



City of Oslo



## ***Electrification of transport – with focus on electrification of the Taxi Fleet and the Oslo ElectriCity programme***

Sture Portvik – Manager Electro mobility

Agency for Urban Environment

City of Oslo

# Making EVs the right choice

With **60%** of global emissions in Oslo coming from the transport sector, the **only** way to reduce emissions in our cities is to boost a green shift in transportation. **As one of the first cities in Europe, the City Parliament in Oslo adopted “a ten-point plan” to reduce CO2 emissions in 2008**, to which the large scale introduction of EVs plays a big part.

Today the focus is on **electrification of all types of transport** including, public transportation (2028), commercial vans (2025), heavy trucks (2030), shared vehicles (2025) and taxis (2024), as well as private cars (2025).



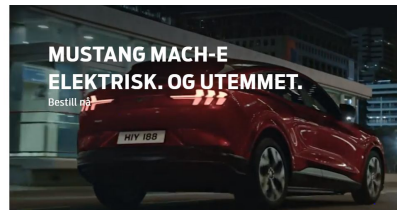
# Making EVs the right choice

There are **three** critical factors to succeed:

- EVs must be **Cheap to buy** (no purchasing tax, no VAT)
- **Cheap to use** (free parking, free electricity, free passing in toll gates)
- **Convenient and practical to use** (easy access to charging, access to parking, bus lines)

But you also need **the Right product!**

Luckily, many new EVs that are launched today works perfectly for the Taxi drivers as well. They are big enough, have enough range capacity (35 km per day) and charges fast.



## Making EVs cheap to buy

Volkswagen Golf	Volkswagen e-Golf
Import price: € 22,077	Import price: € 32,741
CO <sup>2</sup> tax: € 3,919	CO <sup>2</sup> tax: € 0
NOx tax: € 238	NOx tax: € 0
Weight tax: € 1,715	Weight tax: € 0
Scrapping fee: € 249	Scrapping fee: € 249
25% VAT: € 5,019	25% VAT: € 0
Retail price: € 31,236	Retail price: € 32,990

Source: OFV



# EV sales in Oslo are boosting - 87 %

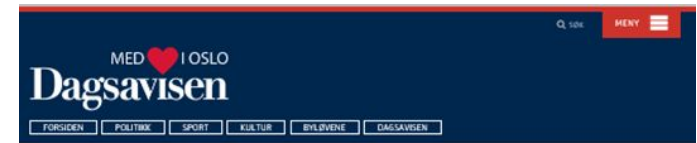
**The World's first mass market for EVs.** EVs are everywhere, and things are moving very fast!

Nowhere on the planet you will find a higher density of electric vehicles.

**The share of EVs in Oslo reached 87% in 2021 (Jan.-Aug.), incl. 68 % BEV/fully-electric and 19 % PHEV.**

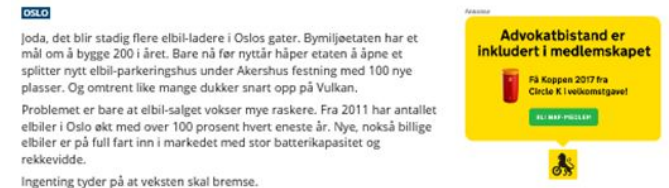
**9 out of 10 vehicles sold are now electric!**

Not rocket science. It shows that **Green taxes are actually working**, but you have to make it **affordable for common people** to take green choices in their daily life!



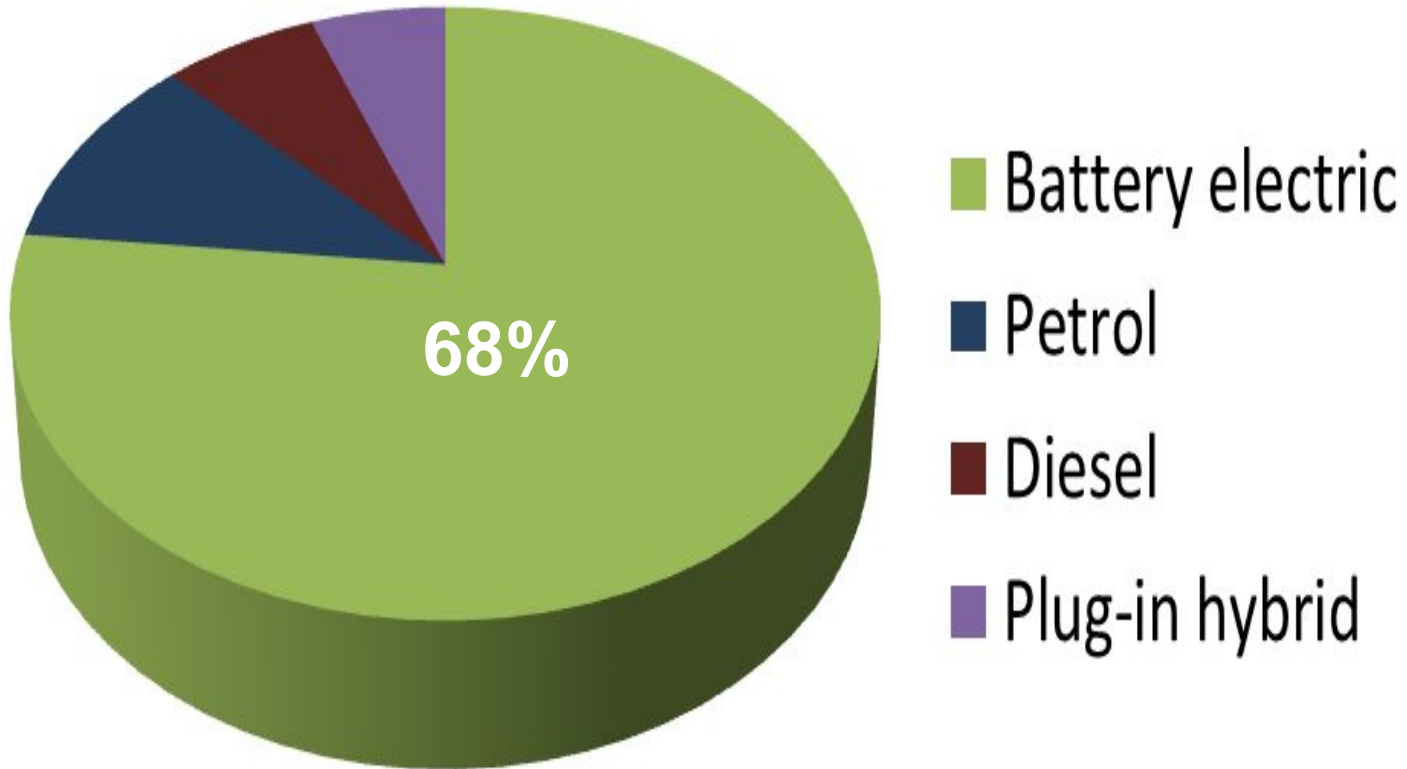
## Opptatt, opptatt, opptatt!

I Oslo deler 10 elbiler på én ladeplass. Og det skal bli veldig mye verre.





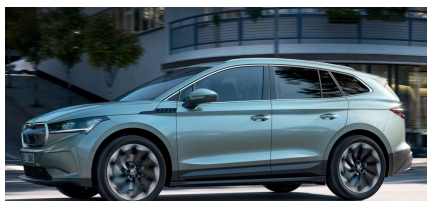
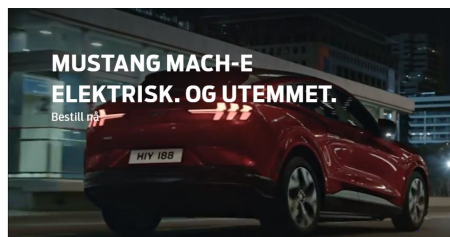
## EV sales in Oslo are boosting - 87 % of sales



# Top 10 selling vehicles models in Oslo 2021 (regardless of driveline)

- 9 Fully battery electric cars (BEV)
- 1 Plug-in Hybrids (PHEV)

Many perfect as a taxi!



Pr. modell

Nr.	Merke	Modell	Periode		Periode året før	
			Antall	Andel	Antall	Andel
	Total for rapport		13 949	100,00 %	10 172	100,00 %
1	Tesla	Model 3	842	6,04 %	333	3,27 %
2	Toyota	RAV4	803	5,76 %	123	1,21 %
3	Volkswagen	ID.4	761	5,46 %	-	-
4	Audi	e-tron	652	4,67 %	1 174	11,54 %
5	Volvo	XC40	600	4,30 %	158	1,55 %
6	Mercedes-Benz	EQC	573	4,11 %	273	2,68 %
7	Ford	Mustang Mach-E	555	3,98 %	-	-
8	Skoda	Enyaq	508	3,64 %	-	-
9	Nissan	Leaf	358	2,57 %	373	3,67 %
10	Polestar	Polestar 2	332	2,38 %	5	0,05 %

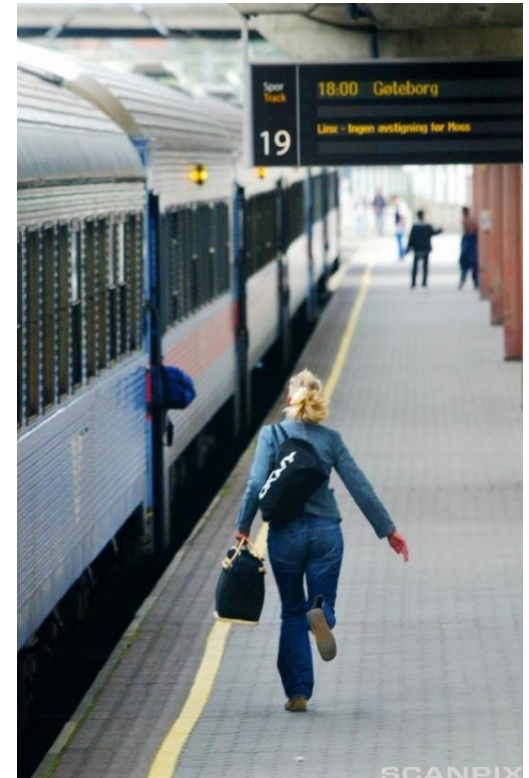


# Challenges: Sky is the limit, or trouble in paradise?



## Obstacles and challenges

- **EV sales are boosting.** Exponential growth of EVs makes it **hard to deploy chargers fast enough**
- **Limited Space in a urban city** (space/earnings requirements)
- **Local grid capacity issues** (capacity/processing time/grid upgrades)
- **61 % are living in multi-family buildings, apartments or town houses in Oslo**
- **30 %** does not have access to privat parking and are reliant on public parking
- **Electrification for professional users of EVs lagging behind privat EVs** and needs a boost even if sales of electric vans, taxis and crafts and service vehicles are picking up speed







# The City and the State - A successful interplay, and a classic win-win



The Central government made EV cheap to buy

The City of Oslo made EVs cheap to use, and practical and convenient to own  
(access to public charging, subsidy schemes for home charging, access to bus lanes etc.)

Both the City and the Central government used a whole package of regulations and financial and non- financial incentives that was **mutual re-enforcing** and pulled in the same direction.

ENERGI KLIMA Nyhet Blogg Kommentar Klimatvino Tema 2°C Klimarisiko Om Energi og Klima

KOMMENTAR

## Kongen på trikken og klima-politikken

EAT-Lancet-rapporten: Et budskap kan ikke betraktes og forstås uavhengig av hvem som er avsender, hvem som er mottaker og situasjonen i omgivelsene.

22. januar 2019



16. desember 1973, under oljekrisen – kong Olav tar Holmenkollbanen for å gå på ski i Merke. Alle visste at det var en symbolhandling, men det var den riktige typen symbolhandling, skriver artikkelforfatteren. (Foto: Jan A. Martinson / Aftenposten / NTB Scansip).

Du husker det ikoniske bildet av kong Olav på trikken i

SPRE KLINGSKAP – DEL DENNE ARTIKKELEN!



# The Taxi Fleet in Oslo

- **2900 Taxi licenses** (1900 in 2019)
- **9 Taxi Centrals**
- **2 Centrals 85% of the market**  
(Oslo Taxi and Norges Taxi/Cabonline)
- The market was **liberalised i November 2020**
- **85 % of all taxis runs on diesels**, creates substantial local pollution, noise and CO2 emissions
- **Long mileages**, in average **35 km** and two shifts per day
- **15% all-electric**, but no. grows fast
- **Only zero emissions taxis** from 2024
- **Strategy** for electrification of the taxi fleet (2017)
- **Meetings with all the taxi centrals** in Oslo. Somewhat bad



Oslo kommune  
**Bymiljøetaten**  
Avdeling for transportlov og skiltmyndighet

Utredning

*Miljøkrav til drosjenæringen*



Dato: 11.8.2017



taxi industry





# Policy measures to boost the transition to zero emission taxis

- **Public chargers** open for all EVs (2100 AC)
- **Public fast chargers** open for all (360 DC)
- **Taxi ranks reserved for zero emission taxis only**
- **Taxi ranks with fast chargers**
- **Charging HUBs for taxis only**
- **Charging at the taxi centrals** and service centres
- **Subsidy scheme for home chargers** for taxi drivers/owners
- **Energy stations** including hydrogen, bio gas, el etc.
- **Zero Emission Zones** (2019, 2023, 2025)
- **Public procurement.** Both the City and the State demands zero emission transport (2025 mandatory)
- **Diesel ban** on the most polluting days
- **Free passing in the toll roads** for ZEV and other perks



Oslo kommune  
Bymiljøetaten  
Avdeling for transportløyve og skiltmyndighet

Utredning



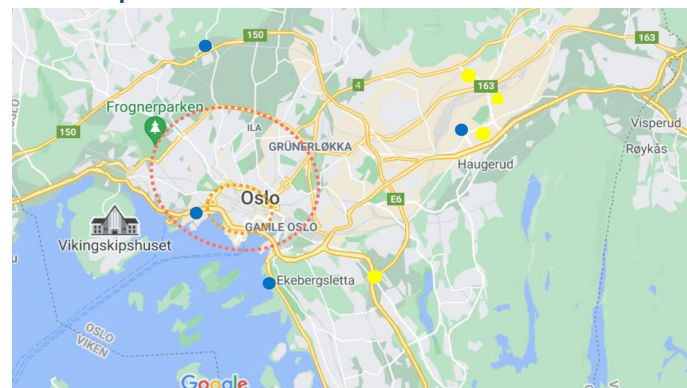
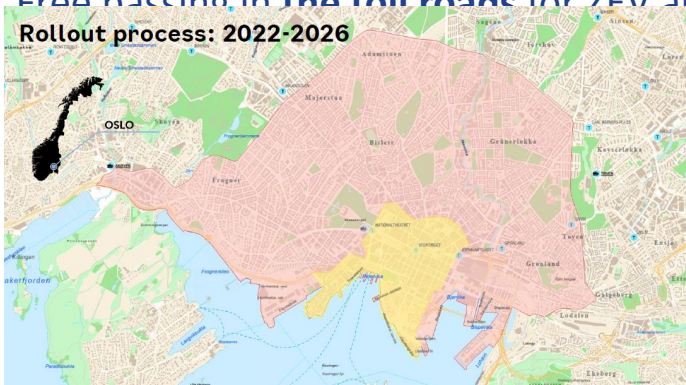
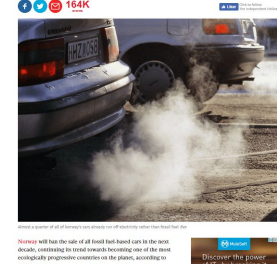
Dato: 11.8.2017



Norway to 'completely ban petrol powered cars by 2025'

What an amazing awesome country, Stan Musk tweeted in response to the plan

164K





## Public charging points – 2100 normal and 300 quick chargers





# New Taxi Ranks reserved for Electric Taxis only

## Locations reserved for el-taxis in 2021

- Olav Vs gate (Wireless/HPDC)
- Skøyen drosjeholdeplass (Wireless/HPDC)
- Trondheimsveien 100 (Oslo Taxi) (HPDC/AC)
- Stovner drosjeholdeplass (Wireless/HPDC)

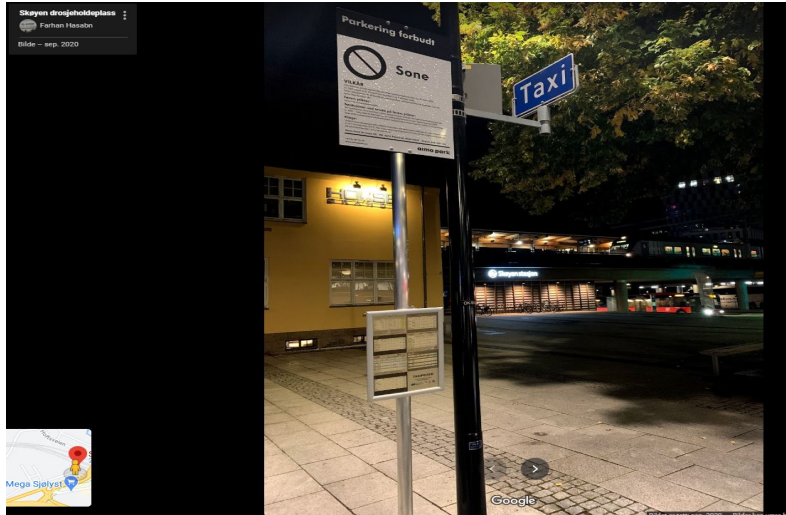
## Planned locations for 2022

- Oslo Central Railway Station (Wireless/HPDC)
- Aker brygge/Filipstad (HPDC)
- Ullevål Hospital (HPDC)
- Frogner (HPDC)
- Rikshospitalet (HPDC)





# Taxi ranks reserved for zero emission taxis– Olav Vs street first to go!



# Charging at taxi depots and services centres - Joint-ventures between taxi companies, privat charging operators and the City

## ODI HAR INVITERT CIRCLE K TIL Å GI TILBUD PÅ TO LADESYSTEMER I TRONDHEIMSVEIEN 100

### Forutsetninger

#### Case 1: Trondheimsveien 100/Tromsøgate

Eksisterende parkeringsplasser sammen med bygning  
Installasjon av opp till 6 hurtigludere (fabrikat Tritium)

- Antall p-plasser: <6
- Effekt: 150 kW per ladere
- Infrastruktur for 6 ladere, initialt installeres 3
- Oppkoppling till internet (uavhengig, 4G-basert)

#### Case 2: Trondheimsveien 100 garasje

Eksisterende parkeringsplasser i garasje i tre etasjer  
Installasjon av opp till 60-70 AC-ladere i det lange løp (fabrikat Zaptec)

- Antall p-plasser:
  - kjeller 39 stk
  - lejetakere 15 stk
  - toppetasje 36 stk
- Effekt: maksimalt – ge tilbud på både 400V 3-fas och 230V 1-fas!
- Infrastruktur forbereds for på sikt 60-70 ladere (skalerbart), initialt monteres 8
- Oppkoppling till internet (uavhengig, 4G-basert)





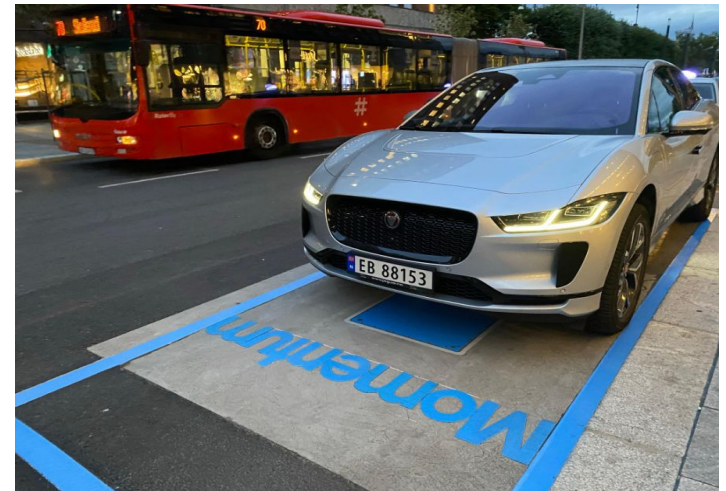
# The World's first pilot for induction-based high-powered

The New York Times

WHEELS

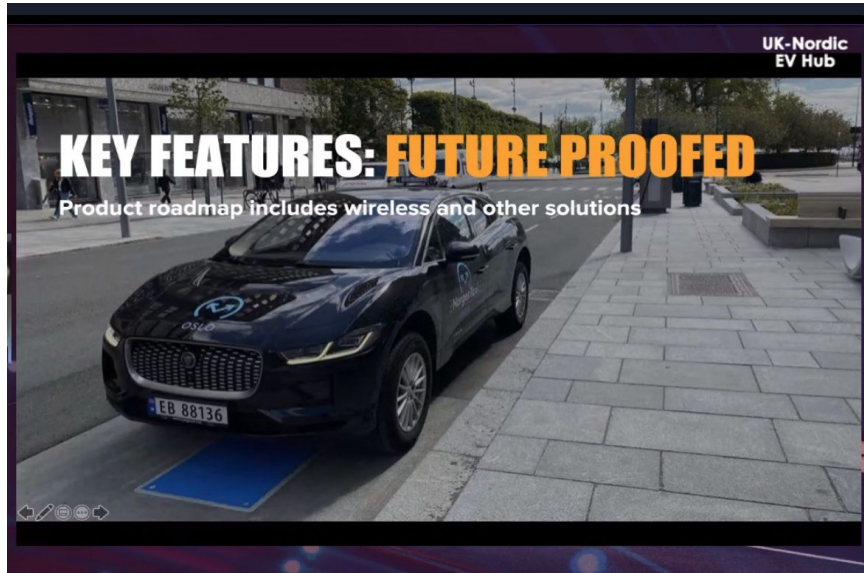
## Norwegian Taxis, Wirelessly Charging While They Wait for a Fare

Electric Jaguars in Oslo, using tech from a former NASA architect, will soon be able to recharge on special pads embedded under the road.





## The Oslo ElectriCity partnership for wireless fast charging of taxis



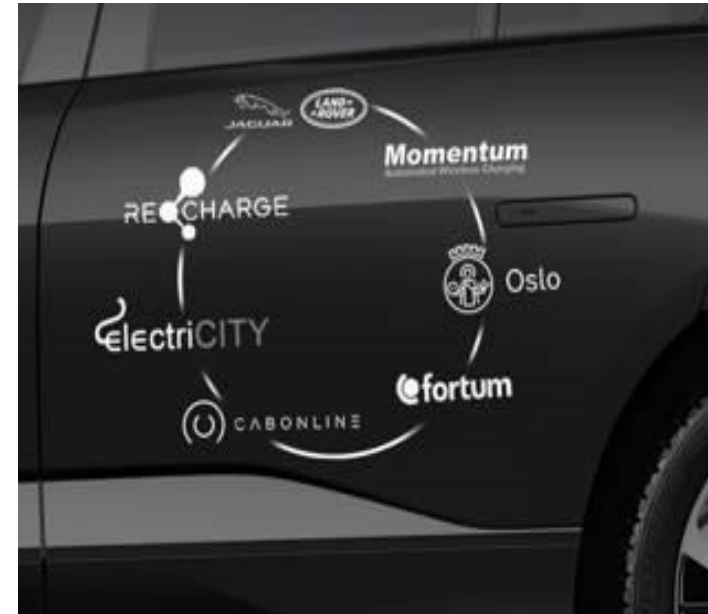
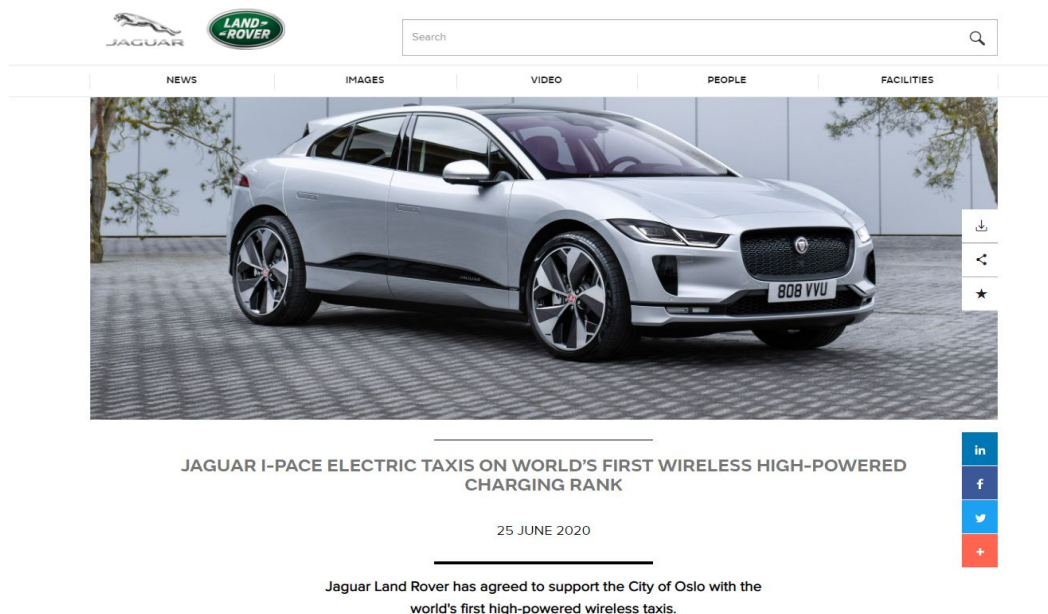
Oslo will be the world's first metropolitan area to install wireless, induction-based high-powered charging stations for electric taxis, in a bid to make its cab system emission free as early as 2024. Norway wants to go even further however and is mandating that all new cars sold in the country by 2025 are zero emission.

For usage efficiency, taxi drivers need a charging system that does not take them off route during their working hours. **Multiple charging plates rated at 50-75 kilowatts each, are installed in the ground in series at pick-up-drop-off points. This allows each equipped taxi to charge while queuing for the next fare.** The system, which uses no cables and situated below ground, requires no physical connection between charger and vehicle, engages automatically and provides on average 6-8 minutes of energy per each charge up to 50kW.

The taxi can then receive multiple charges throughout the day on its return to the rank, maintaining a high battery state of charge and the ability to remain in 24/7 service without driving range restrictions.



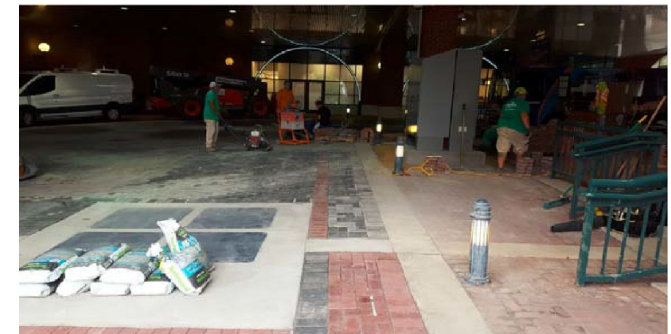
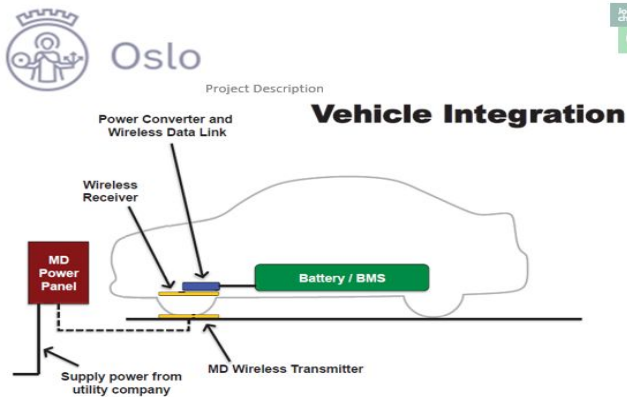
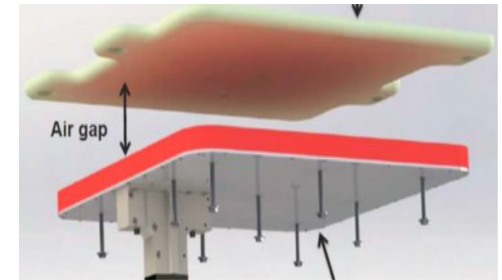
# Wireless fast charging of Taxis – a potential game changer



- **Partners:** Momentum Dynamics (US), Jaguar Landrover (UK), Fortum (Fin./No.), Recharge (No.), Cabonline (No.) and the City of Oslo.
- **No. of vehicles:** 26 Jaguar I-pace
- **No. of taxi ranks :** 3-4 installed with wireless ground chargers and reserved
- **No. of wireless chargers per location:** 2-3 wireless chargers 75 kW
- **Scalable solution:** Can be increased to 450 kW (six ground pads), more vehicles, new sites etc.
- **A third charging option:** In addition to traditional AC and DC charging
- **Start-up:** The first location is up and running. Testing since May 20 21
- **Duration:** 3 years
- **Budget for the City:** 6 mill. NOK (Incl. HPDC chargers)

# Why wireless charging of vehicles is a good idea

- **User-friendly and simple.** Charging while waiting. Simplifies the transition to electric vehicles for commercial drivers.
- **Fast.** 74 kW or more. Saves time and money
- **Cost-effective solution.** Reduce both investment and operating costs
- **Save space.** Reduces the **visual footprint** on sidewalks and scares street space
- **High Energy Efficiency** (92 %. Higher than normal DC)
- **Scalable solutions**, up to 450 kW
- **Simplifies co-location** of charging infrastructure for different purposes, e.g. bus, truck, dump trucks etc.
- **Works for most types of vehicles** and various applications, such as taxis, trucks, buses etc.
- **No cable tangles and increased accessibility** for soft road users. Satisfies requirements for universal lining
- **Simplifies maintenance and operation** of sidewalks and streets
- **Providing a charging infrastructure model that can be implemented almost anywhere**, it will help the rapid adoption of electric vehicles globally.





# The project has contributed to Norway's first emission free construction site



#1 most loved electric vehi  
world

Exclusives Clean Energy EV News EV Reviews T

## World's First: Zero Emission Electric Construction Site

April 9th, 2020 by [Jo Borrás](#)

Even in cities like Oslo, Norway, which is typically thought of as progressive and "green" here in the 'States, more than 20% of the total CO2 emissions comes from heavy-duty construction equipment. That's a huge number, and you can bet that older, less regulated machines in other major cities are even worse. That fact has motivated the authorities in Oslo to enact laws that say all new, public buildings must be built with "fossil-free" construction machinery. The jobsite you see here, featuring a ZE85 battery-powered excavator from Suncar HK, is just such a fossil-free site. What's more, it's believed to be the first zero emission, all-electric jobsite of its kind.



Suncar electric excavator, via Suncar HK

Norway's new laws banning heavy polluters like diesel construction machines and even passenger cars from certain city centers are hardly unique. Cities like Barcelona, London, and Beijing have already passed similar laws that will go into effect in the coming years, and believe other countries won't get in on the act soon, with the general public

