

Electric Vehicles

Evergreen Consulting
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Overview

Introduction

Understanding electric vehicles

- The vehicles
- Charging and infrastructure

Business "how to"

Local authority "how to"

Hands-on of a typical charge point

Hands-on of a real electric vehicle

Introduction

History

- Started going green in 2007
 - When realised a typical household uses about 20,000 litres/year of pure drinking water to flush poo down the loo.
- Personal Goal
 - To create a better world by maximising the take-up of electric vehicles



Introduction (cont'd)



Came from the dark side!

Introduction (cont'd)

Contents

- Practical consideration

Take-aways

- Use real world worst case range figures
- Planning needs to be based on
 - Practical data where available
 - Thorough understanding EV users thought processes and behaviour
- Tesla chargers don't support all vehicles

Electric Vehicles

What sort of vehicles are we talking about?

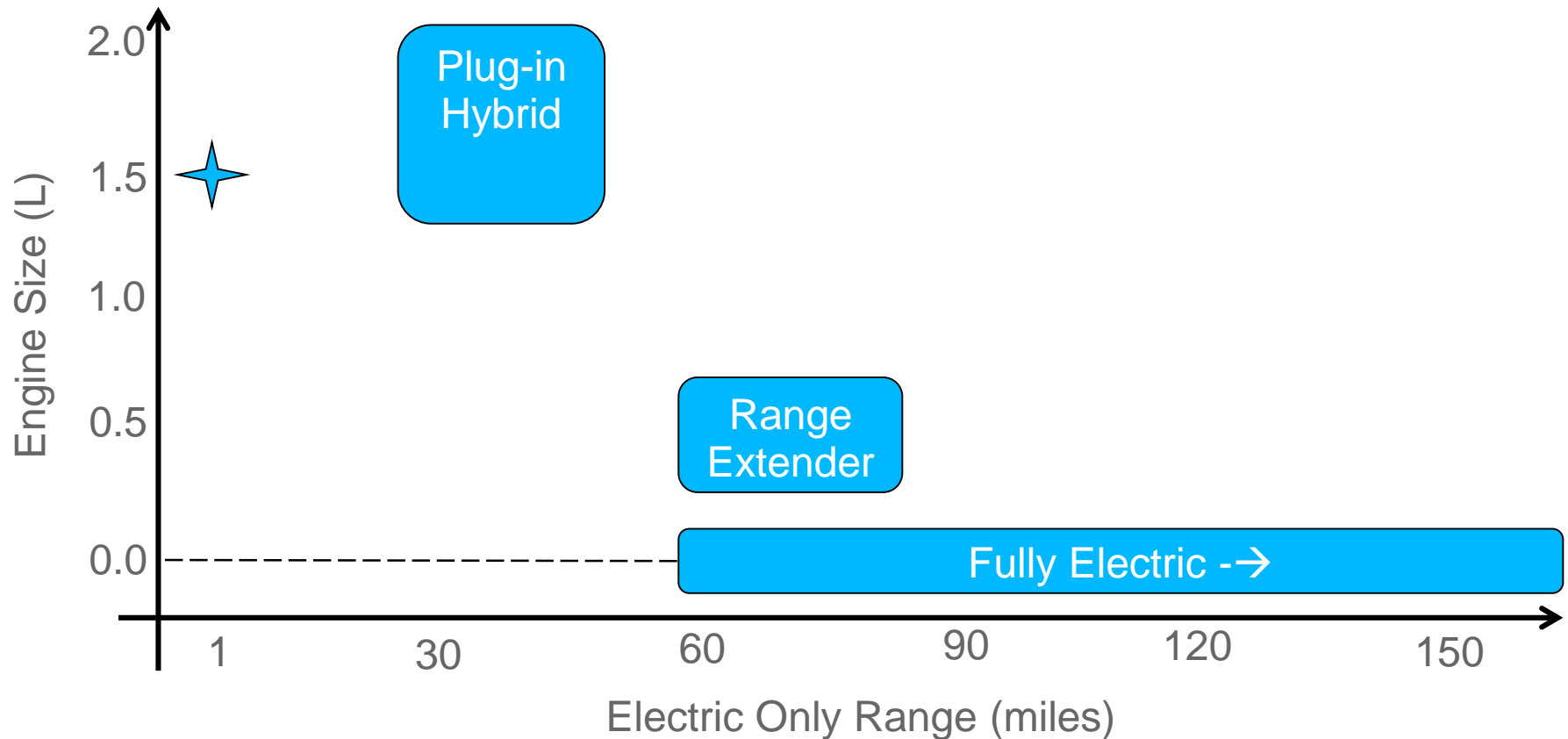


Electric Vehicles (cont'd)



Electric Vehicles (cont'd)

Types of Plug-in Vehicles



Star is a normal (non-plugin) hybrid

Electric Vehicles (cont'd)

Similar (affordable vehicle) performance

- Similar acceleration
- >90 mph top speed

Similar whole life cost ^[1+2]

- Fuel savings (£1k/year^[1] cf diesel) pays for higher purchase cost
- Cheaper to purchase in 2025

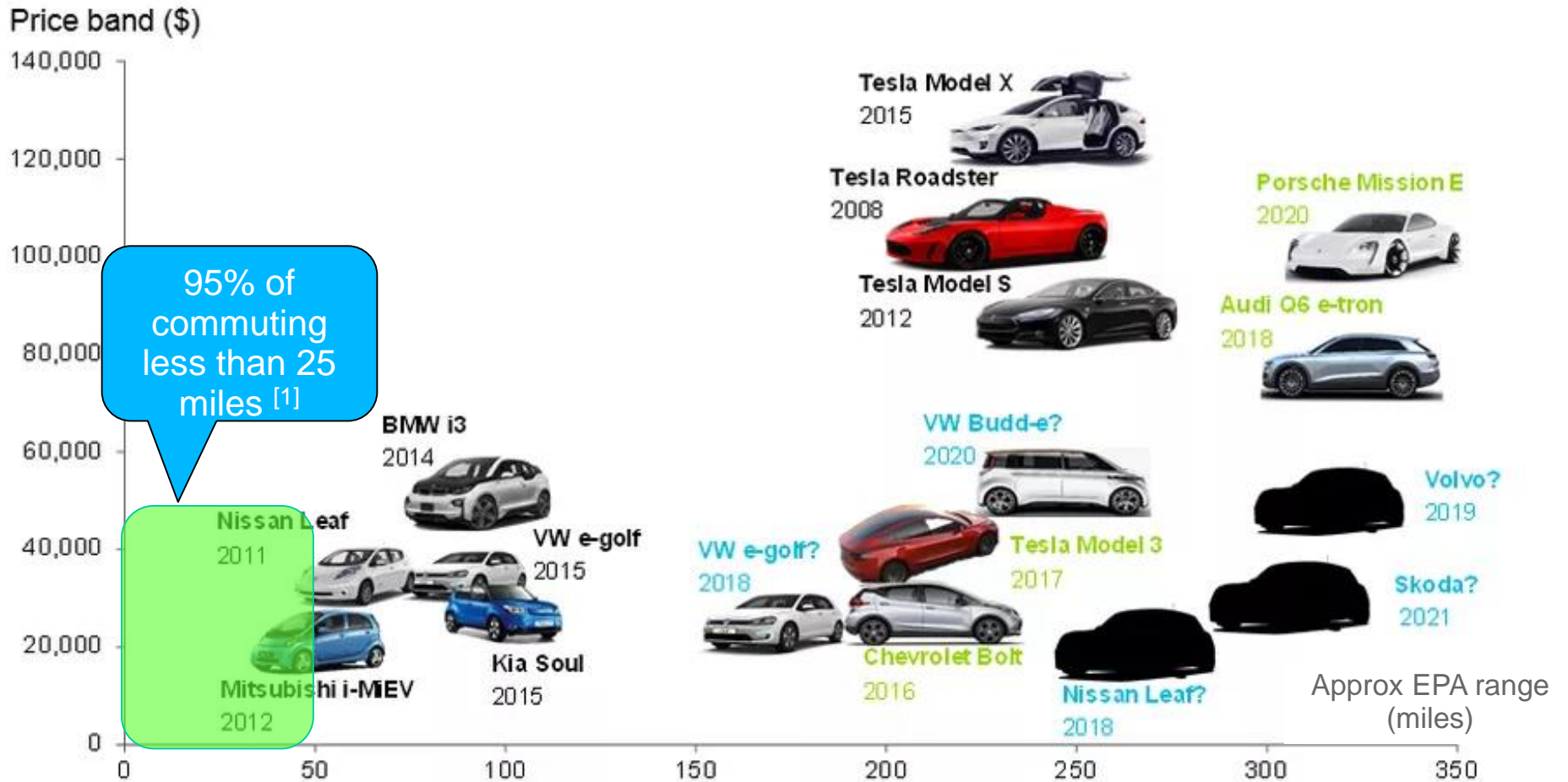
Similar life

- >100,000 miles^[1]

[1] For 12,000 miles per year for 8 years

[2] Including Government grant typically of £5k

Electric Vehicles (cont'd)



Note: Selected US battery electric vehicles (BEV) only. Positions are representative and do not indicate exact prices or range. Back labels = currently available, green labels = forthcoming models with specifications and timeline released. Blue labels = announced but limited details confirmed. Range is based on manufacturers statements, not on any specific test cycle.

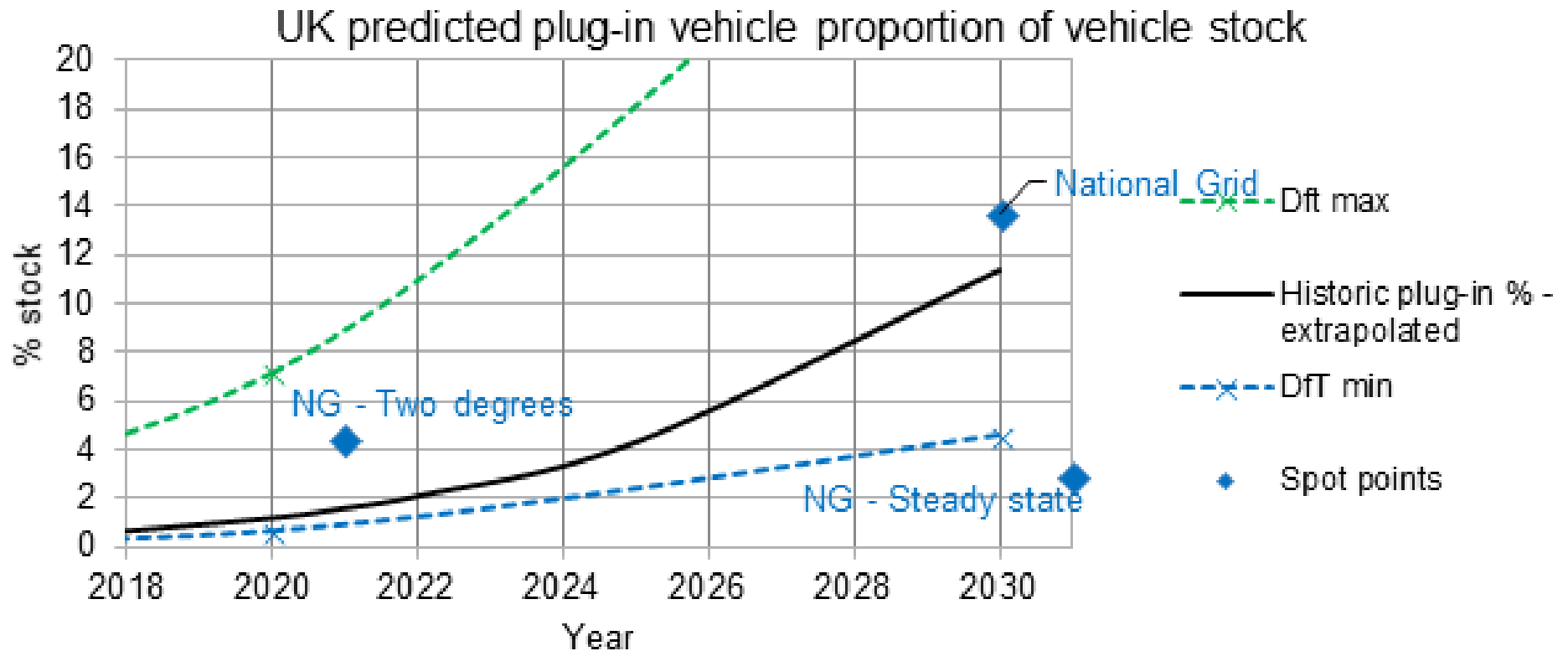
Bloomberg
NEW ENERGY FINANCE

[1] "Sex and distance travelled to work by method of travel to work, Office for National Statistics"



Electric Vehicles (cont'd)

Future Take-up



Electric Vehicles (cont'd)

Fuel

- 100% renewable supplies available
 - Ecotricity, Good Energy, Ovo, etc
 - Switching encourages renewable industry

Vehicle selection

- <http://ev-database.uk>
- Plan for worst case real world range
 - winter = 50% of NEDC or 70% of EPA
- Leasing battery - not good for second hand value
- Leasing vehicle - fuel savings help pay for lease
- Active second hand market

Summary/Questions

Electric vehicles are viable and cost effective

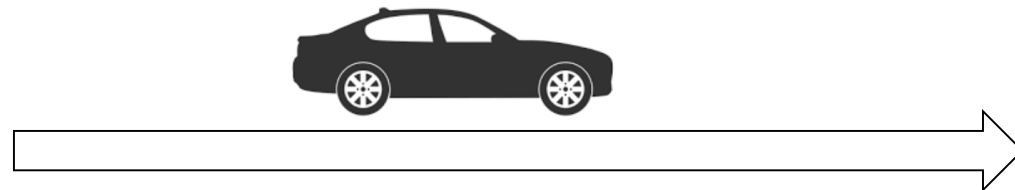
Plan for worst case range



Infrastructure



Destination
14 hours



En-route
Min duration



Destination
8 – 12 hours



Infrastructure (cont'd)

Types - Rapid



Location

- Have to stop on a journey

Duration

- Time critical
- Limited by car and charger power
- Charge to 80% in 30 mins

High power 50 kw

Infrastructure (cont'd)

Types - Slow & Fast

Location

- Home, work, temp accommodation, etc

Duration - defined by stay

Low power 3-7 kw

Home

- Tethered is more convenient

Other

- Socket allows support of different vehicles
- Users already have adapter cable



Infrastructure (cont'd)

Tesla Charger Problems



Super charger

- Not compatible with non-Tesla cars



Destination charger

- Plug not compatible with 80% of vehicles
- Cannot use standard adapter
- Needs an additional non-standard adapter
- No charging security

Summary/Questions?

Destination charging – fits to duration

En-route charging – as quick as possible

Tesla chargers not suitable for all vehicles

Business “How to”

Fleets

- Business need
 - space to charge vehicles overnight
 - vehicles taken to home with off-road parking
- Select suitable vehicles for analysis
 - Quantify driving/stopping habits
 - Calculate charging plan using
 - Worst case range = 50% of NEDC value
 - Charger power (kw) = $0.25 * \text{distance/hours}$
 - Consider available mains capacity of building
 - Decide on

Business “How to” (cont’d)

Employees

- Support those without off-road parking with simple slow chargers
 - Ie 50% of house-holds
- Size the charger to the typical duration of stay and users needs
 - Eg 0.25 x 20 miles / 8 hours
 - Minimises abuse if free
 - Avoid networked chargers



Summary/Questions?

Fleet needs analysis

Employees without off road parking need charger

Simple low cost chargers are best

Local Authorities

Creating an infrastructure strategy

- Quantify the likely growth of EVs in the LA district over the next 5 to 10 years.
- Analyse EV user needs in the region
 - Taxis
 - Householders without off-road parking
 - Commuters with and without off-road parking
 - Visitors travelling long distance
 - Understand user alternatives to using or charging EV
 - Most charging performed at home at off-peak rate
 - Use ICE second hand car

Local Authorities (cont'd)

- Identify optimum locations for charging infrastructure.
- Determine the best type of charge point infrastructure for each location
- Consider cost effective novel options, eg

Issue	Initial solution	An example novel solution
Lack of off-street parking	Install expensive on-street parking at say £5,000/post	Subsidise applicant to install charge point at work at £?00/post
Lack of off-street parking	Install expensive networked destination charge points with associated expensive back-office fees £100/year/single-post	Gather fees by <ul style="list-style-type: none">• defining a different parking ticket• standing order, etc.

Summary/Questions?

CP strategy - needs to fully understand users

Save money by considering novel solutions

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