Impact Report
NRW Sustainability Bond #8

Impact Reporting of the Sustainability Bond #8 issued in 2021 by the German State of North Rhine-Westphalia (NRW)

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This report is based on the results of a study conducted on behalf of the State Government of North Rhine-Westphalia. The authors are responsible for the content.

Overview

The Wuppertal Institute analysed the NRW Sustainability Bond #8 (2021) on behalf of the State Government of North Rhine-Westphalia (NRW). The eligible assets of the most recent Bond amount to a volume of EUR 4.70bn and are part of the budget plan 2021. EUR 4.16bn have been allocated to the respective projects in 2021 (see allocation table in Annex). The selection of projects (75 eligible projects[1]) is done according to the Sustainability Bond Framework[2] and based on the NRW Sustainability Strategy 2020[3] and aligned with the Sustainable Development Goals (SDGs).

Figure 1 shows the allocation per SDG. A large portion of the projects can be attributed to SDG 4 on quality education (34% of allocation) and SDG 9 on industry, infrastructure, and innovation (22%). This is partly due to the large funding provided for university expansion and modernization as well as the State's efforts towards more environmentally friendly infrastructures. The third largest share contributes to SDG 3 on good health and well-being (20%). Here, additional Covid-19 related funding (such as supporting vaccination centres) plays a crucial role. However, the eligible projects contribute to almost all SDGs (except SDG 14 and 17) as shown in figure 1 and many projects contribute to more than one SDG.

figure 1: weighted attribution of allocated eligible projects to Sustainable Development Goals
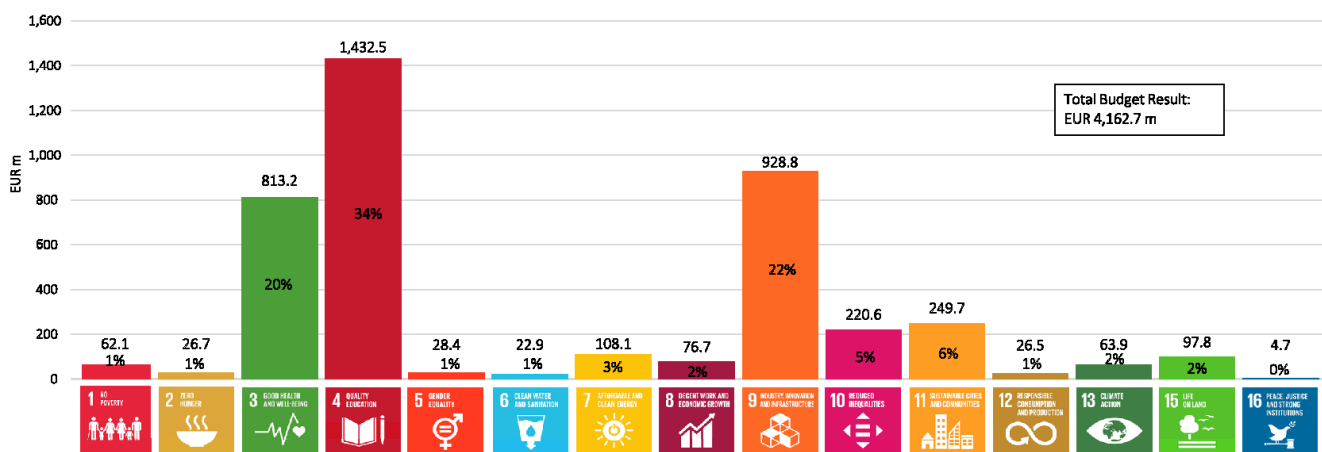
source: Ministry of Finance NRW, 2022

This Investor Briefing reports on indicators related to 50% of the allocated volume to the projects. As a consequence of the update of the issuers' framework, reporting and underlying methodology has been updated as well. The new method description, including a full reporting of all quantified indicators, will be published on the issuers' and authors' website. There are four main changes compared to previous reports. First (1), contributions to climate change mitigation are now considered to be co-benefits (with a separate reporting), attributed to projects in both the social and environmental dimension. Secondly (2), all indicators are more thoroughly scrutinized regarding their position on the pathway towards desired outcomes as well as the robustness of their quantification. Thirdly (3), all indicators are now presented in a way that allows to accumulate the effects of perennial projects (ex-post). And fourthly (4), all effects are now either attributed solely or partially to the State of NRW.

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[1] https://nachhaltigkeit.nrw.de/fileadmin/Dokumente/8._Nachhaltigkeitsanleihe/NRW_State_Eligible_Assets_Sus_Bond_8.pdf

[2] https://nachhaltigkeit.nrw.de/fileadmin/Dokumente/8._Nachhaltigkeitsanleihe/NRW_State_Sustainability_Bond_Framework.pdf

[3] https://nachhaltigkeit.nrw.de/en/

Results

Summary

The Sustainability Bond NRW #8 covers projects in 14 categories that were aligned with the Green Bond Principles (GBP), Social Bond Principles (SBP) and Sustainability Bond Guidelines (SBG) by ICMA. Although some projects contribute to more than one dimension, these categories can be roughly divided into contributions to social targets (categories A to F) and environmental targets (categories G to N).

The overall effects can be summarized with the help of (currently) 11 so-called units of comparison like the number of beneficiaries or the building area renovated. These represent numerical effects that allow to compare and accumulate indicators[4]. The following table 1 summarizes the results for effects that could be solely attributed to the Bond (full contribution) and for effects with a partial contribution. About 50% of the allocated volume could be assessed in this way (EUR 2,083m).

table 1: summary of results for the Sustainability Bond NRW #8

Contribution	assessed budget	Value*	units of comparison
Full contribution (State of NRW is sole contributor or effect is fully contributed to the funding by NRW)	EUR 1,100m	306,100	beneficiaries (full contribution)
		3,900	jobs created/sustained (full contribution)
		15	projects (full contribution)
		9	entities (full contribution)
		159,000	[ha] of sustainable land-use (full contribution)
		54,800	[m²] of new buildings (full contribution)
		99,700	[m²] of building area renovated (full contribution)
		56,800	animals benefiting (full contribution)
Partial Contribution (other actors contribute to effects also)	EUR 983m	573,900	beneficiaries (partial contribution)
		7,500	jobs created/sustained (partial contribution)
		3,800	projects (partial contribution)
		3,400	entities (partial contribution)
		170	[km] of bicycle lanes (partial contribution)
		4,200	vehicles (partial contribution)
		474,600	[MWh] of re production/storage (partial contribution)
in Total (50% of entire budget)	**EUR 2,083m**		

* rounded in most cases to avoid the appearance of accuracy where it is not warranted

source: own calculation based on updated methodology

Over 870,000 people – ranging from students in schools to homeless persons – benefited in 2021 from projects in the Bond. Out of this group, roughly 300,000 of these beneficiaries can be solely attributed to funding by the State of NRW. In addition, circa 11,000 jobs were either created or sustained, with 3,900 jobs from a full contribution.

In the area of environmental effects, 160,000 ha is fully attributed to sustainable land-use, resulting from projects for organic farming and re-afforestation. Another 155,000 m² of building area is fully attributed to green construction and renovation of university and clinical buildings. A further 170 km of new bicycle lanes and more than 4,2000 low-carbon vehicles can at least be partially attributed to the Sustainability Bond.

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[4] The accumulation of indicators between Bonds will be investigated in the next impact report, especially regarding the double counting of beneficiaries (e.g., students benefiting from student tickets over a longer period of time).

The same is true for renewable energy, where circa 500 MW of additional photovoltaic (PV) capacity is expected to yield more than 470 GWh of renewable energy per year (partial contribution by the State of NRW).

The following sections will look into social effects, environmental effects as well as co-benefits for climate change mitigation in more detail. A full accounting of all indicators as well as the underlying data and methods will be shown in the upcoming method description.

Social Effects

Desired societal outcomes can be mainly attributed to categories A to F (as shown in table 2) and categorized regarding their position in an impact pathway. We distinguish between activities (efforts towards outputs), outputs (tangible programme results) and outcomes (indicating desired effects on a larger or regional scale). Overall, more than 47% of the allocated expenditures can be associated with benefits to society in this manner.

table 2: assessed and quantified social effects

Categories	Allocated Expenditures	Quantified Expenditures
A Affordable basic infrastructure	EUR 572.2m	EUR 367.7m (64.3%)
B Access to essential services	EUR 2,450.1m	EUR 1,091.0m (44.5%)
C Affordable housing	EUR 72.7m	EUR 39.4m (54.2%)
D Employment generation	EUR 4.9m	EUR 1.9m (39.3%)
E Food security and sustainable food systems	EUR 2.4m	EUR 1.7m (68.9%)
F Socioeconomic advancement and empowerment	EUR 173.0m	EUR 48.7m (28.2%)
in Total	EUR 3,275.3m	EUR 1,550.4m (47.3%)

source: own calculation

The majority of funding towards social goals is used for improving access to essential services (B) like health care and education. Most indicators in category B relate to persons benefiting from these programmes (e.g., promoting additional first-year students at universities) or jobs created in these sectors (e.g., supporting the salaries of professionals or educating trainees). More than 350,000 persons are positively affected in this way. Regarding the assessment, 6 out of 10 indicators quantified are tangible results (outputs).

The second largest category (A) comprises of projects for affordable basic infrastructures. One output-indicator and two activity-indicators were assessed here: access to broadband internet (circa 100,000 households and/or entities), promoting social tickets (funding sufficient[5] for 83,000 tickets) and promoting tickets for students and trainees (funding sufficient for 117,000 tickets).

The third largest category for socioeconomic advancement and empowerment (F) covers a broad range of activities such as reduction of poverty, protection against violence or gender equality and inclusion of migrants. 7 indicators were quantified here (2 outcomes, 3 outputs

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[5] The grand total of promoted social and student tickets is much larger. These amounts relate to the number of tickets that could be purchased from the funding alone.

and 2 activities), that mostly relate to direct beneficiaries (circa 3,400) like supporting students for career-entry or women and men in sheltered places.

Among the smaller categories, 13 urban development projects are promoted (activity towards affordable housing), 96 jobs are created for persons with disabilities (outcome towards employment generation) and over 220,000 school children benefit from frequent vegetables and fruits in the EU school programme (output towards food security).

Environmental Impacts

The area of environmental effects was assessed in the same manner as social effects (activities, outputs, and outcomes). Direct environmental effects are attributed to the categories G to N (with no available indicator on sustainable water use in category L).

table 3: assessed and quantified environmental effects

Categories	Allocated Expenditures	Quantified Expenditures
G Renewable energy	EUR 10.9m	EUR 10.9m (100%)
H Energy efficiency	EUR 129.2m	EUR 34.2m (26.5%)
I Pollution prevention and control	EUR 35.1m	EUR 10.1m (28.8%)
J Environmentally sustainable management of resources	EUR 81.8m	EUR 74.9m (91.6%)
K Clean transportation	EUR 45.9m	EUR 45.9m (100%)
L Sustainable water and wastewater management	EUR 57.2m	EUR 0.0m (0%)*
M Climate change adaptation	EUR 59.6m	EUR 51.6m (86.5%)
N Green buildings	EUR 467.6m	EUR 304.7m (65.2%)
in Total	EUR 887.3m	EUR 532.2m (60%)

no indicator assessed in this category

source: own calculation

Category N is both the largest category here and the highest volume assessed in terms of indicators. As shown for co-benefits of climate mitigation later on, this category solely focuses on either the construction, renovation, or modernization of university and clinical buildings (including equipment for e.g., research). The share of strictly construction related funding towards higher energy efficiency is estimated at circa 65% (based on assumptions as well as average shares in the past). It is estimated that circa 55,000 m² of building area are added and circa 100,000 m² renovated (activity-indicators).

Category J on the sustainable management of natural resources constitutes the second largest share of quantified programmes. Three outputs are assessed here: 69,000 ha of sustainable land-use from eco-friendly agriculture, circa 57,000 animals benefiting from animal-friendly husbandry and 300 jobs from paid project hours in biological stations.

The target of climate-change adaption is addressed in category M. Two indicators could be assessed: the (partial) funding of 8 nature-conservation projects (activity-indicator) as well as more than 90,000 ha of sustainable land-use from re-afforestation (full contribution to a desired outcome).

In the area of clean transportation (K), all funds were used to support municipalities in building bicycle lanes (especially on roads). It is estimated that more than 170 km of bicycle lanes were constructed (output-indicator) in 2021 (based on past efforts), that also help to reduce GHG emissions (shown in the section on "Co-Benefits of GHG Savings").
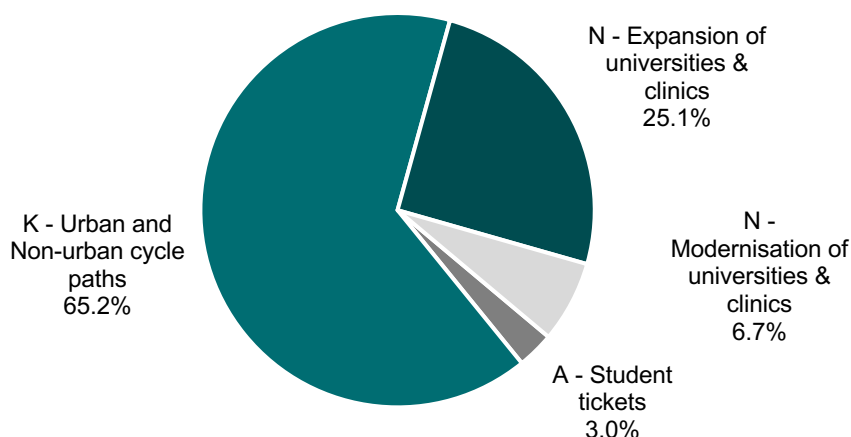
The category renewable energy (G) is currently restricted (budget result for 2021) to the promotion of photovoltaics (PV). Based on the additional installations in previous years, it can be estimated that circa 540 MW_P of PV was installed in 2021 that can partially be attributed to the funding by the State of NRW. Based on typical full-load hours in NRW, we estimate that 470 MWh are produced from these sites in the future (output-indicator).

The remaining projects in category H (energy efficiency) comprise of a broad variety of state-funded programmes, in particular promoting innovations or supporting the purchase of low-carbon technologies like electric vehicles or solar thermal panels for houses. Four indicators were assessed here that all relate to the State's promotion (partial contribution) for two of the programmes in *progres.nrw*: 4,200 low-carbon vehicles (output), 100 MWh of additional solar battery capacity (output), 1,600 new charging-stations for electric vehicles (activity), 1,800 ventilation systems with heat recovery (output).

Co-Benefits for Climate Change Mitigation

The estimated GHG emissions avoided by the Bond can be attributed to investments of EUR 384m for 5 different measures. The measures are part of investments in category A (student tickets), K (urban cycle paths; non-urban fast cycle paths) and N (modernisation of university buildings; conservation, remediation and enlargement of university clinics as well as other investments). The measures are expected to save approximately 366,000 tons of CO_2-equivalents (unit [CO_2e]) over their lifetime (see figure 2).

figure 2: GHG savings (over lifetime) from projects in NRW Sustainability Bond #8

K - Urban and Non-urban cycle paths 65.2%

N - Expansion of universities & clinics 25.1%

N - Modernisation of universities & clinics 6.7%

A - Student tickets 3.0%

source: own calculations

Annual results for each measure range from 128 tons CO_2e per year to 11,081 CO_2e tons per year (see Table 1). With the exception of student tickets, all of these measures are expected to save emissions beyond the term of the Sustainability Bond.

table 4: GHG savings from projects in categories A, K and N

Measure	GHG savings per year	GHG savings over Lifetime	average Lifetime (assumption)
	in tons CO2e	in tons CO2e	in years a
Non-urban fast cycle paths	128	3,844	30
Urban cycle paths	7,816	234,470	30
Student tickets	11,081	11,081	1
Expansion of universities & clinics	1,428	91,876	50-66
Modernisation of universities & clinics	1,225	24,503	20

source: own calculation based on methods and data depicted in the method description

In terms of investments, the anticipated impacts can be normalised to represent the GHG savings over lifetime when one million Euro are invested (see figure 3).

figure 3: efficiency of co-benefits of GHG savings from NRW Sustainability Bond #8
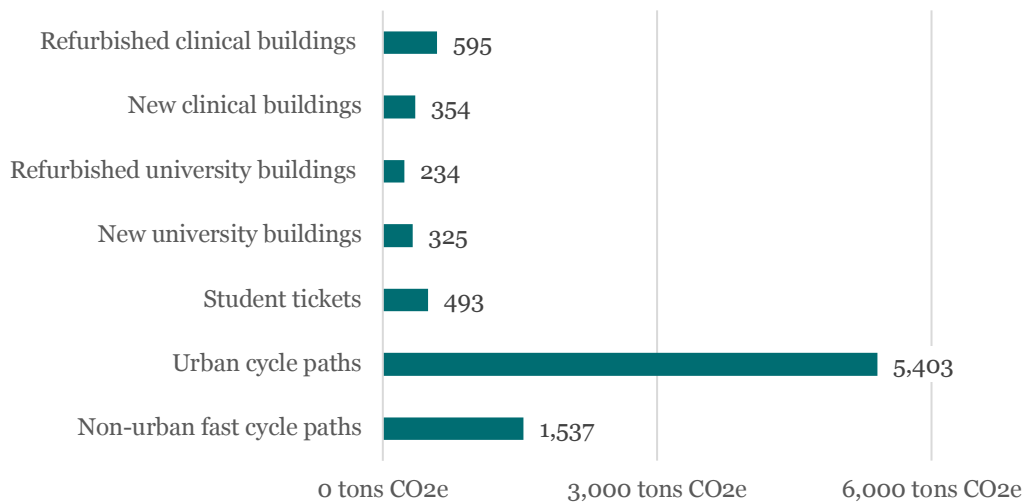
source: own calculation based on methods and data depicted in the method description

All of these projects (at least in terms of materialization) in the Sustainability Bond #8 were already part of the Sustainability Bonds #1 (2014) up to #7 (2020). Consequently, the categories can be aggregated into an eight-year portfolio[6].

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[6] For single measures, such as solar thermal energy generation (Bond #3) or combined heat and power (Bond #2), this was not feasible.

In total, these projects help to mitigate over 1.6 million tons of GHG emissions over the assumed lifetime of the measures (see figure 4).

figure 4: GHG savings over lifetime of projects from 2014 to 2021
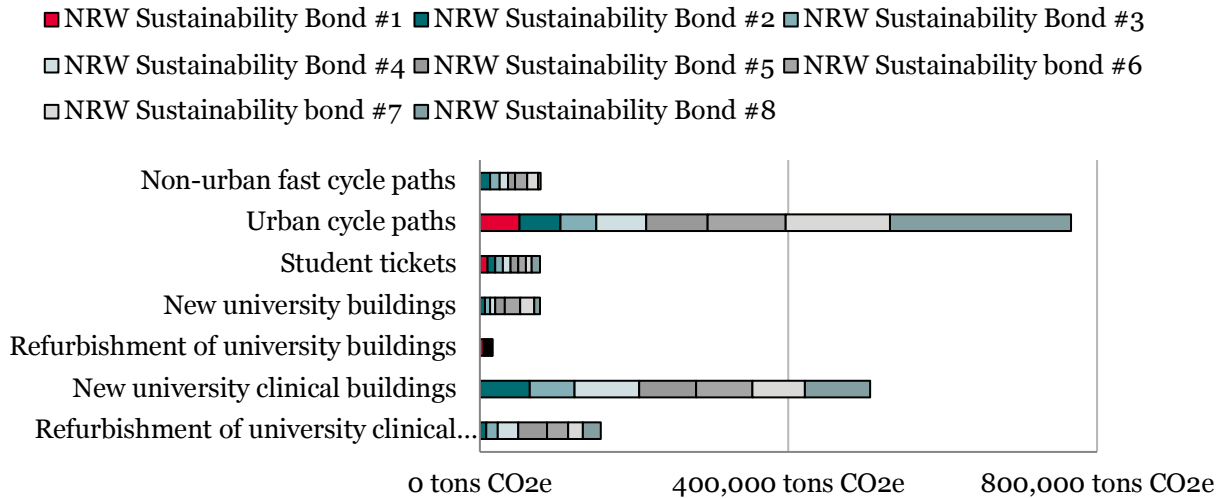
source: own calulation based on methods and data depicted in the method description

Additional climate change mitigation effects can be attributed to the States' share of funding for projects in the European Regional Development Fund (ERDF), as well as the support of companies as part of the promotion of the "Effizienz Agentur NRW" (efa+) and "Oekoprofit". All of these programmes and entities help stakeholders towards higher energy efficiency, material efficiency, water and waste savings. The desired outcomes (shown for GHG savings in table 5) are monitored regularly, but also updated on a regular basis for past effects. So far, only effects until 2020 are validated and can be reported here.

table 5: partial contribution of NRW Sustainability Bonds to GHG savings by 3rd parties

Programm	Budget Result #2 to #7 (2015-2020)	GHG Savings* 2015-2020	Budget Result 2021
ERDF (2014-2020)	EUR 135.7m	26,000 t CO_2e	EUR 22.5m
efa+	EUR 30.4m	83,000 t CO2e	EUR 5.0m
Oekoprofit	circa EUR 1.5m**	111,000 t CO_2e	circa EUR 0.1m
* these (validated) effects cannot be solely attributed to funding by the State of NRW as additional funds were necessary to achieve the goals (such as EU funding or own financial efforts by the stakeholders) ** the budget result for Oekoprofit can only be estimated based on the average promotion per project (circa EUR 20,000)			

source: as reported by efa+ (2022), Ökoprofit (2022) and EFRE.NRW[7] (2022)

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[7] https://www.efre.nrw.de/daten-fakten/buergerinformationen-und-durchfuehrungsberichte/

Annex

Allocation Report by NRW Ministry of Finance

The following table lists the budget plan and budget results for all projects in the NRW Sustainability Bond #8. In total, EUR 4.163bn, more than 100% of the Bond volume (EUR 3.5bn), have been allocated to eligible projects.

SDGs	Projects [types: social (S) | environmental (E) * changes in the budget plan compared to prior publications ** additional funding for Covid-19 projects compared to prior publications		Budget Plan (million EUR)	Budget Result (million EUR)
A Affordable basic infrastructure			**570.2**	**572.2**
9	Broadband expansion/Digitalization	S	391.2	393.2
1|11	Public transportation for low-income citizens	S	40.0	40.0
11	Public transportation for pupils and students	S	139.1	139.0
B Access to essential services			**3,206.8**	**2,450.1**
3	Health expenditures to deal with the coronavirus pandemic	S	126.1	64.9
3	Investment programme for hospitals and nursing schools	S	520.0	112.4
3	Vaccination against SARS-CoV-2	S	483.0**	389.3
3	Clinical study for therapeutic agent for SARS-CoV-2 patients	S	3.5	0.0
3	Hospital structure fund (State's share)	S	95.0	95.0
3	Combating the dangers of addiction	S	14.3	13.7
3	Health economy, telematics, further development of the health campus	S	8.3	2.4
3	Health aid, health protection, action plan hygiene, epidemics control	S	7.1	5.4
3	Measures to ensure medical care	S	2.5	2.6
3	Psychiatric care	S	1.3	1.2
3	Development plan on geriatric care	S	16.5*	10.8
3|4	Professional education of geriatric nurses	S	53.9	45.5
4|8	Bund-Länder-Covenant for the expansion of universities	S	347.1	342.9
4|8|10	Training facilities for the education of special education teachers	S	21.2	21.2
4	Measures to improve the quality of teaching and studying at universities	S	300.0	300.0
4|8|9	Return programme for highly qualified young researchers from abroad	S	6.2	5.3
1|10	Support for family centres/promotion of cooperation of family formation [...]	S	68.3	65.0
4|10	PlusKita and language courses at childcare facilities	S	101.3	100.3
4|10	Childcare in special cases	S	21.0	19.7
4	Exemption to contribution for parents for the last two years of day care	S	425.1	417.7
4	Measures at day care centres in response to the coronavirus pandemic	S	147.0	121.5
3|4	Health-related measures at schools in response to the coronavirus pandemic	S	70.7	15.7
4|10	Digitalization in schools to secure teaching during the coronavirus pandemic	S	149.0	112.9
4	[...] extracurricular education and care offers during the coronavirus pandemic	S	22.2	0.0
4|10	Social work at schools	S	47.7	47.5
9	Excellence Strategy	S	32.0	26.6
8|9	Promotion of innovation	S	31.9	31.9
9	Johannes-Rau-Forschungsgemeinschaft	S	15.4	14.5
8|9	Research and innovation in the fields of sustainable development	S	35.2	35.2
4|12	Sustainable development	S	1.3	1.0

SDGs	Projects [types: social (S) | environmental (E) * changes in the budget plan compared to prior publications ** additional funding for Covid-19 projects compared to prior publications		Budget Plan (million EUR)	Budget Result (million EUR)
4|12	Foundation for Nature and Sustainable Development	S	2.0	2.0
4|12	Facilities for environmental education	S	2.5	2.6
4|12	Consumer protection	S	28.5	23.6
C Affordable housing			**132.3**	**72.7**
9|11	[...] "Urban Reconstruction in the West" and "Growth and Sustainable Renewal"	S	56.8	32.3
8|9|11	[...] "Social City" and "Social Cohesion"	S	55.4	20.4
9|11	State programme for village renewal	S	20.0	20.0
D Employment generation			**14.2**	**4.9**
8|10	Occupational integration of people with disabilities	S	7.7	1.9
8|9	Environmental economy, sustainable economy	S	1.6	1.0
8|9	Green economy	S	5.0*	2.0
E Food security and sustainable food systems			**2.8**	**2.4**
3|4	EU school programme	S	2.8	2.4
F Socioeconomic advancement and empowerment			**231.0**	**173.0**
1|10	Fight against poverty and social exclusion	S	9.6	9.3
4|8	European Social Fund 2014-2020 [...] "No dead-end qualification"[...]	S	28.2	23.8
5|8	Equality and potential development in work and society	S	5.0	0.8
4|5	Promotion of equality at universities	S	4.4	4.3
5|16	Girls in special situations	S	1.1	1.0
16	Protection of children	S	7.7	2.1
5|16	Protection from violence	S	34.0**	25.5
8|10|11	Social inclusion of persons with disabilities	S	4.0	3.3
4|8|10	Measures for children from refugee families and for young refugees	S	12.6	11.6
10	Municipal integration management	S	50.0	30.3
10	Promoting integration of migrants living together in diversity	S	74.4	60.8
G Renewable energy			**44.0**	**10.9**
7	Pumped-storage hydroelectricity plants	E	2.0	0.0
7	Photovoltaic funding	E	42.0	10.9
H Energy efficiency			**90.6**	**129.2**
7|9	Energy [...], system transformation, innovation, e-mobility and energy efficiency	E	84.8	124.1
7|12	Enhancement of resource efficiency	E	5.9	5.0
I Pollution prevention and control			**100.1**	**35.1**
7|9	Energy research offensive and real laboratories	E	11.5	10.1
9|13	Target group-oriented climate protection	E	3.4	0.6
13	Municipal investments in climate protection	E	50.0	0.0
12	Circular economy and resource efficiency	E	9.9	1.9
7|13|15	European Regional Development Fund (ERDF) 2014-2020 (State's share)	E	25.3	22.5
J Environmentally sustainable management of resources			**96.1**	**81.8**
2|15	Responsible agriculture	E	14.5	11.9
2	Improvement of animal welfare	E	3.5	2.0

SDGs	Projects [types: social (S) | environmental (E)] * changes in the budget plan compared to prior publications ** additional funding for Covid-19 projects compared to prior publications		Budget Plan (million EUR)	Budget Result (million EUR)
2|15	European Agricultural Fund for Rural Development – EAFRD (State's share)	E	32.3	27.2
15	Protection of nature	E	37.1	33.8
15	Soil protection	E	4.7	3.5
11	Green infrastructure	E	4.1	3.4
	K Clean transportation		**54.5**	**45.9**
11	Infrastructure for cyclists and pedestrians	E	54.5	45.9
	L Sustainable water and wastewater management		**56.7**	**57.2**
6|13|15	Flood protection and river restoration	E	56.7	57.2
	M Climate change adaptation		**88.9**	**59.6**
13|15	Climate Action/Regional Climate Adaptation Measures [...]	E	16.2*	4.8
13|15	Forests reforestation	E	72.7	54.9
	N Green buildings		**380.0**	**467.6**
4|9	Modernisation of university buildings	E	68.5	62.8
3|9	Conservation, remediation and enlargement of university clinics [...]	E	311.5	404.8
	in Total		**5,068.3** */**	**4,162.7**

source: data provided by the Ministry of Finance of North Rhine-Westphalia (NRW)

NRW Sustainability Bond Programme (2014-2021)

NRW Sustainability Bonds – Emissions

Matching of Bonds (sorted by end-of-term)	Amount (EUR)
#2 NRW 0.125% 16-Mar-2023 (ISIN DE000NRW0JF6)	€ 1,585,000,000
#1 NRW 0.5% 11-Mar-2025 (ISIN DE000NRW0GP1)	€ 750,000,000
#3 NRW 0.5% 16-Feb-2027 (ISIN DE000NRW0KB3)	€ 1,825,000,000
#4 NRW 0.95% 13-Mar-2028 (ISIN DE000NRW0K03)	€ 2,025,000,000
#6/1 NRW 0.00% 26-Nov-2029 (ISIN DE000NRW0LZ0)	€ 1,000,000,000
#5 NRW 1.10% 13-Mar-2034 (ISIN DE000NRW0LM8)	€ 2,250,000,000
#7 NRW 0.00% 12-Oct-2035 (ISIN DE000NRW0ML8)	€ 2,400,000,000
#6/2 NRW 0.50% 25-Nov-2039 (ISIN DE000NRW0L02)	€ 1,500,000,000
#8/1 NRW 0.125% 04-Jun-2031 (ISIN DE000NRW0MY1)	€ 2,000,000,000
#8/2 NRW 0.6% 04-Jun-2041 (ISIN DE000NRW0MZ8)	€ 1,500,000,000
in Total	€ 16,835,000,000

source: issuer (Ministry of Finance NRW, 2022)

Allocation Table

Budget plan figures and budget results for the eligible assets of NRW's Sustainability Bonds #1-8 sorted according to the categories of the updated framework (February 2021)[8].

Eligible Sustainability Category		Budget plan 2014-2021		Budget result 2014-2021	
		EUR	share	EUR	share
Social Focus (A-F)		**17,244,817,206**	**76.4%**	**15,870,122,865**	**76.0%**
A	Affordable basic infrastructure	2,495,270,200	11.1%	2,583,518,054	12.4%
B	Access to essential services	13,058,518,038	57.9%	11,835,904,476	56.7%
C	Affordable housing	664,529,000	2.9%	570,969,405	2.7%
D	Employment generation	68,141,868	0.3%	44,879,094	0.2%
E	Food security and sustainable food systems	8,580,000	0.0%	6,329,466	0.0%
F	Socioeconomic advancement and empowerment	949,778,100	4.2%	828,522,370	4.0%
Environmental Focus (G-N)		**5,324,157,228**	**23.6%**	**5,015,100,927**	**24.0%**
G	Renewable energy	105,000,000	0.5%	23,898,330	0.1%
H	Energy efficiency	417,801,800	1.9%	413,239,373	2.0%
I	Pollution prevention and control	353,377,077	1.6%	234,036,021	1.1%
J	Environmentally sustainable management [...] *	578,509,732	2.6%	499,286,588	2.4%
K	Clean transportation	243,130,000	1.1%	204,173,804	1.0%
L	Sustainable water and wastewater management	363,290,500	1.6%	324,254,885	1.6%
M	Climate change adaptation	129,065,619	0.6%	78,076,596	0.4%
N	Green buildings	3,133,982,500	13.9%	3,238,135,331	15.5%

in Total		**22,568,974,434**	**100%**	**20,885,223,792**	**100%**

* Environmentally sustainable management of living natural resources and land use

source: Ministry of Finance NRW, 2022

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[8] Note that at the date of issuance the assets of Bonds # 1-7 were categorized into the categories according to the framework at the date of issuance. For this reason, the categorization as well as the share of social and environmental assets might deviate from previous publications.

Short Overview of Method Update

The full and detailed description of all quantified indicators as well as the required data and assumptions will be shown in an upcoming "Method Description". A number of changes to the methodology were made in order to accommodate for changes in quantification methods as well as the issuers framework. The goal of the new approach is to qualify reported values more clearly and consistent according to the following characteristics: **Qualification** (What is the context of the measured effect?), **Robustness** (How was the value determined?), **Attributability** (Is the State of NRW the sole promoter of the effect?), **Accumulability** (Which values can be summed up over a period of time?)

Qualification

Indicators are now qualified according to their position in an outcome pathway. Indicators that measure long-term and persistent outcomes towards overarching goals have the highest quality A (no indicator in the current report achieved this quality). Intermediate outcomes (B) describe desired changes beyond the scope of the programmes and projects on a societal or regional level (4 out 37 indicators). The more common output-indicators (C) relate to tangible results on the level of projects (19 out of 37). Activity-indicators are classified as D and comprise of resources deployed in order to achieve outputs and outcomes (14 out of 37 indicators). The minimum quality E refers to inputs in the system. They describe the interventions by the actor (here the State of NRW). All funding towards projects in the NRW Sustainability Bond are considered to be inputs, as their eligibility is defined by the issuer's framework and corroborated by a second-party opinion (SPO).

Robustness

The robustness of the indicators is defined in the following table.

Robustness	Criteria
1	primary data (directly monitored or evaluated)
2	directly estimated from primary data
3	calculated with the help of secondary sources or auxiliary variables
4	estimated on the basis of models with a simplified universal mechanism
5	results from 3rd party reporting without the possibility for validation

Attributability

The main goal of quantification is to attribute effects solely to the interventions by the State of NRW. However, not all available data (or other information) allows for such a contribution. In these cases, the indicator is indicated as "partial contribution", rather than "full contribution".

Accumulability

All indicators are assigned to 1 out of 11 "units of comparison". This allows to accumulate the effects between projects as well as compared to previous Bonds. However, doing so might constitute double counting in some cases, which is why this issue is further investigated in future reports.