London Industry Seminar

CRREM-ERES

Stranding Risk

1st Panel: Climate change impact on real estate- uncertainty and solutions

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ERES CRREM INDUSTRY SEMINAR

STRANDING RISK

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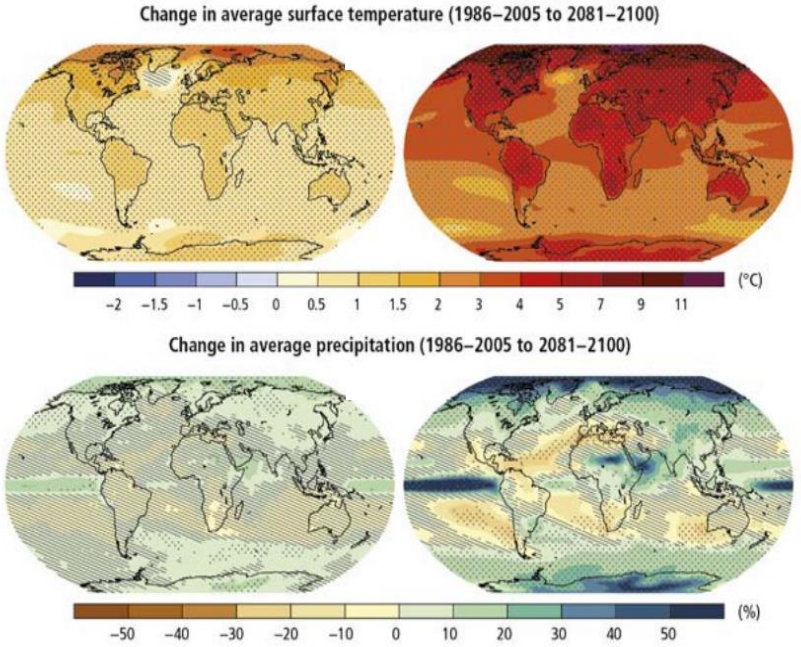
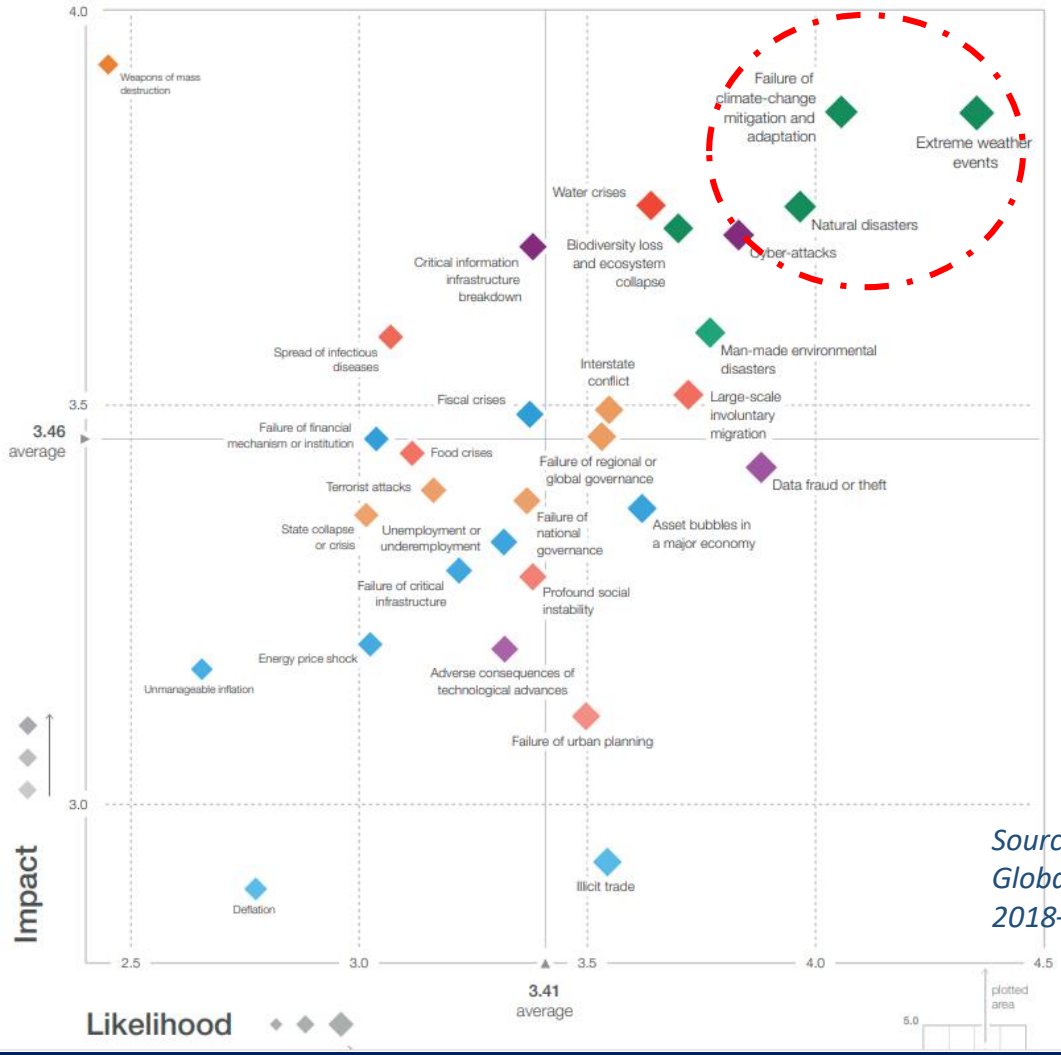
Extreme climatic events caused by the increase in temperatures affect people, altering social, economic and environmental systems.
Heavy heat or cold, periods of drought, hurricanes, floods and fires are increasingly threatening food security, water, **our homes and cities, our businesses and our health.**

Climate change and global warming

- The International Panel on Climate Change (IPCC) warned that we have only a dozen years to limit global warming within the threshold still considered safe by **+ 1.5°C**
- However, we have now reached +1°C and, continuing at this rate, we will reach **+3.2°C in 2035** and **+5°C at the end of this century**



Source: IPCC, 2013



Main risks for our planet

Source: World Economic Forum Global Risks Perception Survey 2018–2019

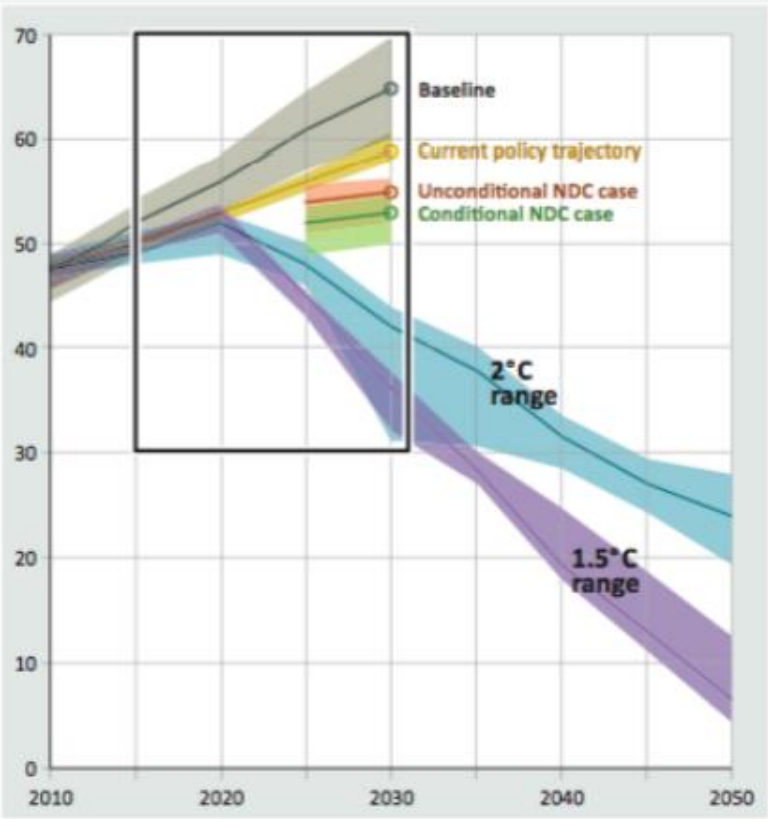
Paris Agreement

- The Paris Agreement brings all nations into a **common cause to undertake ambitious efforts to combat climate change** and adapt to its effects, with enhanced support to assist developing countries to do so

- The Paris Agreement's central aim is to strengthen the global response to the threat of climate change **by keeping a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C**
  - With a **50 % probability** of meeting the 2 °C objective, the budget for 2011–2050 is around 1100 $GtCO_2$, while global fossil fuel reserves hold around 3 times this amount and fossil fuel resources hold significantly more
  - With an **80% probability**, the carbon budget is 565 $GtCO_2$ and only 20 % of fossil fuel reserves can be extracted

- Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. **NDCs embody efforts by each country to reduce national emissions** and adapt to the impacts of climate change
  - Of the 136 NDCs (out of 196) that now reference the buildings sector, most do not have specific targets or policy actions. While existing policies and NDCs covered more than 50% of buildings related CO_2 emissions as of 2018, if committed NDCs were to become policy, the coverage would increase to more than 60%.

Is it enough? Maybe not…

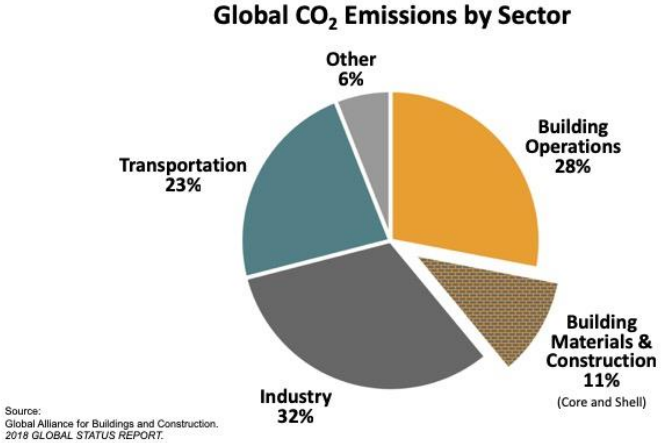


- If respected, NDCs would cause emissions **about 30% higher** than the threshold and currently cover only one-third of global emissions
- This overrun would lead to an increase in temperatures compared to pre-industrial levels that would be between + 2.7°C and 3.7°C over the next century, according to the United Nation Environment Programme's (UNEP), settling around 3.2°C in 2100

Source: IPCC, 2014

Is REAL ESTATE to blame?

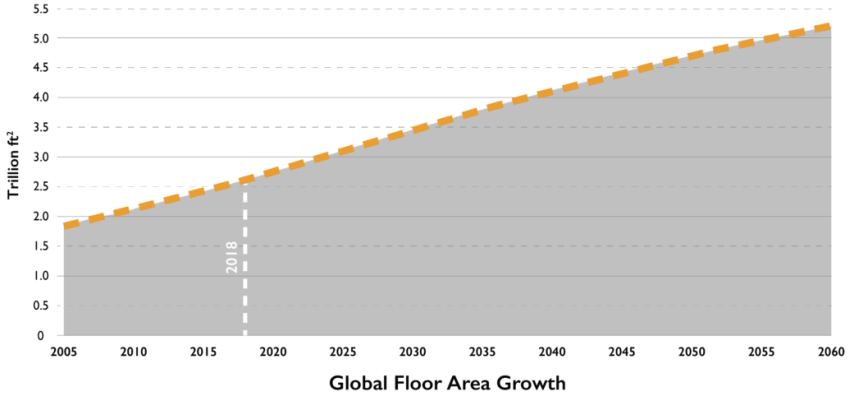
- Buildings and the construction sector are responsible for 39% of all global carbon dioxide emissions worldwide
  - they account for 36% - 40% of all global energy consumption, 50% of raw material extraction and one-third of drinking water consumption. Three out of four buildings are not sufficiently efficient
  - It plays a crucial role in a climate change perspective
- Paris Agreement imply a reduction in CO_2 emissions for the real estate sector of 77% by 2050



Globally, embodied carbon is responsible for 28% of building sector emissions

Global building stock will double in smq by 2060

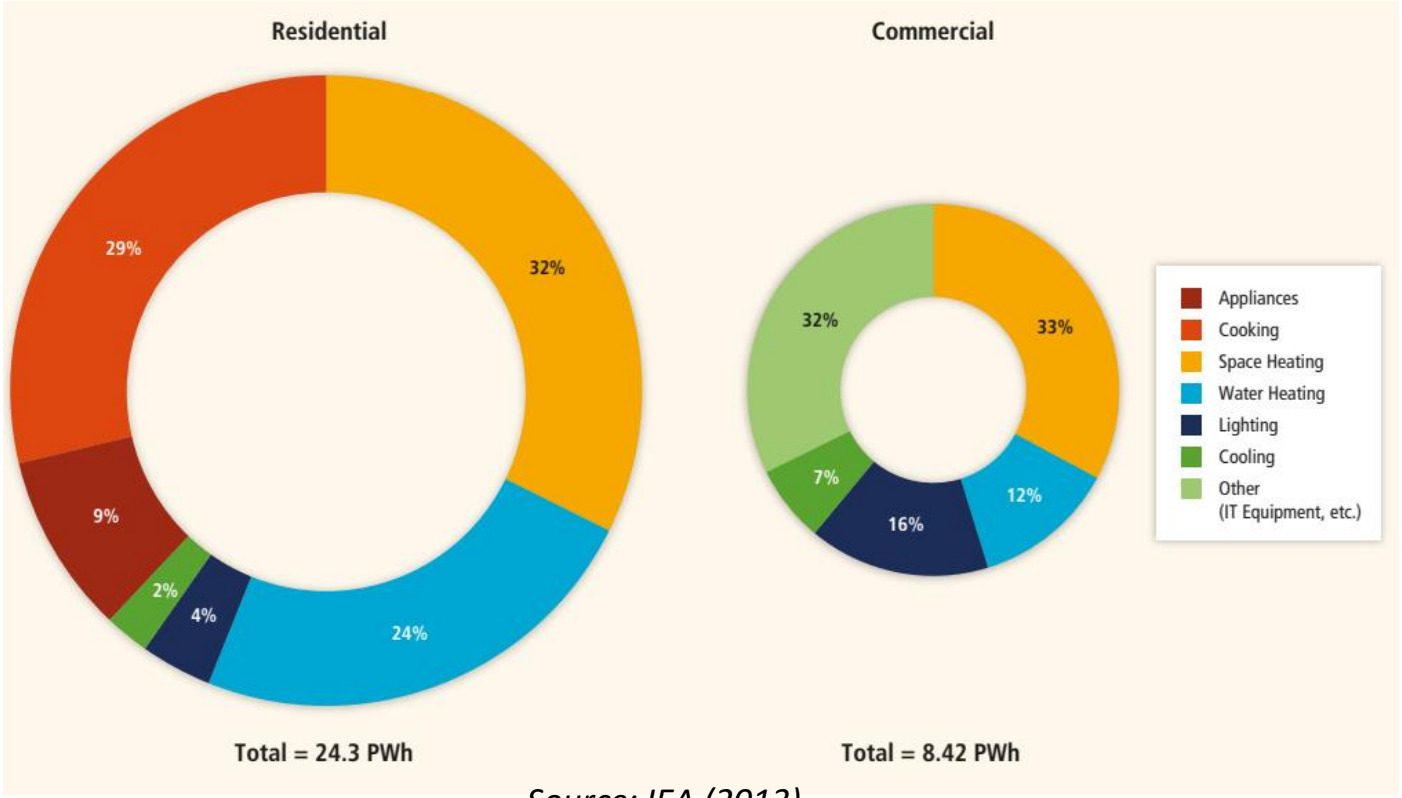
- The world is currently undergoing the largest wave of urban growth in human history
  - The world population is expected to increase from the current 7.5 billion (2019) to 8.5 billion in 2030 (+ 10%), rising to 9.7 billion in 2050 (+26%).
  - More than half of the global population is now concentrated in urban areas, and by 2060 **two thirds of the population of 10 billion will live in cities**
- To accommodate this growth, we expect to add 2.48 trillion square feet (230 billion sqm) of new floor area to the global building stock, doubling it by 2060.



Global Floor Area Growth

Source: UN Environment Global Status Report 2017
Data Source: IEA (2017), World Energy Statistics and Balances

World buildings' final energy consumption



Source: IEA (2013)

Mitigation measures

- Different **mitigation strategies** has been and will be implemented:
- **Energy efficiency of technologies** (at device or system level):
  - High-performance building envelope (HPE); Efficient appliances (EA); Efficient lighting (EL); Efficient Heating, Ventilation, and Air-Conditioning systems (eHVAC); Building automation and control systems (BACS). Daylighting, heat pumps, advances in digital building automation and control systems, smart meters and grids, just to mention few….
- **System / (infrastructure) efficiency:**
  - Passive House standard (PH). Nearly / net zero and nergy plus energy buildings (NZEB) Integrated Design Process (IDP). Urban planning, District heating / cooling (DH / C). Commissioning (C)) High efficiency distributed energy systems, co-generation, load levelling, diurnal thermal storage, advanced management 'Smart-grids' ; Utilization of waste heat
- **Service demand:**
  - Behavioural change (BC). Lifestyle change (LSC)

Potential reductions of energy use / emissions

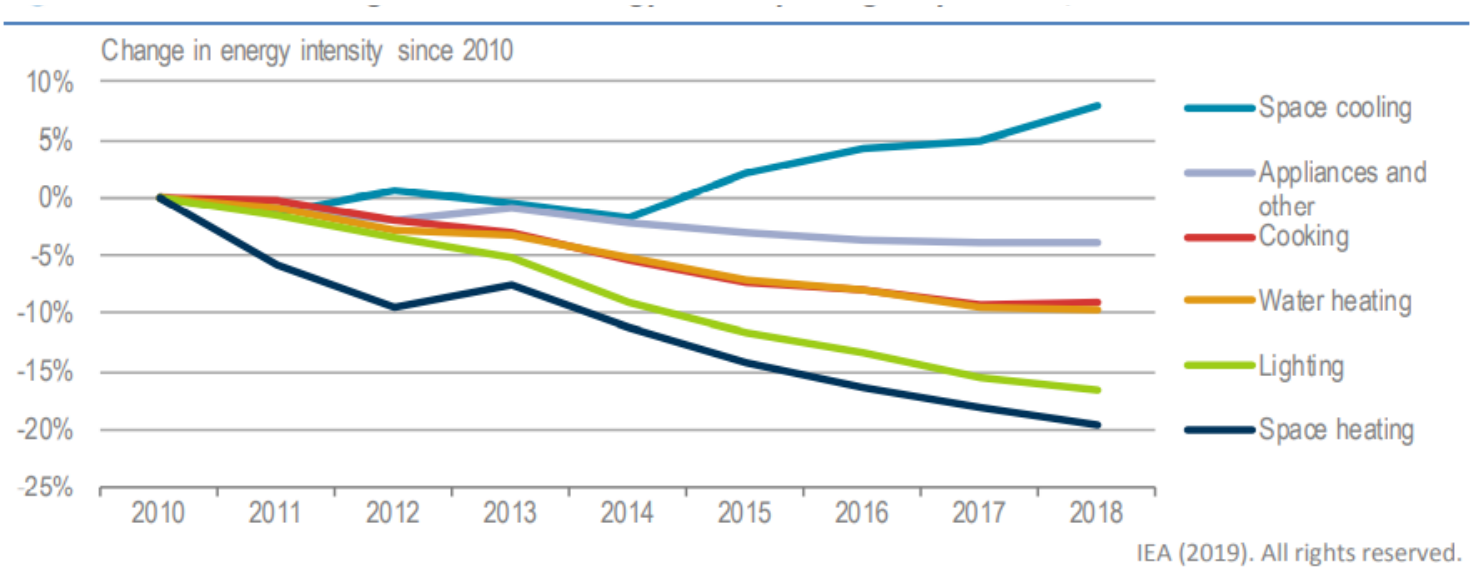
Cost effectiveness

Co-benefits

Key Policies

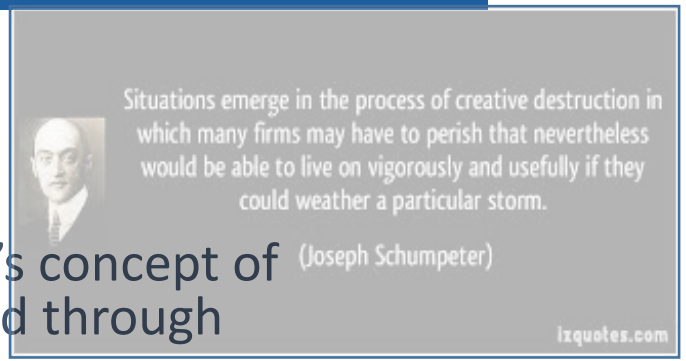
Green finance

Global buildings sector final energy intensity changes



- Sources: **2019 Global Status Report for Buildings and Construction,** *Towards a zero-emissions, effi cient and resilient buildings and constructi on sector, IEA, UN, 2019*

Stranded Assets



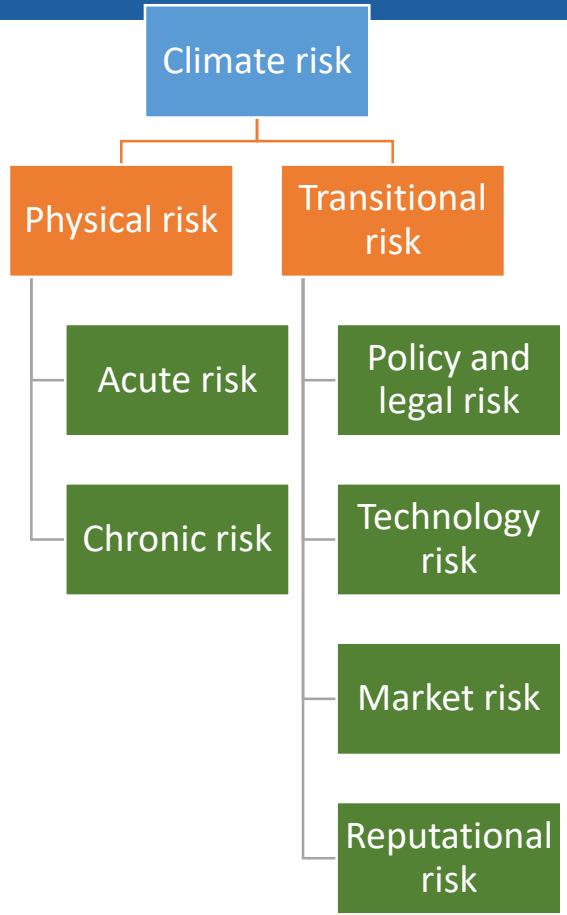
- Stranded assets can be traced back to Schumpeter's concept of **creative destruction** where assets become stranded through competition, innovation and economic growth
  - The 'stranded assets' as investments which will no more earn any economic return prior to the end of their economic life (International Energy Agency)
  - A broader definition: 'Stranded assets are assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities' (Caldecott et al. (2013)
  - Stranded assets are investments whose value falls (or 'sunk' assets) whose profitability is lower than expected (Cairns, 2018); that are prematurely retired (Uibeleisen, 2011); that are subject to costly retrofitting (Caldecott et al. 2018) or that become liabilities (Tajal, 2016)

Why stranded assets?

- This can happen because of **unforeseen, unexpected or non-anticipated changes in:**
  - the regulatory environment (e.g. policy changes, regulatory responses to climate change)
  - market conditions (e.g. price shifts, uneconomic returns or competitive factors)
  - demand and supply influences (e.g. changing consumers preferences)
  - technology (e.g. innovations in clean energy)
  - financial contexts (e.g. currency devaluation/unanticipated write-offs)
  - environmental/natural risks (e.g. storms, flooding, wild fires, etc.)
- This is not new in real estate, as the changing consumer/occupier demand has regularly rendered property assets obsolete
  - what is new is the influence and **systemic reach of climate change and associated environmental policy** on some property assets and related capital markets

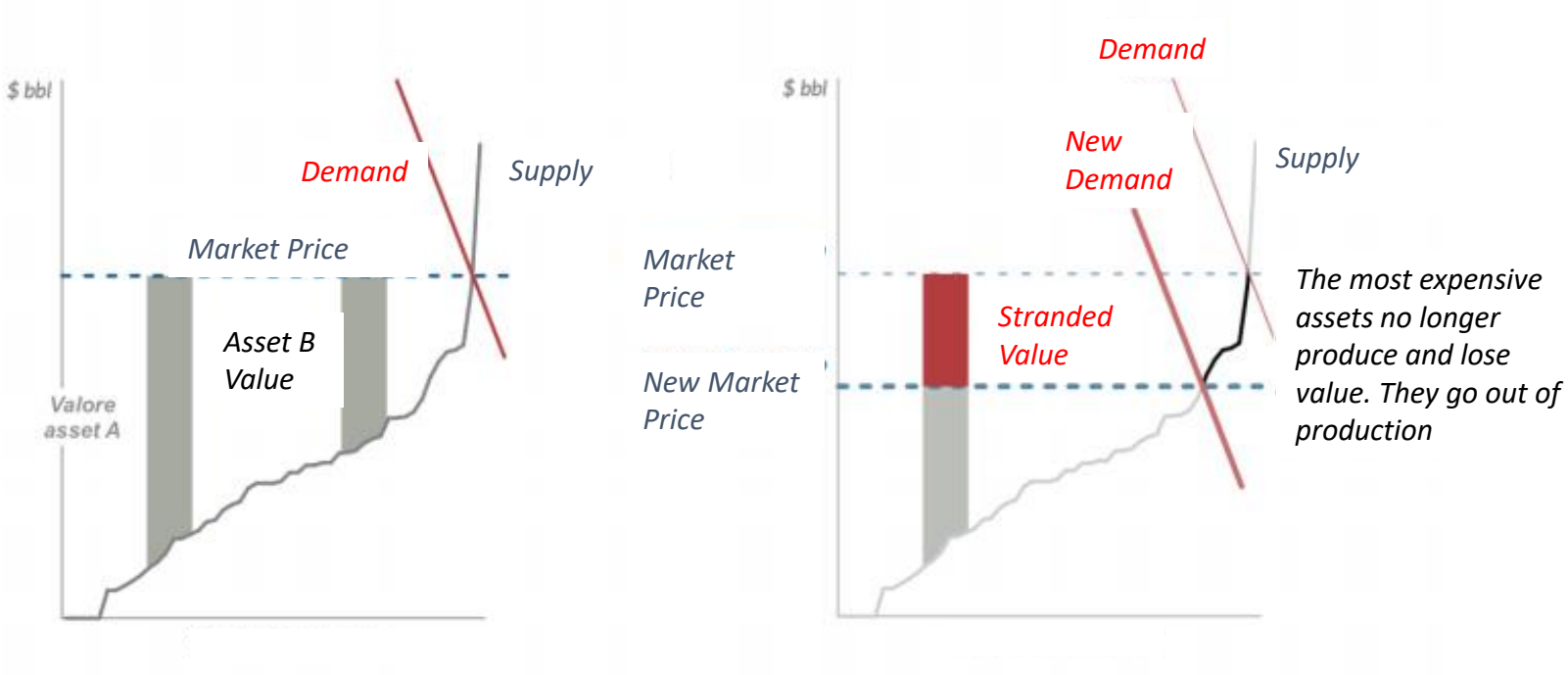
The stranding risk

- There are several types of **climate risk** which can impact upon property investment performance (risk/return profile, diversification, valuation of the asset, holding period).
- The term '**stranding risk**' can be applied to any kind of economic, political or technological transition that poses risk to certain **assets' value**



STRANDING RISK

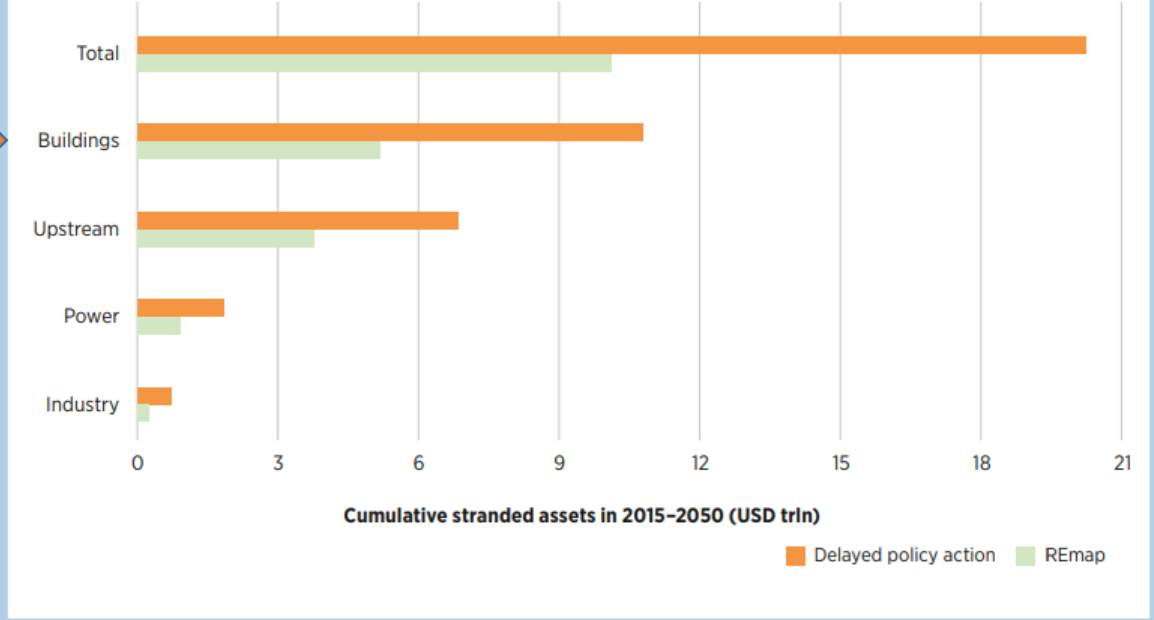
Stranded value



The most expensive assets no longer produce and lose value. They go out of production

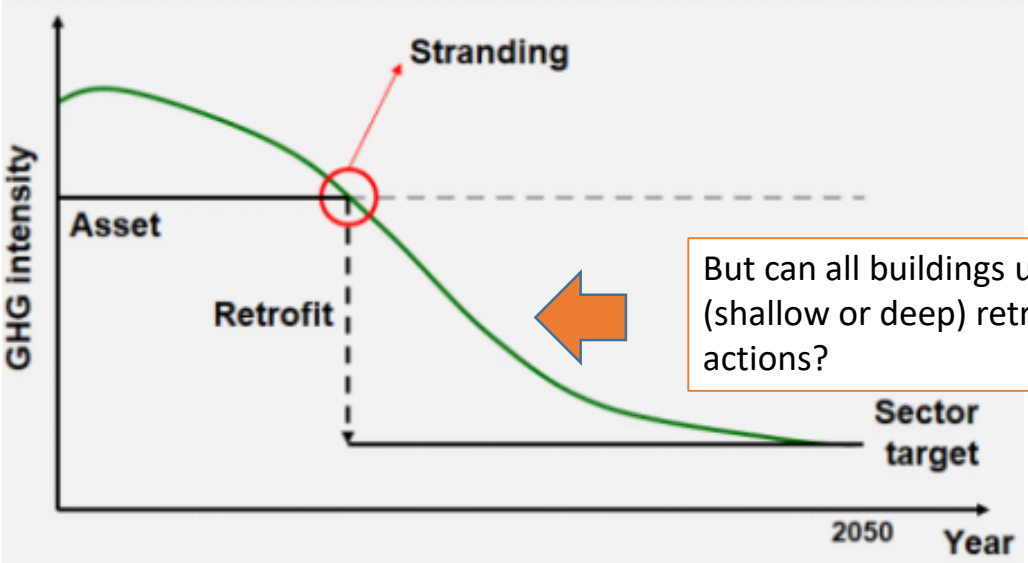
Stranded assets in the future

Figure 1: Stranded assets by sector with REmap and Delayed Policy Action



Source: IRENA analysis

Stranding, assets and retrofit actions

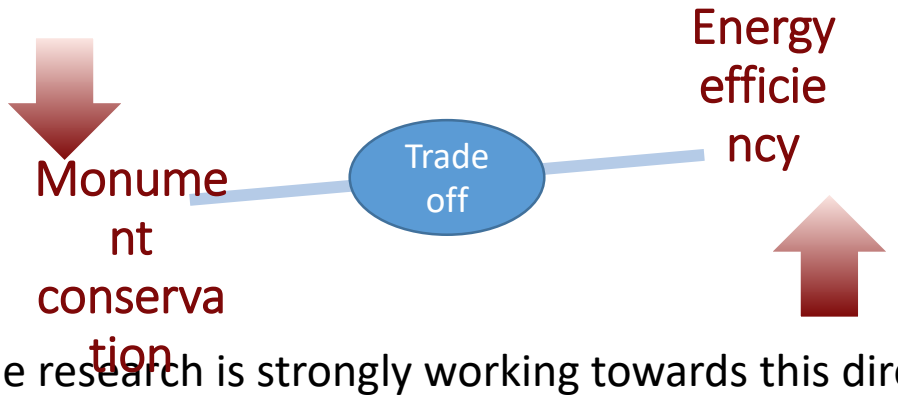


But can all buildings undergo (shallow or deep) retrofit actions?

- *Sources: CRREM - Stranding Risk & Carbon - Science-based decarbonising of the EU commercial real estate sector, 2019*

Historic buildings: future stranded assets?

The task is to explicitly consider the **assessment of historic value** and include it in the decision making process along with **energy efficiency targets**



In **Italy** the research is strongly working towards this direction.

- In fact, there are about **4.000.000** of the 5.367.000 **monuments** totally censed in Europe (60% of the world's cultural heritage)
- Among them, heritage buildings built **before 1919** are assessed to be **19%,** and those built **between 1919 and 1945** are about **12%**
- Buildings of “historical interest” (listed buildings) account for **around 8%** of the total buildings
- They all present very poor energy performances

Energy restoration

- Dlgss 192/2005 and 311/2006 relieve historical heritage from energy efficiency obligations "**in cases where compliance with the requirements would imply an unacceptable alteration of their historical and/or aesthetic characteristics**"
  - Despite that is possible to access tax incentives even with only **minimal interventions** (shallow retrofit rather than deep retrofit) on the historical heritage
- In this case we are not only referring to energy efficiency or retrofitting, but also to "energy restoration"..

Historic buildings

- How to combine efficiency and the protection of historic buildings towards an objective of crucial reduction of their energy consumption?
- The restoration on historic buildings must be targeted as one of the most stimulating challenges for the future:
  - overcome the poor and inadequate regulations: “modern” legislations
  - Consider the "adaptive re-use“ that respect the criteria of "non-invasiveness" and "compatibility“
  - collect information and monitoring data of energy performance of the historical building components in order to consciously predict the behaviour of the solutions adopted and risks: **improvement of technologies for data collection and analysis**
  - creation of **new technologies and new materials**, not yet in the market (materials for thermal insulation, gel for windows, etc.)
  - Lack of a shared methodology to **allocate resources** at a portfolio level considering **multiple objectives**, within given constraints: methodology to **deal with energy retrofit in wide building stocks**, overcoming the single-building perspective
- Energy efficiency must be considered a form of protection, of the individual building or a group of buildings, and even of the same cultural identity of a community (an incentive for heritage tourism and the related economy)
- They cannot become **a stranded asset**!

Conclusions

- Buildings represent a critical piece of a **low-carbon future and a global challenge** for integration with sustainable development
- Buildings embody the greatest unmet need for energy services, and the use of much of the existing energy in buildings is costly and inefficient. Existing buildings and those that will be constructed will determine much of the global energy demand
  - Current trends indicate an increase in constructed buildings, energy demand and related emissions.

- However, buildings offer immediately available and very cost-effective opportunities to reduce energy demand while helping to achieve other critical sustainable development goals