



Charging into the 4th Industrial Revolution

A GREEN PAPER ON ESTABLISHING THE BLUEPRINT FOR
ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

The opportunity

The delivery of electric vehicle charging infrastructure in the UK has the potential to generate significant revenue return to the Exchequer, create significant public value and establish a global template, placing British iconography at the heart of the 4th Industrial Revolution.

This Green Paper sets out recommendations for Government to capitalise on the provision of a new social infrastructure model across the UK.

**The UK Government
has the opportunity to:**

Capitalise on a £64 billion/
year industry

Deliver a new social
infrastructure that is fair and
equitable to all of society

Lead the world by creating
a global blueprint for the 4th
Industrial Revolution

Government has a unique opportunity to wrap its long-term decarbonisation of road infrastructure into a market mechanism that gives investors stability and users an equitable price guarantee.

In return, the Government will generate significant revenue return to the Exchequer.

To ensure Government maximises the benefit of this new market offer the following FIVE policy mechanisms should be created and delivered:

1

Government should establish a White Paper, alongside the Autonomous and Electric Vehicles Act, on the delivery of Society Service Stations, establishing the geographical preferences for the assets based on existing power and road networks.

2

A concession structure and auction, similar to the mobile phone networks, should be established to control the Electric Vehicle Charging Provider's access to power infrastructure, and direct it to preferred locations defined by a central Government Task Force and the White Paper.

3

OFGEM should be granted responsibility for the roll out of power and charging infrastructure, the concession market, and regulating consumer prices. This should include banning unlicensed charging points which are currently taking power capacity, in some cases, at the expense of economic growth.

4

Permitted development rights should be established for Social Service Stations defined by the needs of DEFRA's 25 Year Environment Plan and socially equitable access to motoring electricity.

5

A mandate should be established through OFGEM for the distribution network operators to be 'ready' at identified sites by 2021.

The problem

A sustainable, rapid charging network requires high power electrical supply. In the UK, the local distribution network or street lighting circuits in our urban or rural environment is not designed to deliver high power loads to individual homes, streets and non-industrial businesses.

This presents a problem for infrastructure investment strategies that look to deliver high power consuming electric vehicle charging points at the weakest parts of our power distribution network.

There is currently no provision within the Autonomous and Electric Vehicle Act 2018 to address the power capacity gaps. They set an obligation for large fuel suppliers (assumed to be petrol retailers) to also provide EV charging on their forecourts. The UK petrol filling station portfolios typically

“The loss of the motor forecourt places 100,000 jobs at risk, reduces access to services for the elderly and takes away over 4000 rural services and businesses”

have no geographic affiliation with our power distribution network. Consequently, they will not be the right place to start building charging infrastructure from.

The wider economic impact of digging up every street in the UK to provide new infrastructure or laying new power cables to petrol stations has not been considered.

Also not considered are the economic implications of displacing existing petroleum forecourts that generate approximately £64 billion a year to the UK economy by a disaggregated and disbursed charging approach.

Whilst displacing petrol sales from the traditional forecourt retail model drives environmental betterment, it potentially places 95,000 jobs at risk, reduces

access to services for the elderly and could take away over 1,340 rural services and businesses.

There is an opportunity for National policy to capitalise on the potential opportunity to obtain revenue from an alternative new market proposition in electric vehicle charging infrastructure; an opportunity that could capitalise on £1.3 trillion market value over a 20-year period. It is this opportunity that is behind our concept for a Society Service Station.

The economy of the UK forecourt

£1.3 Trillion:

Potential Market
Value Over 20 Years

This data is taken from the Association of
Convenience Stores: Forecourt Report 2018

ENVIRONMENT

8418

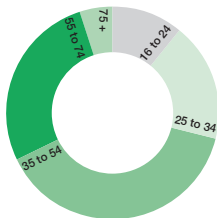
**FORECOURT ENVIRONMENTAL PERMITS
CONTROLLING HYDROCARBON POLLUTION**

 **THE SOURCE OF**

113m TONNES CO₂

SOCIETY

AGE OF CUSTOMER:

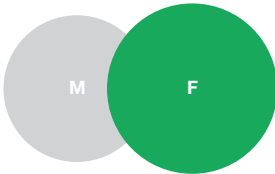


OVER

1/3

FORECOURT
USERS OVER 55

57% OF JOBS
ARE HELD BY
FEMALES



£1.4b

OF TOBACCO, ALCOHOL, SWEETS & SOFT
DRINKS SOLD

ECONOMICS

TOTAL VALUE OF SALES:



RETAIL VALUE OF
PETROL FORECOURTS
£4BILLION

95,000

5%

OF FORECOURTS HAVE A POST OFFICE

AVERAGE SPEND
£5.80

The problem solved

“Bringing national institutions, such as the Post Office and local banks back into communities”

The power capacity to supply electric vehicles (EV) does exist however; just not at the end of existing cables.

The capacity exists ‘up grid’ at the large power substations and ultra high voltage network. Running parallel to all of this ‘up grid’ power capacity is the UK road network; a geographical quirk of constructing our power networks.

This presents an obvious opportunity: why spend billions of pounds retrofitting the UK with new power infrastructure when the existing infrastructure is sufficient? All motorists need is access to this power in an affordable and pragmatic way, which meets society norms and social equality.

The Proposition: The Society Service Station

We need to establish a new land use to provide a universal service to EV car owners.

Government will need to establish policy and economic business cases to enable the spatial planning, design and regulatory context for delivering this new community land use: the Society Service Station.

Fundamentally, the Society Service Station will provide an EV charging system that sits with an established working retail model without introducing barriers to EV ownership.

This modern Service Station, located in proximity to the UK Road and Power

“Delivering DEFRA’s 25 Year Environmental Plan by eliminating waste plastics underpinned by society needs”

Infrastructure will charge cars within 10 minutes at a price comparable with domestic tariff rates and, importantly, offer a new society function in domestic administration whilst charging takes place.

At the centre of the Society Service Station offer will be the ability for consumers to collect both weekly shopping and fast-moving consumer goods and, at the same time, have choice and selection on perishable groceries, liquids and loose produce.

The approach targets delivery of DEFRA’s 25 Year Environment Plan, in reducing packaging and plastic use in favour of combining the ease of an internet shop, the convenience of the local shop, the choice of a supermarket and the need to refill a vehicle with power.

The Society Service Station also offers a touch point for domestic administration; supporting communities who require access to postal and banking services. This can bring national institutions such as the Post Office and local banks back into the communities they have left.

All of this will be underpinned by our existing energy infrastructure offering capacity beyond just electricity.

Socialising the Cost of Infrastructure: the Rights to Power Auction

Wrapping the entirety of this opportunity will be the need to create concessions for EV power retailers to buy into delivering Society Service Stations through a ‘Rights to Power’ auction similar to the mobile data markets.

This will socialise the cost of this universal service. The ‘Rights to Power’ auction, delivered by OFGEM, will generate revenue to the Exchequer through rights to access the UK power infrastructure in a planned manner.

It will allow the balancing of income from high value locations with lower valued markets depending on the economic geographies.

This will create social equity in the potential new services these facilities will deliver and drive a ‘subsidy free’ market through internal market checks and balances. Great Britain can be in the driving seat to set both the economic and institutional structure for new power supply infrastructure and its design, globally.

The underlying requirement will be to match household energy tariff caps to ensure those without access to a home charging point will not be disadvantaged and deterred from EV ownership.

“A ‘Rights to Power’ Auction”

The proposition; to establish a Global Design Standard

“Current EV charging point designs blight our streetscape”

Current EV charging points being installed across the UK attempt to normalise the experience of filling a vehicle through a cable and plug. The outcome of these designs is blighting our street scape.

Looking to the future, uncontrolled design standards will leave the UK's built-up areas with a legacy of trip hazards, copper cable theft, and street clutter.

The experience of refilling can be greater than just plugging in and walking away. Aligned with the common need for the immediacy of movement and refilling vehicles, the charging experience needs to be consistent in access, replicable (globally) and available to all.

A design evolution that allows both replication and consistency with demographic need is critical.



Example of a current EV charging point

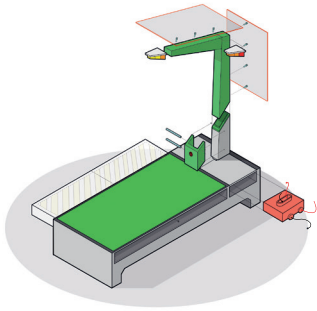
Setting the standard: A new British icon

Imagine a charging point as a piece of street furniture that has the familiarity and timeless elegance of a red post box.

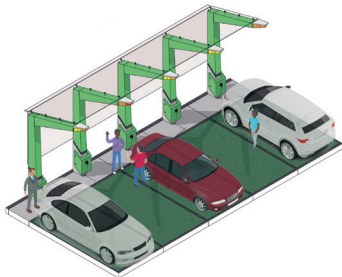
Britain has historically led the way in pragmatic, engineering driven, iconic utility interfaces; the street furniture that has, for over a century, defined our urban identity. As technology is shifting, these gracefully ageing icons are slowly disappearing or evolving into new services. In this space charging points can become a globally recognised new icon for our coming age.

Holistically designed, drawing together pragmatic engineering and operational requirements, this new icon will become an object of simplicity. It will be modest and timeless, designed from the start to allow the rapid evolution of charging technology and delivery. Like the post box, it will be adaptable to rural, suburban, urban and super urban environments whilst retaining its identity.

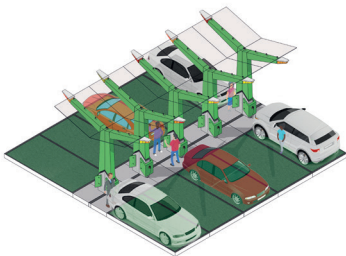
It will adopt an additive architectural philosophy to incrementally expand its offer from kerbside (super urban) to Society Service Station and hence become as much as or a greater part of our lives than the petrol filling station is today.



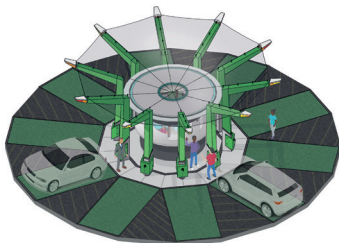
Rapid charge point-the modular components



Five drive-in rapid charging points



Ten drive-in charging points



Ten rapid charging points configured in circle with shopping unit

The supply and installation will be based on modular offsite fabrication in tune with UK Government commitment to modern methods of construction, to ensure high quality rapid deployment with minimal site related work; neighbourly low impact installation.

The charging infrastructure, the forecourt and the Society Service Station can be incrementally tied together through the modularisation of each component part.

This will be critical to the delivery of over 9,000 social service stations with five years to replicate the existing UK forecourt provision.

Resilience needs to be incorporated to allow for future changes in car connection. For example, whilst today we manually plug in, the future car will 'dock', but the basic power infrastructure and data new transfer will remain consistent.

Users will want to know how quickly they are filling up. Lighting symbolism will inform users on speed and time.

Standard practice will, whether powering up during a long trip or the weekly chore of filling up, become dock and wait.

In this moment the social service station will fulfil the gap in our life schedules and create associated retail opportunity.

“Modern Methods of Construction will be critical to replicate the UK forecourt provision”

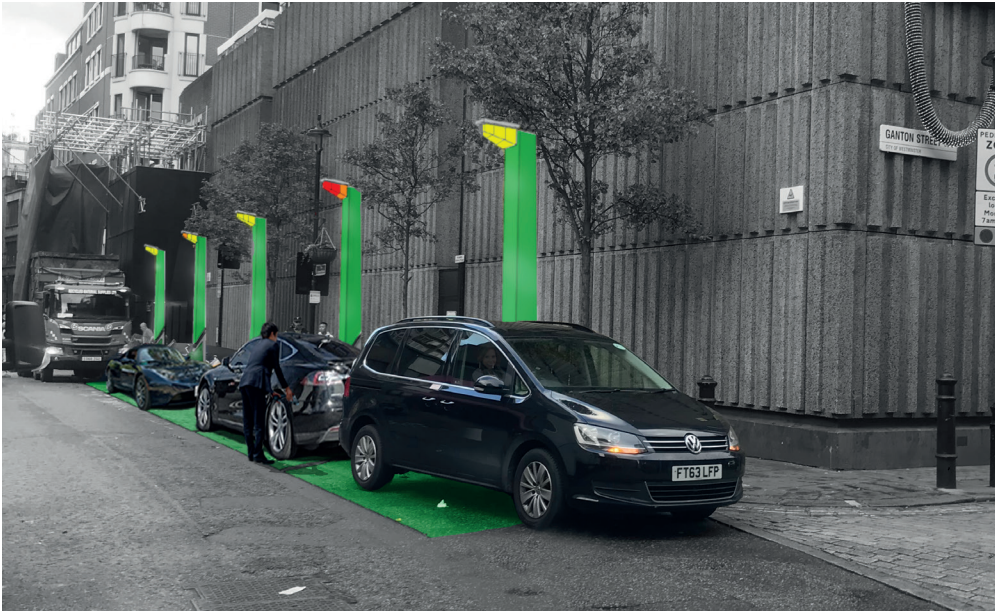
New rules, new opportunities

The integration of vehicles into new land use can focus the intent on the place rather than the vehicle for a friendlier environment. The people-focussed place is easier to integrate into an existing urban environment or new land use.

Replication of a known, iconic design supports this approach and will establish a global intent for a Great British design standard.

Whether 'hub and spoke' or traditional 'park and walk,' the ability to capture a user's time during a charge becomes an additional high value proposition.

Currently over £4 billion of retail services a year are delivered through UK forecourts. Starting from scratch, how could this land use offer maximise the social benefit of this time further?



Example set in an urban scenario



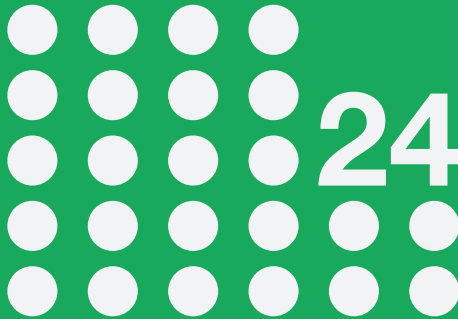
Example set in a rural scenario with Society Service Station

2018

Government

£28b

IN TAXATION FROM PETROL SALES



DIFFERENT RETAILERS OF CHARGING - ALL WITH DIFFERENT TARRIFFS AND MEMBERSHIP

51% OF UK CHARGING INFRASTRUCTURE IS LOCATED IN THE SOUTH



12,352,000 TONNES

OF UK DOMESTIC WASTE EVERY YEAR

Intervention

2040

EXTRACT ECONOMIC VALUE FROM

→ **£1.3**

TRILLION OVER 20 YEARS

→ **ONE**

APPROACH TO
TARRIFFS WITH
ACCESS FOR ALL

→ **SOCIETY
SERVICE
STATION**

SOCIALISING THE
COST OF
INFRASTRUCTURE
FROM A MARKET
VALUE PERSPECTIVE

→ **SOCIETY SERVICE STATION
ENABLING CIRCULAR
ECONOMY ACTION**



Project Refill: In Summary

There is a clear opportunity here for the Government and Exchequer to benefit from private sector investment in Society Service Station provision. In particular, it offers Government the opportunity to recover losses from the reduction in revenue from fossil fuel sales.

It will require collaborative working between DFT, BEIS and the Ministry of Housing, Communities and Local Government, as well as responses to local planning from the highways authority, waste authorities and local plan makers.

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Government has a unique opportunity to wrap its long-term decarbonisation of road infrastructure into a market mechanism that gives investors stability and users equity.

The UK's industrial heritage has delivered globally recognised icons for over 200 years. Now the UK has the opportunity to stand at the front of the new global Industrial Revolution and place Great Britain at the forefront of innovation and design for the world to follow.

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN. Visit us at stantec.com or find us on social media.

For more information on this Green Paper, contact jonathan.riggall@stantec.com



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The practice is experienced in designing a wide range of building types including: office, residential, transport, education, culture, leisure, retail, civic and healthcare. The quality of its designs has been recognised with some of architecture's highest awards, including two RIBA Stirling Prizes.

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Harbour
+ Partners**

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Design with community in mind

