Safety, Sustainability and Human Resources Panel

Date: **20 June 2018**

Item: **TfL Energy Strategy**

This paper will be considered in public

1 Summary

1.1 This paper presents a proposed integrated approach to the development of TfL's energy assets. It sets out how TfL will develop new and existing energy infrastructure, including its approach to future energy procurement, in order to both deliver financial benefits to the organisation and support TfL's Mayors Transport Strategy (MTS) / London Environment Strategy (LES) commitments towards a zero carbon London.

2 Recommendation

2.1 **The panel is asked to discuss the paper and endorse the overall proposed approach to TfL's energy strategy.**

3 Background

3.1 A TfL energy strategy was requested by the Finance Committee at a meeting in October 2017 where the future procurement of TfL's electricity was discussed. This paper also considers this further, as well as TfL's approach to meeting the LES's ambition for all TfL-controlled rail services to be wholly supplied by zero carbon sources by 2030.

3.2 This paper focuses on TfL's energy assets and supports our broader work to achieve MTS / LES targets for a zero carbon city.

4 Reaching zero carbon London

4.1 The MTS sets out the overarching policy roadmap for road, rail and shipping emissions in London to meet the 2050 goal. Achieving zero carbon transport is dependent on meeting three key outcomes:

(a) Maximising the shift to walking, cycling, and public transport; reaching the MTS 80 per cent mode share target by 2041;

(b) Conversion of all remaining motorised transport in London to zero emission technologies such as electric or hydrogen vehicles or electric rail; and

(c) Ensuring that the energy supplies to these modes – primarily grid electricity – are zero carbon.

4.2 However the overall trajectory for CO_2 emissions in London is more important than the 2050 goal in terms of contributing to the prevention of catastrophic

climate change. The final LES sets interim carbon "budgets" for London over the next 15 years, providing shorter term targets by sector. TfL has a major role in delivering reductions in emissions in over this timeframe.

4.3 The MTS and LES also make a number of commitments for TfL, as a major energy user and buyer of electricity, in support of the wider CO_2 emissions reduction in London. These include improving energy efficiency and reducing emissions from TfL's infrastructure, and increasing the level of renewable energy supplying TfL assets. The LES sets an ambition for TfL-controlled rail services to be wholly supplied by zero carbon sources by 2030.

5 Financial challenge

5.1 TfL currently spends c£160m p.a. on direct energy costs, with rail traction representing the majority of consumption. This is forecast to increase significantly in the next 10 years, due primarily to increased unit prices. Measures to improve energy efficiency, increase the direct supply of energy to TfL assets and exploit emerging energy market mechanisms represent a significant potential opportunity to reduce future costs.

5.2 Conversion of the TfL bus fleet to fully zero emission by 2037 is one of the key environmental commitments of the MTS. Work is underway in Surface Transport to assess the high level feasibility and capital cost requirements for the provision of electric vehicle charging infrastructure in support of this. However, recent research and trial initiatives undertaken by TfL indicate that this emerging cost pressure may be partially mitigated by utilising TfL's wider energy infrastructure, for example linking bus charging to the London Underground network.

6 Integrated energy strategy for TfL

6.1 The attached slide pack outlines the overall approach for development of initiatives and interventions on TfL's energy assets in order to support MTS / LES emissions reduction ambitions and deliver financial benefits to TfL. The proposed approach to achieving zero carbon rail by 2030 is covered in the paper.

6.2 TfL proposes to take ambitious approach to its energy strategy which attempts to maximise both financial returns and meet its environmental commitments. The proposed next steps for developing initiatives are set out in the appendix.

List of appendices to this report:

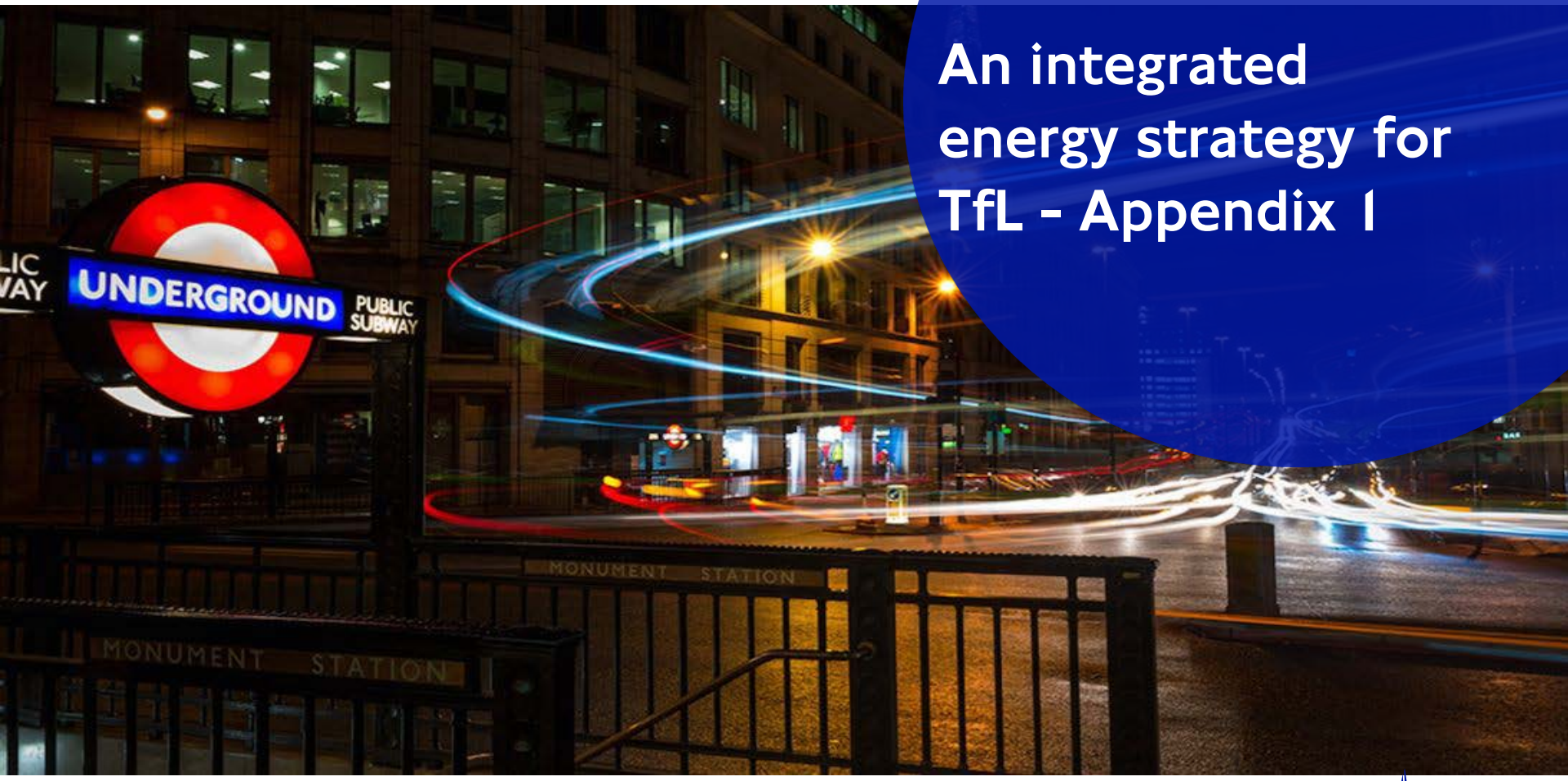
Appendix 1 – An integrated energy strategy for TfL

List of background papers:

None

Contact Officer: Matthew Webb – London Underground
Sam Longman – City Planning
Number: 020 3054 8609 / 020 3054 7120
Email: matthew.webb@tube.tfl.gov.uk / samlongman@tfl.gov.uk

An integrated energy strategy for TfL - Appendix 1



SSHR PANEL

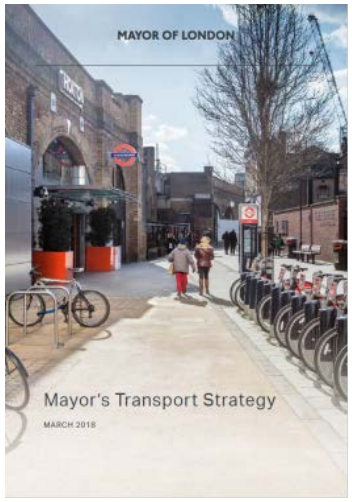
20/06/2018

EVERY JOURNEY MATTERS

Purpose and contents

Purpose	▪ This paper presents a proposed **integrated approach to the development of TfL's energy assets** ▪ It sets out how TfL will **develop new and existing energy infrastructure** to **deliver financial benefits** to the organisation and support TfL's commitments towards **a zero carbon London** and **improved air quality** in the Mayor's Transport Strategy (MTS) / London Environment Strategy (LES) ▪ The Energy Strategy also sets out how TfL's future energy procurement will support the MTS/LES aim for **zero carbon TfL-controlled rail services by 2030**
Decision required	▪ The SSHR panel is asked **discuss** the paper and **endorse** the overall proposed approach to TfL's energy strategy
Contents	▪ MTS and LES energy and carbon commitments for TfL ▪ Financial and environmental challenges ▪ Synthesis of integrated energy strategy objective ▪ Framework for initiative development including zero carbon rail action hierarchy ▪ Proposed energy initiatives for detailed feasibility ▪ Summary and next steps

The MTS and LES set out specific energy and carbon objectives for TfL as part of the 2050 zero carbon ambition



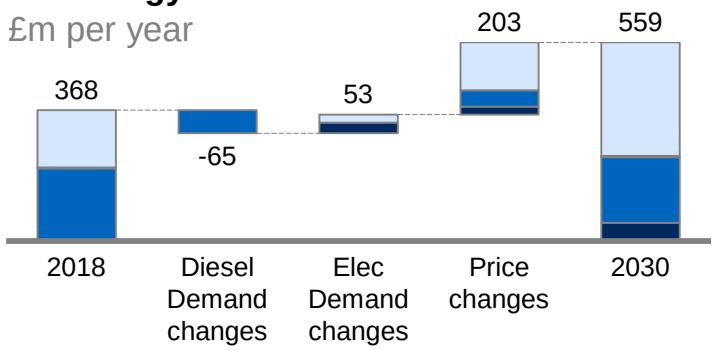
- Overarching aim for all transport in London to be **zero carbon by 2050**
- MTS Proposals set out specific responsibilities for TfL which its Energy Strategy must support:
  - **Minimise the energy impact of increased provision of transport services**
  - **Reduce operational CO_2 and other air pollutant emissions** from all of TfL's assets and infrastructure
  - **Increase the level of low-carbon energy generation** on TfL's land and for supply to its assets – ***with the stated ambition of aiming for all rail services under TfL control to be zero carbon by 2030***
- The LES sets TfL a target of a 60% reduction in CO_2 emissions by 2025 as part of the GLA group
- Other MTS commitments impact on TfL's future energy requirements:
  - **Zero emission bus fleet by 2037.** Electrification costs represent a significant cost pressure to the current Business Plan
  - **TfL support fleet reaching zero emission**
  - Delivering major expansion of London's **electric vehicle charging infrastructure**
- TfL's energy initiatives can either directly support or complement London-wide energy actions set out in the LES

TfL faces significant financial and environmental challenges

Financial

TfL energy bill[1]

£m per year

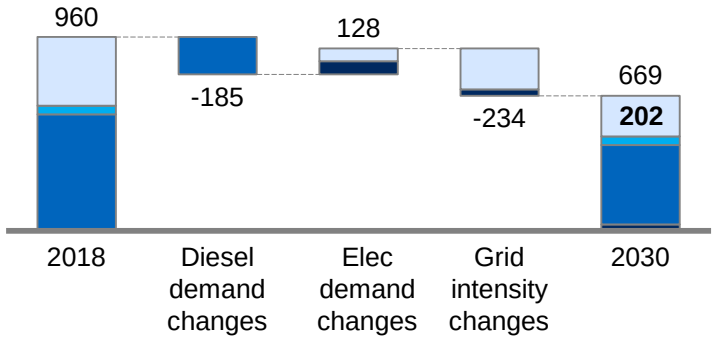


- Energy currently **costs TfL ~£360m** per year**,** ~40% due to traction, 55% due to buses
- Baseline costs **will increase by ~50% by 2030**, due primarily to price increases[2] and cumulatively **cost TfL ~£6 billion**[3]
- **Electric buses** and chargers **will require significant** unbudgeted spend

Environment

TfL CO_2 emissions[3]

Mtonnes

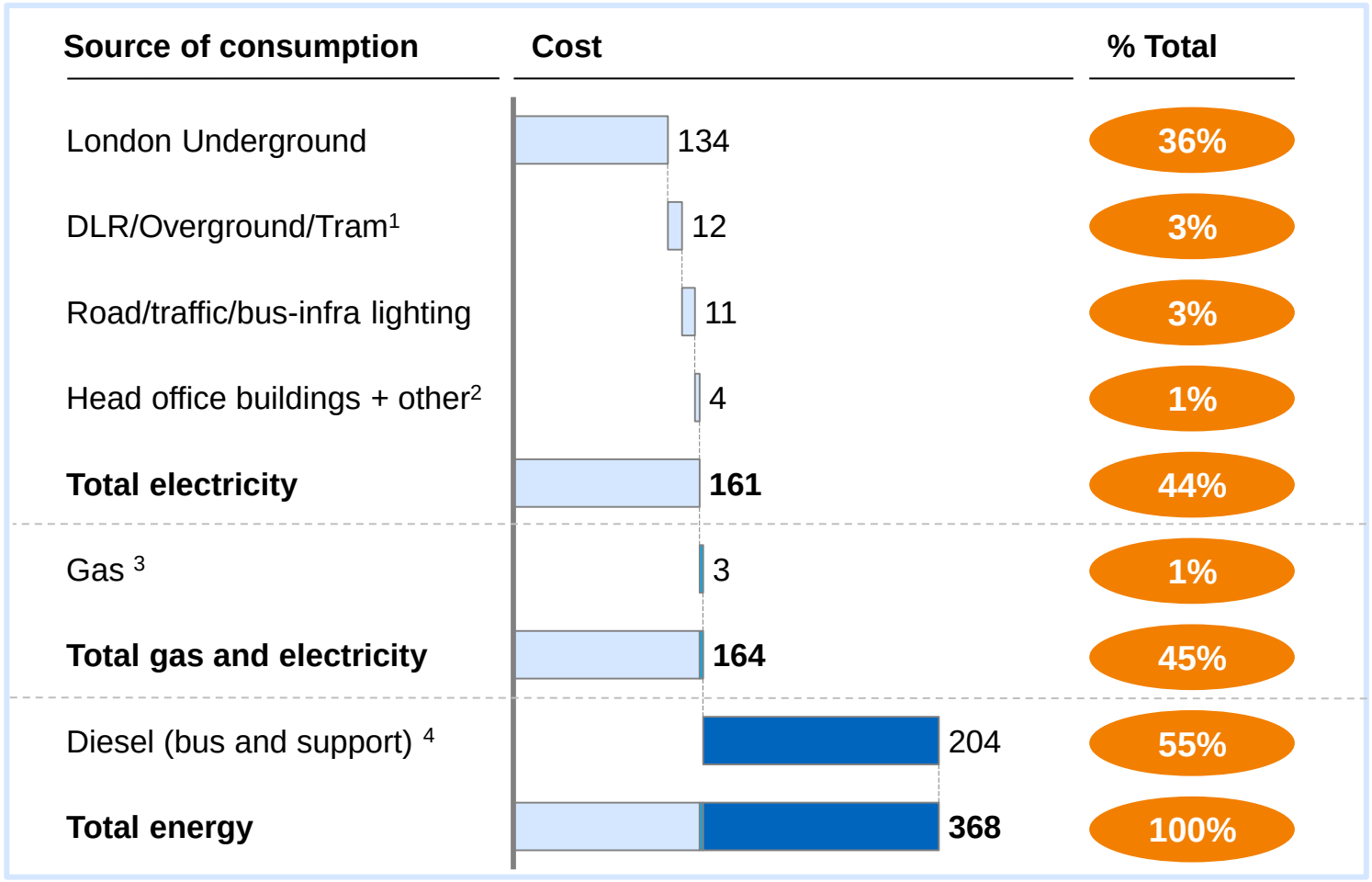


- LES targets **zero carbon TfL rail by 2030**
- MTS targets **zero carbon London by 2050**
- Even if grid carbon intensity targets[3] are met, a **~200 $MtCO_2$ direct electricity** consumption **carbon gap** by 2030 remains
- Cleaner air is a major component of MTS, **requiring significant low emission** vehicle adoption

1 Scope includes direct electricity and gas costs as well as indirect bus fuel/electricity consumption
2 Electricity is predominately pass through (transmission/distribution charges, triad, renewables obligation, feed-in-tariff, capacity market etc) to 2023, wholesale thereafter. Diesel prices based on future forecast of crude oil prices to rise by 33% to 2030
3 Electricity price and carbon Intensity based on BEIS projections, assuming 0.22kg/kWh for 2018, 0.11kg/kWh for 2030 and 0.188kg/kWh for CHP

Bus fuel currently ~55% of the energy bill, LU ~37% (including gas)

£m, 2018/19



SOURCE: Commercial Services

1 Stations, depots etc **2** Emirates Cable car, Dial-a-ride, River, Victoria Coach, metered street furniture

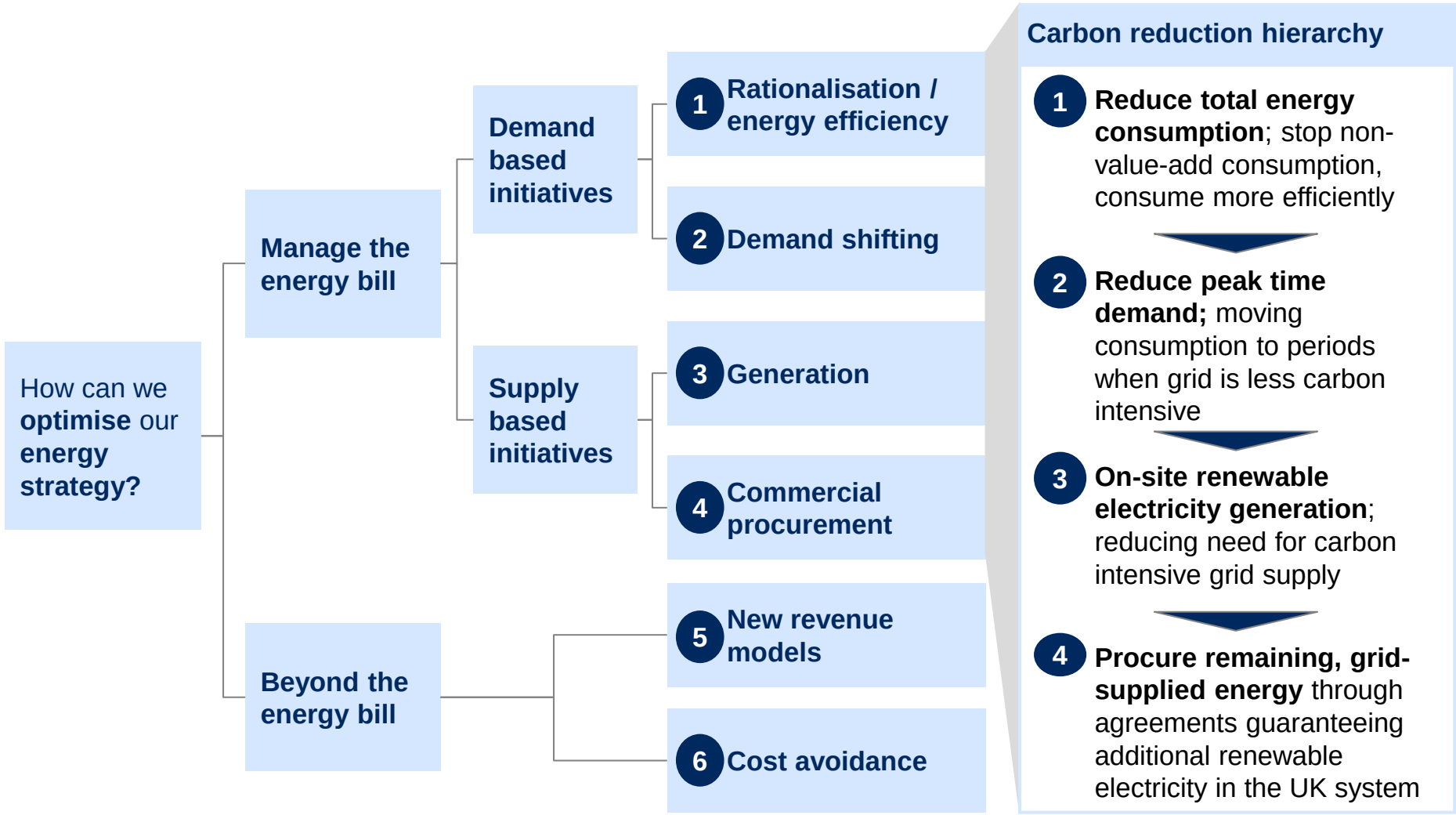
3 52% gas is LU, 23% head office, 14% Greenwich Power Station, 11% other

4 Based on 500m bus km travelled a year with an average consumption of 2km/L and a pump price of £0.95/L

The recommended strategy aims to deliver financial benefits and support the air quality / zero carbon agenda

Strategic objective	In response to the dual **financial** and **environmental** energy challenge, TfL will pursue initiatives prioritised on: • **financial payback** • ability to significantly **reduce carbon emissions** with the aim of achieving the Mayor's zero carbon agenda and supporting the **electrification of road transport** to improve **London's air quality**
Strategic approach	Initiative development encompasses: • TfL's current asset base • Identification of new revenue generating opportunities • Mitigation of future capital costs from transport electrification
Guiding principles	Initiatives seek to **optimise TfL's asset base**, work across business units and take advantage of **innovations in the energy sector**

There are 6 categories of initiatives to address the challenge and form a hierarchy of actions toward achieving the Zero Carbon Rail ambition

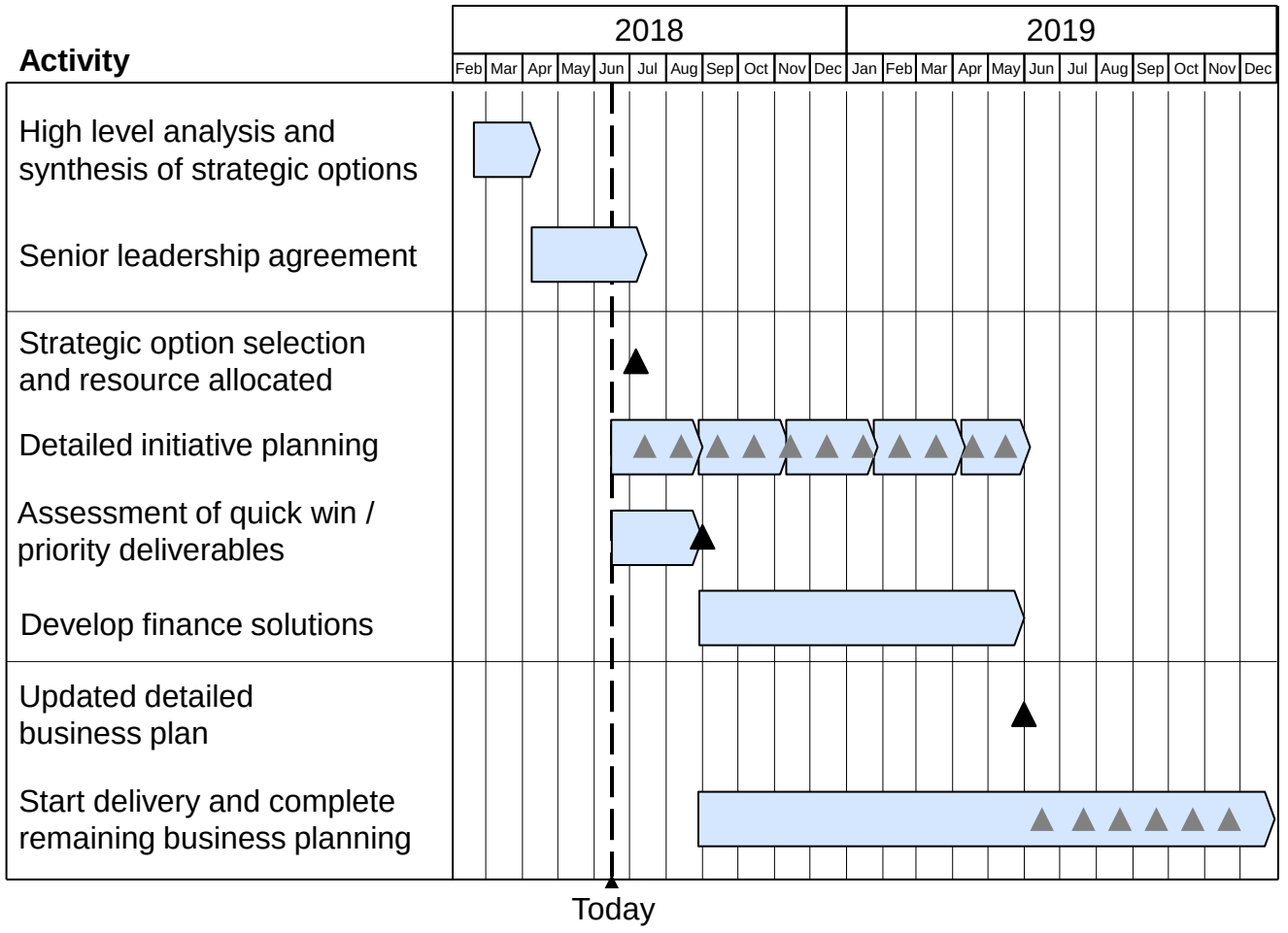


50+ initiatives were identified, of which, 12 high level initiatives were prioritised for further investigation

1 Energy efficiency	Traction efficiency	**Reducing consumption** through **coasting**, regen and battery storage
	Non-traction efficiency	**Energy efficiency** across stations, depots, garages and road network
2 Demand Shifting	Demand side response	Use of **battery or other storage** to shift consumption to lower cost times
3 Generation	Solar PV	**Deploying solar** across TfL estate and beyond (buildings/land/garages)
	Combined Heat and Power (CHP)	Opportunity to utilise **CHP** at TfL assets to generate heat and power - though subject to LES and London Plan
4 Commercial procurement	Private wire	Connecting directly to energy generators to **save pass-through costs**
	Procurement optimisation	Determining the best **procurement strategy and framework** in which to deliver wider initiative benefits
	Renewable power purchase agreement (PPA)	Closing the carbon gap by **buying renewable energy** through a PPA
5 New revenue models	Optimised EV charging	Delivering EV infrastructure in a **financially sustainable** way
	Waste heat	Capture waste heat from **tunnels** to provide to **developments** / other users
	Zero-carbon homes	**TfL**-enabled **housing developments** deliver **zero-carbon homes**
6 Cost avoidance	Optimised / accelerated bus electrification	**Accelerating bus electrification** in a **commercially viable** way through **optimised** vehicle/charger **technology** and **contracting mix**

The next phase will identify resource and enter detailed initiative planning

Roadmap looking ahead



To move into detailed planning we require endorsement of the proposed approach from SSHR panel

Purpose	▪ This paper presents a proposed **integrated approach to the development of TfL's energy assets** ▪ It sets out how TfL will **develop new and existing energy infrastructure** to **deliver financial benefits** to the organisation and support TfL's commitments towards **a zero carbon London** and **improved air quality** in the Mayor's Transport Strategy (MTS) / London Environment Strategy (LES) ▪ The Energy Strategy also sets out how TfL's future energy procurement will support the MTS/LES aim for **zero carbon TfL-controlled rail services by 2030**
Decision required	▪ The SSHR panel is asked to **discuss** the paper and **endorse** the overall proposed approach to TfL's energy strategy