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Smart Schools in Smart Cities

An Erasmus+ project

Welcome to the final presentation of the project results

A solid green horizontal bar at the bottom of the slide.

Our schools



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RBZ Wirtschaft . Kiel



3900 pupils
210 teachers

Bodø videregående skole



1400 pupils
230 teachers

Our Project



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- School partnership startet 2019
- Application for Erasmus+: "Kiel Bodø smart cities"

Our Project



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- other common projects startet
- Corona time lag

Our Project



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- first mobility in May 2022: a group of 25 pupils from Bodø in Kiel
- second mobility in June 2022: a class of 25 pupils from Kiel in Bodø

Our Project



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- first mobility in May 2022: a group of 25 pupils from Bodø in Kiel
- second mobility in June 2022: a class of 25 pupils from Kiel in Bodø

- Project weeks in September 2022: evaluation and comparison
- public presentations in Kiel and now Bodø



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Kiel and Bodø as sustainable and smart cities

PRESENTED BY CLASS BG-12B



Structure



Economics



Mobility



Energy



Waste



Life and Environment



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Economy

PRESENTED BY ONUR AND ASK



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Economics

Mobility

Energy

Waste

Life & Environment



Kiel and Bodø in comparison

KIEL

Inhabitants: 246.000

GDP per capita: 48.000

BODØ AND NORDLAND

Inhabitants Nordland: 240.000

Inhabitants Bodø : 56.000

GDP per capita Nordland: 46.600

Economics

Mobility

Energy

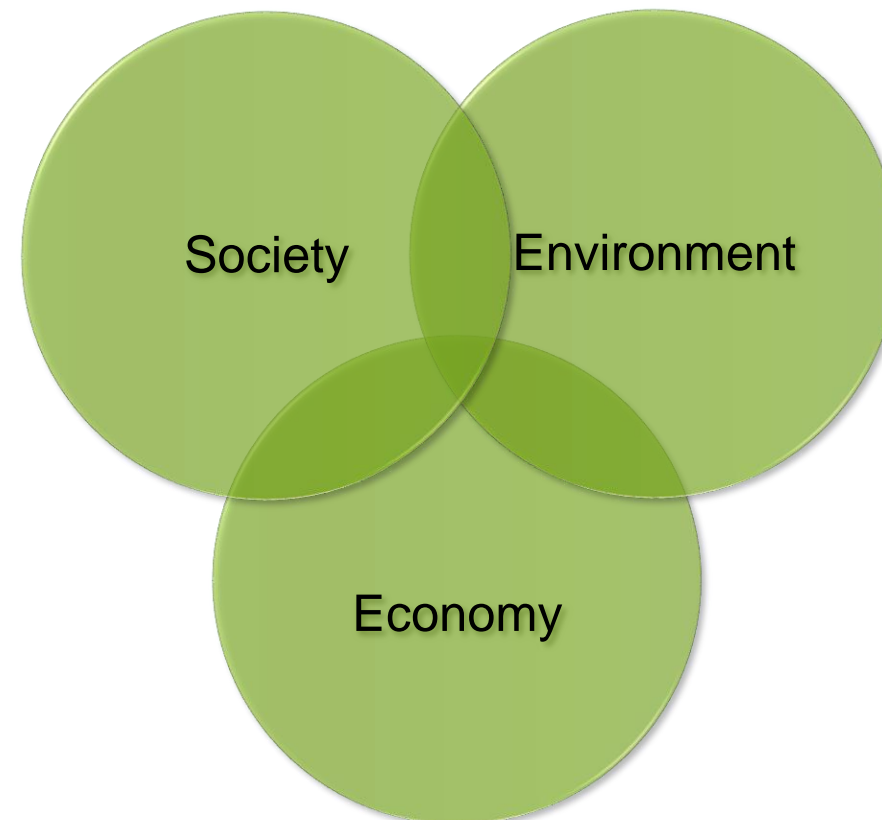
Waste

Life & Environment



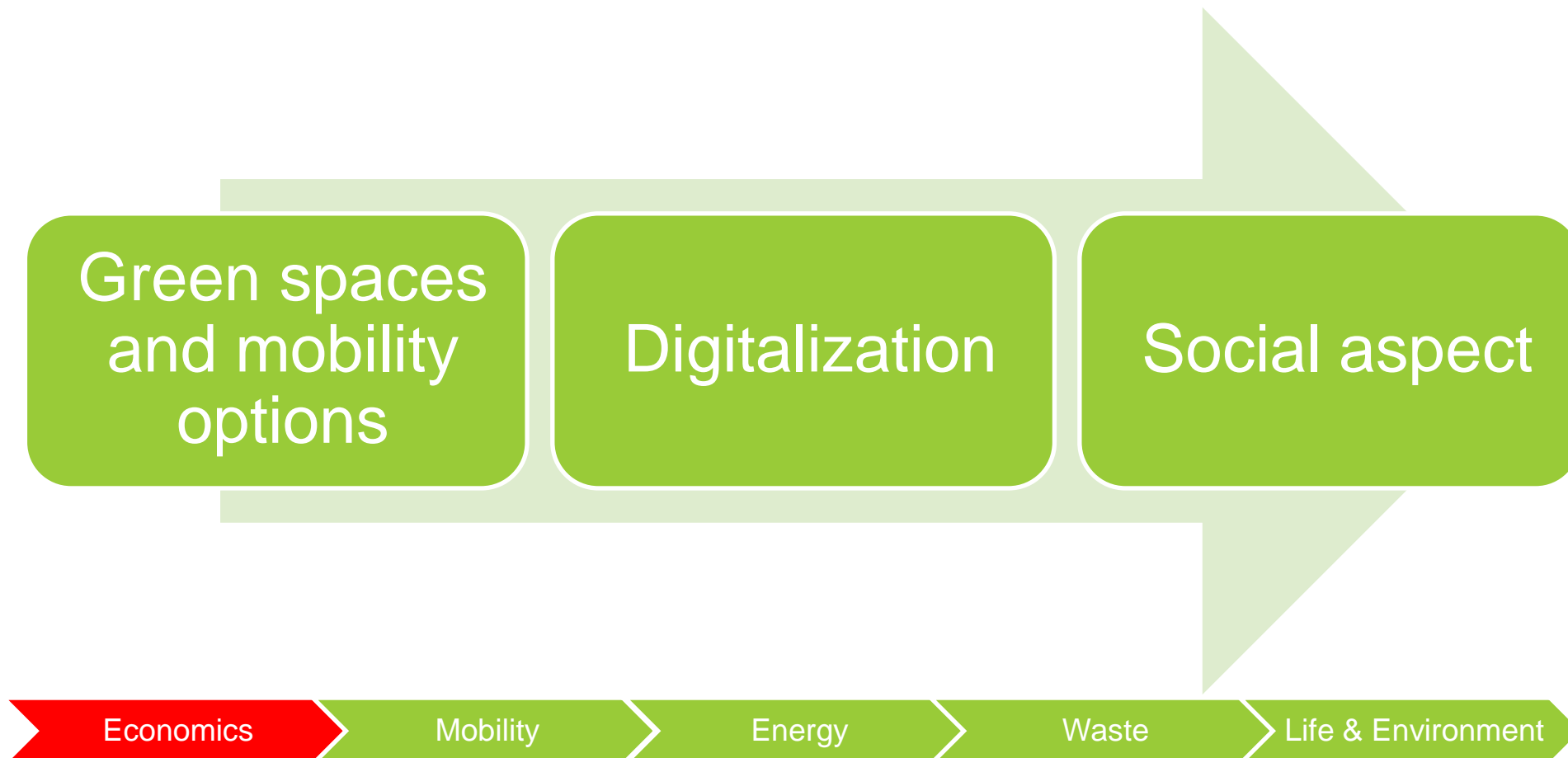
What means economic sustainability?

- Quality of life and equal opportunities
- Increase the natural resources
- Not only increase profit
- Long-term strategies





Smart City Gaarden





Caterpillar

- Basic needs of people should be sustainable
- Economic growth because of development
- Sustainable progress = development of better systems





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Operating goals

- New ecological buildings
- Reduction by 50%
- 20% renewable energy
- Sustainable leadership principles
- Avoidance of waste = safety, efficiency, productivity
- Promote companies, communities, environment = higher life quality



Economics

Mobility

Energy

Waste

Life & Environment



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Løvold[®] Solution

- Production and distribution
- Green policy/production
- Sustainability = company growth
- Protecting their source of income
- Creating value for the company and society
- Projects for the future



Economics

Mobility

Energy

Waste

Life & Environment



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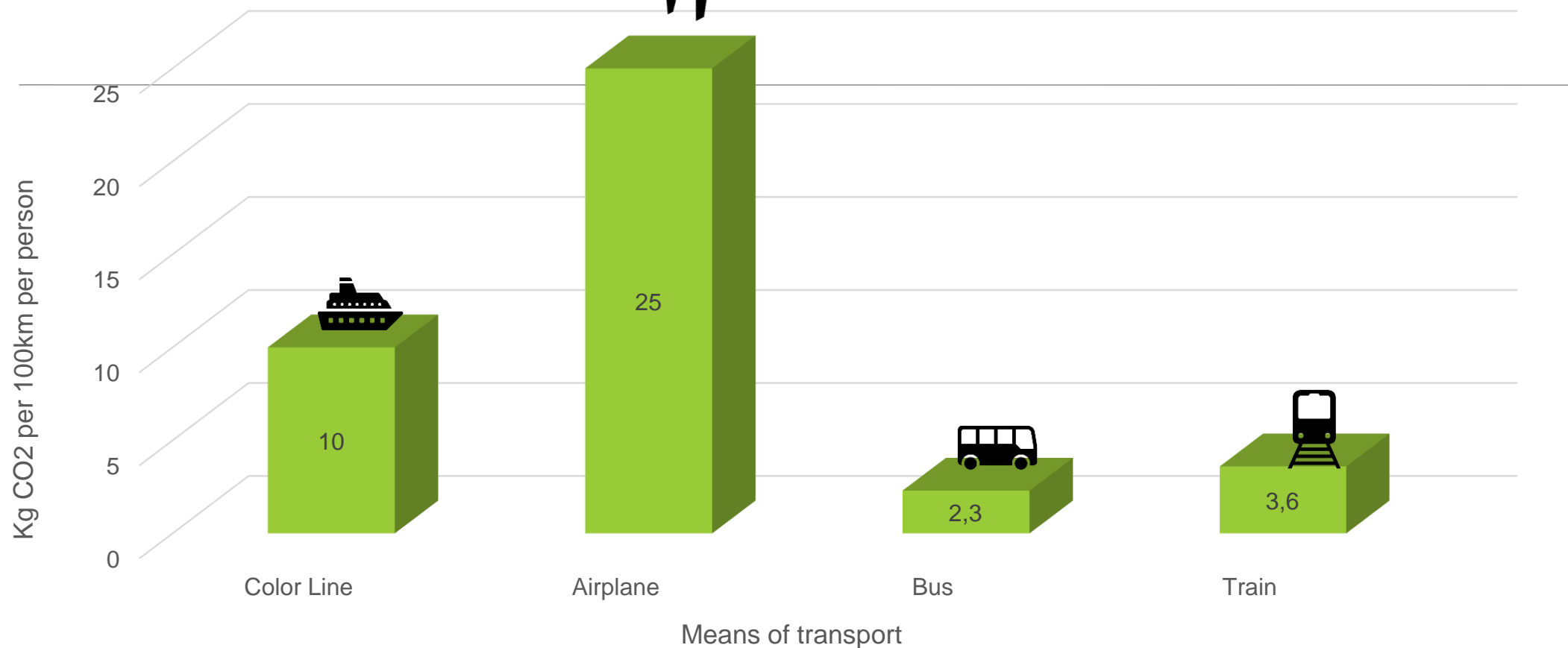
Mobility

PRESENTED BY METIN AND WILLIAM





Sustainable travel?





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Our trip



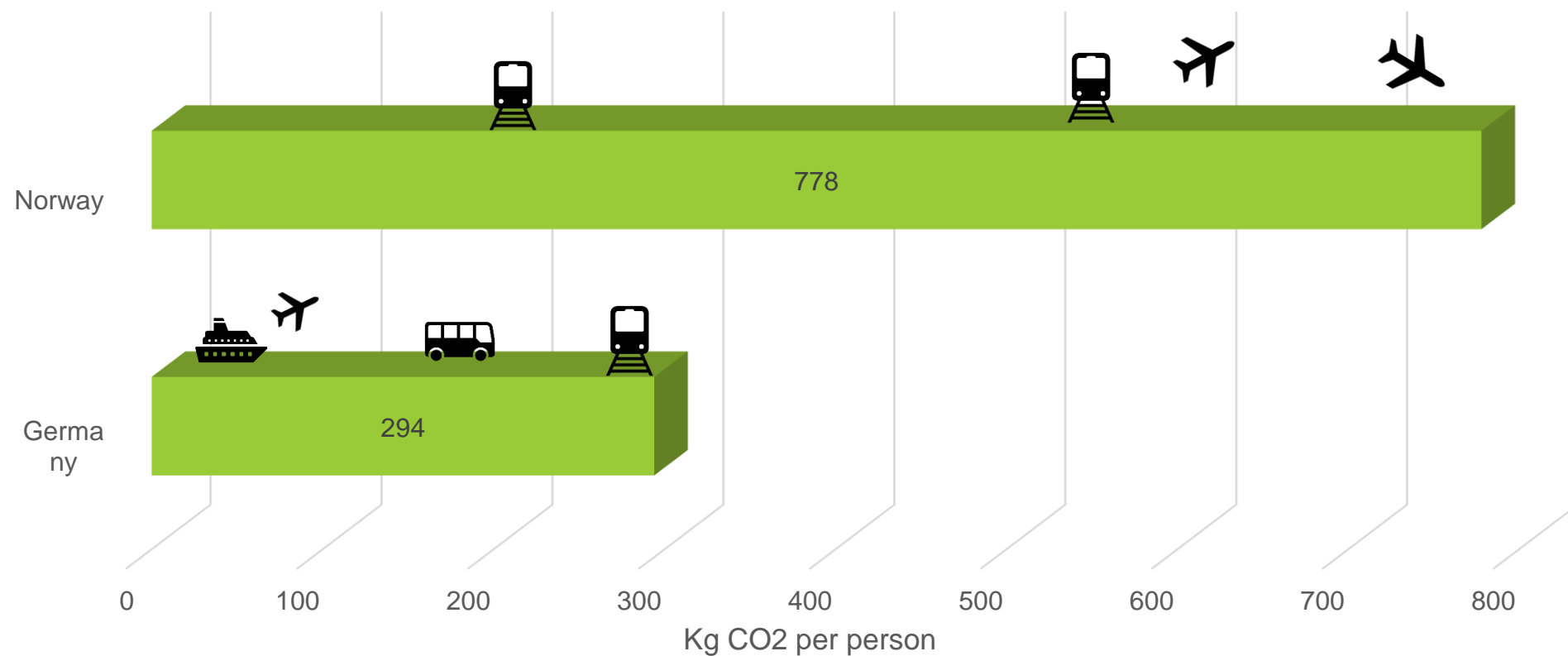
Legend:

— — — : way there

- - - : way back



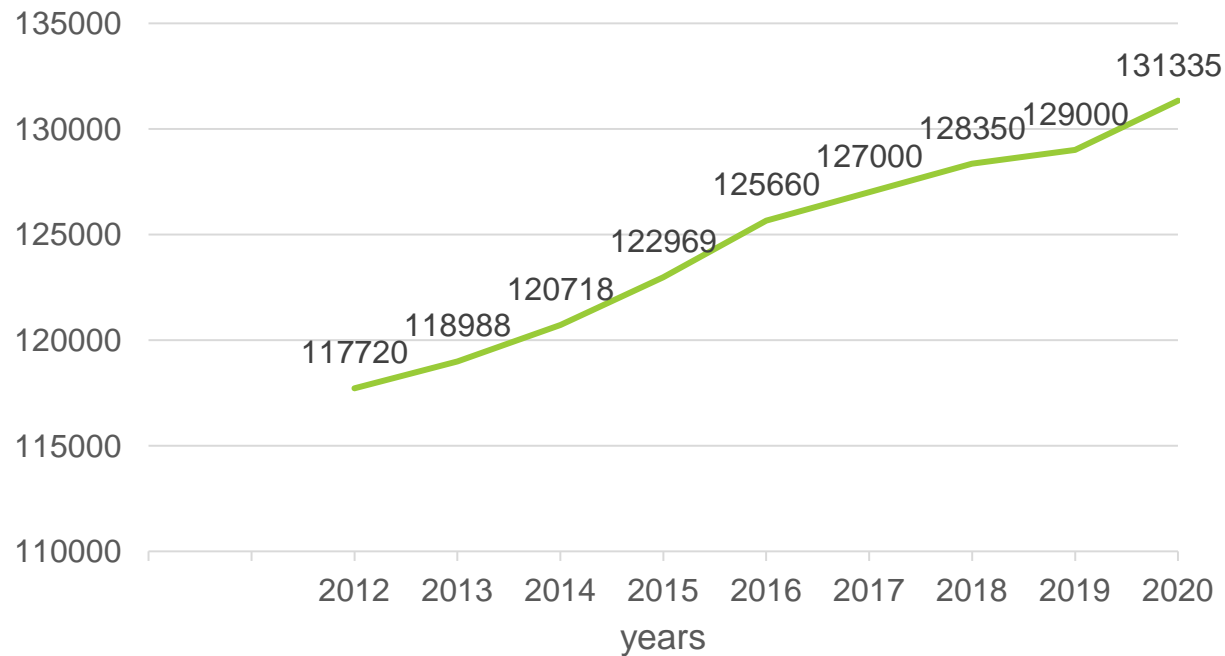
Comparison



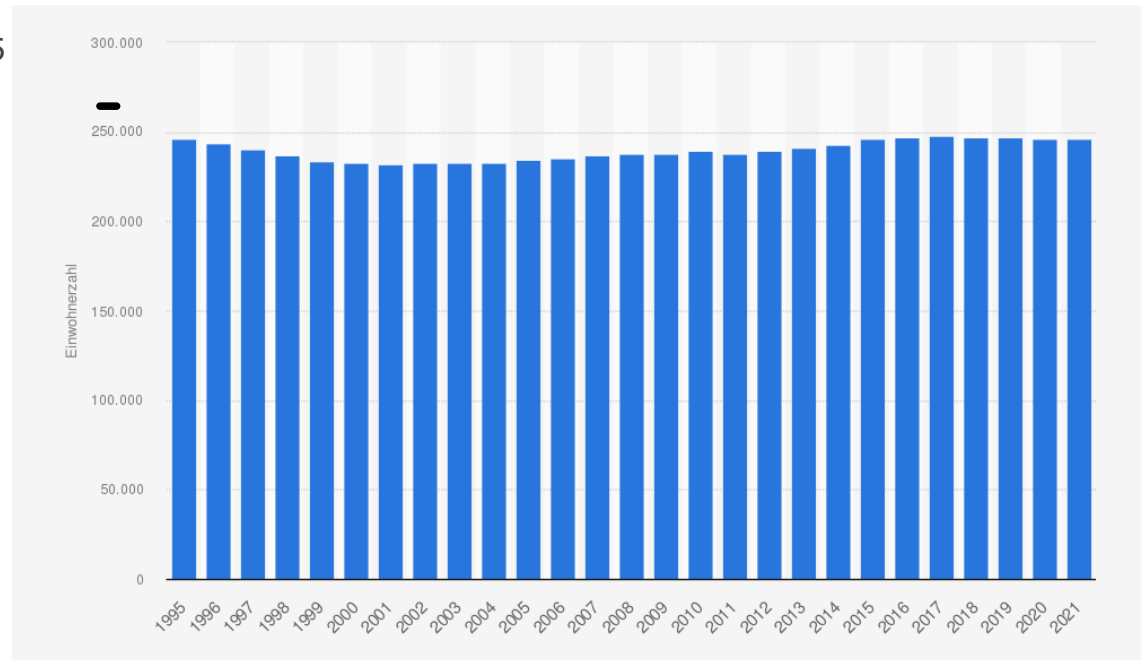


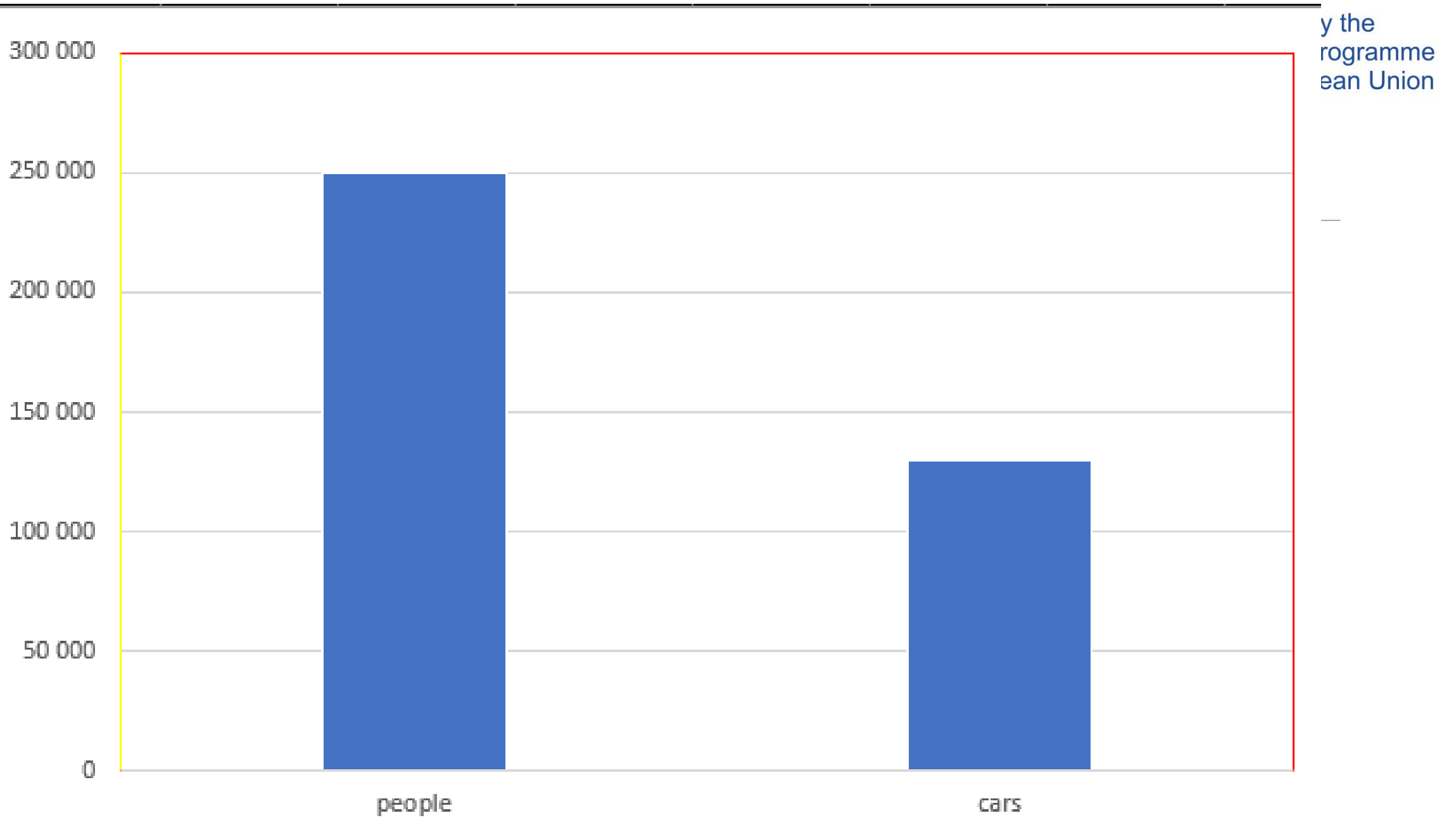
Problems of cars in the city center

usage of motor vehicles in Kiel (2012-2020)



— usage of motor vehicles in Kiel







Problems of cars in the city center

- Loud noises
- Traffic jams
- Lack of space
- Air pollution



Economics

Mobility

Energy

Waste

Life & Environment



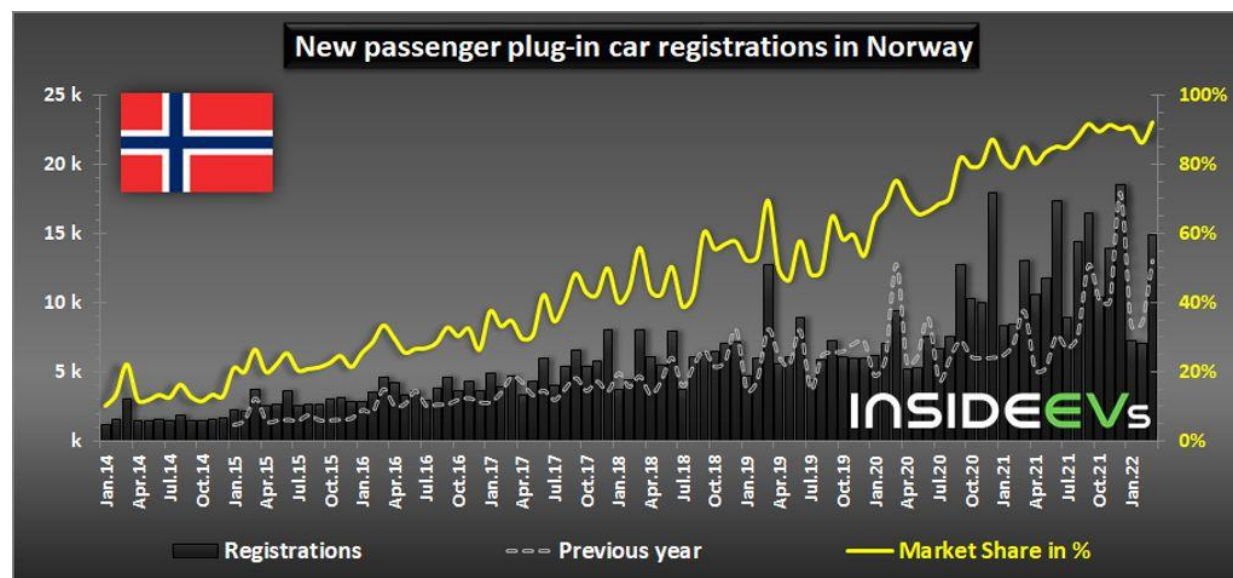
Smart mobility in Kiel

- The public transport company of Kiel uses 67 electric buses
30% of their fleet
- Two plug-in-hybrid and one electric ferry are used
- Good bike infrastructure
- More than 600 bikes at 100 station for rent
- More than 600 rental e-scooters





Smart mobility in Bodø



- Four electric bus lines
- Many electric cars in Norway

Because:

- Lower taxes on electric cars
- Trendy

Economics

Mobility

Energy

Waste

Life & Environment



Future visions in Kiel

- more electric buses and ferries in the future
- Better and new bike routes
- Reintroduction of the tram



Economics

Mobility

Energy

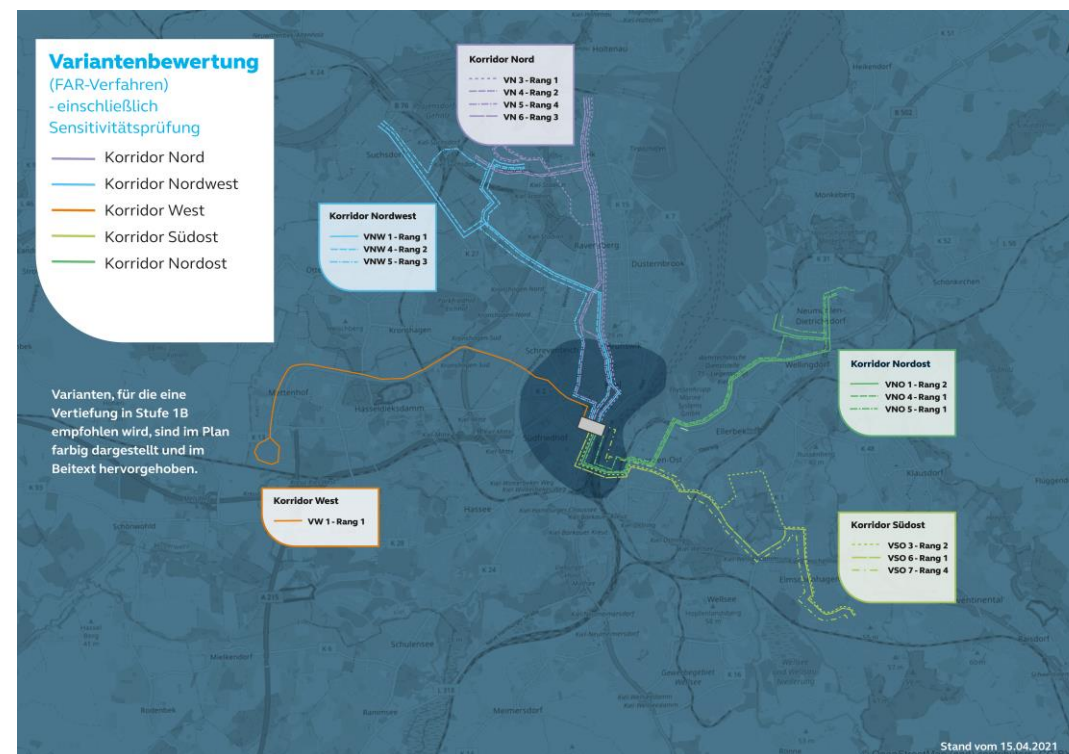
Waste

Life & Environment



Tram or BRT-System

- Solves the problems of cars in the city center
- 15 minute city
- Potential social and economic growth
- First route 2030



Economics

Mobility

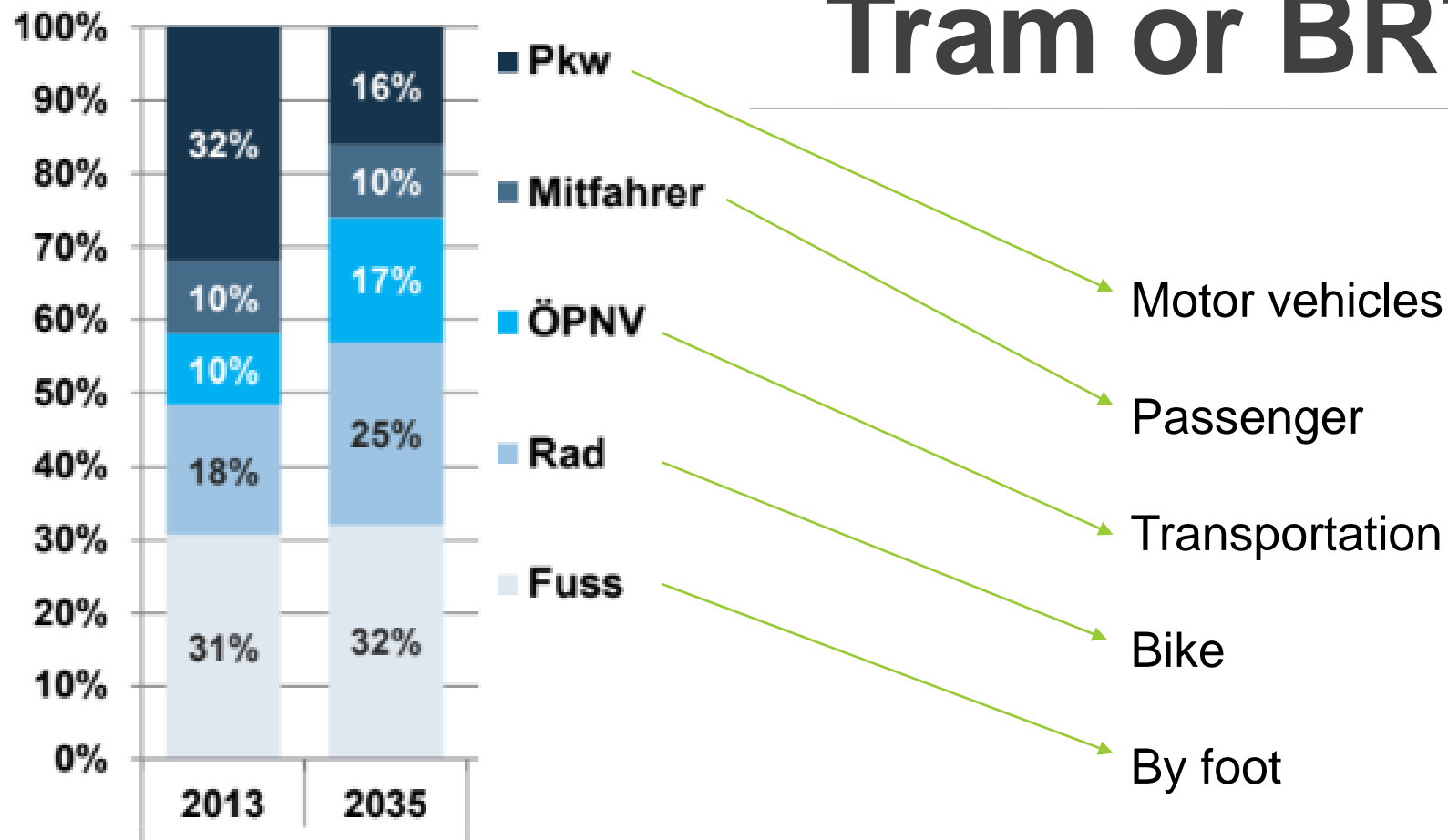
Energy

Waste

Life & Environment



Modal Split in Kiel



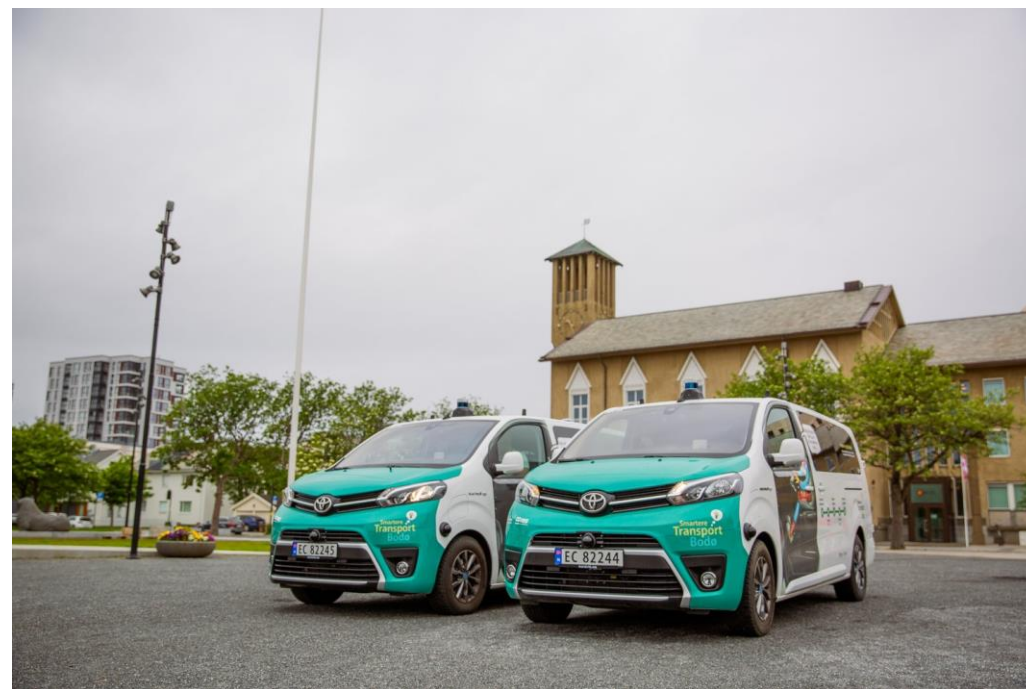
Tram or BRT-System





Future visions in Bodø

- Two self- driving electric buses in the city
- currently testing
- More attractive public transport
- Less cars and parking place in the city
- More safety in traffic



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Energy

PRESENTED BY LILLY, ANDREA AND TIRIL



Electric Cars

- Remaining energy must be stored
- Use the battery of an electric vehicle to save energy
- Feed energy from your car to your house system



Economics

Mobility

Energy

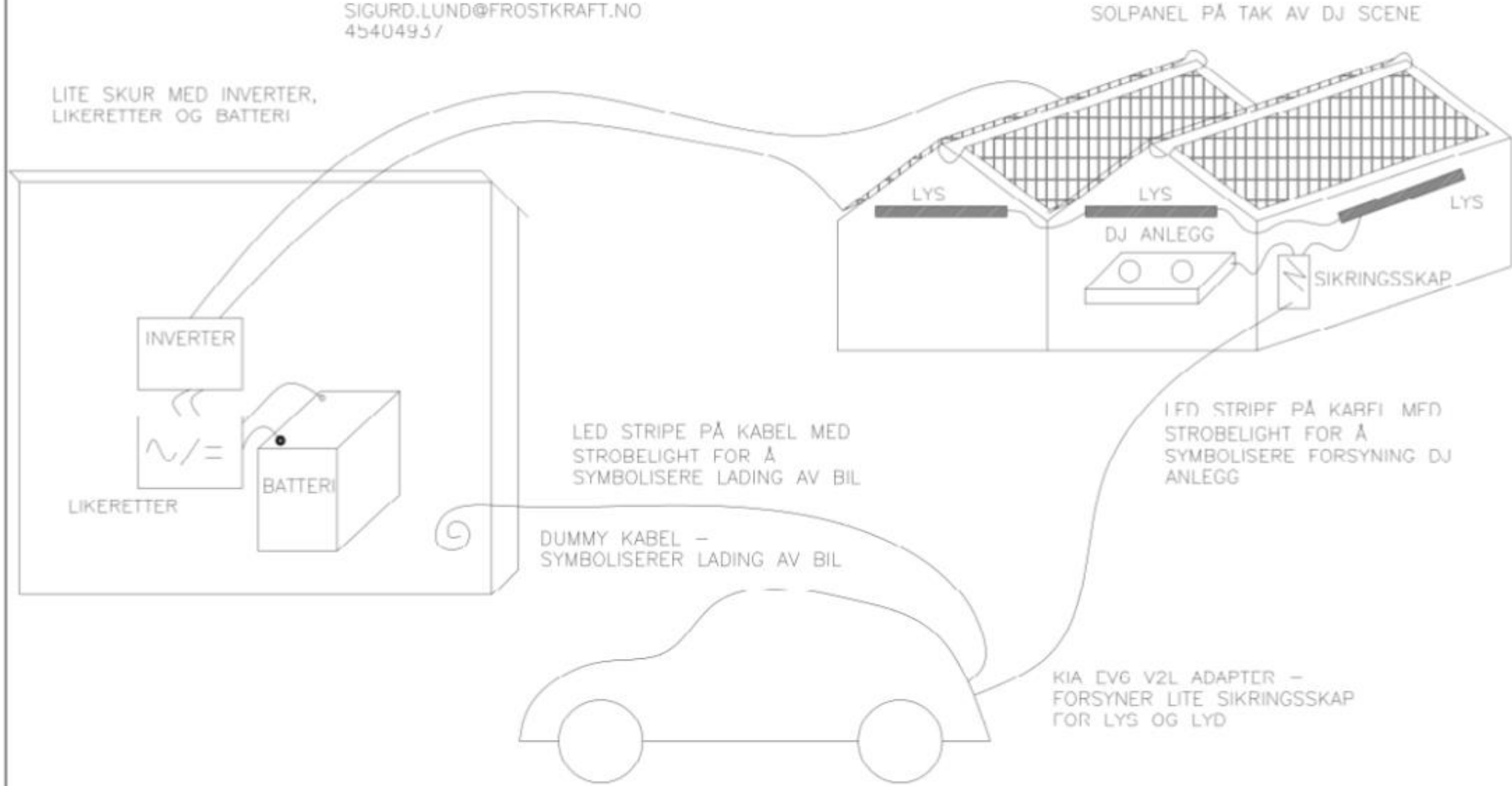
Waste

Life & Environment

Vehicle to Grid (V2G)

BODØ ENERGI 15.03.2022
TESTPROSJEKT OFF-GRID LADING MED SOLCELLER OG
FORSYNING TIL DJ ANLEGG

SIGURD.LUND@FROSTKRAFT.NO
45404937





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Kiels coastal power plant

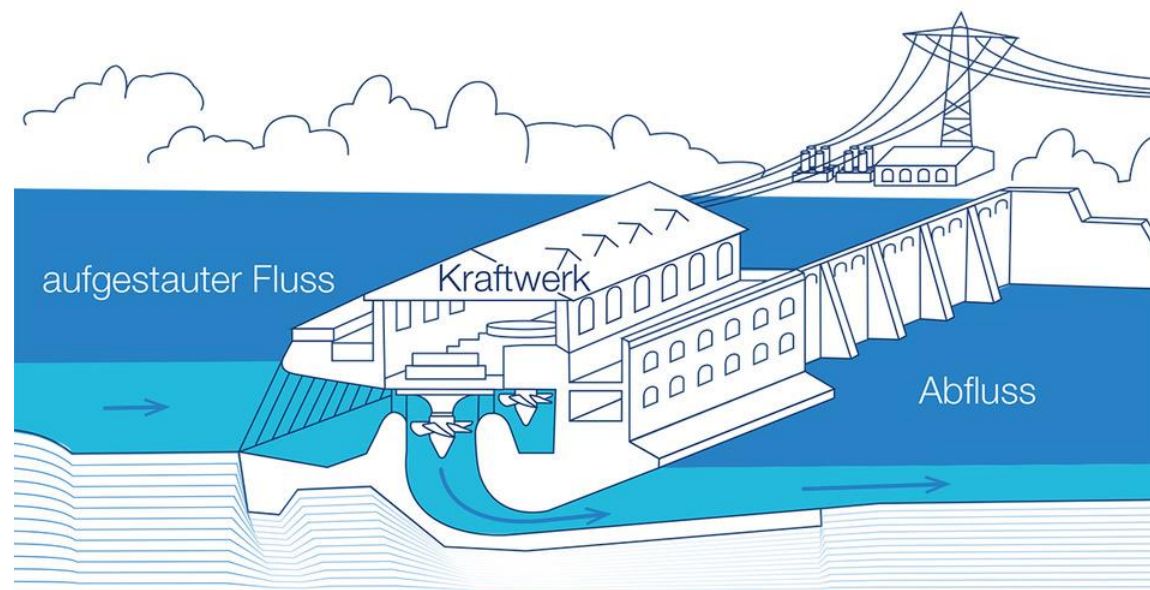
- Since 2020
- 290 million€ is the largest investment project in the history of Stadtwerke Kiel
- Saves approx. 1,000,000 tonnes of CO² per year
- Europe's most modern Project Heat supply
- Produces electricity and heat with Gas





Hydroelectric power station

- Hydroelectric power in Norway
- How does it work



Economics

Mobility

Energy

Waste

Life & Environment



Solar

- Selling energy
- Svalbard airport



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Energy

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Wind energy

Germany:

- important role
- 10% in 2010

Norway:

- very good
- financial support



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Energy

Waste

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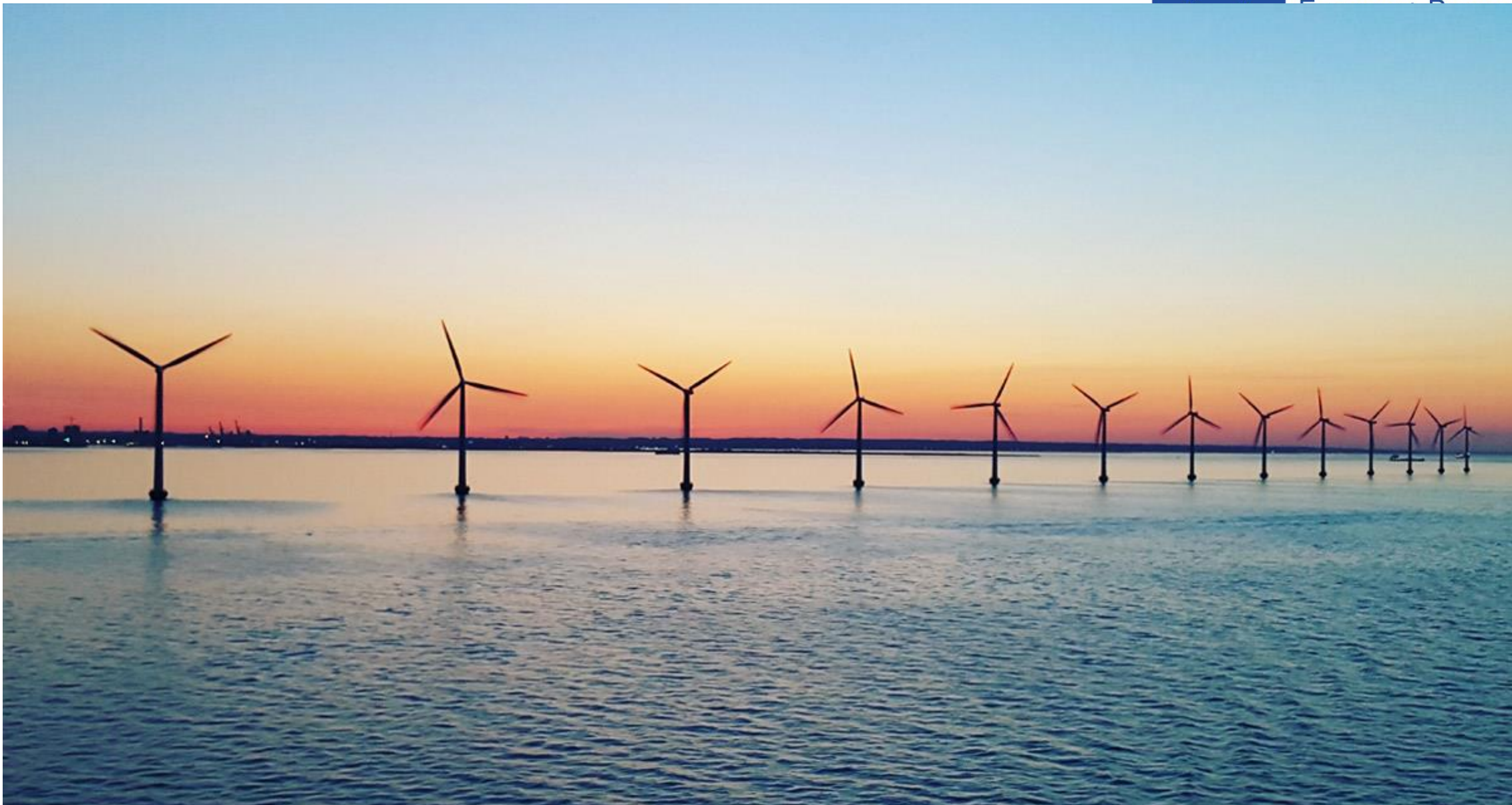
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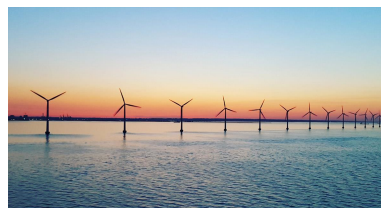
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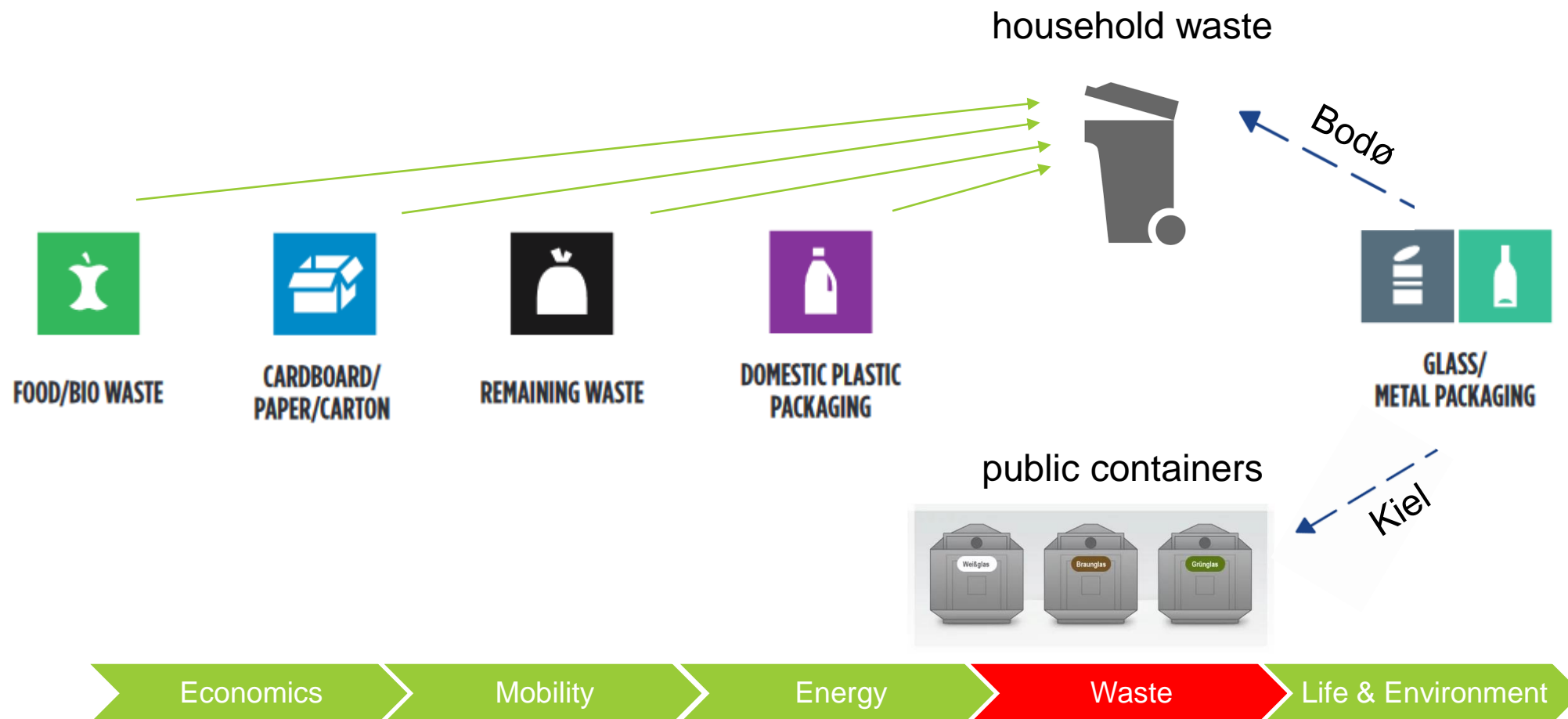
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Waste in Bodø and Kiel

PRESENTED BY LILIAN

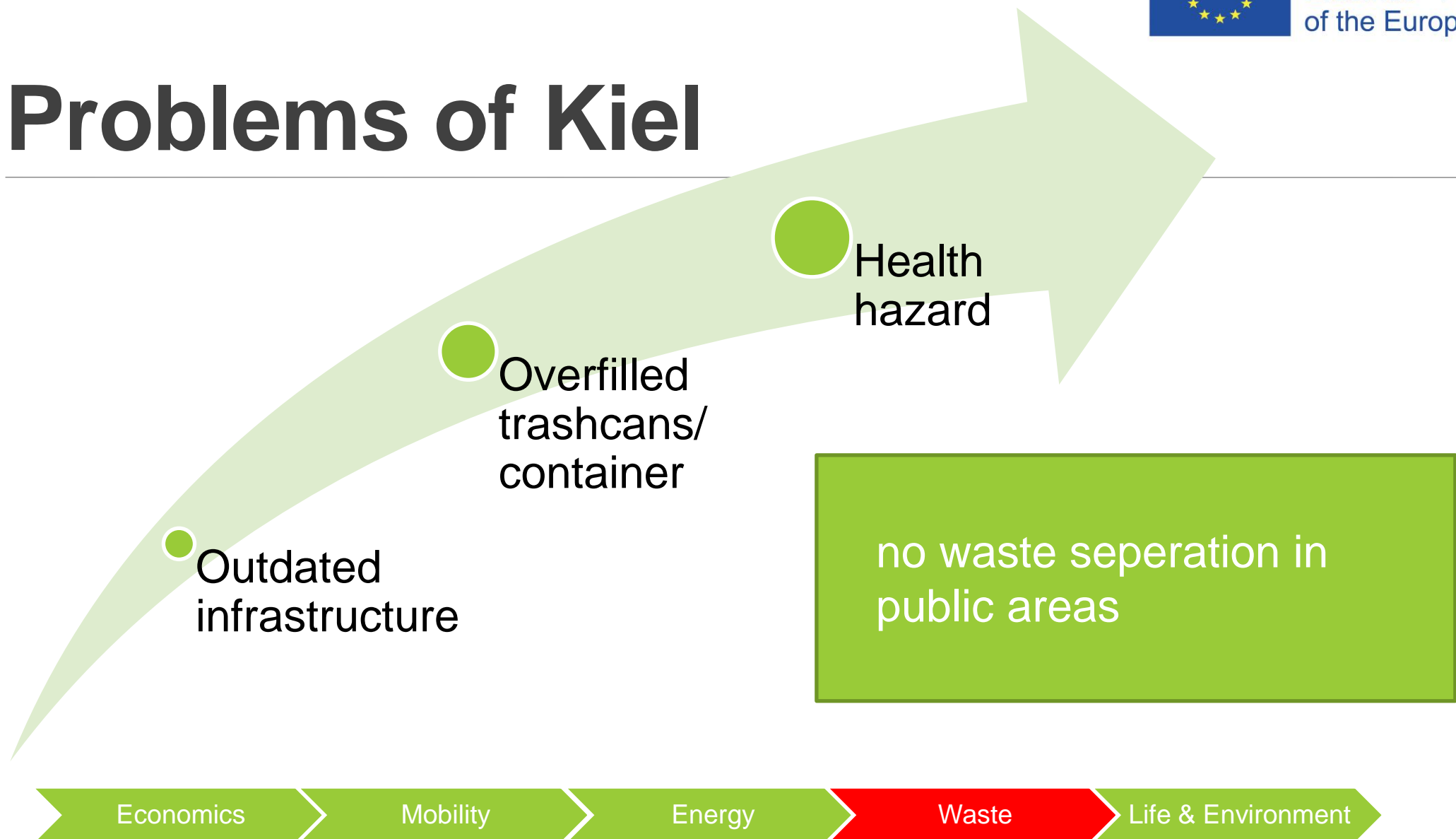


Garbage waste collection





Problems of Kiel





Smart Waste

RIGHT NOW



Optimized route vs. unoptimized route

IOT SENSORES



Optimized route vs. unoptimized route



Economics

Mobility

Energy

Waste

Life & Environment



What happens with the trash in Kiel?

Waste incineration Kiel

- Since 1975
- First the trash wasn't separated
- Nowadays

Recycling

- Organic waste
- Plastic waste
- Hazardous waste



Economics

Mobility

Energy

Waste

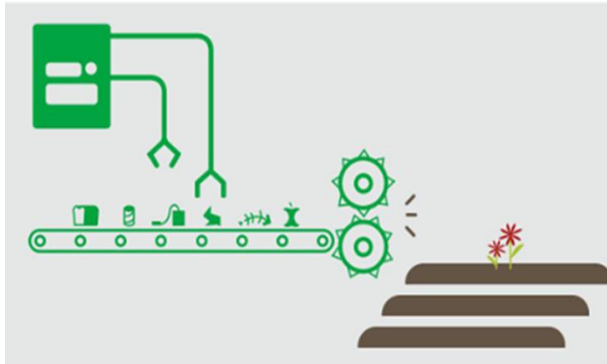
Life & Environment

IRIS SALTEN

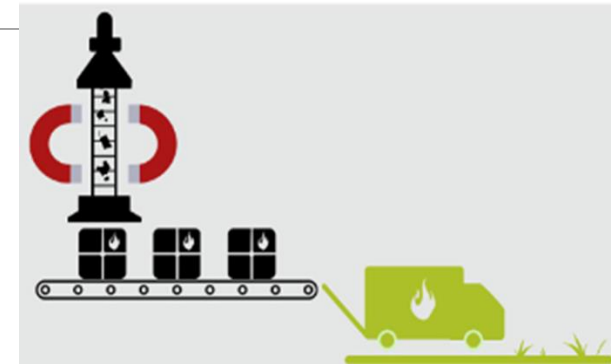


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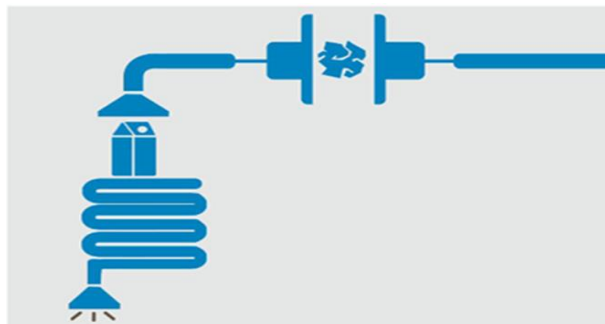
Food waste



Plastic packaging



Paper and cardboard



Glass/ Metall



Economics

Mobility

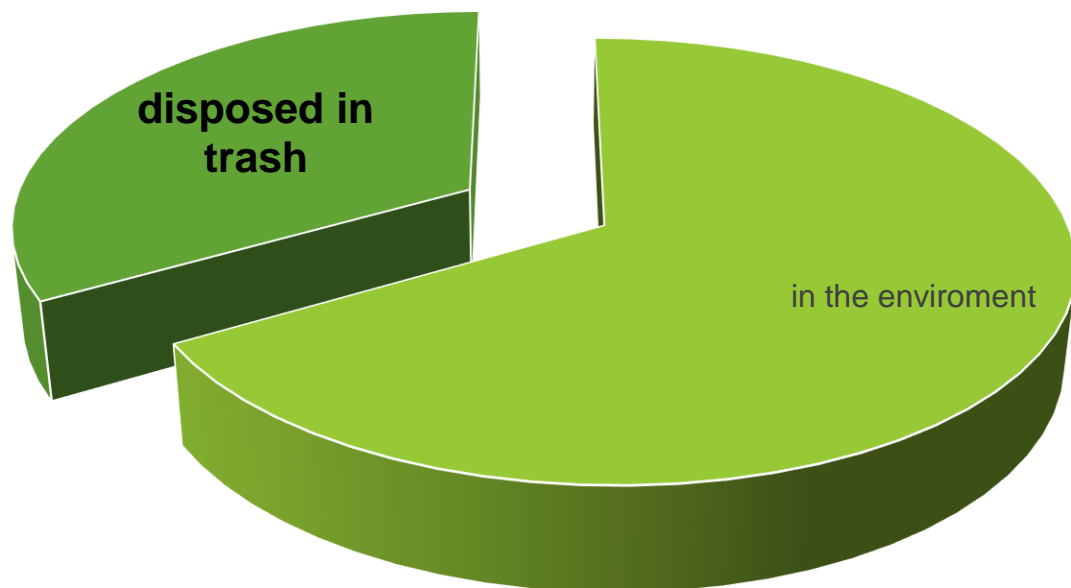
Energy

Waste

Life & Environment



Cigarettes in the environment



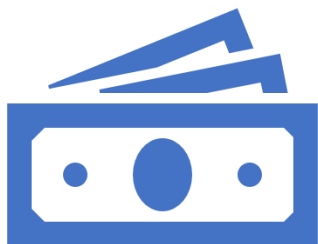


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Cafeteria

KIEL

BODØ



For half the price or for
free



- Employees get leftovers
- Further processed
- Re-cup system

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Energy

Waste

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The environment and life in Kiel and Bodø

PRESENTED BY MATHEA, INGRID & LOTTA

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Energy

Waste

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Kiel & Sustainability



- German Sustainability Award 2021
- Climate protection city (25 years+)
- First german city:
 - call out climate emergency
 - packaging free grocery store

Economics

Mobility

Energy

Waste

Life & Environment



Sustainability Goal - Kiel



city by 2040

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Energy

Waste

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How?

1) Blue Port

- Most ecological port of Europe
- CO2 neutral by 2030



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Energy

Waste

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How?

- **2) Public participation**
- Many possibilities
- e.g. Climate week
- e.g. "Kiel kann mehr" festival



Economics

Mobility

Energy

Waste

Life & Environment



Air Quality in Kiel

- Generally moderate/ good
- AQI forecast =>

Tag	Verschmutzungsgrad		
Heute	Gut	17 US-AQI	
Donnerstag, Sept 22	Gut	18 US-AQI	
Freitag, Sept 23	Gut	33 US-AQI	
Samstag, Sept 24	Gut	41 US-AQI	
Sonntag, Sept 25	Gut	34 US-AQI	
Montag, Sept 26	Gut	32 US-AQI	
Dienstag, Sept 27	Gut	49 US-AQI	

Economics

Mobility

Energy

Waste

Life & Environment



Theodor-Heuss-Ring



air measuring station

- Very busy
- High concentration fine dust & nitrogen oxides

Economics

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Energy

Waste

Life & Environment

Results

- Causes:
 - Arrangement houses
 - Overcrowding
- Consequence
 - Sued by country

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Mobility

Energy

Waste

Life & Environment





Solution a



- 1) air filter containers
- 2) speed limit
- 3) limited access

- no general solution

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Energy

Waste

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Lichens

Indicator of air pollution

- Eutrophication
- Nitrogen
- Air quality



Economics

Mobility

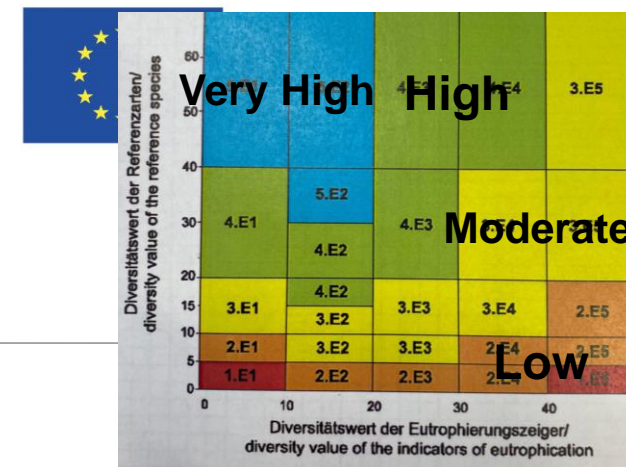
Energy

Waste

Life & Environment

Results

- Kiel: generally good
- Our measurements: moderate/ low air quality
- Bodø: moderate, high and very high air quality



Economics

Mobility

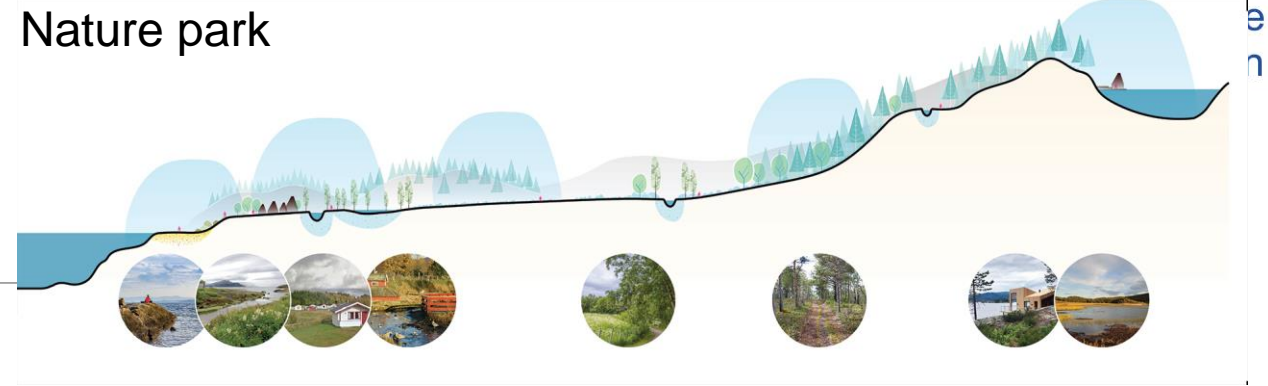
Energy

Waste

Life & Environment

Bodø

- Better life quality for the citizens in Bodø
- New activities and green areas



What do you know about the new football stadium?



Aspmyra Stadium



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Conclusions

- Air quality
 - Bodø generally better
 - Both: differences between areas
 - Find more solutions to improve air quality
- Sustainability & Life
 - Effort
 - Many future plans



Economics

Mobility

Energy

Waste

Life & Environment



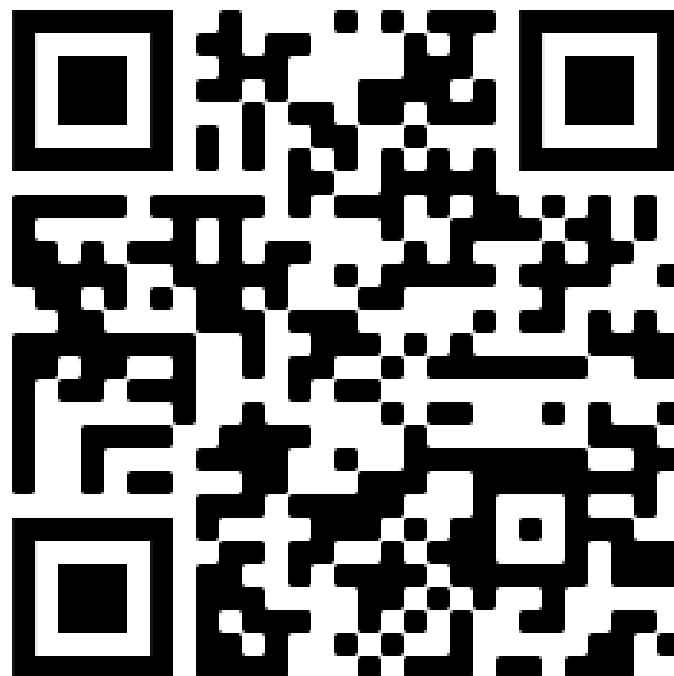
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**Thank you for your
attention 😊**



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Here is our travel blog





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<https://nachhaltigkeit.bvng.org/en/the-global-goals-for-sustainable-development/sdg-goal-3-good-health-and-well-being/>

<https://www.felixx.nl/projects/circular-city-bod-20.html>

https://www.kiel.de/de/kiel_zukunft/deutscher_nachhaltigkeitspreis.php

<https://www.camp24-7.de/>



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