



Research Centre on
ZERO EMISSION
NEIGHBOURHOODS
IN SMART CITIES



TOOLS FOR STAKEHOLDER ENGAGEMENT IN ZERO EMISSION NEIGHBOURHOOD DEVELOPMENTS

Mapping of tools in use in Trondheim, Steinkjer, Elverum and
Bodø

ZEN REPORT No. 13 – 2019





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Tools for Stakeholder engagement in Zero Emission Neighbourhood Developments Mapping of tools in use in Trondheim, Steinkjer, Elverum and Bodø

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Preface

Acknowledgements

This report has been written within the Research Centre on Zero Emission Neighbourhoods in Smart Cities (FME ZEN). The authors gratefully acknowledge the support from the Research Council of Norway, the Norwegian University of Science and Technology (NTNU), SINTEF, the municipalities of Oslo, Bergen, Trondheim, Bodø, Bærum, Elverum and Steinkjer, Trøndelag county, Norwegian Directorate for Public Construction and Property Management, Norwegian Water Resources and Energy Directorate, Norwegian Building Authority, ByBo, Elverum Tomteselskap, TOBB, Snøhetta, Tegn_3, Asplan Viak, Multiconsult, Sweco, Civitas, FutureBuilt, Hunton, Moelven, Norcem, Skanska, GK, Caverion, Nord-Trøndelag Elektrisitetsverk (NTE), Smart Grid Services Cluster, Statkraft Varme, Energy Norway and Norsk Fjernvarme.

The Research Centre on Zero Emission Neighbourhoods (ZEN) in Smart Cities

The ZEN Research Centre develops solutions for future buildings and neighbourhoods with no greenhouse gas emissions and thereby contributes to a low carbon society.

Researchers, municipalities, industry and governmental organizations work together in the ZEN Research Centre in order to plan, develop and run neighbourhoods with zero greenhouse gas emissions. The ZEN Centre has nine pilot projects spread over all of Norway that encompass an area of more than 1 million m² and more than 30 000 inhabitants in total.

In order to achieve its high ambitions, the Centre will, together with its partners:

- Develop neighbourhood design and planning instruments while integrating science-based knowledge on greenhouse gas emissions;
- Create new business models, roles, and services that address the lack of flexibility towards markets and catalyze the development of innovations for a broader public use; This includes studies of political instruments and market design;
- Create cost effective and resource and energy efficient buildings by developing low carbon technologies and construction systems based on lifecycle design strategies;
- Develop technologies and solutions for the design and operation of energy flexible neighbourhoods;
- Develop a decision-support tool for optimizing local energy systems and their interaction with the larger system;
- Create and manage a series of neighbourhood-scale living labs, which will act as innovation hubs and a testing ground for the solutions developed in the ZEN Research Centre. The pilot projects are Furuset in Oslo, Fornebu in Bærum, Sluppen and Campus NTNU in Trondheim, an NRK-site in Steinkjer, Ydalir in Elverum, Campus Evenstad, NyBy Bodø, and Zero Village Bergen.

The ZEN Research Centre will last eight years (2017-2024), and the budget is approximately NOK 380 million, funded by the Research Council of Norway, the research partners NTNU and SINTEF, and the user partners from the private and public sector. The Norwegian University of Science and Technology (NTNU) is the host and leads the Centre together with SINTEF.



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Abstract

People play a key role in zero emission neighbourhoods. They are the ones designing and creating the neighbourhood, transforming and building it and finally using it when living and working there. People play different roles in that process – such as project owners, architects, construction workers, neighbours, and users. We summarize them under the word of stakeholders. They all have a stake in the project of ZEN even if their role and influence is different and changing under the development.

Important is the way stakeholders are collaborating and how their knowledge, needs, and goals are negotiated and integrated in the project development. When asked for challenges to develop ZEN, interview partners emphasized the need for good collaboration between stakeholders. This is especially important as ZEN developments asks for more than standard neighbourhood developments: greenhouse gas emissions are an important planning and design factor, something that is new for many stakeholders, and tools and knowledge are missing for that.

This memo will present tools in use for stakeholder engagement in the four ZEN pilot projects in Trondheim, Elverum, Steinkjer, and Sluppen. The mapping of tools was conducted in 2017 and 2018, and the analysis is based on qualitative interviews with involved stakeholders in the four pilot projects.

The results show that the pilot projects use several tools on different spatial levels (city, neighbourhood and building level), and different tools are in use in different phases of development. The tools have different goals and involve different stakeholders, some are focusing on citizens, while others aim for engagement of professional stakeholders such as construction and energy companies.

The concept of the ZEN toolbox is also introduced in this memo as the tools identified in the pilot projects are to be integrated in the further development of the toolbox. But before that, we need a better understanding of the applicability and benefit of the tools used for stakeholder engagement.

Norwegian Summary

Mennesker spiller en nøkkelrolle for å få til nullutslipps nabolag. De er de som planlegger og designer nabolaget, transformerer det, bygger det og til slutt bruker det. Mennesker spiller ulike roller i prosessen - som prosjekteiere, arkitekter, bygningsarbeidere, naboer og brukere. Vi kan samlet kalle dem stakeholdere. De har alle en eierandel i utviklingen av et ZEN område selv om deres rolle og innflytelse er forskjellig og endres under utviklingen av området.

Det er særlig viktig hvordan stakeholderne samarbeider og hvordan deres kunnskap, behov og målsetninger blir ivaretatt og innlemmet i prosjektutviklingen. Når vi har spurt samtalepartnere fra ZEN pilotprosjektene hva som er viktig, har de understreket behovet for godt samarbeid mellom aktørene. Dette er spesielt viktig, fordi et ZEN område er noe mer enn vanlig områdeutvikling da fokus på klimagassutslipp må inn i plan og designfasen. Dette er nytt for mange av aktørene, og tilgangen til verktøy og kunnskap er fortsatt begrenset.

Dette notatet vil presentere ulike verktøy og tiltak til bruk i dialog med stakeholderne i de fire FME ZEN pilotprosjekter Trondheim, Elverum, Steinkjer, og Bodø. Kartleggingen av verktøy er gjennomført i 2017 og 2018, og analysen er basert på kvalitative intervjuer med ulike aktører som er involvert i de fire pilotprosjektene.

Resultatene viser at pilotprosjektene bruker forskjellige verktøy på ulike nivåer (by, nabolag, og bygningsnivå), og de bruker ulike verktøy i de aktuelle faser av utviklingen. Verktøyene har forskjellige mål og involvere ulike interessenter. Noen fokuserer på innbyggerne, mens andre retter seg mot profesjonelle aktører som for eksempel bygg og anleggsbransjen og energiselskapene.

Konseptet med en ZEN verktøykasse er også innført i dette notatet, fordi de suksessfulle verktøyene som identifiseres i pilotprosjektene skal integreres på et senere tidspunkt i verktøykassen. Verktøykassen skal hjelpe andre utviklingsprosjekt på områdenivå til å ta de riktige valg i framtiden. Før vi kommer så langt trenger vi en bedre forståelse av anvendbarheten til de verktøyene som i dag finnes for å opprette en god dialog med de ulike stakeholderne.

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1 Introduction

A successful implementation of the concept of zero emission neighbourhoods (ZEN) in city development is dependent on a holistic planning and implementation process, which is integrating all the crucial topics, such as e.g. energy, emissions, LCA, mobility, spatial qualities, etc. into the planning and design phase as well as involving the right stakeholders in the development process. Stakeholders involved face a bundle of challenges: new goals and ambitions with regard to the reduction of climate gases and energy consumption, new stakeholders on the agenda, and new ways to plan and design for ZEN are needed.

Through interviews with central stakeholders in the development projects, as well as the study of relevant documents, we have identified ten main challenges in the projects so far (Andresen, Baer, 2017):

1. Stakeholder engagement and project organization
2. Lack of knowledge
3. Legislation
4. Goal conflicts
5. Time and cost pressure
6. New energy technologies
7. System boundaries
8. Risks and uncertainties
9. Flexibility
10. Transferability

It is important to note that in all the pilot projects, the ability to find a technical solution to develop and implement a ZEN was considered feasible. The realization of emission reduction on the neighbourhood level within buildings, infrastructure, and the energy system is perceived as technically possible among the interviews partners. However, the creation of good cooperation and co-creation processes, such as the involvement of crucial stakeholders and the generation of knowledge transfer, were considered as more challenging.

The pilot projects are therefore in need for tools to engage and involve different stakeholders in the planning and design for ZEN. This memo will present the results of a mapping of tools for stakeholder engagement in four pilot projects of the ZEN Research Centre.

Structure of the memo

After a short introduction in **chapter 1**, **chapter 2** will present the background of the research topic by presenting the main definitions and concepts for stakeholder engagement. The concept of the ZEN toolbox is introduced. **Chapter 3** presents the results of the mapping of the pilot projects with regard to the stakeholders involved and tools for stakeholder engagement in use in the four pilot projects 'New City – new Airport', Ydalir, former NRK site in Lø, and Sluppen. After a short introduction to each of the pilot projects, the stakeholders involved and the tools in use to involve stakeholders are presented. **Chapter 4** will present the results, and **chapter 5** will end with a short conclusion and outlook on future work.

2 Background

2.1 Stakeholders

Stakeholders are defined as any individuals, groups or organizations from different disciplines and with different needs, responsibilities, and resources who affect the project, or are affected by it, or show an interest in it. There are three generic stakeholder groups: Those who affect the project, those who are affected by it, and those who show an interest in it.

According to their role in the project, the three generic stakeholder groups can be divided into more detailed subgroups as displayed in figure 1. It must be considered that several stakeholders may belong to more than one subgroup – e.g. they may affect the project and be affected by it as well.

Main category of stakeholders	Sub-category	Examples of Stakeholders
Those who affect the project	Those involved in delivery of the project	Developer
		Owner
		Investor
		Designer
		Banks
		Insurance
	Those who determine the context	Professional consultants such as architectural, financial, structural, engineering etc.
		Local Authority – planning department etc.
		Regional government departments
		Central government departments
Those who are affected by the project	Directly affected	Users of the buildings, infrastructure, spaces, facilities etc.
		Local community groups such as residents' associations, or other community-based groups
	May be directly affected or indirectly affected depending upon the context	Community members (local/surrounding)
		Specific demographic groups such as those based on race, ethnicity, gender, age etc.
		General public
Other who may be interested		Potential users/clients for future projects
		Media
		Research/Academics
		Environmental/social campaigning organisations

Figure 1. Group of stakeholders and examples in the context of sustainable city development, Mathur et al. 2007

Regarding their influence and power in the project development, the stakeholders could be divided into different groups regarding their interest and following the matrix in figure 2.

Power / influence	High	Watch	Keep Satisfied	Actively Manage
	Some	Keep On Side		
	Little	General Communication	Keep Informed	
		Little	Some	High
		Interest		

Figure 2. Stakeholder map regarding their power and interest in the project development. *Stakeholder Analysis Toolkit (Anon., n.d.)*

Figure 2 shows the strategies to manage the stakeholders, which results from their position within the matrix of interest and power. The stakeholder group often most affected by the project development – the users of the neighbourhood or e.g. the buildings – have often little power on influencing the project development. The ZEN work program addresses “users” mainly as recipients of technical solutions and as part of institutions and markets. However, there is a broad consensus about the necessity to actively involve users as stakeholders and as “experts of their everyday lives” to make zero emission neighbourhoods a reality (ZEN Centre, 2017).

Within the ZEN Centre, we define **users** as 1) end users (e.g. citizen) and 2) professional users. The first group of end users will be addressed 1a) as citizens, i.e. as stakeholders in their local communities, neighbourhoods, and cities and 1b) as occupants, i.e. those who use the neighbourhood with its buildings and other related infrastructures in their everyday lives. The second group of professional users consists of the professionals working with the maintenance and operation of the neighbourhood.

2.2 Tools

There is a need for appropriate tools to plan, design, manage, and monitor ZEN and especially tools to involve and engage stakeholders into these processes.

A **tool** is by definition an item or implement used for a specific purpose. A tool can be a physical object such as mechanical tools, including saws and hammers, or a technical object, such as a web authoring tool or software program. Furthermore, a concept can also be considered a tool.

Regarding the planning for ZEN, a tool is in the context of this report a technical object or a concept to support a holistic planning process for ZEN. In this regard tools could be e.g. experience or a workshop (Nielsen et al., 2016).

2.3 ZEN toolbox

To foster the development of Zero Emission Neighbourhoods – and thereby the vision of the FME ZEN –, the Research Centre's goal is to develop a ZEN toolbox. With the help of the ZEN toolbox stakeholders are enabled to make science-based choices and make use of tools to foster ZEN developments. A special focus is to integrate considerations of GHG emissions more effectively into practice-based neighbourhood design and planning.

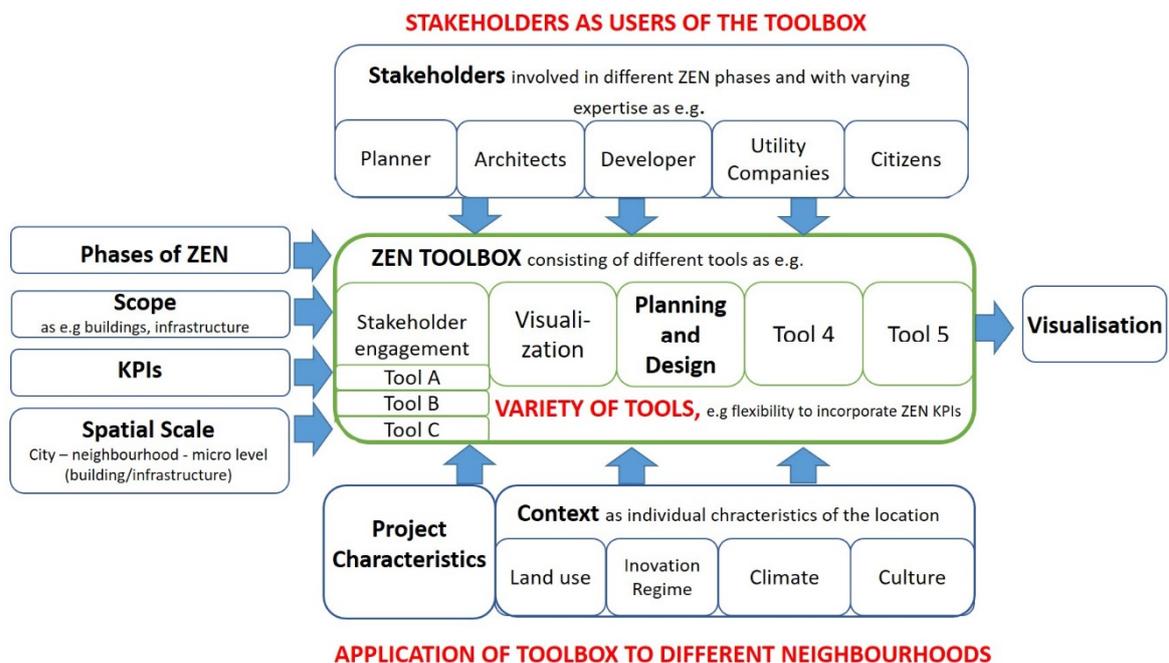


Figure 3. *Concept of the ZEN Toolbox, Wiberg, Baer 2019*

The toolbox consists of different tools which are applicable to different parameters, visualised around the toolbox in the figure above. Tools address e.g. different stakeholders, phases of ZEN development, or key performance indicators (KPIs) for ZEN development (Kjendseth Wiik et al. 2018). The tools mapped in this memo are applicable to the category of spatial qualities. The KPI 'Demographic Analysis and Consultation Plan' describes a process to guarantee stakeholder engagement through all phases of ZEN development.

This report will thereby, with its results, contribute to identify a set of tools for stakeholder engagement in use in four pilot projects. In future work and in alignment with results from other reports, such as the ZEN pilot project mapping report (Baer, Andresen, 2019), the tools have to be evaluated with regard to their significance and usability and the other parameters described in figure 3.

2.4 Phases of ZEN development

From a planning point of view, the development of a ZEN can be divided into three phases, the strategic long-term planning phase on a more general city or neighbourhood level, the tactical planning and implementation phase, and the operational phase after completion.

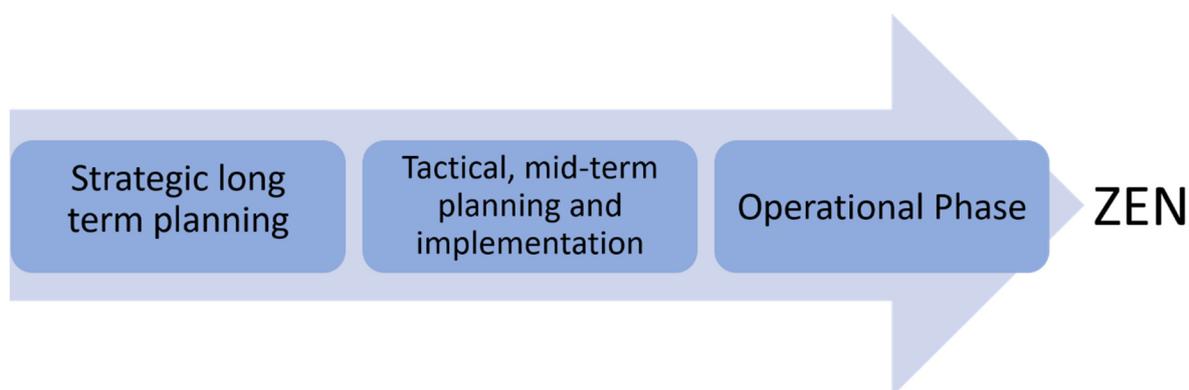


Figure 1. *Phases of ZEN development*

The strategic planning phase at the beginning will identify the goals and ambitions for the ZEN development. In this phase, for instance central planning documents such as the municipal sub-plan [kommune-delplan] or an energy plan are provided. Measures to fulfil the goals and ambitions are already identified on a general basis in this phase.

In the tactical, mid-term planning and implementation phase zoning plans [reguleringsplan] and development agreements [utbyggeravtale] are developed to further specify the development goals developed in phase one. Planning and implementation can be at a project level, such as a building or an estate, or more on a general thematic level, such as planning for the public space or the energy system.

In the operational and management phase the whole planned neighbourhood or parts of it are in use.

Figure 5 shows in which phase the eight pilot projects within the FME ZEN are.

ZEN Pilot project	Strategic long term planning phase	Tactical mid-term planning and implementation	Operational Phase
Sluppen in Trondheim	in process	-	in process, existing neighbourhood
"New City – New Airport" in Bodø	in process	-	-
ZVB in Bergen	Completed and waiting for approval	-	-
Furuset in Oslo	completed	in process	in process
NTNU Campus in Trondheim	completed	in process	in process, existing neighbourhood
NRK estate in Lø, Steinkjer	Not relevant	in process	-
Ydalir in Elverum	Not relevant	in process	-
Evenstad	Not relevant	completed	in process

Figure 5. *Phase of development of the eight ZEN pilot projects, 2018.*

It is important to divide ZEN developments in different phases as varying stakeholders are involved in the specific phases. This memo will focus on tools to involve stakeholders in an early planning phase – both in strategic long-term and tactical mid-term planning phase – and show examples of tools in use to involve stakeholders in four ZEN pilot projects.

2.5 Research scope and methodology

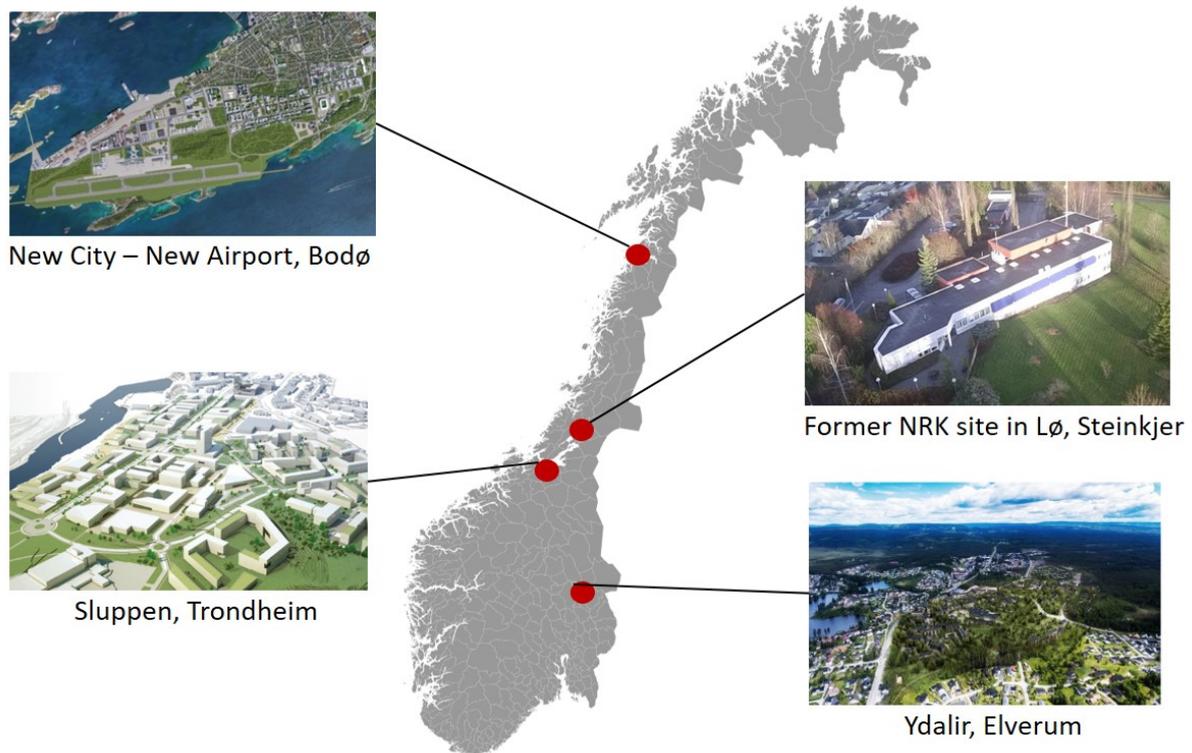
To develop an understanding of tools available and in use, we started with a mapping of tools in use for stakeholder engagement. For the scope of this memo and with the aim to develop a user-centered urban planning and design tool-box, the ZEN toolbox, we focused the analysis on the strategic and tactical planning phase. At the time of writing, the four pilot projects Ydalir in Elverum, 'New City – New Airport' in Bodø, Sluppen in Trondheim and the former NRK site in Lø, Steinkjer were analyzed.

The data for the mapping of tools for this report is gathered through 21 qualitative interviews in 2017. 25 stakeholders, chosen out of different stakeholder groups except end users, were interviewed within the four pilot projects. Interviews were conducted either as individual interviews or as group interviews. The interviews, which followed a semi-structured interview guide, were transcribed and analyzed with the help of the qualitative content analysis methodology (Mayring, 2000).

3 Stakeholder engagement tools in use in ZEN pilot projects

This chapter will present which tools are in use for stakeholder engagement within the four pilot projects of the FME ZEN:

- Ydalir in Elverum,
- 'New City – New Airport' in Bodø,
- the former NRK site in Lø, Steinkjer,
- Sluppen in Trondheim.



	City population (1.1.2017)	Project owner	Area size in m ²	Planned/Existing function	Construction	Status/Phase
Elverum - Ydalir	14 877	Public (Municipality)	430 000	Residential area with a school and kindergarten (planned)	New construction: 1 000 dwellings (ca. 100 000 m ²), a school and a kindergarten	Planning and implementation
Trondheim - Sluppen	190 464	Public (Municipality)	275 000	Multifunctional sub centre with a mobility hub (planned)	Retro-fitting and new construction	Planning and operation
Steinkjer – Former NRK site	12 744	Public (Municipality)	11 113	Kindergarten and dwellings (planned)	Re-use and new construction of 10-12 dwellings	Planning
Bodø – New City - New Airport	51 002	Public (Municipality)	3 400 000	Multifunctional city centre extension with residential and business areas (planned)	Re-use and new construction: 2 800 dwellings in the first construction stage	Planning

Figure 6. The four ZEN pilot projects at a glance, Illustrations: Bodø Municipality, Kjeldsberg Eiendom, Steinkjer Avis, tegn3

After a short project description, the current status of development and the involved stakeholders will be presented. For each pilot project it will be highlighted how stakeholders were engaged and which tools were in use in the development so far.

3.1 Ydalir, Elverum

PROJECT DESCRIPTION

The Ydalir project aims to develop a new neighbourhood with high energy and emission ambitions in the town of Elverum, county of Hedmark. 800 to 1 000 residential units (approx. 100 000 m²), a school and a kindergarten are planned to be developed over a timeframe of 10-12 years. The residential units are planned as a combination of detached houses and apartment buildings and are built around a school for approx. 300 pupils (approx. 5 000 m²) and a kindergarten with eight units (approx. 1 500 m²).

STATUS

In 2017, the pilot project Ydalir consists of eight sites, where two sites were privately owned, five were owned by the land development agency of Elverum [Elverum tomteselskap, ETS], and one site was already sold to Elverum municipality. On this site, the school and kindergarten are - at the time writing - under construction with an estimated completion in autumn 2019.

Ydalir is at the end of the strategic planning phase while completing the masterplan for the area. The masterplan is a guideline for the development of the neighbourhood, putting measures for energy, materials and transport in focus. It was developed over a year in a cooperative process with all of the stakeholders named below involved and partly funded by the state enterprise ENOVA and its program for innovative energy solutions [Konseptutredninger for innovative energi- og klimaløsninger i bygg, områder og energisystem]. The masterplan is a complementary and mandatory document to the selling contracts of land from the project owner to private developers. The masterplan was completed in autumn 2017, and the sale of the first sites started right after.

The development in Ydalir is based on a neighbourhood zoning plan [områderegeringsplan] from 2010, and future construction will be defined in a more detailed zoning plan [detaljregulering].

STAKEHOLDERS INVOLVED

The project owner and driving force of the project is ETS, a land development agency owned by the municipality of Elverum. ETS is one of four corporations, working with the development and commercialization of sites and buildings in Elverum and corporated under the umbrella of Elverum Vekst. All these corporations are 100 % owned by the municipality. The land development agency's general assembly [general forsamling] is the municipal executive board [formanskapet]. This organisational structure results in a high influence from the political side on the work of ETS, but on the other hand on a wider flexibility to develop the pilot project with regard to law restrictions, as the ETS is not required to use public procurement. The ETS has for example the possibility to ask for more ambitious energy and emission goals for the building projects than what is required by the current building code (TEK 10), as the selling contracts for the sites follow private law regulations.

From the public side Elverum municipality is involved in the project via different tasks and departments. While the planning department is mainly involved in the development of the masterplan, several other departments cooperate on the building project of the school and kindergarten. Besides that, the technical department of the municipality is responsible for the construction and preparation of the technical

infrastructure in the whole neighbourhood. The construction of the road system and technical infrastructure of the neighbourhood was finished in 2018.

From the private side, several local developers, consultants, the local utility company Eidsiva, and the local bank Sparebank 1 with its real estate agents have been involved in the process so far.

STAKEHOLDER ENGAGEMENT

Masterplan Development

Since autumn 2016 a masterplan for the neighbourhood was developed in a cooperation between the project owner and the above named stakeholders involved. Five workshops, over a period of six months, were dedicated to different aspects of the project development. These included different topics, such as aims and vision, energy, building and infrastructure, user and quality aspects, and transportation. This work was concluded in a summarizing workshop in April 2017. The discussion and results of these workshops helped to develop the Masterplan for Ydalir in a joint approach. The masterplan consists of two parts, and the second part shall be completed in 2018 (ETS, 2017). The masterplan development, including the workshops, were partly funded by Enova and facilitated by Asplan Viak, a consultant company and partner in the ZEN Centre.

The project owner ETS stated that they "*deliberately invited a bit wide*" to the five workshops to integrate as many stakeholders as possible in the masterplan development. The interview partners who participated at the workshops described the process as fruitful and important to develop a common understanding for the project and the ambitions related to ZEN. The workshops provided the arena to discuss challenges and integrated solutions. One challenge discussed at the workshop was the difficulties to integrate the energy system, mainly based on district heating for heating, into the design of the buildings and to install the energy system correctly. As a result of that discussion, a guideline for the implementation of the heating system will be developed under the guidance of the utility company Eidsiva and the help of the ZEN Centre.

Another example of a new cooperation between stakeholders involved in the ZEN project is the walk- and cycle path that will tie Ydalir to the center of Elverum. This will be built as a cooperation between the municipality and the utility company Eidsiva, as Eidsiva must nevertheless dig a channel to offer district heating to the district. The cycle path was originally an idea from the local architectural office Plan1, and with the opportunity to gather stakeholders and their good ideas in a set of workshops, this solution was further discussed and will most likely be realized.

The impact and importance for the social relations between the involved stakeholders - especially to build up trust between them - is highlighted by one interview partner, who described the social situation between the participants as a feeling of "one family", where "everybody is in and contributing".



Figure 7. Stakeholder workshop for the masterplan development in Ydalir, Photos: ETS

END USER ENGAGEMENT

Target Group Identification

The area of Ydalir was formerly used as a sand pit, and therefore it is perceived as difficult by the interview partners to predict who is living in the neighbourhood after completion. The municipality is focusing on young families - especially people moving back to Elverum after finishing their education. Elverum and the whole county of Hedmark is suffering from a brain drain, as people are moving away for education and only a smaller number of them is moving back after completed education. Another focus group is 'young agers', including people who are close to retirement and whose kids have already moved out. Both groups are described as lucrative for the municipality by the interview partners, as they are paying taxes and are part of the working community. The interview partners emphasized that these focus groups of inhabitants are chosen as they are more open to innovative, sustainable, and technical solutions (see figure 8).

But we'd rather let them move in!



Young people in the establishment phase (with or without children), value-based lifestyle, future-oriented and related to Elverum.



Mature couples, on their way to retirement. Adult children, want flexibility and modern solutions.



Both groups want to live in a mixed residential area
Are open to innovative and sustainable solutions

Figure 8. Illustration of some of the inhabitants in the focus groups in the Ydalir neighbourhood. Illustration: Tweed; translated from Norwegian

Branding Strategy

To address these potential user groups a branding strategy was developed at the beginning of the planning phase for Ydalir. A workshop was conducted with participants from ETS, local politicians, members of the administration of the municipality, and representatives for the focused inhabitant groups of Ydalir (families and young agers).

The aim was to identify needs and values of the potential inhabitants regarding the neighbourhood development. Representatives from different potential user groups participated in the workshop: citizens who have just moved to Elverum, former citizens of Elverum who are living out of town and considering moving back, as well as older residents living in Elverum. Three values were identified as especially important to the potential inhabitants. These are close [nær], lasting [varig], and real [real]. Each of these values contains many ideas of how the everyday life shall be in Ydalir, as visualized in figure 9.

CLOSE	<ul style="list-style-type: none"> • Close to everything. Job, school, kindergarten, leisure and outdoor activities [friluftsliv], culture. • Urban and close to nature at the same time. The future way of living. • Citizen's needs in focus. Focus on good relations with friends, neighbours, family and facilitating new acquaintances. • Design of buildings. Densification, housing diversity and smart solutions.
LASTING	<ul style="list-style-type: none"> • Green neighbourhood development. Goal to be a zero emission neighbourhood. • A healthy residential area. Absence of pollution, unnecessary car traffic, safe outdoor areas, short distances, easy [lettvint] solutions, flexibility and foreseeability. • Welfare. Focus on liveability in combination with new technology creates a trendsetting way of living. • Livsyklusnabolag. Several generations in the same neighbourhood, now and in the future.
REAL	<ul style="list-style-type: none"> • Down to earth and unaffected. Characteristics the Elverum region is historically known for. • Building on strong roots. Roots that are connected to nature and resources of the Elverum region. • Joint solutions and sharing economy. E.g. carsharing pool, spaces to rent, sports arenas, rental offices and apartments. • Aesthetics and living conditions. Solutions that foster wellbeing. • Ydalir is for everybody. Openness to a diversity of residents, workers and visitors.

Figure 9. Values identified for the marketing strategy of the Ydalir project, Source: Tweed, translated from Norwegian

The values and ideas developed at the workshop were used to develop Ydalir as a brand with its own logo and a marketing strategy which is focusing on promoting Ydalir as a sustainable neighbourhood. The idea is to sell Ydalir as a place where it is easy to live sustainably. People who are displayed in the marketing photos are residents of Elverum (see figure 10).



Figure 10. Examples of the logo and marketing visualisations, Source: ETS

Information about the Ydalir project

Information about the project development for the general public is published on the project's own webpage (see figure 11) and in social media, such as facebook.

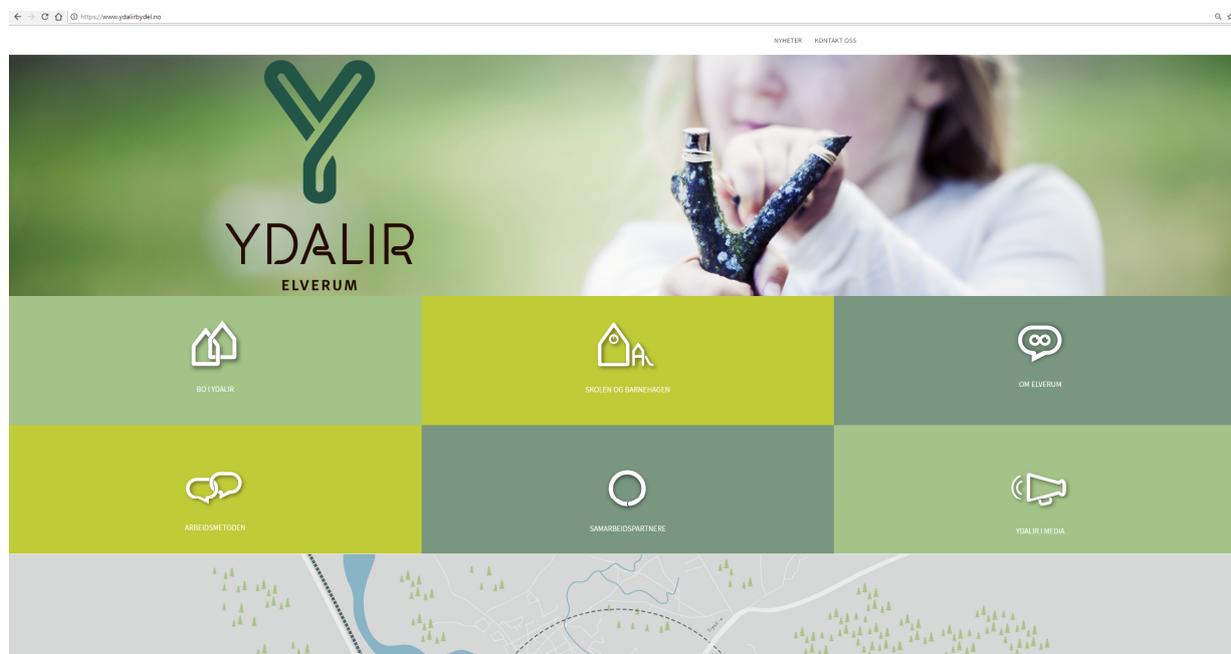


Figure 11. Screenshot of the Ydalir webpage, Source: ETS, <https://www.ydalirbydel.no>

School Estate Consultation

Regarding the development of public buildings in Elverum, the responsible real estate department [Eiendomsavdeling] has established a process to involve professional users of the building (facility management, cleaning, etc.) in the planning process to make sure that the building will be appropriate and easy to operate. The future users of the school, staff at the school, and representatives of students were involved in the planning of the buildings as well.

3.2 'New City – New Airport', Bodø

PROJECT DESCRIPTION

Bodø's former civil and military airport is planned to be replaced by a smaller civil airport, located 900m southwest of the existing one. Today the airport area site is approx. 5 600 000 m² and located in close proximity to the city center. An area of 2 200 000 m² at the southern end will be developed with the new civil airport. The remaining area of 3 400 000 m² - the same size as the current city center - is dedicated to expanding the existing city center and will include residential and business areas, as well as a logistic hub (flight, railway, shipping) in proximity to the new airport. The planned multifunctional urban area, known as 'New City - New Airport' project, will be developed within a timeframe of 60 to 80 years.

The goal is to develop a dense, mixed-used urban neighbourhood, which is environmentally friendly and citizen-centered. The environmental goals are to minimize the neighbourhood energy demand and greenhouse gas emissions. Buildings are planned to be built according to the ZEB standard. The neighbourhood development is expected to function as a catalyst for the business sector in Bodø, which is mainly characterized by the construction and consultant sector, the IT sector, and an export sector based on agricultural products and food. The municipality has imbedded the 'New City – New Airport' project in a broader vision, which is to become the world's smartest city. 'New City – New Airport' is planned as a citizen-centered development with a strong focus on citizen participation in the planning process.

STATUS

The planning for the re-location of the civil airport and the re-use of the site of the former airport started in June 2012, after the decision to relocate the military airport. The municipality conducted a conceptual analysis regarding the adequacy of re-use options along with a mixed-used city expansion and a focus on transport hub development. In June 2017, the Norwegian government accepted the plan to re-locate the airport to the southern part of the area. The construction of the new airport is planned to start in 2019 and the first construction phase for the neighbourhood development with 2 800 dwellings is planned for the second part of the 2020's. The civil airport will be in use until 2024, the preceding years will be dedicated to the design and planning process.

The planning for the area zoning [områderegulering] for the new civil airport started already in 2017 and is currently under development. The municipal sub-plan [kommundelplan] for the vacant land between the new airport and the city center started in 2018.

The transfer of the vacant land to the ownership of Bodø municipality and the establishment of an organizational form to manage the land and the development is under negotiation. Bodø municipality has started a cooperation on the integrated transport planning for the 'New City – New Airport' project by signing a cooperation contract [samarbeids- og utviklingsavtale] on 'Ny By Bodø – smart transport' with several stakeholders in February 2018 (Bodø Kommune, 2018).

STAKEHOLDERS INVOLVED

Within the municipality, a project group is established to facilitate the planning and development of the

'New City – New Airport' project, see figure 12.

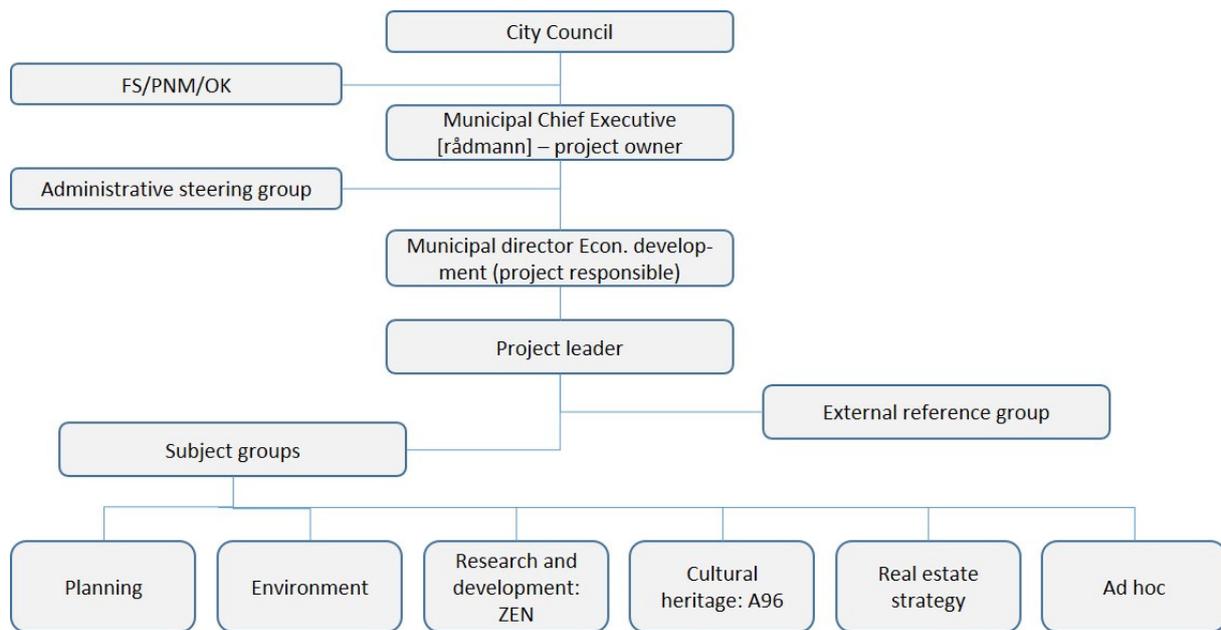


Figure 12. Municipal project group of the 'New City – New Airport' project; Source: Bodø Municipality, translated from Norwegian

The stakeholders involved are the municipal project group with a project manager and members from different municipal departments. The project is administrated within the department for industry and development [Næring og utvikling] of Bodø municipality and is managed by a project manager. Several working groups from different departments as e.g. a planning group from the planning department or a group responsible for cultural heritage are facilitated within the project group of the 'New City – New Airport' project.

Other stakeholders involved are the Ministry of Defence, which is responsible for operating the military airport and owns the land. The negotiations about the transfer of the land is facilitated by the Norwegian Defence Estates Agency [Forsvarbygg], an administrative agency subordinate to the Ministry of Defence. The agency's primary tasks relate to the planning, construction, administration, leasing, and disposal by sale of defence estates and properties.

Another stakeholder involved is Avinor, a public owned corporation subordinate to the Ministry of Transport and Communication [Samferdselsdepartement] and operating the civil airport of Bodø. As Avinor will be the developer of the new civil airport they are deeply involved in the planning process for the new airport. Avinor has therefore developed a masterplan for the new airport which was published in February 2018 (Avinor, 2018).

Regarding transportation planning, a cooperation contract was signed in February 2018 between stakeholders from national level (National Road Authority, Norwegian Railway Directorate, Coastal Administration [Kystverket] and Avinor AS), regional level (Nordland county) and Bodø municipality (Bodø municipality et al., 2018). This cooperation shall guarantee that national investments in transportation infrastructure in Bodø is aligned with goals for city development in the 'New City – New Airport' project on a local level. This is especially important as the national investments for the airport and road system are made in an early phase of the neighbourhood development, while the urban

development of the vacant land will follow at a later stage.

STAKEHOLDER ENGAGEMENT

The project owner Bodø municipality is keen to involve and engage stakeholders in the development of the 'New City – New Airport' project and the focus on stakeholder engagement and especially citizen participation is one of the main project goals. Therefore, Bodø Municipality is working with different strategies to involve and engage stakeholders. These will be presented beneath.

Information about the 'New City – New Airport' project

Bodø municipality is providing information and relevant documents on different channels. Besides the project webpage on <http://nyby.bodo.kommune.no>, other social media channels, such as facebook and LinkedIn, are used to inform and promote the project.

Idea Storming about the future of Bodø

The project owner Bodø municipality provides an Idea Storming tool [idébank for fremtidsbodø] on the project webpage, see figure 13. Citizens and stakeholders are invited to deliver their ideas and thoughts about the future development of the 'New City – New Airport' project. Following the sentence and question "*We are developing an idea bank for the future of Bodø. What is your future idea?*", participants are invited to deliver their ideas via an online form on the website.

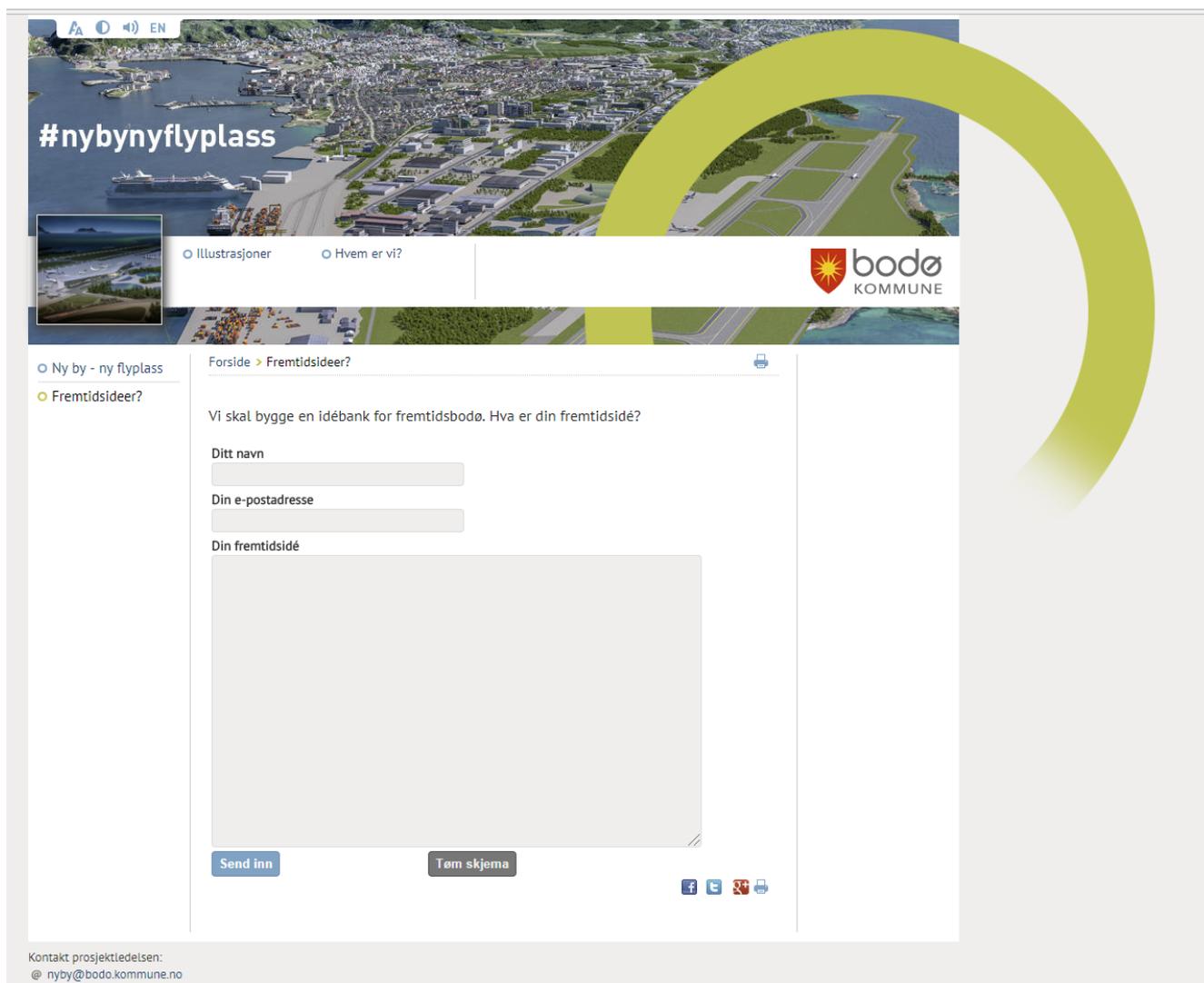


Figure 13. Screenshot of the 'New City – New Airport' webpage with the forum for future ideas, Bodø Municipality

Gründercamp about Smart Bodø

An entrepreneurial camp [Gründercamp] about the future Smart City Bodø, in collaboration with Young Entrepreneurship, was arranged in 2016. Here, about 600 14-year-olds received concrete tasks to create ideas and solutions for planning the world's smartest city. A similar arrangement has also been conducted in collaboration with the cultural school of Bodø, which invited almost 600 13 and 14-year-olds to an idea camp for the future of Bodø. The youth were given the task of running full planning by making plan descriptions, drawing maps, and building districts. The knowledge and solutions that emerged are valuable for the further planning, and the ideas, preferences, and solutions are thought to have a lasting value in the realization of future city development projects such as the 'New city – new airport' project (Hvitsand et al., 2017).



Figure 14. Impressions from the Gründercamp and opening of the exhibition of the results of the Gründercamp at Stormen library, Photos: Bodø Municipality, Løkas, 2016 (far right)

Bodo ByLab

The city of Bodø is experimenting with new forms of stakeholder engagement by establishing a city lab, the Bodø ByLab. The ByLab consists of a virtual and physical platform to test and implement future-oriented participation processes within its smart city strategy, especially the 'New City – New Airport' project.

The ByLab will test new forms of engagement with stakeholders within and outside the administration. It shall also prepare and increase the competence of the municipality's employees for new future working methods and cooperation across the departments, which is an important factor for successful planning for ZEN.

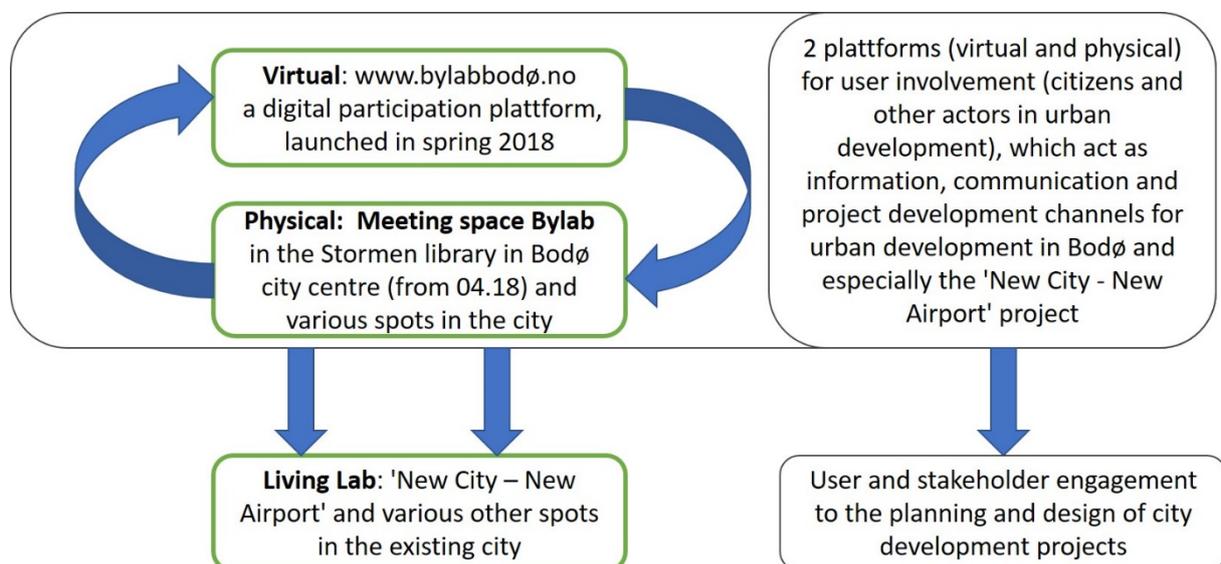


Figure 15. Structure of the Bodø ByLab

The **virtual ByLab** on the webpage www.bodobylab.no/ shall facilitate easier access to information about urban projects and opportunities to become involved into them. Employees of the municipality, citizens, and other actors in Bodø can start own projects and create groups at the platform and thereby create easier and faster communication between the city administration, business sector, and citizens in Bodø. For example, users can define a geographical area of interest within the city, and whenever a

planning process starts or a project on platform created within that geographical area, they will automatically be informed about ongoing process and possibilities for participation.

The **physical ByLab** was opened at the beginning of April 2018 at the Stormen library located in the city center of Bodø. The Bylab is a physical meeting space for stakeholders involved in urban city developments. With a focus on citizens, the library was chosen as its location to make it easier for citizens to join. The physical lab will also demonstrate that the municipality is thinking of new ways for the municipality's employees to work and be organized.



Figure 12. Impressions from the opening of the Bodø ByLab, Photos: B. Nielsen, D. Baer

As one of the first events, the planning for the 'New City – New Airport' was presented by employees of the city planning department. The first two months were filled with different activities and events to inform and engage stakeholders in city development as the following figure 17 shows.

Date	Event
5.April	Opening of the ByLab at Stormen Library with presentations about smart cities
6.April	Launch of digital building permits (eByggesak) from the technical department of Bodø municipality
12.-13. April	'New City - New Airport' project: public presentation, city planners on site
14.April	Childrens City Lab, activities for children to generate their ideas for further city development
18.April	Public meeting of the Committee on Planning, Industry and the Environment
18.April	'New City - New Airport' project: city planners on site
19./24.-26.April	Presentation of the municipal sub-plan on health and societal services 'Ny virkelighet - ny velferd' and opportunity for input to the plan
24.April	Presentation of various city development projects by the city planning department
25.April	Building Permits
25.April	Welfare Technology
03.Mai	Public Health Day: Presentation of Action Plan for Wellbeing and good living conditions
22.-23. Mai	Public Schools as Community Center: Dialog about possibilities to use public schools for community activities, facilitated by Public Health and Real estate group of Bodø municipality
24.Mai	Universal Design in Bodø

Figure 13. Program at the Bodø ByLab, April-Mai 2018

ByLab Bodø, with its virtual and physical components, shall contribute to ensuring a sufficient degree of stakeholder involvement and commitment to the development of a smart city today and in the future in line with the 'New City - New Airport' project. ByLab Bodø is one of the first municipal-scale concepts of its kind in Norway. Experience and conclusions from ByLab Bodø shall form the basis for the creation of a permanent lab in the new town hall, which is under construction and shall be completed in 2019.

Urban planning tool for ZEN

Bodø Municipality is working with Urbanetic Pte Ltd from Singapore on an urban planning tool which enhances the ability to design for sustainability by improving the understanding of the built environment with its complex and dynamic interrelations of its components (Flack, 2017). As a data management tool, and with help of the design concept of 'serious play', it can transparently manage and integrate data from different sources, see figure 18.

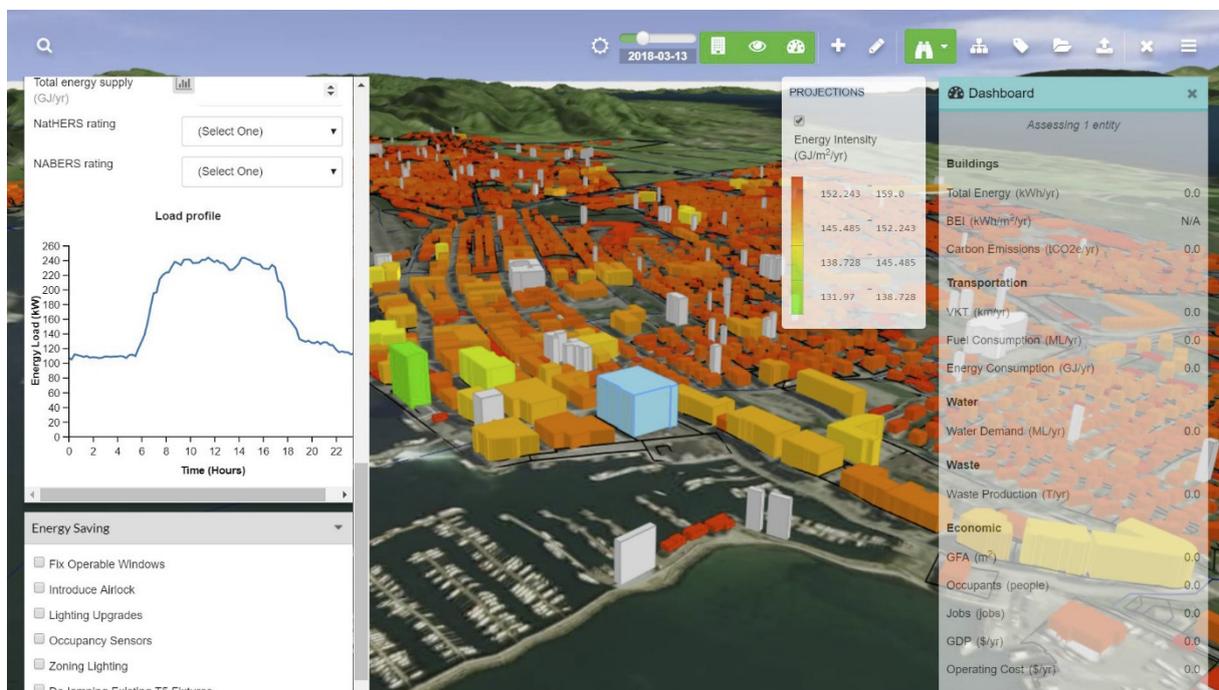


Figure 14. Screenshot of the planning tool for ZEN, Bodø Municipality

The tool consists of a 3D model of the city and is currently focusing on energy analysis. Shortly the key performance indicators (KPIs) of ZEN are planned to be incorporated into it. Integrating these KPIs into the urban planning tool gives planners and stakeholders the possibility for a better assessment of planning and design decisions as new assessment criteria, such as emissions, are operationalized. It enables users to visualize planning and design alternatives and their impacts on the KPIs. With this ability it is expected to provide stakeholders with a broader basis for holistic and integrated planning decisions. In the future, it is planned that stakeholders can dive into the digital 3D-model of the city with VR glasses. Bodø municipality would like to use the visualization possibilities which are incorporated in the planning tool for ZEN to engage stakeholders in the planning for 'New City - New Airport' in the future.

Consultation required by Building Act

Besides the above mentioned tools to involve stakeholders, the traditional and official participation process of public planning following the § 12-9 in the Planning and Building Act is implemented in addition.

The planning for the 'New City – New Airport' projects is divided into two parts. Establishment of the new civil airport will be planned through a separate planning process for an area zoning plan [områderegulering]. A municipal sub-plan will be developed for the entire district (see figure 9).



Figure 15. Geographical scope of planning processes of the 'New City – New Airport' project, Illustration: Bodø Municipality, translated from Norwegian

Following the mandatory requirements for consultation, e.g. the planning program for the zoning plan of the new civil airport within the 'New City – New Airport' projects was on hearing in the beginning of 2018 and for the municipal sub-plan at the end of 2018.

Idea Storming: vision and goals for the municipal sub-plan

The process of developing the municipal sub-plan for the urban development area will take many years, and the process is in an initial phase (see figure 20). In the early phase, a set of overall visions and goals for planning the new district are developed, and they will be adopted by the City Council. The red circle in the figure shows the stage of process in autumn 2017, when the public was invited to contribute to the general visions and goals for the new neighbourhood.

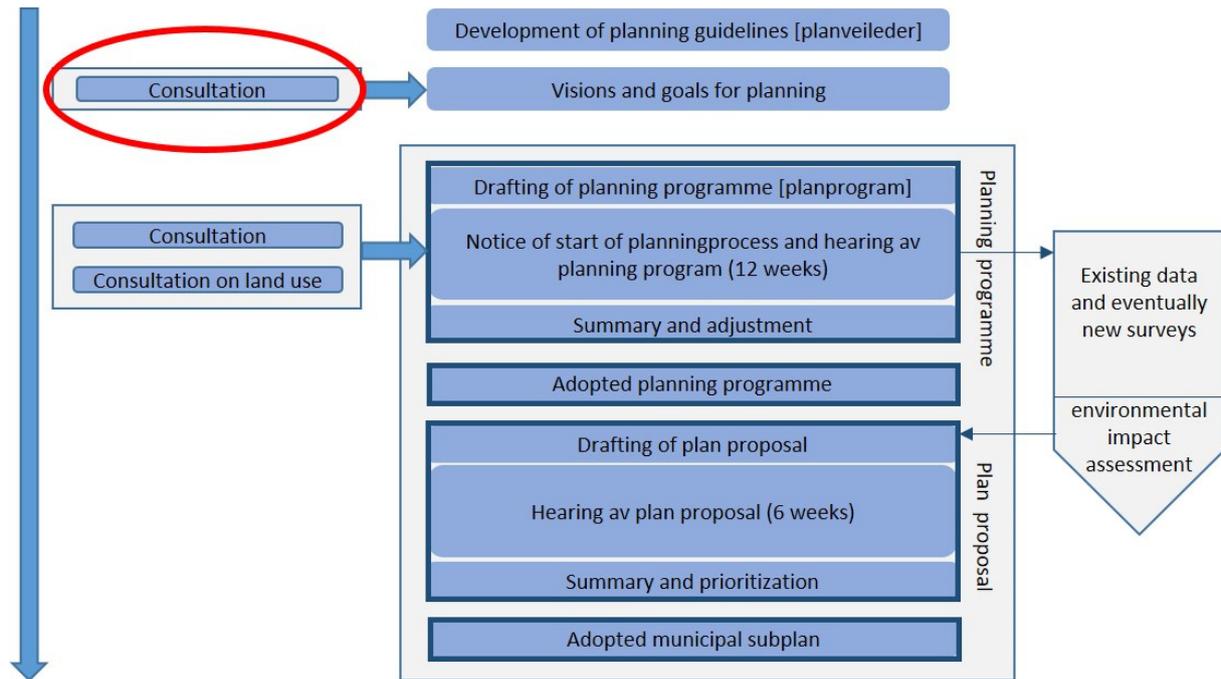


Figure 20. Planning process for the municipal sub-plan for the 'New City – New Airport' project, Illustration: Bodø Municipality, translated from Norwegian

Giving input to the planning process of the municipal sub-plan on visions and goals was facilitated over a webpage on Bodø municipality's internet platform, see figure 21.

Figure 6. Screenshot of the consultation website on future ideas for the new 'New City – New Airport' neighbourhood development, Bodø Municipality

Following the question "*How shall the new city district be?*", participants were invited to deliver their ideas using the online form. The participants could already choose a category out of seven in which their idea should be posted. Figure 22 shows the categories for the delivery of ideas and the number of posts in each category. This method for input of ideas is labelled Idea Storming, where people are invited to deliver ideas on special topics.

Category	Number of posts
Climate	0
Environment	2
Nature and Landscape	3
Housing and Industry	2
Green Structure and Recreation	5
Transportation	12
Miscellaneous	5
Total Number of Posts	29

Figure 7. *Categories for idea storming and number of posts per category*

The consultation webpage included, besides the online form for idea delivery, the presentation of the delivered ideas, general information about the planning and consultation process, and a contact form.

3.3 Former NRK site in Lø, Steinkjer

PROJECT DESCRIPTION

In Steinkjer, the ZEN pilot project is planned as a re-use of a former office building, with the establishment of a kindergarten and 10 to 12 residential units on the site. The building was formerly used by the Norwegian Broadcasting Corporation (NRK). It is planned to cooperate two separate kindergartens in one, the Lø kindergarten. The site is located within a residential area, 1.5 km from Steinkjer city center.

STATUS

The work with the zoning plan has recently started, and the planned kindergarten should be taken into use in the autumn 2019. The process of user involvement of the two kindergartens started recently, and a number of workshops were conducted during autumn and winter of 2017. A recently conducted preliminary analysis by the ZEN Centre showed that, with regard to the greenhouse gas emissions, the re-use of the NRK building is likely more efficient than a demolition and new construction (Skeie et al., 2017).

STAKEHOLDERS INVOLVED

The project owner is Steinkjer municipality with the department of social development as the responsible unit. It is planned that the public-owned land development agency Steinkjerbygg will develop the land in cooperation with private entrepreneurs. The local energy agency NTE and a network of regional IT start-ups 'The smart Grid Cluster' are partners of the ZEN Research Centre and potential stakeholders to involve in the further development. As future end users of the kindergarten building, the staff and the parents' representatives are involved in the planning of the future kindergarten building and its surroundings.

END USER ENGAGEMENT

NRK Estate Consultation

The involvement of end users in the planning process started in autumn 2017 with two workshops with the two existing kindergartens Figgia and Sørli. Participants were Steinkjer municipality, the leader and employees from both kindergartens, representatives of the parents, and ZEN researchers. The goal of the workshops was to evaluate the demand and ideas for the future development of the NRK site. The workshops were facilitated by an external person, hired by the municipality to organize the workshops.

The first workshop was held at Figgia kindergarten and focused on the development of a common understanding, especially regarding ZEN. A researcher from the ZEN Centre introduced the ZEN concept briefly at the beginning of the workshop. The ideas of the participants about how a sustainable kindergarten could be realized were discussed in one of the tasks while the participants worked together in smaller groups. Further, the expectation towards the process of establishment of the new kindergarten and the vision for the project were discussed.

The second workshop was held with the same participants three weeks later at Sørليا kindergarten. It focused on the mapping of the demand of the users, which was focused on the spatial design and equipment of the building and its surroundings. At the beginning of the workshop one of the ZEN researchers showed best practice examples of existing kindergartens which combine high environmental ambitions with a good building design. The intention was to inspire the participants by these examples and thereby widen the opportunity space for ideas by the participants. The participants themselves pointed to the recently opened Sør Eggen kindergarten in Steinkjer as a good example.

Between the second and third workshop a site visit was organized to offer the chance for the participants to discuss the possibilities for a re-use of the existing building. A third workshop was conducted at Sør Eggen kindergarten in spring 2018 to learn from the realized solution at a recently built kindergarten and to evaluate the possible implementation of these solutions in the Lø kindergarten.

3.4 Sluppen, Trondheim

PROJECT DESCRIPTION

Sluppen is a mainly commercial area that in the coming years is planned to be transformed into a mixed-used neighbourhood with a mobility hub in its center. The current planning status includes office and residential buildings, the mobility hub, and social infrastructure such as a school. Trondheim municipality is planning the renovation and building of a school, a multifunctional hall and two health care facilities [helsehus] on site. The goal is to transform the area into a new attractive and distinctive city district, with good living conditions for its users. Sluppen shall be developed as a climate-neutral neighbourhood with innovative solutions for the mobility sector.

STATUS

The municipality has started with the development of a planning strategy, which is to be completed in autumn 2018 and followed by a municipal sub-plan for the area. The planning for the re-development and building of the Nidarvoll and Sundland schools, the multifunctional hall, and the health care building care is planned to start in autumn 2018, as the school shall be opened in 2022. The private developer Kjeldsberg has already built two office buildings with environmental standards above the actual building requirements in the neighbourhood. A third office building is under development.

STAKEHOLDERS INVOLVED

The stakeholders involved are Trondheim municipality, with the planning and real estate department. The main private landowner is R. Kjeldsberg AS, which owns nearly half of the area with 130 000 m². Other landowners are Trondos, Koteng, KLP Eiendom, og Norske Shell. Other stakeholders involved are the National Road Administration [Statens Vegvesen], Trøndelag Fylkeskommune, Miljøpakken, and Siemens. Trondheim municipality hosts the Forum Sluppen, a cooperation platform between the main stakeholders in the area, funded by the Ministry of Local Development and Modernization.

STAKEHOLDER ENGAGEMENT

Dialogue plattform 'Forum Sluppen'

In 2015, a dialogue forum was established between the stakeholders in Sluppen, called 'Forum Sluppen'. The Forum Sluppen was established as an experiment in the CityLab approach of Trondheim's Knowledge axis and has been partly funded by the Ministry of Local Development and Modernization within the planning program for big cities [Storby program]. The goal was to test new forms for cooperation between several public and private stakeholders in the area (Hvitsand, Richards, 2017).

Trondheim municipality, Sør-Trøndelag county, the National Road Authority (also presenting Miljøpakken) and the largest private landowner R. Kjeldsberg participated in the Forum Sluppen. NTNU has assisted the work of the Forum Sluppen. The project leader is Trondheim municipality. There was also an attempt to involve other stakeholders. Siemens, as an industry stakeholder in Sluppen, and Koteng, another private landowner in Sluppen, participated only at an early stage.

In 2017, a feasibility study for Sluppen was conducted as a parallel assignment. The reason for doing this as a parallel assignment was that the participants in the Forum Sluppen wanted an open process with a broad academic discussion. NTNU has assisted the work with the feasibility study. The parallel assignment involved three invited interdisciplinary teams with architects and advisory engineers who were selected by the Forum Sluppen members after an open tender competition with 13 participants.

It was important for the members of the Forum Sluppen to ensure that the selected teams could share experiences during the process and get input from the Forum Sluppen along the way. In the period from March to June 2017 a start-up seminar, a mid-term seminar, and a closing presentation meeting was organized to ensure the possibility for discussion. The final presentation meeting in June was also open to the public, and around 50-60 persons participated. The Forum Sluppen evaluated the three proposals. The results are presented in the evaluation report of the feasibility study (Trondheim Kommune et al., 2017).

Trøndelag County (Trøndelag Fylkeskommune, 2018) describes the dialogue within the Forum Sluppen as good and especially useful to find common agreements about the objectives and requirements for the feasibility study. The cooperation is described as an "*open dialogue*", characterized by an understanding for the different positions and agendas of the involved stakeholders. The work with the feasibility study has pointed out the difficulties to find a solution in line with the different demands and requirements. The willingness to cooperate and compromise is described as crucial for an integrated and long-term solution for land-use in Sluppen, including the implementation and financing of this solution. The cooperation in the Forum Sluppen enabled the participants to understand the need for compromises and to set the development in Sluppen within a long-term perspective. It also helped to build up a better mutual understanding and the development of common goals.

Reference group municipal sub-plan

The work with a municipal sub-plan for Sluppen has started in spring 2018. This plan will set the overall principles for urban development in Sluppen and is mandatory to anchor infrastructure projects, such as the re-organisation of the E6 within the National Transportation Plan. The work of the feasibility study is planned to be integrated in the municipal sub-plan.

To continue the cooperation of stakeholders established in the Forum Sluppen and to guarantee a dialogue forum to discuss further work in Sluppen, a reference group with the members of the Forum Sluppen, named Forum Sluppen 2.0, is established (see figure 23). The reference group will discuss the main decisions for the plan, help to detect disagreements among the involved stakeholders, and ensure that the municipal sub-plan will be developed in line with its objectives.

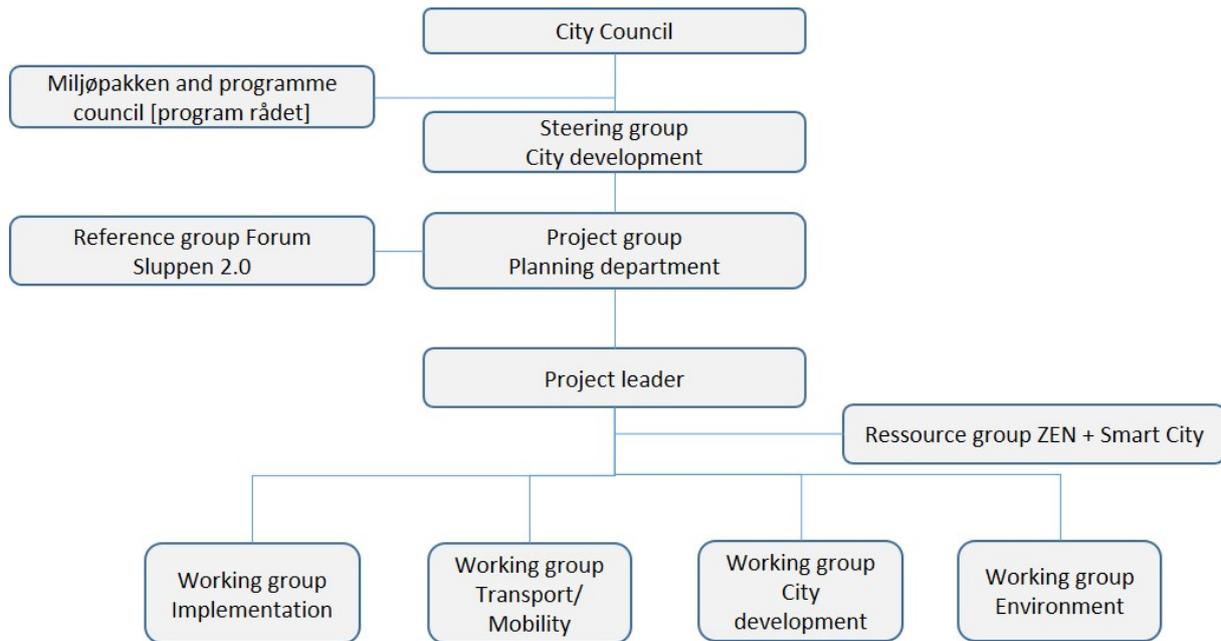


Figure 8. Organization model for the municipal sub-plan for Sluppen, Illustration: Trondheim Municipality, translated from Norwegian

END USER ENGAGEMENT

Energy Performance Consultation

The private land owner Kjeldsberg owns several buildings in Sluppen and is currently developing new office buildings on site. Kjeldsberg is trying to involve end users, the future or current tenants of the buildings, to develop better solutions for energy performance in the buildings.

One example is a recently renovated office building where the future tenant asked for the energy standard B for the building. Kjeldsberg proposed to develop the building according to standard A, which will lead to an energy saving equivalent to 25 NOK per m². The tenant and the land owner agreed on a higher rent for the building - exactly 25 NOK per m². With this agreement the land owner will re-finance its additional investments, while the tenant pays in total the same for use of the building.

4 Results and Discussion

The previous chapter presented the tools in use in the four ZEN pilot projects in Elverum, Bodø, Steinkjer, and Trondheim. Figure 24 gives an overview of the tools in use, their specific goals, and which target groups are meant to be involved while applying the tools. Some of the tools consist of several elements, which by themselves can be defined as tools. A workshop is for instance a tool in the Ydalir masterplan development.

Tool	Elements/tools used	Goal	Engaged stakeholders	Implemented phase
YDALIR, ELVERUM				
Masterplan development	Workshops, presentations, group work, site visits	To develop a common understanding for the goals of ZEN and develop a guideline document	All involved stakeholders	Strategic long-term planning
Target group identification	Workshop	Identification of future users of Ydalir – focused on residents	All involved stakeholders, including representatives of end users	Strategic long-term planning
Branding strategy	-	Create a project identity	All involved stakeholders, including representatives of end users	Strategic long-term planning
School estate consultation	-	Consultation of future users	Professional and end users	Tactical mid-term planning
Information	Presentation of the project on a webpage and in social media	Dissemination of project information	The public	All, currently in strategic long-term planning phase
NEW CITY - NEW AIRPORT, BODØ				
Entrepreneurcamp 'Gründercamp'	Group work, prototype development	Idea input, student consultation	Students	Strategic long-term planning phase
Idea Storming 'Future of Bodø'	Online form for the delivery of ideas	Consultation, idea input,	The public	Strategic long-term planning phase
Bodø ByLab	Physical place for involvement, Webbased tool for involvement	Stakeholder engagement	All	Strategic long-term planning, planned in all phases
Urban planning tool for ZEN	Assessment of KPIs, Dashboard for visualisation	Scenario-based planning, stakeholder engagement	Professional stakeholders and citizen	Strategic long term and tactical mid-term planning phase
Information	Presentation of the project on a webpage and in social media	Dissemination of project information	The public	Strategic long-term planning, planned in all phases
Idea storming vision and goals	Online form for the delivery of ideas	Consultation, idea input to planning programme	The public	Strategic long-term planning
Consultation required by Building Act	-	Consultation	All	Strategic long-term and tactical mid-term planning

NRK-ESTATE, STEINKJER				
NRK estate consultation	Presentations, group work, site visit	Information and consultation about the project development	Staff of kindergartens, representatives of parents	Tactical mid-term planning phase
SLUPPEN, TRONDHEIM				
Dialogue platform 'Forum Sluppen'	Regular meetings, feasibility study, evaluation report	Discussion and development of common goals	Stakeholders from public and private side	Strategic long-term planning phase
Reference Group for the municipal sub-plan	Regular meetings	Coordination among involved stakeholders	Stakeholders from public and private side	Strategic long-term planning phase
Energy performance consultation	Contract, delivery of technical solutions, financing model	Appliance of technical solutions to save energy	Landowner and tenant	Tactical mid-term planning phase

Figure 9. Tools used for stakeholder involvement in the ZEN pilot projects

The identified tools for stakeholder engagement are used in different phases of ZEN development and at different scales as the city, neighbourhood or project/building level (figure 25).

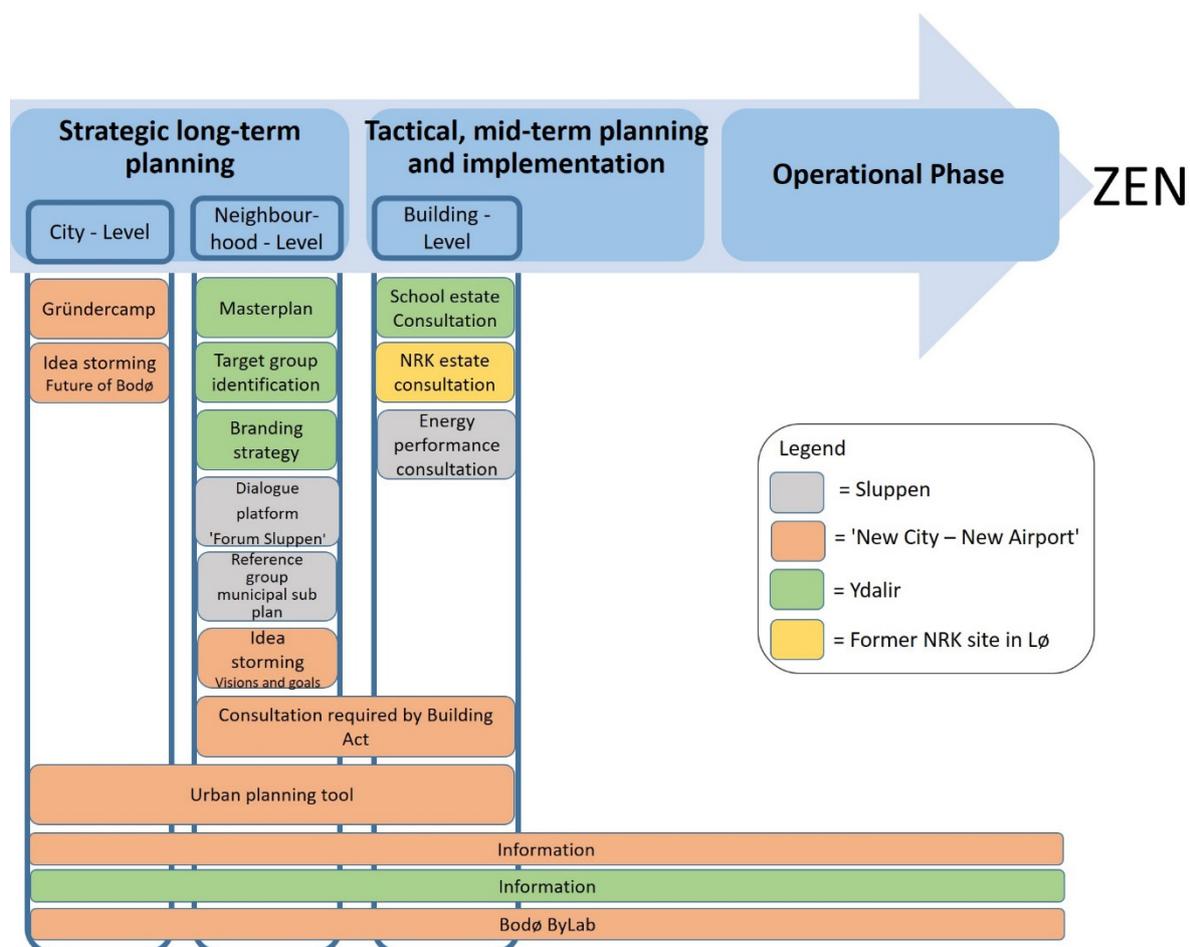


Figure 10. Use of tools in different phases of development and geographical levels in ZEN pilot projects

Just two tools, the 'Gründercamp' in Bodø and the 'Idea Storming for the future of Bodø', are exclusively used in the strategic long-term planning and on the city level. Bodø's vision is to be the world's smartest city, and the development of the 'New City – New Airport' project is deeply intertwined with the city development as a whole. The pilot project is the largest area of city development for the next 100 years and as big as Bodø's city center today. The ideas developed in the Gründercamp are valid for the whole city but will mainly be used for the 'New City – New Airport' development.

There are several tools used exclusively in the strategic long-term planning and on the neighbourhood level. The most complex is the masterplan development in Ydalir, including a series of workshops, site visits, and the development of a masterplan. The other tools are more specific on different topics, such as the target group identification or the development of the branding strategy. The idea storming is comparable to the 'Gründercamp', an idea development and consultation tool, but focused on the neighbourhood level, in this case the New City – New Airport' project.

Three tools are exclusively used at the building-level in the tactical mid-term planning phase. The 'school estate consultation' is used at one of the first construction projects in Ydalir, the new construction of a school in the center of Ydalir. With the help of this tool the design of the school is synchronized with the demand of its users. The 'NRK estate consultation' is similar to that, involving the users into the planning and design of the new kindergarten. The 'energy performance consultation' is more specifically focused on financial agreements between owner and tenant to realize buildings with a high environmental standard.

The size and the future use of the project development influence the use of the tool 'Target Group Identification'. Ydalir is using this tool to identify the future main user groups of the residential buildings to be built in the pilot project and to build its branding strategy on the demand of the targeted groups. This tool is therefore useful on the strategic planning level for the neighbourhood or even on the city level, while building projects, such as in Steinkjer or the school in the Ydalir project, are more clear about the future users.

The tools 'Urban planning tool' and 'Involvement required by Building Act' are used in the strategic long-term and tactical mid-term phase. The 'Urban planning tool' is under development with the goal to help the stakeholders to plan and design for low-carbon developments by assessing KPIs on the city-, neighbourhood-, and building-level in Bodø. These levels of urban development must be assessed in conjunction, with the result that the tool is adaptable to all of the three levels.

Some tools are used during several phases of development. The tool 'Consultation required by Building Act' is the only mandatory tool to use for consultation according to Norwegian law. The reason why it is currently just used in the ZEN pilot in Bodø is that the Ydalir and the NRK-Estate are developed according to older zoning plans. The size of the 'New City – New Airport', and thereby the societal impact as well as the re-use of the airport area with residential and commercial functions, require a municipal sub-plan [Kommunedelplan]. Bodø Municipality is currently working on the planning program for the area zoning plan and a municipal sub-plan for the pilot project area. Later this tool will also be used in Sluppen, where Trondheim municipality recently started with the work on the planning program for the municipal sub-plan for the area.

The tool 'Information' about the project is used in Bodø and Ydalir and is planned to be used during all planning phases. Because of the long time frame of completion of the whole neighbourhood, this tool

will be used while parts of the neighbourhood are already completed and in the operational phase while others are still in the planning or implementation phase.

5 Conclusion

5.1 Tools in use in the ZEN pilot projects

This report has presented the mapping of tools used to plan and design zero emission neighbourhoods. It has a special focus on stakeholder engagement in the four selected pilot projects Ydalir in Elverum, 'New City-New Airport' in Bodø, former NRK site in Lø, Steinkjer, and Sluppen in Trondheim. Each of the pilot projects used different tools because of specific and individual characteristics of the project.

We pointed out that the specific characteristics of each of the ZEN pilot projects influence the choice of tools. These are e.g. individual project characteristics, such as stakeholders involved and stage of development, or more context dependent factors, such as being an existing or a new neighbourhood development. Only the information tool and the consultation for building projects were used or are planned to be used in several pilot projects.

This shows that the different ZEN pilot projects require different tools for planning and design of a ZEN in general and for stakeholder engagement in particular.

Stakeholders involved

The involvement of stakeholders in the development of ZEN is an important success factor for sustainable neighbourhoods with a low carbon footprint. Different stakeholders are involved in the pilot projects, and the tools used address different stakeholders. This raises the question of whether the appropriate stakeholders are involved in the development and whether appropriate tools are available to involve them, especially when it comes to citizen and end user engagement. This stakeholder group often has low power and influence on the project development, but a high interest in it. On the other hand, this group is crucial for reaching for the ambitious goals of a ZEN development as they have the highest impact on energy use and emissions during the operational phase. Future work has to evaluate if the appropriate stakeholders were involved in the ZEN development in an appropriate way and which tools were most beneficial.

Evaluation of the tools in use

To identify appropriate tools to support a successful ZEN development, the tools used in the pilot projects have to be evaluated. The application of the tool 'Masterplan Development' in the Ydalir project already showed its success by the fact that it built trust between stakeholders and facilitated cooperation between them. Future work has to evaluate the tools used and their impact on stakeholder engagement and on the success of the ZEN development.

This report was a starting point for the mapping of stakeholder engagement tools. It is necessary to continue to map tools in use in the pilot projects to learn from them as well as to investigate tools in use in other neighbourhoods, nationally and internationally, to learn from best practice cases.

5.2 Significance for ZEN toolbox

The report showed that each of the ZEN pilot projects is different. There is therefore a different demand for tools for stakeholder engagement, depending on if the future users are already available and on the phase of development (strategic long-term, mid-term planning and implementation, or operational phase). With regard to the development of the ZEN toolbox (see chapter 2.3), the toolbox has to have a

wide variety of stakeholder engagement tools available in order to cover as best as possible the different individual project characteristics and contexts (Wiberg, Baer, 2019).

The tools are used in different phases of ZEN development and have different scales, as they are either on the city, neighbourhood, or project/building level. Parallel to different phases and scopes, different stakeholders have to be involved in the ZEN developments on different scales and in different phases of ZEN development.

5.3 Future Work

To integrate the appropriate stakeholders in the ZEN development, more information about the stakeholders is needed. Points of interest are their goals and ambitions, mindsets and knowledge, involvement in the process so far, and perceived challenges in planning and designing ZEN.

Over the lifetime of the FME ZEN a ZEN toolbox will be developed. Work Package 1.3 contributes by developing a framework for the toolbox (Wiberg, Baer, 2019) and by defining and evaluating tools to integrate into the toolbox with regard to stakeholder engagement, planning and design, and visualization.

Based on the mapping of the ZEN pilot projects, the stakeholders involved were identified and presented in this report. This information needs to be updated and followed up as the pilot projects are further developed and as different stakeholders are involved in different phases of ZEN development. To engage stakeholders in the planning and design process, we must identify which stake the stakeholders have in the projects and how they influence the ZEN development – in both ways: positively and negatively.

Future work will focus on a stakeholder analysis and additional qualitative interviews. The stakeholders will be identified and characterized by i.e. their goals and ambitions, mindsets and knowledge, involvement in the process, and perceived challenges to planning and designing for ZEN. The individual project characteristics and their impact on ZEN development in general and stakeholder involvement in particular will be discussed. A special focus in future work will be on the involvement of citizens and end users in the ZEN development.

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