Energy Technology Perspectives: Transitions to Sustainable Buildings

John Dulac
International Energy Agency
Global buildings status report
Buildings are not on track to meet 2DS objectives

Despite some positive developments in the last two years, more assertive action is still needed to put the global buildings sector on track.
Global building energy intensity per m\(^2\) improved at roughly 1.5\% per year since 1990, but this was not enough to offset strong growth in buildings sector floor area at nearly 3\% per year.
Floor area will increase sharply over the next 20 years...

Floor area additions to 2060 will largely occur in developing countries. Half of global building additions will be completed by 2035.
Swift action is needed to address building envelope performance over the next 20 years to avoid the lock-in of energy-intensive building investments, especially in developing regions.
Forging a pathway to sustainable buildings
Capturing the enormous energy efficiency potential in buildings

Buildings final energy consumption by scenario and fuel type

Going from RTS to B2DS would save the equivalent of twice global energy production in 2014.
More than 50% of cumulative CO$_2$ emissions reduction in buildings to 2060 under the B2DS results from shifts to low-carbon and high-performance technologies.
Locking in better buildings today...

Changes in global residential building stock and energy intensity to 2060

High-performance building construction and deep energy renovations of existing buildings play a critical role in reducing buildings sector energy demand.
Consequences of a ten-year delay in achieving building envelope objectives

Delaying implementation and enforcement of building envelope measures would result in the equivalent of three years of additional energy consumption for heating and cooling in the buildings sector.
Transitioning to a low-carbon buildings sector

Evolution of heating equipment in buildings to 2060

The B2DS represents a strategic shift away from fossil fuel equipment to high-efficiency and renewable technologies, such as heat pumps, solar thermal and modern district energy.
Cooling sales aren’t keeping up with performance potential

 Cooling demand could increase as much as tenfold in some countries over the next 40 years, and average equipment performance is far from its energy efficiency potential.
A call to action
# Technology strategies for a B2DS buildings sector

## Whole building
- High-performance envelope components and whole building packages
- nZEB(+) building construction across all countries
- Low-cost deep energy renovation solutions
- Zero-carbon building energy communities

## Heating and cooling equipment
- Improved thermal distribution and control
- High-performance heat pumps and solar thermal solutions
- Responsive and affordable thermal energy storage
- Integrated, flexible district energy solutions

## Lighting and appliances
- High-performance, lower cost solid state lighting
- Integrated design and control for lighting service
- High-efficiency appliance technologies
- Performance standards for plug loads and smarter use of connected devices

## Cooking and energy access
- Clean, affordable cooking solutions for developing countries
- Low-cost solar thermal and storage solutions
- Efficient, low-polluting biomass solutions
## Policy strategies for a B2DS buildings sector

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<th>Building construction &amp; renovation</th>
<th>Transition to zero-carbon buildings</th>
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<td>▪ Mandatory building energy codes for new and existing buildings</td>
<td>▪ Long-term, strategic vision for energy transition</td>
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<td>▪ Capacity building and training</td>
<td>▪ Phase-out of fossil fuel subsidies and other perverse incentives</td>
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<td>▪ Financing schemes and market incentives</td>
<td>▪ Assertive market frameworks</td>
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<td>▪ Cooperation and knowledge sharing</td>
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<td>▪ Minimum energy performance standards</td>
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<td>▪ Labelling and awareness programmes</td>
<td>▪ Cost reductions for critical technologies</td>
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<td>▪ Support for market scale (e.g. bulk procurement)</td>
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Thank you!

Contact:
john.dulac@iea.org