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Planning Instruments for Smart Energy Communities

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Goals

PI-SEC will deliver efficient planning instruments for integrated energy design at the neighbourhood scale, qualified for Norwegian planning context in cooperation with public stakeholders.

The project will provide increased knowledge about what parameters are essential for moving towards smart and sustainable energy use in Norwegian cities

and how these can be linked to the planning, operation and monitoring of new or renewed neighbourhoods.

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Country level	Energy use per capita, Energy use per unit of GDP, Reserves-to-production ratio, Non-carbon energy share in energy and electricity, Net energy import dependency, Percentage of income spent on energy, Storage capacity, Security of supply, etc.
City level	Total residential electrical energy use per capita, Energy consumption of public buildings, Percentage from renewables of total energy use, Impact on the electricity network, Air pollution, Charging networks, Intelligent transport systems, Average commuting times, Value of fuel savings, etc.
Neighbourhood level	Reductions in CO_2-emissions, Life Cycle Costs, Air pollution, Import and export of energy, kWh/m^2 per hours of occupancy, CO_2/travel km, Distance to public transport nodes, Frequency of public transport, Cycling networks, Integration of RES, Intelligent transport facilities, etc.
Building level	Energy demand in kWh/m^2 floor area, Delivered and primary energy in kWh/m^2 floor area, Power demand, CO_2-emissions from materials, construction and operation, Life cycle energy costs, Load match/grid interaction indicators, User interaction, etc.

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Which targets and KPIs are essential for smart and sustainable energy use in Norwegian cities and how can these be linked to the planning, operation and monitoring of new or renewed neighborhoods?

Research question

Work Package 2:

Planning Instruments for Municipalities

(NTNU)

- "Top-down" approach
- - How the municipalities should design their planning instruments to facilitate the move towards smart energy communities

Work Package 1:

Cross Scale Indicators in Project Planning

(SINTEF byggforsk)

- "Bottom-up" approach
- - The goals and indicators used in the planning and design of buildings and neighbourhood development projects

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Furuset in Oslo: An upgrading of suburb from the 1970's with 9500 inhabitants.

Case studies

Ådland	New	Smaller	Building owner driven development	One owner	Distance to public transport
Furuset	Existing	Larger	Municipality driven development	Many owners	Public transport hub

Ådland in Bergen: A new development with 6 to 800 dwellings and a community centre

Furuset, Oslo: An upgrading of suburb from the 1970's with 9500 inhabitants.

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Extension to other FME ZEN pilot areas

Structure

WP 1: Cross Scale Indicators in Project Planning	**Task 1.1** Analysis of goals and KPIs in design projects (DP)	**Task 1.2** Preliminary toolkit of goals and KPIs in DP	**Task 1.3** Testing of toolkit in case studies. Focus: Project planning	**Task 1.4** Final toolkit and guidelines for design projects
WP 2: Planning Instruments for Municipalities	**Task 2.1** Analysis of goals municipality planning instruments	**Task 2.2** Preliminary toolkit of municipality PIs	**Task 2.3** Testing of toolkit in case studies. Focus: Municipality practice	**Task 2.4** Regulatory and planning implications for municipalities

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Participants

- NTNU (project leader + leader WP2)
- SINTEF Byggforsk (leader WP1)
- National resource group incl Oslo and Bergen municipalities, Standard Norway, FutureBuilt, Norwegian Green Building Council and others
- European reference group incl research and public sector, European Innovation Partnership on Smart Cities and Communities, European Energy Research Alliance Joint Programme Smart Cities, International Energy Agency projects.

+ connection to FME ZEN

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Target group

- urban decision makers,
- municipal planning departments
- and other stakeholders that are developing targets, criteria, roadmaps and tools for sustainable energy use in Norwegian communities.

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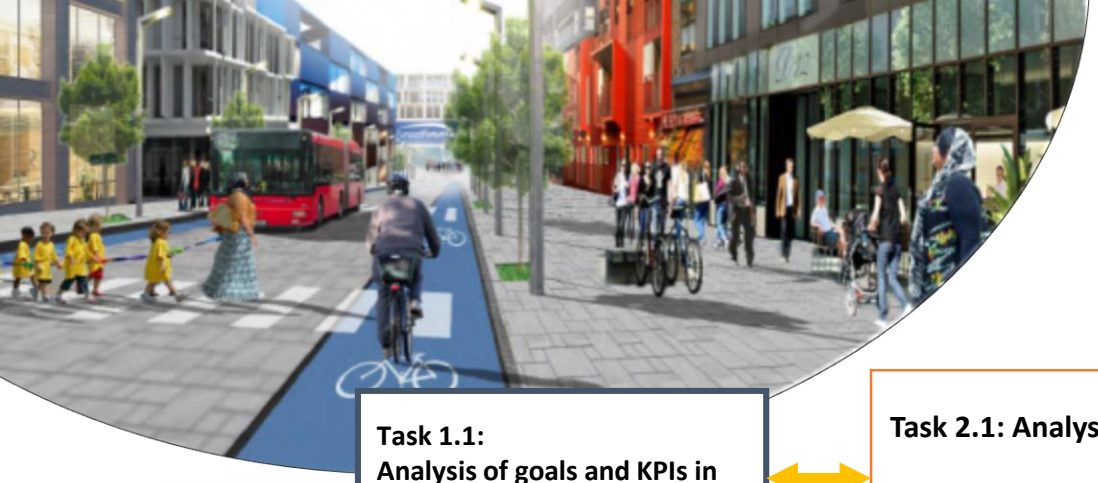

Task 2.1 in the project framework

Task 1.1:
Analysis of goals and KPIs in designs projects

Task 2.1: Analysis of municipal planning instruments

- **identify the main drivers and challenges** experienced in the planning and implementation of these neighbourhood projects.
- Interviews with stakeholders, document analysis (documents such as tenders, meeting minutes and strategic programmes)

- Outcome: **overview of the definition and scope** of the PI-SEC case projects, the manner in which these are (not) supported by, and embedded in, municipal planning instruments, and the manner in which this potentially has developed over time.
- The overview will also make explicit any diverging views and experiences, and potential conflicts, that need to be resolved in Tasks 2.2-2.3.

Task 2.2: Preliminary toolkit of municipal planning instruments

- a reference base of Norwegian and international projects that have similar targets, challenges and drivers, evaluate how they were tackled, and whether these experiences are transferable to Norwegian context, specifically to the PI-SEC case projects.

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Sources in Task 2.1

Overview of international practice

Neighbourhood (re)development projects with environmental focus

Name	Type
Brøset – case studies	Norwegian project, 2010
FP7 ZenN	EU project
cRRescendo	EU project
FP7 RAMSES	EU project

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Task 2.1

Experiences and international best practice

Neighbourhood (re)development projects with environmental focus

Currently: Norwegian and some European cases (will be extended in Task 2.2)

Focus:
Goals, drivers, tools, stakeholder involvement
Challenges, barriers, gaps

«Tools»: process, policy, digital tools, participatory tools and processes, etc…

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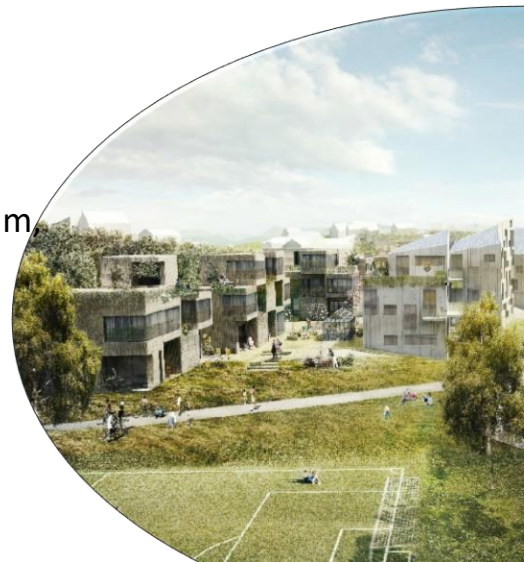
Task 2.1 findings

- Challenges/barriers: technical, social, financial, environmental/health, organizational/legal
  - Social: mistrust towards zero-energy buildings: concerns over health issues, preference for DIY
  - Main financial issue in Norway: no return of investment (in low-energy renovations) (low energy price, high work cost)
  - Public bodies depend on legal background, private actors are used to market logic during the negotiation processes
  - Organizational/legal challenges vary depending on the role of private/public actors; power distribution regarding energy system
- Common goals Transport, energy use/supply, indoor climate, reduction of pollution/noise/emissions, common waste treatment, outdoor/green areas
- Tools (based on Narvestad, 2010 and cRRescendo publication):
  - Legally binding: through instruments defined in planning law or civil law
  - Not legally binding: creating a sense of ownership over the mutually accepted goals (e.g. miljøopfølgningsprogram, kvalitetsprogram,
  - Available tools vary depending on the role of private/public actors
  - Incentives



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Task 2.1 findings

- Long negotiation and planning processes can be beneficial in later stages of the projects, as they allow for more detailed discussions/plans – fewer unexpected issues. Refurbishment projects often take longer to prepare
- Selecting goals: selection of few focus areas OR prioritization of goals can lead to good results

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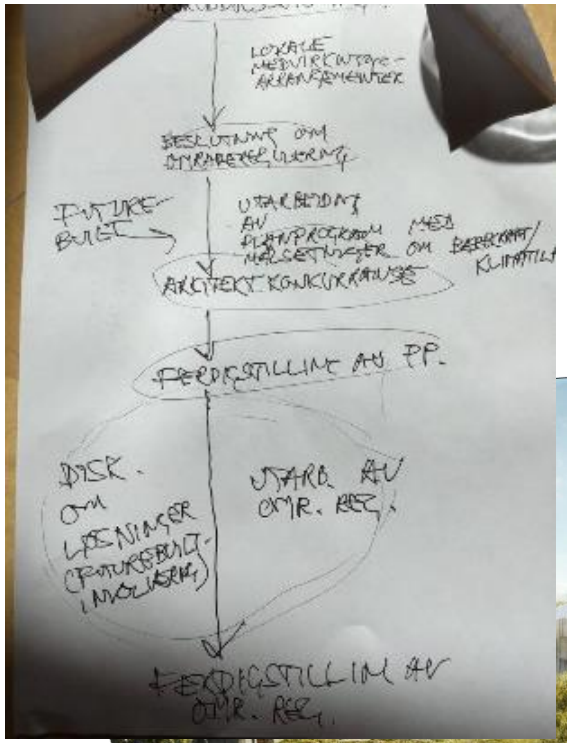
Data gathering

- Interviews with stakeholders in each project
- Focus on planning process and stakeholder perspectives
- Finding challenges and drivers
- Still ongoing and possibly extended



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Perceived tools for the planning of SECs

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AREA REGULATION (OMRÅDEREGULERING)

- FLAGSHIP STATUS
- SCENARIO-BUILDING
- DOCU-MENTATION
- PROPERTY
- PARTICIPATORY METHODS
- BUSINESS MODELS
- SIMULATION TOOLS
- NEEDS ASSESSMENT
- PARTICI-PATORY METHODS
- STAKE-HOLDER WORKSHOPS

PLANNING AND BUILDING ACT (PLAN OG BYGNINGSLOVEN)

- OBJECTION INNSIGELSE)
- TECHNICAL REQUIREMENTS (TEKNISK FORSKRIFT)
- AREA PLANNING (SONE PLANLEGGING)
- SOUND SHADOW MODELLING
- PROPERTY REGULATION
- LOCALIZATION
- NORWEGIAN STANDARD
- ECONOMIC MODELS
- ENERGY PERFORMANCE (SIMIAN, PVsys..)
- TRAINING
- EXPERIENCE

Wished for tools

- MODELS TO REDUCE TRANSPORT, EX. CAR POOL
- POLICY THAT INCLUDES KNOWLEDGE BASED DECISIONS IN CP
- TOOLS THAT CAN CALCULATE IMPACT ON CLIMATE EMISSION
- BETTER INTEGRATION OF ENERGY PLANNING INTO CITY PLANNING
- INSENTIVES FOR MOVERS
- VISUAL LABELING OF LOCAL ENERGY USE
- BETTER TOOLS FOR ENERGY SCENARIO BUILDING
- GREEN OR RED LIGHT MEETING WITH STAKEHOLDERS AT THE START
- SMART BUILDINGS TO FACILITATE ENERGY USE IN TRANSPORT ETC.
- DESIGN THAT CONNECTS END-USER WITH ENERGY USE
- REGULATION OF PROPERTY IN ACCOR-DANCE WITH ZERO EMISSION GOALS
- REGULATIONS THAT FACILITATE INCREMENTAL LEARING
- EASY ACCCESS APPLICATION PROCEDURES FOR GREEN BUILDERS

Furuset Zero Village Bergen

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Suggestions from 2.1

Five hot spots for tool matchmaking and development

- Energy screening and integrative start-up tools
- Visualization tools of relationships between energy use, energy production, and emissions
- Triple bottom line (economic, social, environmental) scenario building tools to support decision making for SEC implementation
- Sustainable user behavior design of buildings and urban area
- Stakeholder/incentive based understanding of system boundaries; tools that can help municipalities understand which stakeholders and incentives can benefit the planning and implementation of SECs.

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Suggestions from 2.1

•Approaches should be identified that have loosened up projects that are ‘stuck’ due to conflicting agendas through disruption of the “business as usual” process

•Knowledge-based tools for the future city planning: how can participatory and knowledge-based city planning approaches be scaled and made more time effective to also be integrated into quicker planning processes for SECs? (problem: urgent need for new housing and city planners see that there is a risk to move directly from plan to building without the inclusion of common visions and participatory processes etc. since these are seen as obstacles to timely implementation)

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Task 2.2

Task 2.1: identify the main drivers and challenges experienced in the planning and implementation of these neighbourhood projects

Task 2.2: Preliminary toolkit of municipal planning instruments

- Task 2.2 will collect a reference base of Norwegian and international projects that have similar targets, challenges and drivers, evaluate how they were tackled, and whether these experiences are transferable to Norwegian context, specifically to the PI-SEC case projects
- Methods: workshops and interviews with stakeholders, desk research

Task 1.2:
Preliminary toolkit of goals and KPIs

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Task 2.2 – Tool development and tool matching

- Participatory, design thinking workshops with Bergen and Oslo to determine priority, futured oriented goals in terms of tool development and narrow needs
  - Backcasting
  - Use of scenarios
  - Story telling/Case based reasoning
- Stakeholder analysis to structure findings in relation to SEC planning processes
- Matching with international tools to find relevant international experiences and decideareas for potential new tool development (participatory and desk studies)

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Stakeholder mapping

- Relationship between the stakeholders is very different in the two processes
- The list of stakeholders and their level of involvement changes significantly throughout the process
  - Triggers for changes: emerging needs, opportunities, difficulties
  - Often these changes solve significant problems – leads to development of tools and other solutions that help the process along
- Some external stakeholders hold a lot of power over the planning process (not necessarily SEC related)
  - Awareness and management of this can help not just with the PI-SEC cases, but other relevant projects

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Task 2.2 – Identifying relevant experiences and tools

- Building on review from Task 2.1
- Extending scope (in progress) AND focusing on

particular needs in the PI-SEC cases

- Finding relevant solutions to the most important issues in the form of particular tools
- Sources: FP7 ZenN, Brøset project, cRRescendo (Concerto), IEA Annex 63, SmartEnCity, FP7 RAMSES, CoSSMiC… - ***ANY RECOMMENDATIONS?***

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