

# Charging and refueling demand for heavy-duty zero emission trucks in Norwegian transport corridors

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## Motivation:

Considering a future with battery electric and fuel cell electric trucks, how could the infrastructure serving these trucks look like along the main freight corridors in Norway? Both regarding the energy demand and the energy station layout.

## Data gathered from:

- National freight model (Norwegian Institute of Transport Economics)
- Traffic counts (Norwegian Public Road Administration)



Selected locations shown on a heat map of truckers break locations developed in [1].

## Method:

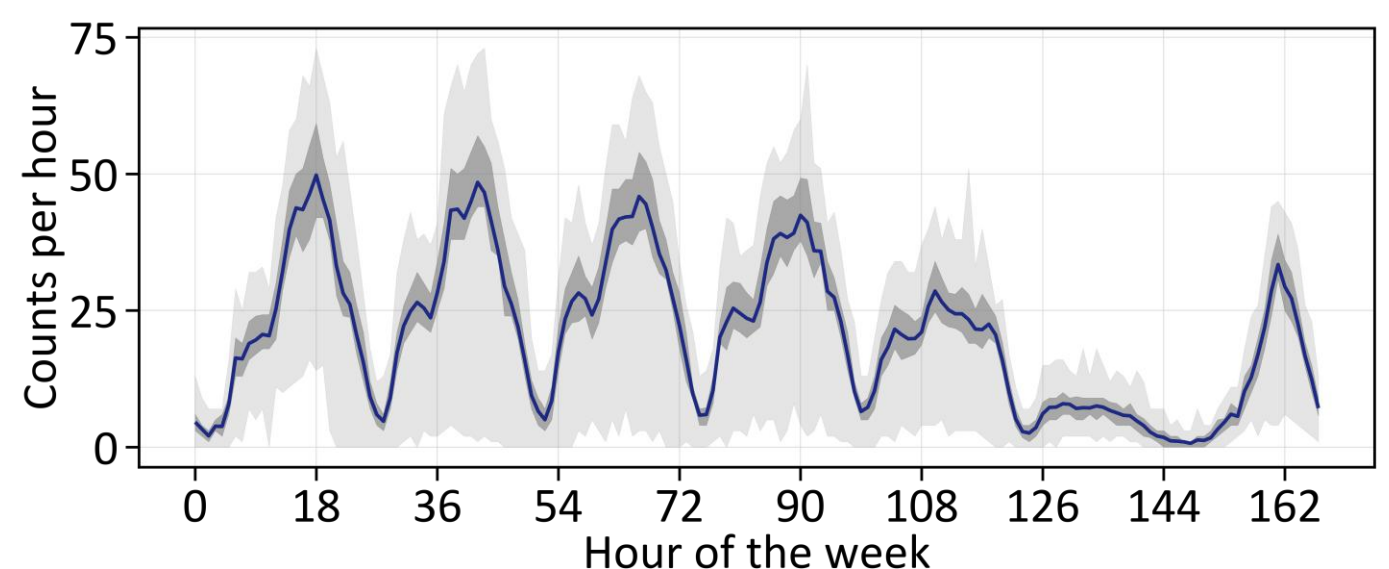
### Step 1.

Annual energy demand estimated based on:

- Assumptions for trucks
- Selected locations
- Trip characteristics from National Freight Model
- Local hydrogen production with electrolysis

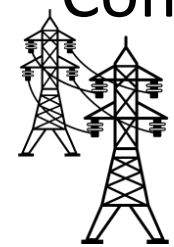
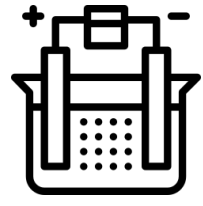
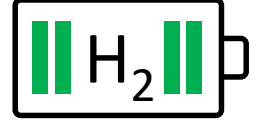
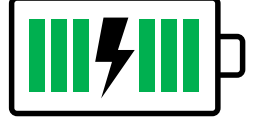
### Step 2.

Modelling energy station to identify optimal component size



— Average — Range — Upper and lower quartile  
Weekly pattern of trucks passing Otta, own visualization of data from [2].

## Results for year 2030:

Scenario	Annual electricity demand (GWh)	Component size at the energy station			
		 $MW_{el}$	 $MW_{H_2}$	 $MWh_{H_2}$	 $MWh_{el}$
Battery and fuel cell electric trucks	32-56	4.6-7.7	2.3-4.2	51-77	0
Only battery electric trucks	17-22	5.9-9.1	n/a	n/a	0.6-1.9

- Both future scenarios requires similar sized grid connection, though annual electricity demand for fast charging is significantly lower in a future with only battery electric trucks
- The energy demand and component size increase tenfold towards 2050
- Grid congestion can be expected at Hanestad, and over time also at Otta

[1] I.B. Hovi, et al., *Logistikk, miljø og kostnader - Kjøretøydata som grunnlag for forskning, transportplanlegging og forbedringsarbeid*, Institute of Transport Economics, 2021, TØI-rapport 1861/2021,  
[2] The Norwegian Public Roads Administration, *Trafikkdata*. n.d. <https://www.vegvesen.no/trafikkdata/start/om-trafikkdata>, accessed on 2021/04/07/