#LCV2019 @LCV_Event

Understanding the True Value of V2G

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LCV2019 Event Sponsor:

GEOTAB®
management by measurement

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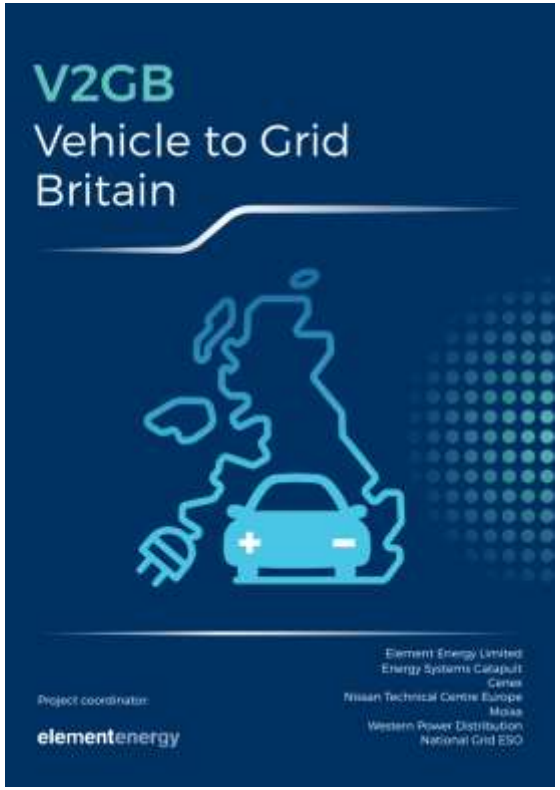
Cenex Modelling & Simulation Lead

ITHECA 2015

EFES 2015-17

Sciurus July 2019

What can V2G do today?



- Revenue Streams
- Customer Archetypes
- Possible Value

V2G Projects funded by OLEV and BEIS

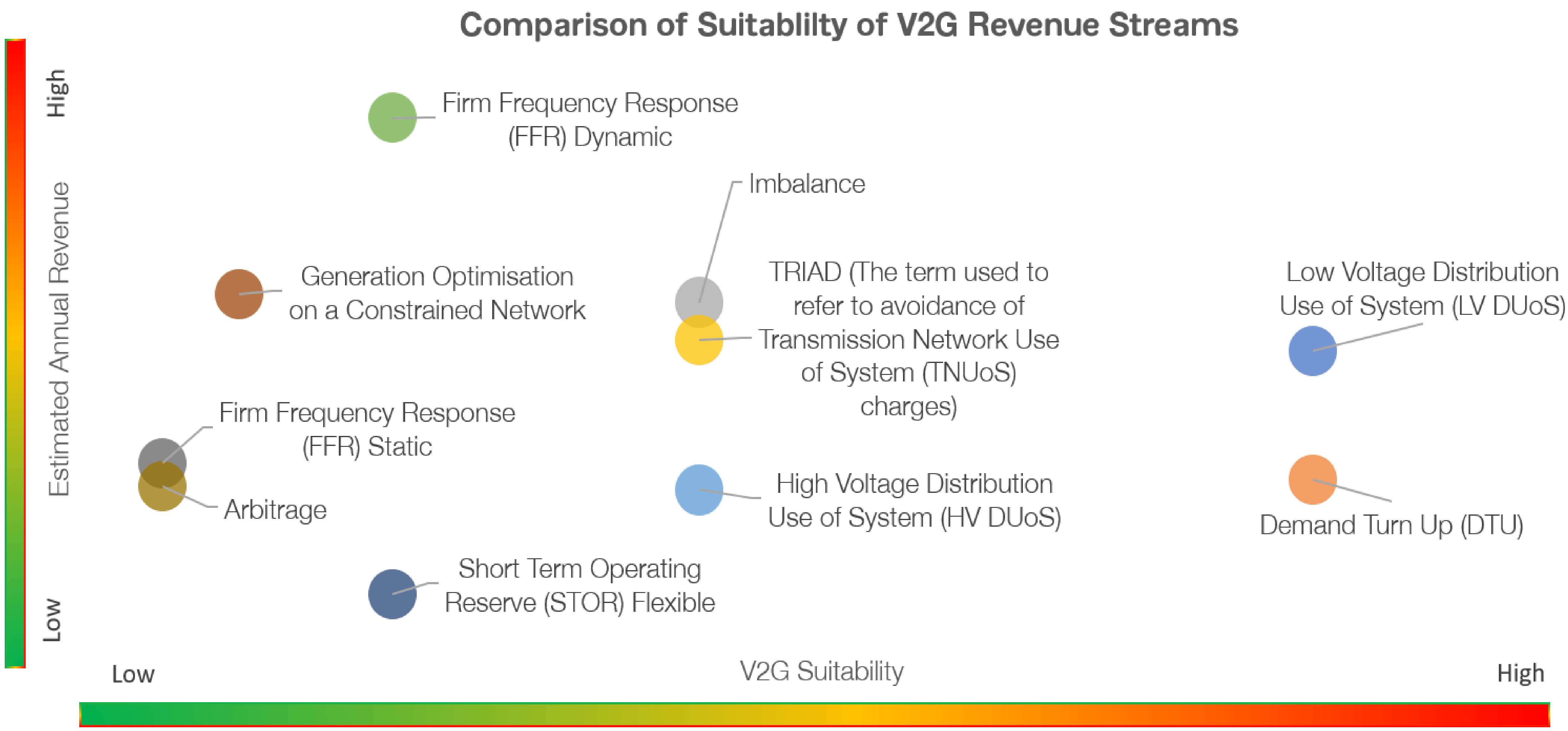
EV-elocity

project sciurus

Department for Business, Energy & Industrial Strategy

Office for Low Emission Vehicles

Innovate UK


Comparison of Suitablilty of V2G Revenue Streams
Estimated Annual Revenue
High
Low
V2G Suitability
Low
High
Firm Frequency Response (FFR) Dynamic
Imbalance
Generation Optimisation on a Constrained Network
TRIAD (The term used to refer to avoidance of Transmission Network Use of System (TNUoS) charges)
Low Voltage Distribution Use of System (LV DUoS)
Firm Frequency Response (FFR) Static
Arbitrage
High Voltage Distribution Use of System (HV DUoS)
Demand Turn Up (DTU)
Short Term Operating Reserve (STOR) Flexible

What Determines the Best Customer Archetype?

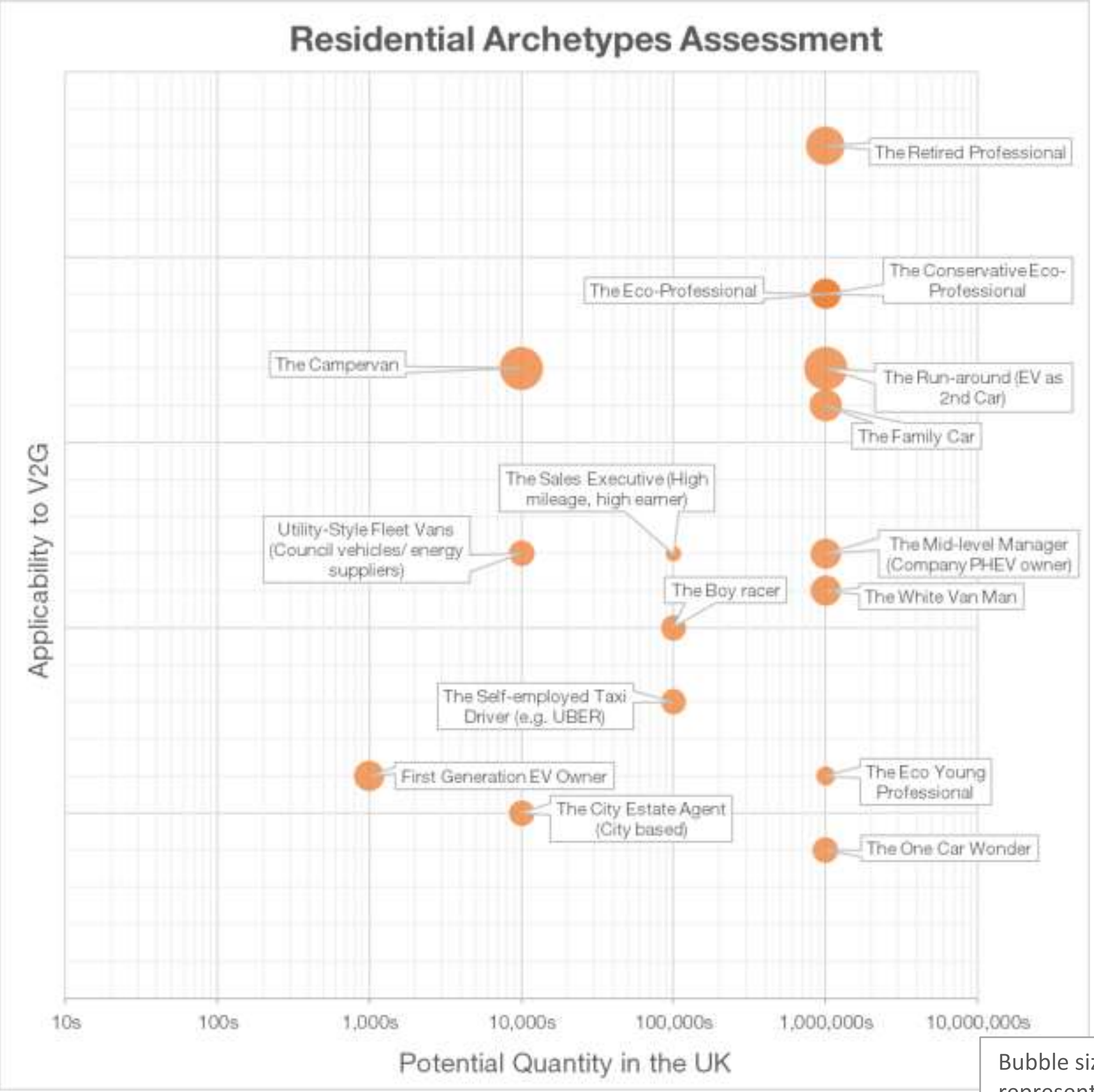
Predictability of Plug-in Pattern

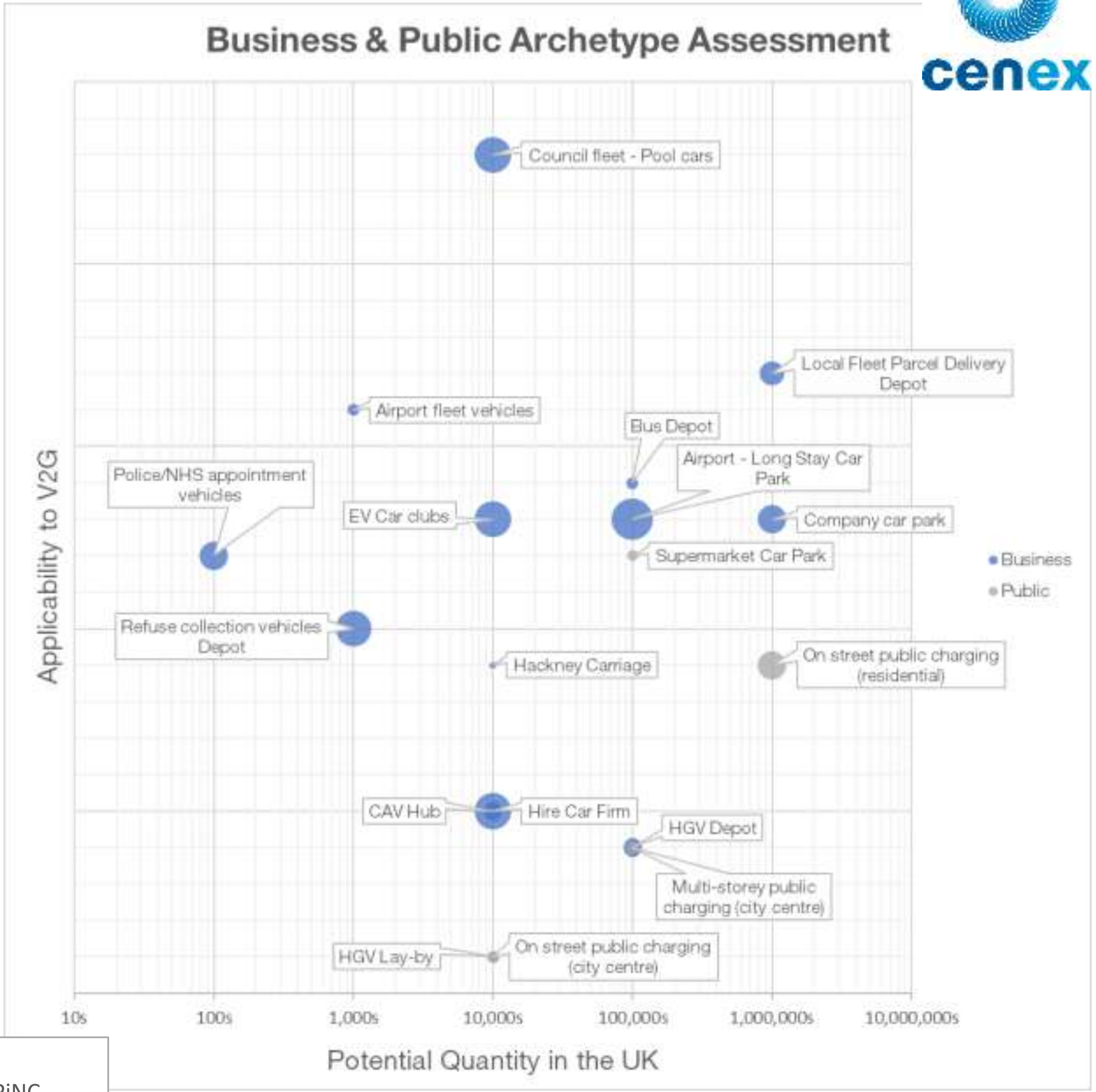
Plug-in Duration

Journey Demand

Battery Size

Plugged-in Not Charging (PiNC) time - %





Bubble size represents PiNC time.
= 50%

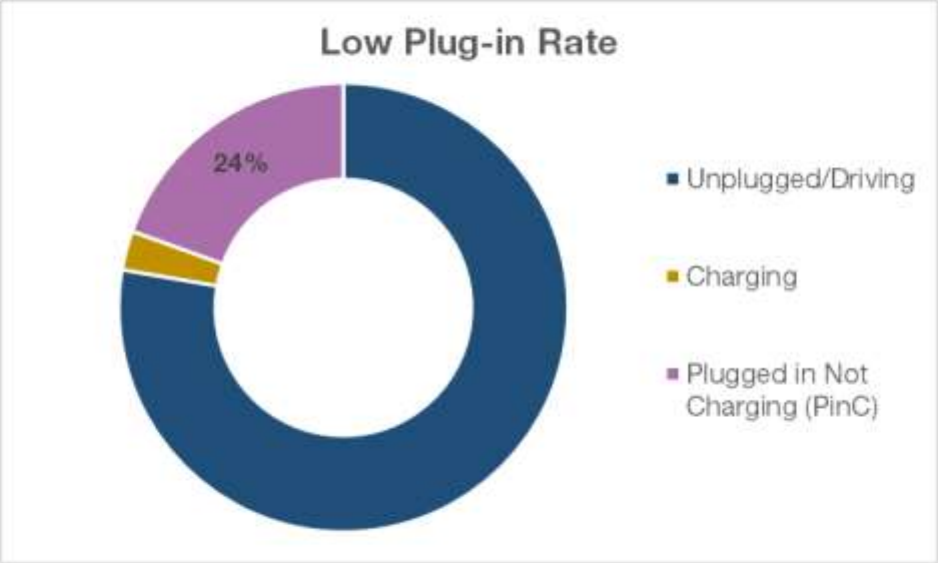
Archetype Portfolios Used in Modelling

Low Plug-in Rate

Existing EV plug-in behaviour (60 cars).

Archetypes:

- Council fleet – Pool cars (PiNC 28%)
- The Eco-Professional (PiNC 21%)
- The Retired Professional (PiNC 13%)
- The Run-around Company car park (PiNC 74%)



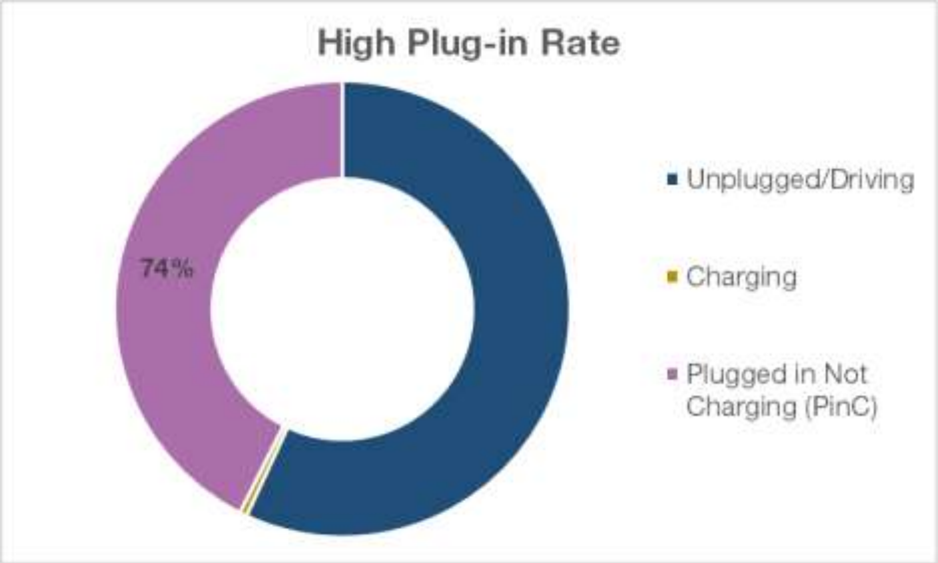
High Plug-in Rate

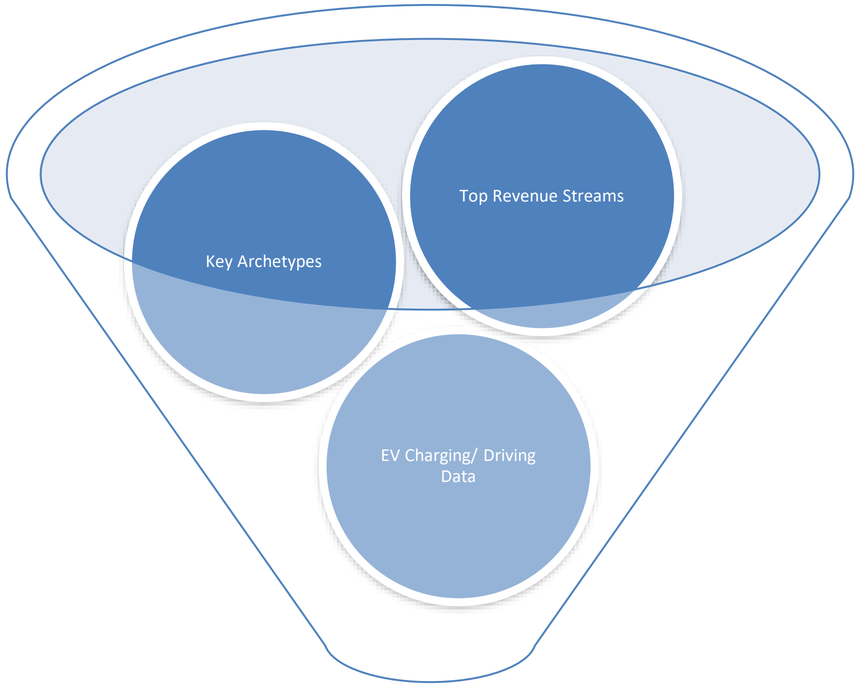
V2G user with incentive to plug-in.

Simulated portfolio (60 cars).

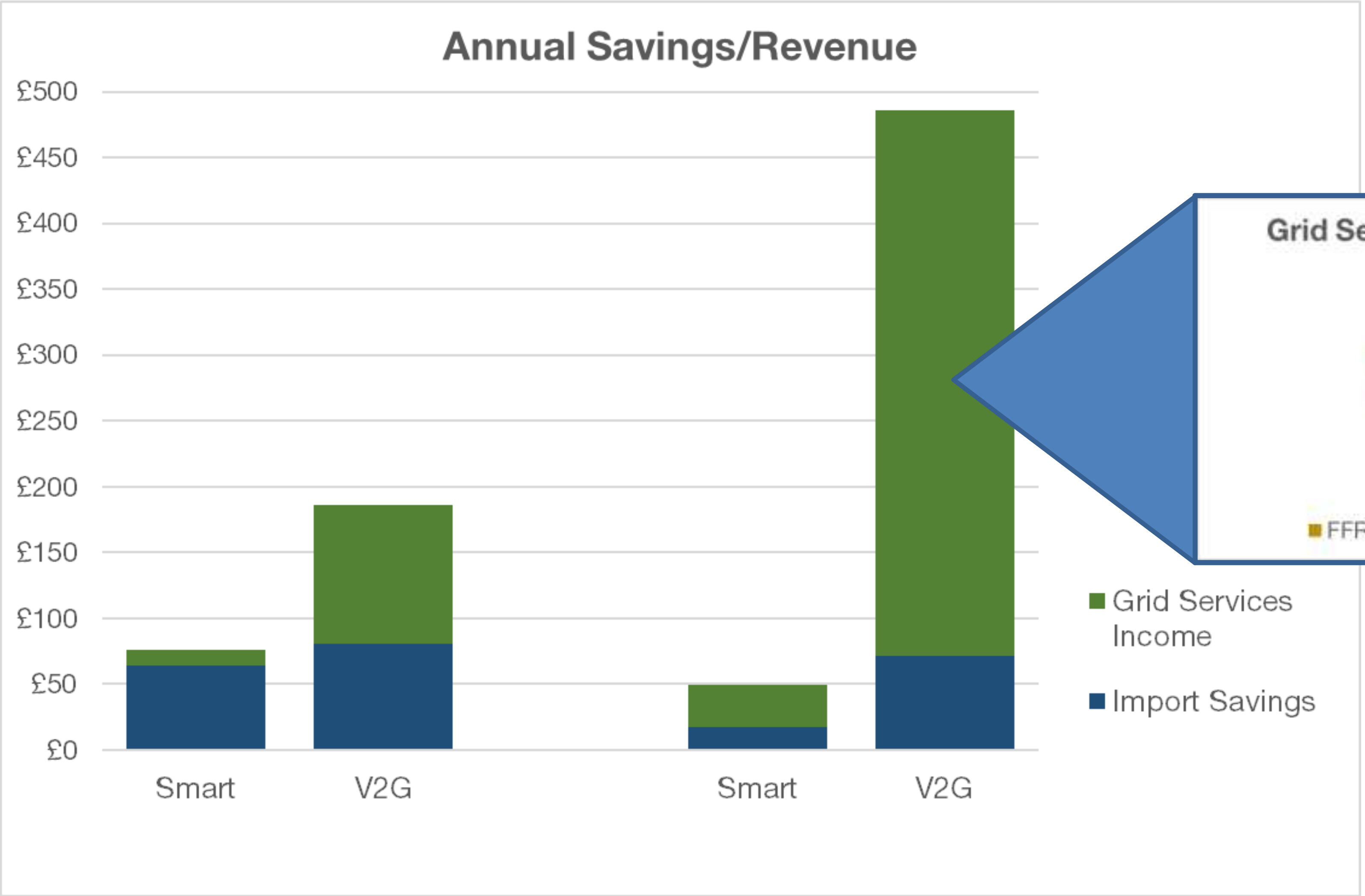
Archetypes:

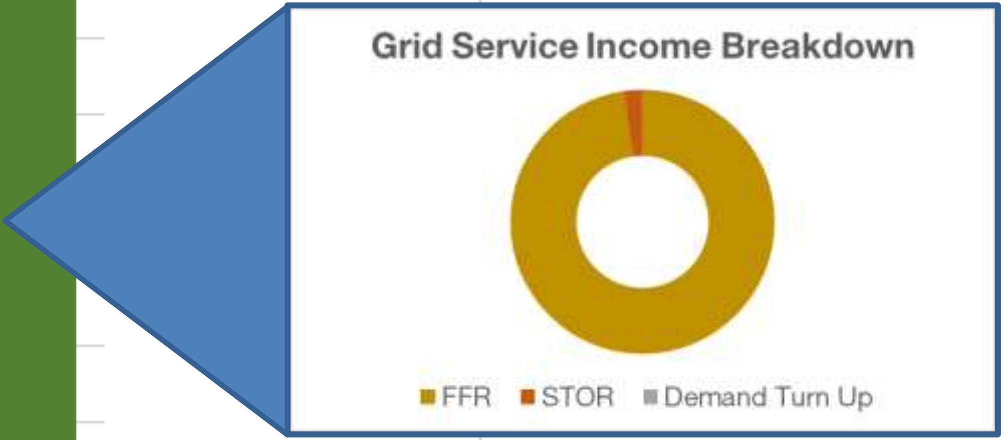
- The Run-around (EV as 2nd Car) (PiNC 74%)





Optimised Charging Schedules & Grid Service Participation





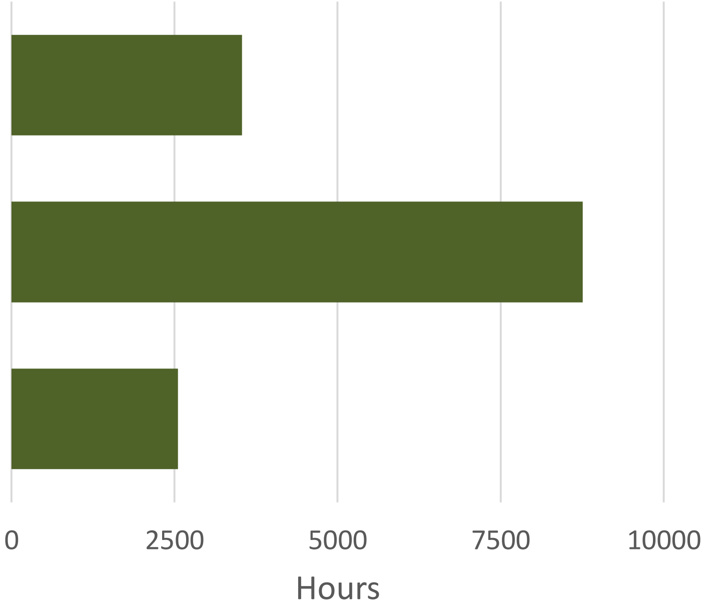
	Low Plug-in	High Plug-in
PiNC time	24%	74%
Approx. Annual Mileage	6,500	1,750

Savings/Revenues are based against a counterfactual of a residential customer on a single rate tariff with dumb charging.
Smart/V2G bars are based on an Economy 7 tariff and access to TSO grid services.

What’s best for the battery?

- Degradation effects of V2G on EV batteries are complex.
- But revenue streams can be ordered by revenue per discharge volume from V2G.

Revenue Stream	Price Assumptions	Revenue per kWh of Discharge From V2G Unit	Max Annual Hours Service Can Be Offered
STOR (Short Term Operating Reserve)	£2.40/MW/h Availability £150/MWh Utilisation	27p	
FFR (Firm Frequency Response- Dynamic)	£8/MW/h	20p	



Risks & Opportunities

Risks

- Revenue demonstrated is heavily dependant on FFR prices which are on a downward trend.
- Flexibility services continue to change (DTU now discontinued).
- Battery degradation effects still unclear.

Opportunities

- V2G hardware costs are falling.
- New DSO services are emerging (but location dependent).
- Flexibility will continue to have a value within the wider energy system (new opportunities such as Wider Access to Balancing Mechanism).
- Additional revenue from Wholesale Energy Market optimisation may be available.

Thank you for listening

For further information pick up our “True Value of V2G” report at:

https://www.cenex.co.uk/energy/vehicle-to-grid/

Or Google “Cenex V2G”

Greg Payne