Part II: Policy pathways towards energy efficiency roadmap to 2030 for Ukraine

Focus on the buildings sector

Simone Landolina and Marc LaFrance,
International Energy Agency
Kiev, 5 November 2014
**Importance of Buildings Sector**

- **Largest end-use sector**
- **1/3 carbon emissions**
- **50% of electricity**
- **Major portion of GDP**
- **Stock opportunities:**
  - 75% - 90% of OECD building stock still in service by 2050
  - Large population growth in developing world will drive new floor area that needs to be efficient (2.5 billion more by 2050)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>35%</td>
</tr>
<tr>
<td>Industry</td>
<td>31%</td>
</tr>
<tr>
<td>Transport</td>
<td>30%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
</tbody>
</table>

Energy Sources:
- Coal: 11%
- Oil: 22%
- Natural gas: 28%
- Electricity: 28%
- Commercial heat: 5%
- Renewables: 30%
Floor Area: Today and Forecasts

Large growth expected in non-OECD countries!!!
Selected IEA analysis on EE in buildings

Dec 2013  Aug 2013  Jun 2013
Technology Roadmaps and Policy Pathways

- **Technology Roadmaps**
  - Define and analyse available technologies
  - Develop vision for R&D and technology deployment
  - Assess policy, financial, and related needs

- **Policy Pathway**
  - Based on one of 25 IEA energy efficiency recommendations
  - 10 step guide for policy planning, implementation, monitoring and evaluation
  - Highlights best experience in countries
TECHNOLOGY ROADMAP
ENERGY EFFICIENT BUILDING ENVELOPES

- Construction transformation strategy
- Provides technical, economic and strategic framework
- Assessment of high priority areas for 12 regions of the world
- Policy criteria and evaluation
Transformation to Low-Energy Buildings

Transforming construction to low energy buildings

**Inefficient – still common and old stock**
- Single pane windows.
- No insulation.
- High air leakage.

**Typical building code in advanced regions**
- Low-e double glaze windows.
- High levels of insulation.
- Low air leakage.

**Zero-energy buildings**
- Highly insulated windows and dynamic solar control.
- Optimised designs and orientations.
- Daylighting.

**KEY POINT:** the world needs to shift from very old buildings to modern buildings, and then to low-energy or zero-energy buildings.
Assessment of advanced envelope components

Countries to conduct their own assessment

<table>
<thead>
<tr>
<th>Market maturity/saturation</th>
<th>ASEAN</th>
<th>Brazil</th>
<th>China</th>
<th>European Union</th>
<th>India</th>
<th>Japan/Korea</th>
<th>Mexico</th>
<th>Middle East</th>
<th>Australia/New Zealand</th>
<th>Russia</th>
<th>South Africa</th>
<th>United States/Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-glazed low-e glass</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Window films</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Window attachments (e.g. shutters, shades, storm panel)</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Highly insulating windows (e.g. triple-glazed)</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<td>★</td>
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<td>★</td>
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<tr>
<td>Typical insulation</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Exterior insulation</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Advanced insulation (e.g. aerogel, VIPs)</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<td>★</td>
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<td>★</td>
<td>★</td>
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<tr>
<td>Air sealing</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Cool roofs</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
</tr>
<tr>
<td>BIPV/advanced roofs</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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</tbody>
</table>

★ Mature market  Established market  Initial market
## Technology policy evaluation

<table>
<thead>
<tr>
<th>Policy level</th>
<th>Governance</th>
<th>Energy prices</th>
<th>Infrastructure and human capacity</th>
<th>Materials at commodity prices</th>
<th>Voluntary programmes</th>
<th>Mandatory building codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>No active government agency promoting efficient construction.</td>
<td>Subsidies in place or below market prices.</td>
<td>Limited test capability and knowledge of buildings, unproven buildings programme.</td>
<td>No local access to efficient materials and high price premiums.</td>
<td>Limited to a few demo projects without lasting impacts.</td>
<td>An agency is pursuing or has been granted authority to pursue.</td>
</tr>
<tr>
<td>Medium</td>
<td>Shared responsibility between construction and energy departments.</td>
<td>Market-based prices without environment impact.</td>
<td>Ability to test some products and university expertise.</td>
<td>Some products are widely available and cost-effective.</td>
<td>Educational materials and advanced programmes introduced.</td>
<td>Mandatory building codes are in place but lack infrastructure.</td>
</tr>
<tr>
<td>High</td>
<td>One agency has responsibility and is active with funding.</td>
<td>Tariffs in place to account for non-energy impacts.</td>
<td>Rating organisations, policy and enforcement personnel, in place.</td>
<td>Mature markets with many cost-effective products available.</td>
<td>Energy savings calculators, simulation tools and incentives in place.</td>
<td>Building codes demonstrate efficient construction.</td>
</tr>
</tbody>
</table>
Thank you for your attention!

Questions?