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BUILDING FOR TOMORROW

Exploring case studies, legislation and investor best practice in greening real estate

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TABLE OF CONTENTS

INTRODUCTION

By transforming the built environment, we can significantly reduce the threat of climate change. So much so that buildings are envisaged to be amongst the first sectors to decarbonise as tackling global emission moves to a faster lane. Moreover, the physical impacts of climate change require the buildings to have resilience taken systematically into account. Therefore, adaptation of buildings to inevitable climate change needs to be urgently incorporated alongside mitigation efforts

Climate change poses clear and material risks to the real estate sector. Consequently, there is a growing number of investors who demonstrate that climate-conscious interventions can both preserve and increase asset value. Incorporating climate change into investment practices is also increasingly accepted as the new norm of the industry. Institutional investors and companies are expected to report on voluntary basis according to the Task Force on Climate-related Financial Disclosures (TCFD) recommendations. The finalisation of the recommendations in 2017 marked a turning point on how to understand and respond to climate risk and opportunity – and the framework is expected to become the standard practice in climate-related reporting. The recommendations explicitly call for the description of the resilience of the organization's strategy, taking into consideration different climate related scenarios, including a 2°C or lower scenario. Considerably more ambitious emissions reductions and adaptation to climate change are therefore an integral part of the real estate sector's future.

The replication of good practices to ensure the capitalisation the full potential of the building sector is of pivotal importance. For this reason, this literary review has collected a handful of concrete case studies from different national circumstances and of various types of buildings to demonstrate what can be done both in the realm mitigation and adaptation. Also, some European legislative examples from the frontrunner countries has been collected. Lastly, a comprehensive collection of international and Finnish examples on institutional investors' (asset owners and asset managers) currently demonstrated best practice has been compiled at the end of the report.

CLIMATE CHANGE MITIGATION OPTIONS FOR REAL ESTATE INVESTORS

Climate-proofing buildings can be financially lucrative to investors as there are demonstrated profit gains. For some related investments, e.g. energy efficiency refurbishments, the return on investment is easy to calculate when the costs of the refurbishment and the consequent energy savings and energy price are known.

Some aspects of the return on investment are, however, more difficult to allocate and thus need to be estimated based on studies. According to Fuerst et al. (2017) eco-certified buildings sell at a premium of approximately 5% relative to non-certified buildings. This can be contributed to e.g. higher rental income or lower costs. Another study shows that not only do buildings with sustainability features, e.g. energy certificates, attract higher rents, but they also do so at no additional long-term risk and with reduced short-term volatility. They contribute this finding to likely result from the higher demand for space with sustainability characteristics and increased business efficiency of operating such properties. According to their findings, rental rates adjust to the new level over two years of increased volatility (Szumilo & Fuerst, 2017.)

Portfolio-level sustainability investment by ABP-owned Vesteda, the Netherlands

Vesteda is the largest commercial residential fund in the Netherlands with a portfolio of around 22,500 residential units. In 2015, the company decided to invest €23 million over 6 years in refurbishment measures to improve the energy efficiency of its building stock. The measures included better insulation, double-glazing, high-efficiency boilers and solar panels. In addition, Vesteda started a programme to make staff aware of the importance of sustainability and best practices. The investment resulted in a notable increase in the company's GRESB ranking, spurred by an almost 30 percentage point rating climb from 38 to 67 out of 100. The investment decision resulted from a policy change by ABP and other stakeholders. At the time, ABP owned 43% of Vesteda.

Source: ABP Report Sustainable and responsible Investment 2016

Prefabricated systems for deep energy retrofits of residential buildings

Today, most building renovations still address single building components, such as roofs, façades or heating systems. This often results in inefficient, inappropriate (causes local condensation or overheating) and ultimately expensive solutions (IEA, 2011). Deep renovations using such conventional approaches are often as costly as demolishing and constructing new.

Largely standardized façade and roof systems that are suitable for prefabrication for typical apartment buildings (representing ca 40% of the European dwelling stock) have several advantages including:

(1) reduced energy consumption for heating, cooling, ventilation and hot water between 60% and 90%;

(2) improved comfort and indoor air quality;

(3) a quick process with minimized disturbances for inhabitants, and

(4) less waste during the building process.

Off-site industrialization of the construction of prefabricated elements will lead to lower costs for holistic energy renovations through reduced person-hours and wharf costs when scaffolding, crane and construction site infrastructure are no longer needed, decreased logistics as well as economy of scale from reusing models and limiting the time spent on individual projects. The highly insulated new building envelope may also include smart solutions, a ventilation system and even produce energy (Buildings Performance Institute Europe, n.d., c.).

Prefabricated systems are currently introduced in the Helsinki Metropolitan area through the Smart Elements for Renovation Leap -project that is implemented by Sitra in collaboration with Helsinki, Espoo, Vantaa, Uusimaa Regional Council, several ministries and the Climate Leadership Coalition (Smart & Clean, n.d.).

Stroomversnelling, the Netherlands

The Stroomversnelling cooperation was started by four construction companies and six social housing associations with support of the Dutch government. The goal of the cooperation is to renovate 111,000 dwellings to a net zero energy level before 2020. The concept consists of a deep-retrofit plan and a business model, where the money the tenant would spend on their energy bill is freed up and paid as an Energy Performance Fee (EPF) to the housing association. Thus, the savings from the energy bills are used to finance the deep-energy retrofits. The deep-retrofit-pan measures are: reducing heat demand by insulation (facades and roof), adding ventilation system with heath recovery, replacing gas boiler by heat pump boiler, and adding a solar roof with PV to generate electricity.

Source: van Goch et al. (2017)

Thermal energy storage for buildings

The role that thermal energy storage (TES) systems play in energy conservation in the building and industrial sector has been widely acknowledged. The use of TES helps alleviate the load mismatching between the energy supply and its demand while TES systems in active and passive systems enables the use of waste energy, peak load shifting strategies and efficient use of thermal energy. Advantages may be summed up as the increase of the overall efficiency and reliability, financial gains through reduced investments and running costs, and less CO2 emissions.

Passive TES systems utilize the naturally available heat energy sources to create comfortable indoor conditions and minimize the use of mechanical heating or cooling systems. Passive systems refer to the use of ventilated facades, thermal mass, shading effect using blinds, coated glazing elements, solar heating and free cooling (night ventilation) techniques.

Active TES systems are used to control indoor conditions, improve storage of heat energy, provide free cooling (low night outdoor temperature is stored and released when cooling is needed) or to shift the thermal load during peak hours. Active TES applications include domestic hot water appliances and heating, ventilation and air-conditioning (HVAC) systems.

Associations such as IEA, The European Technology Platform on Renewable Heating and Cooling (RHC-Platform) and The European Association for Storage of Energy (EASE) have highlighted the potential of TES in reducing energy demand of buildings. However, issues remain to be explored including ways to reduce cost, increase the compactness, density and thermal properties of the materials and systems (de Garcia et al., 2015).

Aquifer Thermal Energy Storage (ATES) system retrofit, Rotterdam

A retail and office building at Groot Willemsplein in Rotterdam, built in the 1940's, was retrofitted with an aquifer thermal energy storage system. In the summer, heat will be absorbed and stored in a ground water aquifer, which will make it available in winter to heat the building in an energy efficient way, and vice versa. Consequently, the measure contributes to both climate change adaptation (preparing for increased cooling needs in summer in a sustainable way) and mitigation (energy efficiency leading to reduced CO2 emissions). The system saves some 24.000€ per year. With a net investment cost that is approximately 225.000€ higher compare to a conventional system, the return on investment for the ATES is about 9.5 years.

Source: http://climate-adapt.eea.europa.eu/metadata/case-studies/climate-resilient-retrofit-of-a-rotterdam-building/

Building automation and control technologies

Building Automation (BA) can refer to Building Automated Control Systems (BACS), Building Automation Technologies (BAT) and Home and Building Energy Management Systems (HEMS/BEMS) of which the latter saves energy most cost-effectively. They all adjust settings in Heating, Ventilation and Air Conditioning (HVAC) systems automatically using self-learning control systems. These dynamic systems can determine and adjust parameters including optimal temperature, heating time, light lumen and overheating protection according to occupation of the building, forecasted inside and outside temperatures. Final energy use of a building is determined by building envelope qualities like design and orientation, (renewable energy) installations and user behavior (turning on heating and air conditioning, opening windows, switching on lights) that is adapted to the newly constructed or renovated building.

User behavior creates the significant gap between the actual and designed final energy demand. This gap can be substantially reduced using so called Ubiquitous Home systems that learn user behavior and respond accordingly. Average net energy savings per installation are promising: ca 37% for cooling/ventilation, space and water heating, and 25% for lighting. Building Automation complements smart metering and is a necessary component when buildings are integrated into the energy market through on-site renewable energy generation, storage and demand management. European countries leading the market development include Germany, Scandinavian countries, the UK and the Netherlands (Buildings Performance Institute Europe, n.d., a).

The Edge, Amsterdam

The Edge is an office building owned and occupied by Deloitte in Amsterdam. One of the greenest office buildings in the world, it has been built with several sustainability features in mind. The Edge uses 70% less electricity than a comparable office building. One of its key attributes is the lighting automation and control system, enabled by 30,000 sensors in the building. The sensors enable facility managers to assess how and when certain parts of the building are being used. Each light is controlled over the Ethernet (Light over Ethernet, LoE LED), which means that each led can be individually controlled. Over the long term, emerging patterns showing light use of certain locales on certain days can lead to rooms or even entire floors being closed off to save energy.

Sources: https://www2.deloitte.com/global/en/pages/about-deloitte/articles/gx-the-edge-of-tomorrow.html, http://www.breeam.com/case-studies/offices/the-edge-amsterdam/

Green lease

A split incentive problem exists between tenants and landlords of office spaces when neither party has adequate incentive to invest in energy-efficiency upgrades or energy management. Leases may contribute to the problem. Leases do not usually allow tenants to make structural modifications (e.g. energy upgrades) to the premises, enable landlords to reclaim the cost of energy renovations from tenants or require parties to share energy consumption data with one another which can obstruct energy management. 'Green leasing' aims to facilitate landlords and tenants to achieve environmental goals by modifying their practices to cooperate through the lease and foster more effective communication.

The Australian government has made green leases mandatory and requires them for all new government leases of more than 2000 m2 through the national Green Lease Schedule. The evidence to date in the UK and Australia suggests that green leases provide a 'necessary but insufficient' mechanism in rental commercial property. However, Better Building Partnerships (BBP) – groups of leading commercial property owners that promote collaborative efforts across the industry to enhance sustainability - in Sydney and the UK are developing the concept further as green leases encourage inter-organizational energy and environmental management (Janda et al., 2016).

Cherry Street Plaza, Cleveland

Cherry Street Plaza is a 1,400 m2 mixed-use office and retail centre. The property owner, NEO Realty Group converted it's tenant's, the American Cancer Society's (ACS) lease contract into a green lease contract to perform energy efficiency upgrades. Pre-upgrade, the ACS paid its utility expenses directly to the utility provider. NEO Realty Group covered the ENERGY STAR lighting and HVAC upgrade costs, which reduced the ACS's utility bills by 43%. For the first 48 months post-upgrade, the owner captured 65% of the 43% (28%) in total savings to pay off the investment. Thus, the tenant will benefit with 16% utility savings in the first 48 months, and 43% of utility savings after the first 48 months.

Source: http://www.imt.org/uploads/resources/files/NEO_Realty_Green_Leasing_Case_Study.pdf

Sustainable electricity

An efficient way to reduce the life-cycle carbon footprint of a building is to switch to sustainably generated electricity[1][2]. Average emissions of electricity consumed in Finland is 273 grams CO2e / kWh which is based on the average mix of energy (emissions from the entire fuel supply chain) consumed during 2007-2013 (Statistics Finland). Average emissions for green electricity produced in various ways is considerably lower - 10 grams CO2e / kWh (Green Building Council Finland, n.d.).

In Finland, sustainable electricity generation is rooted in wind and solar technologies, in particular. Electrifying heating (by installing heat pumps, for instance) for buildings is also a highly recommendable action to reduce emissions - provided that the electricity is sustainably generated.

[1] The negative environmental impacts of certain renewable energy sources are well documented, particularly in hydropower and bioenergy. This requires the electricity providers to be chosen carefully to ensure environmental integrity.

[2] WWF's position paper on EU bioenergy: http://d2ouvy59p0dg6k.cloudfront.net/downloads/eu_bioenergy_policy___wwf_briefing_paper___final_4.pdf

Renewable energy and passive technologies for nearly zero energy buildings

Rabani et al.'s (2017) review indicates that integration of passive and renewable technologies, especially those making use of passive solar energy and phase change materials (PCMs) with building elements such as BIPV/T are the most effective methods to reduce building-related energy. These technologies thus play a key role in achieving a zero or plus energy level. Phase-change materiala are capable of storing and releasing significant amounts of energy. It can be placed in the exterior wall to increase the time delay between absorption of solar energy and its transfer to living areas thus reducing the wall's capacity as a heat sink. A hybrid BIPV/T-GSHP system that is currently in development combines photovoltaic panels and thermal system (BIPV/T) with ground source heat pump system (GSHP) to achieve a nearly zero energy building (nZEB) level. The dual technology of a PV/T system creates a significantly more efficient panel and can supply both electricity and hot water simultaneously. The excess heat removed from the BIPV/T system can be utilized by the GSHP to charge the ground borehole (Rabani et al., 2017).

Power House Kjørbo, Norway

Power House Kjørbo is a renovation project of a 1980s built office building where the interior, facades, windows and technical systems have been renewed to reach nearly zero-energy building criteria in Nordic conditions, 15km to the West from Oslo. This is accomplished with occupancy sensors controlling lighting, ventilation and energy usage. Energy is supplied with solar PV panels and a ground source heat pump.

Source: Dokka et al. (2015)

Cooperative Net Zero Energy Communities

The energy performance of buildings directive aims all new buildings to be nearly Net Zero Energy Buildings (Net-ZEB) by the end of 2020[1]. In general, Net Zero Energy Building does not have one fixed definition and it can vary in the strictness of the interpretation. However, typically it refers to a building that, over a certain period of time (such asone year), supplies as much energy using renewable energy technologies as it consumes from the grid. As the on-site supply of renewable energy is restricted by the availability of the respective primary energy source there is often a mismatch between the local generation and the net demand.

One solution to the local matching challenge is provided by Cooperative Net Zero Energy Communities (CNet-ZEC) where all buildings cooperate by sharing the total on-site produced energy and by modifying their demand patterns to address the load matching of the entire CNet-ZEB community and thus integrate the community. Cooperative Net Zero Energy Communities have a potential to improve load matching thanks to:

(1) different demand patterns of community buildings;

(2) higher number of devices controlled by demand-side management, and

(3) greater capacity for on-site energy generation (Lopes et al., 2016).

Current research is mainly focused on enhancing the load matching of individual buildings but Lopes et al.'s (2016) study extends the discussion to the wider community level.

[1] However, the transposition of the directive in Finland has been considered controversial due to a relatively high nationally adopted E-numbers for different building types (kWhE/m2).

CLIMATE CHANGE ADAPTATION OPTIONS FOR REAL ESTATE INVESTORS

In addition to promoting mitigation measures, real estate investors also need to consider building resilience by adapting to the impacts of climate change, such as increased flooding caused by sea-level rise or extreme weather events, i.e. storms and wildfires. In addition to physical damage to buildings, these impacts can affect insurance risk premiums in high-risk areas. Climate change adaptation measures include e.g. specialized materials such as pervious concrete, as well as green roofs and rainwater harvesting systems.

Green space factor and Green Points

The green space factor refers to a system where factors are assigned to different surface types which add up to a green space factor for an entire area. High factors are granted to green roofs, large trees, and walls covered with climbing plants. The aim is to encourage incorporating a certain amount of green cover in every housing unit and minimize the sealed or paved surface areas, especially in new developments.

This approach can result in a more attractive, healthy environment for people and simultaneously builds up biodiversity, helps cope with temperature extremes, reduces stormwater runoff and air pollution through an improved microclimate.

These factors were first applied in a new housing district developed in the Western Harbour in Malmö, Sweden and has been used in Hamburg, Berlin, Seattle and more recently in Jyväskylä, Finland (Kruuse, n.d.).

Rainwater harvesting system

Rainwater harvesting systems (RWHS) consist of containers that collect runoff from rooftops during rain and convey it to a cistern tank which can be either released or re-used during dry periods. Rainwater harvesting systems are referred to as low-impact development (LID) facilities together with green roofs, permeable paving and roadside ecological spaces among others.

These low-impact development facilities reduce peak and total runoff with considerably lower costs compared to conventional flood control techniques such as underground culverts. A rainwater harvesting system with an optimized spatial rain barrel can reduce inundation losses with as much as 72% and thus provides a viable alternative for urban flood mitigation (Huang et al., 2015).

In addition to flood mitigation, rainwater harvesting systems also bring water and energy savings. Chiu, Tsai and Chiang (2015) found in another study that rainwater harvesting systems enabled a 21.6% savings in domestic water consumption and 138.6 (kWh/year/family) energy savings.

Current centralized urban water supply systems demand energy in all processing phases, such as purification, distribution, and sewage treatment (Chiu et al., 2015). However, rainwater can be harvested on-site and used to flush toilets, water the garden, wash cars and for other non-potable functions without any treatment and transportation (ibid.). Multiple significant indirect benefits of rainwater systems thus include CO2 emissions reduction and flood runoff mitigation (ibid.). Additionally, they are easy and cheap to install s (Huang et al., 2015).

Manskun Rasti, Helsinki

Manskun Rasti, built and accommodated by Skanska Finland, has the LEED Core & Shell Platinum certification, as well as the EU GreenBuilding certification. The building has a rainwater management system that collects water for toilet flushing, with a total roof collection area of 2,200m2 and storage capacity of 70m3. The system reduces stormwater runoff and, coupled with the building's efficient water fixtures, causes the building to use around 50 percent less water than the LEED baseline for the building.

Source: https://group.skanska.com/projects/57337/Manskun-Rasti/sustainability

Green roofs

Green roofs are already in extensive use for stormwater retention – to reduce and delay runoff and peak flows on urban surface areas - across various climates including the Nordic cold and wet locations. These multifunctional roof gardens help mitigate flooding by removing water through both evaporation from the surface and plants transpiration. They also store water in the vegetation, substrates and special layers (Johannessen, 2017).

Green roofs and facades can also play a useful role in reducing building-related energy consumption thanks to their energy-saving, thermal insulation, shading and evapotranspiration qualities. Green roofs also address the urban heat island challenge.

Green roofs consume 2.2–16.7% less energy than conventional roofs in the summers and a similar tendency has been detected in the winters - depending on regional and climatic conditions. Heat flow through roofs in summer can be slashed by 80% using green roofs. The temperature difference between traditional and green roofs has been confirmed as 4 °C in winter and ca 12 °C in summer - while the roofs can contribute to thermally comfortable indoor and outdoor conditions. In addition, average carbon accumulation capacity of green roofs has been measured in the range of 0.375–30.12 kg carbon/m2 (Besir et al., 2018).

Green roof policy of Helsinki

The Helsinki City Board adopted the first comprehensive green roof policy in 2016. The strategy includes active promotion of green roofs through (1) integration in city planning, pilot projects and allocation of plots, (2) a requirement to demonstrate having considered integrating green roofs in all new construction projects with roof slopes less than 20 degrees, (3) developing local and municipal expertise through monitoring, evaluation and dissemination of information, (4) requirements set on depth of the substrate and species, and (5) promoting resource-efficient materials. Helsinki city will disseminate information on benefits and best practices to interested parties and explore financial instruments (City of Helsinki, 2016).

Simulation case study on green roofs, Helsinki

Green roofs benefit building owners through energy savings, membrane longevity (longer service life), sound insulation and aesthetic value. The energy savings depend on various factors, such as current insulation and the surrounding microclimate. Finnish Meteorological Institute's analysis shows that for a simulation performed in Helsinki and assuming electricity price of 0.1€/kWh including transfer price, the total discounted energy savings benefit of a green roof for a new building (U=0.09) is 3.33€/m² and for an older building (built before 2005, U=0.15) 22.86€/m². Excluding the non-monetary aesthetic value, a cost/benefit analysis shows that the break-even green roof installation cost for an older multilevel office building is around 30-40€/m² in Helsinki.

Moreover, public benefits of 6 – 10€/m² are produced by improved air quality and decreased sewage costs through improved stormwater management. Non-monetary public benefits include increased urban biodiversity and scenic value.

Source: Nurmi et al. (2013)

Pervious concrete

Pervious concrete comprises of interconnected pores that filter stormwater runoff and therefore make an excellent tool for managing flooding in urban areas. The VTT Technical Research Centre of Finland has developed pervious concrete that is durable for arctic environmental conditions. The new materials are optimized during design, construction and maintenance to filter high volumes of runoff to the substrate rather than burdening stormwater collection systems or polluting water bodies close-by.

This brings various benefits to the environment, including:

1) enable soil to remove chemicals, oils, metals and other pollutants while filling up the ground water level;

2) water trees and plants;

3) improved traffic and pedestrian safety as less ice is formed on pavements;

4) keeping temperatures lower in urban areas.

Also, a governmental directive in Finland obliges municipalities to deal with stormwater. Field projects have been conducted in Helsinki, Vantaa, Espoo and Oulu. Pervious concrete is suitable for areas with low traffic such as parking lots, pavements and courtyards (Kuosa et al., 2014).

LEGISLATIVE EXAMPLES FROM FRONT-RUNNER COUNTRIES

The EU legislation heightens expectations that the building sector needs to decarbonize quicker than the other emitting sectors. According to Roadmap for Moving to a Competitive Low Carbon Economy in 2050 (European Commission, 2011), soon the be replaced by an updated one to reflect the Paris Agreement's ambition level, the emissions from the built environment could be reduced by around 90% by 2050 – which is a higher target than for other sectors.

Buildings have a climatic impact throughout their life cycle and regulatory interventions can target them at various points. The life cycle carbon analysis of buildings and building materials is already regulated in some European countries, while in other jurisdictions regulation has been introduced ensure lower energy use in existing buildings.

European Union

The European Commission has also recently broadened its focus to drive the decarbonization of the building stock also by utilizing voluntary actions, initiatives and frameworks in addition to regulation. One such key initiative is the voluntary Level(s) framework, developed in wide collaboration with the various stakeholders of the European real estate and construction industry. With its background in the European Commission's 2014 Communication Resource efficiency opportunities in the building sector and Circular Economy Action Plan, the Level(s) framework provides a flexible system of indicators, that can be incorporated into new and existing assessment schemes or used on their own by a diverse range of stakeholders, including property investors (European Commission 2017). Level(s)' sustainability framework represents circular economy and offers a tiered approach to life cycle assessment. The likewise voluntary Green Public Procurement (GPP) scheme aims at facilitating public authorities in reducing the environmental impacts of the purchased products, services and works, including buildings (European Commission, 2016). The EU GPP criteria feature options on assessing for example carbon emissions, life cycle impacts and recycling of materials and include directions for office buildings in regards to their procurement process. The criteria can be utilized by anyone in addition to the public sector.

The high-level EU climate goals, development of above mentioned voluntary frameworks and the growth of commercial certification systems like LEED and BREEAM, have generated an ambition and an incentive for the EU member countries to start drafting national calculation methodologies and standards for the life cycle assessment of buildings' carbon emissions to support the move towards a decarbonized built environment and eventually regulation of the carbon emissions of buildings.

By following, testing and utilizing these voluntary frameworks and taking part in the development of national and international assessment methods, institutional investors can prepare themselves for the possible upcoming changes in legislation regarding carbon emissions.

France

France currently regulates the environmental impacts of buildings by legislation affecting the building materials and is looking to set regulation for the life cycle emissions of buildings by 2020. For the materials, the decree 2013-1264 obliges the production and publication of product specific environmental product declarations, or EPDs in short (Ministry of Territorial Equality and Housing, 2014). This requirement aims to facilitate life cycle analysis of the environmental impacts of buildings with adequate information as this relies on the data provided by the EPDs. The EPDs are independently verified, registered documents that provide transparent and comparable information about the environmental impacts of building products. The French requirement concerns all manufacturers that promote their solutions to consumers and make

environmental statements about their offering. The decree does not impose any levels on the emissions – it only requires the reporting and publication.

The ultimate goal in France is to introduce regulatory levels for building carbon emissions per square meter by 2020 and a voluntary pilot project is underway to set the basis for the regulation. The pilot with its strict assessment methodology includes detached and row houses, apartment buildings and offices in addition to other types of buildings. The state is looking to gather more information on buildings' life cycle impacts. To cut down emissions, it has also enabled a pilot incentive for the real estate and construction sector where high-performing building projects can apply for additional permitted building volume when applying for a building permit. At maximum, the benefit can amount to up to 30% of the floor area, enabling the construction of a bigger unit on the lot. A national environmental label has also been developed to support the pilot phase and to communicate the excellent performance of the most sustainable buildings for the building users and therefore to showcase the frontrunners in sustainability, which can be utilized by these actors. (Bionova Oy, 2017.)

The Netherlands

In the Netherlands the Dutch Building Decree from April 2012 stipulated that from January 2013 a calculation of material environmental performance for a dwelling or office should be available at submission of the environmental building permit (Scholten & van Ewijk, 2013; Dutch Ministry of the Interior and Kingdom Relations, 2011). The carbon footprint and resource consumption of the structural elements is calculated according to the national methods of environmental impact assessment (Bepalingsmethode Milieuprestatie Gebouwen en GWW-werken and Harmonisatie rekenregels materiaalgebonden milieuprestatie gebouwen). The decree requires life cycle assessment to be used in the process. MPRI, the national database for the emissions of building materials is also advised to be utilised. The assessment features the analysis of the materials' life cycle impacts but does not account for water or energy.

The building regulations of the Netherlands are to be updated in 2018 to feature a maximum limit on carbon emissions of building projects. In addition to the carbon emissions, this would include the assessment of other environmental impacts and even display these negative impacts in monetary terms that showcase their "shadow price" in comparison to better alternatives. For example, a price of 50 € would be set per a ton of CO_2, which then would account to a total price that is allowed per square meter. The price per amount of the measured impact varies based on how harmful impacts it generates. In total, there are 11 different categories and the maximum level of total environmental impact is planned to be set at 1 € per square meter per year from 2018. (Bionova Oy, 2017.)

The UK

Another example of strict legislation regarding the environmental impact of buildings through energy efficiency comes from the UK and could shine light on the possible future of carbon regulation as well. In the UK the Minimum Level of Energy Efficiency standard states that from April 2018 any properties rented out in the private sector are required to have a minimum energy performance rating of E on an Energy Performance Certificate (EPC) and renting a property which breaches the requirement will be unlawful, unless there is an applicable exemption. New lets and renewals of tenancies are affected by the regulations from 1st April 2018 and all existing tenancies from 1st April 2020. (Parliamentary Under Secretary of State Department of Energy and Climate Change, 2015 & 2016.)

The Nordics

Nordic countries are also moving towards regulating buildings' carbon emissions. Sweden will introduce a requirement to report the carbon emissions of building projects by 2020. The focus will at first be on the emissions generated by the building materials but will be broadened to account the whole life cycle of buildings later on. In Norway, the assessment of CO_2 emissions is required in all public building projects carried out by the state. The requirement is complimented by a national calculation standard and tool to be utilised in the analysis. Finland is aiming to

introduce regulatory carbon emissions levels for buildings by 2025 and is now developing a national calculation standard. (The Ministry of Environment in Finland, 2017.)[1]

[1] The regulatory changes are introduced in part to increase wood-based construction. However, the climate benefits of using wood to replace construction materials is heavily dependent on the appropriate carbon accounting and the impacts of the Finnish carbon sinks, which are under threat due to increasing domestic harvesting levels. Between year 2000 and now the carbon sinks of Finnish forests (that remain forest) has been more than 35 Mt/a on average. During the reference period (1990-2009) of the EU Commissions LULUCF proposal the average sink has been more than 31 Mt/a. Current bioeconomy policies set by the Finnish government are aiming to increase the harvest level from 65 Mm3/a (2013-2014) to 80 Mm3/a in the next decade. According to the analysis on the Finnish Natural Resource Research institute these increased harvest will lead to dramatically reduced carbon sinks of 13,3 Mt/a around year 2030. The negative climate impact due to increased wood harvests will be larger than all the emissions of the Finnish transport sector.

A SUMMARY OF ASSET OWNERS' ACTIVITIES COVERING CLIMATE CHANGE AND ENERGY IN REAL ESTATE AND PROPERTY INVESTMENTS

The following list includes a summary of asset owners' activities on climate change and energy in real estate and property investments. The list includes a selection of asset owners that have been AAA rated in 2017 by the Asset Owner Disclosure Project (AODP) and the largest Finnish investors.

The review is conducted by an internet search covering following asset owners and one asset manager:

Local Government Super (LGS), Australia

Environmental Agency Pension Fund (EAPF), Great Britain

Kommunal Landspensjonskasse Gjensidige Forsikringsselskap (KLP), Norway

Fjärde AP-fonden, Sweden

Elo, Finland

Pensionskassernas Administration (PKA), Denmark

Sjunde AP-fonden (AP7), Sweden

Ilmarinen, Finland

Varma, Finland

Keva (Local Government Pensions Institution), Finland

Valtion eläkerahasto (State Pension Fund), Finland

Osuuspankki, Finland

ABP, The Netherlands

First State Super, Australia

New York State Common Retirement Fund, US

FRR Fonds de Réserve pour les Retraites, France

Church Commissioners for England, UK

NZ Superannuation Fund, New Zealand

UNJSP United Nations Joint Staff Pension Fund, US

Local Government Super (LGS), Australia

Value of real estate; Real estate's share of total assets (%):
EUR 397 million; of which EUR 352 million in direct property investments; 5.9% (LGS, 2016a.) of total assets of EUR 6.7 bn.

Types of buildings:
Office 53 %, retail 39%, industrial 8% (of direct property assets worth EUR 397 million) (LGS, 2016a.)

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 1 (↑2)

Current energy consumption of all buildings:
Average NABERS Energy rating of 4.71 Stars (LGS, 2016b.) (see Glossary)

Energy efficiency and conservation targets for buildings: -

Additional energy conservation and environmental commitments and aims:
Continuous improvement of the energy, water and waste performance of buildings by engaging with tenants, property managers and industry stakeholders (NSW, 2015). 100% GreenPower is purchased for the base building energy needs in direct property investments and funds; LSG requires all tenants to purchase 100% GreenPower (NSW, 2015).

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
Montreal Pledge signatory, The Portfolio Decarbonization Coalition (PDC) member.

Environmental Agency Pension Fund (EAPF), Great Britain

Value of real estate; Real estate's share of total assets (%):
N/A; EUR 449 million in real assets (property, infrastructure, forestry, agriculture) or 12.1% of total assets (EAPF, 2017).

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 2 (↓1)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims:
Before choosing property investments, funds are assessed according to the Global Real Estate Sustainability Benchmark (GRESB, 2017a); 14 of the 15 current funds received Green Star status (GRESB, 2017b.) (see Glossary)

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
Montreal Pledge signatory, The Portfolio Decarbonization Coalition (PDC) member.

Kommunal Landspensjonskasse Gjensidige Forsikringsselskap (KLP), Norway

Number of people insured (members):
710 000 members (KLP, 2016)

Value of real estate; Real estate's share of total assets (%):
6.1 billion EUR or 9.9% of total assets of 61.2 billion EUR (KLP, 2016)

Types of buildings: Office, retail (KLP, 2017b.)

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 7 (↑12)

Current energy consumption of all buildings:
Average energy consumption (2016) of offices managed by real estate management company KLP Eiendom in Oslo, Trondheim, Copenhagen and Stockholm - 188 kWh/m2; average energy consumption of KLP's office building KLP Huset and offices in Bergen and Trondheim – 142 kWh/m2 (KLP, 2017a.)

Energy efficiency and conservation targets for buildings:
From 188 to 180 kWh/m2 by 2017 for buildings managed by real estate management company KLP Eiendom (owned by KLP) in Oslo, Trondheim, Copenhagen and Stockholm; no reduction targets for other offices.

Additional energy conservation and environmental commitments and aims:
A reduction target for business travel (largest source of GHG emissions of office staff) of KLP's staff for 2017 is estimated at 5% (KLP, 2017a.); new buildings must fulfill requirements of 'low-energy houses' and investigate the possibility of installing renewable energy; all larger objects are BREEAM certified (KLP, 2017b.); target for waste separation at source for offices managed by KLP Eiendom is 40-56% (KLP, 2017a.), for KLP's own offices 75% and for new buildings 80% (KLP, 2017b.)

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
The Portfolio Decarbonization Coalition (PDC) member

Fjärde AP-fonden, Sweden

Property management companies Vasakronan (jointly owned by the First, Second, Third and Fourth Swedish National Pension Funds) and Rikshem (50% Fourth Pension Fund and 50% AMF Pensioninsurance)

Value of real estate; Real estate's share of total assets (%):
EUR 2.5 bn or 8.6 % of total investments; EUR 33.7 bn (AP4, 2016)

Types of buildings:
ca 50% commercial buildings (managed by Vasakronan), ca 25% houses and real estates with long-term leases primarily for municipalities (managed by Rikshem) (AP4, 2016)

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 8 (↓5)

Current energy consumption of all buildings:
Commercial buildings managed by Vasakronan - 110 kWh/m2; water intensity 0.5 m3/m2/year (Vasakronan, 2017); Buildings managed by Rikshem: ca 117 kW/m2 (2016); 4% reduction in 2016 from 2015 (Rikshem AB, 2017a.)

Energy efficiency and conservation targets for buildings:
Property management companies Vasakronan and Rikshem have their own sustainability targets. 2017 targets for AP4's commercial buildings managed by Vasakronan include: 3% improvement in energy performance from 2016; 50% of buildings have energy performance below 100 kWh/m2; 50 PV systems installed at properties; in 2016 37 PV systems that generate ca 2,400 MWh per year (Vasakronan, 2017). For houses and other real estates managed by Rikshem: 20% energy saving target between 2013 and 2023 (Rikshem AB, 2017b.)

Additional energy conservation and environmental commitments and aims:
2017 targets for AP4's commercial buildings managed by Vasakronan include: higher GRESB ranking (see notes below); increase the percentage of buildings with environmental certification;

increase reuse of materials in project development; 5% less waste generated during project development; food waste is sorted and collected; 100% renewable fuel is used for transports; 10 % lower emissions from commuting and business travel; all leases will include the main requirements of Green Leases (Vasakronan, 2017) incl. purchase environmentally certified renewable energy, reduce energy consumption, comply with building material regulations, recycle waste (Vasakronan, 2012).

For houses and other real estates managed by Rikshem: during renovations energy consumption for heating is reduced by 50%; wood is primarily used to construct apartments, environmentally friendly energy sources and green electricity are used.

Property management companies Vasakronan and Rikshem (both partially owned by AP4) issue green bonds that finance energy-saving measures (AP4, 2016b).

Climate change adaptation measures: N/A

Carbon footprinting/ Montreal Pledge:
Montreal Pledge signatory, The Portfolio Decarbonization Coalition (PDC) member.

Elo, Finland

Number of people insured (members):
500 000 members

Value of real estate; Real estate's share of total assets (%):
EUR 2.9 bn (direct property investments) or 13.3% of total assets of EUR 21.5 bn (Elo, 2016); additional EUR 730.4 million in real estate funds (Elo, 2016).

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 10 (↑69)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims:
Provide information on water and energy consumption to tenants and seek ways to reduce consumption and environmental impact; energy saving measures are taken into consideration during renovations and maintenance; aim to install energy saving technology and utilize renewable energy where possible; test new solutions in lighting, telematics, metering and automatization (Elo, 2017); sign the voluntary Energy Efficiency Agreement in 2017 (Elo, 2017); by 2025 a significant share of real investments (incl. real estate) will support UN's Sustainable Development Goals (Elo, 2017).

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
Montreal Pledge signatory.

Pensionskassernas Administration (PKA), Denmark

Number of people insured (members):
275 000 members

Value of real estate; Real estate's share of total assets (%):
N/A; total assets - ca EUR 33.6 bn in 2015 (AUM, market value) (PKA, n.d.)

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 13 (↓7)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims:
Shift from the current energy label class C to B (following EU's Energy Performance of Buildings Directive) for properties in Denmark (average for all buildings) by investing in latest climate technology (PKA, 2016); this would reduce the properties' CO2 emissions per square meter by 50% from 2008 to 2020; continue to certify properties (7 certified by 2017) (PKA, 2016); in 2015 a 40 million EUR (DKK 300 mill.) fund called SustainSolutions was established to finance energy renovations for social and public housing projects (HPPF, 2015); an analysis is conducted to see if this model could be extended to residential properties owned by PKA (HPPF, 2015); issue green bonds that finance renewable energy installations and energy efficiency measures (HPPF, 2015).

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: N/A

Sjunde AP-fonden (AP7), Sweden

Value of real estate; Real estate's share of total assets (%):
N/A (no direct investments in real estate); total assets EUR 15.2 bn (AP7, 2017)

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 16 (↑16)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims: N/A

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: Montreal Pledge signatory

Ilmarinen, Finland

Number of people insured (members):
1.1 million members. (Etera's former customers have transferred to Ilmarinen as of 1st January 2018)

Value of real estate; Real estate's share of total assets (%):
EUR 4.7 bn (2017) (Ilmarinen, n.d.) or 11.9% of total assets of EUR 39.36 bn (Ilmarinen, 2017c.)

Types of buildings:
Office 21%, residential 17%, indirect property investments 11%, hotels 9%, retail 8%, warehouse 6% (Ilmarinen, 2016a.), ie. 3600 apartments and ca 100 office and retail buildings (Ilmarinen n.d.)

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 19 (↑214)

Current energy consumption of all buildings:
36 kgCO2e/m2 (only direct property investments in Finland); includes electricity, heating, water, district cooling (Ilmarinen, 2017a.)

Energy efficiency and conservation targets for buildings:
10% by 2020 from 2016 level; 20% by 2025 (Ilmarinen, 2017a.)

Additional energy conservation and environmental commitments and aims:
Signed a voluntary Energy Efficiency Agreement and committed to 10.5 % energy savings during 2017-2025 from 2014 levels (Ilmarinen, 2017a.); LEED gold standard or equivalent required for office buildings; use of solar and geothermal energy is mapped for several real estates; energy saving measures implemented incl. automation and ventilation systems and lights; life cycle carbon footprint analysis is conducted for all new constructions from 2016 onwards (Ilmarinen, 2017a.); long-term energy efficiency action plans have been developed for all properties (Ilmarinen, 2016b.); energy manager monitors energy consumption of largest properties (Ilmarinen, 2016b.)

Climate change adaptation measures: N/A

Carbon footprinting/ Montreal Pledge: Montreal Pledge signatory

Varma, Finland

Number of people insured (members):
870 000 members

Value of real estate; Real estate's share of total assets (%):
EUR 2.7 bn (2016) (Varma, 2017) or 6.3% of total assets of EUR 42.9 bn (Varma, 2016)

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 66 (↑157)

Current energy consumption of all buildings:
31.1 kgCO2e/gfa2 (gross floor area) (2016); includes electricity, heating, partly water, cooling for 71% of total direct property investments (Varma, 2017). For apartments: 25.3 kgCO2e/gfa2 (2016). For offices: 32.8 kgCO2e/gfa2. (2016) (Varma, 2017)

Energy efficiency and conservation targets for buildings:
15% by 2020 from 2015 levels, 20% by 2025 (gross floor area; 10% by 2025 offices

Additional energy conservation and environmental commitments and aims:
Signed a voluntary Energy Efficiency Agreement and committed to 10.5 % energy savings during 2017-2025 from 2014 levels; shift to 100% renewably produced electricity in residential properties by 2019 (Varma, 2016); BREEAM-certifying all existing buildings by 2025 (Varma, 2016); adjusting ventilation and heating systems, installing more energy efficient lighting especially in office buildings (Varma, 2016)

Climate change adaptation measures: N/A

Carbon footprinting/ Montreal Pledge:
Montreal Pledge signatory

Keva (Local Government Pensions Institution), Finland

Number of people insured (members):
1.2 million members

Value of real estate; Real estate's share of total assets (%):
3,0 billion EUR (of which EUR 720 million in real estate funds) – 6.2% of total investments of EUR 48.5 bn (Keva, 2016b.)

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 205 (↓29)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings:
7% by 2021 from 2014 level; water consumption reduction target 10% by 2021 from the 2014 level (Keva, 2016a.)

Additional energy conservation and environmental commitments and aims:
Keva aims to certify all new offices built during 2016-2020 with LEED or BREEAM; additional important objects will be renovated and certified with LEED and BREEAM by 2021; map installation of renewable energy in new buildings/ purchases; energy management developed for buildings; encouraging tenants to participate;increase the share of green electricity consumed in offices and common areas of apartment buildings from 11% in 2014 to 15% by 2020 (Keva, 2016a.)

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: N/A

Valtion eläkerahasto (State Pension Fund), Finland

Number of people insured (members):
410 000 members

Value of real estate; Real estate's share of total assets (%):
545 million EUR in real estate funds - 2,9% of total assets of 18,8 billion EUR (VER, n.d.)

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 255 (↓132)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims: N/A

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: N/A

Osuuspankki, Finland

Main real estates managed by OP-Kiinteistösijoitus

Value of real estate; Real estate's share of total assets (%):
N/A; total assets equal EUR 1.14 bn (OP, n.d.a.)

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): N/A

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims:
Signed a voluntary Energy Efficiency Agreement and committed to 7.5 % energy savings during 2017-2025 (OP kiinteistösijoitus, 2016); aims to certify all new construction projects (OP kiinteistösijoitus, 2016); constructors are obliged to report amount and manage waste appropriately (ibid.); installation of PVs and geothermal energy is mapped for all new construction projects (ibid.); new solutions are tested for potential scale-up incl. electric vehicle charging stations, green roofs, smart lighting, water conservation technology (ibid.); energy savings will be achieved through real-time monitoring (remote), and management of energy consumption (ibid.); testing how to reduce energy consumption in residential buildings (ibid.); aims to reduce

the carbon footprint of its own operations through CO2 emission limits on company cars (150 g/km), video conferences to minimize business travelling, preferring train and busses to domestic travelling, encouraging staff to use public transport for commuting (OP, n.d. b.)

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: N/A

ABP, The Netherlands

Value of real estate; Real estate's share of total assets (%):
Total EUR 356 billion AUM (June 30, 2015). Sustainable real estate investments EUR 23.4 bn

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 5 (↓1)

Current energy consumption of all buildings:
Only savings reported, in 2016 122 GWh saved. Total energy use is not available.

Energy efficiency and conservation targets for buildings:
ABP encourages real funds to take part in the annual Global Real Estate Sustainability Benchmark (GRESB). New portfolio investments are required to participate.

Additional energy conservation and environmental commitments and aims:
In 2016, 74% of infrastructure investments (expressed as invested assets) took part in the first GRESB infrastructure survey to measure the sustainability performance of infrastructure investments. The results to be used in discussions on how and where infrastructure funds can improve their performance. ABP's aim is that GRESB Infra will become the standard for the sector and expect all ABP's infrastructure investments to participate and have made it a contractual requirement for new investments from 2016.

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: Montreal Pledge signatory. The Portfolio Decarbonization Coalition (PDC) member.

First State Super, Australia

Value of real estate; Real estate's share of total assets (%):
EUR 45 bn AUM. Real estate figures N/A.

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 3 (↑9)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings:
Generic ESG targets stated in the Responsible Investment: Environmental, Social & Corporate Governance Policy. No in detail information on real estate.

Additional energy conservation and environmental commitments and aims: N/A

Climate change adaptation measures:
First State Super has recognized the importance of climate change and is implementing a portfolio-wide Climate Change Adaptation Plan to increase the fund's resilience to the direct and indirect impacts of climate change (Purves, 2016)

Carbon footprinting / Montreal Pledge: N/A

New York State Common Retirement Fund F, US

Value of real estate; Real estate's share of total assets (%):
Assets $192 billion. Real estate USD 12.9 bn (share 6.7%)

Types of buildings: Office 32 %, retail 26%, residential 15%.

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 3 (↑2)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings:
In order to quantify climate risks, and better manage them, the Fund participated in the Mercer LLC study, "Investing in a Time of Climate Change," which identified the impacts that various scenarios of climate change could have on global investors.

Additional energy conservation and environmental commitments and aims:
The Fund created in 2015 a low emission index investment that was doubled to $4 bn in Jan 2018. The increased allocation, from the Fund's regular index holdings, raises the current value of the Fund's sustainable investments to more than $7 bn.

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
The Fund has joined the Ceres Carbon Asset Risk Initiative. Montreal Pledge N/A.

FRR Fonds de Réserve pour les Retraites, France

Value of real estate; Real estate's share of total assets (%):
Total assets EUR 34.5 bn. Real estate share not available.

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 11 (↑5)

Current energy consumption of all buildings: Energy N/A, but emissions are reported: "Intensity of the carbon emissions for the equity portfolio, by scope (tco2e/eurm)"

Energy efficiency and conservation targets for buildings:
N/A, data on real estate not available.

Additional energy conservation and environmental commitments and aims:
FRR has taken an active role in promoting the reduction in carbon intensity of portfolios owned by asset owners.

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
Montreal Pledge signatory. The Portfolio Decarbonization Coalition (PDC) member.

Church Commissioners for England, UK

Value of real estate; Real estate's share of total assets (%):
Total assets EUR 8.9 bn. Real estate share 3%.

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 12 (↓2)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims: N/A

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge:
Montreal Pledge signatory.
The Church of England Pensions Board has reported a carbon footprint analysis on EUR 1bn portfolio showing that the portfolio is 18.48% less carbon intensive than its benchmark, MSCI ACWI. The Church commissioned investment consultants Mercer to conduct climate scenario analysis on the portfolio in 2015.

NZ Superannuation Fund, New Zealand

Value of real estate; Real estate's share of total assets (%):
Total assets EUR 22 bn. Real estate/property share 2 %.

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 15 (↑94)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings: N/A

Additional energy conservation and environmental commitments and aims:
The Fund is committed to reducing exposure to carbon across the whole Fund. Carbon exposure defined as a combination of our portfolio's current emissions (emissions intensity) and potential future emissions (reserves). By 2020, the carbon emission intensity reduction of the Fund expected at least 20%, and its carbon reserves at least 40%.

Climate change adaptation measures:
In 2017 updated Climate Change Investment Strategy the fund has indicated the targets in reducing their carbon footprint which was reported in 2017.

Carbon footprinting / Montreal Pledge: N/A

UNJSP United Nations Joint Staff Pension Fund, US

Value of real estate; Real estate's share of total assets (%):
Total assets USD 66.6 bn. Real Asset (Real Estate, Infrastructure, and Timberland) USD 4.1 bn, 6.5%.

Types of buildings: N/A

Global Climate Index rating of Asset Owners Disclosure Project for 2017 (2016 / 2017 change): 17 (↑3)

Current energy consumption of all buildings: N/A

Energy efficiency and conservation targets for buildings:
Real Assets are externally managed funds and the funds include LEED and BREEAM certified buildings. Funds include renewables in Africa, Central America, Latin America, Europe and U.S.

Additional energy conservation and environmental commitments and aims:
Carbon Footprint target is stated to be lighter than MSCI ACWI index

Climate change adaptation measures: N/A

Carbon footprinting / Montreal Pledge: N/A

Glossary

AUM. Assets Under Management

BREEAM. BRE Environmental Assessment Method. It is an environmental assessment method for buildings and communities.

The Global Real Estate Sustainability Benchmark (GRESB, global). “GRESB assesses the sustainability performance of real asset sector portfolios and assets. It offers ESG data, Scorecards, Benchmark Reports and portfolio analysis tools. Information is collected on performance indicators, such as energy, GHG emissions, water and waste. The GRESB Green Star is a rating on absolute performance for entities that score higher than 50 on the Implementation & Measurement and the Management & Policy areas” (GRESB, 2017a).

Green Power (Australia). Green Power is government accredited renewable energy that organizations can purchase through more than 20 GreenPower providers across Australia. This electricity comes from a variety of sources including wind, solar, mini-hydro and bioenergy, which produce no net greenhouse gas emissions (NSW, 2015).

Green Lease (global). With a Green Lease, Vasakronan and the tenant work together to lower the consumption of electricity, heating and cooling of the office. The tenant recycles waste and complies with the requirements on building materials when renovations are made. The tenant is required to purchase ‘Good Environmental Choice’ labelled green electricity administrated by the Swedish Society for Nature Conservation’s. (Vasakronan, 2012).

Gross floor area (GFA). GFA is the total floor area inside the building envelope, including the external walls, and excluding the roof. Definitions of GFA, including which areas are to be counted towards it and which areas are not, vary around the world (U.S. Green Building Council, 2017).

LEED. Leadership in Energy and Environmental Design (LEED) is a rating system devised by the United States Green Building Council (USGBC) to evaluate the environmental performance of a building and encourage market transformation towards sustainable design.

NABERS (Australia). “The National Australian Built Environment Rating System (NABERS) is a Government initiative in Australia to measure and compare the environmental performance of a building against its market peers. NABERS rates against a set of benchmarks developed using national building performance data and a star rating reflecting the building’s performance relative to its peers is calculated. NABERS can be used to measure a building’s operational energy and water efficiency, indoor environmental quality and waste recovery. The NABERS suite of rating tools measures performance on a 6 star scale, with 2.5 to 3 stars representing average performance. A 6 star rating demonstrates market leading performance, while a 1 star rating means the building is performing well below average market practice and has considerable scope for improvement. NABERS was developed with industry, for industry, and is managed nationally by the Office of Environment and Heritage NSW (OEH) on behalf of federal, state and territory governments (New South Wales government - Office of Environment and Heritage, 2011a).
The Energy Use is adjusted to account for area, climate, hours of occupancy and equipment density. This enables buildings with very different attributes to be compared against the same performance targets. The corrected figure, called the Benchmark Factor, puts the building on a level playing field with other buildings in the same geographic location. The Benchmark Factor is not a kgCO2/m2 figure, but rather a value that enables a building to be located on the benchmark rating scale” (New South Wales government - Office of Environment and Heritage, 2011b).

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