Save cost by Charging smart

Best practice charging in parking facilities

September 2018

EVCONSULT
experts in sustainable mobility

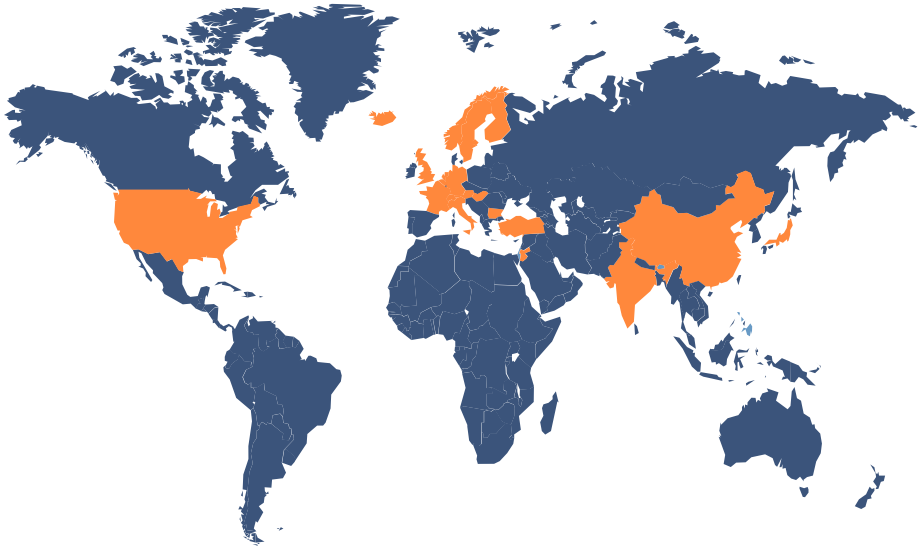
EPA

POLIS
CITIES AND REGIONS FOR TRANSPORT INNOVATION

Introduction EVConsult

100% Zero Emission

- 10 years of experience and over **200 EV projects** worldwide
- A diverse team of **20 academic EV experts** (technical, economical and legal backgrounds)
- Strategy, Project management, technical support and innovation management
- Projects for transport sector, oil & gas industry, car/ bus manufactures, grid operators, energy suppliers and national/ local governments.
- Based in the Amsterdam (NL), Antwerp (BE) and more to come



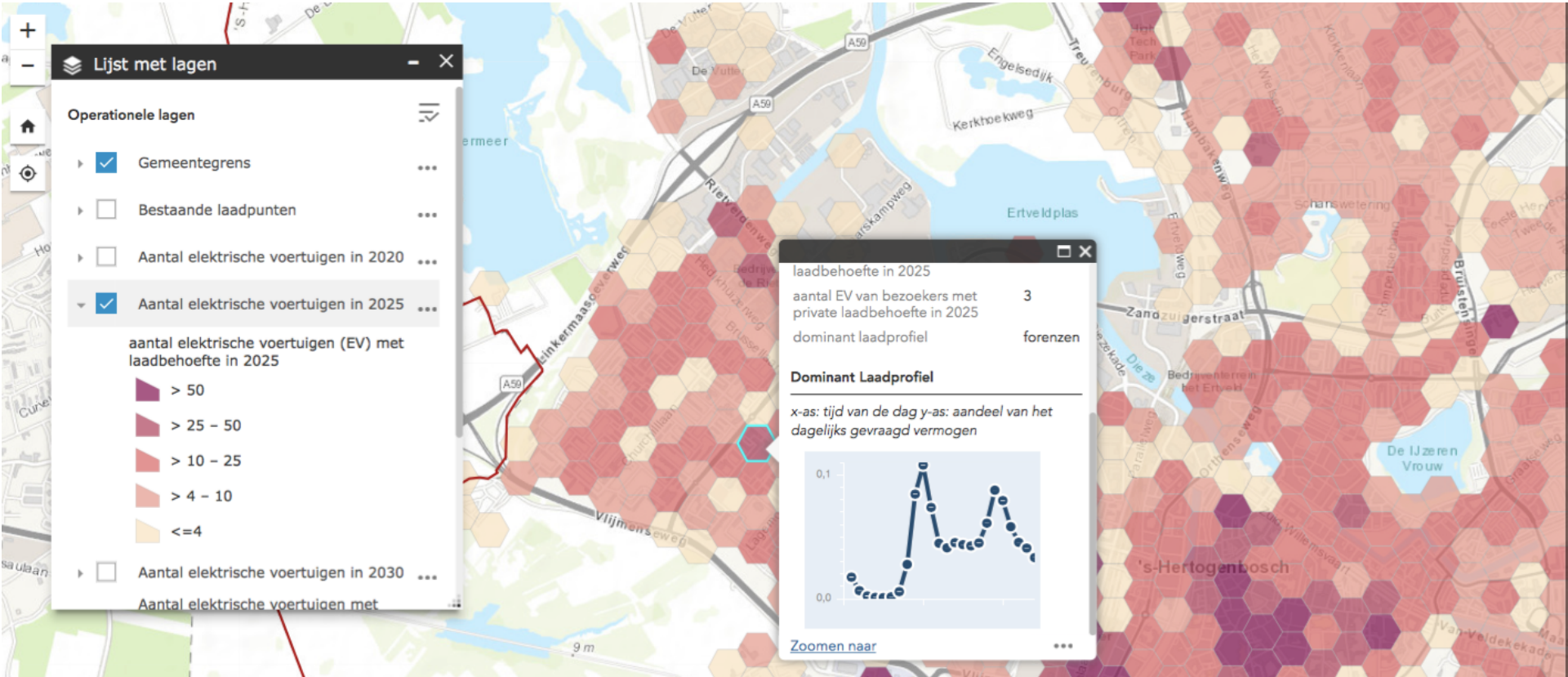
Showcase: ‘s-Hertogenbosch

EV-ready parking facility

- Solar panels
- Charging infrastructure
- Stationairy battery
- Fast-charger e-bus
- Energy Management System

Showcase: Public Charging intelligence

Insight in adoption and charging need



Agenda

Trends
- Trends and developments energy transition

Electric mobility
- Developments driving & charging
- EV-adoption prognoses

Smart charging
- Steps to find the best solution
- Best practice parking facilities

Conclusion
- From challenge to solution

Energy Transition

Trends & developments

Trends & developments

Electric transport as enabler in the energy transition

Exponential growth EVs	More renewable energy	Flexibele diensten
		
• CO_2-reduction & clean air • Fuel efficiency & low maintenance • Positive TCO	• CO_2-reduction & clean air • Unstable energy production	• V2B, V1G & V2G • Smart buildings • Energymarket

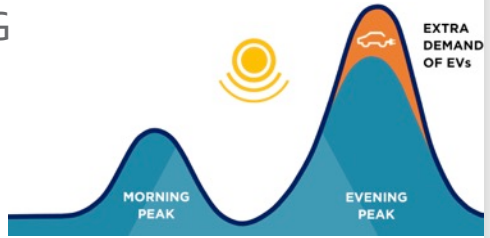
Trends & developments

Challenges

- Solar and Wind
  - ➢ Decentralised
  - ➢ Unpredictable
  - ➢ Uncontrollable
  - ➢ Day- & seasonal fluctuations

Solutions

- Stationary storage in batteries
- H_2-production overcapacity
- Smart Charging
  - V2G
- From:



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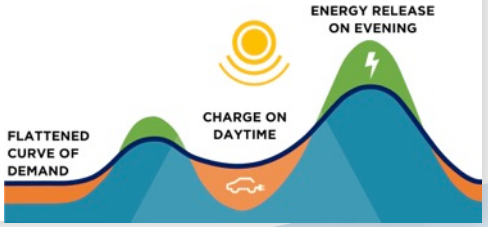


Developments Electric Mobility

Developments electric mobility

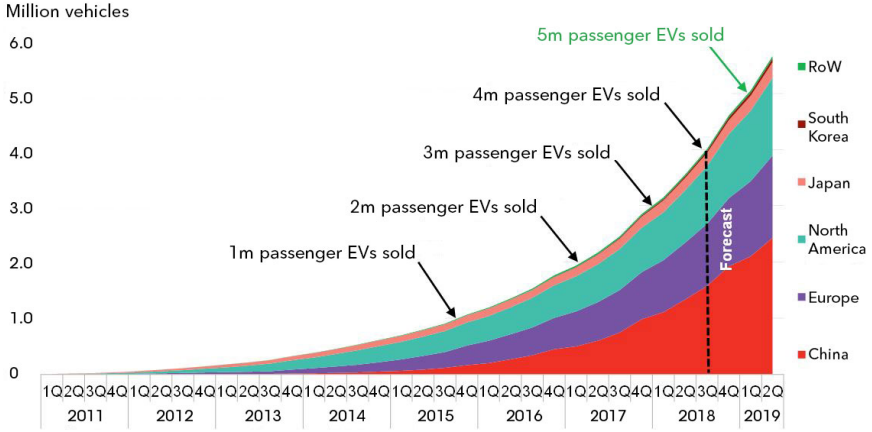
Ever larger and heavier vehicles become electric

Trends & developments

The number of EVs and renewable energy production grow

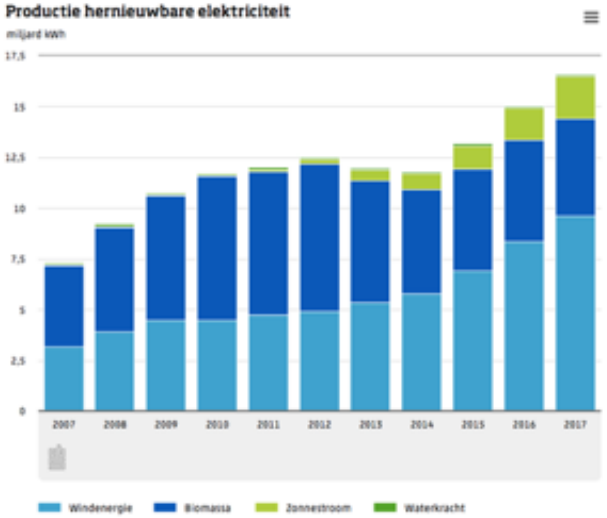
- Nearing 5m vehicles on the roads
- Strong growth accross EU

Figure 3: Cumulative global passenger EV sales, current and forecast



Source: Bloomberg NEF

- Continues rise in renewable energy production

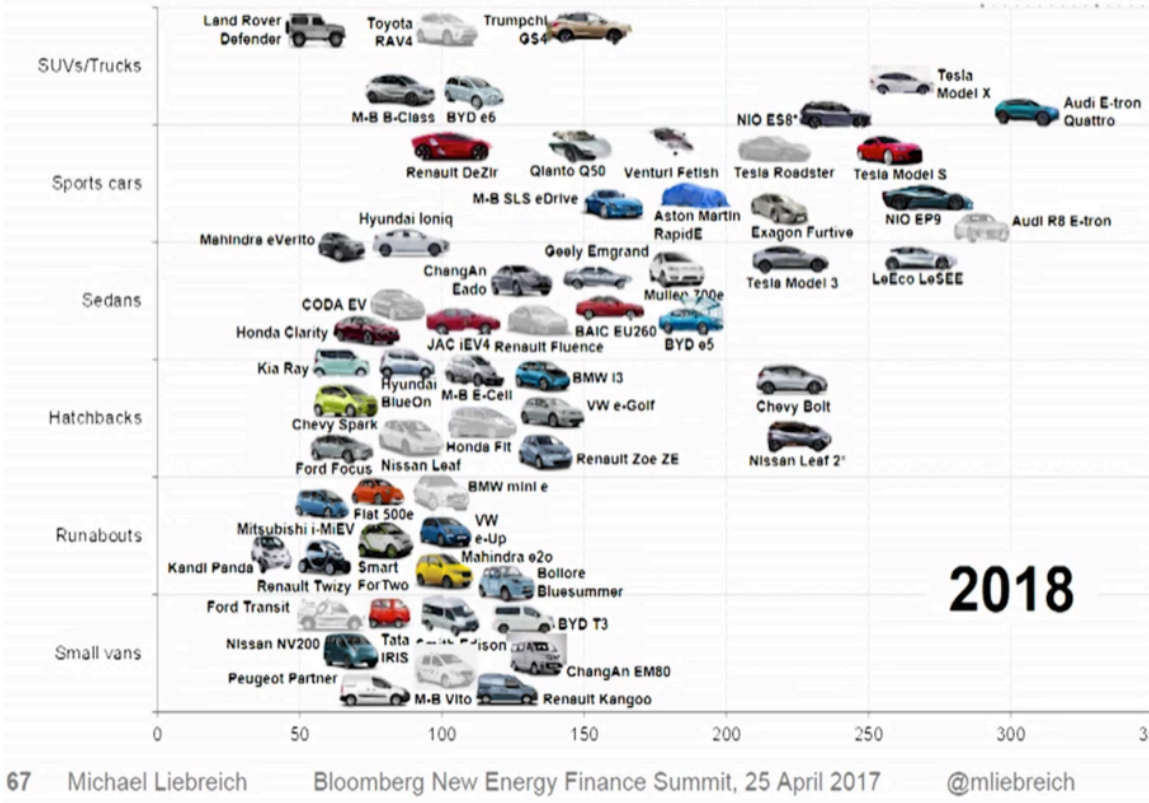


Source: CBS

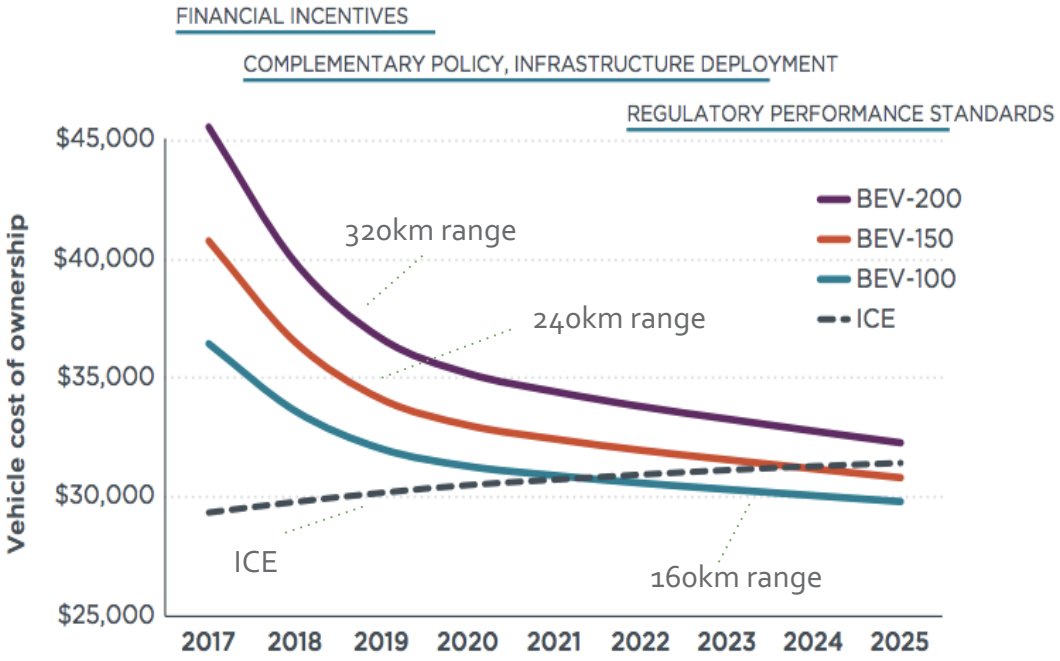
Developments electric mobility

Cheaper models with more range

- More models with larger range available
- EVs are introduced in all segments
- Range up to 500km
- All major brands come with BEV (fully electric) models



Developments electric mobility



Source: ICCT

Developments electric mobility

Charging locations

Fast charging

Mostly done along the highway

Public charging

On street, shared with other EV drivers

Semi-public

At shopping areas, supermarkets, parking garages, etc.

Private charging

At home or work

Developments electric mobility

Charging point fitted in environment and speed up

2009

Charging lamp post

Streetplug

Induction

3,7kW

11kW

50-175kW

375kW

Three ways to…

Save cost with Smart Charging

Best practice charging in parking facilities

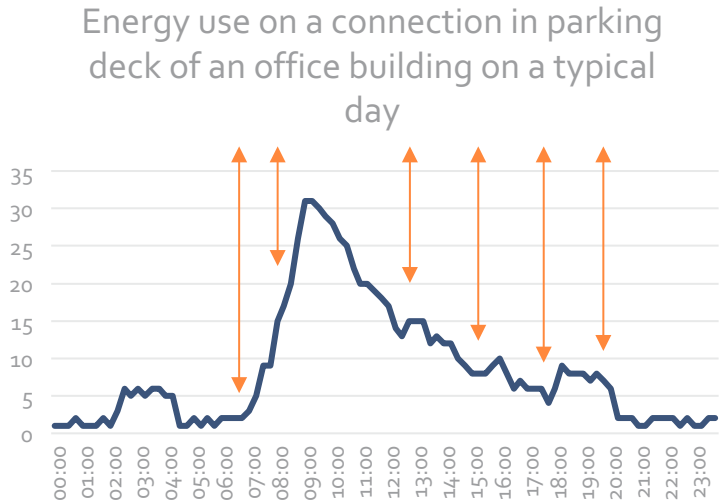
1	Base charging solution on energy consumption building, not the other way around.
2	Smart charging is an umbrella term, select the best functional solution.
3	Plan ahead and be ready for future demand

Best practice charging in parking facilities

4	Challenge the market for user friendly solutions.
5	Smaller organisations: optimize knowhow and position by a combined tender.

Save cost by charging smart

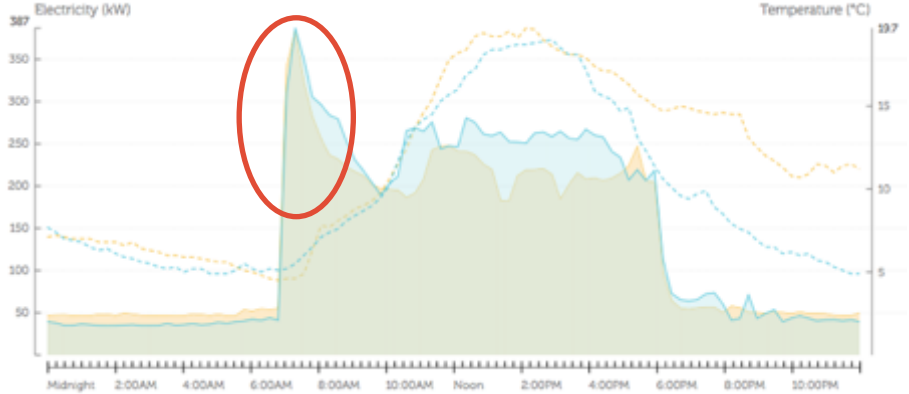
Energy consumption & charging solution



Trends & developments

Problem: Charging peaks cause imbalance and high energy costs in buildings

- Energy in buildings shows consumption peak in morning
- Charging of EVs peaks at the same moment
- Possibly combined solar energy production is low



Typical energyconsumption in a building, during the day

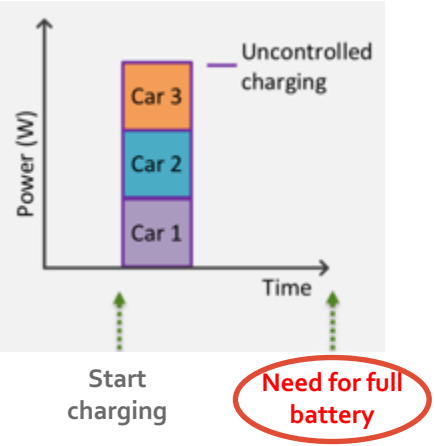
Result:

- **High costs** grid connection due too peak demand
- **Suboptimal** use of energy during day

Save cost by charging smart

Energy consumption & charging solution

- **Uncontrolled charging:**
  - as soon as the EV arrives, the charging starts
  - Usually a full battery is needed later in the day



- **Chances smart charging:**
  - Optimize available grid capacity
  - Respond to fluctuating energy prices
  - Prioritise between vehicles
  - Make (better) use of locally generated renewable energy
  - Trade on energy markets

Best practice charging in parking facilities

1	Base charging solution on energy consumption building, not the other way around.
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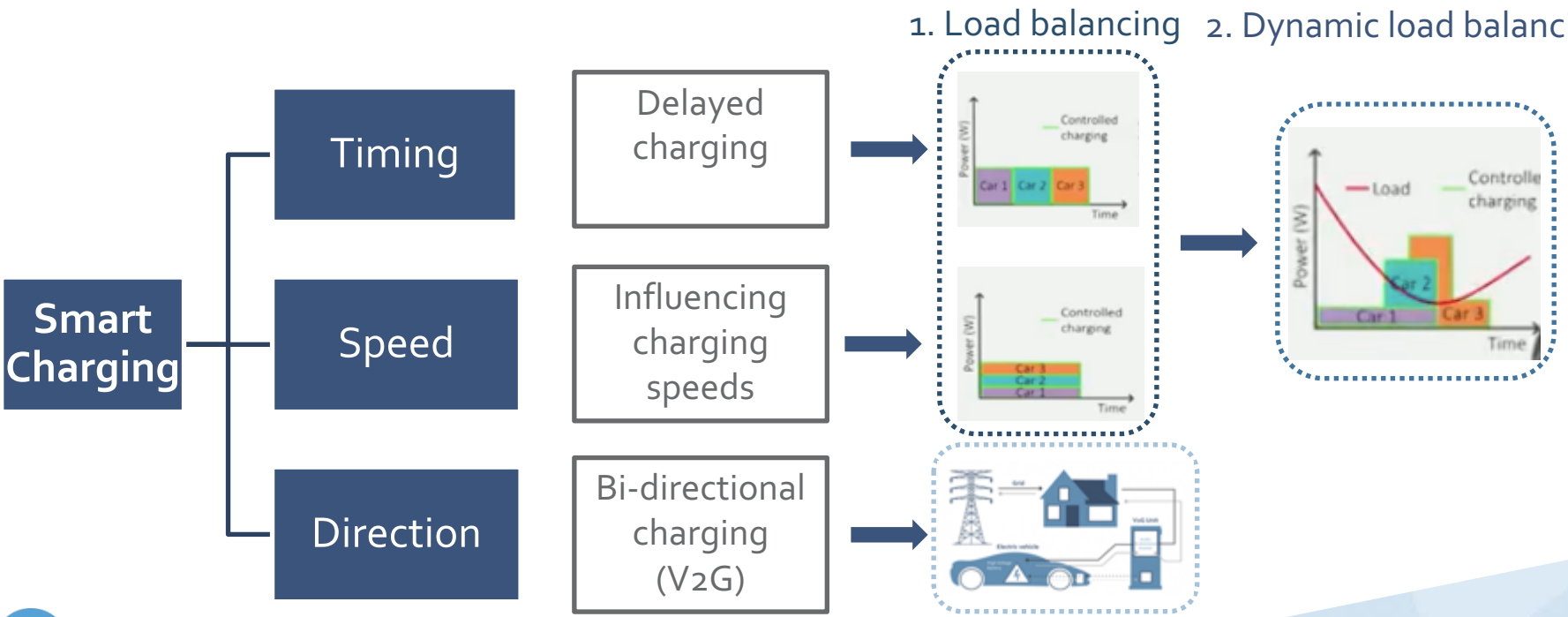
Save cost by charging smart

Smart charging: controlling charging behavior

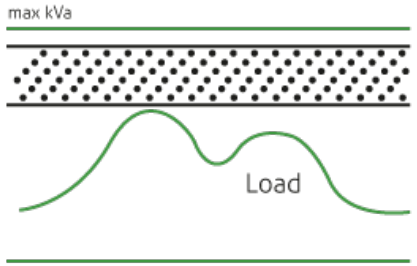


Save cost by charging smart

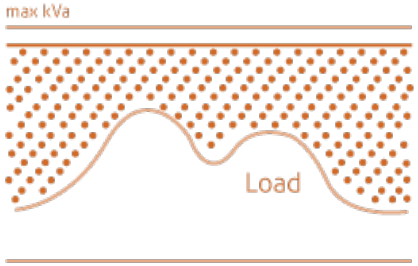
More chargepoints on the same grid connection

Smart Charging
- Timing
- Speed
- Direction

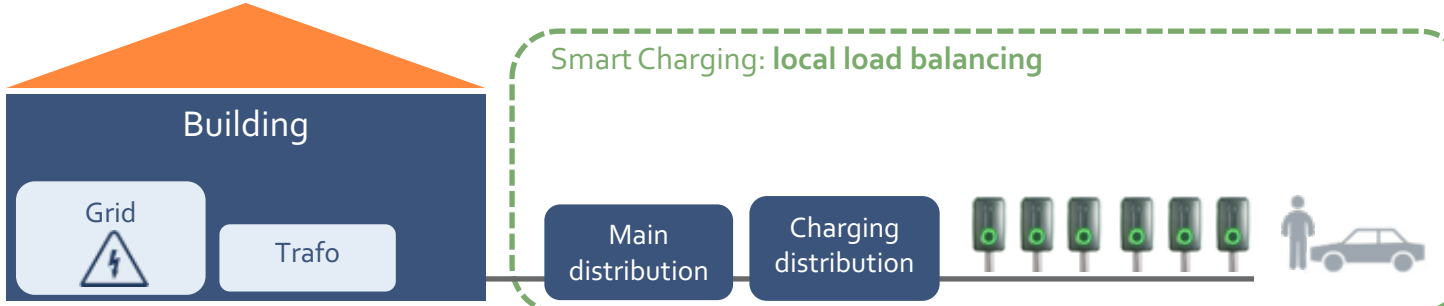
Local load balancing:



Dynamic load balancing:



Smart Charging: **dynamic load balancing**



Best practice charging in parking facilities

1	Base charging solution on energy consumption building, not the other way around.
2	Smart charging is an umbrella term, select the best functional solution.
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Steps for charging infrastructure in parking facility

Growth scenario electric transport → Establish principles → Charging infrastructure variants → Design and calculate technical execution → Weigh variants and make a choice

Main variables for parking facilities

1. % Installed charging points at completion

2. % prepared charging points

3. Maximum charging capacity per charging point

4. Number of EVs charged a the same time

Saving costs by charging smart

Conclusions

From challenge to solution

Based on case specific data the most cost efficient solution is determined

Current trends show challenges

- EV-adoption, local energy use & renewable energy = sub-optimal utilization of capacity

Smart charging solutions

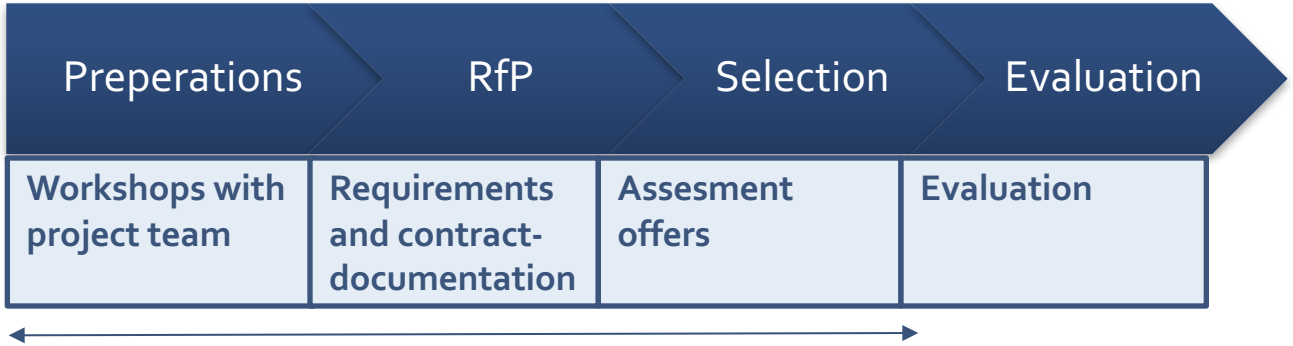
- Smart charging can be used to respond to these developments in innovative ways

Elaboration for the customer

- **Based on customer specific data**
- **Selection of most relevant strategy**
- **Concrete elaboration to realize savings**

Approach to the realization of charging infrastructure

Process: charging infrastructure in line with own objectives



- EV growth forecasts and scalability
- Prevent vendor lock-in versus partnership
- Charging points own terrain versus public and home charging
- Energy management and linking sustainable energy
- Business case

✓ **Cost-efficiënt**
✓ **Future-proof**

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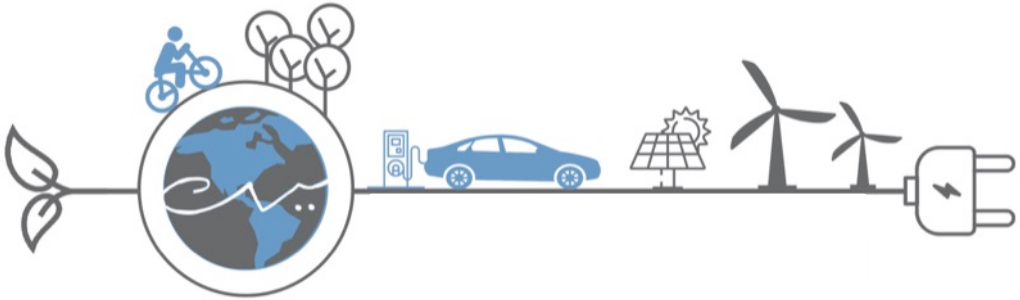
Anticipate the growth of electric mobility

- **The adoption of Electric Vehicles will grow quickly**
  - > 4.000.000 EVs worldwide, more charging locations needed
  - As prices are going down, more models introduced and range extended

- **Include EV parking facilities in design and construction**
  - EV is not only a choice about charging points, but about the energy system
  - Create a scaling plan from the start (this saves a lot of costs and effort)



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Strategisch advies en project management

Overzicht markt en technische mogelijkheden laadinfrastructuur

Home charging
premium OEM

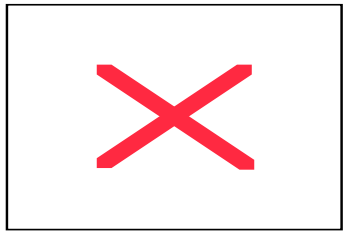
Den Haag, Binnenhof

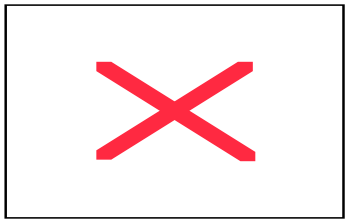
Den Haag, NATO-complex

Den Haag, Raamweg 47

Doorn, Park Huis Doorn

Laadinfra > 80 objecten
Rijksvastgoedbedrijf



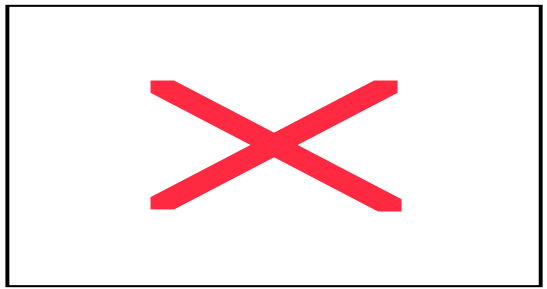


Laadinfra bestelbussen
PostNL en Ahold

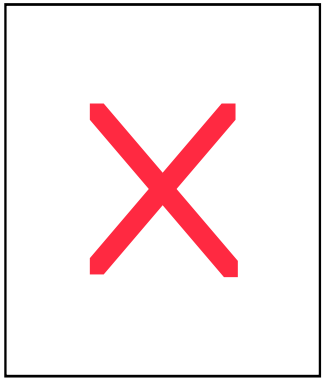
Modellen en prognoses

Inpassing laadinfrastructuur in omgeving en elektriciteitsnet

Weloverwogen keuze voor elektrische bussen op basis 3-lagenmodel



EV prognose atlas en plankaarten voor de uitrol van openbare laadinfrastructuur



Smart charging models voor UKPN

Uitgangspunten lopende aanbesteding laadpunten

Opdracht RVB		• Laadpunten voor 4% van de parkeerplaatsen bij Rijkskantoren
Doel RVB		• Accommoderen doel Rijk: in 2020 20% van dienstauto's elektrisch
Scope aanbesteding in twee percelen	  	• Laadpunten voor 4% parkeerplaatsen bij Rijkskantoren en op parkeerplaatsen van andere Rijksgebouwen • Realisatie slimme laadpunten, beheer & onderhoud, app voor gebruikers, verrekening, monitoring en overige dienstverlening • Overname bestaande laadpunten • Innovatiegebouw en jaarlijkse innovatie
Scope aanbesteding in aantallen		• 15 Rijksonderdelen • 2 percelen • Circa 2.000 laadpunten

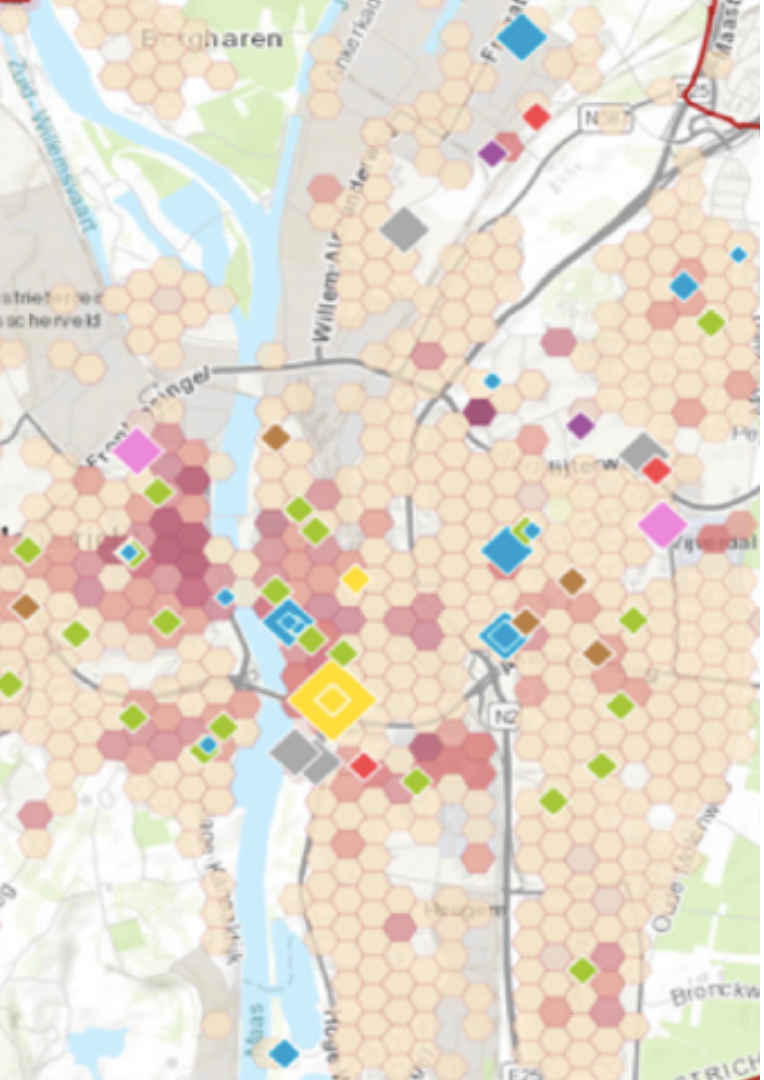
In NL nu 18.0000 openbare en 17.000 semipublieke laadpunten

Rijksvastgoedbedrijf
Ministerie van Binnenlandse Zaken en Koninkrijksrelaties

KPIs lopende aanbesteding laadpunten

Uniformiteit maar ook klanttevredenheid gebruikersgroepen	Inpassing structuur Rijk en beheersbaar contract	Toekomstbestendig en uitbreidbare oplossing
		
• 2 percelen: 1e voor RK en 2e voor Specialties • Herzieningsclausule voor aanvullende functionele wensen gebruikersgroepen	• Strikte geschiktheidseisen • Customished dashboards voor verschillende gebruikersgroepen • Marktconform tarief bezoekers en voordelig tarief dienstauto's	• Laadopstelling gemakkelijk uit te breiden • Slimme onderlinge verdeling (*load balancing*) en gereed voor *dynamic load balancing* • Pilot gebouw met innovatieve toepassing • Jaarlijks innovatievoorstel

Rijksvastgoedbedrijf
Ministerie van Binnenlandse Zaken en Koninkrijksrelaties



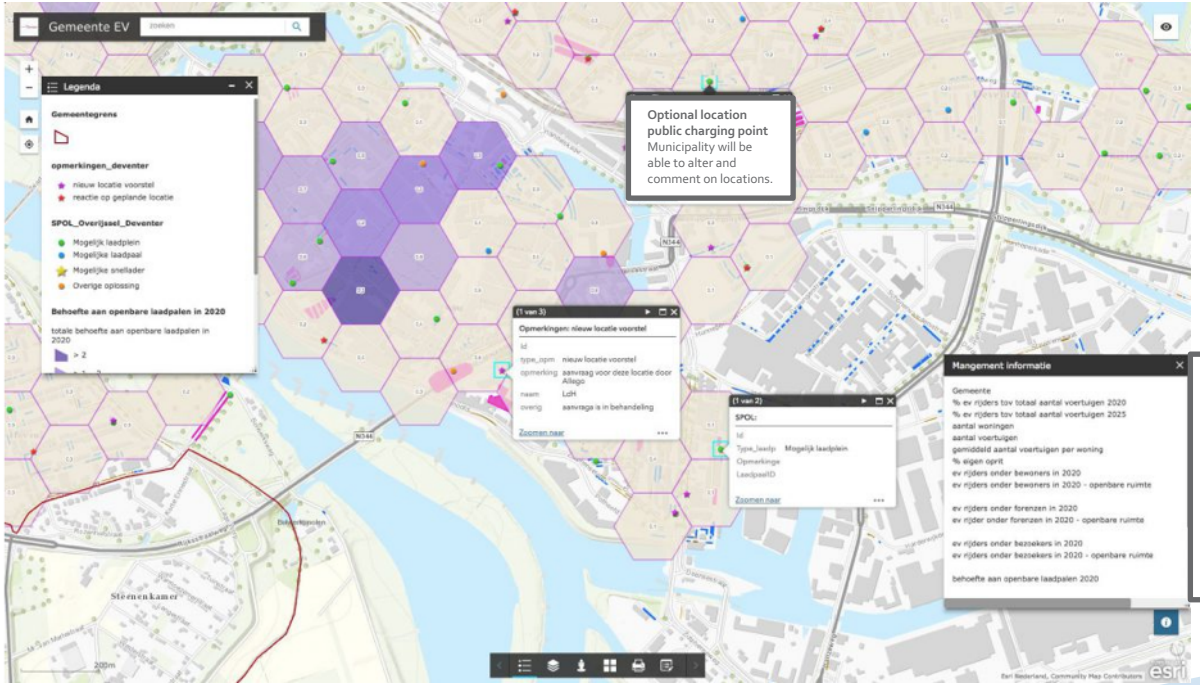
Charging strategies

EV-forcast and simulation

- **Goal:** provide insight in the future demand for charging infrastructure – performing case studies of EV adoption and local impact.
- **Users:** Cities/municipalities, charge point operators, grid operators, project developers, OEMs.
- **Data:** geographic, socio-demographic, car-ownership, EV developments and purchase behaviour.

Charging strategies

EV-forecast and simulation



Management information

> % of EV in total 2020
> % of EV in total 2025
> Number of residences
> Number of vehicles
> Number of vehicles/residency
> % private driveway
> Number of EV-drivers, public and private charging need
- Residents,
- Commuters
- Visitors

> Need for public charging stations 2020