



International  
Energy Agency  
1974•2014

# Key Policy and Analysis to Drive Deep Energy Renovation

*Marc LaFrance*

*Annex 61 – Technology Day and  
Experts Workshop*

*Reading, UK, 13 April 2015*

# Overview

- **Introduction** – *IEA Publications and Future Work*
- **Deep Energy Renovation – Key Policy Perspectives**
- **Working Together**
- **Next Steps**

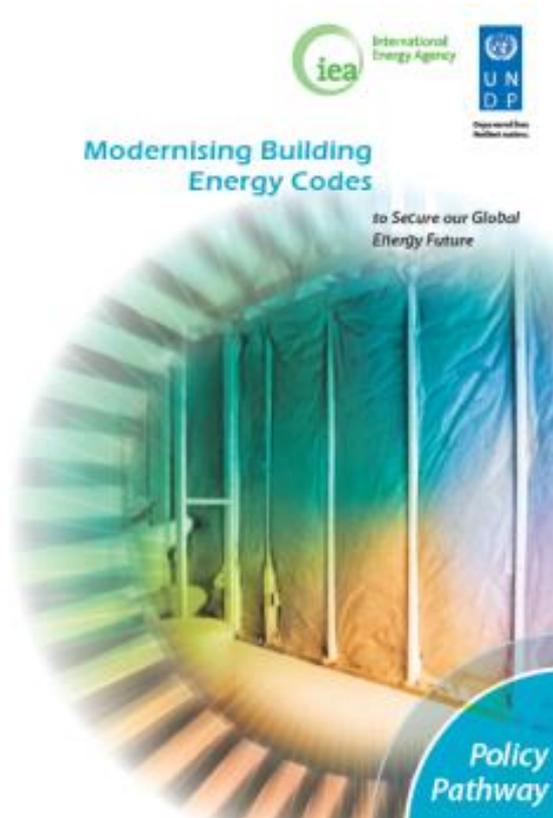
# 2013 BUILDING PUBLICATIONS



**Technology Roadmap**  
Energy efficient building envelopes



Dec 2013

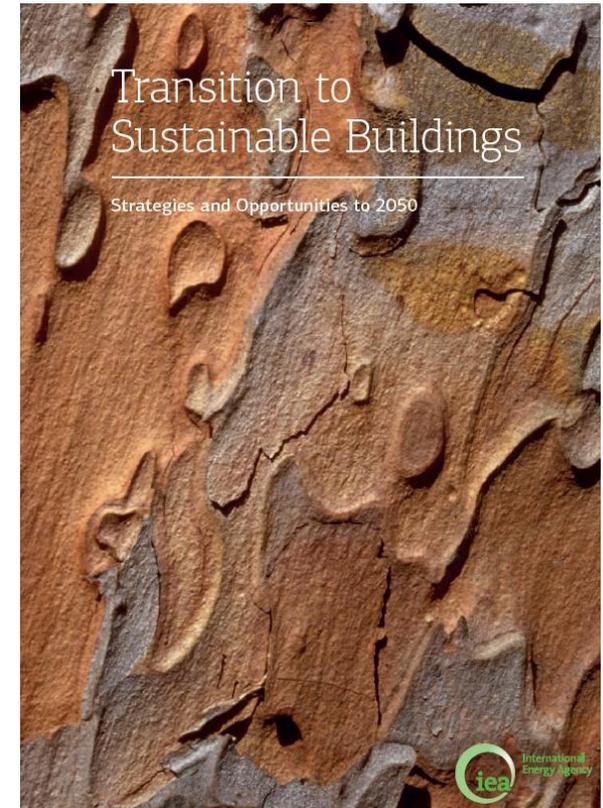


**Modernising Building Energy Codes**

to Secure our Global Energy Future

Policy Pathway

Aug 2013

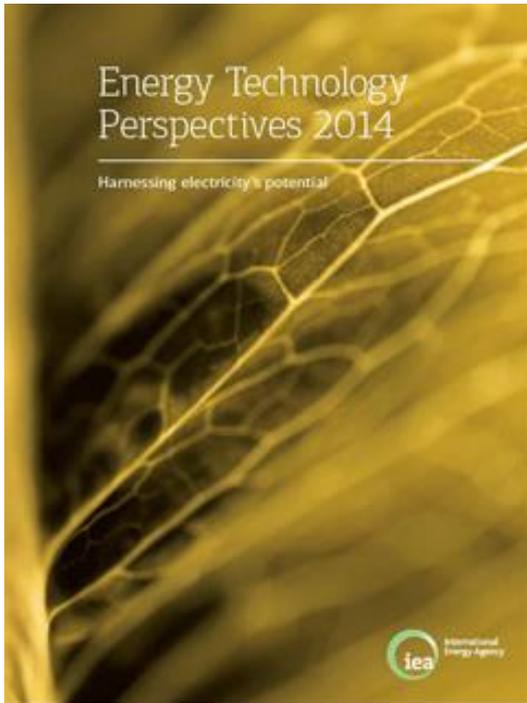


**Transition to Sustainable Buildings**

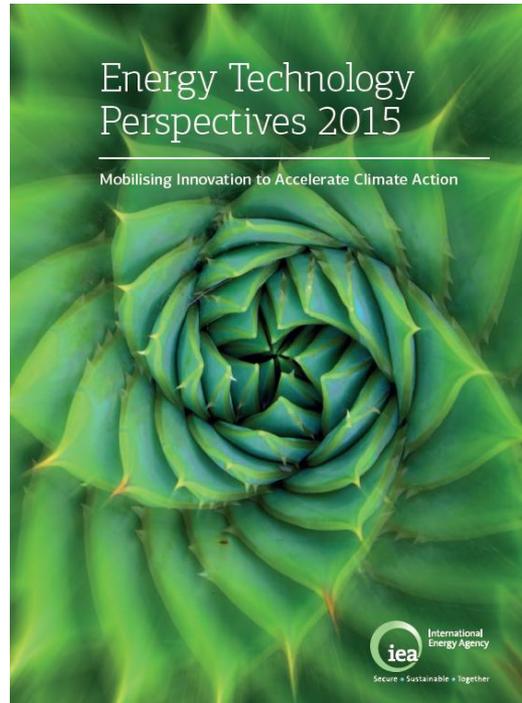
Strategies and Opportunities to 2050

Jun 2013

# 2014 AND 2015 PUBLICATIONS



High use of heat pumps for China and EU



Forthcoming Importance of heating



## Building Energy Performance Metrics

Supporting Energy Efficiency Progress in Major Economies

BUILDING ENERGY EFFICIENCY TASKGROUP



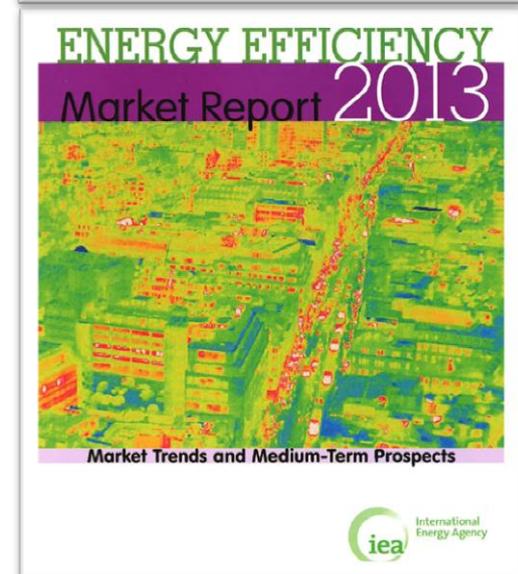
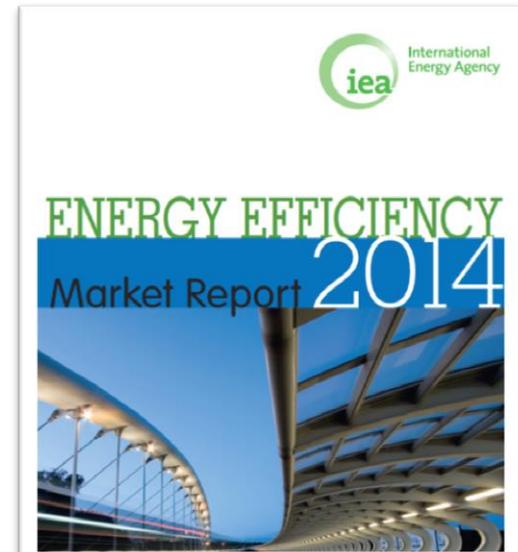
Forthcoming, with IPEEC for MEF and G20

## NEW in 2015 EE Market Report: Buildings Chapter

1. Context of the global buildings energy efficiency market
2. Current energy efficiency investments
3. The drivers & emerging trends for energy efficiency
  - Policies
  - Technologies
  - Finance and business models

Do you have data that can improve the EE Market Report Building Chapter?

Contact: Brian Dean, IEA Energy Efficiency Unit  
([Brian.Dean@IEA.org](mailto:Brian.Dean@IEA.org))



- **Macro Building Performance Metrics**  
Collaboration with IPEEC on MEF Countries (2<sup>nd</sup> Qtr 2015)
- **China Building Energy Consumption Report**  
Joint project with Tsinghua University (2<sup>nd</sup> Qtr 2015)
- **Model improvements, integrated analysis and expanded capability**
  - Joint work with NORDIC countries on ETP 2016 (construction and renovation assessment tool)
  - Urban integration of building efficiency and advanced district heating (technology and economics)

# Deep Energy Renovation Priority for Cold OECD

	ASEAN	Brazil	China	European Union	India	Mexico	Russia	South Africa	United States
<b>Technology</b>									
Advanced envelope – cold climate			Red	Gold			Red		Red
Reduced cooling loads – hot climates	Gold	Gold				Gold			
Heat pumps			Gold	Red			Gold		Gold
Solar thermal		Red			Gold	Red		Red	
More efficient use of biomass	Red				Red			Gold	
<b>Policy</b>									
Building codes with supporting infrastructure	Gold	Gold	Gold		Red	Gold	Gold	Gold	
Appliance and equipment standard	Red	Red	Red		Gold	Red	Red	Red	
Deep renovation of existing buildings				Red			Red		Red
Zero-energy new buildings				Gold					Gold

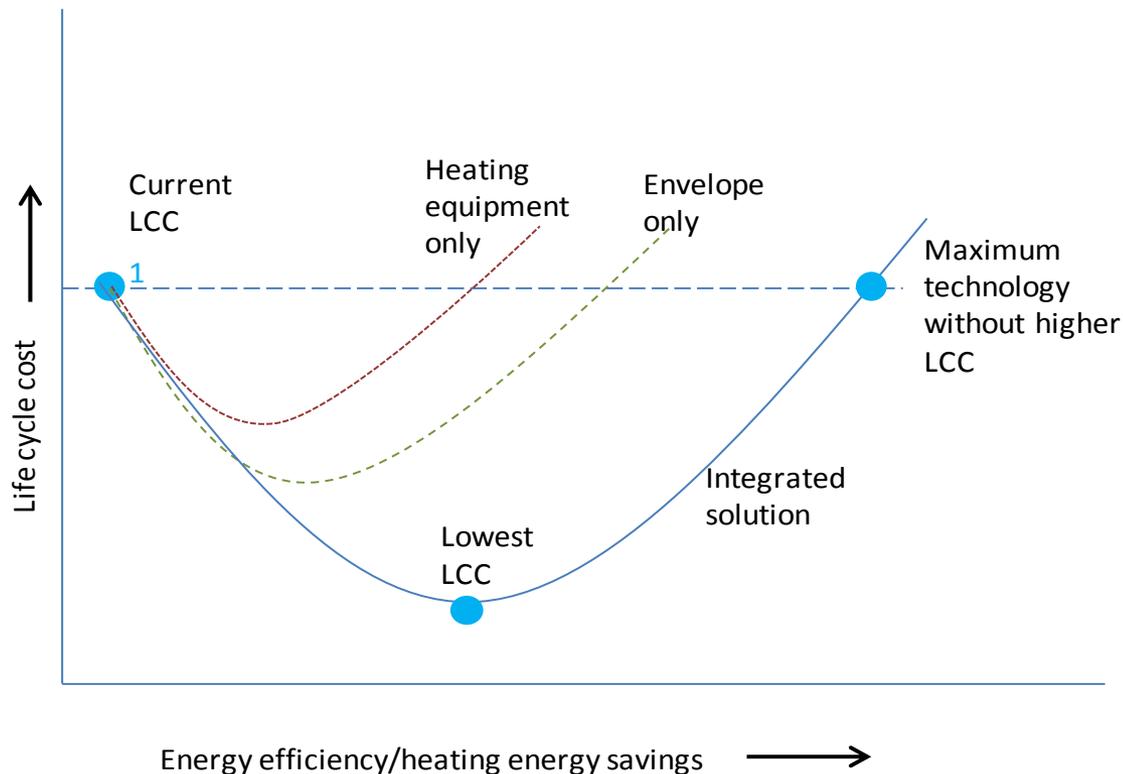
Note: Recommendations limited to top two for technology and policy, all items could be relevant for most countries. Red indicates immediate priority, while gold indicates second priority.

# Deep Energy Renovation Approach and Strategy

- Treat Deep Energy Renovation similar to long-term R&D efforts, need aggressive market conditioning for 10 – 15 years (how many years have we supported PV policy?)
  - Requires stringent component specifications during replacement
  - Develop system level criteria (e.g. >50%/GBPN definition) in order to obtain incentives and component incentives for very high performance products/materials
  - Move market to adopt deep energy renovation as part of normal renovation (~1 to 3% per year in OECD)
  - Build business case for buildings not planned for renovation
  - Establish mitigation cost for early renovation, compare to other supply options (e.g. CCS, Nuclear, etc)

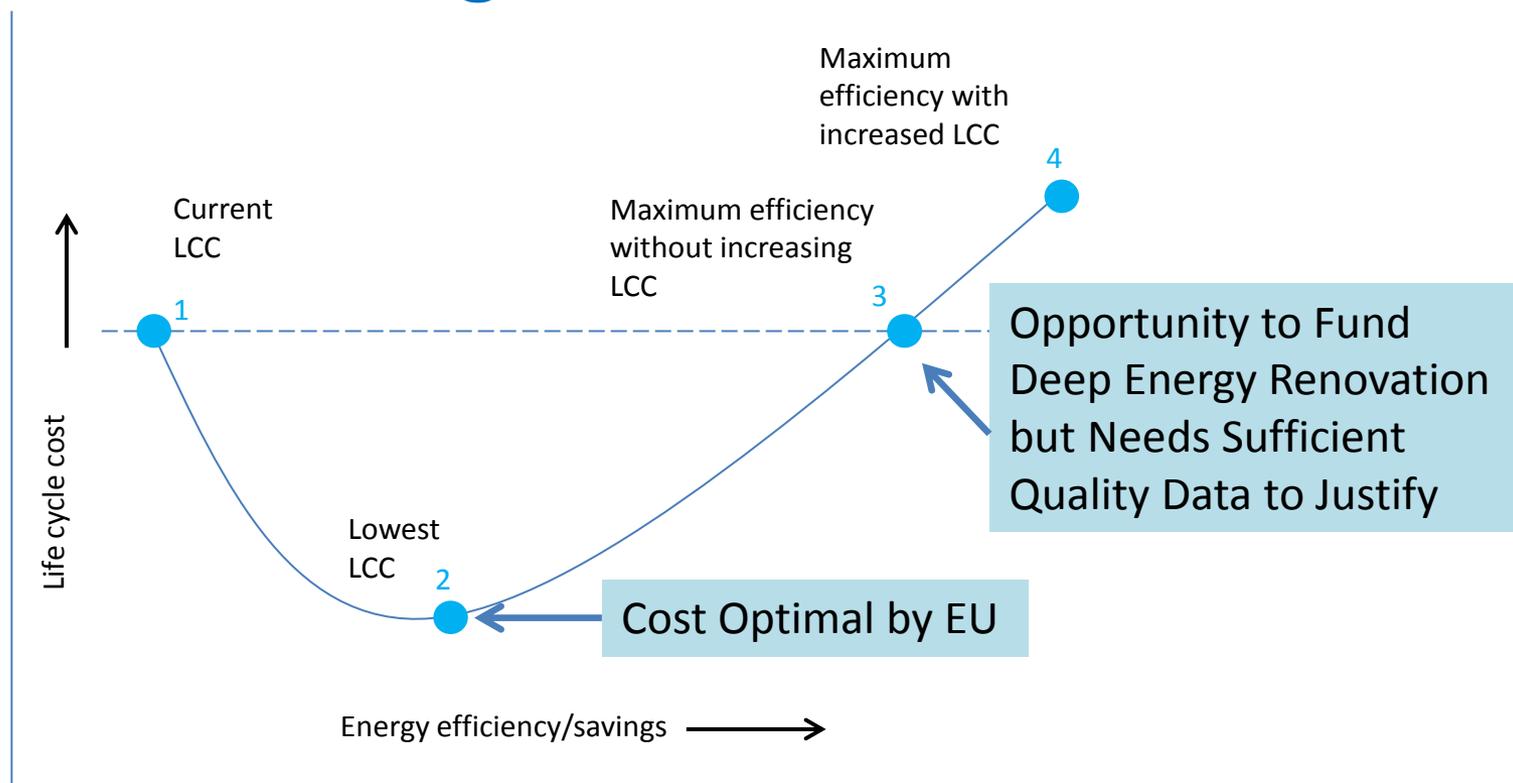
# Integrated Solutions are Essential

- Avoid heating equipment replacement without systems approach (heating equipment should not be staged!!)
- Most envelope components can be replaced upon failure without major financial/technical impact



# LCC Analysis – EU Cost Optimal is Not Good Enough

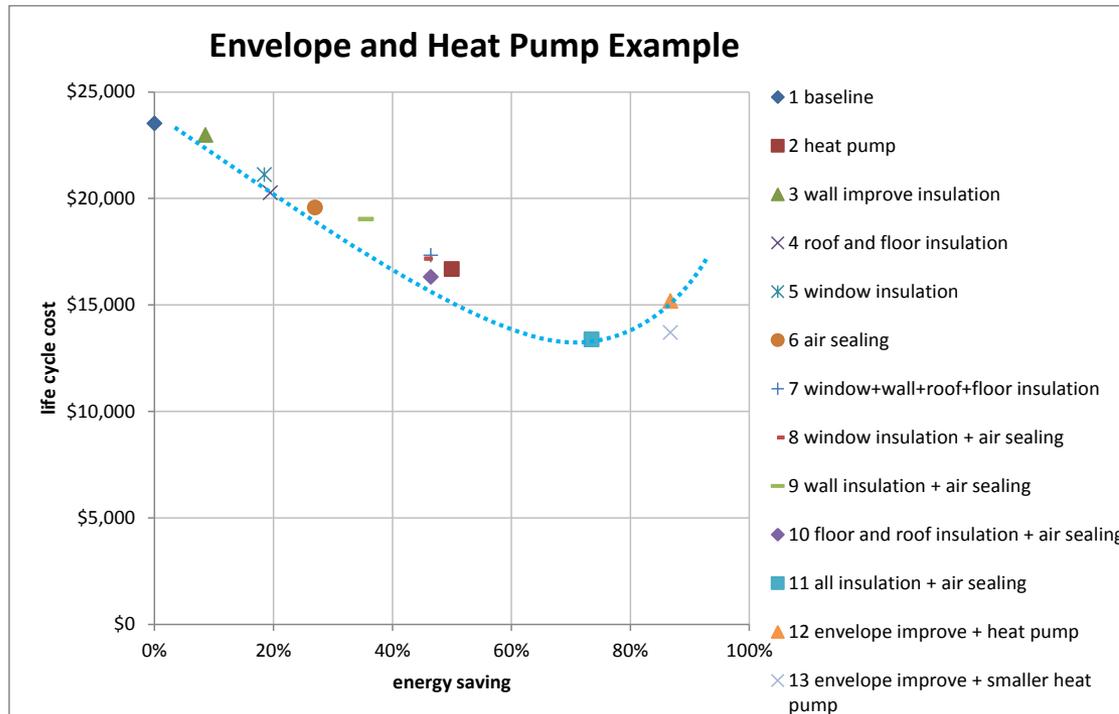
- High quality, full economy of scales, cost data will be essential to get investment at neutral LCC



Not to scale – theoretical example

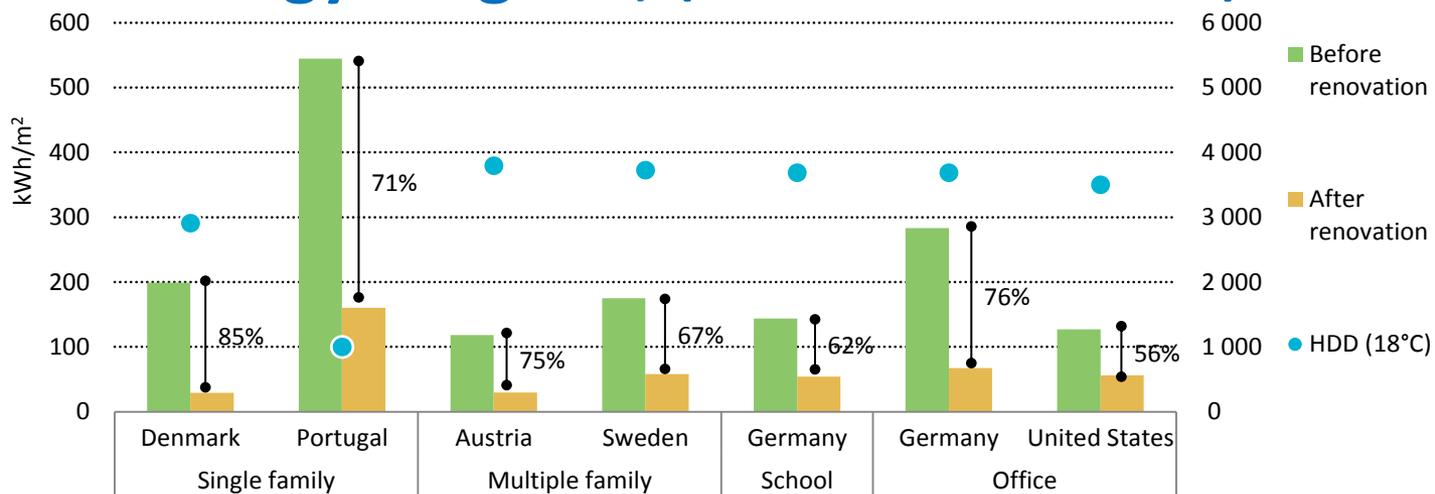
# ETP 2016 to Include Cost Studies for Urban Low Energy Buildings

- Deep envelope efficiency improvements
- Variety of heating supply options (on-site, district heat, etc)
- Consideration of water heating and lighting portion, similar to more comprehensive building codes
- Scope likely limited to a variety of case studies



# How can IEA Technology Network Help?

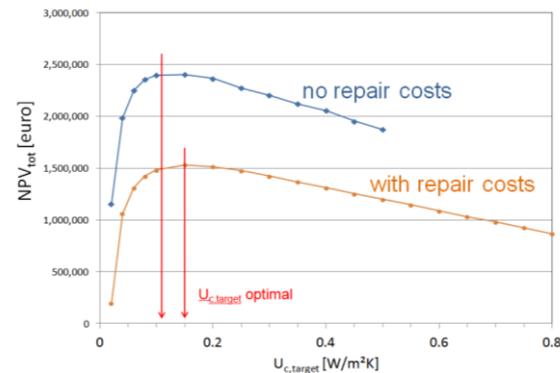
- Excellent input from Annex 61 on ETP 2015, Tracking Clean Energy Progress, (Ove Christen Mørck)



- Annex 55 has potential cost data?

- Access to data appears to be highly restricted
- Does anyone know why?

Outcome of analysis:  
Total Net Present Value for all 237 dwellings

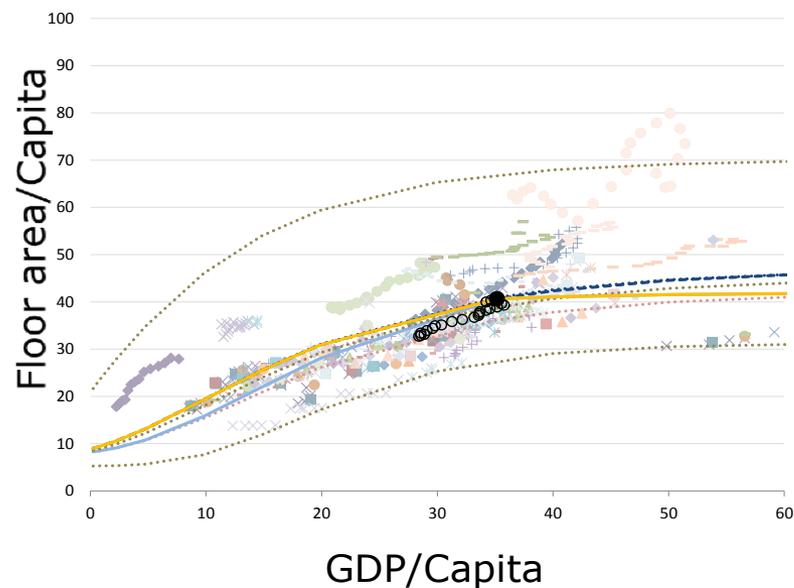


# ETP 2015 – New Residential Floor Area Forecasts

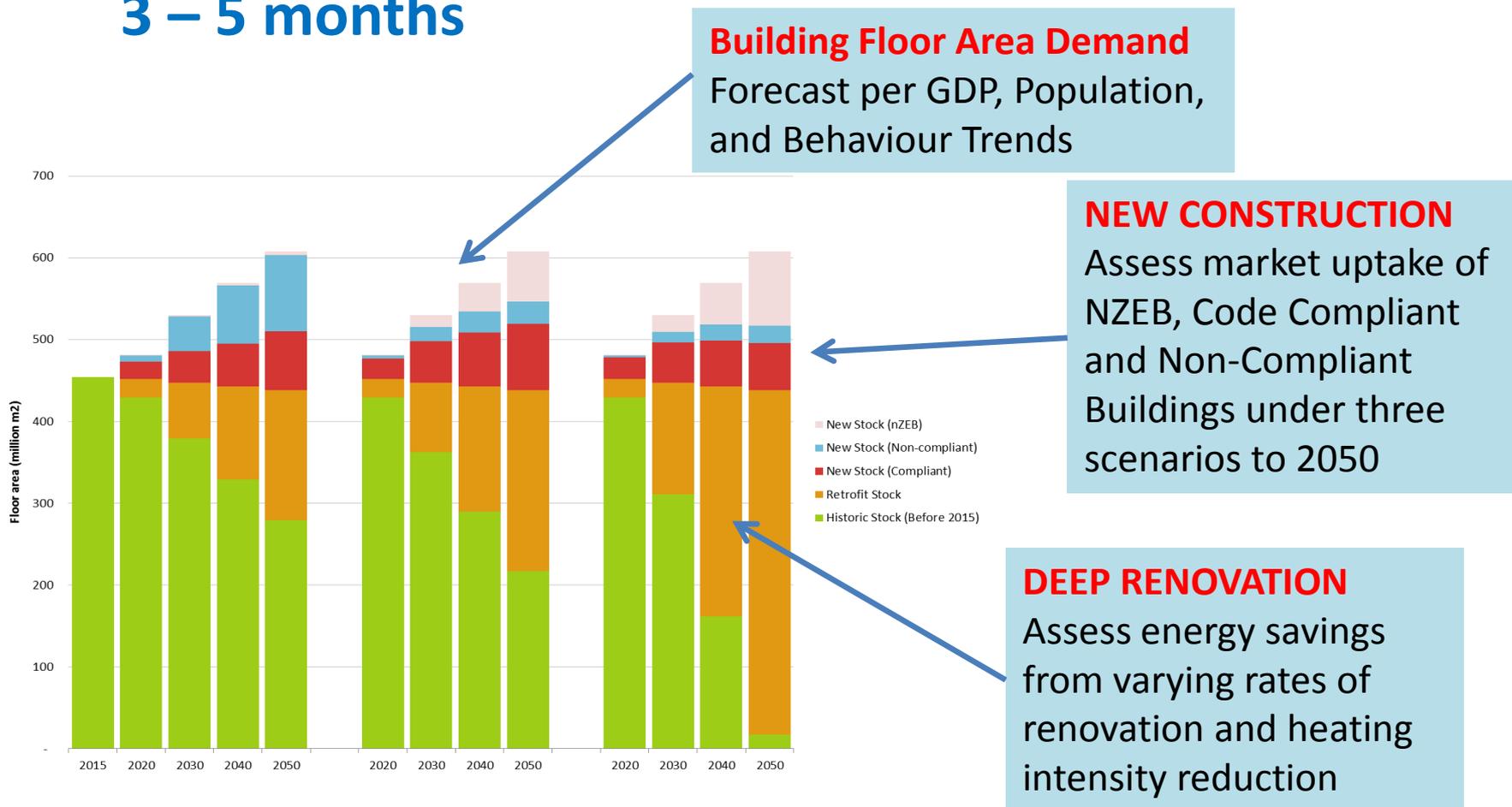
- IEA in collaboration with Tsinghua University derived new floor area projections as part of ETP 2015 forecasts for 31 regions of the world

## Sample Countries

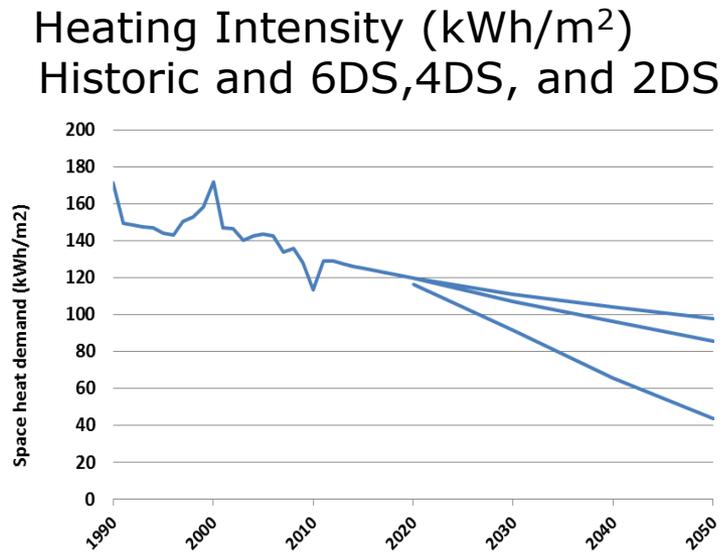
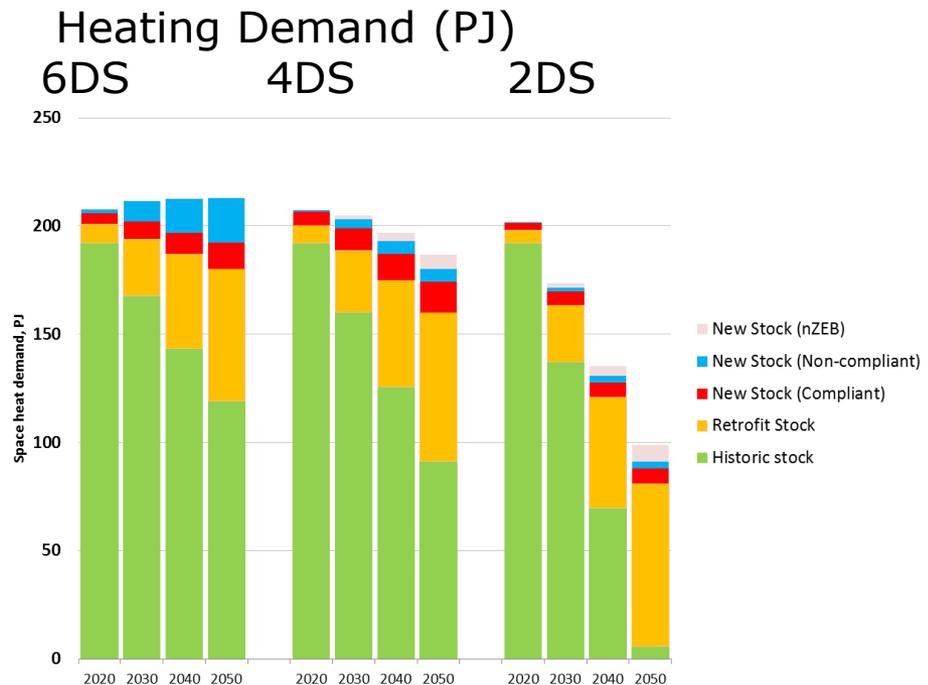
Country	Floor area (million m <sup>2</sup> ) in 2012	Floor area (million m <sup>2</sup> ) in 2050**	Additional floor area (million m <sup>2</sup> )	Change in floor area (%)
World	203 889	391 571	187 683	92.1%
Brazil	3 937	9 384	5 447	138.4%
China	49 583	83 642	34 059	68.7%
EU	27 917	34 001	6 084	21.8%
India	13 994	52 756	38 762	277.0%
Indonesia	4 081	11 882	7 801	191.2%
Mexico	5 560	10 331	4 771	85.8%
Russia	4 189	5 737	1 548	37.0%
South Africa	1 209	2 834	1 625	134.4%
UK	3 609	4 712	1 103	30.6%
US	28 263	39 834	11 571	40.9%



- IEA working in collaboration with NORDIC partners, Swedish Environmental Research Institute at IEA for 3 – 5 months



## Space heating demand forecast and energy intensity per floor area



**Initial Draft Results: Population increases by 41% and Floor Area increases by 57% to 2050, but total space heating is reduced by 53%.**

**Requires aggressive renovation, increasing to 2050: 2020: 1%/yr ~74kWh/m<sup>2</sup>; 2030: 3%/yr~47kWh/m<sup>2</sup> stock; and 2050: 3.5%/yr~39kWh/m<sup>2</sup> .**

# Next Steps

- **Agreement to share case study data with the IEA**
- **Provide individual energy efficient measure cost and performance data, along with integrated packages including baseline conditions**  
(e.g. NREL residential cost database [www.nrel.gov/ap/retrofits/](http://www.nrel.gov/ap/retrofits/))
- **Consider collaborative research and sharing approaches, analysis, results and recommended findings with the IEA**  
(Working with many countries to present global perspectives)
- **Help establish policy recommendations**  
(e.g. to IEA Governing Board via CERT, EUWP, EBC, however, going to much more specific and critical details that is beyond technology analysis – Beyond EBC 2013 Annual Report)

## International Energy Agency

9, rue de la Federation

757 Paris Cedex 15, France

**Marc LaFrance, CEM**

Energy Analyst Buildings Sector, Sustainable Energy Policy and Technology Directorate

[marc.lafrance@iea.org](mailto:marc.lafrance@iea.org), +33 (0)1 40 57 67 38

## Free Download: Energy Efficient Building Envelopes (Roadmap)

<http://www.iea.org/publications/freepublications/publication/technology-roadmap-energy-efficient-building-envelopes.html>

## Free Download: Transition to Sustainable Buildings (Book)

<http://www.iea.org/publications/freepublications/publication/transition-to-sustainable-buildings.html>

## Free Download: Modernising Building Energy Codes (Policy Pathway)

<http://www.iea.org/publications/freepublications/publication/policy-pathways-modernising-building-energy-codes.html>