Summary | February 2017

Impact Report
Sustainability Bond #2 NRW

Analysis of the
Sustainability Bond 2016 issued by the
German State of North Rhine-Westphalia

Wuppertal Institut

This report is based on the results of a study conducted on behalf of the State Government of North Rhine-Westphalia.

Project duration: October 2016 - February 2017

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On behalf of the State Government of North Rhine-Westphalia (NRW), the Wuppertal Institute carried out an impact analysis of the NRW Sustainability Bond 2016. The bond has a volume of EUR 1,585m and a tenor of 7 years. The Sustainability Bond finances projects in the field of sustainable development and refers to 48 eligible projects from the State's 2015 General Budget. All projects were selected in accordance with the specifications set out in the "Sustainability Bond Framework". This report analyses the contribution to climate protection and provides recommendations for future impact reports (beyond climate mitigation effects).

Overall, the bond refers to projects within the following categories (NRW 2016)

- A: Education and Sustainability Research EUR 678.4m
- B: Inclusion and Social Coherence EUR 146.5m
- C: Public Transport and Local Mobility EUR 179.8m
- D: Climate Protection and Energy Transition EUR 49.4m
- E: Protection of Natural Resources EUR 61.7m
- F: Sustainable Urban Development EUR 62.4m
- G: Modernisation of Educational and Public Health Facilities EUR 411.7m

A strong contribution to climate mitigation can be expected for projects in category C, D and G for which the avoided greenhouse gas emissions (GHG savings) were estimated measured in CO_2 equivalents. Due to limited data availability or missing baseline metrics some shares of the volume could only be roughly estimated or not be quantified at all. However, results reflect a first approximation and function as a blue print for further impact reports[1]. Figure 1 shows the volume of the project categories analysed and the respective fractions for which GHG emissions were quantified.

The bulk of projects in category A are targeted at the extension and enlargement of universities, in order to provide additional places to study. Some of these projects include newly built universities which are designed in an energy-efficient manner and fully comply with current environmental laws and regulations. The focus of these projects, however, is on educational issues, not on avoidance of greenhouse gases. Therefore, projects from category A are not included in this analysis.

[1] Detailed information on the impact analysis are available in German (Wiesen et al. 2017).

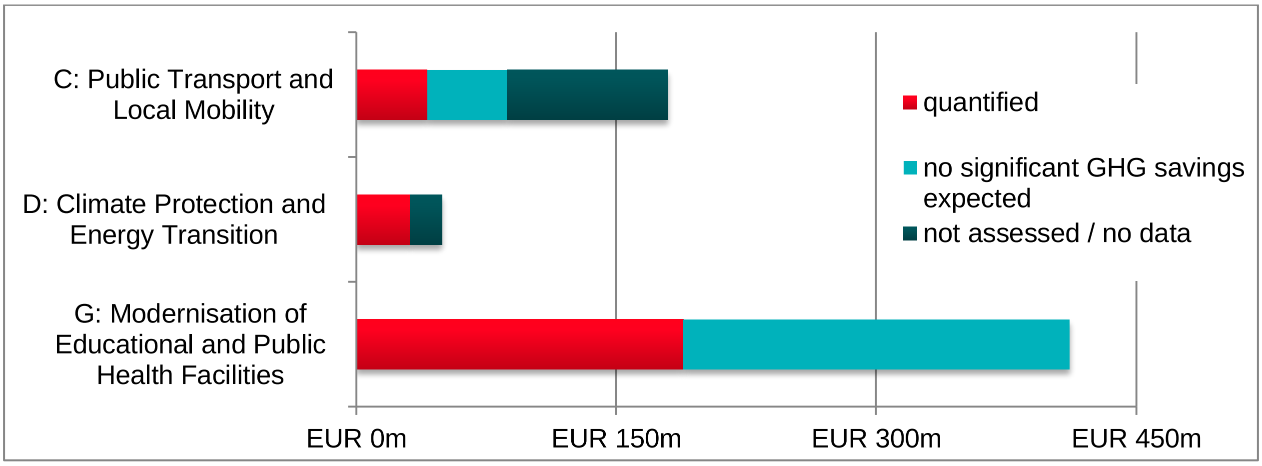

Figure 1: Fractions of the project categories C, D and G for which greenhouse gas emission savings were quantified (overall EUR 261m out of EUR 640.9m). .

Estimations for Project Group C "Public Transport and Local Mobility"

From the overall EUR 179.8m in project group C, investments of EUR 133.75m were identified as potentially leading to GHG savings. EUR 113.75m were used to fund public traffic tickets for students and trainees and EUR 20m were invested into the construction of cycle paths. Regarding the EUR 113.75m, GHG emission savings could only be assessed for a share of EUR 21m used to fund semester tickets. For the remaining amount data availability was too limited for a quantification, although there is strong evidence for a positive environmental benefit from these projects.

The baseline metric for GHG emission savings by each student tickets is 1,242 avoided passenger km (pkm) by car (substituted by public transport). The data are based on (Müller 2011) and refer to a specific university (Bielefeld) in NRW. GHG savings may hence deviate for other universities.

Overall, 1.2m tickets were sold[2] in 2015 leading to GHG savings of 95,000 tons. Of this amount a share of 9.7 % can be allocated to the Sustainability Bond. **As a final result, the investment of EUR 21m in semester tickets leads to 9,200 tons GHG savings for the first year. As the economic lifetime is one year the amount saved over the economic lifetime is also 9,200 tons.**

As baseline metric for each km cycle path built, a mix of avoided 1,756 pkm per year by car and public transport was chosen. This ratio was derived from a feasibility study for a non-urban fast cycle path in the Ruhr region (Regionalverband Ruhr 2014) and is based on estimates.

For investments into cycle paths, an economic lifetime of 30 years was assumed. The net share of total project financing through the Sustainability Bond could not be identified. Instead, costs of EUR 1.1m per km cycle path were estimated based on realized projects (Wiesen et al. 2017). **As a final result, EUR 20m invested in**

[2] Period assumed is summer semester 2015 and winter semester 2015/2016, during which overall 1,180,000 (regional) and 1,156,000 (NRW expansion) tickets were sold.

cycle paths lead to 1,700 tons GHG savings for the first year. Over the economic lifetime of 30 years GHG savings accumulate to 50,000 tons.

Estimations for Project Group D "Climate Protection and Energy Transition"

EUR 49.4m were invested into renewable energies and climate protection. While the overall volume is assumed to lead to significant GHG savings, a quantification was only possible for EUR 31.1m. These were mainly used to finance loans for the installation of combined heat and power technologies.

The quantification of GHG is based on projections of GHG savings from the project funding applications. Adjusting for plausibility, we calculated an average value of 432 g GHG savings per EUR derived from 30 projects funded (Wiesen et al. 2017).

As a final result, Euro 31.1m invested in combined heat and power technologies lead to GHG savings of 13,400 tons for the first year. Over the assumed economic lifetime of 20 years GHG savings accumulate to 268,000 tons.

Estimations for Project Group G "Modernisation of Educational and Public Health Facilities"

From the overall volume of EUR 411.7m in project group G, EUR 116.7m was invested in universities. EUR 79m were mainly invested in refurbishment of existing university buildings while EUR 37.7m were mainly invested in new university buildings replacing existing facilities. Based on data from the State of NRW, we estimate that 52 % of the investments were used for new furniture and therewith do not contribute to GHG savings.

EUR 295m were invested in university medical clinics. According to the Ministry of Finance NRW, 45 % of the funds were used for the refurbishment of clinic buildings and lead to GHG savings.

The baseline metric for GHG savings is the average heat demand and heat supply in non-residential buildings in Germany. Heat demand in existing, refurbished or new buildings is based on a 2013 study by the Federal Ministry for the Environment (Deilmann et al. 2013) and guidelines for non-residential buildings (VDI 2014). The estimated GHG savings are based on investment costs for already realised construction measures in universities and university medical clinics in NRW (NRW 2015).

As a final result, EUR 189m invested in refurbishment and replacement of university and university clinic buildings lead to GHG savings of 4,100 tons for the first year. This amount accumulates to GHG savings of 86,000 tons over the assumed economic lifetime (20 years for refurbishments and 50 years for replaced buildings). As no data for GHG savings through increased efficiency in electricity consumption was available, the results are likely to be a rather conservative estimation.

Overall Results

Figure 2 and Figure 3 show results (in tons of CO_2 equivalents per EUR 1m) for the first year as well as over the economic lifetime for each direct GHG mitigation measure (e.g. excluding furniture in buildings). Investments in student tickets have a high saving per EUR but they are limited to one year of economic lifetime. Investments in combined head and power technologies achieve the highest savings per year and over the economic lifetime. Investments in the refurbishment and replacement of university (clinic) buildings result in the lowest savings. However, as savings from the decrease in electricity consumption have not been considered, savings might be underestimated.

Overall, EUR 261m invested lead to GHG savings of 28,400 tons for the first year and 413,200 tons over the particular economic lifetimes. Further investments of EUR 111m are assumed to lead to significant GHG savings but were not quantified due to poor data availability.

All results are based on assumptions and cannot be further validated. Future studies will have to validate if these differences persist on this scale.

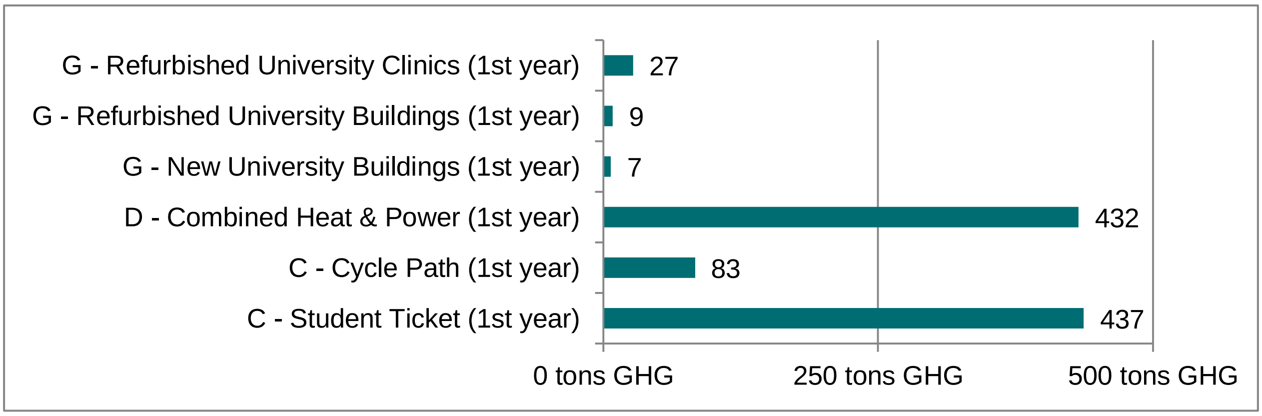

Figure 2: Comparison of the projected GHG savings (in tons CO_2 equivalents) per EUR 1m of investments for the first year.

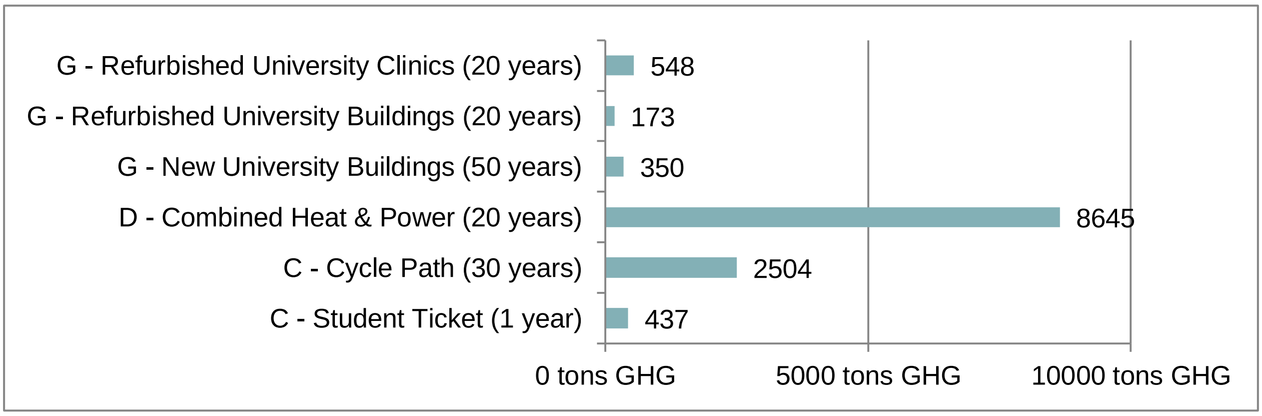

Figure 3: Comparison of the projected GHG savings (in tons CO_2 equivalents) per EUR 1m of investment over the projected economic project lifetime (1-50 years).

Recommendations for Future Impact Analyses

To enable a reliable estimation of GHG savings, data provision should be improved. We suggest that important data are especially

- the amount of total funding for those projects for which proceeds from the Sustainability Bond cover only a fraction of the overall investment,
- the amount allocated for energy efficiency measures and generation of renewable energy and
- the economic lifetime assumed for the projects.

Moreover, GHG savings are only one of multiple benefits from sustainability bonds like the NRW Sustainability Bond 2016. Currently, it is challenging to measure those benefits as there are no standards. Especially methods to measure social impacts (e.g. better health care or better access to university education) are missing.

Facing this, one task within the conducted impact analysis was to elaborate a method to consider benefits with relevance for sustainable development beyond climate mitigation. Considering that an impact analysis for financial investments should be realised with limited effort and complexity, we propose two categories of indicators: A first category "project output" could provide simple and easy to gather indicators. These are direct outcomes of the investment and do not require projections for its quantification. In addition to the project output indicator the other category "impacts" could consider indicators to measure the contribution to sustainability targets. Suitable targets can be based on the Sustainable Development Goals of the United Nations and on the Sustainability Strategy for North Rhine-Westphalia. Where quantitative indicators and targets do not exist, or where quantification is not feasible – which is especially the case for many social impacts – the contribution should be described with help of a nominal scale, e.g. as "with (relevant) impact" or "without (relevant) impact".

Literature

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