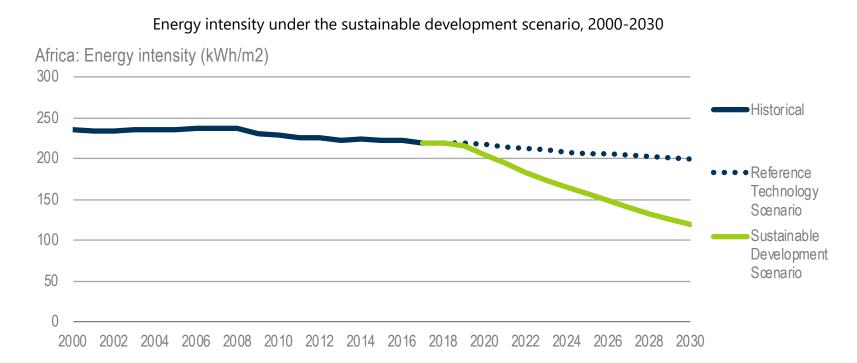


Emissions and tightly linked to population and floor area growth, mostly in residential access to electricity

Global supporting the path to sustainable development goals

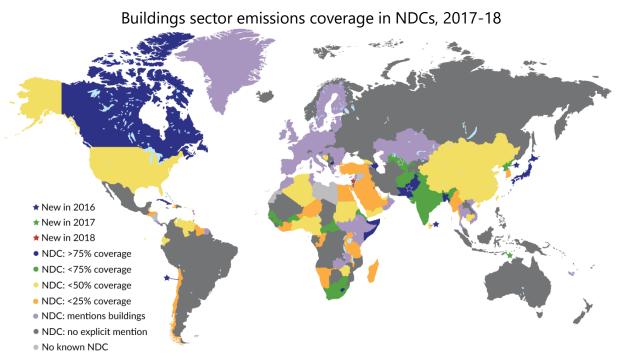


Africa supporting the path to sustainable development goals



Energy use per m² in buildings needs to be reduced by 40% by 2030

Reason 4: defining commitments for sustainable development



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

The majority of NDCs today do not explicitly cover buildings sector emissions

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To achieve low-emission, efficient and resilient buildings and construction

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Current 8 strategic priority areas:

- 1. Urban planning: use urban planning policies to enable reduced energy demand, increased renewable energy capacity and improved infrastructure resilience.
- 2. New buildings: Increase uptake of new buildings with net-zero operating emissions.
- 3. Building retrofits: Increase the rate of building energy renovation and increase the level of sustainability in existing buildings.
- 4. Building operations: Reduce the operating energy and emissions through improved energy management tools and operational capacity building.
- 5. Systems: Reduce the energy and emissions needed for equipment, appliances, lighting and cooking.
- 6. Materials: Reduce the environmental impact of materials and products in buildings and construction by taking a life-cycle and circular economy approach.
- 7. Resilience: Reduce building risks related to climate change through building design, selection of materials and improving resilience to structural, water and heat risks.
- 8. Clean energy: Increase secure, affordable and sustainable energy and reduce the carbon footprint of energy demand in buildings.

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- Urban planning
- New buildings
- Building retrofits
- Building operations
- Systems
- Materials
- Resilience
- Clean energy

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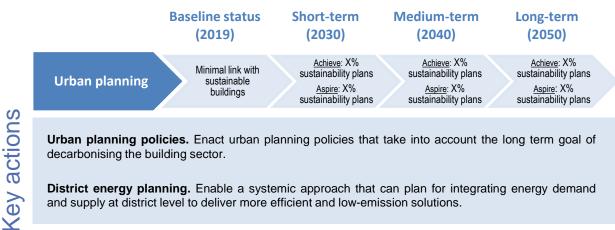


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Set targets for:

- Urban planning
- New buildings
- **Building retrofits**
- Building operations
- Systems
- **Materials**
- Resilience
- Clean energy



Urban planning policies. Enact urban planning policies that take into account the long term goal of decarbonising the building sector.

District energy planning. Enable a systemic approach that can plan for integrating energy demand and supply at district level to deliver more efficient and low-emission solutions.

actions

Key



Set targets for:

- Urban planning
- New buildings
- Building retrofits
- Building operations
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Develop and implement mandatory codes. Transition from voluntary to mandatory codes that set the minimal efficiency in new buildings.

Strengthen building codes. Ensure that there is a building code improvement cycle that strengthens the performance requirements every 3-5 years with aspirations of achieving zero emission and net zero energy codes.

Integrate renewable energy in new building design. Achieve net zero emissions or net zero energy through the integration of renewable energy.

Enable sustainable building investments. Enable increasing design and construction of sustainable buildings by increasing access to and use of finance to enable private investment.

Governments lead by example. Develop policies that ensure all new government buildings are lowemission and efficient.

actions

Key



Set targets for:

- Urban planning
- New buildings
- Building retrofits
- Building operations
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	Baseline status	Short-term	Medium-term	Long-term
	(2019)	(2030)	(2040)	(2050)
Building retrofits	<x% buildings<="" th=""><th><u>Achieve</u>: X%</th><th><u>Achieve</u>: X%</th><th><u>Achieve</u>: X%</th></x%>	<u>Achieve</u> : X%	<u>Achieve</u> : X%	<u>Achieve</u> : X%
	renovated each	renovation	renovation	renovation
	year to be	<u>Aspire</u> : X%	<u>Aspire</u> : X%	<u>Aspire</u> : X%
	sustainable	renovation	renovation	renovation

Increase renovation rates. Renovation rates in industrialised countries to reach 2% on average of the existing stock per year by 2025 and 3% by 2040. Renovation rates in developing countries reaching 1.5% by 2025 and 2% by 2040.

Increase the depth of renovation. Enable deep energy renovations that reduce energy consumption of existing building by at least 50%.

Enable renovation investments. Enable increasing renovation rates by increasing access to and use of finance to enable private investment in renovations.

Governments lead by example. Develop policies that ensure existing government buildings are renovated to be low-emission and efficient.

Key actions



Set targets for:

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	Baseline status	Short-term	Medium-term	Long-term
	(2019)	(2030)	(2040)	(2050)
Building operations	Minimal use of	<u>Achieve</u> : X%	<u>Achieve</u> : X%	<u>Achieve</u> : X%
	sustainability and	coverage	coverage	coverage
	energy	<u>Aspire</u> : X%	<u>Aspire</u> : X%	<u>Aspire</u> : X%
	management	coverage	coverage	coverage

Energy management systems. Train on energy management systems and use energy management processes in all buildings, particularly non-residential buildings.

Human resources: Hire and support the capacity building of sustainability and energy managers.

Smart controls. Deploy temperature, lighting and ventilation systems controls, sensors and energy metering.

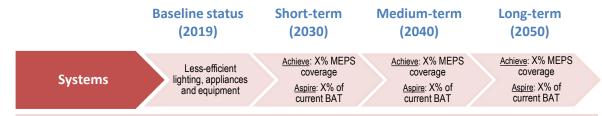
Information. Provide data and information that will improve the decision making for building operators and occupants.

Key actions



Set targets for:

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Minimum Energy Performance Standards (MEPS). Develop, enforce and improve standards that set product quality and performance requirements.

Enable investment in clean systems. Enable increasing use of sustainable products by increasing access to and use of finance to enable private investment.

Governments lead by example. Develop policies that ensure all government buildings invest in lowemission and efficient systems.

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Baseline status Short-term Medium-term Long-term (2019)(2030)(2040)(2050)Achieve: X% GHG + Achieve: X% GHG Achieve: X% GHG + Significant energy, + GWP decrease GWP decrease GWP decrease emissions and **Materials** global warming Aspire: X% GHG + Aspire: X% GHG + Aspire: X% GHG + potential GWP decrease GWP decrease GWP decrease

Circular economy. Developing cradle to grave or cradle to cradle life-cycle approaches in the building sector to enable a systemic, material-neutral and performance-based approach and business models.

Purchase low-energy and low-emission products and materials. Implement policies that enable improved purchasing decisions based on embodied carbon and energy.

Reduce demolition. Implement policies that support improved decisions on the impact associated with building demolition rather than re-use.

Recycle construction materials. Support the development of material recycling processes for products and materials that can reduce the lifecycle embodied energy and emissions.

Phase out high global warming potential (GWP) refrigerants. Implement policies and technology evolution that enables a phase down and then phase out of refrigerants that cause global warming emissions.

Information and awareness. Promote information on low-carbon materials and technologies (e.g. wood and earth constructions, innovative concrete) amongst professionals involved in the building design and construction process.

Government lead by example. Develop policies that ensure all government buildings invest in lowemission and efficient materials based on lifecycle analysis.

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Key action



Set targets for:

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Urban planning risk zoning. Use data and information to document the potential risk exposure by location to enable improved decision making during the building and infrastructure design process.

Wind and seismic resistant construction. Implement policies and use best practice design and strong materials to enable buildings to be resistant to natural disasters and extreme weather events.

Storm water management. Require improved retention of storm water within properties to reduce the negative impact of water flowing to other properties and to surging waterways.

actions

Key



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Integration of on-site renewable energy. Include building integrated photovoltaic (BIPV), solar thermal and micro-wind renewable energy projects in the planning and design of buildings and neighbourhoods.

Eliminate on-site fossil fuel burning equipment. Replace systems with equipment that use clean energy, including heat pump technology.

Connect buildings to low-emission district energy systems. Support the clean energy transition for district energy systems by connecting buildings when districts commit to systems upgrades with clean energy.

Purchase green power. Support the electric grid clean energy transition through the purchase of only green power.

Zero carbon policies. Implement energy policies that support the clean energy transition based on the lifecycle benefit of the measures.

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Buildings could be 40% more efficient than today

What is possible by 2040



- Building space could increase by 60% for no additional energy use.
- Space heating, cooling and water heating offer 60% of savings.

Key policy actions

- Comprehensive efficiency policies, targeting both new and existing building stock and appliances.
- Incentives to encourage consumers to adopt high efficiency appliances and undertake deep energy retrofits.
- Improved quality and availability of energy performance information and tools.

