





# Wessex Live Lab Carbon Baseline Overview

## INFORMATION PACK







# Live Labs II – Project context

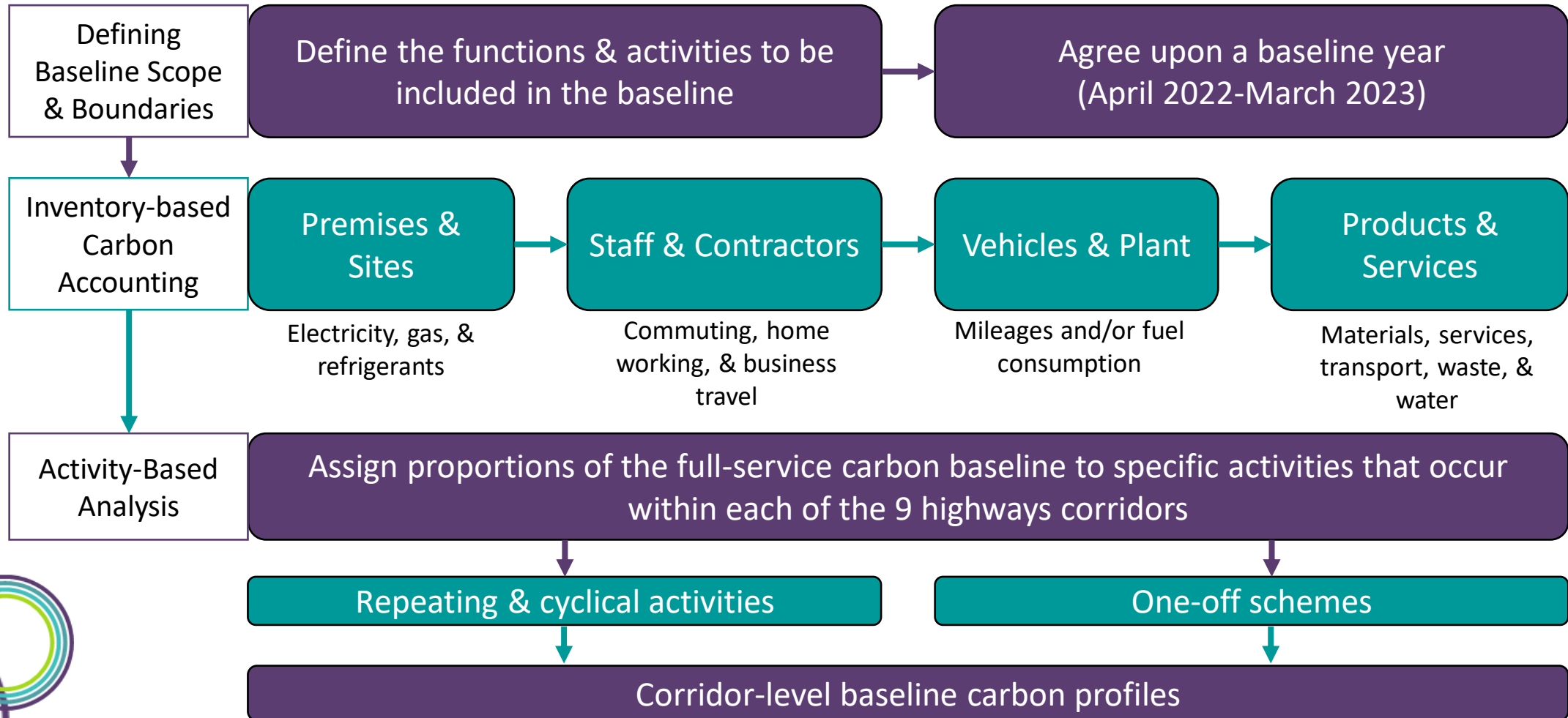
- UK-wide, ADEPT-funded £30m DfT programme
  - Local authorities providing leadership & innovation on how to decarbonise local highways infrastructure and assets.
  - Wessex Live Lab is one of 4 themes (corridor and place-based decarbonisation) and one of 7 projects across the UK.
  - 9 corridors – 3 in each LA (Cornwall, Hampshire, & Somerset).
  - Working towards resilient Net Zero roads – pioneering an approach to measuring and reducing maintenance-phase emissions.
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# Carbon Baselineing – why is it important?

- Full-service picture required to identify carbon hotspots & understand where we can make the greatest difference.
  - All-encompassing - every aspect of highways maintenance has a carbon contribution, not just material-based activities.
  - Enables carbon figures to be assigned to each activity that occurs on the corridors, providing a benchmark to compare lower-carbon alternatives against.
  - Builds in carbon linked to non-operational elements, such as buildings, and links them to service activities
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# Carbon Baseline - Methodology






# Carbon Baseline – Data Sources

	Premises & Sites	Staff & Contractors		Vehicles & Plant			Products & Services
Where does the data come from?	Electricity & gas meter readings	Staff commute surveys	Business mileage claims	Pool vehicle mileages	Inspection vehicle mileages	Contracted plant & vehicle fuel usage	Invoices, POs, job codes, and/or BoMs
Who does the data come from?	Facilities Manager	All staff in highways dept.	HR	Fleet Engineering Manager	Inspection Manager	Plant & fleet managers	Purchasing staff
Which tiers does the data come from?	Local Authority, Tier 1 contractor	Local Authority, Tier 1 contractor		Local Authority		Tier 1 & 2 contractors	Local Authority, Tier 1 & 2 contractors



# Novel approaches

- Doughnut Economics principles & normalised scorecard to be integrated into Carbon Analyser.
  - Development of Carbon Toolkit to guide & inform the carbon baselining process.
  - Production of Staff Commute Survey as a resource for use across the Live Lab, tailored to the requirements of each organisation.
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# Maintaining the highest standards of carbon analysis

## Best-practice approach

- FHRG Carbon Analyser - alignment with standards including EN 15978 and PAS 2080.
- Trialled and tested across local authorities.
- Calculation of 90-95% of carbon emissions at 80% confidence.

## Data quality

- Selecting verifiable data sources, e.g., mileage claims.
- Pursuing statistically significant sample sizes
- Ensuring accuracy of responses by following up on potential errors / inconsistencies.

## Consistency

Across all three local authorities:

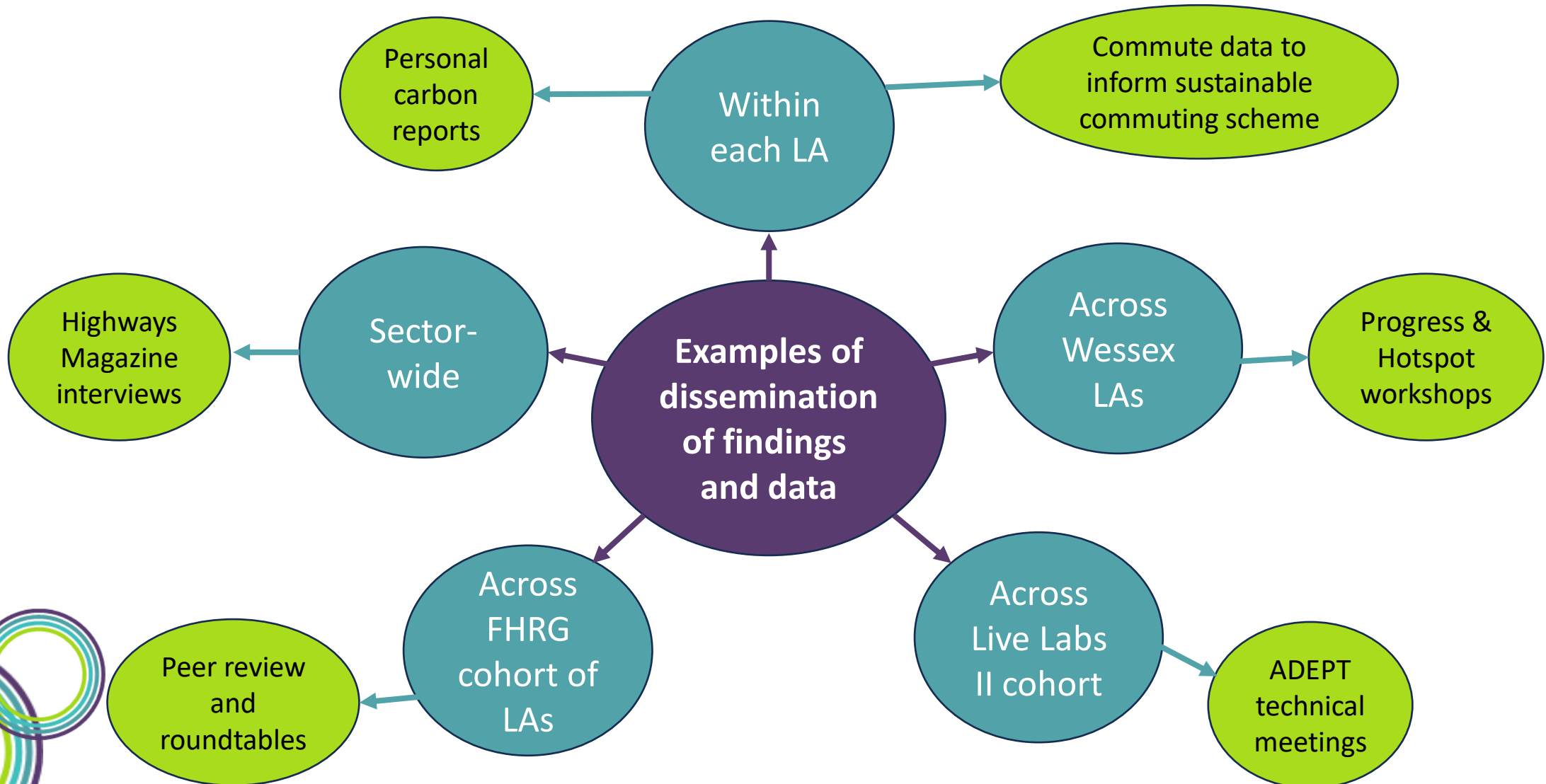
- Same functions and time period used to define baseline boundaries.
- Same point of contact for data processing.
- Same carbon tool and CCAS protocols used.

## Rigour

- Ongoing verification process to identify and rectify data gaps & inconsistencies.
- Weekly opportunity to report findings to the Core Team and request further actions.
- Assumptions are documented for auditability.



# Disseminating findings & data







# Verification & validation



- Data is validated before entry, and data gaps / inconsistencies are followed up.
- As part of the FHRG support package:
  - The baseline carbon footprint assessment will be independently assessed.
  - Veracity, accuracy, and completeness of experimental carbon profiles will be independently certified.



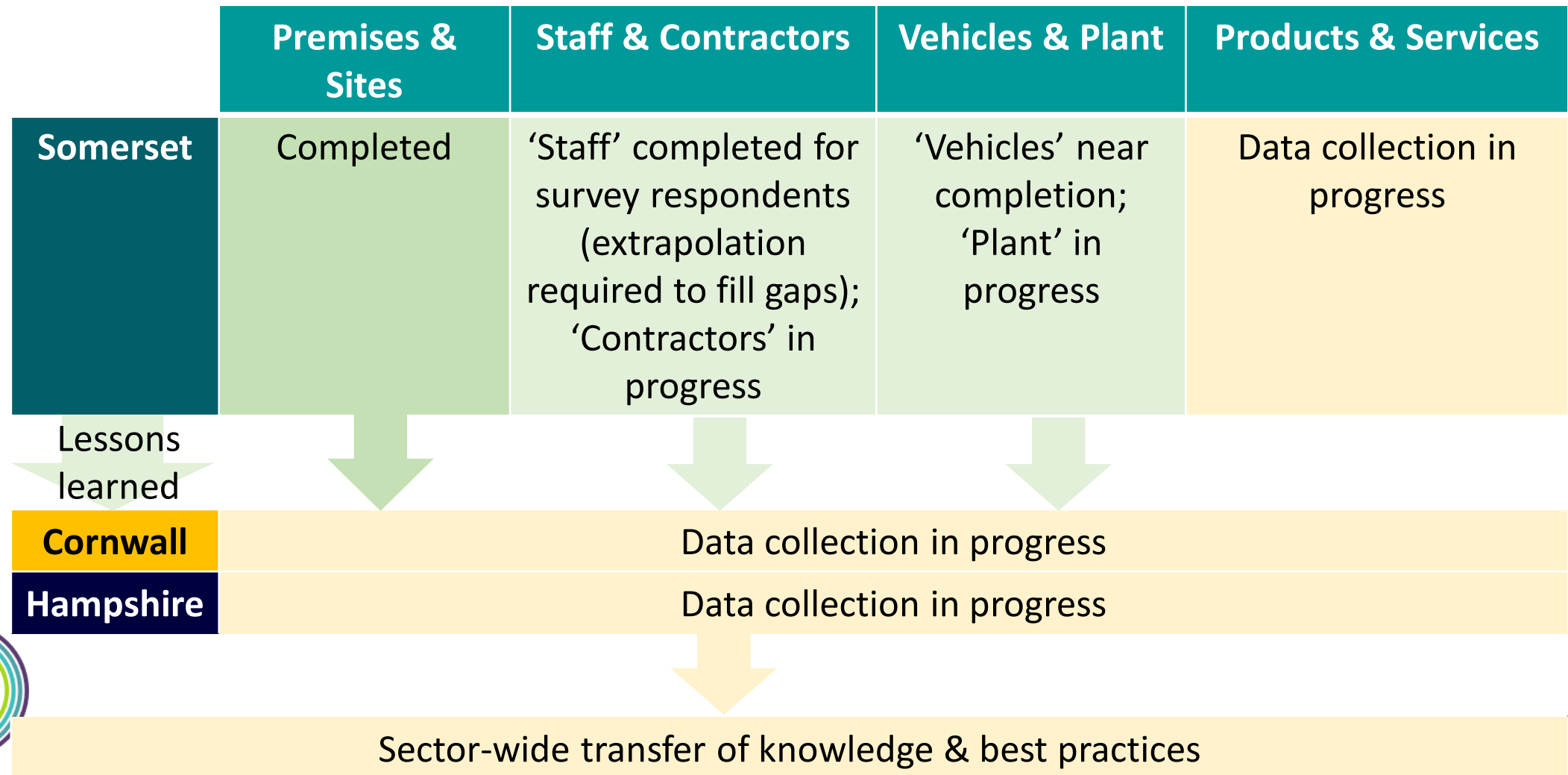


# Results & progress so far

Key statistics, observations and analysis



# Progress so far - iterative learning across the three authorities



# Key Statistics – Somerset Council

108 tonnes CO<sub>2</sub>e



Total carbon emissions produced due to energy consumption across the depots/sites.

49 tonnes CO<sub>2</sub>e



Total emissions from SC Inspections vehicles per year

749 kg CO<sub>2</sub>e



Average per-person carbon emissions produced by staff (excluding travel in SC-owned vehicles)

*(Total emissions TBC)*

32 tonnes CO<sub>2</sub>e



Total emissions from SC pool vehicles used by highways staff per year

*(TBC - includes only the 15 vehicles for which mileages were reported)*



# Key observations

## Data Collection Processes

- Discovering more efficient ways to collect data:
  - Depot meter readings obtained directly from the contractor, allowing both LA and Tier 1 data to be obtained simultaneously.
  - Staff commute survey streamlined & changed from MS Word to Forms.
  - Requesting full list of business mileage claims instead of relying on individual estimates.
- Moving from manual data entry to bulk data imports – proforma template for consistency.

## Challenges

- Complexity of coordinating data collection across multiple organisations and contracts.
- Survey – low response rates and inconsistent responses. Highlights importance of promoting staff engagement and clarifying data requirements.
- Difficulty of obtaining mileages for entire vehicle fleet - some vehicles do not appear to have mileages recorded against them (data gaps are currently under investigation).



# Key observations

## Surprises

- 88% of Premises & Sites emissions came from just 3 sites (out of 7), and 94% came from gas consumption alone.
- Home working was more carbon-intensive on average than commuting (excluding SC vehicles).
- Inspections staff accounted for 2x more emissions than any other OU - and more than the most carbon-intensive depot.

## Potential actions

- Explore strategies (potentially through a 'Lean Carbon' review) to reduce inspection trips, such as combined inspections, remote monitoring, and/or a revised inspection schedule.
- Regular meetings across supply chain to coordinate Scope 3 data collection and share progress & learning.

# Detailed Results Discussion





# Premises & Sites

Key statistics, observations and analysis



# Key Statistics

**108 tonnes CO<sub>2</sub>e**



Total carbon emissions produced due to energy consumption across the depots/sites.

**88%**



of emissions came from just 3 sites: Glastonbury Depot, Dunball Depot, and County Hall.

**94%**



of emissions due to gas combustion



**6%**

of emissions due to electricity consumption





# Premises & Sites – Key observations

## Data Collection Process

- A proforma template was sent to the Facilities Manager to input gas & electricity meter readings for each site – however, returning raw/independently formatted data proved to be preferable.
- For depots, data was obtained directly from the contractor, allowing both LA and Tier 1 data to be obtained simultaneously & efficiently.

## Challenges

- Determining the emissions share for County Hall – this was achieved by dividing the number of desks allocated to Highways staff by the total number of desks in Blocks A & B.

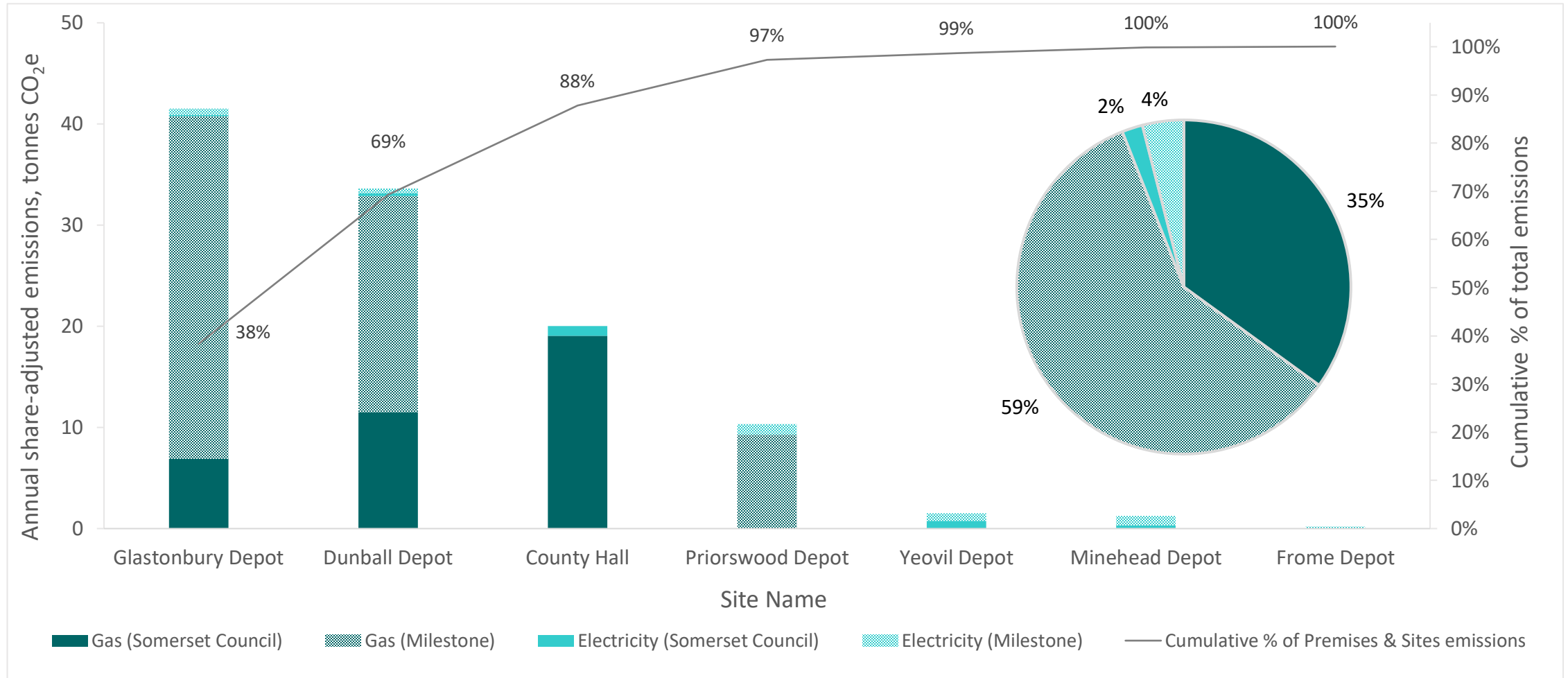
## Surprises

- Whilst only 4 out of 7 sites reported gas usage, gas consumption accounted for 94% of the total CO<sub>2</sub>e emissions in this module.

## Potential actions

- Focus on reducing demand for gas and transitioning to alternative heating sources, particularly in Glastonbury & Dunball depots.

# Premises & Sites – emissions by source



# Staff & Contractors

Key statistics, observations and analysis



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Council

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**LIVELABS2**  
Decarbonising Local Roads

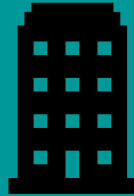
# Key Statistics

**158 days**



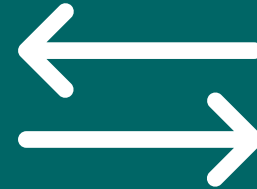
Average number of days worked from home per year

**77 days**



Average number of days commuting to work per year

**18 miles**



Average daily commute distance (9 miles each way).

**1039 miles**



Average distance travelled for business per year (in private vehicles only)

**749 kgCO<sub>2</sub>e**



Average annual carbon emissions per person (excluding travel in SC vehicles)



# Staff & Contractors– Key observations

## Data Collection Process

- Survey distributed to staff to collect data on their home working, commuting, and business travel habits (see next slide).
- Estimations of business mileage were verified using mileage claims.
- Missing responses are to be accounted for by attributing the average values for each mode of transport to the remaining staff.

## Challenges

- Initial survey response rates were low, necessitating further prompting and an extension of the return deadline.
- Surveys were returned with incomplete or conflicting information, and the questions did not account for more complex commutes. The survey was refined to resolve these issues (see next slide).

## Surprises

- On average, home working (based on assumed energy usage) was the largest source of CO<sub>2</sub>e emissions for this module (47%).

## Potential actions

- Explore whether converting home working to office-based just shifts the CO<sub>2</sub>e emissions or increases/reduces them.
- Investigate why people may be reluctant to respond – and how this links to beliefs, worries and behaviours around carbon.
- Engage with staff to explore the potential for increased car-sharing, active travel, and/or use of public transport.



# Staff & Contractors – Survey: lessons learned

**Carbon Baseline Survey - Staff**

Please complete this survey and return it to [kira.jefferies@colas.co.uk](mailto:kira.jefferies@colas.co.uk) by Friday 28<sup>th</sup> July.

About You	
Name	
Organisational unit	Choose an item.
Home town / village*	
Work location	Choose an item.
Annual no. days working from home (2022-23)**	
Annual no. days commuting to work (2022-23)**	

\*This information is to help us to understand the place-based constraints on the adoption of low-carbon transport.  
\*\*If you have no record of this, please estimate based on a typical month and multiply by 12.

Commuting to Work									
Typical* daily commuting distance (both ways)		_ miles							
Mode(s) of transport used for your typical* daily commute (Please specify mileage for each mode)									
Bus / Coach	Car / Taxi	Bicycle	eBike / eScooter	Motorbike	Train	Van / LGV	Walk	Other (please specify)	
If you use a personal motor vehicle, please specify:									
Vehicle type and size		Choose an item.							
Vehicle ownership		Choose an item.							
Fuel type		Choose an item.							
Engine size (litres)									
<small>*If you sometimes commute by another means (e.g., a weekly car-share), please give details of the frequency, mileage, and mode of transport below.</small>									

Business Travel	
What vehicle do you use for business travel?	My own vehicle (see 'Commuting to Work')
<small>If you said 'My own vehicle': Please estimate your total business mileage from 1<sup>st</sup> April 2022 – 31<sup>st</sup> March 2023</small>	
<small>If you said 'A Somerset Council vehicle': Please provide the registration number.</small>	

Opt-in to personal carbon report	
To help you to reduce your carbon footprint, would you like to receive a personal report on your work-related CO <sub>2</sub> emissions?	Choose an item.

If you wish to have any assistance or advice with regards to completing this form, please contact | [kira.jefferies@colas.co.uk](mailto:kira.jefferies@colas.co.uk)

Questions clarified to avoid confusion

Questions set to 'Required' to avoid omissions

Branching used to direct respondents only to questions relevant to them

MS Forms used to streamline response aggregation into an exportable format

**Carbon Baseline Survey - Staff Commute Survey**

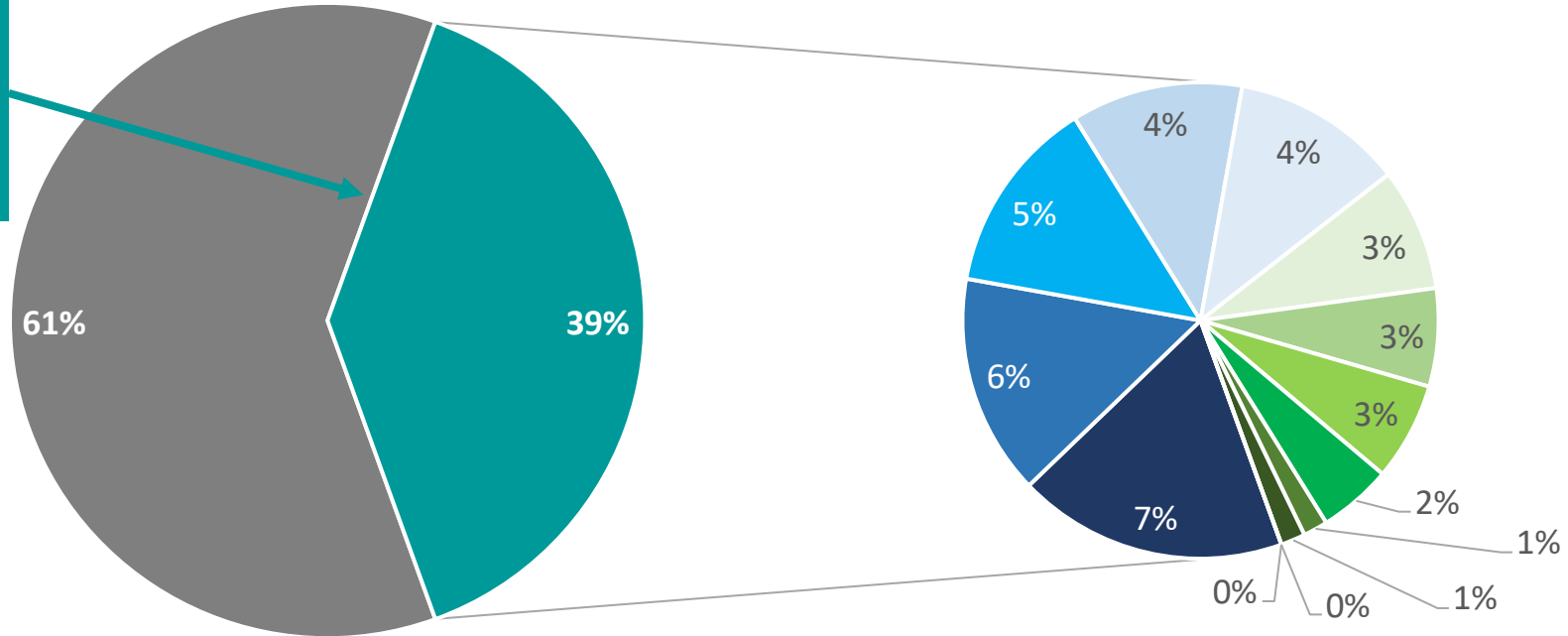
\* Required

1. Your name \*
2. Department / Organisational unit \*
3. Home town / village  
*This information is to help us to understand the place-based constraints on the adoption of low-carbon transport.*
4. Work Location

# Response Rates by Organisational Unit

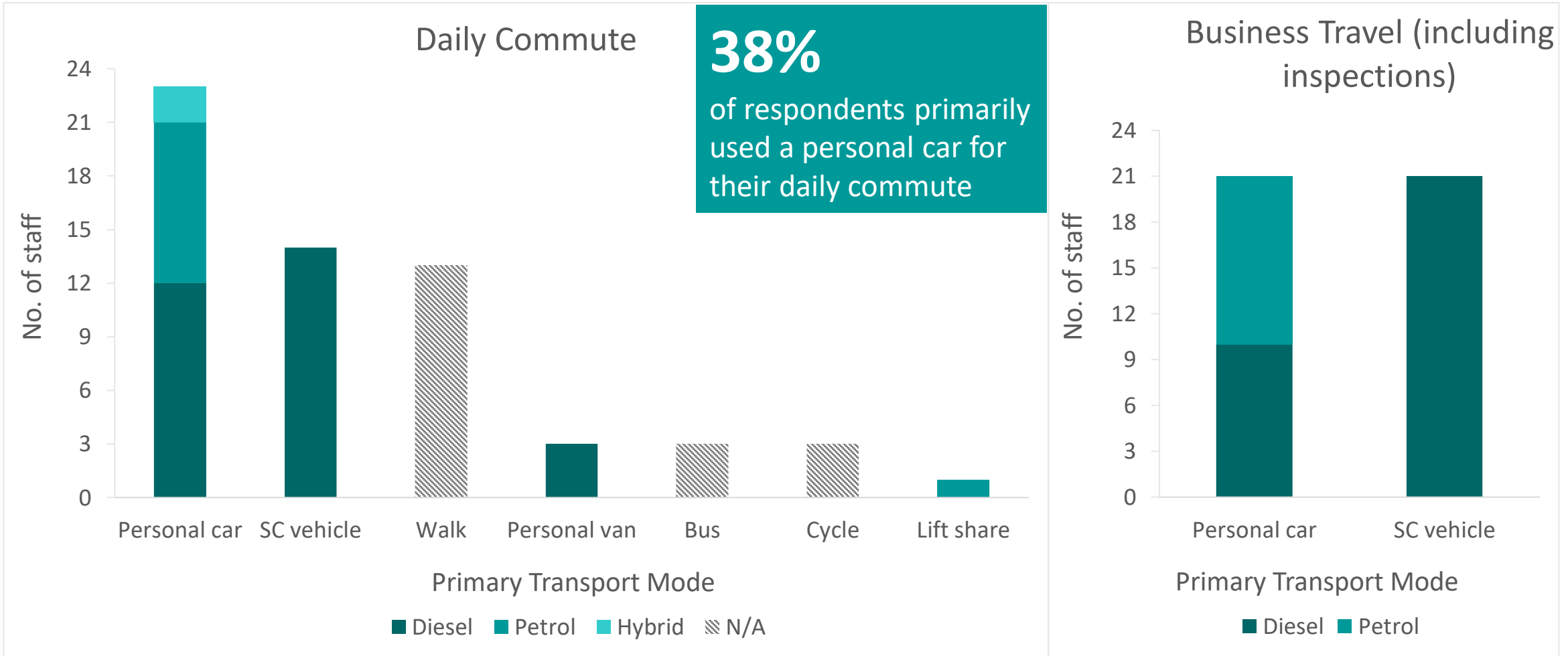
60

surveys returned out of 154 relevant staff



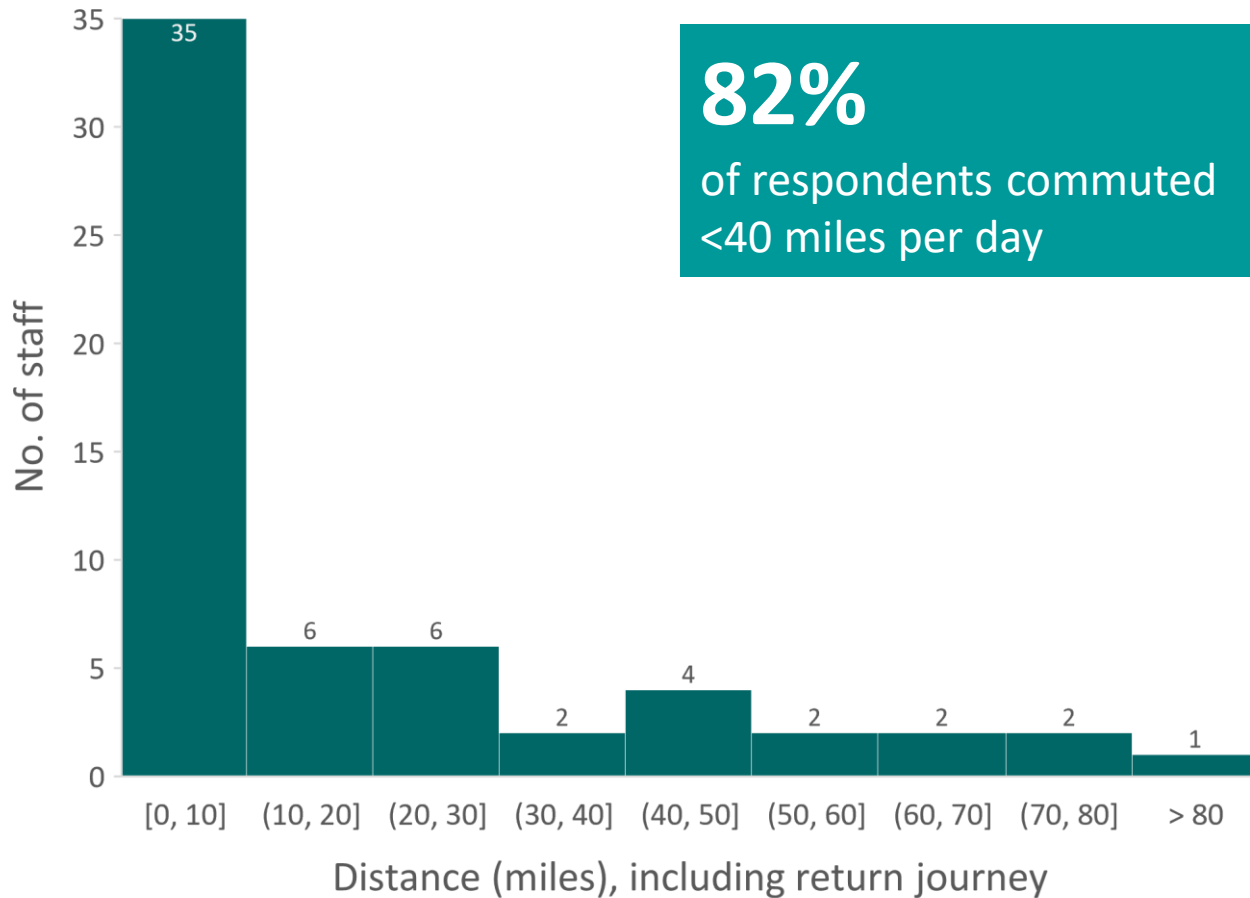
- Traffic Engineering
- Area Highways
- Inspections
- Bridges & Structures
- Traffic Regulation Orders & Events
- Streetworks
- Traffic Control
- Road Safety & Transport Data
- Asset Data & Management Systems
- Traffic Management & Road Safety
- Contracts & Performance
- Tree Strategic Function
- Work Programmes
- No response

# Primary Transport Modes

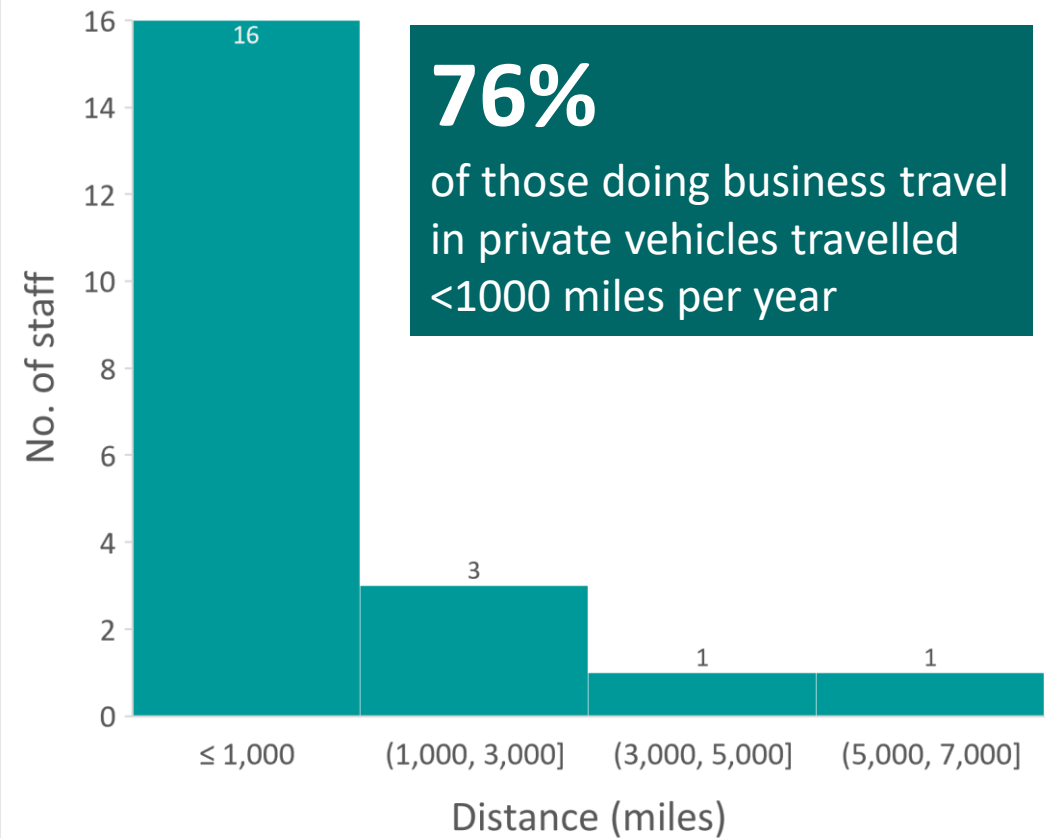


# Distance Travelled

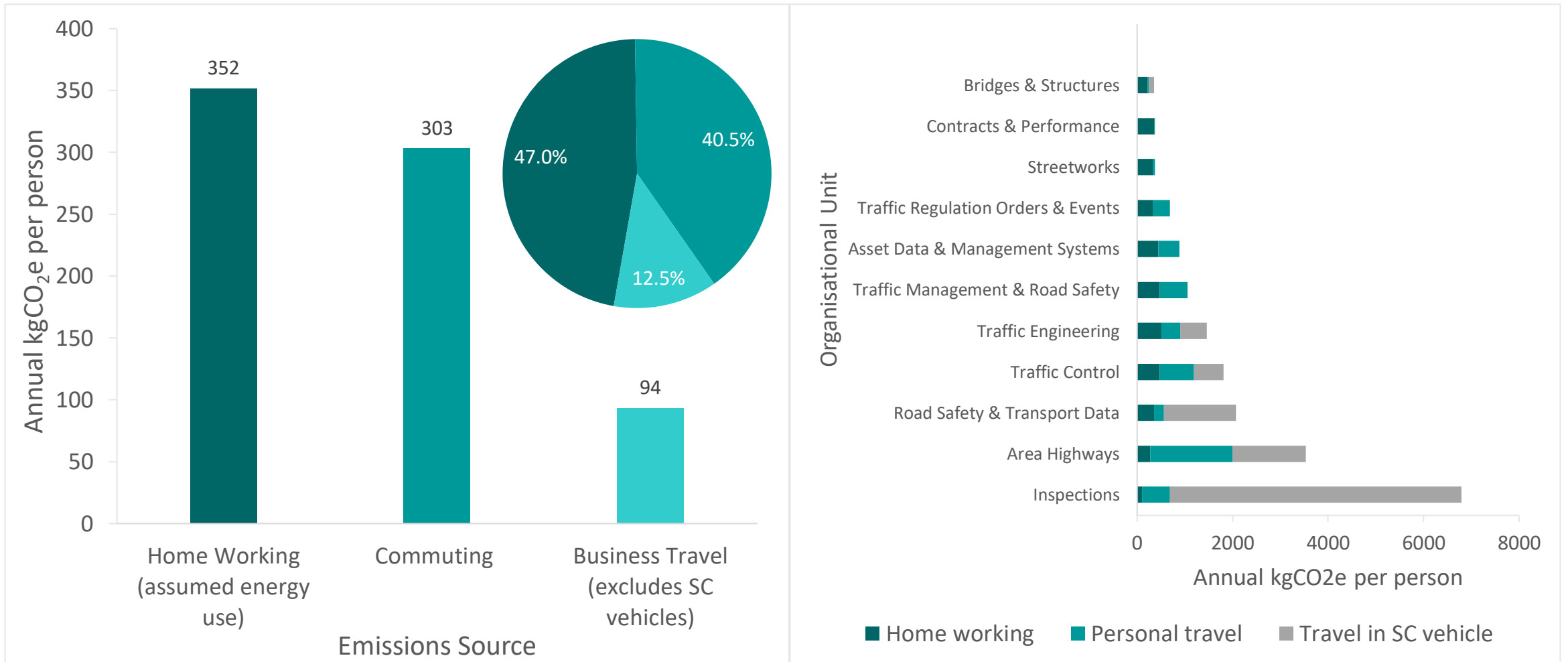
## Daily Commute



## Business Travel (excluding Council-owned vehicles)



# Average Carbon Emissions Per Person\*



# Vehicles & Plant

Key statistics, observations & analysis



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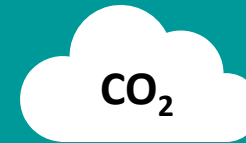
# Vehicles & Plant – Key statistics

**6,028 miles**



Average distance travelled by SC pool vehicles per year

**2.0 tonnes CO<sub>2</sub>e**



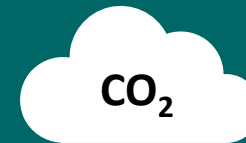
Average emissions from SC pool vehicles per year

**12,014 miles**





Average distance travelled by SC Inspections vehicles per year –  
**96,112 miles in total**

**6.1 tonnes CO<sub>2</sub>e**



Average emissions from SC Inspections vehicles per year -  
**48.8 tonnes in total**





# Vehicles & Plant – Key observations

## Data Collection Process

- Mileages were originally requested for each pool vehicle recorded by the survey respondents. However, requesting a full vehicle inventory with mileages assigned to each vehicle proved to be more efficient.
- Inspection vehicle mileages were provided separately by the Inspections manager.

## Challenges

- It has proven difficult to obtain mileages for the whole fleet, as some vehicles do not appear to have mileages recorded against them. Data gaps are currently under investigation.

## Surprises

- Inspection vehicles alone account for more CO<sub>2</sub>e emissions (48.8 tonnes) than the most carbon-intensive depot.

## Potential actions

- Explore strategies (potentially through a 'Lean Carbon' review) to reduce inspection trips, such as combined inspections, remote monitoring, and/or a revised inspection schedule.

# Products & Services

Data collection is ongoing....



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# Products & Services – ongoing - key observations so far



## Data Collection Process (yet to be completed)

- Workshop with Tier 1 & 2 partners to establish data collection protocols.
- Coordination by central Carbon Analyst.
- Provision of a new proforma template to support consistent data formatting & collation.

## Challenges

- Complexity of gathering data across multiple organisations and contracts.
- Ensuring consistency, e.g., definitions, baseline year.

## Surprises




- Watch this space!

## Potential actions

- Regular progress meetings across supply chain.



# In summary...

- Carbon isn't always where we think it is! Focus on solutions that will address the real carbon hotspots.
  - It's complex and needs to be all-encompassing.
  - Identifying and solving the challenges of carbon baselining is informing the Carbon Toolkit development.
  - Carbon baselining underpins meaningful demonstrators by highlighting key areas to target.
  - Aiming to bring innovation into what we do every day.
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# Live Labs II: Carbon Assessment

Future Highways Research Group



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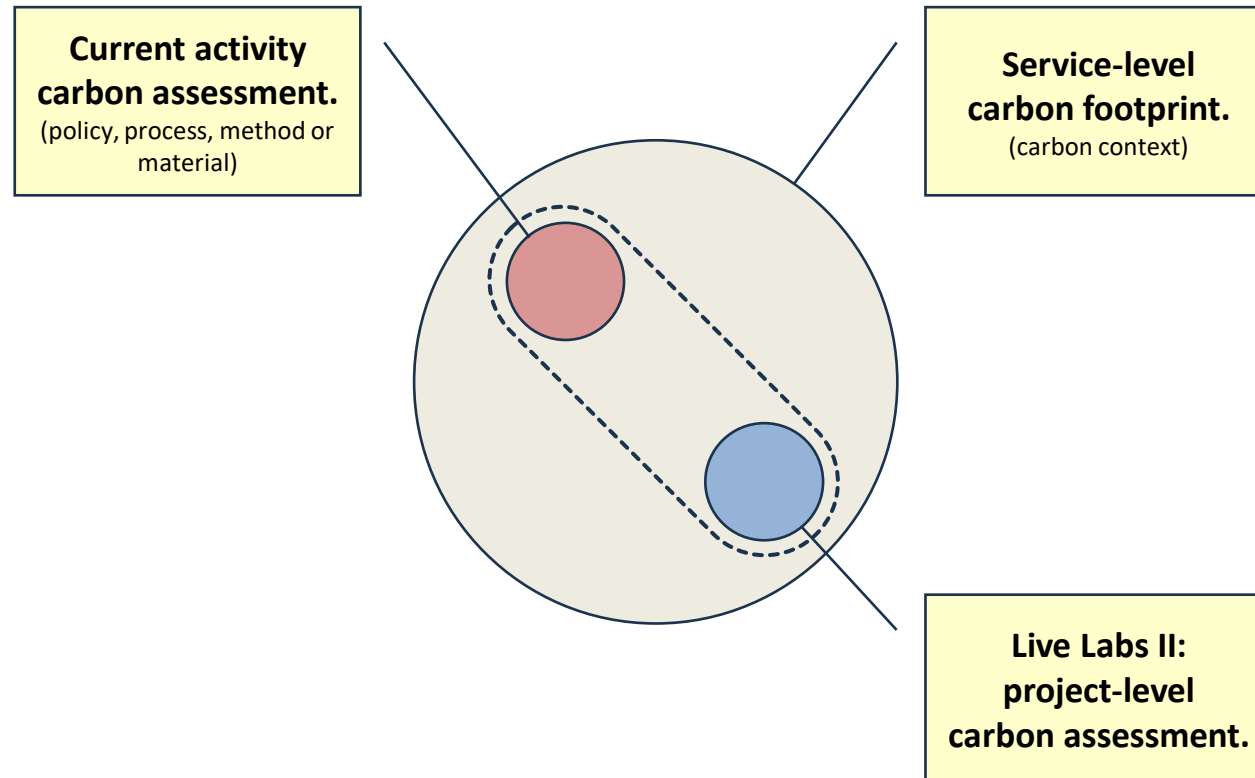
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# Overview

Live Labs II

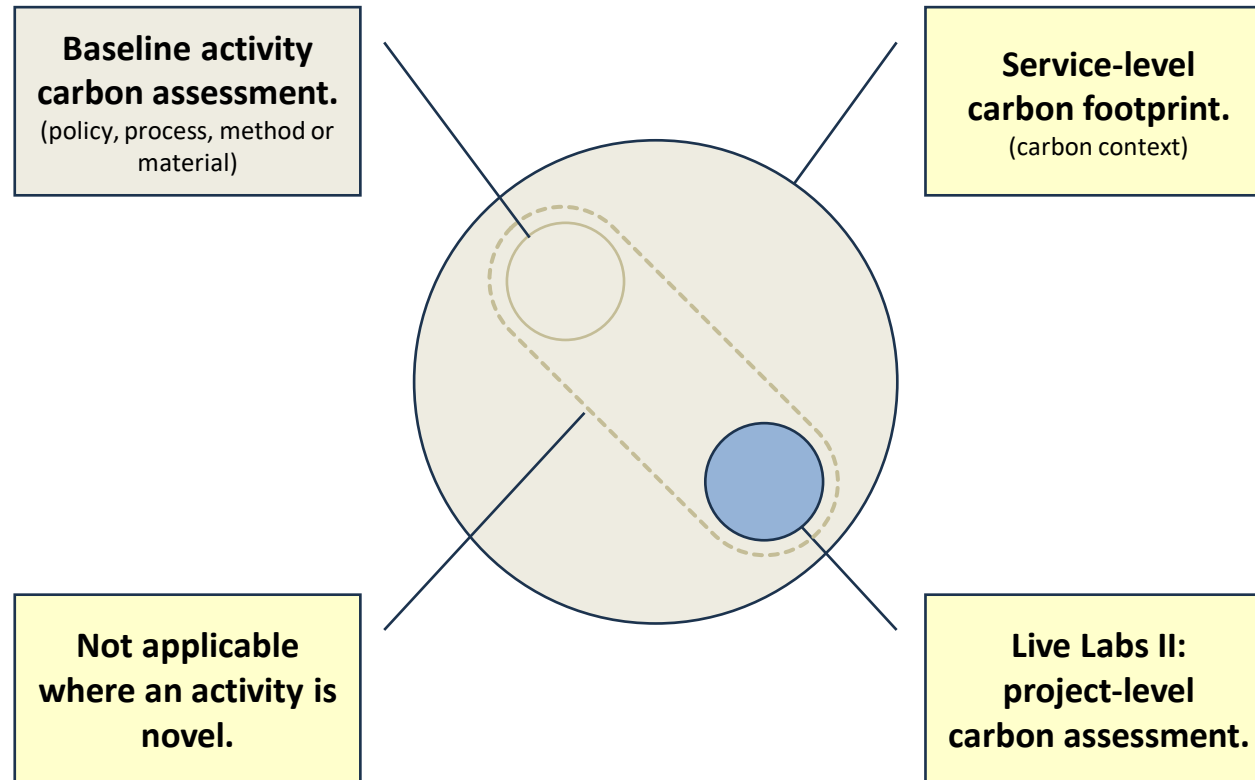


# Live Labs II: Carbon Assessments

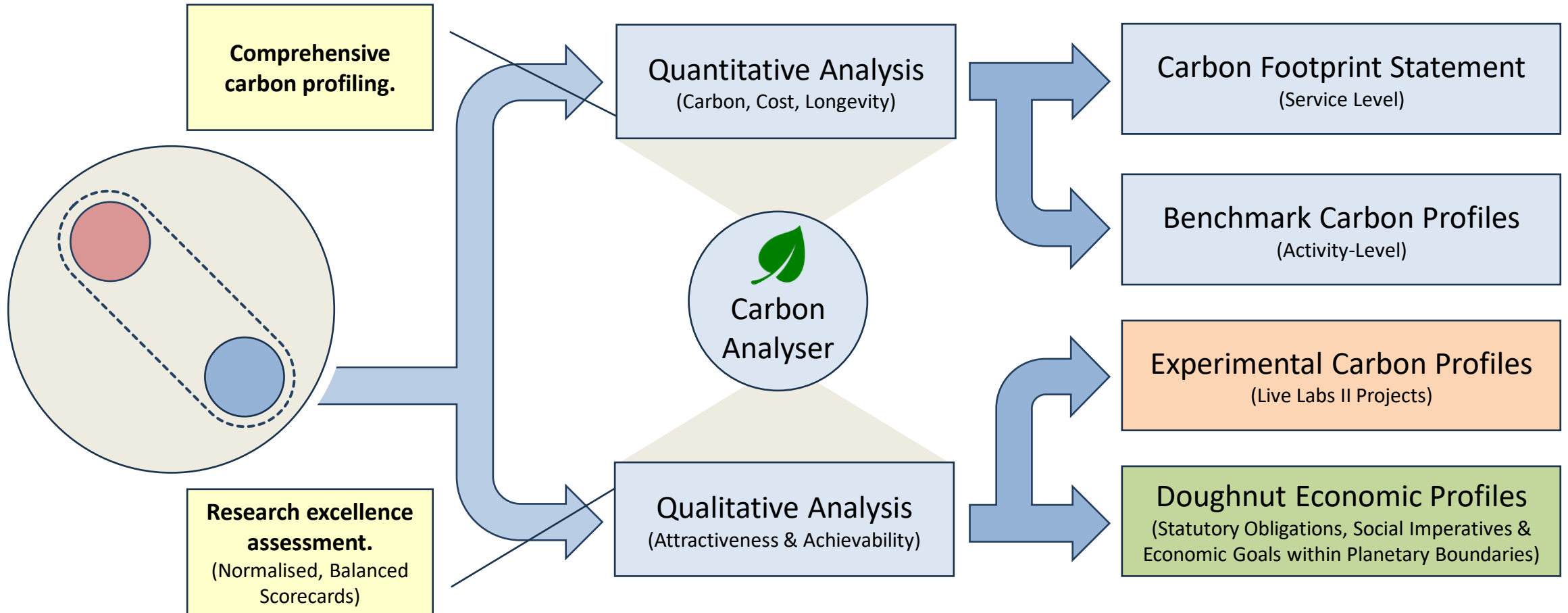




# Live Labs II: Carbon Assessments

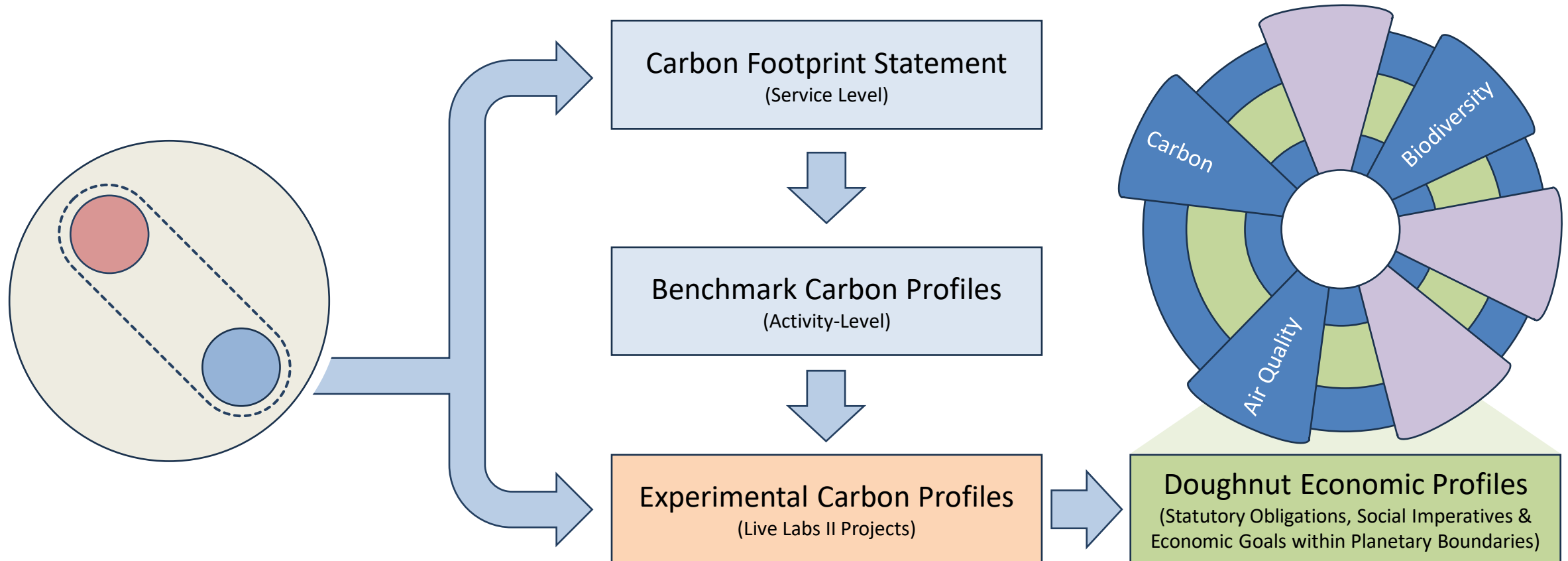


# Live Labs II: Carbon Assessments



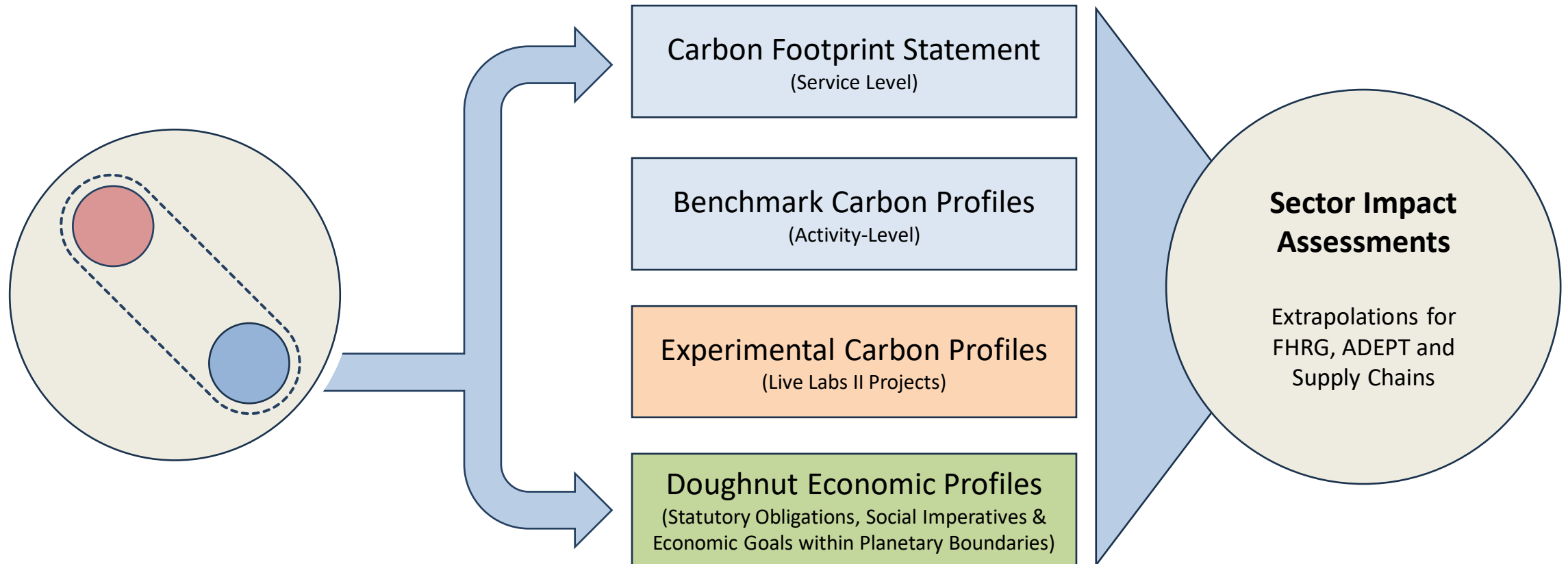
# Live Labs II: Carbon Assessments

## Sector Impact Assessment



# Live Labs II: Carbon Assessments

## Sector Impact Assessment





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# Overview

Live Labs II

# Five Step Process

## High Accuracy, Low Overhead

