

**Looking Ahead for Sustainable Development:  
Results and Lessons Learned from the Vision development of a  
“Sustainable North Rhine-Westphalia 2030” in a science-practice-dialogue**

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## **1. Introduction**

Sustainable development is a complex and uncertain endeavor that requires fundamental system changes and long-term guidance.<sup>1</sup> It is a cross-cutting task that can only be achieved by coordinated strategies at global, national, regional and local levels.<sup>2</sup>

Sustainable development in urban areas is particularly challenging, as urban areas accumulate problem areas as well as solution options. Urban areas are places to live and work with the highest energy and resource consumption. Although cities only cover 2 per cent of the earth's surface, 70 per cent of the world's anthropogenic greenhouse gas emissions are generated here<sup>3</sup> as well as up to 80 per cent of the world's energy and resource usage.<sup>4</sup> Urban areas accumulate inequality and poverty, but also knowledge, creativity and innovative entrepreneurial concepts. Urban areas are places where sustainability processes are implemented and can be seen and experienced. Cities are in direct contact with their citizens, businesses and institutions, and can build

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<sup>1</sup> Kemp, R.; Loorbach, D.; Rotmans, J. Transition management as a model for managing processes of co-evolution towards sustainable development. *Int. J. Sustain. Dev. World Ecol.* **2007**, *14*, 1–15.

<sup>2</sup> United Nations. Johannesburg Declaration on Sustainable Development. In Proceedings of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002. Available online: <http://www.un-documents.net/jburgdec.htm> (accessed on 31 July 2017).

<sup>3</sup> UN Habitat (2011): Cities and Climate Change. Global Report on Human Settlements 2011. United Nations Human Settlements Programme, London/Washington, DC. [www.unhabitat.org](http://www.unhabitat.org) (accessed on 31 July 2017)

<sup>4</sup> UNEP (2012): Sustainable, Resource Efficient Cities – Making it Happen! <https://sustainabledevelopment.un.org/content/documents/1124SustainableResourceEfficientCities.pdf> (accessed on 31 July 2017)

strong partnerships for managing transition processes towards sustainability. With their actions, cities can serve as concrete and touchable role models for their citizens and other cities worldwide.

North Rhine-Westphalia (NRW) is the most populous federal state of Germany (17,7 million) and highly urbanized: It contains 396 municipalities including 28 cities with more than 100.000 inhabitants. There are two major metropolitan regions in NRW: The metropolitan region Rheinland with more than 9 million inhabitants and large cities like Aachen (245.000 inhabitants), Bonn (320.000 inhabitants), Cologne (1 million inhabitants) and Düsseldorf (610.000 inhabitants) and the metropolitan region Ruhr with more than 5 million inhabitants and large cities like Essen (580.000 inhabitants), Dortmund (585.000 inhabitants), Duisburg (490.000 inhabitants) and Bochum (365.000 inhabitants).<sup>5</sup>

In Germany, federal states play a vital role in managing transitions towards sustainable development, because of their regional competences in legislation and implementation, their regional expertise and their proximity to citizens, civil society, companies – and cities and urban areas.<sup>6</sup> In June 2016, NRW adopted its first sustainability strategy as the eleventh of sixteen federal states in Germany. Especially in the last couple of years, there has been a high dynamic in the development of sustainability strategies at federal state level in Germany.

The Sustainability Strategy of NRW consists of a strategy paper<sup>7</sup> and a first indicator report<sup>8</sup> that shall be updated every two years. The strategy covers environmental, social and economic aspects of sustainable development, has 19 fields of action and seven priority areas.<sup>9</sup> The strategy and indicator report contain about 70 indicators and targets for 2020, 2030 and 2050.

The development of the “Sustainability Strategy NRW” was accompanied by a research project of the Wuppertal Institute (WI). In one work package, a vision was developed for a “Sustainable NRW 2030” that draws a positive image of a sustainable NRW in 2030.<sup>10</sup>

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<sup>5</sup> IT.NRW, Einwohnerzahl und Bevölkerungsdichte in NRW, 2015

<https://www.it.nrw.de/statistik/a/daten/eckdaten/r511dichte.html> (last accessed on 31 Juli 2017).

<sup>6</sup> Kerkow, U. *Ländersache Nachhaltigkeit*; Global Policy Forum: Bonn, Germany, 2016.

<sup>7</sup> Ministry for Climate Protection, Environment, Agriculture, Nature and Consumer Protection of the State of North Rhine-Westphalia. *Sustainability Strategy for North Rhine-Westphalia*; Ministry for Climate Protection, Environment, Agriculture, Nature and Consumer Protection of the State of North Rhine-Westphalia: Düsseldorf, Germany, 2016. Available online: [https://www.nachhaltigkeit.nrw.de/fileadmin/download/sustainability\\_strategy\\_for\\_north\\_rhine-westphalia.pdf](https://www.nachhaltigkeit.nrw.de/fileadmin/download/sustainability_strategy_for_north_rhine-westphalia.pdf) (accessed on 10 April 2017).

<sup>8</sup> Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen. *Nachhaltigkeitsindikatoren Nordrhein-Westfalen—Bericht 2016*; Die Landesregierung Nordrhein-Westfalen: Düsseldorf, Germany, 2016. [https://www.nachhaltigkeit.nrw.de/fileadmin/download/nachhaltigkeits-indikatorenbericht\\_2016.pdf](https://www.nachhaltigkeit.nrw.de/fileadmin/download/nachhaltigkeits-indikatorenbericht_2016.pdf) (accessed on 19 April 2017).

<sup>9</sup> (1) Climate Protection; (2) Environmental Economics; (3) Biodiversity; (4) Sustainable Financial Policy; (5) Sustainable Urban and Neighborhood Development and Local Mobility; (6) Demographic Change and age-appropriate Neighborhoods; and (7) State initiative “NRW holds together—for a life without poverty and outlawing”

<sup>10</sup> Müller, Miriam; Reutter, Oscar; *Vision Development towards a Sustainable North Rhine-Westphalia 2030 in a Science-Practice-Dialogue*; In: Sustainability 2017, 9, 1111; doi: 10.3390 /

The vision contains both: A narrative vision text describing a desirable sustainable NRW in 2030 and target and indicator proposals for making the vision measurable and manageable. Vision development and target formulation are important strategic instruments for sustainable development.

The paper describes the vision formulation process, the role of the vision for sustainable development in an urbanized area like NRW and the role science can play for developing such a vision and thus contributing to vertical integration of transition management processes between different political levels – especially between state and city level.

## 2. Participatory Vision Development Process

The vision was developed in a participatory approach in three iterative dialogue rounds from January 2015 until May 2015. The research team of the Wuppertal Institute developed a first draft text of the vision.

For developing the vision, ten guiding criteria were taken into account:<sup>11</sup>

1. **Normative orientation:** The vision draws a positive and holistic picture of a desirable sustainable future to demonstrate “This is how we want to live!” The purpose of the vision is to inspire and motivate.
2. **Time horizon:** The target year of the vision is 2030 or 2050 when reasonable (e.g., for climate change). The vision is written in present tense.
3. **Context:** The vision highlights the specific character and context conditions of NRW but is also generally valid.
4. **Ambition:** The vision is ambitious, but also feasible; the vision is neither utopian nor naïve.
5. **Subject:** Subject is the federal state of NRW in the third person (“NRW” and not “we” or an invented individual).
6. **Target group:** Target group is the informed public.
7. **Language style:** The vision is systematic, analytical and scientifically sound but also comprehensible for people from outside the scientific community. The language style is objective, factual and with short sentences, but imaginative by created images.
8. **Content:** The vision draws a holistic picture of sustainable development.
9. **Level of detail:** The vision contains both a qualitative text and operationalized targets (existing targets at state level or other political levels and proposed targets from the science perspective) to link the vision to implementation and monitoring. The targets developed were quantified, time-related, easy to communicate and (if possible) and conformed to the “SMART” criteria: They were specific (target a specific area for improvement), measurable (quantify or at least suggest an indicator of progress), assignable (specify who will do it), realistic (state what results can realistically be achieved, given available resources), time-related (specify when the result(s) can be achieved).
10. **Acceptance:** The vision was discussed with relevant stakeholders from science, civil society and administration to integrate a broad variety of stakeholder views and generate high acceptance.

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su9071111. Online open accessed <http://www.mdpi.com/2071-1050/9/7/1111/htm> (last accessed on 31 July 2017).

<sup>11</sup> Compare *ibid.*

The draft text version was then discussed with stakeholders from science and practice:

1. A first dialogue round was held with scientific experts for social and economic sustainability.
2. A second dialogue round was held with the members of the 'TEAM sustainability', an advisory board to the research project with representatives from social, economic and ecological organizations.
3. A third dialogue round was held with the members of the interdepartmental working group (IMAG sustainability) with leading representatives from all NRW ministries.

As a result of the iterative loops, the length and contents of the vision changed considerably three times.

The iterative dialogue rounds led to several refinements of the draft text version of the vision. The main refinements were:

- The inclusion of further aspects, e.g. agriculture, health, habitation, payment of social jobs, energy poverty, lifelong learning, noise as a social problem, culture, mega trends (e.g. refugees, demographic change, digitalization, industry 4.0);
- The further accentuation of NRW specifics;
- The revision of the length of the vision (first shortening, then extending).

### 3. Results

#### 3.1 Structure and Content of the Vision

The resulting vision consists of a qualitative text of four pages, three pages of references and four pages of final scores containing explanations, the description of existing targets and target propositions. The main vision text consists of the following sections:

1. **The Principle:** The Principle summarizes the main principles of the vision described hereafter. It states that in 2030, NRW has demonstrated how change is possible while keeping and strengthening its industrial structures. The section refers to the three dimensions of sustainability, the intergenerational Brundtland definition of sustainability (preserving a sustainable world for future generations)<sup>12</sup> and the concept of the planetary boundaries<sup>13</sup>.
2. **The Land of North Rhine-Westphalia:** This section describes the specific challenges and supporting factors for sustainable development in NRW, e.g. its particular responsibility by being the most populous German federal state and an important economic and industrial region. The section describes that NRW has successfully managed its change because it has learned from former transition processes in NRW, such as immigration and industrial change.
3. **The People:** The section "The People" describes the social sustainability dimension in NRW and addresses aspects like a solidary society that NRW has considerably come closer to in 2030, equal rights for participation, gender

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<sup>12</sup> World Commission on Environment and Development (WCED). *Our Common Future (Brundtland Report)*; Oxford University Press: Oxford, UK, 1987. Available online: <http://www.un-documents.net/ocf-02.htm> (accessed on 1 August 2017).

<sup>13</sup> Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, S.F., III; Lambin, E.F.; Lenton, T.M.; Scheffer, M.; Folke, C.; Schellnhuber, H.J.; et al. A safe operating space for humanity. *Nature* **2009**, *461*, 472–275, doi:10.1038/461472a.

- equality, inclusion and a pluralistic democracy.
4. **The Economy:** The section “The Economy” describes the economic dimension of sustainability and addresses topics such as a diverse labor market, fair wages, the smart integration of digitalization and industry 4.0, circular economy, the prevention of energy poverty and sustainable mobility.
  5. **The Environment:** The section “The Environment” describes the environmental dimension of sustainability and addresses topics like climate protection, air pollution and noise control, water quality, biodiversity, nature and species conservation.
  6. **The Transition:** The section “The Transition” describes how change has been achieved in NRW until 2030 from a backcasting perspective. It states that change has been made possible by the joint commitment of citizens, civil society, municipalities, science, education, economy and politics. NRW has successfully implemented its sustainability strategy and is continuously updated. All state activities are reviewed for their sustainability and actions continue also after the year of 2030.

The sections addressing the three sustainability dimensions all contain quantitative target proposals. The state government used some of these target proposals in their sustainability strategy. The following table gives an overview of some exemplary targets proposed as part of the vision and how the state government used them for their sustainability strategy.

**Table 1: Targets proposed as part of the vision and targets used by the state government in their sustainability strategy**

Di- men- sion	Targets for 2030 proposed as part of the vision	Target derived from	Usage of the target by the state government in their sustainability strategy?
Social	Oder workers are valued.	/	Increase of the employment rate among elderly people (from age 55 up to the statutory retirement age), especially of elderly women.
Social	Inclusion is embraced in all areas of society.	/	Continuous increase of the percentage of special-needs students attending regular schools by 2030.
Economic	In 2030, NRW produces around one- third of its electricity from renewable energies.	Scenario calculations of the Climate Protection Plan NRW.	Yes, similarly: more than 30% until 2025, more than 80% until 2050.
Economic	4 × 25% modal split in passenger transport (one quarter of all trips by foot, bike, public transport, motorized private transport).	Targets of the City of Essen (4x25% until 2035) and the vision of the Ruhr metropolitan region (4x25% without target year).	Similar: 60% walking, cycling and pedelec use of all trips in inner city areas in 2030.

Dimension	Targets for 2030 proposed as part of the vision	Target derived from	Usage of the target by the state government in their sustainability strategy?
Economic	Reduction in the number of people killed in traffic accidents by two-thirds by 2030 compared to 2004.	Existing interim target of the NRW State Government.	No
Environmental	Reduction of greenhouse gas emissions by more than 40% in 2030 compared to 1990 levels.	Existing NRW targets of -25% until 2020 and -80% until 2050 compared to 1990 according to the NRW Climate Protection Law and the scenario calculations of the Climate Protection Plan NRW for 2030.	Yes, similarly: -25% until 2020 und -80% until 2050 compared to 1990; 2030 is oriented towards the calculations of the climate protection law of around -44%.
Environmental	Doubling organic farming between 2013 and 2030.	Targets in other German federal states.	Partly: Without operationalization (increase of organic farming).
Environmental	Compilation with the EU's limit values for particulate matter and nitrogen dioxide emissions; being well on the way to achieving the more ambitious target values of the WHO.	Targets of the City of Essen in its application for European Green Capital 2017 (compliance with EU limits until 2020, extensive compliance with WHO guidelines until 2035)	Yes, inclusion of some air targets: Annual mean of 20 µg/m <sup>3</sup> PM <sub>10</sub> and of 40 µg/m <sup>3</sup> NO <sub>2</sub> (=both WHO guidelines).
Environmental	Largely avoiding harmful noise levels (65 dB(A) all-day; 55 dB(A) at night) and approaching more ambitious quality targets (55 dB(A) all-day; 45 dB(A) at night) according to WHO guidelines.	Targets derived from the targets of the City of Essen in its application for European Green Capital 2017 (for 2035/long-term objective)	Partly: Reduction of noise in residential areas taking WHO guidelines into consideration (65 dB(A) day and night, 55 dB(A) at night).

### 3.2 Utilization of the Vision by the State Government NRW

After finishing the vision development process, the final version was submitted to the contracting authority of the Environmental State Ministry. The Wuppertal Institute published the final vision online on its web server, so it is available for download and public debate. The NRW State Administration then developed its draft sustainability

strategy and also used parts of the vision that was put at the beginning of the sustainability strategy. In fact, most parts of the state vision are sentences directly taken from the vision developed in the research project. As a result, the state vision is considerably shorter than the vision developed in the research project. However, 65 per cent of the words of the state vision are words and sentences taken from the scientific vision. Most sentences are taken word-by-word and mainly derived from the part “The Principle”, the part that summarizes the main principles of the sustainability vision developed for 2030.

#### **4. Discussion: The Role of Science for Managing Transition Processes towards Sustainable Development and Fostering Vertical Integration**

The research project demonstrates that science can contribute valuable inputs for transition processes towards sustainability – by going “beyond observing and analyzing societal transformations, but rather [taking] an active role in initiating and catalyzing change processes”.<sup>14</sup> The research project used a systematic, trans- and interdisciplinary approach by involving stakeholders for participatory vision development. This way, both quality and acceptance of the vision increased. As a result, the Federal State of North Rhine-Westphalia used parts of the vision and target proposals for its Sustainability Strategy.

The specific role of science was to systematically develop and discuss the vision with stakeholders and to incorporate target proposals by a profound analysis of existing targets and reasonable target proposals, for example based on empirical research and scientific studies. This way, the Wuppertal Institute also contributed to the vertical integration of sustainability actions in NRW: Some target proposals for the state level were developed based on existing targets at city level. In three cases, the City of Essen, located in the Ruhr Metropolitan Region, served as a good practice example for ambitious environmental targets. The City of Essen has been awarded the title “European Green Capital 2017” by the European Commission within a yearly city competition. As part of this competition, the City of Essen set ambitious targets for twelve different environmental topic areas.<sup>15</sup> Three of these targets were taken by the Wuppertal Institute as target proposals for the state level in NRW: A 4 x 25% modal split in passenger transport, the compilation with the EU’s limit values for particulate matter and nitrogen dioxide emissions and the avoidance of harmful noise levels (see table 1).

As a result, the target proposals taken from municipal level were similarly adopted by the sustainability strategy at state level (see table 1). Thus, by proposing targets existing at municipal level to the state level, the Wuppertal Institute contributed to a learning-process between the state and city level and to the harmonization of targets at different political levels. By incorporating the proposed targets into the Sustainability Strategy of NRW, the targets now become visible from the state level to the subordinated levels and

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<sup>14</sup> Schneidewind, U.; Singer-Brodowski, M.; Augenstein, K.; Stelzer, F. *Pledge for a Transformative Science—A Conceptual Framework*; Wuppertal Institute for Climate, Environment and Energy: Wuppertal, Germany, 2016; ISSN 0949-5266. Available online: <https://epub.wupperinst.org/files/6414/WP191.pdf> (accessed on 1 August 2017).

<sup>15</sup> City of Essen; Bewerbung der Stadt Essen um den Titel “Grüne Hauptstadt Europas 2017” (Application of the City of Essen for the title ‘European Green Capital 2017’), 2014, [https://media.essen.de/media/egc2017media/egc2017\\_dokumente/application\\_egc2017.de.pdf](https://media.essen.de/media/egc2017media/egc2017_dokumente/application_egc2017.de.pdf) (accessed on 1 August 2017)

might be adopted by further cities or regions and also to the superordinated levels.

To conclude, one can say that a state sustainability strategy with a vision and targets influences sustainable development in the subordinated policy levels like cities, as it provides common guidance and goals for where to develop regarding the pressing sustainability challenges like climate, water, natural resources and transportation. A state strategy can help to coordinate and align actions in urban areas like in NRW. Likewise, superordinated policy levels can learn from subordinated policy levels regarding good practice examples for ambitious target setting. In this context, science can contribute to the mutual learning process by systematically analyzing and outlining possible targets areas based on scientific analysis or empirical evidence, contributing to the vertical integration of sustainability actions.

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