

An aerial photograph of a city, likely Trondheim, Norway, showing a mix of urban development and green spaces. A large, semi-transparent green rectangle is overlaid on the center of the image, containing white text. The text is arranged in three lines: the first line is 'MIKROENERGISYSTEM FURUSET', the second line is 'FUTUREBUILT KONFERANSEN JUNI 2017', and the third line is 'TROND MOENGEN'. The background image shows various buildings, roads, and green areas, with a river visible on the right side.

MIKROENERGISYSTEM FURUSET
FUTUREBUILT KONFERANSEN JUNI 2017

TROND MOENGEN

Mitt **mål** med presentasjonen:

... å gi dere et lite innblikk i

- **HVA** et mikroenergisystem kan være og
- **HVILKE** elementer det kan bestå av

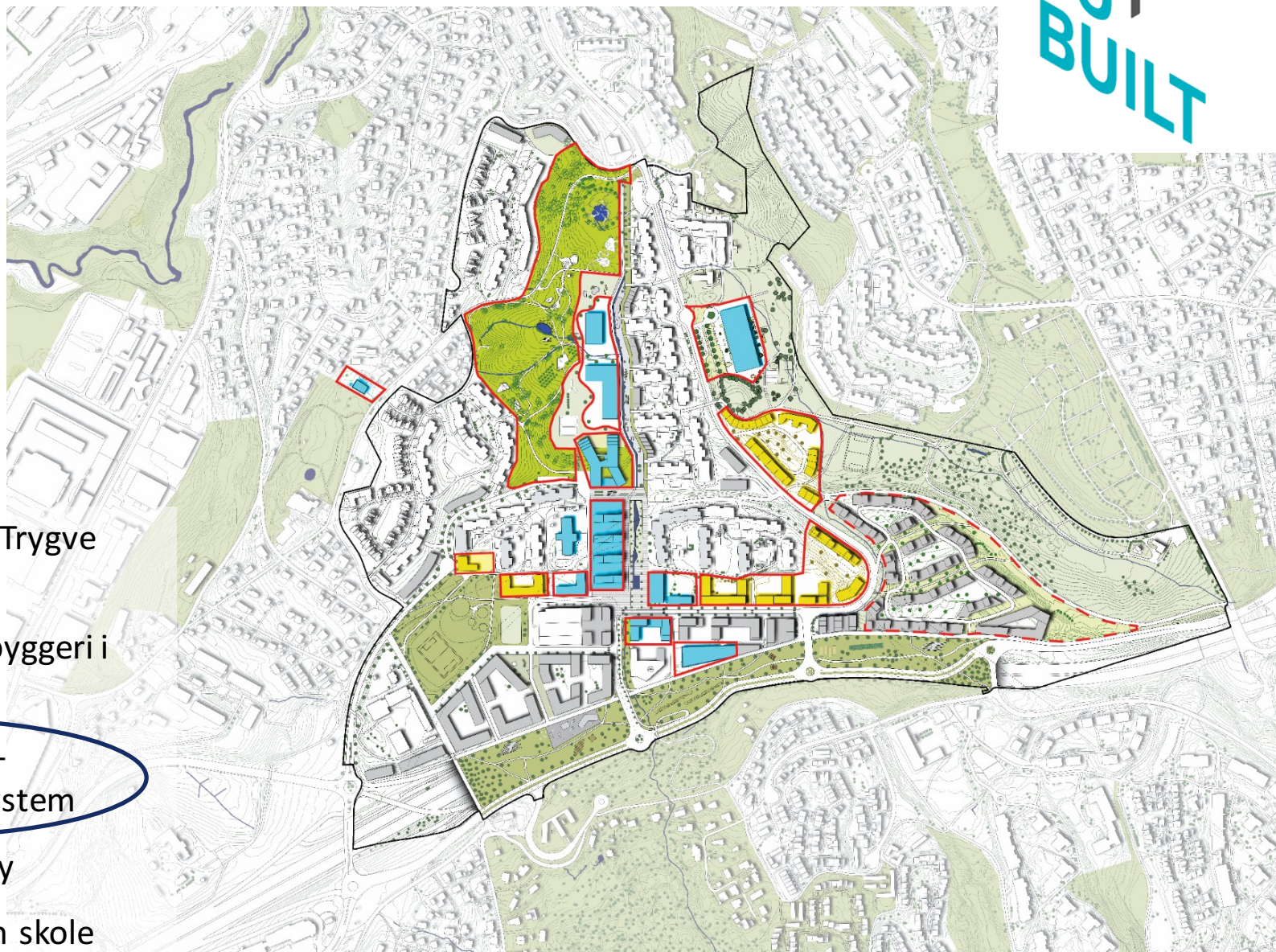


SMART DRABANT I FORKANT

Prioriterte prosjekter

FUTURE
BUILT

1. Knutepunktet Trygve
Lies plass
2. Klimavennlig byggeri i
bygata
3. Energiløsning -
Mikroenergisystem
4. Furuset hageby
5. Verdensparken skole



An aerial photograph of a modern urban development. The image shows a dense cluster of buildings with green roofs, interspersed with green spaces, trees, and winding paths. The architecture is contemporary, with flat roofs and large windows. The surrounding area includes a road with a bridge and some older residential buildings. The overall scene is bright and sunny, with a clear sky.

HVA ER ET MIKROENERGISYSTEM?

Et mikro-energisystem består av et lokalt energinett som **leverer energi** til brukere i nærområdet, og som kan **ta imot energi** fra energibrukere i nærområdet. Eksempel på dette er å levere varme fra et hus som har overskudd, varmt vann fra solfangere og elektrisk energi fra solceller.

Mikroenergisystemet kan veksle mellom **ulike energibærere** og **kilder** blir dermed mer fleksibelt. I tillegg kan det redusere behovet for å bygge opp kapasitet i infrastruktur som elektriske og vannbårne nett inn til området.

Mikroenergisystemet spiller sammen med det ytre energisystemet.

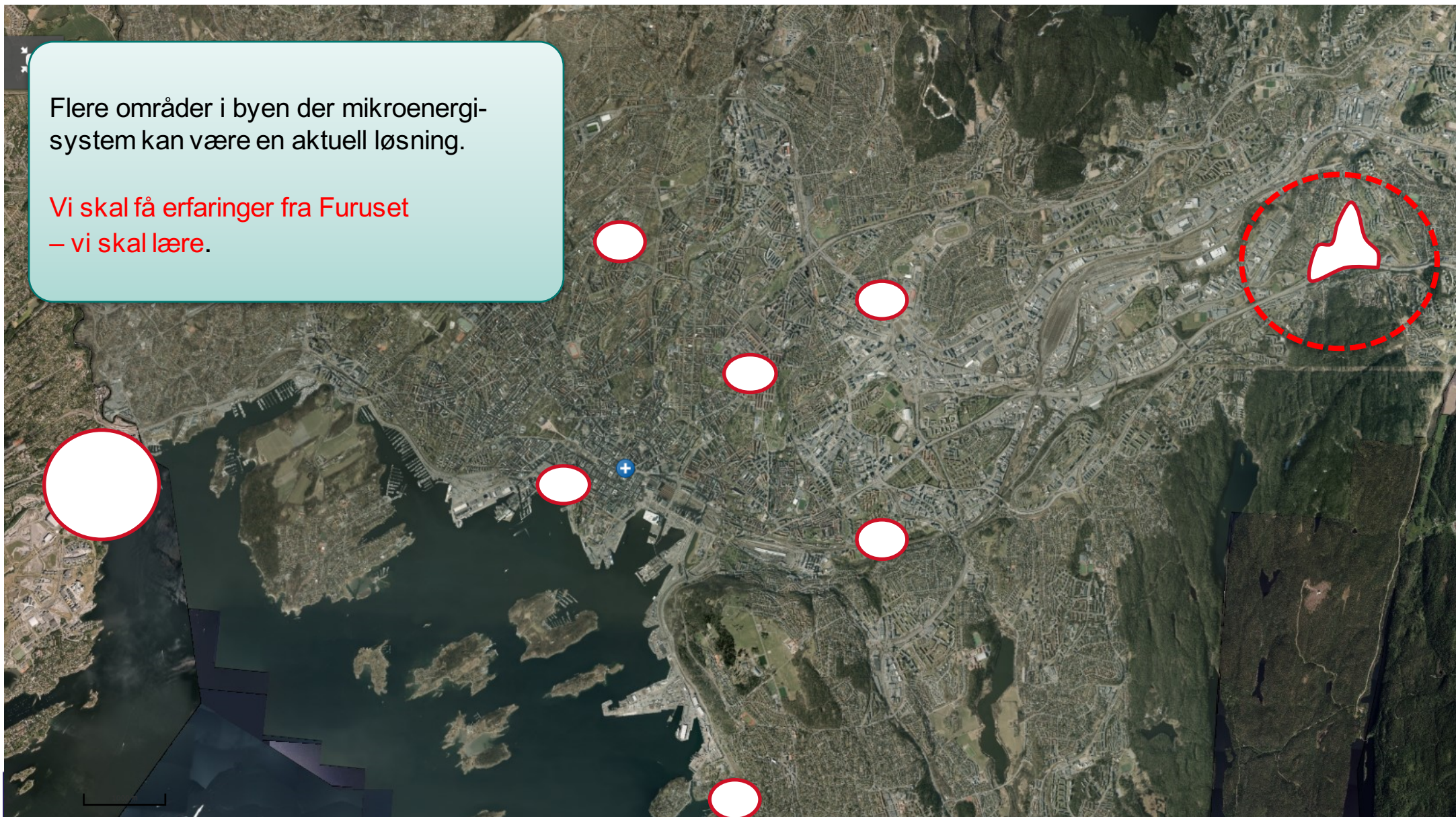
Et moderne mikroenergisystem er et **smart energisystem – styring og samspill.**



MIKROENERGISYSTEM – FURUSET

Flere områder i byen der mikroenergisystem kan være en aktuell løsning.

Vi skal få erfaringer fra Furuset
– vi skal lære.



FASER – OG ALT AVHENGER AV ALT....

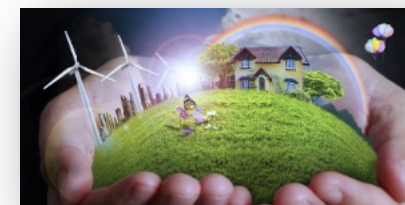
Utbygging – Utbygging av Furuset som en bydel



Implementere et energi- og mobilitetssystem



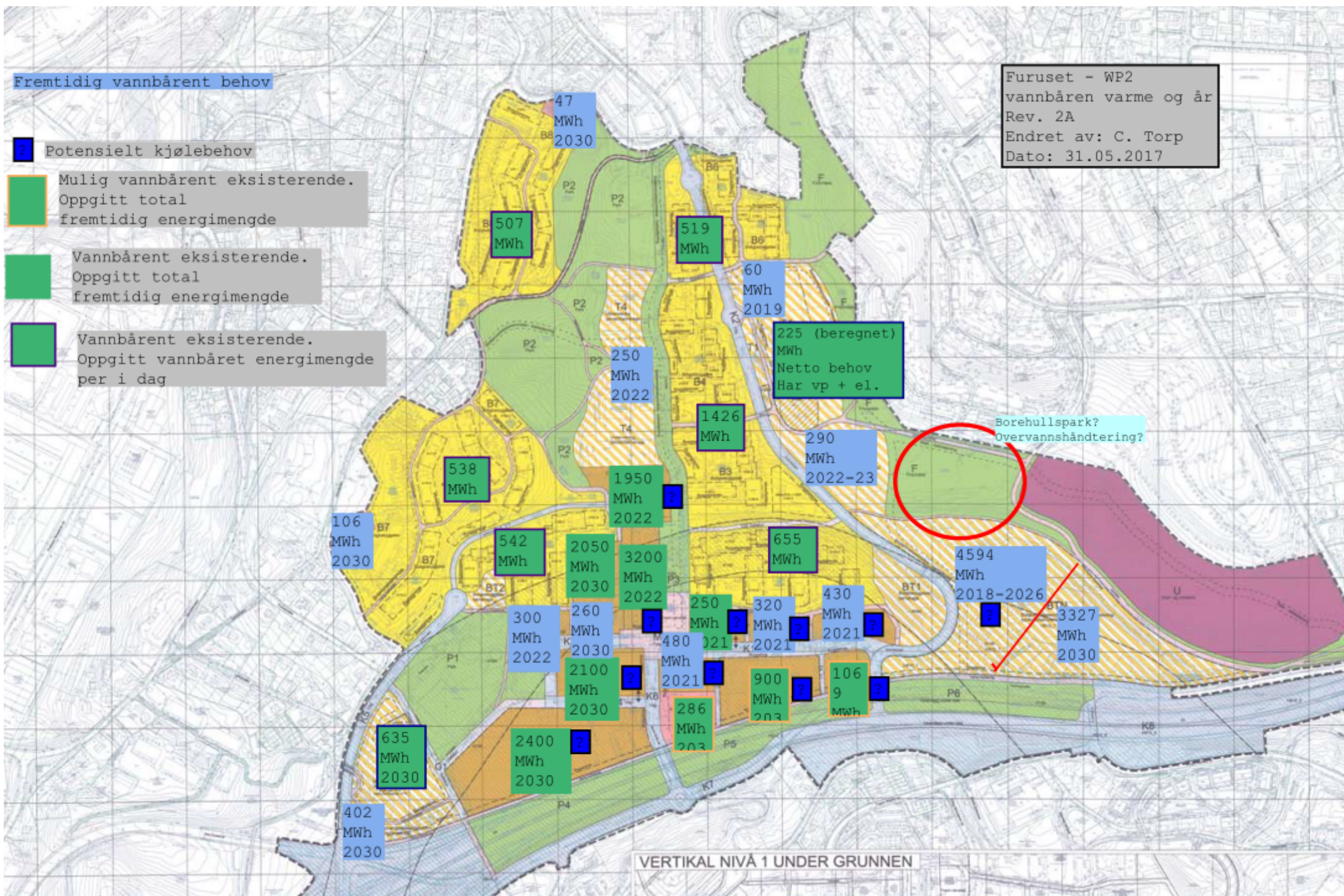
Designe et smart energi- og mobilitetssystem



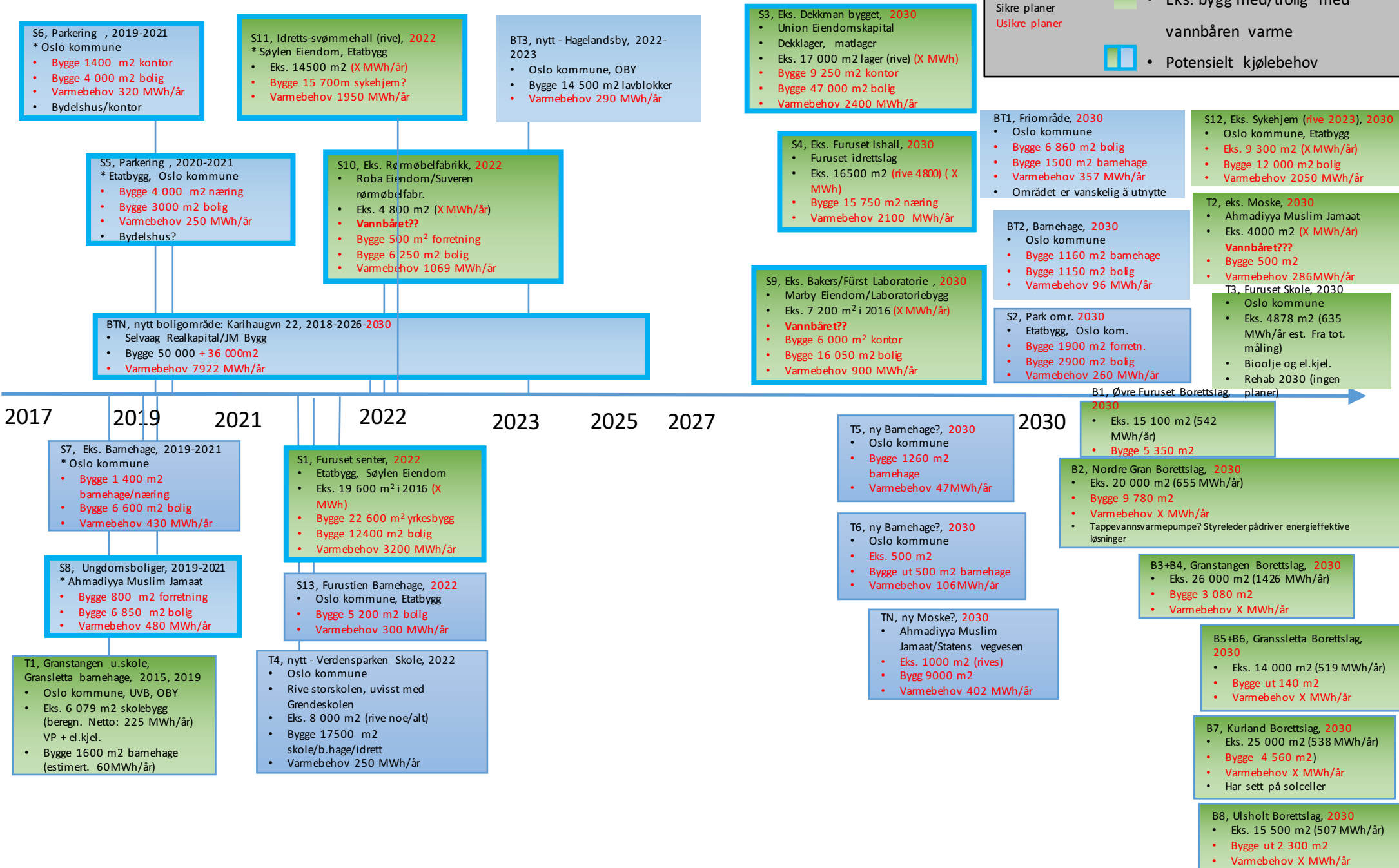
Fremtidig vannbærent behov

- Potensielt kjølebehov
- Mulig vannbærent eksisterende.
Oppgitt total
fremtidig energimengde
- Vannbærent eksisterende.
Oppgitt total
fremtidig energimengde
- Vannbærent eksisterende.
Oppgitt vannbæret energimengde
per i dag

Furuset - WP2
vannbæren varme og år
Rev. 2A
Endret av: C. Torp
Dato: 31.05.2017



Tidslinje utbygging Furuset en mulig en....



FASER – OG ALT AVHENGER AV ALT....

Utbygging – Utbygging av Furuset som en bydel



Implementere et energi- og mobilitetssystem



Design et smart energi- og mobilitetssystem



FASER – OG ALT AVHENGER AV ALT....

Design et smart energi- og mobilitetssystem

WP 1: Energisystem – Integrasjon – Smartgrid

WP 2: Varme / kjøling / vannbåren

WP 3: Bygg – og lokal prod

WP 4: Mobilitet

WP 5: Klima- og miljøeffekter - analyse

WP 6: Mobilisering – sosiologi – involvering - adferd

WP 7: Klimatilpasning



UTVIKLINGSPROSJEKTET - ORGANISASJONSMODELL

Design et smart energi- og mobilitetssystem



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FJERNVARME I OSLO

WP 1: Energy system – Integration - Smartgrid

WP 2: Heating and Cooling

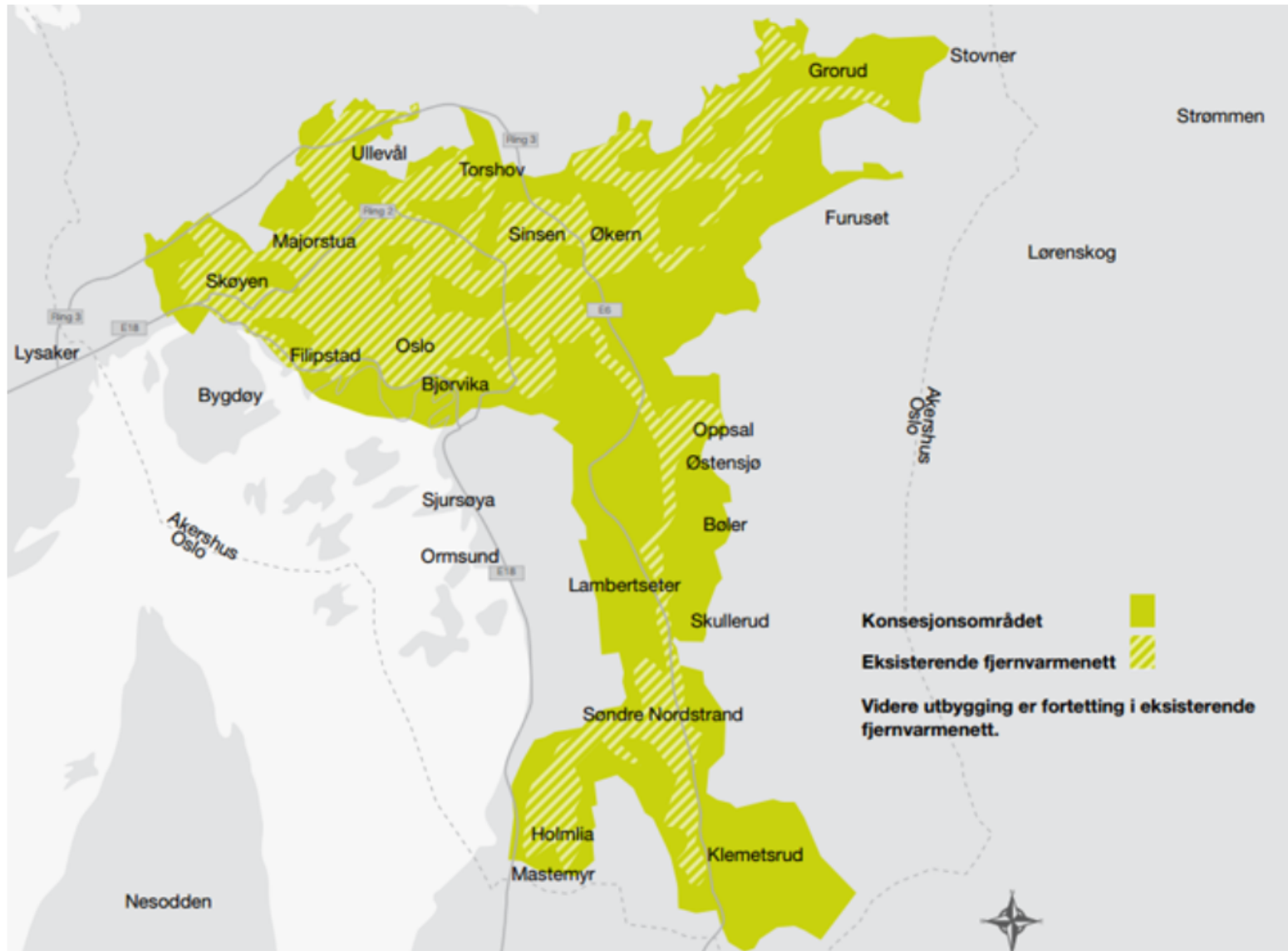
WP 3: Electricity – prod and use

WP 4: Mobility

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Hafslund utvider
sitt fjernvarmenett

Furuset



absorptions cooling and/or Sorption cooling.

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**Furuset FORUM
Icehockey stadium**

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Tema 1: Lavtemperaturnett - høytemperaturnett

- Utnytte spillvarme fra Furuset FORUM – lokale kilder



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WP 2: Heating and Cooling

WP 3: Electricity – prod and use

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- Utnytte spillvarme fra Furuset FORUM – lokale kilder
- Utnytte spillvarme fra Klemetsrud – fjernvarme

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WP 2: Heating and Cooling

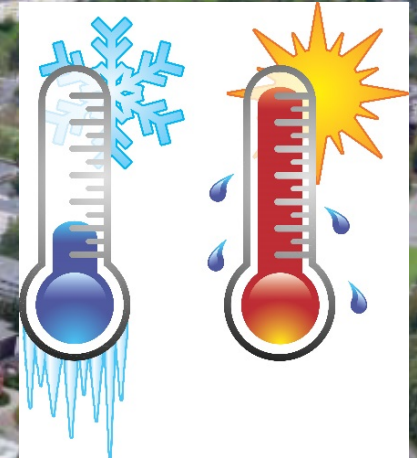
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WP 4: Mobility

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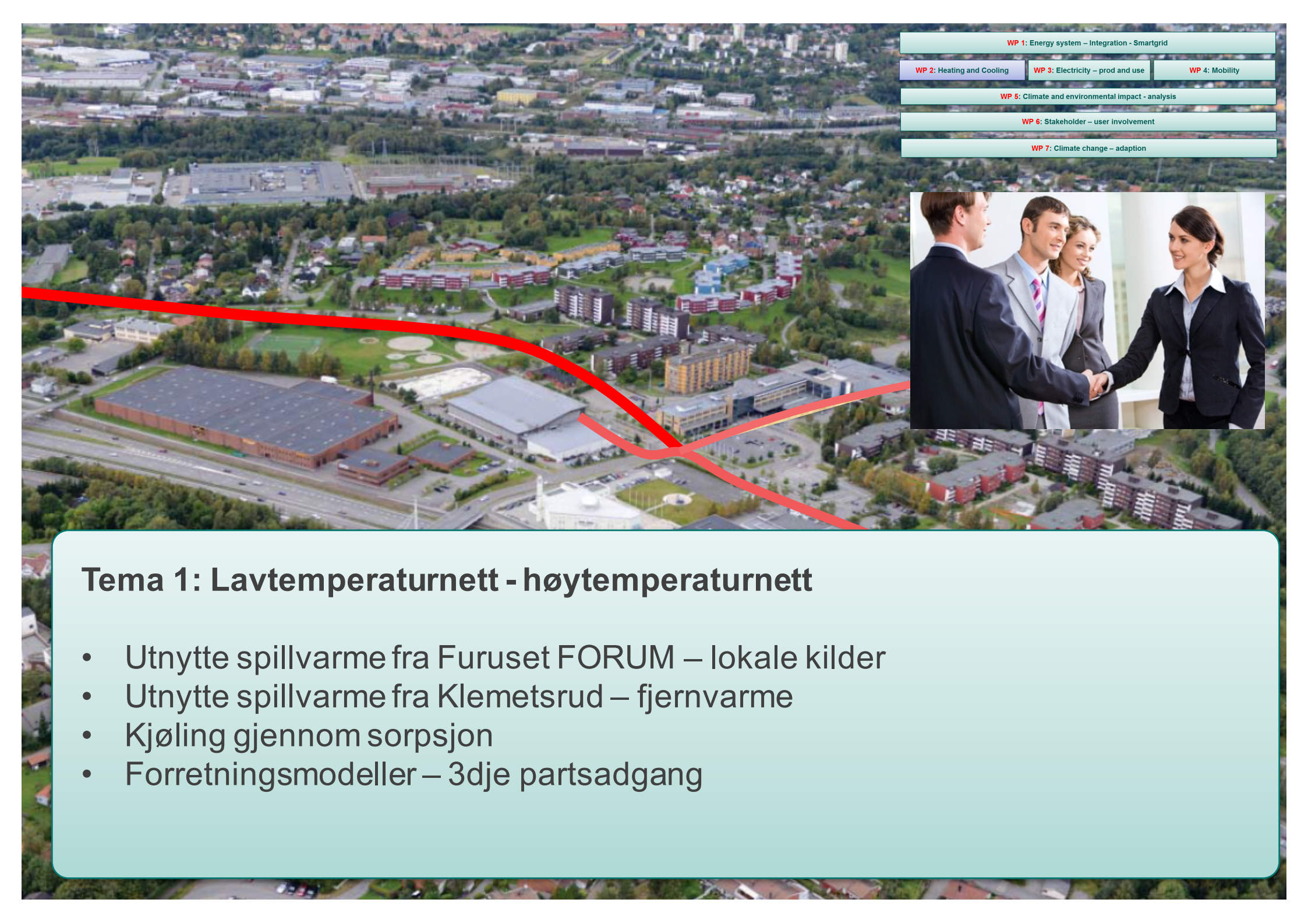
WP 6: Stakeholder – user involvement

WP 7: Climate change – adaption



Tema 1: Lavtemperaturnett - høytemperaturnett

- Utnytte spillvarme fra Furuset FORUM – lokale kilder
- Utnytte spillvarme fra Klemetsrud – fjernvarme
- Kjøling gjennom sorpsjon



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WP 2: Heating and Cooling

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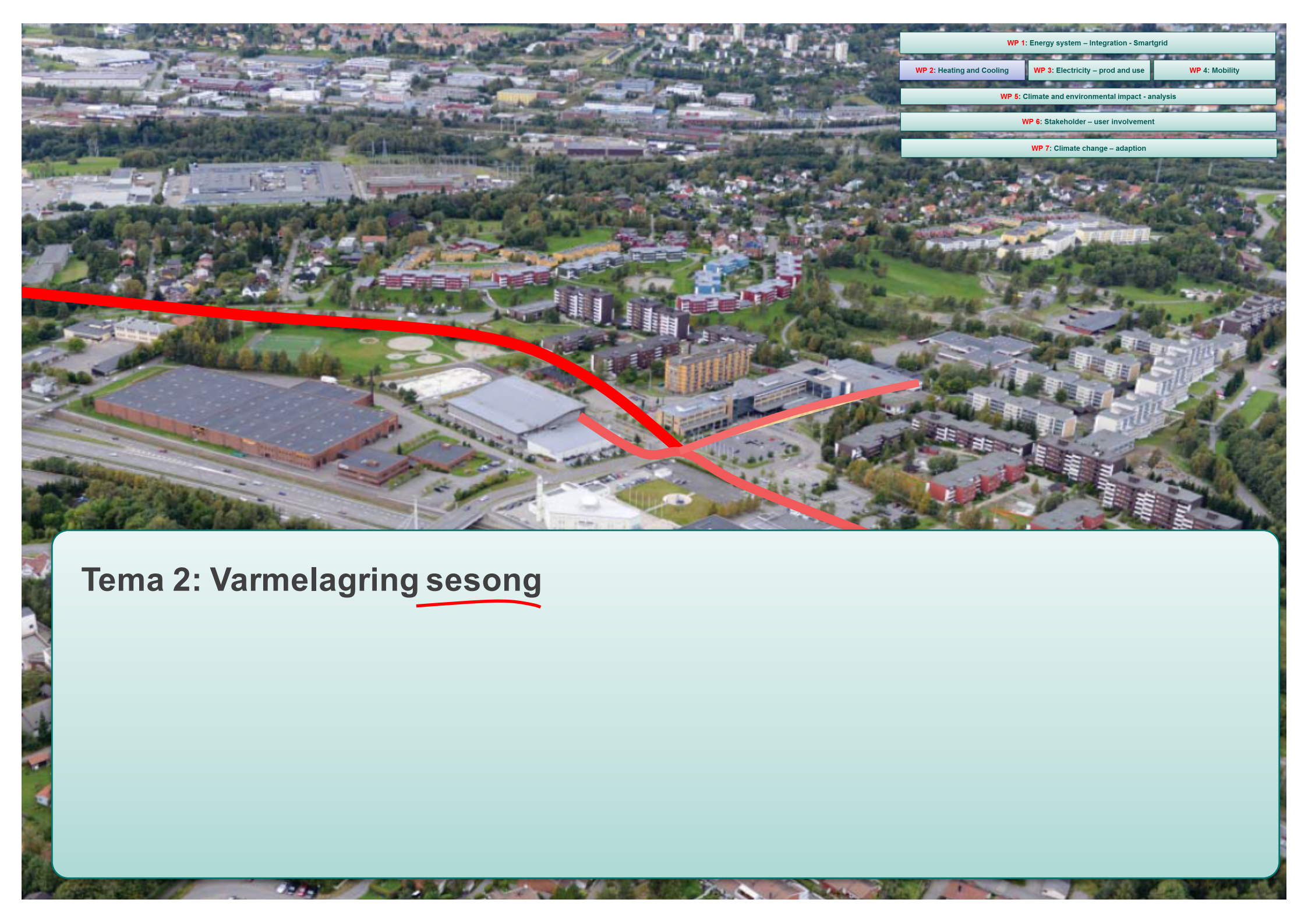
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Tema 1: Lavtemperaturnett - høytemperaturnett

- Utnytte spillvarme fra Furuset FORUM – lokale kilder
- Utnytte spillvarme fra Klemetsrud – fjernvarme
- Kjøling gjennom sorpsjon
- Forretningsmodeller – 3dje partsadgang

An aerial photograph of a city, likely Oslo, showing a mix of residential buildings, green spaces, and industrial areas. A thick red line is drawn across the image, starting from the left edge and curving towards the center. In the top right corner, there is a list of seven work packages (WP) in light blue boxes.

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Tema 2: Varmelagring sesong

WP 1: Energy system – Integration - Smartgrid

WP 2: Heating and Cooling

WP 3: Electricity – prod and use

WP 4: Mobility

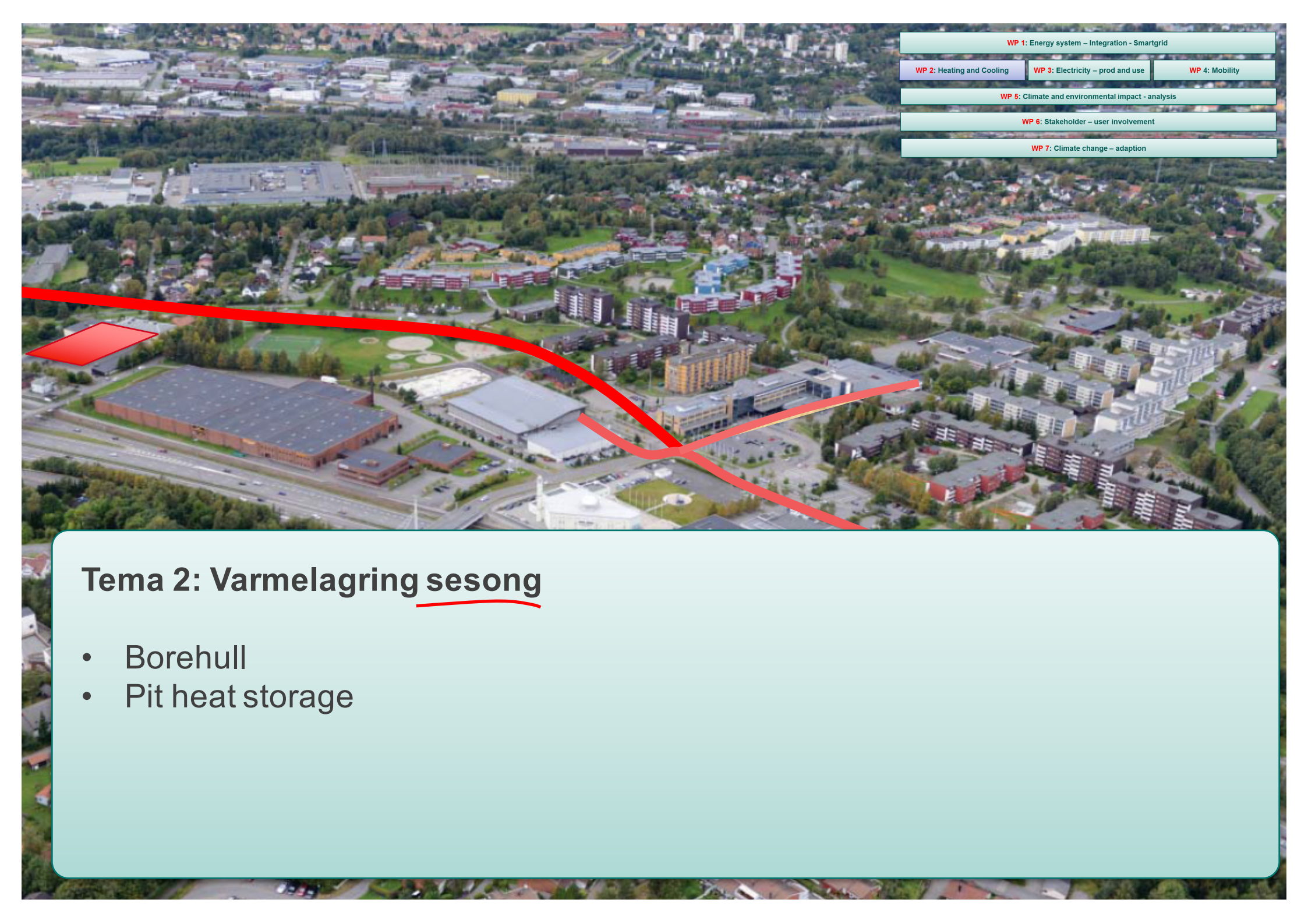
WP 5: Climate and environmental impact - analysis

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Tema 2: Varmelagring sesong

- Borehull

An aerial photograph of a city, likely Oslo, showing a mix of residential and commercial buildings, green spaces, and a large industrial or warehouse building in the foreground. A thick red line starts from the left edge, curves across the middle of the image, and ends with a red arrow pointing towards the large industrial building. In the top right corner, there is a vertical stack of seven light blue rectangular boxes, each containing text about a Work Package (WP).

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Tema 2: Varmelagring sesong

- Borehull
- Pit heat storage

ENERGLAGRING – PIT HOLE



Foto: GSE Environmental

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ENERGLAGRING – PIT HOLE

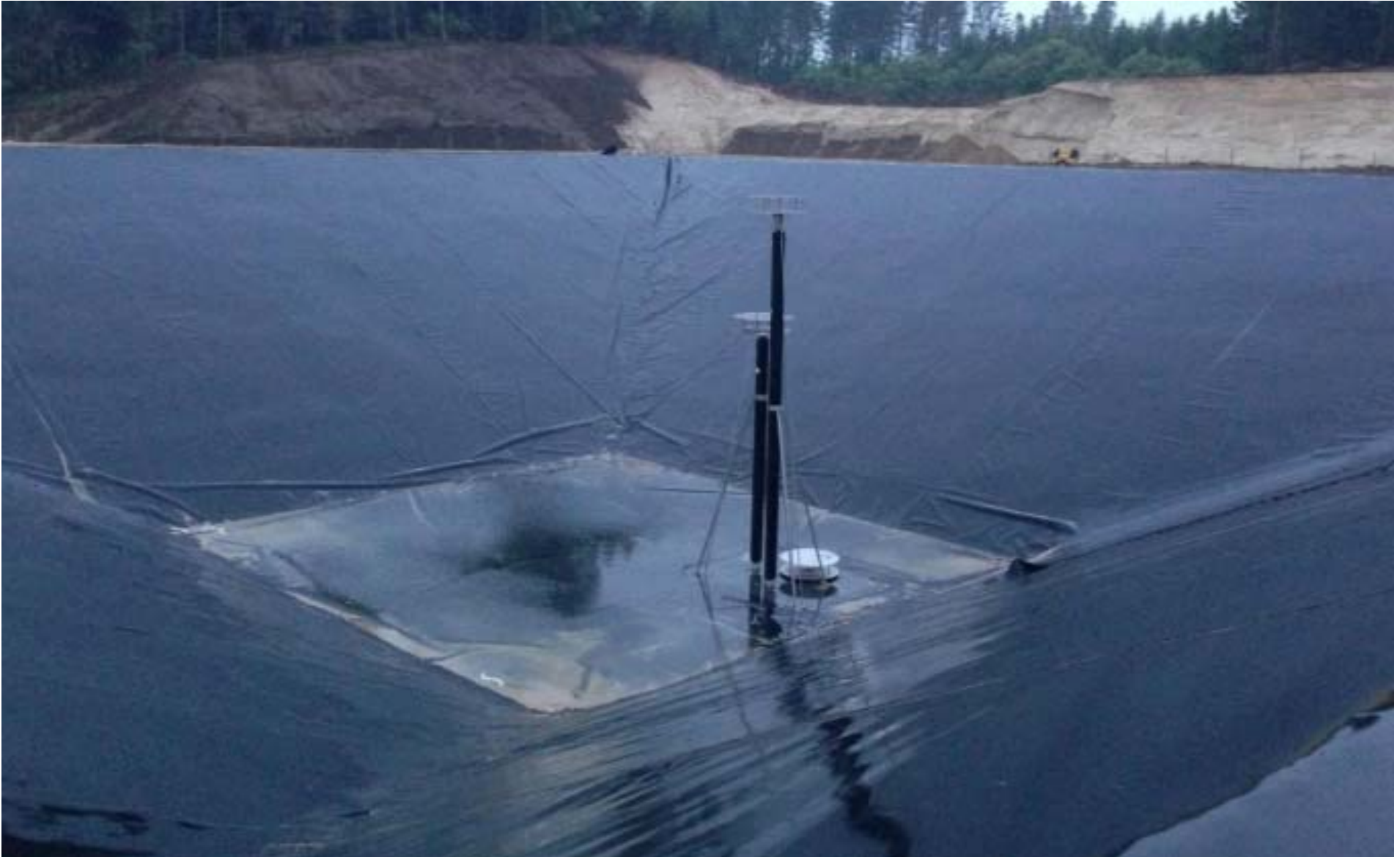


Foto: GSE Environmental

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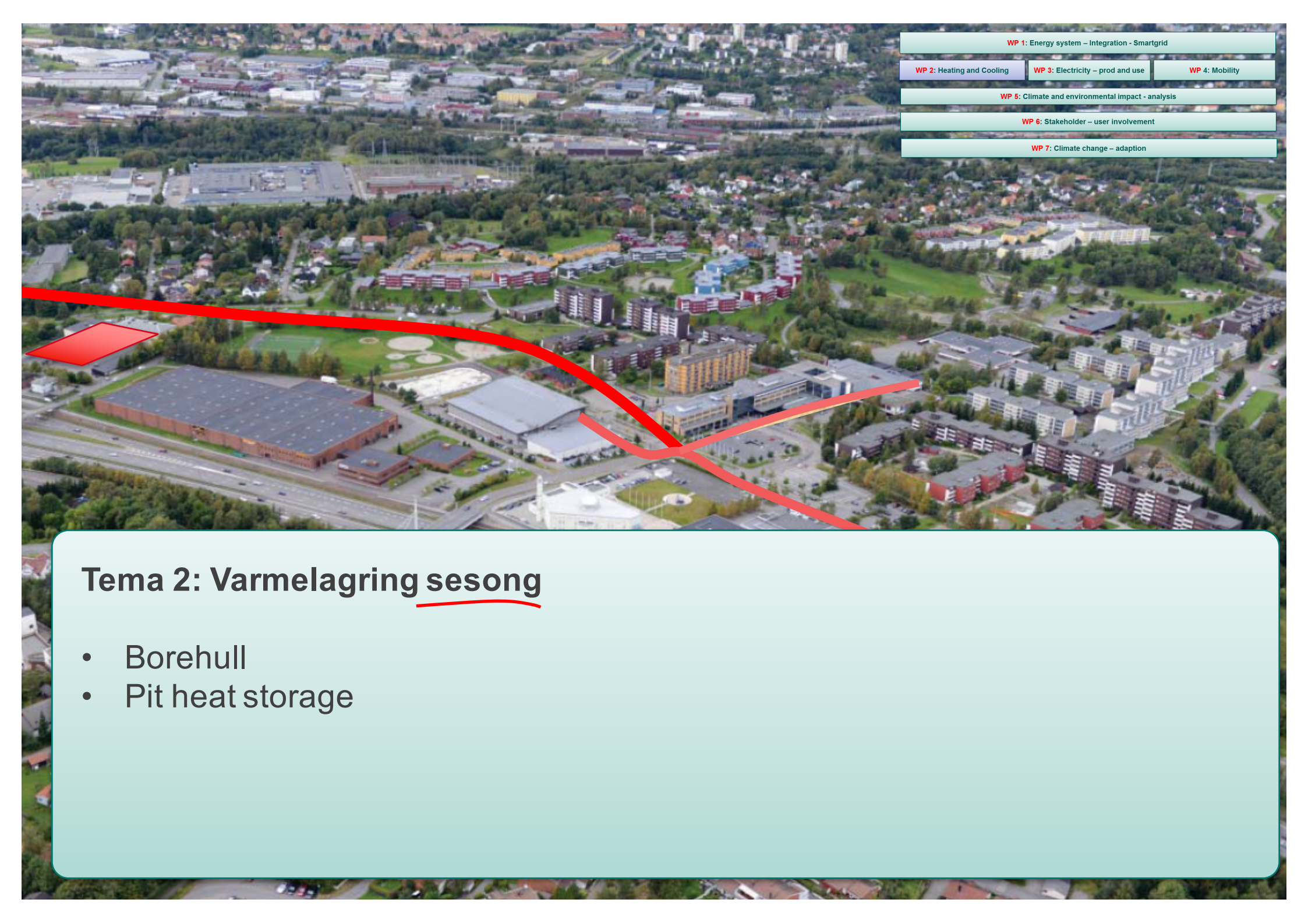


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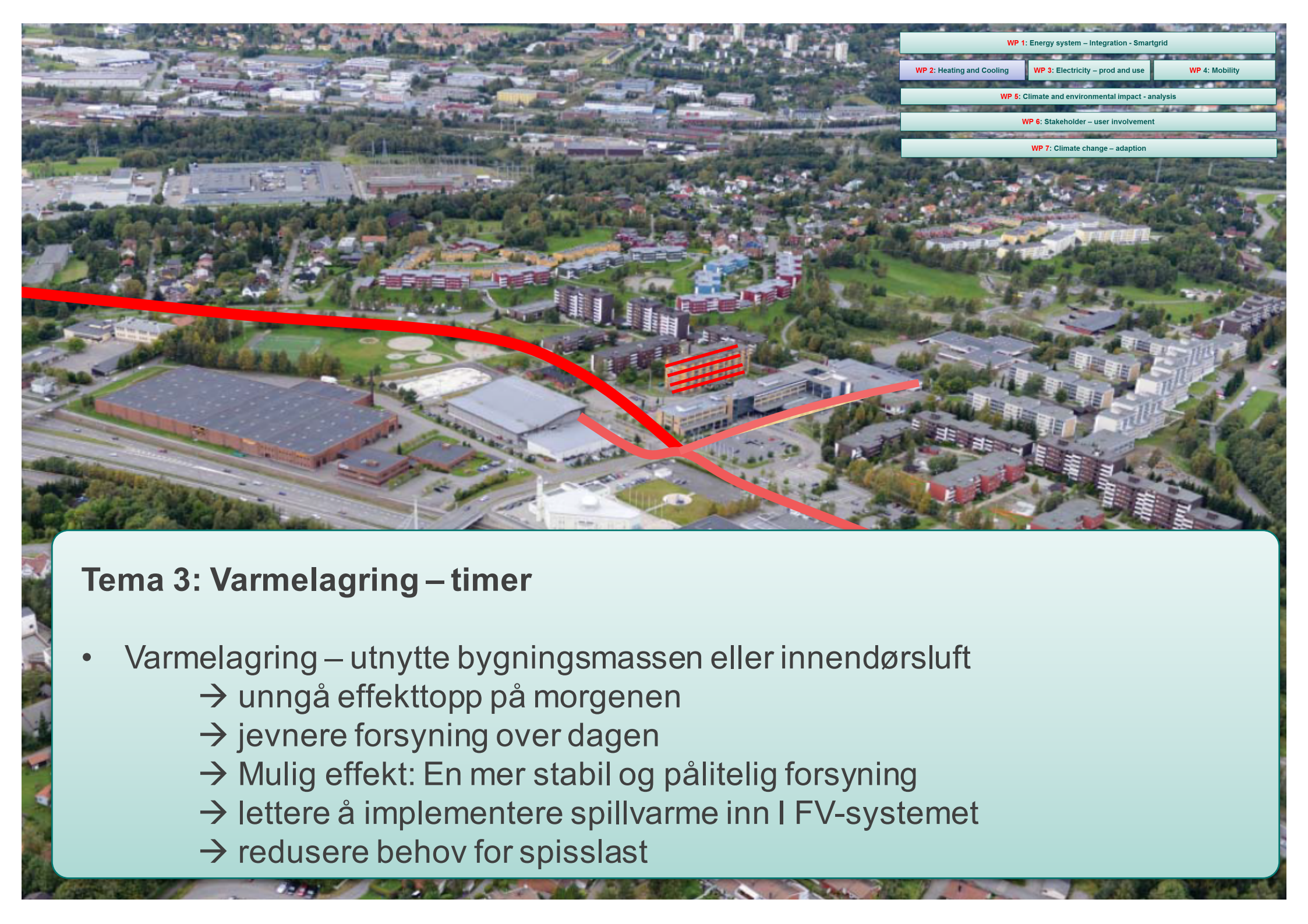
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Tema 2: Varmelagring sesong

- Borehull
- Pit heat storage

An aerial photograph of a city, likely Oslo, showing a mix of residential and commercial buildings, green spaces, and a large stadium in the foreground. A thick red line is drawn across the image, starting from the left and curving towards the center. A red box with horizontal lines is drawn around a specific building in the center-right area.

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Tema 3: Varmelagring – timer

- Varmelagring – utnytte bygningsmassen eller innendørsluft
 - unngå effekttopp på morgenen
 - jevnere forsyning over dagen
 - Mulig effekt: En mer stabil og pålitelig forsyning
 - lettere å implementere spillvarme inn i FV-systemet
 - redusere behov for spisslast

UTVIKLINGSPROSJEKTET - ORGANISASJONSMODELL

Design et smart energi- og mobilitetssystem



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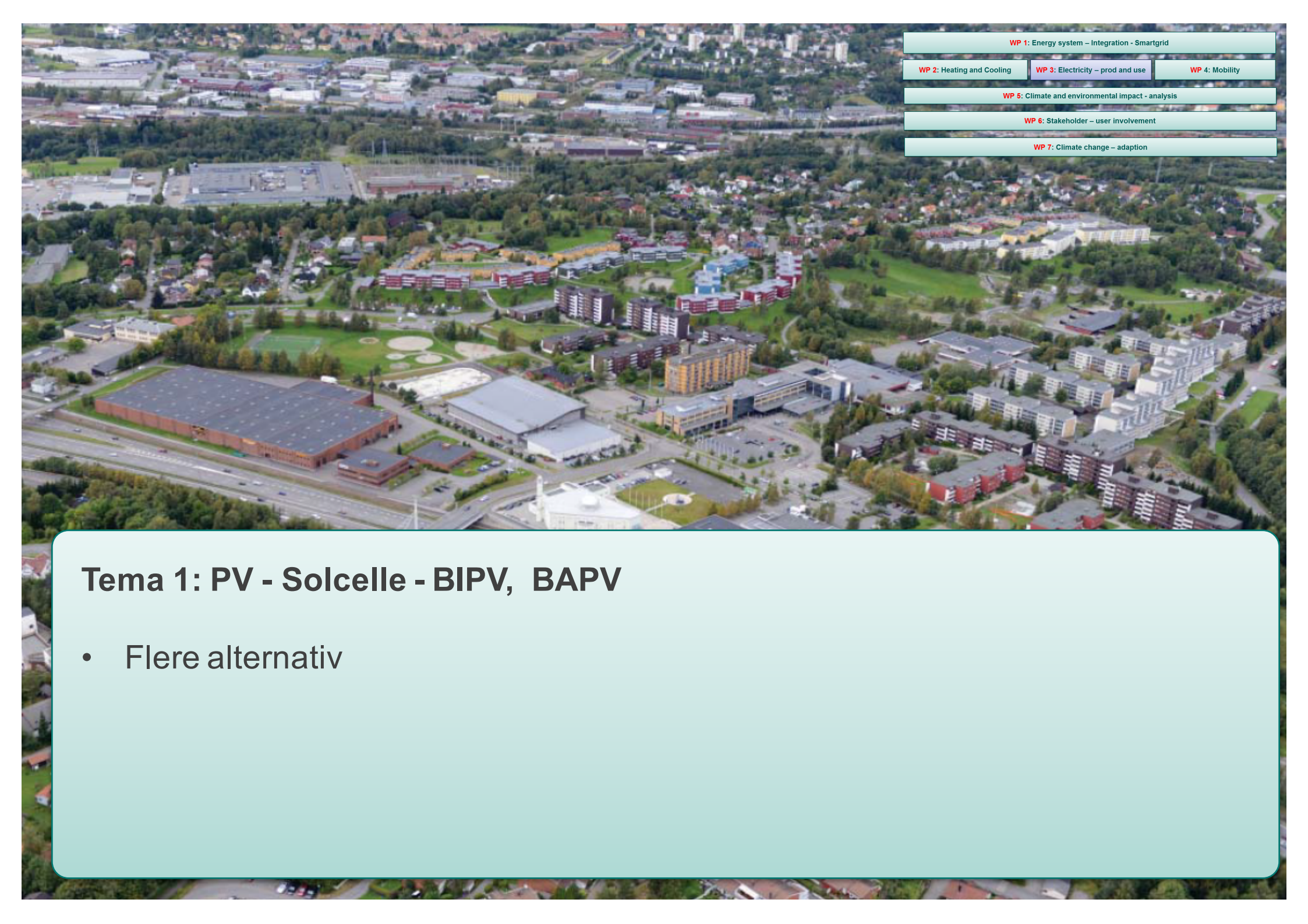
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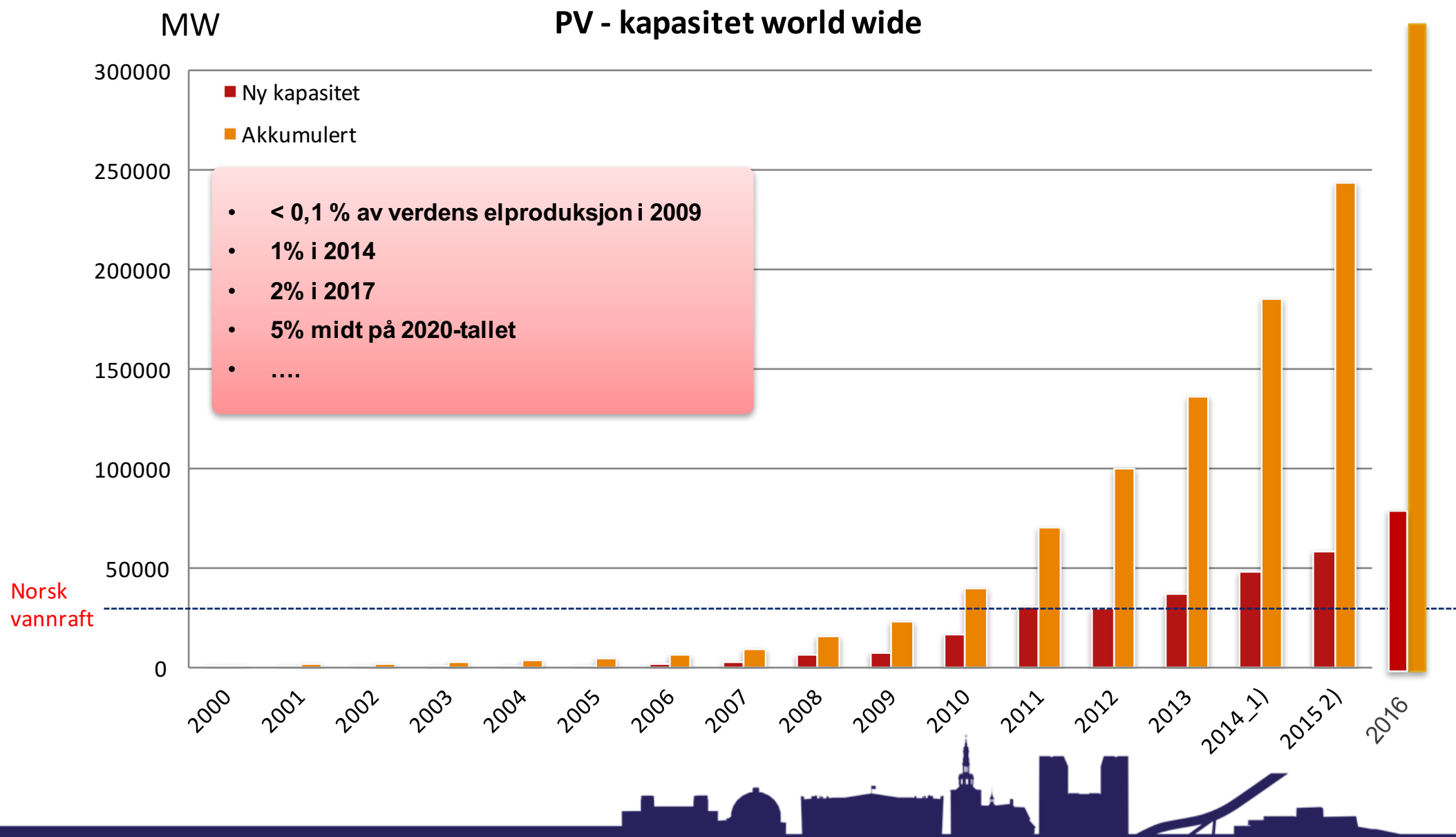
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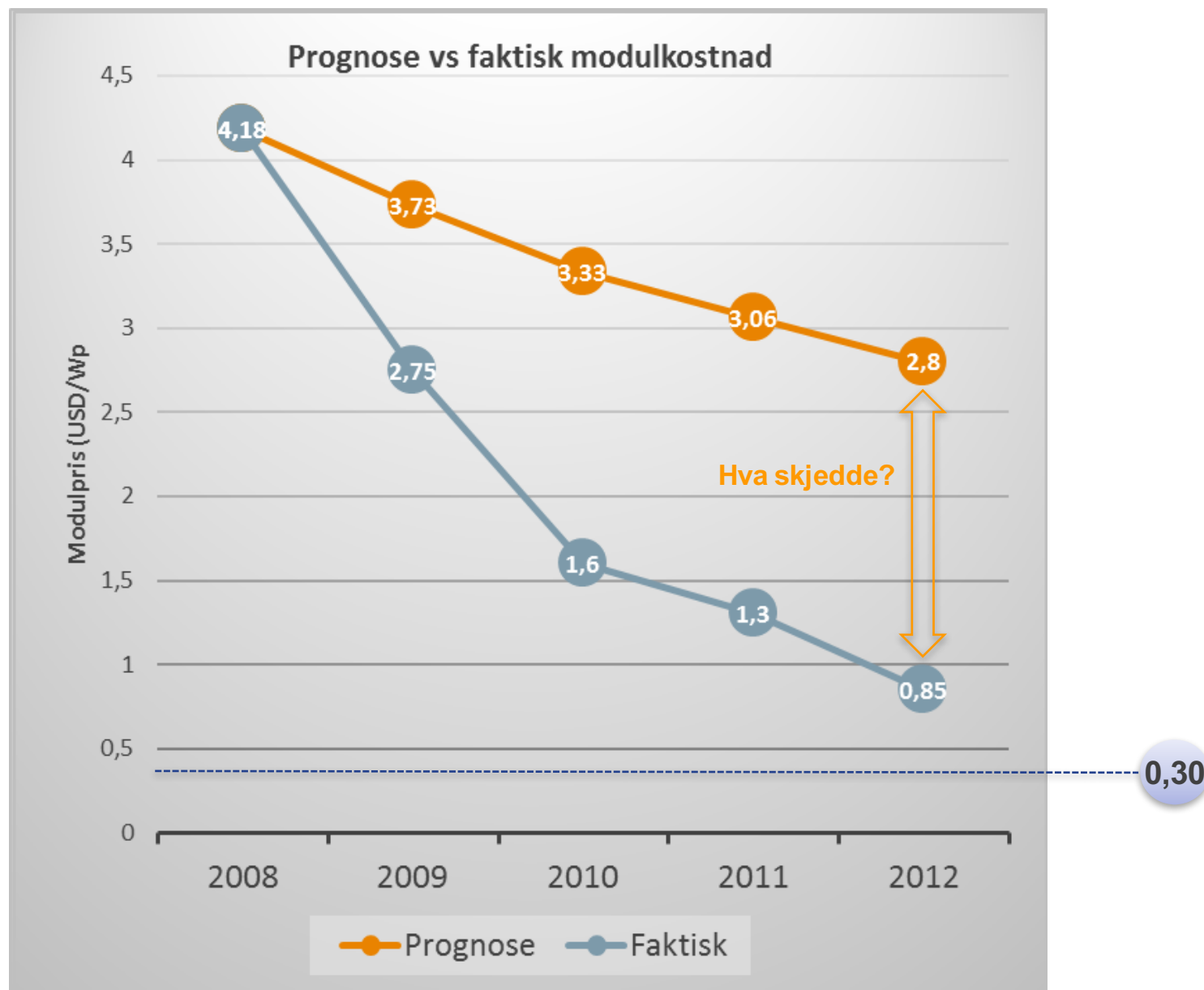
Tema 1: PV - Solcelle - BIPV, BAPV

- Flere alternativ

SOLCELLER I VERDEN – INSTALLERT KAPASITET



PRIS – PROGNOSE OG FAKTISK UTVIKLING



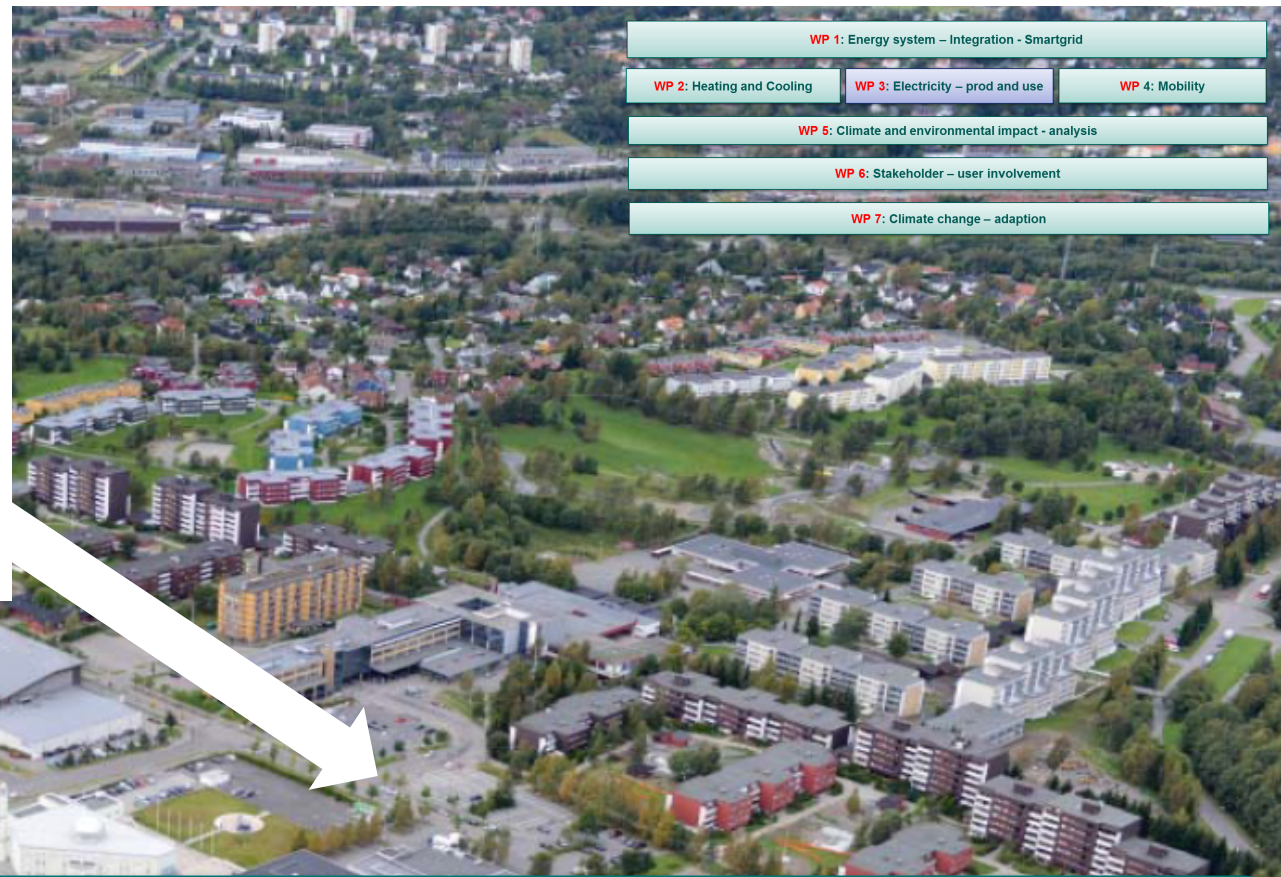
Kilde: Innsatsgruppe sol – Energi21 – Solarbuzz EPIA / McKinsey



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- Flere alternativ
- Furuset FORUM



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- Flere alternativ
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- Flere alternativ
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- “Granstangen” – ettermontert?



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- Nye førstehjemsboliger med BIPV – vegg og tak – ferdige i disse dager

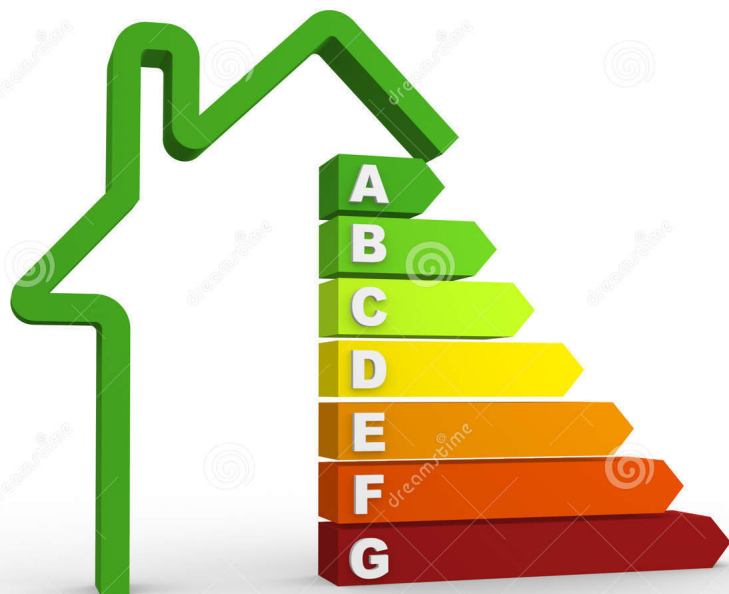


Ambisjon:

Etablere ett eller flere lokale markeder for lokal prod

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- Furuset FORUM
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Tema 2: PV - Energieffektivitet i eksisterende bygningsmasse

- Må adresseres - Smart Grid og DSM
- Hovedpoeng for å realisere SmartHomes

UTVIKLINGSPROSJEKTET - ORGANISASJONSMODELL

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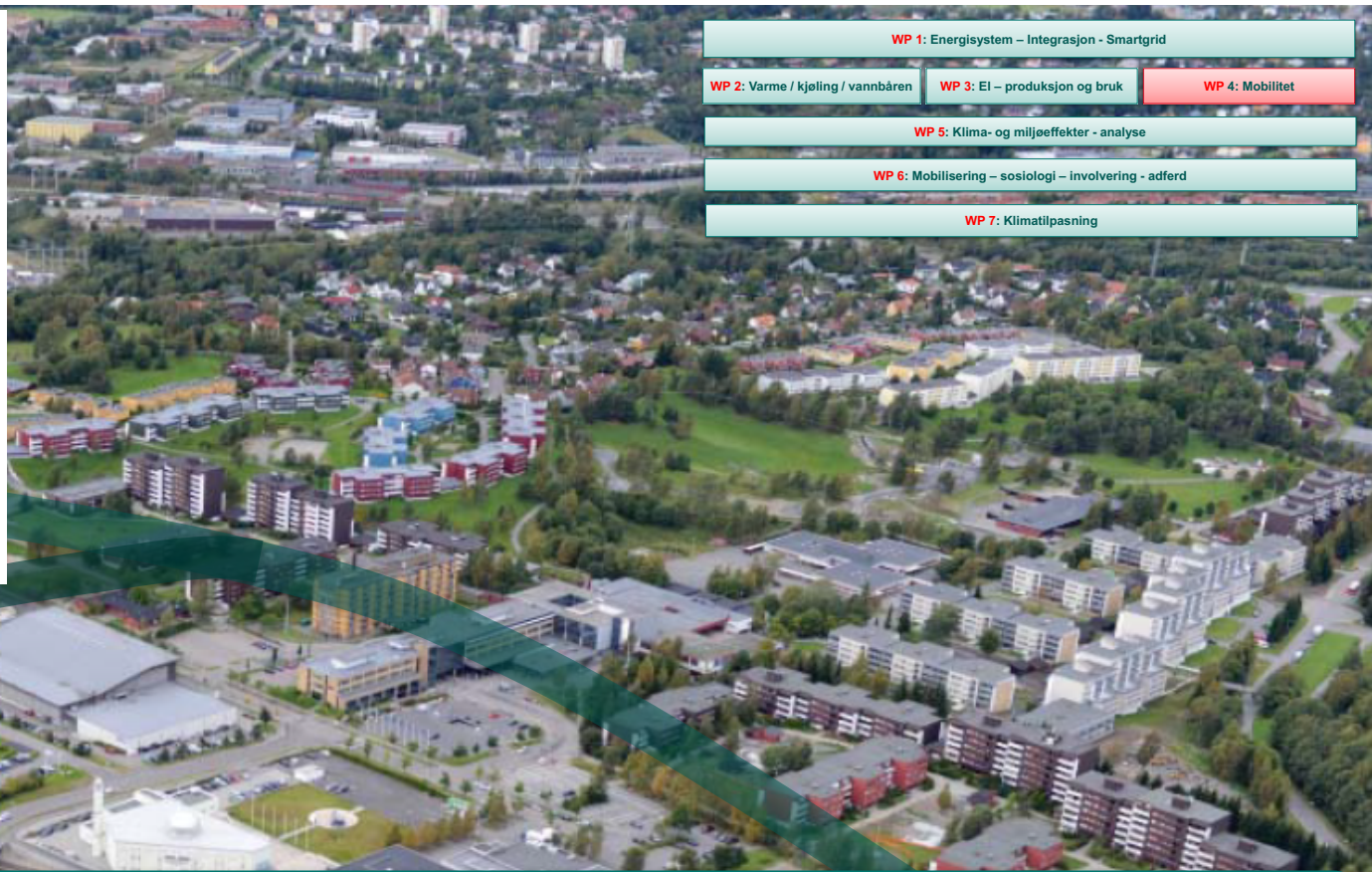
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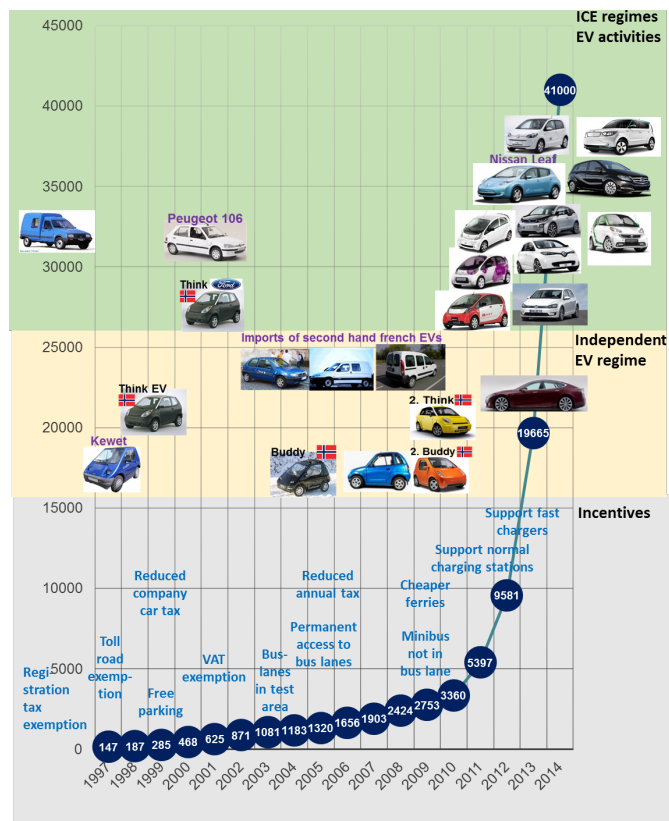




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Tema 1: Mobilitet - knutepunkt

- T-banestasjon – knutepunkt
- Multimodalitet – buss – T-bane – sykkel – e-sykkel – elbiler – H2-biler



EVs in Norway and Oslo

- Verdens raskeste vekst i ladbare biler
- Over 100 000 i Norge
- 25% i Oslo og omegn



Tema 1: Mobilitet - knutepunkt

- T-banestasjon – knutepunkt
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- Ladeløsning for biler
 - Hurtiglading
 - “Saktelading” (hjemmelading)



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Overordnet: Sammenhengen – fleksibelt energisystem – Mikroenergisystem

- AMS innen 2019
- Big data
- Bruk av informasjon – DSM – Peak Shaving
- Tilpasning til nye tariffregimer – energi → effekt
- Integrasjon lavtemperatur – høytemperatur
- Forretningsmodeller



Takk for meg