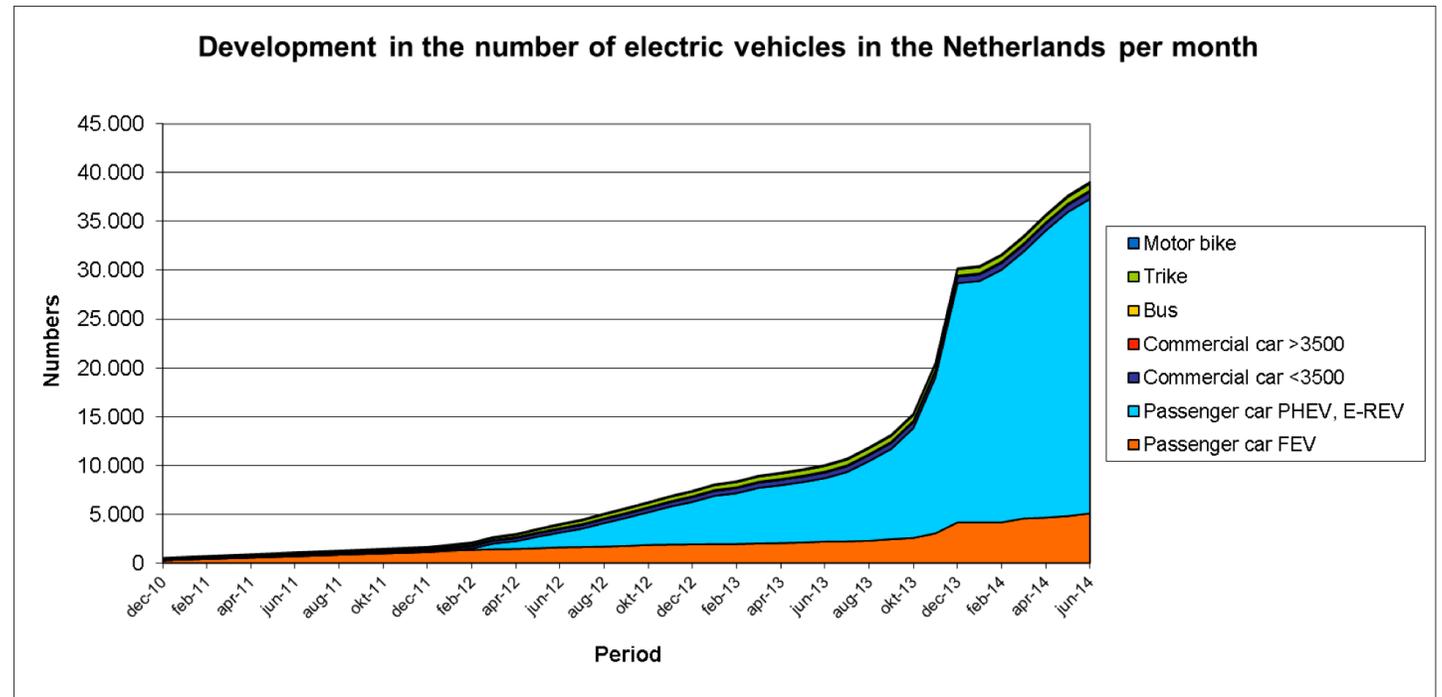




Netherlands EV charging development

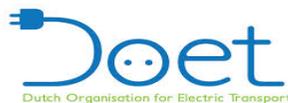
Maryland – Netherlands G2G knowledge exchange

1. East Coast Electric
2. Dutch approach – Triple Helix
3. Location Location Location
 1. Home, Work & semi-public
 2. Public Charging
 3. Fastcharging
4. The EVSE business-case
 1. Increasing utilization
 2. Decreasing demand charge
5. Q&A – steps for Maryland





East Coast Electric – A Public-private partnership of 15 companies and organizations to stimulate EV growth





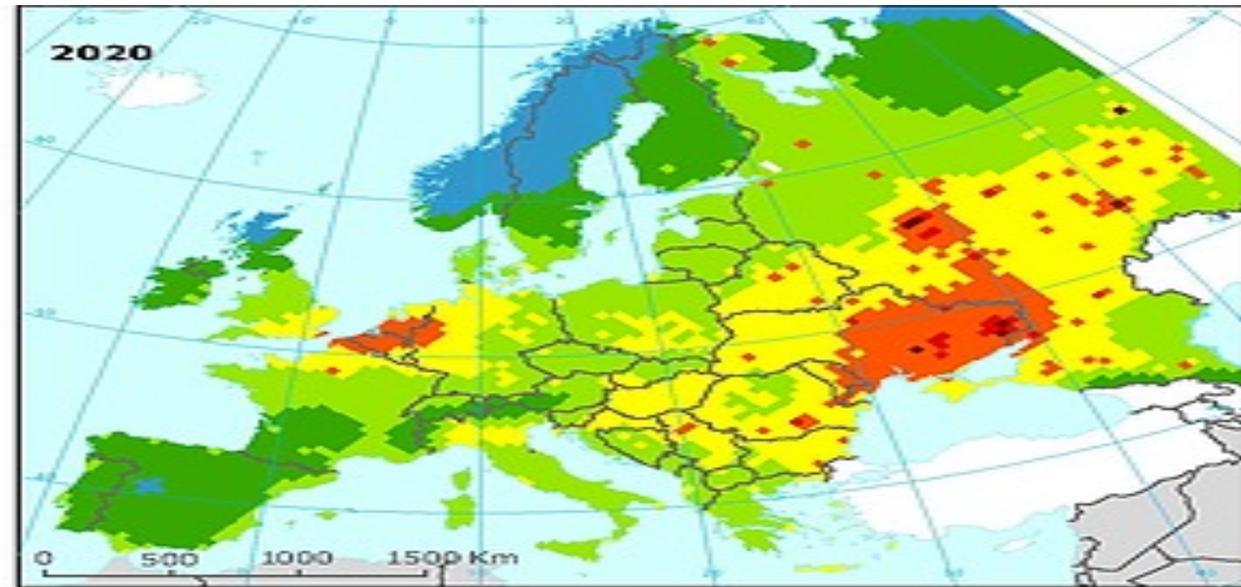
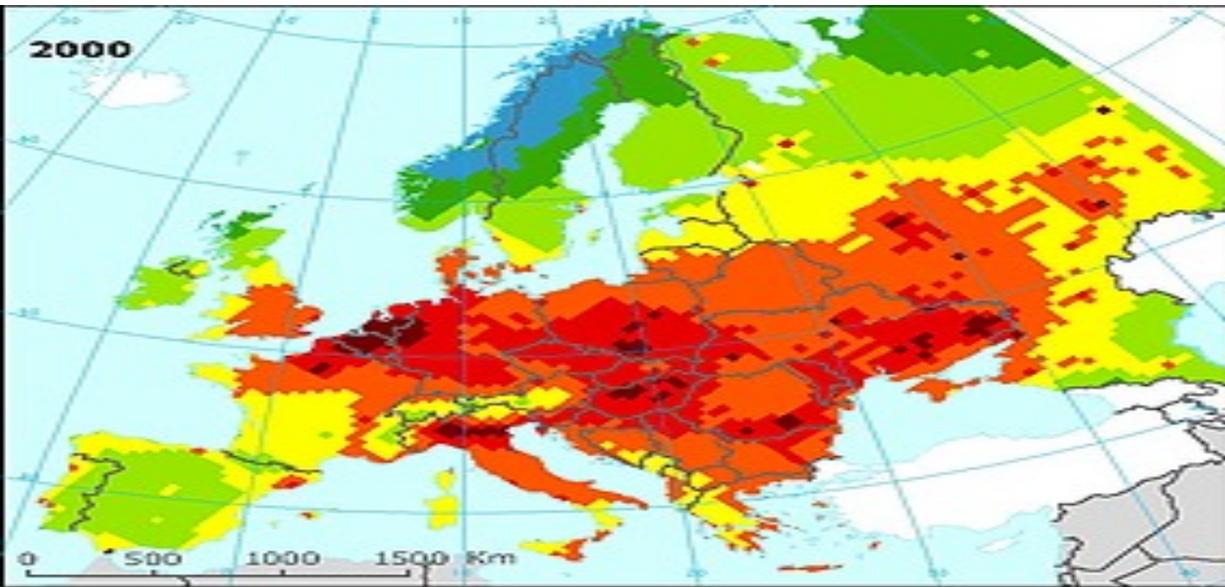
Maryland - Netherlands



	Maryland	Netherlands
Population	5.8 Million	16 million
Square miles	12.407	16.000
Median income	\$69.272	\$64.000 +/-
Minimum wage	\$8.25 per hour	\$11
Average commuter distance	28 miles	11 miles
Price per gallon	3.449	8.228
Price per kWh	\$.17	\$.31
EV goal 2020	60.000	200.000
EV 2015		48.000 (goal 20.000)



Air-quality premier driver for Dutch EV program





Dutch Approach – Triple Helix

ACTIVE EV POLICY SINCE 2009

- Council of government + industry + researchers
- Euro 65 million actionplan 2009-2014.
- Active fiscal policy making EV for businesses 30-40% cheaper.
- Active support for open EVSE infrastructure through help with hardware + software standardization
- State focussed on Car incentives, city + utilities focussed on EVSE incentives
- Focus on frequent drivers – better business-case – better for the environment

PUBLIC – PRIVATE NETWORK



3TU

energie-nederland

Doet
Dutch Organisation for Electric Transport

netbeheer nederland
energie in beweging

NATUUR
& MILIEU

anwb

BOVAG

rai
vereniging

DE GROENE ZAAK
ondernemers voor een duurzame economie

AutomotiveNL

VNA
VERENIGING VAN NEDERLANDSE
AUTOLEASEMAATSCHAPPIJEN

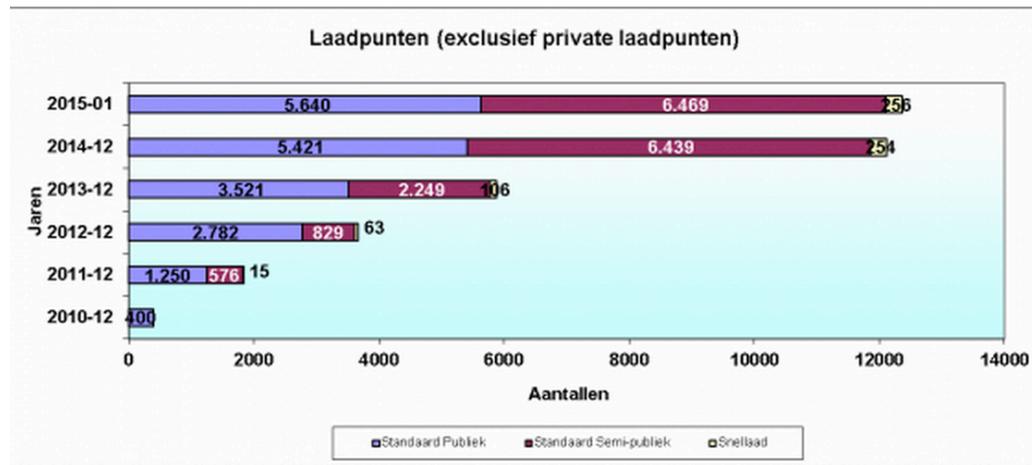
VNG
Vereniging van
Nederlandse Gemeenten



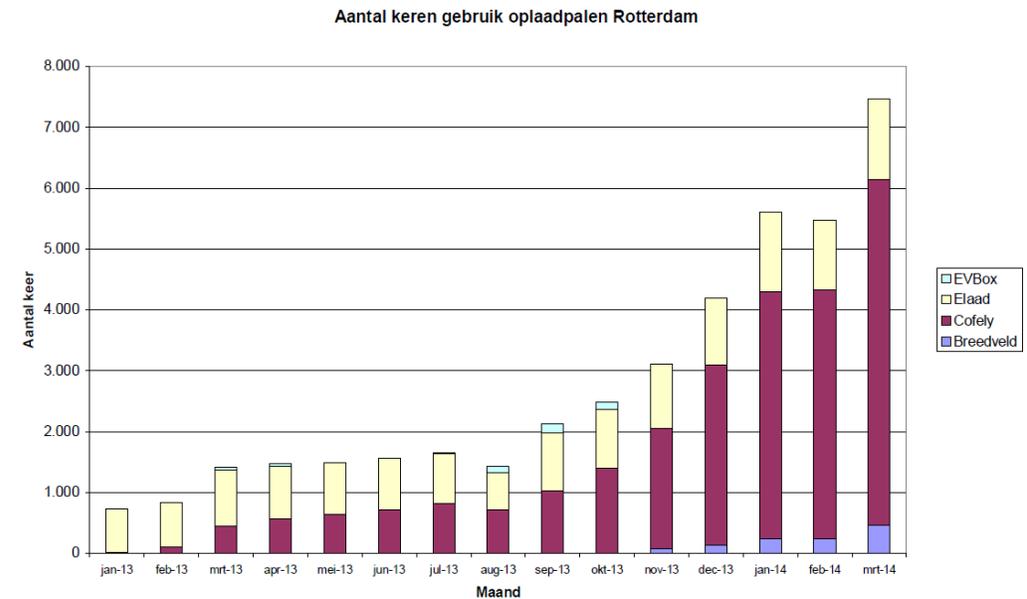
Rapid EV charger growth

EVSE ARE BECOMING SCARCE IN URBAN AREAS – RATIO OF 1 EVSE TO 3 EV

ROTTERDAM (POP 600.000) HAS MORE THAN 1400 CHARGING STATIONS – BELOW USAGE RATE OF CHARGERS



NL has +/- 28.000 private EV chargers (home + workplace)





Maryland obstacles

FROM TCI 2013 REPORT:

Special Challenges and Opportunities

Up to 46% of Maryland residents do not have private access to an electrical outlet.

- ❑ **Multi-dwelling units**
 - Convene educational workshops and webinars for developers, property managers and homeowner associations on the benefits of providing charging for residents
- ❑ **Urban**
 - Facilitate on-street charging by building on the municipal parking permit model for residential on-street parking with charging
 - Investigate options for wiring existing publicly and privately owned garages and parking lots for EV charging
 - Pilot Projects: Demonstrate options for shared use of existing parking facilities, allowing urban residents to park and charge at night in facilities used for business and employment during the day
- ❑ **Workplace**
 - Convene workshops to share best practices and benefits of providing EV charging for employees
 - Encourage businesses to join U.S. DOE Workplace Charging Challenge and TCI EV Pledge
 - Recognize business leaders

25

NL HAS SEEN SIMILAR OBSTACLES

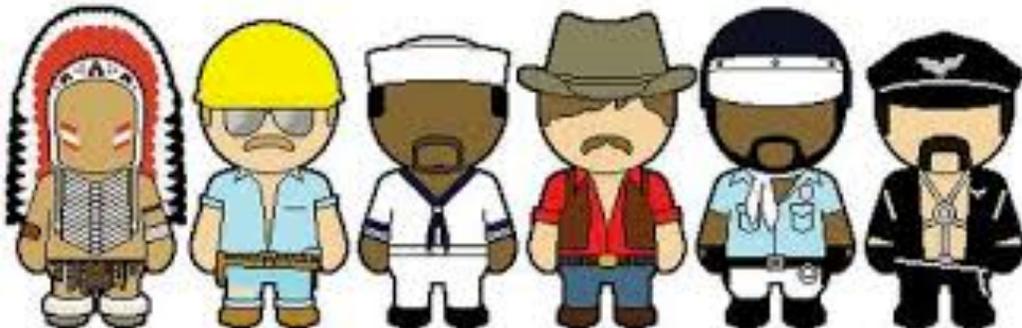
- How to facilitate in public parking garage
- What to do with the 54% of people that do not have private parking
- How can government facilitate business-owners to adopt EV chargers without spending too much money?
- What other obstacles do you currently encounter?



EV charging is all about location and accessibility

CUSTOMER SEGMENTATION

OPEN STANDARDS



- Dutch government extremely pro-active in creating open protocol to stimulate innovation
 - All RFP mandated open protocol
 - 6 Main EVSE producers – 15 Service providers
 - 400+ FTE created in EVSE industry in 5 years!



Private/ Home + Work charging

CHEAPEST OPTION AVAILABLE

- Behind the meter (so no interconnection cost)
- Do not need to be vandalism proof
- No changes to building codes
- \$650 dollar rebate for local governments

Ideal first step, but problems with scale:

- Multiple EV chargers at work create high demand charge
- Current EV demand too much power from residential interconnection
- In the Netherlands only 28% of people have private parking spot

INTERCONNECTION UPGRADE IS VERY COSTLY



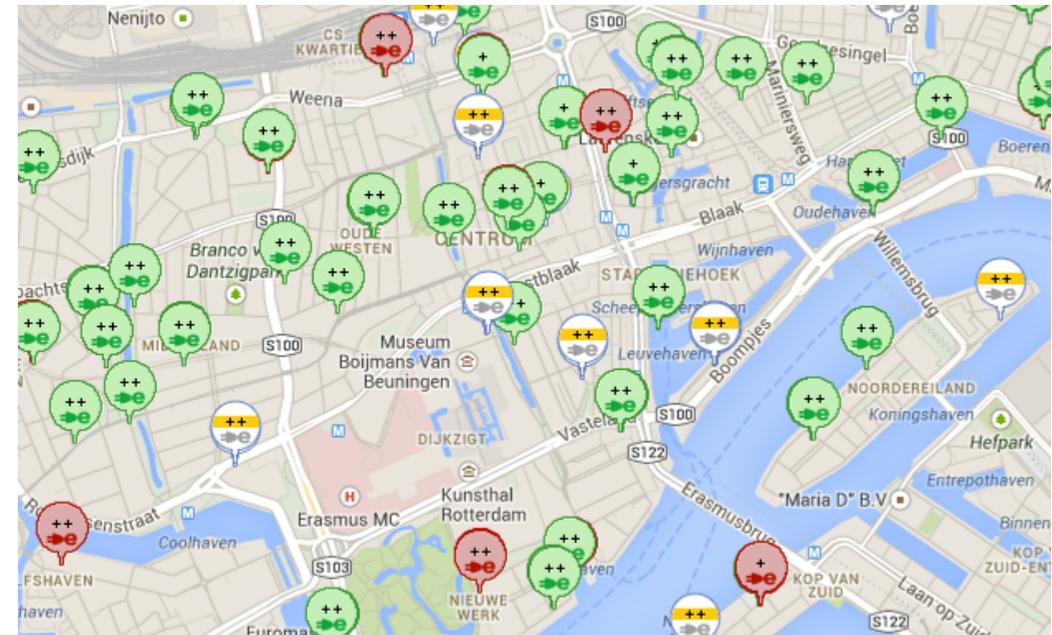


Public charging – costly but sometimes necessary

BIG GOVERNMENT SUPPORT NEEDED

- Dutch innercity areas no private parking available, but a lot of EV's
- Active government policy needed
 - Interchange regular parking for EV parking (not an easy sell)
 - No direct business-case so government needs to financially support (+/- \$1500 per EVSE per year)
- Advice: avoid public charging if you can and stimulate semi-public charging

CHARGERS IN ROTTERDAM CITY CENTER



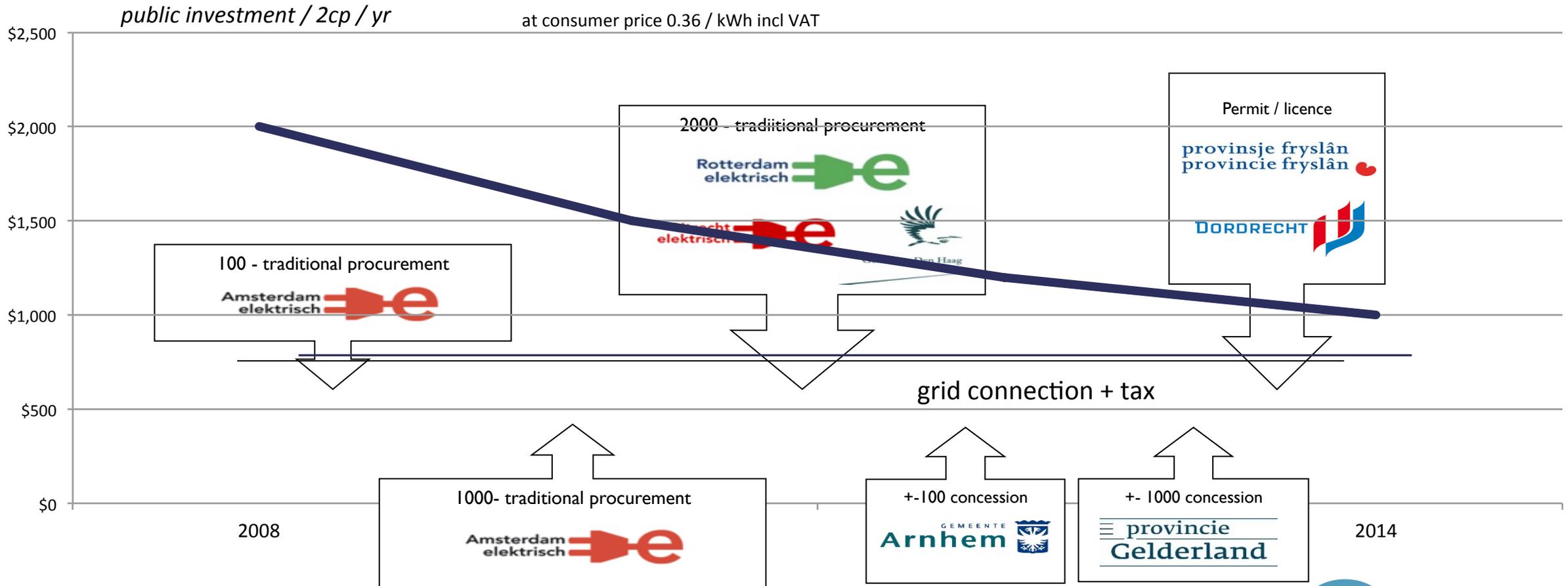
Charging infrastructure

Best practices: 5 years of bringing down costs



East Coast Electric

BRINGING DUTCH INNOVATION TO AMERICAN STREETS



Charging infrastructure

Best practices: 5 years of bringing down costs

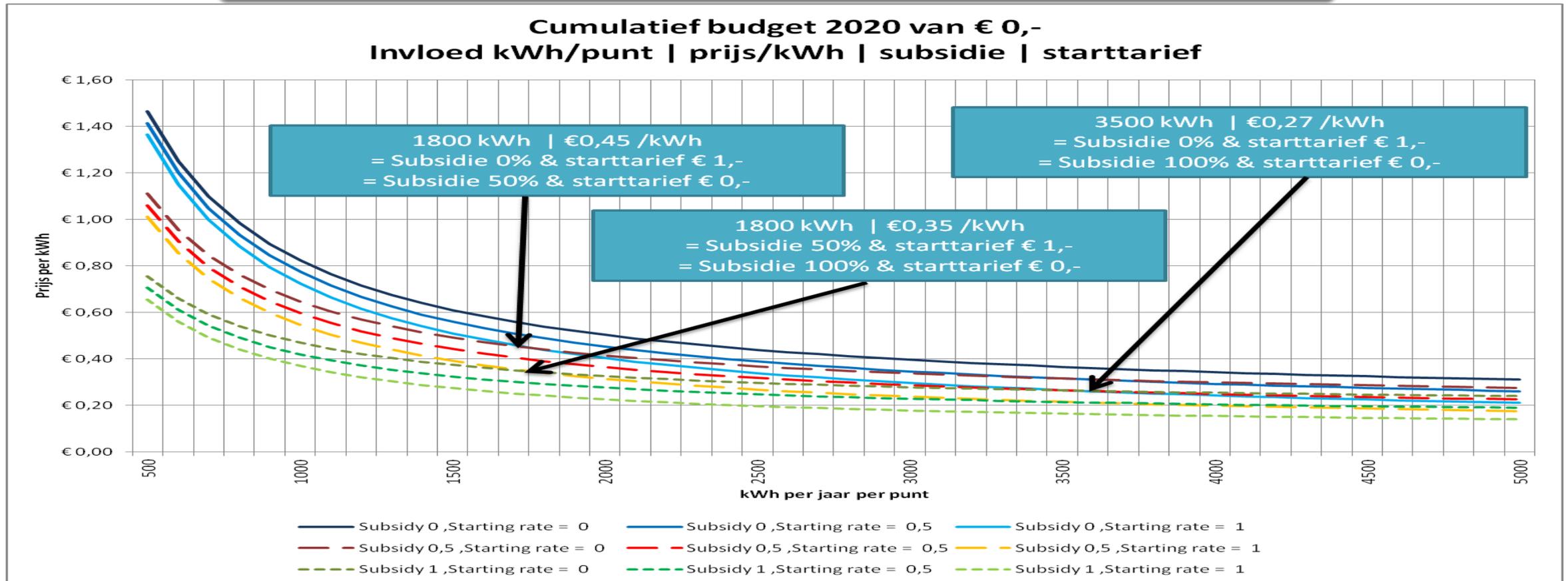


East Coast Electric

BRINGING DUTCH INNOVATION
TO AMERICAN STREETS



Stimulate EV through pricing mechanisms





Fastcharger a quickly expanding network

400 FAST-CHARGER LOCATIONS – 6 PROVIDERS = 0 GOVERNMENT INVESTMENT

DUTCH DEPARTMENT OF TRANSPORT APPROACH



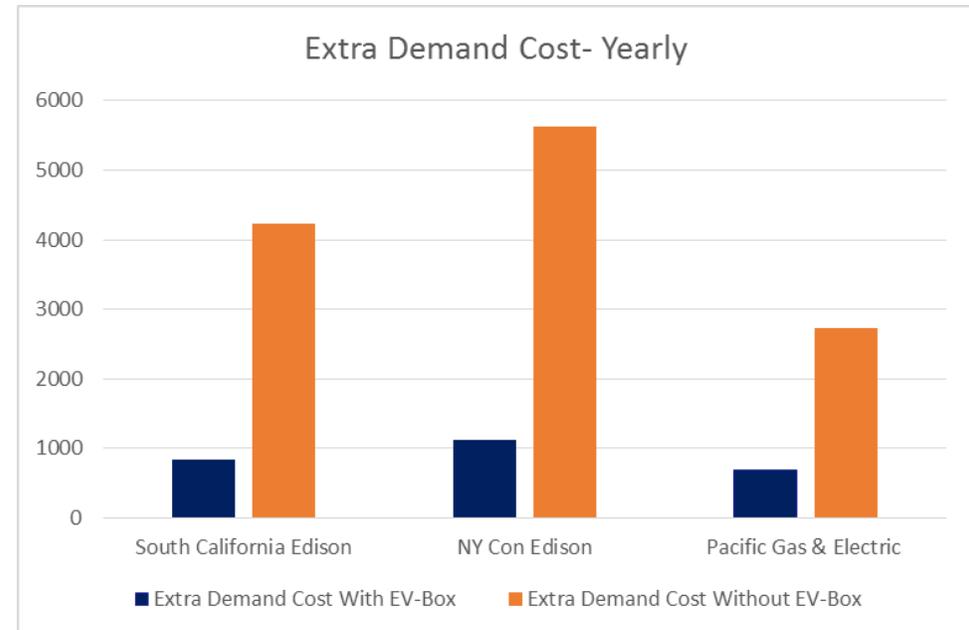
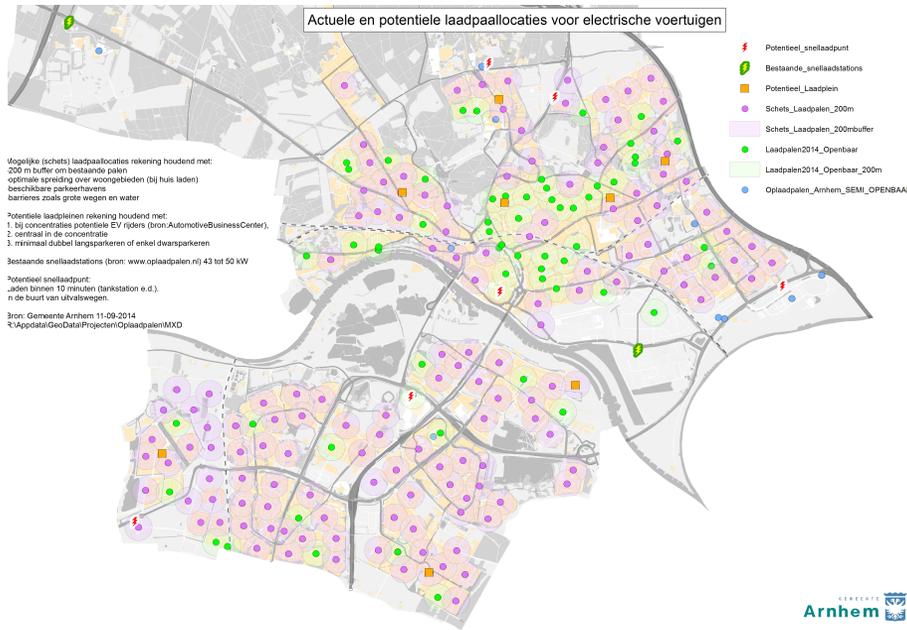
- Dutch government owns the territory of the resting places alongside interstates
- Fastcharging companies could subscribe to locations to place fastchargers for a lease period of 15 years for 0 dollar
- Companies are responsible for functioning infrastructure and maintenance
- On average 1 out of 10 charges with an EV in NL is done at a fast charger



Utilization and reduction of OPEX key for the EVSE business-case

INCREASE UTILIZATION THROUGH STRATEGIC MAPPING

SMART CHARGING TO AVOID ADDITIONAL OPEX





Different location requires different government role

IN GENERAL

- Stimulate open-protocol as they have proven in numerous industries to lower cost and stimulate innovation
- Avoid split incentives of EVSE ownership this varies per location
- Work together with gridoperator to reduce installation cost of EVSE
- EV can be big utility revenue boost (3000 kWh per EV per year) find a model where all parties benefit this will spur adoption (and as seen in solar and EV this will be difficult)
- Be cautious of models that create vendor lock-ins

PER LOCATION

Home – Work:

- Make it easy, government rebates work – facilitate

Semipublic:

- Actively stimulate – advocate and present together with industry business-case to parking garage owners

Public:

- No business-case possible in short run
- If needed always through open network to avoid lock-in

Fastcharging:

- Facilitate – business-case possible if industry is properly incentivized (avoid government funding)



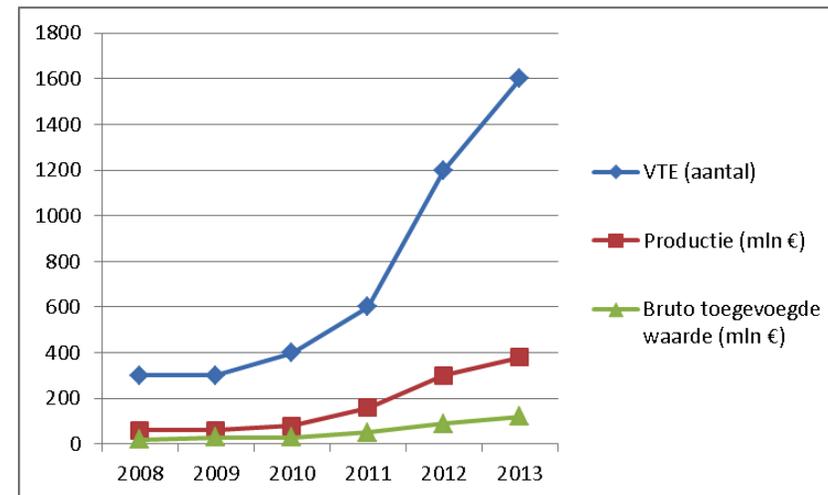
Does active government role pay-off?

NETHERLANDS LEADING IN:

- Per capita EV (also compared to California)
- Per capita EVSE
- Electric Bikes

Thanks for your attention – for questions please reach me at:
tim.kreukniet@eastcoastelectric.info

400 FTE IN EVSE



Figuur x: ontwikkeling economische indicatoren EV-sector