°CICERO Shades of Green

K2A Knaust & Andersson Fastigheter AB (publ)
Shades of Green assessment

Sector: Real Estate

Region: Sweden

May 7, 2020

Executive summary

K2A Knaust & Andersson Fastigheter AB (publ) (hereafter K2A) was founded in 2013 and is a real estate company focusing on long-term management of self-produced rental buildings for all types of housing. By using environmentally friendly raw materials, mostly locally produced Swedish wood, K2A has been able to produce the buildings with lower climate impact compared to conventional house production.

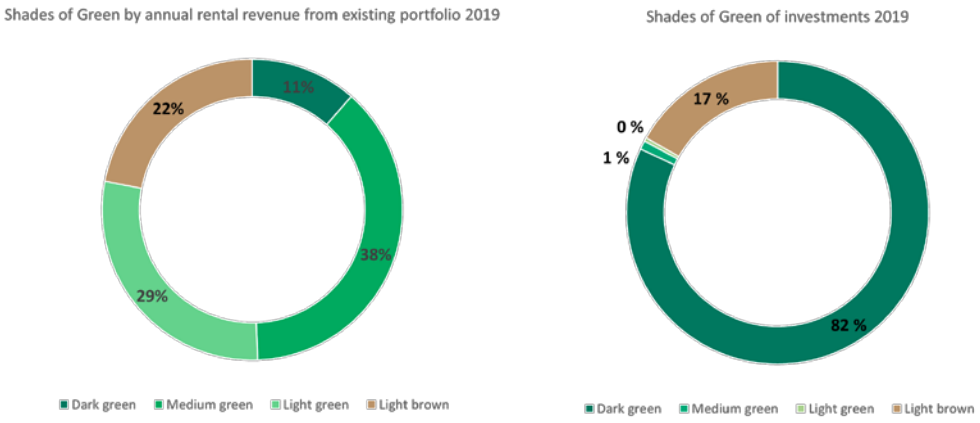

Figure 1 Shading based on rental revenue 2019 (left) and investments 2019 (right).

Almost 80% of the rental revenue in 2019 where from buildings shaded green, see Figure 1 (left). 83% of investments in 2019 went to buildings with some shade of green and 82% went to buildings shaded Dark green, see Figure 1 (right). The above shading follows established practice and allocate a Dark green shading to wooden buildings with Nordic Swan classification and/or passive houses. A Medium green shading is given to wooden buildings with geothermal heating as energy source or with a specific energy use at least 20% below current regulation or 20 percent improvement in energy use. Light green shading is for wooden buildings not meeting the 20% energy efficiency threshold. A large number of LCA studies show that wood-frame building results in lower primary energy and GHG emission compared to non-wood alternatives including concrete and steel. Finally, a Light brown shading is given to buildings falling outside the above categories. We note that one building in K2A's portfolio has heating based on natural gas (shaded light brown despite its high energy efficiency performance).

All investments in new buildings are in Nordic Swan certified buildings. K2A has during the period 2016-2019 invested more than 80% in environmentally certified and/or wooden buildings and is committed to keep those levels as high as possible. In addition, K2A strives to renovate non-certified buildings where possible in order to optimize their energy efficiency.

As a real estate company, K2A is naturally exposed to transitional risks and physical risks associated with climate change and more frequent extreme weather. For the Swedish building sector, the most severe physical

impacts will likely be increased flooding and urban overflow, as well as increased storms and extreme weather. Based on the geotechnical survey and the local municipality's stormwater strategy, an analysis of infiltration possibilities, stormwater recipients, pollution situation, handling in extreme weather and the need and dimension of supplementary or strengthening measures is carried out for each of the projects of K2A. The Nordic Swan ecolabel presumably will protect against most transition risks. Thus, **K2A is well aware of the physical risks to their portfolio.** It is more uncertain whether risks to their supply chain is focused in planning projects.

According to the International Energy Agency (IEA), the buildings and buildings construction sectors combined are responsible for 36% of global final energy consumption in 2018 and nearly 40% of total direct and indirect CO_2 emissions. The materials, construction and demolition phase of the building lifecycle constitute additional emissions and are becoming increasingly important as buildings becomes more energy efficient and the electricity and heat supply becomes 'greener'. A little over half of all life cycle greenhouse gas emissions in new offices or residential apartment building in the Nordics comes from heat and energy use, while approximately 40% comes from use of materials. Emissions associated with construction and demolition accounts for around 2-5%.

K2A has high transparency on environmental governance structure and good reporting procedures and standards. K2A has in place quantitative short- and long-term environmental goals. The reporting is good. However, K2A does not use an internal carbon price in their planning, neither do they follow TCFD guidelines when it comes to use of scenarios and stress testing of their portfolio, although that is planned for the future. CICERO Green assess K2A's governance structure and practice to be **Good,** cf. Figure 2.

Figure 2 K2A's governance score as assessed by CICERO Green

K2A has ambitious strategies and policies when it comes to its climate impact. K2A's efforts to limit and reduce the environmental impact of its business are based, among other things, on the principles of the UN Global Compact and are manifested in a guiding sustainability policy and a code of conduct that includes both employees and suppliers. K2A aims to use renewable energy wherever possible and reduce the per capita electricity consumption by using energy saving devices wherever possible. K2A also seeks to reduce the impact on the environment by considering the carbon footprint in all dealings by e.g. reducing travel, source locally and choosing green energy options. The goal is that all new construction of properties from 2018 should be Nordic Swan Ecolabelled or equivalent. A Nordic Swan Ecolabel means that the buildings have been assessed from a life-cycle perspective. K2A has as a target to reduce demand for heat by 5% from 2018 to 2021. In 2019 the specific use of energy was 138 kWh/m^2 (BOA) including K2A's own operations. Furthermore, CO_2 emissions should be reduced by 1% per year to 2021. We note that this is less than the annual default economic efficiency gains of 1.6% in recent IEA scenarios.

Table 1 Measured specific sector metrics for K2A. Energy is for electricity and heat.

Specific sector metrics	Energy use (kWh/m^2)[1]	Nordic Swan labelled (% of area)	Emission intensity[2] (kg CO_2e/m^2)	Per cent area heated directly by fossil fuels
2019	137.7	16%	7.1	1.4
2018	138.4	-	8.0	0
2017	143.0	-	7.2	0

[1]Excluding energy consumption for households and K2A's own operations according to BBR's definition.
[2] Scope 1 and 2 emissions only. Grid factor is based on local electricity mix.

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Contents

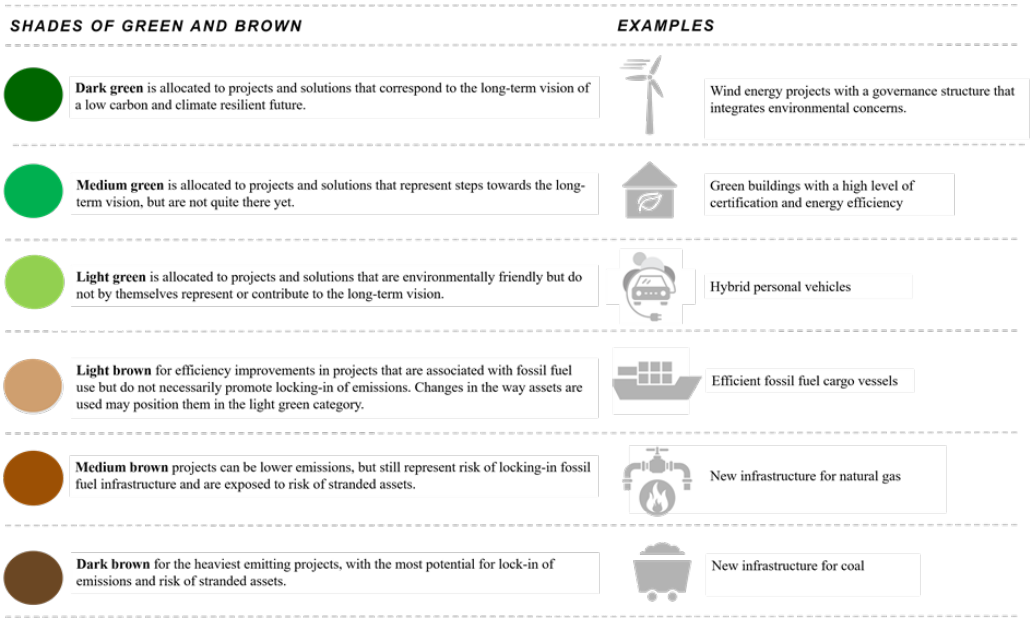
1 Terms and methodology

The aim of this analysis is to be a practical tool for investors, lenders and public authorities for understanding climate risk. This first iteration provides several key elements of this analysis but should be viewed as a starting point for discussion and further development, rather than a conclusive analysis.

Shading corporate revenue and investments

Our view is that the green transformation must be financially sustainable to be lasting at the corporate level. We have therefore shaded the company's current revenue generating activities. Shaded investments add a forward-looking element and provide insight into future revenue streams and corporate strategy in relation to the green transformation.

The approach is an adaptation of the CICERO Shades of Green methodology for the green bond market. The Shade of Green allocated to a green bond framework reflects how aligned the likely implementation of the framework is to a low carbon and climate resilient future, we have rated investments and revenue streams similarly. To encompass the full scale of potential projects, we have added three "brown" categories. While some projects with fossil fuel elements might be accepted, we are careful to avoid projects that increase the capacity or longevity of fossil fuel infrastructure.



In addition to shading from dark green via light green to dark brown, CICERO Shades of Green also includes a governance score to show the robustness of the governance structure. The company assessment also provides investors and lenders with information on possible alignment to the EU taxonomy as well as companies' environmental governance structure, including an assessment of how companies respond to the TCFD recommendations on climate-related risk disclosure.

We have only shaded revenue or investments to the extent we were able to find sufficient information. The amount of "unshaded" revenue and investments is noted in the scorecard. Our data sources are annual- and sustainability reports, as well as CDP responses. We aim to develop a methodology based on publicly available sources.

2 Brief description of K2A's activities, strategies and related policies

Company description

K2A is a real estate company founded in 2013 focusing on long-term management of self-produced rental buildings for all types of housing, but with a focus on housing for students (representing 69% by number and 43% by area of the total portfolio) and smaller families (28% and 37% by numbers and area, respectively). The property portfolio further includes community service properties, such as care centres, preschools etc. (3% and 20% by numbers and area, respectively)[3]. K2A is involved in the entire value chain, from customer analysis to land acquisition, own industrial production, construction and ultimately long-term ownership and management. By managing its construction process in a sustainable way and using environmentally friendly raw materials, mostly locally produced Swedish wood, K2A has been able to produce the buildings in a resource- and energy-efficient industrial process with lower climate impact compared to conventional house production. This method has made K2A the first manufacturer of prefabricated wooden apartment units that have been licensed to build Nordic Swan Ecolabelled (Sw. "Svanenmärkt") properties. The goal is that all new construction of properties from 2018 should be Nordic Swan Ecolabelled or equivalent.

The company is currently operating in 16 locations in Sweden with focus on Stockholm, Mälardalen and a number of selected university cities located in other parts of Sweden, where demand for rental buildings is high.

K2A's real estate portfolio mainly consists of housing built from year 2015 to present. In addition, some older properties have undergone or are undergoing energy saving renovations. As of December 2019, K2A had properties totalling 82,300 m^2 with annual rental revenue of SEK 148m. The revenue from environmentally certified and/or wooden buildings amounted to 76% of total revenue, up from 45% in 2016. In addition, 9% of the revenue in 2019 has been derived from properties that have undergone or are undergoing energy saving renovations. Combined, around 78% of K2A's rental income comes from buildings with some shade of green.

K2A's total investments during 2019 amounted to SEK 621m. Of those, 83% were towards buildings with some shade of green, mainly wooden and/or certified buildings with a Medium or Dark green shading. K2A has during the period 2016-2019 an investment average of 89% in environmentally certified and/or wooden buildings and is committed to keep those levels as high as possible. In addition, K2A strives to renovate non-certified buildings where possible in order to optimize energy efficiency. In 2019 investments in energy saving renovations amounted to SEK 4.75m.

Electricity and heat are the main components of energy use. K2A always choose green electricity and as much green as possible district heating. For example, K2A has installed solar panels on several residential properties in Lund, Västerås and Haninge. The excess energy produced by the solar panels are used in charging the local carpool (Bobil). The carpools are available to tenants in Umeå, Örebro, Haninge, Västerås and Lund.

[3] Source: K2A Q3 2019 report

Climate risk exposure

According to the International Energy Agency (IEA), the buildings and buildings construction sectors combined are responsible for 36% of global final energy consumption in 2018 and nearly 40% of total direct and indirect CO_2 emissions. Appliances (excluding heating, cooking and cooling appliances) are responsible for around 17% of final electricity use by buildings.

Emissions from heating of buildings in Sweden have decreased from 9.3 million tonnes CO_2e to 0.88 million tonnes over the period from 1990 to 2018. In 2018, the sector accounted for approximately 2% of Sweden's total emissions[4]. Emissions from production of materials, construction and demolition of the buildings constitute additional emission[5]. These (scope 3) emissions becomes increasingly important as buildings becomes more energy efficient and the electricity and heat supply becomes 'greener', reducing scope 1 and 2 emissions. According to a report from Asplan Viak[6], a little over half of all life cycle greenhouse gas emissions in new buildings comes from heat and energy use, while approximately 40% comes from use of materials. Emissions associated with construction and demolition accounts for 2-5%.

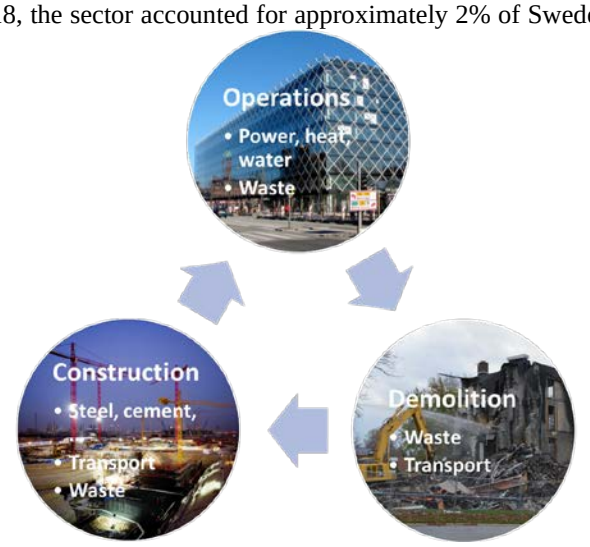


Figure 3 Life cycle and source of emissions. This shows the value chain of K2A's operations. Emissions are connected to the construction, operation, and demolition of buildings.

Physical climate change such as extreme events and flooding are affecting all sectors and regions already. Due to historical emissions, we are de facto already locked in for approximately 1.5°C global warming.[7] Given today's policy ambition, the world is most likely heading toward 3°C warming in 2100 which implies accelerated physical climate impacts, including more extreme storms, accelerated sea level rise, droughts and flooding.[8] For near-term physical risk, investors and companies must consider the probabilities of physical events and resiliency measures to plan for and protect against the worst impacts. For the Nordic building sector, the most severe physical impacts will likely be increased flooding and urban overflow, as well as increased storms and extreme weather. Developing projects with climate resilience in mind is critical for this sector.

As a real estate company, K2A is naturally exposed to physical risks associated with climate change, such as more extreme precipitation events and associated flooding, mudslide and avalanche risks, stronger winds, heat stress and also sea level rise for properties close to the ocean. A lack of ambitious policies at a global level to rapidly reduce greenhouse gas emissions, will increase the frequency of such events, increase the probability of physical damage to buildings and associated infrastructure. The real estate sector is also exposed to climate risks through links to the construction industry and the utilities.

[4]Naturvårdsverket: https://www.naturvardsverket.se/Sa-mar-miljon/Statistik-A-O/Vaxthusgaser-utslapp-fran-uppvarmning-av-bostader-och-lokaler/
[5] https://www.miljostatus.no/tema/klima/norske-klimagassutslipp/klimagassutslipp-bygg/
[6] Asplan Viak AS (2018): Utredning av livsløpsbaserte miljøkrav i TEK, https://dibk.no/globalassets/02.-om-oss/rapporter-og-publikasjoner/utredning_av_livslopsbaserte_miljokrav_i_tek_asplan_viak_2018.pdf
[7] https://www.cicero.oslo.no/en/posts/news/scientists-demystify-climate-scenarios-for-investors
[8] https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf

In addition to the physical risks, K2A is also exposed to transition risks from stricter climate policies, associated with e.g.: 1) Policy risks when heating systems based on fossil fuel are banned or strong mandatory efficiency upgrades are introduced. 2) Liability risks due to e.g. stricter standards in the future for building owners or legal challenges if preventable damages from climate change increases. 3) Technology risks if consumers prefer climate smart buildings and demand for low efficiency buildings decrease or building companies may suddenly have to upgrade technologies.

To counter these risks, K2A has adopted a sustainability policy which stipulates that K2A will use green electricity and, if available, green district heating for heating of management objects. In new production, K2A invests in energy-efficient solutions such as solar cells and geothermal heat, which are highly contributing measures to reduce the consumption of mainly heating and electricity.

K2A has adopted a sustainability policy as well as a business plan which stipulates that all K2A's new production from 2018 should be environmentally classified in accordance with the Nordic Ecolabel or equivalent environmental certification. K2A's assessment today is that certification in accordance with the Swan corresponds to a relatively high level of sustainability and the necessary protection against possible political reforms and stricter legislation. K2A's level of ambition is to be at the forefront of sustainability and follows technology development and legislation in order to integrate new energy efficient solutions and adaptations.

Key statistics & background figures

Energy use[9]

In 2019, total energy use was 10.3 GWh, corresponding to a specific measured energy use of 138 kWh/m^2. For wooden buildings, the specific energy use was 120 kWh/m^2. Less than 3% of total energy use had fossil elements (mostly through district heating, but one property has heating based on natural gas). There is no explicit plan to phase out the natural gas for this building. Total energy use has increased by almost 50% over the last three years (2017-2019), while energy use per square meter has fallen slightly by -4%. K2A has as a target to reduce demand for heat by 5% from 2018 to 2021.

Emissions

Total emissions in 2019 was 525 tons CO_2e (scope 1 and 2), mostly from small amounts of fossil fuels in district heating, but also from one property with natural gas heating. Specific emissions were 7.1 kgCO_2e/m^2 in 2019. Development over the last three years shows a similar pattern to energy use; an increase in total emissions, but a reduction when measured per square meter. CO_2 emissions should be reduced by 1% per year to 2021. We note that this is less than the annual default economic efficiency gains of 1.6% in recent IEA scenarios.

Certifications

Approximately 16% of the total portfolio measured by area has been certified by the end of 2019. The share is slightly larger (19%) when measured in value terms.

[9] Excluding energy consumption for households and K2A's own operations. In cases where K2A has not yet received data for 2019, preliminary data or data from 2018 have been used.

Environmental Strategies and Policies

K2A's efforts to limit and reduce the environmental impact of its business are based, among other things, on the principles of the UN Global Compact and are manifested in a guiding sustainability policy and a code of conduct that includes both employees and suppliers. Currently, the following targets are included in K2A's business plan:

- All new own produced buildings[10] should be Nordic Swan Ecolabelled or have equivalent environmental certification.
- K2A shall maintain sustainable and environmentally friendly management by
    - Minimize the carbon dioxide load per square meter managed
    - Reduce the consumption of heat, electricity and water
    - Use green electricity and increase the proportion of real estate electricity produced by own solar cells
    - Use green district heating (if possible)

Suppliers should e.g. assist in reduction of supply chain impacts on the environment and be open and transparent in reporting on product or service utilization and any environmental impacts. K2A aims to use renewable energy wherever possible and reduce the per capita electricity consumption by using energy saving devices wherever possible. K2A also seeks to reduce the impact on the environment by considering the carbon footprint in all dealings by e.g. reducing travel, source locally and choosing green energy options. K2A expects its suppliers to also find solutions to achieve this.

To support Agenda 2030 and the global goals for sustainable development, Objective 6 - Clean water and sanitation for all, and Objective 15 - Ecosystems and biodiversity, K2A has developed strategies and routines for all construction projects regarding stormwater management. As part of the stormwater strategy, K2A works actively to reduce or eliminate potential sources of contamination to the groundwater from the construction projects through proactive work in planning and risk management in production. Contents of hazardous substances in facade materials and foundations are checked and ensured by certification according to the Nordic Ecolabel. Safety measures are also being taken in production to avoid potential discharges to groundwater from work machines or stored chemicals.

The production method has made K2A the first manufacturer of prefabricated wooden apartment units that have been licensed to build Nordic Swan Ecolabelled ("Svanenmärkt") properties. A Nordic Swan Ecolabel means that the buildings have been assessed from a life-cycle perspective and based on a holistic approach, including the building process, the building by itself and how it is used and managed. The goal is that all new construction of properties from 2018 and onwards should be Nordic Swan Ecolabelled or equivalent. This implies for instance that annual energy use should be 85% of BBR 24 or 90% of BBR 25/BBR 26 for apartment buildings and buildings for pre-schools and schools and 80% of BBR 24 or 85% of BBR 25/BBR 26 for small houses.

Governance

When assessing the governance of K2A, CICERO Green looks at the overarching structures and procedures for decision making connected to climate risk analysis in K2A, strategy and policy formulation and implementation including policies towards sub-contractors and use of LCA, handling of resilience issues and quality of reporting.

K2A's Board of Directors has adopted a sustainability policy and a business plan that governs K2A's sustainability work and sustainability goals. The CEO is ultimately responsible for the sustainability work.

[10] The goal is that all new buildings will be certified. However, K2A does sometimes take over projects that have already started, and in those instances, it is not always possible to certify buildings.

K2A's Board of Directors has decided to establish a special sustainability committee in the spring of 2020. The members of the Sustainability Committee will be made up of three board members appointed at the statutory board meeting. The Sustainability Committee's work and tasks are regulated by the committee's rules of procedure, which are adopted by the Board. The Sustainability Committee will be responsible for the design and follow-up of K2A's sustainability goals. K2A has also decided to appoint a Sustainability Manager who will assist the Sustainability Committee and be responsible for the implementation of measures, review, reporting and follow-up.

The Nordic Eco-label for buildings is a standard requirement when employing sub-contractors. The environmental certification system includes requirements related to energy use, local disposal of surface water, green roofs and green areas, as well as renewable energy and energy- and water efficient tap ware.

Reporting

K2A reports the sustainability work according to the Global Reporting Initiative, GRI. K2A's annual sustainability report (included in the annual report) contains among other things the number of new units with the Swan classification (currently 100%), use of electricity, heat and water and CO_2 emissions.

K2A commits to regular reporting at least on an annual basis. The reporting will be published at the company's homepage and will include the below information for the total property portfolio:

- Total rental revenue whereof rental revenue related to environmentally certified and/or wooden buildings as well as buildings that have undergone energy saving renovations.
- Total investments whereof investments related to wooden and/or certified buildings
- Type of certification and degree of certification, energy performance per square meter and/or estimated annual greenhouse gas emissions reduced or avoided for buildings (tCO_2e)
- Amount of energy saved[11] per square meter, and/or estimated annual greenhouse gas emissions reduced or avoided for buildings (tCO_2e). The grid factor used in calculating these numbers is determined as follows: When the electricity supplier is known, the grid factor given by the supplier is then used. In case the grid factor is unknown, the grid factor for electricity is given by the Swedish energy agency[12], 13 g CO_2e/MJ. Grid factors for district heating is given by statistics from SwedEnergy[13].

K2A has the ambition of reporting according to TCFD guidelines in 2021 at the latest. The company will strive to report consistent with definitions of sustainable activities available in the EU Taxonomy at every point of time.

[11] For renovation projects, savings are calculated by comparing with previous years measured consumption.
[12] https://www.energimyndigheten.se/fornybart/hallbarhetskriterier/drivmedelslagen/vaxthusgasutslapp/
[13] https://www.energiforetagen.se/statistik/fjarrvarmestatistik/miljovardering-av-fjarrvarme/

3 Assessment of K2A's green activities and policies

According to CICERO Green's methodology shades of green or brown should be allocated to the revenue stream and investments according to how these streams reflect alignment of the underlying activities to a low carbon and climate resilient future and taking into account governance issues. (See notes and methodology page for further details on shading).

The shading follows established practice and allocate a Dark green shading to wooden buildings with Nordic Swan classification and/or passive houses. A Medium green shading is given to wooden buildings with geothermal heating as energy source or with a specific energy use at least 20% below current regulation or 20 percent improvement in energy use. Light green shading is for wooden buildings not meeting the 20% energy efficiency threshold. A large number of LCA studies show that wood-frame building results in lower primary energy and GHG emission compared to non-wood alternatives including concrete and steel. Finally, a Light brown shading is given to buildings falling outside the above categories. We note that one building in K2A's portfolio has heating based on natural gas which we shaded light brown despite its high energy efficiency performance. At present there are no explicit plans to switch to a cleaner energy source.

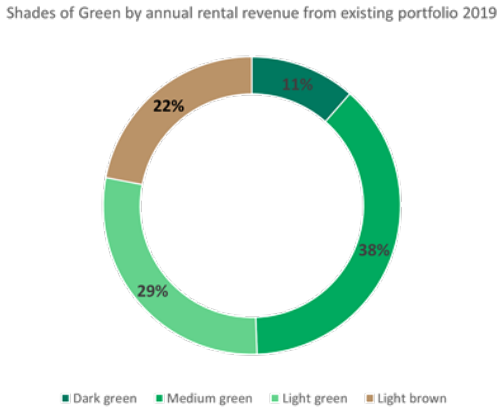


Figure 4 Shading based on rental revenue 2019.

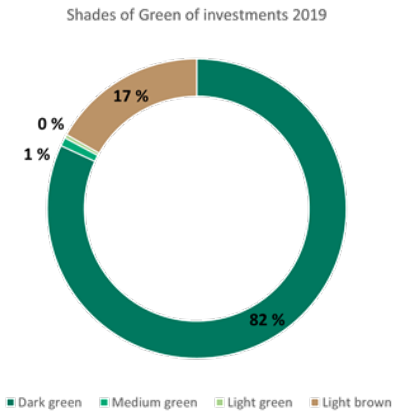


Figure 5 Shading based on investments 2019.

With these provisions, we find that in 2019 11% of rental revenue came from assets considered Dark green, 38% from assets shaded Medium green, 29% from assets shaded Light green, and 22% from Light brown assets, see Figure 4. Thus, close to 80% of the rental revenue came from assets with some shade of green.

According to K2A, all new building projects in the pipeline will have caracteristics making them Dark green. K2A will however have investments activities outside of these assets, e.g. in older already existing buildings. In 2019, 82% of investments were in properties shaded Dark green, 1% in Medium green properties and 17% of the investments are characterised as Light brown, see Figure 5.

Governance Assessment

When assessing the governance of K2A, CICERO Green looks at three elements: 1) Strategy, goals, policies including policies towards sub-contractors and use of LCA; 2) handling of resilience issues; and 3) reporting.

Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent.

K2A has good strategies and short-term goals but lack clear quantitative climate targets for the medium term. The Nordic Swan ecolabelling will secure long-term improvements in climate and environmental footprints. The decision to establish a special Sustainability Committee is welcomed. The Sustainability Committee will be responsible for the design and follow-up of K2A's sustainability goals. K2A has also decided to appoint a Sustainability Manager who will assist the Sustainability Committee and be responsible for the implementation of measures, review, reporting and follow-up. The planned reporting is good and include elements of impact reporting. We note that K2A does not carry out climate scenario analysis or risk assessments in alignment with the methodology recommended by TCFD[14]. However, K2A has the ambition to report according to TCFD recommendations in 2020 or 2021. For handling of resilience issues K2A relies on the certification processes.

Assessing these elements, CICERO Green concludes that K2A is getting a reasonable score on all of the elements and is therefore given an overall governance score of **Good.**

Strengths

A large number of LCA studies show that wood-frame building results in lower primary energy and GHG emission compared to non-wood alternatives including concrete and steel. In addition, K2A uses locally produced wood, further lowering the climate footprint.

Through its strategic framework and other policies, K2A is committed to contribute to a green transition towards a low carbon society in the longer run. Its insistence of only building houses with a Nordic Swan eco-label will secure a continued reduction in climate footprint and other environmental impacts as long as the national building standards improve over time, but this will depend on what other acquisitions are made to the portfolio.

K2A makes investments in sustainable material choices that are suitable for long-term management. They also make investments in environmentally friendly technology with the aim of achieving lower consumption in long-term management. However, K2A does not perform LCA analysis beyond what is required by certification.

Weaknesses

No significant weaknesses are perceived. However, we note that K2A has no internal carbon pricing. There is also a lack of scenario analysis whether or not formally in alignment with the TCFD recommendations.

K2A has clear but modest targets when it comes to reducing energy consumption and CO_2 emissions in the shorter term. This can partially be explained by already relatively low energy and emission values. We note that one building in K2A's portfolio has heating based on natural gas (shaded light brown).

[14] https://www.fsb-tcfd.org/publications/final-recommendations-report/

Pitfalls

It is unclear to us whether K2A optimize (from a climate perspective) the choice between new construction versus refurbishments. It is also unclear whether the climate risk of sub-contractors and utilities are explicitly taken into account during project planning.

As noted above K2A also plans for investments in projects not associated with wooden or certified buildings. These investments can be made in already started projects which could be impossible to certify or in old buildings that can't reach up to certification. We note that in those instances, K2A's ambition is to strive to minimize CO_2 emissions by renovating and upgrading the buildings where possible. This may contribute to an increase in the climate footprint of K2A going forward, but may also be the more climate friendly option given that refurbishment may have a lower footprint than new buildings.

Finally, in a low carbon 2050 perspective the energy performance of buildings is expected to be improved, with passive and plus house technologies becoming mainstream and the energy performance of existing buildings greatly improved through refurbishments. K2A is not quite there yet but is taking valuable steps towards this long-term vision. Green building certifications, such as the Nordic Swan, include many important environmental aspects. However, these certifications alone do not necessarily ensure that resilience aspects are taken into considerations.

EU Taxonomy

The proposed EU taxonomy for sustainable finance[15] includes thresholds for the real estate sector, briefly summarized as follows:

1. The design and construction of new buildings needs to ensure a net primary energy demand that is at least 20% lower than the level mandated by national regulations.
2. Ownership or acquisition of buildings built before 2021: Energy performance in the top 15% of similar stock.
3. Renovations should deliver 30% energy savings.
4. Large non-residential buildings should have dedicated energy management system.

It is currently unclear how this will apply to Sweden, but it is reasonable to expect that buildings with energy use 20 percent below present regulation would be aligned with the taxonomy. The taxonomy also highlights the importance of lifecycle emissions including a focus on building material such as wood.

K2A considers that all new production of environmentally certified buildings and wooden buildings with 20% lower energy consumption compared to the new building requirements do live up to the EU Taxonomy's definitions. Hence, roughly 50% of the company's rental revenue as of year-end 2019 is deemed being consistent with the EU Taxonomy. Wooden buildings not meeting the requirement of 20% lower energy consumption compared to the new building requirements, although considered being light green due to the renewable building material (locally produced Swedish wood) with lower climate impact compared to conventional house production, is not consistent with the EU Taxonomy.

Energy saving renovations for existing properties that result in buildings lowering their primary energy demand with 30% are also to be classified as sustainable within the EU Taxonomy. Currently, K2A has several buildings that have undergone or will undergo such renovations. It is further anticipated that activities related to energy

[15] Taxonomy: Final report of the Technical Expert Group on Sustainable Finance, March 2020. https://ec.europa.eu/knowledge4policy/publication/sustainable-finance-teg-final-report-eu-taxonomy_en

efficiency, including installation of solar panels, heat pumps, extension of district heating and cooling, are to be classified as sustainable according to the EU Taxonomy.

Appendix 1: Source List

Document Number	Document Name	Description
1	Green equity framework	K2A's Green Equity Framework dated May 2020
2	Web site: https://k2a.se	
3	Draft K2A Green Finance Framework 20200109_clean v.2	K2A - Green Finance Framework - January 2020
4	Second Opinion K2A 12 January 2020	CICERO second opinion on K2A's green finance framework
5	Årsrapport 2018	K2A's annual report 2018
6	Årsrapport 2019	K2A's annual report 2019
7	Q3 2019 rapport	Third quarter reporting from 2019
8	Cicero_data_20200430_v.2	Excel sheet with financial data
9	Appendix 1	Summary of statistics from K2A
10	10 K2A Hållbarhetspolicy 20190122	K2A's sustainability policy, dated 22 January 2019
11	Appendix 2	Summary of K2A's governance procedures

Appendix 2: Background

In a low carbon 2050 perspective, the energy performance of buildings is expected to be improved, with passive house technology becoming mainstream and the energy performance of existing buildings greatly improved through refurbishments. According to the IEA[16], the buildings and buildings construction sectors combined are responsible for 36% of global final energy consumption and nearly 40% of total direct and indirect CO_2 emissions. Efficiency of building envelopes needs to improve by 30% by 2025 to keep pace with increased building size and energy demand – in addition to improvements in lighting and appliances and increased renewable heat sources.[17] Energy efficiency improvements in buildings are thus important building blocks towards reaching the 2°C goal. Also, local transport solutions and easy access to renewable energy are important elements. Emissions from buildings are approximately half coming from materials/construction and half from energy use. Over time the energy use becomes less important (with off grid solution such as geothermal and solar increasing).

According to IPCC, more emphasis on refurbishment instead of new constructions combined with more stringent standards for older buildings and their retrofit is important.

Choice of building materials is becoming more important for climate footprint than heating/cooling and power. Further electrification of the vehicle fleet will reduce Scope 3 emissions.

A large number of LCA studies show that wood-frame building results in lower primary energy and GHG emission compared to non-wood alternatives including concrete and steel. Less energy, in particular fossil fuels, is needed to manufacture wood-based building materials compared with alternative non-wood materials. Wood-based materials use primarily biomass residues for processing energy. Wooden materials also store carbon during their lifetime, temporary sequestering carbon from the atmosphere. Large amounts of biomass residues are produced during the manufacture and end-of-life of wood products, and these can be used to replace fossil fuels. Hence, wood-based buildings are appropriate for long-term strategies for reducing fossil fuel use and GHG emissions when combined with sustainable forestry[18]. Quantitative estimates are imprecise, but some studies indicate energy savings of the order of one third in the construction phase of wood buildings compared to buildings using mainly other materials.

Although voluntary environmental certifications such as LEED and BREEAM or equivalents can measure or estimate the environmental footprint of buildings and raise awareness of environmental issues, they fall short of guaranteeing an environmental-friendly building. They do not guarantee a reduction in GHG emissions nor necessarily include considerations of resiliency. In addition to certifications we consider:

a) Energy efficiency targets that exceed regulations.
b) Low carbon transportation solutions.
c) Construction phase concerns.
d) Resiliency. Flooding risk, in combination with extreme weather and sea level rise, has been observed in almost all regions in the world.[19] Flood risk for properties, is of particular concerns in

[16] https://www.iea.org/topics/energyefficiency/buildings/
[17] http://www.iea.org/tcep
[18] R&D Fund for public real estate, The Swedish Association of Local Authorities and Regions (2016): Climate impacts of wood vs. non-wood buildings.
[19] https://www.cicero.oslo.no/no/publications/internal/2871

vulnerable geographic regions, i.e. Europe, coastal regions of North America, and Asial and South America.

Finally, the building sector traditionally has incentive problems due to the different interests of constructors, owners and tenants of buildings:

- Constructors do not necessarily focus on long-term efficiency, but more on short term cost of construction.
- Owners do not necessarily upgrade the building as the running costs are carried by the tenants.
- Tenants often have less flexibility to upgrade efficiency as this requires investments from owners.

Appendix 3: About CICERO Shades of Green

CICERO Green is a subsidiary of the climate research institute CICERO. CICERO is Norway's foremost institute for interdisciplinary climate research. We deliver new insight that helps solve the climate challenge and strengthen international cooperation. CICERO has garnered attention for its work on the effects of manmade emissions on the climate and has played an active role in the UN's IPCC since 1995. CICERO staff provide quality control and methodological development for CICERO Green.

CICERO Green provides second opinions on institutions' frameworks and guidance for assessing and selecting eligible projects for green bond investments. CICERO Green is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO Green is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. CICERO Green operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

We work with both international and domestic issuers, drawing on the global expertise of the Expert Network on Second Opinions (ENSO). Led by CICERO Green, ENSO contributes expertise to the second opinions, and is comprised of a network of trusted, independent research institutions and reputable experts on climate change and other environmental issues, including the Basque Center for Climate Change (BC3), the Stockholm Environment Institute, the Institute of Energy, Environment and Economy at Tsinghua University and the International Institute for Sustainable Development (IISD).