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How to Contextualize SDG 11? Looking at Indicators for Sustainable Urban Development in Germany

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Abstract: Agenda 2030 pursues a universal approach and identifies countries in the Global South and in the Global North that are in need of transformation toward sustainability. Therefore, countries of the Global North such as Germany have signed the commitment to implement the Sustainable Development Goals (SDGs). However, the SDGs need to be "translated" to the specific national context. Existing sustainability indicators and monitoring and reporting systems need to be adjusted as well. Our paper evaluates how three different initiatives translated SDG 11 ("Make cities and human settlements inclusive, safe, resilient, and sustainable") to the German context, given the specific role of cities in contributing to sustainable development. These initiatives included the official 'National Sustainable Development Strategy' of the German Government, a scientific initiative led by the 'German Institute for Urban Affairs', and a project carried out by the 'Open Knowledge Foundation', a non-governmental organization (NGO). This article aims to analyze how global goals addressing urban developments are contextualized on a national level. Our findings demonstrate that only a few of the original targets and indicators for SDG 11 are used in the German context; thus, major adjustments have been made according to the main sustainability challenges identified for Germany. Furthermore, our results show that the current contextualization of SDG 11 and sustainable urban development in Germany are still ongoing, and more changes and commitments need to be made.

Keywords: Sustainable Development Goals; Agenda 2030; indicators; urban development; urban sustainability transformations; cities

1. Introduction

With the adoption of Agenda 2030 by the United Nations (UN) member states in September 2015, a new global agenda came into force that puts sustainability center stage [1]. This includes the 17 Sustainable Development Goals (SDGs) as an important step toward a more sustainable world. As wanted as the orientation toward global sustainability is, it is nonetheless of crucial importance to think about how to implement the SDGs. Issues such as governance, funding, the negotiation of emerging trade-offs, as well as the general character of global agreements and responsibility need to be considered [2]. Another vital aspect is the question of how SDG implementation can be measured, and which type of monitoring systems are most adequate for this purpose. As the 17 SDGs are divided into 169 targets and 232 quantifiable indicators, data measurement is challenging, especially since reliable data from the UN is only available for a few indicators.

In contrast to the developmental focus of their antecessors, the Millennium Development Goals (MDGs), the SDGs have a broader scope, addressing ecological, social, and economic challenges. This way, Agenda 2030 has a transformative character, stating that current development paths are

widely unsustainable and need to be changed profoundly. Two of the main differences between the MDGs and the SDGs are related to scale.

First, while the MDGs focused on countries of the Global South, the SDGs have a universal approach, considering countries in the Global South *and* the Global North as in need of transformation toward sustainability. This also refers to the special political and ideological responsibility of countries of the Global North to achieve global sustainability due to their higher historical (and current) per capita use of natural resources. In this article, we use "Global South" and "Global North" instead of formerly widespread categories such as first-world, second-world, and third/fourth-world or developed/developing countries. Global South and Global North are increasingly used terms in studying world politics [see for example [3,4] as they do not refer to a former global world order such as the ranking of first, second, third and fourth-world, and also do not transmit a normative dimension such as the categories developed/developing countries. Furthermore, the division between developed/developing countries is critical because the definition of what actually is development depends largely upon who defines it. The Global North and Global South are not geographical locations but describe countries, which are in a privileged societal, political, and economic position (Global North) or in disadvantaged position globally (Global South). This way, the different experiences of countries concerning colonialism and exploitation as well as existing power relations are considered. However, the frontier between Global North and Global South can be fuzzy, as some countries of the Global South are gaining political and economic power and a clear-cut definition between privileged and non-privileged countries is therefore difficult, as the example of the BRICS countries (Brazil, Russia, India, China and South Africa) shows. McFarlane [5] discussed the shortcoming of the terms Global North/South especially for urban studies and highlighted that the binary character of the terms falls short to describe the multitude of urban development paths worldwide. Nevertheless, the categories Global South and Global North have also been widely applied in urban (sustainability) studies in general due to the benefits compared to other categories such as developed/non-developed countries [6–9]. Major works on the use of the terms such as the contributions in the edited volume of Parnell and Oldfield [10] argue that the division Global North/South, which emerged first in the Brandt report in the 1980s [11], increasingly becomes a useful tool to depict differences concerning knowledge production and the transfer of urban concepts. Acknowledging the risk of oversimplification and potential confusion and especially referring to the variety of countries and cities that are subsumed under the two categories Global North and Global South, we decided to use those terms in order to highlight the impact of different institutional, political, societal, and economic contexts on SDG implementation. For this, the categories Global North/Global South are more suitable than the categories first-world, second-world, and third/fourth-world or developed/developing countries. This is especially true since one of the achievements of the SDGs in contrast to the MDGs was to identify no country as "developed" in terms of sustainability, but to turn all countries of the world into developing countries that need to be transformed in order to achieve more sustainability [12]).

Second, different to the MDGs, the SDGs should be implemented not only on the national level, but also on regional and local levels, with cities playing a major role in their implementation [13]. This change of scale bears enormous challenges for data provision, indicator development, and monitoring with regard to the SDGs [14]. Therefore, the 'Inter-agency and Expert Group on Sustainable Development Goal Indicators' (IAEG-SDGs), which represents the 'UN's Statistical Commission' as well as several national statistical offices, regularly discusses and updates the indicators and data availability for the SDGs.

Indicators in general are considered communication tools that help transmit information related to ongoing processes, and as elements of evidence-based policymaking [15]. Indicator-based sustainability communication helps interpret the complexity and uncertainty of sustainable development, and inform the different actors involved in sustainable development processes on the current progress [15]. The establishment of sustainability indicators is generally not a straightforward

process but a contested area, as those indicators define, regarding what is actually understood as sustainable development.

Within the SDGs, indicators have a special importance, which is related to the underlying governance approach: Agenda 2030 marks a shift in global politics [12]. Rather than top–down or market-based approaches, the SDGs build upon non-legally binding goals, on which the UN member states agreed on; this approach is described as *global governance by goal-setting* [12]. This means that the UN cannot enforce implementation, as countries do not have any legal obligation regarding SDG implementation. That is why alternative forms to foster SDG implementation were established, such as the 'High Political Forum', and reporting and review mechanisms on the country level. Consequently, the success of the SDGs does not depend on the strict application of existing laws and regulations, but rather on those "weak" instruments such as reporting on the process (combined with formalized commitments by governments at the national level) [12]. The success of SDG reporting and reviewing mechanisms again needs to build upon the existence of appropriate, transparent, and clear indicators, which measure the performance of a country concerning SDG implementation. Therefore, issues such as devising metrics, establishing monitoring systems, and standardizing and verifying data [16] are not peripheral points but rather key aspects that determine if the pursuit of SDG implementation process by UN member states as well as individual cities will succeed or fail.

In order to make the 232 indicators of all 17 SDGS mentioned in Agenda 2030 operational, countries need to translate and concretize those for their specific context. This translation is crucial, as not all indicators are of equal importance for each country. For example, countries with a considerable amount of coastal areas and important fishing industries may put more emphasis on SDG 14 'Life below water' than landlocked countries without maritime areas.

The focus of this article is SDG 11, which deals with urbanization: "Make cities and human settlements inclusive, safe, resilient, and sustainable" [1]. Given the high urbanization rates in many countries and the envisaged future share of urban dwellers in the total population, SDG 11 and the question of sustainable urbanization is of importance for most of the countries. SDG 11 addresses directly the urban level with 10 targets and 15 indicators developed by the UN [1]. Those strongly link to potential urban transformations to sustainability. Here, a specific challenge stands out, as no clear guidelines exist of how to translate national sustainability goals to the urban level, and how to implement SDGs in cities. Also, research on SDG indicators has focused either on the global, national, or urban level [15,17,18], whereas research on the interactions between different levels is lacking. Effective translation of SDG indicators from the global to the national level is needed, and national governments are considered as key actors in this process [12,19], but at the same time, SDG implementation at the local level likewise needs application by municipal actors. Therefore, for indicator development on the urban level, the national–urban interactions are particularly decisive in order to foster SDG implementation in cities. While the process of translating global indicators to national contexts is crucial for all 17 SDGs, it is the interplay between global, national, and particularly the local scale that is fundamental for SDG 11, because the indicators of this SDG require disaggregation, and cannot be collected on a national level only [20,21]. This is a challenge for official statistics, because comparable data is often more easily available on the national level, rather than on the city or regional level [22], with disaggregation considered also an issue for much of the other SDGs.

Accordingly, in contrast to the existing literature on SDGs in cities, which shows a strong focus on the urban level only [20,23,24], we put emphasis on the relation between the national and local levels. In doing so, this article analyzes how SDG indicators, which address sustainability at the urban level, are contextualized by different German initiatives. These include the official 'German Sustainable Development Strategy' of the German government [25], the initiative of the 'German Institute for Urban Affairs' et al. on SDG indicators for municipalities [26], as well as the work of the 'Open Knowledge Foundation' that critically assesses SDG implementation in Germany [27]. We chose these three initiatives because they represent different actor groups concerned with SDG implementation:

government, academia, and civil society, which allows us to shed insight on how different groups translate the global SDGs in terms of indicators and related data.

For all three initiatives, we examine how the SDG 11 indicators of Agenda 2030 have been contextualized, and specifically, what kind of indicators were used. Our aim is to evaluate how the indicators that were set for the urban areas by the UN in terms of SDG 11 were transformed on a national level in order to fit the specific German context. We thereby only present and discuss those indicators that are directly related to SDG 11. This offers the possibility of gaining further insight on the question of scale, as this SDG explicitly addresses the local level. However, the implementation of Agenda 2030 in cities cannot be reduced only to the implementation of SDG 11, as most of the other SDGs also have strong connections to urban areas [28].

Based on this research, we come up with an appraisal of how different actors contextualize SDG 11 at the national level, and what differences between the indicators set by the UN and the national translation emerge. This way, our article reveals how this process as well as prioritization of indicators for SDG 11 in Germany take place, and how challenges such as data availability, scale, and disaggregation are addressed. Therefore, the findings help to understand the processes of contextualizing SDGs in terms of sustainable urban development in a Global North context.

2. Framing the Implementation of the SDGs in Cities on National Level

SDG indicators present a contested topic in both practice and research. Scientists see the need to devise metrics, establish monitoring mechanisms, evaluate progress, enhance infrastructure, and standardize and verify data [16], which not only holds true for SDG indicators, but also for the work with indicators in general. Thus, specific SDG indicators that indicate transformative and progressive agendas such as Agenda 2030 call for new methodological tools going away from purely data-based indicators [29]. "Greening by numbers" by measuring environmental parameters with smart technologies does not seem to be justifiable to the society ([29] p. 91), because this focus on numbers often hides the broader sustainability effects that the improvement of data for one specific indicator might have. For example, the establishment of new park areas in a city might improve the overall share of urban green spaces, but may also simultaneously lead to gentrification and displacement [30]. Kaika [29] argued that dissensus, the emergence of social movements, and the development of alternative, neither state nor private initiatives based on the commons debate could act as living indicators that go beyond the techno-managerial, data-driven approach currently pursued in the SDGs. In the same vein, Satttherthwaite [31] highlighted the need to consider the potential of non-governmental initiatives such as slum/shack dweller groups in SDG implementation. However, the current indicators of SDG 11 hardly display the impact of these initiatives. For example, the aspect of resilience is measured through the existence of municipal risk reduction plans and not through community or neighborhood-based actions in place.

The question on what is actually evaluated with the SDG indicators is also part of fundamental critiques, which argue that the radical change that is needed for sustainability is not reflected in the current conception of the SDG indicators [32,33]. Following this up, the development of an appropriate indicator system for cities will depend on embedded capacities to share and learn across contexts and work collaboratively [3$]. This participatory approach toward indicator system development and implementation reflects the transformative character of Agenda 2030: "with the participation of all countries, all stakeholders, and all people" ([1] p. 2).

Besides these more general questions on the effect and challenges of adopting Agenda 2030 and its indicators, research has revealed that different cities in the Global South and the Global North face problems in providing all of the data required in the indicators of SDG 11, and therefore proposed various changes to maximize the local relevance of particular targets and indicators [34,35]. Furthermore, the potential of big data, cross-national comparisons, as well as the process of establishing the SDGs in general and of the urban SDG in specific have been discussed [21,36–38].

Research on the urban dimension of the SDGs highlights that applying SDG indicators in the cities of the Global South is challenging. Limited data availability, the importance of so-called informal practices of urban development, and the related shortcomings concerning data reliability, which among others cumulate in a lack of comparability, make monitoring difficult [18,20,24]. Thus, challenges also occur in cities of the Global North. Here, existing sustainability strategies, indicators, and monitoring and reporting systems need to be adjusted to the new framing of the SDGs. Contextualization to the urban context presents a major challenge, and issues such as data accountability as well as data provision and collection on the different spatial scales from city to national level as well as that civil society should also be involved in SDG implementation, and monitoring requires new data assessment, quality, and monitoring approaches in the Global North also. In addition, not only, but specifically countries in the Global North need to translate SDG indicators to the respective context. For example, SDG 2, "No hunger", stemming from the MDGs and referring strongly to a development perspective, has to be translated in order to be applicable to the Global North.

If the SDGs should achieve their aim to become a truly global agenda, their conceptualization and adoption to the national as well as the local contexts is of high importance for countries in both the Global North and the Global South. Therefore, indicators of the SDGs as stated in Agenda 2030 should be considered as a broad framework that needs to be specified on the national/local level. National and local translations of the SDGs and adjustment of the indicators is crucial in order to make the SDGs work and avoid meaningless wish lists on how the world should look in 2030.

3. Germany and the SDGs

In its current coalition agreement, the federal government of Germany has committed itself to implement Agenda 2030 [39]. The implementation is threefold, and contains not only measures with effects in Germany, but also measures in Germany that have a global impact. Additionally, the support of other countries through bilateral cooperation (measures with Germany) should be part of the German efforts of SDG implementation [25]. The recent peer review of the 'German National Sustainable Development Strategy' emphasized that this "triple approach" gets the challenge of sustainable development right and supports its further implementation [40].

3.1. The German National Sustainable Development Strategy and SDG 11

The German federal government published its first 'National Sustainable Development Strategy' in 2002 with an update in 2009. In the latest edition from 2016, an orientation of the strategy at the SDGs took place, explicitly aiming at renewing the existing strategy, rather than elaborating a new one. For all 17 SDGs, specific targets and indicators have been defined, by taking SDG targets and indicators as a reference. Thus, a translation of the SDG indicators to implement the 'UN Agenda 2030' on a national level, and enlargement of the existing 38 indicators of the previous version to 63 indicators in the current 'German National Sustainable Development Strategy' (GSDS) took place.

The German government emphasizes that this translation has been carried out in a participative way [25] by organizing dialogue and cooperation events with representatives from the federal government, regional governments at the federal state level, municipalities, different associations ("Verbände"), and civil society groups. As a result, approximately 100 representatives participated in the process, and around 200 organized interest groups handed in their written observations on the GSDS. Furthermore, the federal government organized five public consultation events in which approximately 1,200 citizens participated and around 750 comments on the GSDS were collected [25]. This way, many different institutions and individuals participated in the consultation process and shared their opinions on the GSDS.

In the course of this adoption process, targets and indicators of SDG 11 as defined by the UN were changed, enlarged, or deleted in order to fit to the specific German national context. The following priority areas stand out in terms of urban sustainability transformations in Germany: the reduction of land consumption, the reduction of emissions in the mobility sector, and affordable housing. For these

priorities, the GSDS underpins the social dimensions in terms of access to affordable housing, affordable public transportation, public spaces, and green areas. Air quality and noise protection are among the environmental challenges to be addressed. Priority is also given to resource efficient transport infrastructure for reducing CO2 emissions. Table 1 shows the targets (here named indicator fields) and indicators with specific target values concerning SDG 11 in the German sustainability strategy.

The strategy not only contains quantifiable objectives for all of the indicators for the year 2030, it also sets a measurement system that evaluates the success of reaching different targets. Every two years, the 'Federal Statistical Office' publishes a report of the current state of the sustainability indicators; every four years, the GSDS itself is developed further. The monitoring system indicates for each indicator whether the

a. Goal has (almost) been reached
b. Development is heading in the right direction, but between 5–20% of the goal is not being met
c. Development is heading in the right direction, but a gap of more than 20% remains
d. Development is heading in the wrong direction (cf. "status" in Table 1).

Table 1. Targets and Indicators addressing Goal 11 in the German National Sustainable Development Strategy (GSDS).

SDG 11	Indicator Field	Indicator	Measurement	Status
11.1	Land use: Sustainable Land use	Built-up area and transport infrastructure expansion	To be reduced to 30 ha minus × per day by 2030	Goal has (almost) been reached
11.1		Loss of open space in m^2/inhabitant	Reduction in the loss of open space per inhabitant	Goal has (almost) been reached
11.1.c		Inhabitants by area occupied by built-up areas and transport infrastructure (settlement density)	No reduction in settlement density	Development is heading in the right direction, but a gap of more than 20% remains
11.2	Mobility: Guaranteeing mobility—protecting the environment	Final energy consumption in freight transport	Reduce 15% to 20% by 2030	Development is heading in the wrong direction
11.2		Final energy consumption in passenger transport	Reduce 15% to 20% by 2030	Development is heading in the wrong direction
11.2		Population-weighted average travel time with public transport from each stop to the next medium/large-sized city	Reduction	No evaluation possible due to statistical uncertainty
11.3	Housing: Affordable housing for all	Housing cost overload	Proportion of the population to decline 13% by 2030	Development is heading in the wrong direction

Concerning the indicators of SDG 11, the GSDS indicates that the objectives "built-up area and transport infrastructure expansion" and "change in open space per capita" have been already or almost achieved. The objective "inhabitants per square kilometer of built-up area and transport infrastructure" is not achieved yet, and the gap is more than 20%. For three out of six indicators, a development heading in the direction of increasing unsustainability has been identified. It is remarkable that for the objectives "Final energy consumption in freight transport", "Final energy consumption in passenger transport", and "Share of people in households that spend more than 40% of their disposable income on living expenses", the strategy outlines that the development is heading in the wrong direction.

Summing up, Table 1 shows that the degree of target achievements varies for the different indicators. This sustains the main idea of the SDGs, that countries of the Global North also need transformative change toward sustainability. On the other hand, this "self-evaluation" also underpins that Germany has set very ambitious targets, and it would be interesting to evaluate whether other countries do the same as well. However, whether the political will to implement the goals is just as ambitious also remains to be seen for Germany. In terms of SDG implementation at the urban level, the GSDS highlights the importance of cooperation among the national, federal, and local levels of cities and communities, but does not provide any guidance for the translation of the GSDS.

3.2. SDG Indicators for Municipalities

The Project "SDG Indicators for Municipalities" has been carried out by the 'German Institute for Urban Affairs (DIFU)', 'Bertelsmann Foundation', as well as other institutions such as the 'Bundesinstitut für Bau, Stadt, und Raumforschung', 'Deutscher Städtetag', 'Deutscher Städte und Gemeindebund', 'Deutscher Landkreistag', and 'Engagement Global' in 2017 and 2018 [26]. In contrast to the 'German National Sustainable Development Strategy', this project explicitly addresses the transfer of SDGs to the local level. All 169 UN SDG indicators were evaluated from the point of view of German municipalities for their relevancy, validity, data availability, data quality, and function, and by evaluating the possible contribution of municipalities to achieve goals and targets set by the UN. Based on this evaluation, the project partners developed 47 core indicators and 469 indicators in total, covering all 17 SDGs. Whenever possible, indicators were aligned to more than one SDG. The project applied existing German sustainability indicator sets and developed new indicators as well, based on available datasets and criteria such as validity, data availability, data quality, and function.

The participating institutions also aimed to provide the necessary data, in order to support the sustainability management of individual municipalities according to the indicators elaborated, which should serve as a framework. Thus, each municipality can and should determine, based on the individual contexts, the most relevant indicators. As SDG 11 is of major importance for cities, five of the developed 47 core indicators relate to SDG 11 (see Table 2). For other SDGs, which are of less importance for cities (e.g., SDG 14), fewer indicators were established.

Representatives of municipalities, Agenda 21 organizations, and other experts were involved in the one-year process of translating the SDGs to the local level. Different discussion rounds took place within the involved organizations as well as with the project advisory board. Consultation of the broader public on the indicator development did not take place due to the experimental and scientific character of the project.

Table 2. Targets and indicators of Sustainable Development Goal (SDG) 11 developed in the project "SDG Indicators for Municipalities".

Indicator	Calculation
11.1.1 Residential rental prices	Average basic rent per square meter
11.2.1 Modal split	(Traffic volume of pedestrian, bicycle, and public transport traffic/(Overall traffic volume) * 100
11.2.2. Traffic injuries	(Number of injured and killed persons in traffic accidents)/(Number of inhabitants) * 1000
11.3.1 Land consumption	(Area for settlement and traffic total area * 100)
11.3.1/11.7 Recreation areas	(Amount of recreation areas)/(Number of inhabitants)

The results of the project such as the data for most of the 47 core indicators for German cities and administrative districts are available online [41]. Statistical correlation analyses show the interaction between different core indicators [25]. Currently, selected municipalities are testing the indicator set, evaluating it in terms of its practical applicability and developing it further. Different areas for extending the indicators have already been identified.

It was beyond the scope of the project to define thresholds or normative targets for the indicators. For example, while extensive data on the development of the average rent per square meter in German cities (indicator 11.1.1) exist, the project did not indicate what level of rent per square meter is considered as adequate and should be achieved by 2030. The project coordinators argue that the municipalities should take over the target setting and define the exact values.

An analysis of the data of the five biggest cities in Germany (Berlin, Hamburg, Munich, Cologne, and Frankfurt) according to SDG 11 targets as set by the "SDG Indicators For Municipalities" project reveals significant differences between the five cities, especially for the indicators "Residential rental prices", "Land consumption", and "Recreation areas" [41]. Therefore, SDG implementation in different cities of the same national context requires either clear thresholds for individual cities, or one threshold to be reached/not be exceeded by all of the cities in order to be able to measure success over time. In contrast, aggregated data for the urban areas of one country would hide these city-specific differences, and probably lead to misleading national urban politics orientations.

3.3. www.2030-watch.de

The platform www.2030-watch.de is one of the projects developed by the 'Open Knowledge Foundation Germany' (OKF). OKF is a non-profit association that supports the distribution of publicly available knowledge and is part of an international network of similar organizations in other countries. 2030-watch is financed by the 'Federal Ministry for Economic Cooperation and Development', the 'development agency of the Protestant Churches in Germany', 'Brot für die Welt', and the cooperation agency of the federal state of Berlin [27]. Even though public sources partly fund the project, it works independently from state actors, and tries to involve civil society organizations in SDG implementation.

The idea of 2030-watch is to provide an additional, alternative non-governmental organization (NGO)-based perspective of SDG implementation in Germany. The project aims to offer a critical perspective on the state of the art regarding sustainability implementation in Germany in order to shed light on pressing action fields, following up on the intention to "Leave no one behind" and highlight the international responsibilities of Germany as a highly developed country. Therefore, the official indicators of the GSDS are critically evaluated, and alternative forms of data measurement as well as changes concerning the desired degree of target fulfillment until 2030 are applied. Furthermore, the project developed additional indicators that are not part of the GSDS. This is based on the opinion of experts and civil society, as well as the scientific literature and international political agendas referring to a proper evaluation system of the NGO. However, 2030-watch does not publish detailed information on the involved experts and the participation process. This makes the contextualization of the SDG indicators not as transparent as in the case of the GSDS.

Table 3 shows all of the indicators for SDG 11 of 2030-watch, with reference to those of the 'German National Sustainable Development Strategy'. Those have been re-evaluated; new ones have been added, and the extent to which progress has been made in achieving the sustainability targets set by the selected indicators has been evaluated.

Table 3. Targets and Indicators of Goal 11 developed by 2030-watch.de.

Target	Indicator
Maintain settlement density	This official indicator of the GSDS is not calculable. Therefore, no progress concerning the achievement of the target/implementation can be calculated
Reduce the final energy consumption in freight transport	Final energy consumption in freight transport in %
Reduce the final energy consumption in passenger transport	Final energy consumption in passenger transport in %
Reduce the increase of built-up area and transport infrastructure area expansion	Built-up area and transport infrastructure area/total area * 100
Reduction in the loss of open space per inhabitant	Loss of open space in m^2/inhabitants per year
Reduce exposure to air pollution by particulate matter PM 2.5	PM 2.5 particulate matter pollution (in $\mu g/m^3$, 2015) (new indicator, which has not been involved in the GSDS, but is part of the Eurostat SDG monitoring at the European level (Eurostat 2017))
Traffic relocation in freight transport	Traffic relocation in freight transport (in % of total km, 2016 (new indicator that is already part of the European Union (EU) sustainability strategy but has not been involved in the GSDS)
Traffic relocation in passenger transport	Traffic relocation in passenger transport (in % of covered passenger-km) 2015) New indicator that is already part of the EU sustainability strategy, but has not been involved in the GSDS
Housing cost overload	Housing cost overload (in %)
Reduction of urban solid waste	Urban solid waste (in kg/capita) (new indicator, which has not been involved in the German Sustainability Strategy)
Reduction of population-weighted average travel time with public transport from each stop to the next medium-sized/large city	This official indicator of the German National Sustainable Development Strategy has no clearly defined target value. Therefore, no progress concerning the achievement of the target/implementation can be calculated.

The 2030-watch project considers two of the SDG 11 indicators ("Settlement density" and "Travel time with public transport") of the GSDS as not calculable. As quantitative targets have not been defined, this makes progress evaluation impossible. Therefore, they deleted those indicators, while four new indicators have been added ("Reduce urban solid waste", "Traffic relocation in freight transport", "Traffic relocation in passenger transport", and "Reduce exposure to air pollution") in order to stress the important challenges that German cities are facing in terms of particulate matter pollution, waste, and traffic relocation. Additionally, indicator thresholds and targets of the GSDS have been adjusted. For example, whereas the GSDS aims to reduce the land consumption until 2030 to 30 ha per day, 2030-watch argued that the target should be 20 ha per day. This is based on the argumentation that the definition of thresholds is a political decision.

Similarly to the GSDS, 2030-watch searched the data for all of the indicators, and assessed to what degree the SDGs have already been implemented. For SDG 11, 2030-watch stated that the degree of actual fulfillment is 27%, considering the adjusted thresholds as well as the current situation of the newly defined indicators, which is different to the GSDS. Interestingly, 2030-watch stated that the degree of fulfillment of SDG 11 is just 18% if only the indicators and the target values of the GSDS were applied. This leads to a rather paradoxical situation, where the seemingly more critical perspective of the 2030-watch project states more progress toward SDG 11 fulfillment than the official government-led approach. Here, the question remains as to whether this can be explained to some extent with the data that is used for calculation.

4. Discussion: Comparison of Targets and Indicators of the Different Approaches

All three German approaches considerably reduced the overall number of SDG 11 indicators in comparison to the 15 indicators of Agenda 2030. This was done through additional analyses, consultation with various stakeholders, critical reflection of the targets set by the GSDS, and explicit focus on the urban level. Five of the SDG 11 targets (11.4, 11.5, 11.a, 11.b, 11.c) have not been addressed by any of the approaches, while housing (SDG target 11.1) is a topic addressed by all in terms of affordability. Transportation is also one of the main issues in all three initiatives, thus with a strong link to energy reduction. Time and death reduction in the transport sector is also covered, addressing accessibility and safety aspects (SDG 11.2) to some extent. All three address SDG target 11.3 in terms of the first indicator, "land consumption", while participation or other process-related indicators are not issues at all. Environmental impacts according to SDG target 11.6 are explicitly addressed by 2030-watch with regard to waste and air pollution, and indirectly in relation to transportation. SDG target 11.7 is acknowledged by all concerning the protection of open space (see Table 4 for an overview).

Table 4. Targets and indicators of United Nations (UN) SDG 11, the GSDS, the German Institute for Urban Affairs (DIFU) et al. project on SDG indicators for municipalities and the 2030-watch-project.

Strategy	Target	Indicator
SDG 11	**11.1 Ensure access for all to adequate, safe, and affordable housing and basic services and upgrade slums**	**11.1.1 Proportion of urban population living in slums, informal settlements, or inadequate housing**
GSDS	Housing: Affordable housing for all	Housing cost overload: Proportion of the population to decline to 13% by 2030
DIFU	Residential rental prices	Average basic rent per square meter
2030-watch	Housing cost overload	Housing cost overload (in %)
SDG 11	**11.2 Provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons**	**11.2.1 Proportion of population that has convenient access to public transport, by sex, age, and persons with disabilities**
GSDS	Mobility: Guaranteeing mobility—protecting the environment	Population-weighted average travel time with public transport from each stop to the next medium-sized/large city → Reduction
		Final energy consumption in freight transport → Reduced 15% to 20% by 2030
		Final energy consumption in passenger transport → Reduced 15% to 20% by 2030
DIFU	Modal split	(Traffic volume of pedestrian, bicycle, and public transport traffic/(Overall traffic volume) * 100
	Traffic injuries	(Number of injured and killed persons in traffic accidents)/(Number of inhabitants) * 1000
2030-watch	Reduce final energy consumption in freight transport	Final energy consumption in freight transport in %
	Reduce final energy consumption in passenger transport	Final energy consumption in passenger transport in %
	Traffic relocation in freight transport	Traffic relocation in freight transport (in % of total km)
	Traffic relocation in passenger transport	Traffic relocation in passenger transport (in % of covered passenger-km)
SDG 11	**11.3 Enhance inclusive and sustainable urbanization and capacity for participatory, integrated, and sustainable human settlement planning and management in all countries**	**11.3.1 Ratio of land consumption rate to population growth rate** **11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically**
GSDS	Land use: Sustainable land use	Built-up area and transport infrastructure expansion → To be reduced to 30 ha minus x per day by 2030 Inhabitants by area occupied by built-up areas and transport infrastructure (settlement density) → No reduction in settlement density
DIFU	Land consumption	Built-up area and transport infrastructure area/total area) * 100
2030-watch	-	-
SDG 11	**11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage**	**Total expenditure (public and private) per capita spent on the preservation, protection, and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed, and World Heritage Center designation), level of government (national, regional, and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector, and sponsorship)**
Not addressed by GSDS, DIFU and 2030-watch		

Table 4. *Cont.*

Strategy	Target	Indicator
SDG 11	**11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations;**	**11.5.1 Number of deaths, missing persons, and persons affected by disaster per 100,000 population** **11.5.2 Direct economic loss in relation to global gross domestic product (GDP), damage to critical infrastructure, and number of disruptions to basic services, attributed to disasters**
Not addressed by GSDS, DIFU, and 2030-watch		
SDG 11	**11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management**	**11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities** **11.6.2 Annual mean levels of fine particulate matter (e.g., PM2.5 and PM10) in cities (population weighted)**
Not addressed by GSDS and DIFU		
2030-watch	Reduction of urban solid waste	Urban solid waste (in kg/capita)
	Reduce exposure to air pollution by particulate matter	PM2.5 Particulate matter pollution (in $\mu g/m^3$)
SDG 11	**11.7 By 2030, provide universal access to safe, inclusive and accessible green and public spaces, in particular for women and children, older persons, and persons with disabilities**	**11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age, and persons with disabilities** **11.7.2 Proportion of persons victim of physical or sexual harassment, by sex, age, disability status, and place of occurrence, in the previous 12 months**
GSDS	Land use: Sustainable land use	Loss of open space in m^2/inhabitant → Reduction in the loss of open space per inhabitant
DIFU	Recreation areas	(Amount of recreation areas)/(Number of inhabitants)
2030-watch	Reduction in the loss of open space per inhabitant	Loss of open space in m^2/inhabitant per year
SDG 11	**11.a Support positive economic, social, and environmental links between urban, peri-urban, and rural areas by strengthening national and regional development planning**	**11.a.1Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs by size of city**
Not addressed by GSDS, DIFU, and 2030-watch		
SDG 11	**11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans toward inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction, holistic disaster risk management at all levels**	**11.b.1 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030** **11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies**
Not addressed by GSDS, DIFU and 2030-watch		
SDG 11	**11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials**	**11.c.1 Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient, and resource-efficient buildings utilizing local materials**
Not addressed by GSDS, DIFU and 2030-watch		

We can state that all three initiatives adjusted the original list of indicators of Agenda 2030 considerably. All three initiatives have chosen similar or at least comparable indicators. This way, the three initiatives fit together and create a coherent picture of how SDG 11 is contextualized in Germany. All three initiatives seem to share a common understanding of the priorities for sustainable urban development in Germany, which differs largely from the original indicators for SDG 11 set by the UN.

What are the consequences of this contextualization for SDG implementation in a country of the Global North and its cities? What tensions emerge between the global conception of Agenda 2030 and its translation to a specific national context? We would like to highlight three main points:

- The adjustments of SDG 11 in Germany made by the three approaches limit the international comparability on the progress made toward a sustainable urban development based on UN indicators. Whether a city in Germany is performing well and is on its track to achieve the SDGs (or at least SDG 11) depends on the adoption of specific indicators. As no clear thresholds were set, it will still depend on the cities to develop their individual ones as well as monitoring systems to evaluate success and progress. If other indicators would have been chosen (for example SDG 11.4 "Cultural heritage" or SDG 11.a. "Linkages between urban, peri-urban, and rural areas"), the same city probably would have performed differently. Cross-national comparisons are therefore useless if they are not based on the same indicators. A related challenge is the comparison between cities of the Global North and the Global South, as the ignorance of several SDG 11 indicators by Germany reveals. Not all the 10 targets and 15 indicators are helpful in the same way, for cities

in different contexts. The translation of the SDGs to a specific country or city is a process in which the priorities for sustainable urban development need to be defined according to prevailing sustainability challenges. These priorities may differ especially in cities of the Global North and Global South. While in this way, comparability on the process of SDG implementation can hardly be achieved through indicators, it is important to emphasize the general need of transformations of both cities of the Global South and North. Therefore, comparability can focus on process indicators, such as how the contextualization took place, what participation methods have been implemented, and how transparent and inclusive was the process. Nevertheless, this is even harder to measure, as quantitative data does not exist.

- The three approaches address the challenges of scale and target setting in different ways. Only the DIFU project followed a specific local approach and facilitated data at the municipal level, while the GSDS and 2030-watch did not provide disaggregated data at the city level. That is why the conclusions of the GSDS and 2030-watch only have limited relevance for urban development strategies in cities. For example, the indicator "Share of people in households that spend more than 40% of their disposable income on living expenses" by the GSDS does not tell anything about how the situation is in a specific city. If the value of the indicator decreases in general, this does not allow concluding that political instruments such as rent control or the construction of social housing are not needed anymore in cities with a tense real estate market. This means that it is the responsibility of the cities to thoroughly define individual indicators. This needs to be done by analyzing the local situation in order to develop context-specific municipal sustainability strategies to address SDGs. In consequence, national urban politics to support SDG implementation should be framed in a way that they provide guidance and define general targets to be reached, but leave it up to the cities to develop their individual strategies within the given framework. Therefore, disaggregated data can be an important source to monitor the divergent developments taking place within the same national context. As up to now, no difference is made by the GSDS between metropolitan regions, peri-urban settlement structures, or conurbations. Therefore, future approaches should focus on how data on the SDGs can be aggregated in order to grasp complex urban–rural relations as well.
- One of the innovations of the GSDS is its focus on sustainability measures *in* Germany, measures *by* Germany, as well as measures *with* Germany. This shows that the German government acknowledges its global responsibility for local actions, and highlights the interconnectedness of sustainable development. However, the indicators of SDG 11 do not reflect this. Even though the role of cities for global sustainability action (for example regarding combat climate change [42–44]) is known, also the current indicators used by the three German initiatives do not address the role of cities as global sustainability actors. The indicators focus exclusively on the situation in German cities, neglecting measures *by* and *with* German cities. Possible indicators could address, for example, international sustainable development initiatives supported by German cities according to SDG 11.c. The lack of indicators concerning 'measures of', 'measures by', and 'measures with' German cities has also been acknowledged by the DIFU project, and is identified as one future research priority of the project.

5. Conclusions and Recommendations

With this article, we provided an analysis of how different actor groups (government, academia, and civil society) translated SDG 11 to the German context and the indicators that were used. It is rather a snapshot of the ongoing processes, as the three initiatives agree that further concretization and modification of the indicators will take place. Furthermore, they followed up different aims. Nevertheless, we identified three main challenges to be solved within the German context: 1. limited comparability and expressiveness of the indicators, 2. difficulties in data disaggregation, and 3. a lack of indicators on sustainability measures by and with the German cities. Thus, we did not analyze whether and how individual cities make use of the three approaches. In this context, we would like to

state that some German cities have already developed their own strategies to address the SDGs [45]. However, as other countries encounter similar challenges, cross-country knowledge and experience transfers are recommended. It would be interesting to discuss further whether the three approaches that were presented have the potential to guide cities in developing their sustainability strategies. Additionally, the relation between the national contextualization of SDG 11, the local contextualization in cities, as well as the issue of comparability, should be analyzed further.

The three initiatives elaborated new indicators and revised existing indicators for SDG 11, which stand in the tradition of formerly used urban sustainability indicators. New data sources or other innovative forms of how to measure the objectives of SDG 11 (see for example Kaika [20] or Kharrazi et al. [35]) are widely missing. This impression is strengthened by the innovative idea of the GSDS regarding sustainability measures *in* Germany, *by* Germany, and *with* Germany, which has not been included in the contextualization of SDG 11. Therefore, whether the current indicators are adequate to measure the transformative change promoted by Agenda 2030 is questionable. All three initiatives are currently working on an update of the indicators, which might address these shortcomings.

With our focus on SDG 11, we did not address the universal character and the interlinkages of different SDGs. However, we are convinced that the implementation of SDG 11 is closely related to other SDGs, and that interactions, synergies, and trade-offs exist among the targets of the SDGs [17,19,46]. One of the crucial aspects is how to adjust the indicators—not only to, but also for SDG 11—in a way that the nexus between the different sustainable development goals becomes measurable in cities. Therefore, the question of how policy coherence throughout all of the SDGs is implemented in national and local urban politics in Germany requires further research. Additionally, cross-country comparisons of how global–national–urban interlinkages concerning SDG indicators work, not only between Global South and Global North countries, but also within countries of the Global South/Global North is needed. This would provide further insights on place-specific SDG contextualization. This relates to questions of the role of institutional and financial capacities in SDG implementation. Countries and cities of the Global South might need to find other ways to contextualize the SDGs than the rather capital and human resource-intensive approaches chosen in Germany. In all three initiatives analyzed, different consultation forms existed that led to comparable outcomes concerning the indicators. This also relates to the question of how the organizational form and the actors involved influence the contextualization of the global SDG indicators. Our three cases show that irrespective of the involved actors and modes of participation, rather similar indicators for SDG 11 in Germany emerged.

Our research also demonstrated that the disaggregation of data, availability of comparable data on local and national levels, definition of adequate indicators, and acknowledgement of national and local specifics need to be considered. Besides, the questions of how the indicators are defined, who defines the local thresholds, and with which motivation, require further analyses. How can it be avoided that the three initiatives become facades that are erected for the benefit of the UN without any impact on urban development on the ground? While the GSDS as well as 2030-watch defined quantifiable thresholds for the indicators, the DIFU project provided the indicators only, and left it for urban politics to define the exact thresholds for specific cities. Both approaches seem to be valuable: centralized thresholds for indicators allow a more coordinated action toward implementing the SDGs, while specific thresholds for cities allow a more context-sensitive approach. The definition of thresholds for local SDG implementation is not trivial, because the success of the SDGs will be measured according to those thresholds. Furthermore, as cities are seen as key actors for SDG implementation, it is crucial to know whether they are on the path toward a more sustainable world by 2030, or not.

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