# PRIORITISED LIST OF METRICS TO ENABLE AN AI SUPERVISED APPROACH

## NEEM HUB

Nordic Energy Efficient Mortgage Hub

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The Nordic Energy Efficient Mortgage Hub aims to scale-up lending to energy renovations in the Nordics and will publish a blueprint on how to accomplish this which will be implementable in other regions of Europe and, indeed, the world. In striving to increase energy renovations, the NEEM Hub will help achieve the targets of the European Green Deal and contribute to addressing ambitious national climate targets.

The NEEM Hub will be comprised of a long list of institutions from the financial sector, behavioural scientists, mortgage specialists and authorities, and digital technologies communities from across the Nordics, all guided by leading European Economics Consultancy, Copenhagen Economics.

# CHAPTER 1
# PRIORITISED LIST OF METRICS TO ENABLE AN AI SUPERVISED APPROACH

AI supervised approaches to scale uptake of energy efficient mortgages in the Nordics depend both on the readiness of a data and software supply side as well as on a demand side driven by banks and mortgage institutions. The Nordic NEEM Hub brings together the demand and supply side via an eco-system of actors from data providers to software solution providers, over knowledge institutions and financial service institutions.

The NEEM hub engages in collaborative experimentation to offer banks and their client's access to automated metrics that will support their decision-making process toward scaling EEM financing. Metrics delivered through experimentation in the Nordic NEEM hub operate at two levels:

1) **Asset level metrics**: NEEM design metrics which leverage data directly from asset level via IoT, as well as from real-estate registries and from the EU Space Agency for localised weather data to offer automated high-level retrofit advice. The reason for designing metrics that can be generated using an AI supervised approach is because requiring homeowners to actively input data or arrange a visit by an energy consultant, acts as a barrier to engaging in an EEM financing journey. Therefore, NEEM aims to offer homeowners automated metrics, which conveniently offers them actionable information as an incentive to initiate an EEM journey.

2) **Portfolio level metrics**: Metrics for portfolio level screening is offered by the NEEM hub to equip banks with actionable information on energy inefficiency hotspots across their mortgage portfolio, to enable them to assess EPC distribution across their entire single-family home mortgage portfolio and to enable them to identify which parts of their portfolio holds the greatest potential to shift to best in class EPCs. The latter both to identify which homeowners to engage with to test readiness for retrofit financing as well as for reporting, disclosure, and compliance.

The aim of this priority list of metrics is to enable the assessment of the readiness of the supply side to respond to the existing and emerging demands of Nordic banks to scale their energy-efficient mortgages. The current demand at the portfolio level is mainly for metrics built around the EPC label and currently, the supply side is ready to address this demand via rough EPC label estimations using static data sets such as e.g., build year, housing type and for limited geographical areas based on dynamic data harvested directly from the asset for more accurate EPC estimates. The identified asset level metrics listed in the table below are currently more readily available from the supply side because data access can be granted by a client via consent allowing a bank to leverage data from household smart meters. The current data infrastructure is not ready for the supply side to offer fully AI supervised portfolio screenings due to data restrictions and data supply

gaps, such as in Denmark where access to full energy consumption data does not cover the entire country, in Norway where the Elhub does not offer access to anonymized data sets and in Sweden where there is no energy consumption data warehouse or data-lake and where there are limitations on number of API calls to the real-estate register allowed per day.

Below is an overview of the current and short-term future needs of the demand side and the match with the solution capabilities of the supply side.

| Demand side | Supply side | | Demand side | Supply side | |
|---|---|---|---|---|---|
| House asset level | Hemma | NEEM core solution | Portfolio level | Hemma | NEEM core solution |
| Emissions avoided from energy due to the retrofit[1] | | | Identification F & G EPC labels across entire real estate portfolios based on dynamic energy consumption data | Sweden - Hemma user base / 100 % of Sweden | Norway 2022 / 50% of Denmark 2023 / 100% of Denmark 2024 |
| Energy intensity = energy consumption per square meter. Before and after retrofit. | | | Portfolio estimated EPC distribution and identification of the real estate, which is part of the 8%[2] best in class on energy efficiency based on **real energy consumption data** | 100 % of Sweden | Norway 2022 / 50% of Denmark 2023 / 100% of Denmark 2024 |

[1] Hemma captures this metric 12 months after installation and based on LCA of equipment installed to adjust for scope 1,2 & 3 of embodied carbon in equipment
[2] Today current market practice in the Nordics is for banks to estimate whether a piece of real-estate is part of top 8% on energy performance.

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|---|---|---|---|---|---|
| Increase in house value projected and verified after retrofit. | | | Portfolio estimated EPC distribution & identification of real estate which is part of the 8% best in class **based on rough EPC estimations using building parameter data** | Sweden | Norway & Denmark |
| Projected savings before retrofits and verification of savings after retrofits. | | | Identify buildings with potential to move to EPC A & B using static data | Sweden | Norway & Denmark |
| Metric automatically identifying causes of energy inefficiency (lack of isolation/lack of air tightness/insufficient use of natural light/behaviours) | | | Identify buildings with potential to move to EPC A & B using dynamic data | Sweden - Hemma user base | Norway 2022 |
| | | | | | 50% of Denmark 2023 |
| | | | | | 100% of Denmark 2024 |

| | |
|---|---|
| Available now | |
| Available in 2023 | |
| Available in 2024 | |
| Don't know when available | |