Appendix A2: Methodology diagrams

1. Buildings
    - Geospatial processing
    - Baseline energy demand
    - Retrofit
    - Planned growth
    - Heat electrification
2. Heat networks
3. Renewables
    - Current and future capacity
4. Transport
    - Current and future vehicle statistics
    - Current and future milage and energy consumption
    - Current and future number of EVs
    - Current and future number of charge points
    - Current and future EV capacity and demand
    - Car parks
    - Transport hubs
5. Scenario modelling

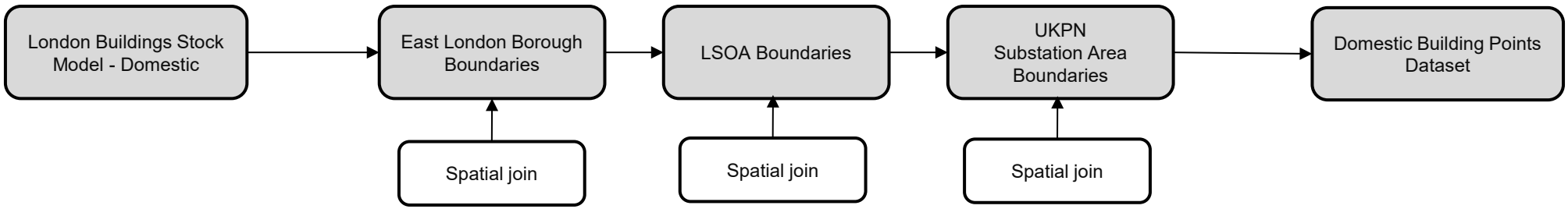
Appendix A2 – Methodology Diagrams
1. Buildings – Geospatial processing – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_01	London Buildings Stock Model - Domestic	The London Building Stock Model is a detailed 3D digital representation of every building in Greater London, integrating spatial, structural, and energy data to support planning, retrofit, and decarbonisation efforts.	Greater London Authority	London Building Stock Model v2	22/06/2025	Six-months	Property location	Open Government Licence v3.0 (OGL), Some components subject to Crown copyright / other restrictions
Input_012	East London Borough Boundaries	Digital vector boundaries for all UK Local Authority Districts as at May 2024	GLA	London Boroughs - London Datastore	26/02/2025	Monthly	Borough	Public dataset
Input_092	LSOA Boundaries	December 2021 Lower Layer Super Output Areas	ONS	Lower layer Super Output Areas (December 2021) Boundaries EW BSC (V4) | Open Geography Portal	20/02/2025	Unknown	LSOA	Public dataset
Input_015	UKPN Primary Substation Areas	This dataset is a geospatial view of the areas fed by primary substations. The aim is to create an indicative map showing the extent to which individual primary substations feed areas based on MPAN data.	UK Power Networks	UK Power Networks primary substation distribution areas — UK Power Networks	06/01/2025	Ad-hoc	Primary substation	Open
Input_086-090	Skenario Labs CRE Full Results per Borough	Skenario Labs modelling results: CRE full results per borough	Skenario Labs	N/A	08/04/2025	Unknown	Building location	Restricted
Outputs								
Output_01	Domestic Building Points Dataset	Point data set of domestic buildings in LAEP area with demand data	Arup	N/A	N/A	N/A	Building location	N/A
Output_02	Non-Domestic Building Points Dataset	Point data set of non-domestic buildings in LAEP area with demand data	Arup	N/A	N/A	N/A	Building location	N/A

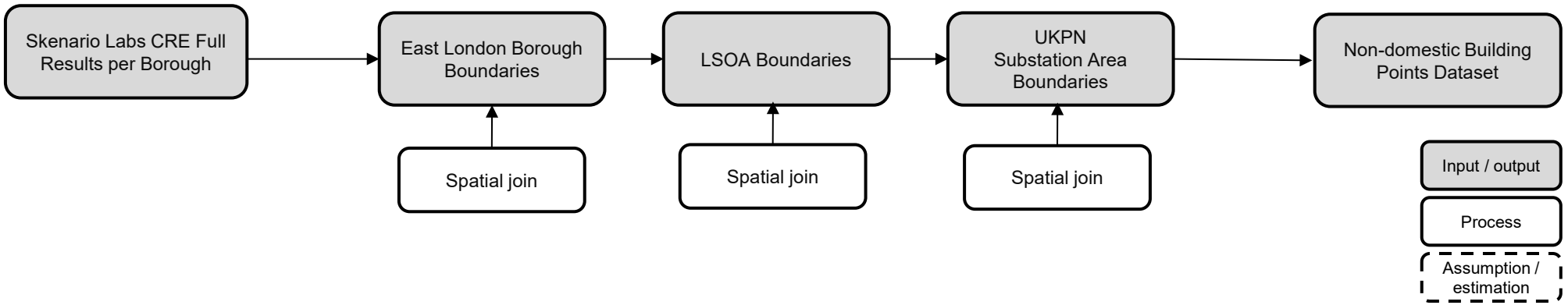
Appendix A2 – Methodology Diagrams

1. Buildings – Geospatial processing – Methodology

Domestic



Non-domestic



Appendix A2 – Methodology Diagrams

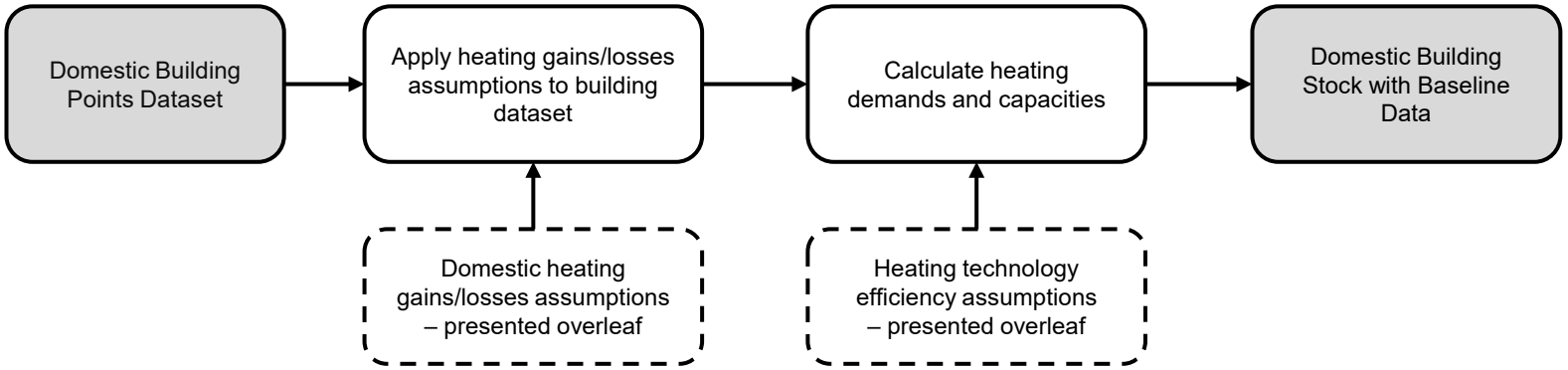
1. Buildings – Baseline energy demand – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_01	Domestic Building Points Dataset	Point data set of domestic buildings in LAEP area with demand data	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Outputs								
Output_44	Domestic Building Stock with Baseline Data	LBSM Domestic heating/ electrical baseline demands & capacities	Arup	N/A	N/A	N/A	Building location	N/A

Appendix A2 – Methodology Diagrams

1. Buildings – Baseline energy demand – Methodology

Domestic



Appendix A2 – Methodology Diagrams
1. Buildings – Baseline energy demand

Domestic demand assumptions

London Building Stock heating demand assumptions:

Dwelling dimensions and constructions:

- Assumed floor-ceiling height of 2.5m
- Window-to-wall ratio of 0.2
- Every dwelling is assumed to have a square floorplan with side lengths being the square root of the floor area of a single level
- Pitched roofs have an angle of 45 degrees
- Different dwelling topologies have different numbers of exposed walls and this has been accounted for in the conduction loss calculation.
  Number of exposed walls:
    - Detached – 4
    - Semi-detached/end of terrace – 3
    - Terraced – 2
- Dwellings in apartment blocks that are not on the top floor are assumed to have no gains/losses through the ceiling.

Internal gains:

- Assumed home occupancy rate of 16 hours per day
- Assumed lighting gains of 2W/m^2
- Assumed occupancy rate of 30m^2 per person, 60W per person emitted
- 'Other gains' include kitchen equipment, TVs, computers, white goods at a rate of 2 hours per day

External gains/losses:

- Infiltration rates (air changes per hour) and conduction U-values (W/m^2K) for walls and roofs are based on PartL, CIBSE, and Arup project data, and grouped into dwelling age groups.
- Glazing types are split into single/partial, secondary, and double/triple with associated U-values and solar gains (W/m^2 of window area)
- Assumed average of 2 hours of direct incident sunlight through glazing to represent solar gains.

Electricity consumption rates (kWh/m^2) are based on past Arup project data and UKPN 2025 data.

Heating technology assumptions

- District Heating – assumed COP of 2.4
- Air Source Heat Pump – assumed COP of 3

Appendix A2 – Methodology Diagrams
1. Buildings – Baseline energy demand

Non-domestic demand assumptions and methodology

Skenario Lab modelling assumptions

- London Building Stock Model OS data has been used as the source data to identify the building types.
- Where OS data indicates a mixed use residential building:
    - We have assumed that the ground floor level of the building (only) is occupied by the commercial activity
    - The energy use intensity for these buildings indicates the energy use intensity of the commercial (ground floor) level of the building only.
    - The gross floor area and number of storeys for these buildings include the commercial part of the building only (i.e. in all cases the number of storeys is one). This allows the reader to, for example, calculate the total energy consumption of the commercial unit within the building.
- In case of a missing build year, the default is set to 1980.
- In case of a missing building type, the default is set to Retail.
- Heating consumption has been calculated using the ISO 52016-1:2017 methodology
    - Some of the buildings come out with an apparently anomalously high heating consumption intensity using this methodology, typically when the building shape is different from the norm (e.g. wide and thin).
- Electricity and domestic hot water consumption has been calculated using data from the Building Energy Efficiency Survey (DESNZ, 2016).
- We have assumed that the heating and hot water demand of 'Other non residential' buildings is zero.
- Where OS data indicates an 'Unknown' building type, we have assumed these are Other non-residential buildings (i.e.unheated).

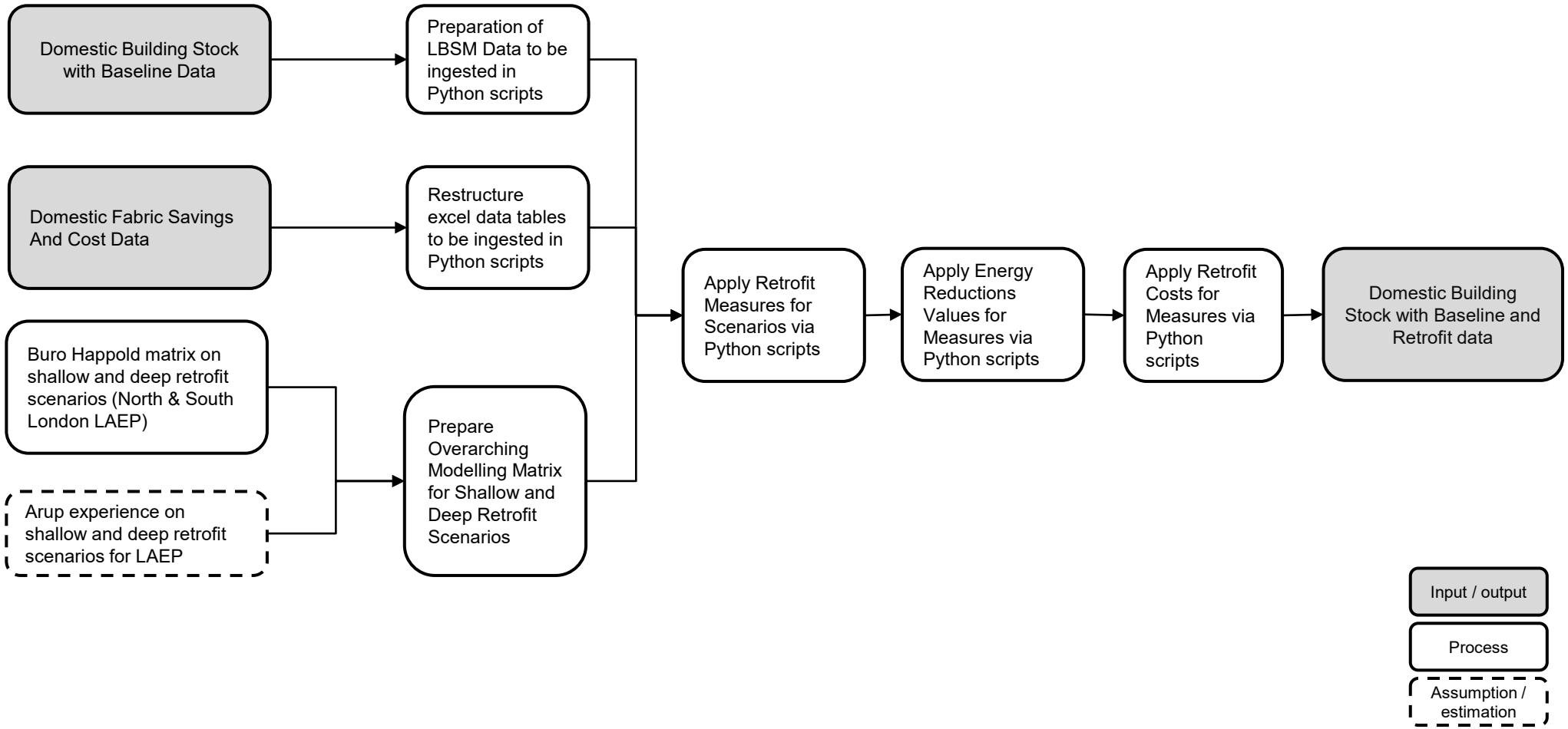
Appendix A2 – Methodology Diagrams

1. Buildings – Domestic Retrofit – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_44	Domestic Building Stock with Baseline Data	The London Building Stock Model is a detailed 3D digital representation of every building in Greater London, integrating spatial, structural, and energy data to support planning, retrofit, and decarbonisation efforts.	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Input_0117	Domestic Fabric Savings And Cost Data	Buro Happold data provided by GLA on energy reductions & costs for retrofit measures	Buro Happold	N/A	15/05/1025	N/A	N/A	Restricted
Outputs								
Intermediate_1	Domestic Building Stock with Baseline and Retrofit data	LBSM data with retrofit measures, energy demand reductions and associated heat demands and costs for these, both for shallow and deep retrofit scenarios	Arup	N/A	N/A	N/A	Building location	N/A

Appendix A2 – Methodology Diagrams

1. Buildings – Domestic Retrofit – Methodology



Appendix A2 – Methodology Diagrams
1. Buildings – Domestic Retrofit – Assumptions

Shallow Scenario: Domestic Shallow Retrofit Modelling Matrix

Property Retrofit Category	EPC Rating	Solid Wall Insulation	Cavity Wall Insulation	Single Glazing upgrade	Secondary Glazing Upgrade	Double / Triple Upgrade	Loft Insulation	Draught Proofing	Smarter Energy Control
Conservation	A-B	N	N	N	N	N	N	N	N
Conservation	C	N	Y	N	N	N	Y	Y	Y
Conservation	D	N	Y	Y	Y	N	Y	Y	Y
Conservation	E	N	Y	Y	Y	N	Y	Y	Y
Conservation	F-G	N	Y	Y	Y	N	Y	Y	Y
Listed	A-B	N	N	N	N	N	N	N	N
Listed	C	N	Y	N	N	N	Y	Y	Y
Listed	D	N	Y	Y	N	N	Y	Y	Y
Listed	E	N	Y	Y	N	N	Y	Y	Y
Listed	F-G	N	Y	Y	N	N	Y	Y	Y
Remaining	A-B	N	N	N	N	N	N	N	N
Remaining	C	N	Y	Y	N	N	Y	Y	Y
Remaining	D	N	Y	Y	Y	N	Y	Y	Y
Remaining	E	N	Y	Y	Y	N	Y	Y	Y
Remaining	F-G	N	Y	Y	Y	N	Y	Y	Y

Appendix A2 – Methodology Diagrams
1. Buildings – Domestic Retrofit – Assumptions

Deep Scenario: Domestic Deep Retrofit Modelling Matrix

Property Retrofit Category	EPC Rating	Solid Wall Insulation	Cavity Wall Insulation	Single Glazing Upgrade	Secondary Glazing Upgrade	Double / Triple Upgrade	Loft Insulation	Draught Proofing	Smarter Energy Control
Conservation	A-B	N	N	N	N	N	N	N	Y
Conservation	C	N	Y	Y	Y	Y	Y	Y	Y
Conservation	D	Y	Y	Y	Y	Y	Y	Y	Y
Conservation	E	Y	Y	Y	Y	Y	Y	Y	Y
Conservation	F-G	Y	Y	Y	Y	Y	Y	Y	Y
Listed	A-B	N	N	N	N	N	N	N	Y
Listed	C	N	Y	Y	N	N	Y	Y	Y
Listed	D	N	Y	Y	N	N	Y	Y	Y
Listed	E	N	Y	Y	N	N	Y	Y	Y
Listed	F-G	N	Y	Y	N	N	Y	Y	Y
Remaining	A-B	N	N	N	N	N	N	N	Y
Remaining	C	Y	Y	Y	Y	Y	Y	Y	Y
Remaining	D	Y	Y	Y	Y	Y	Y	Y	Y
Remaining	E	Y	Y	Y	Y	Y	Y	Y	Y
Remaining	F-G	Y	Y	Y	Y	Y	Y	Y	Y

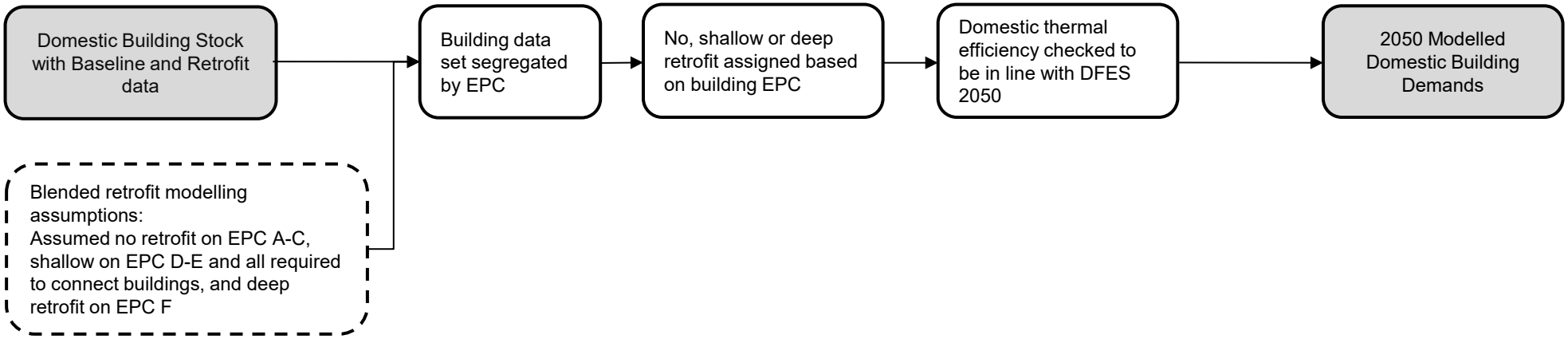
Appendix A2 – Methodology Diagrams
1. Buildings – Retrofit – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Intermediate_1	Domestic Building Stock with Baseline and Retrofit data	LBSM data with retrofit measures, energy demand reductions and associated heat demands and costs for these, both for shallow and deep retrofit scenarios	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Output_02	Non-domestic Building Points Dataset	Skenario Labs modelling results: CRE full results per borough (with 2050 retrofit demands)	Skenario Labs	N/A	08/04/2025	Unknown	Building location	Restricted
Outputs								
Intermediate_2	2050 Modelled Domestic Building Demands	2050 domestic building stock dataset with retrofit demands	Arup	N/A	N/A	N/A	Building location	N/A
Intermediate_3	2050 Modelled Non-domestic Building Demands	2050 non-domestic building stock dataset with retrofit demands	Arup	N/A	N/A	N/A	Building location	N/A

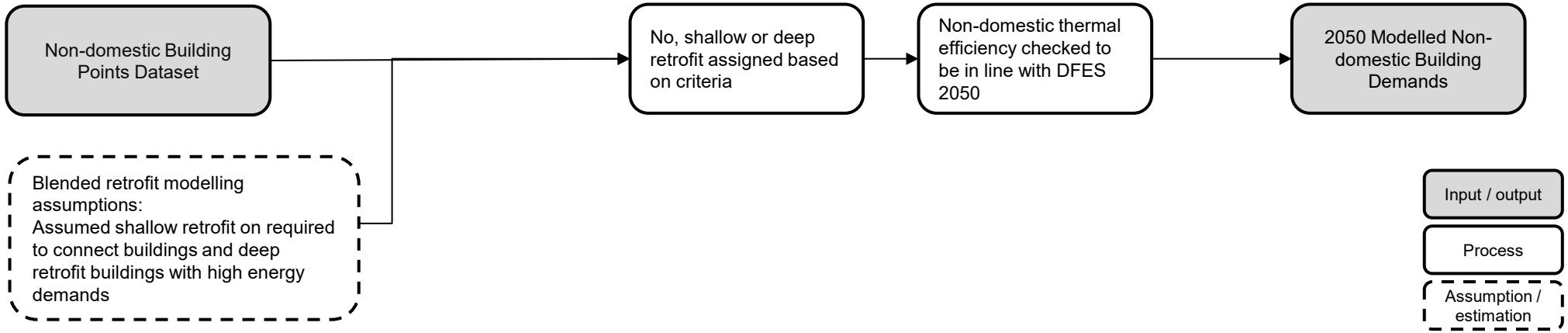
Appendix A2 – Methodology Diagrams

1. Buildings – Retrofit – Methodology

Domestic



Non-domestic



Appendix A2 – Methodology Diagrams

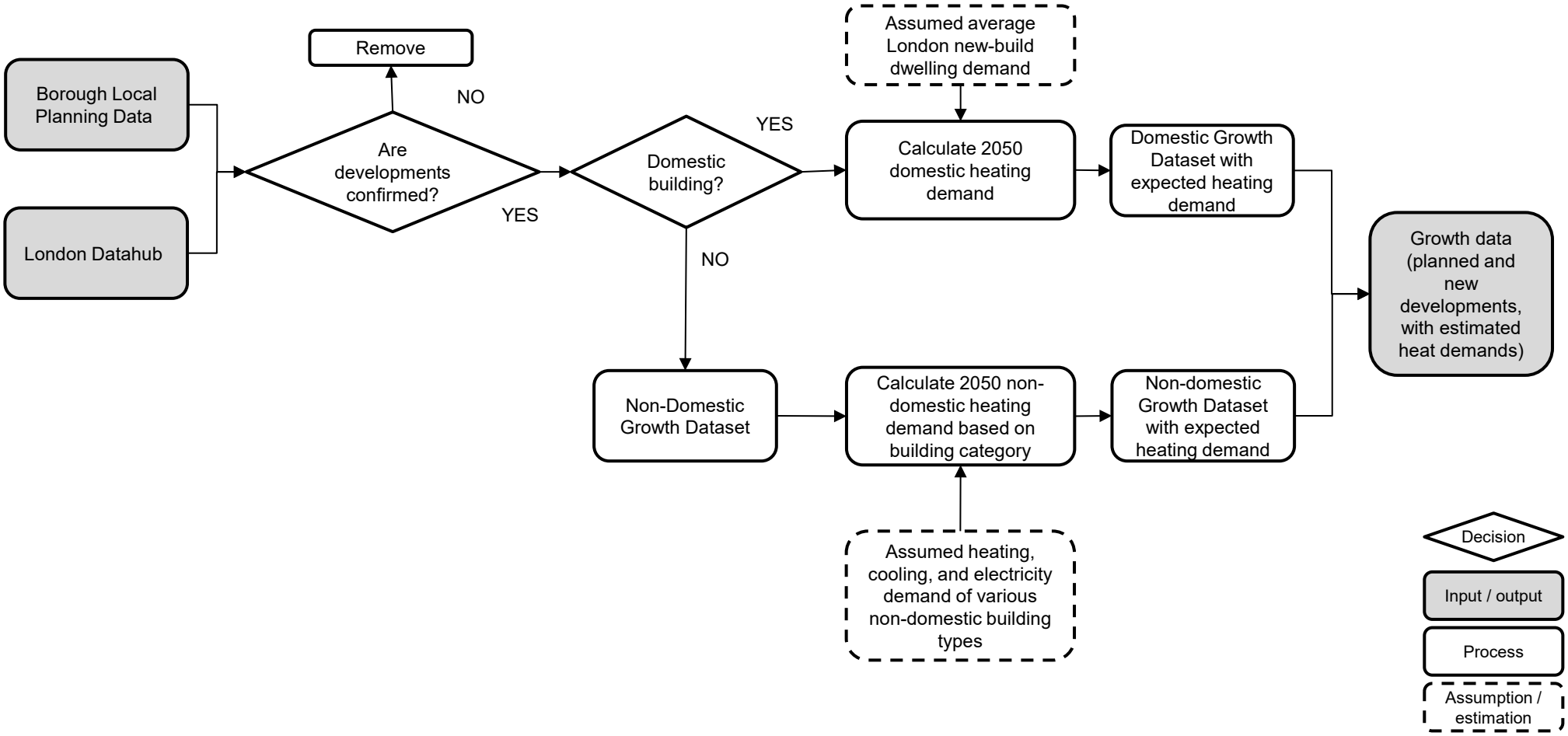
1. Buildings – Growth energy demands – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_067	London Datahub	Planning Permissions from the Planning London DataHub (PLD)	GLA	https://www.london.gov.uk/programmes-strategies/planning/digital-planning/planning-london-datahub	12/03/25	Daily	Point	Open
Input_0123	Borough Local Planning Data	Borough specific data handover of residential and non-residential growth data from boroughs in LAEP area	London Boroughs of LAEP Area	N/A	Mixed	Borough	Address level	Shared under IMA NDA
Outputs								
Output_28	2050 Growth Building Dataset	Growth data (planned and new developments, with estimated heat demands)	Arup	N/A	N/A	N/A	Building location	N/A

Appendix A2 – Methodology Diagrams

1. Buildings – Growth energy demands – Methodology

Growth Data



Appendix A2 – Methodology Diagrams

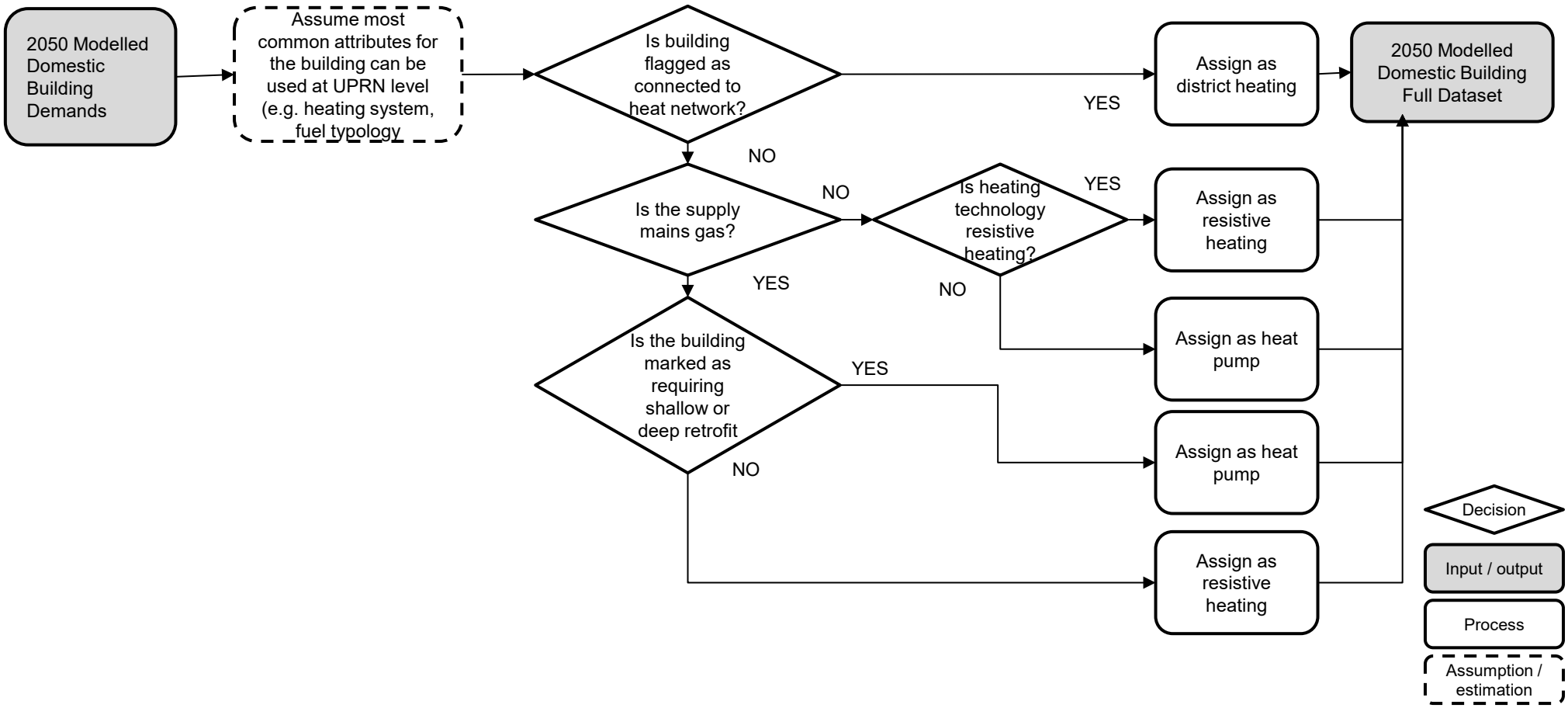
1. Buildings – Domestic heating technology assignment – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Intermediate_2	2050 Modelled Domestic Building Demands	2050 domestic building stock dataset with retrofit demands	Arup	Output from previous flow	N.A	N/A	Building location	N/A
Outputs								
Intermediate_4	2050 Modelled Domestic Building Full Dataset	2050 domestic building stock dataset with demands following retrofit and technology assignment	Arup	N/A	N/A	N/A	Building location	N/A

Appendix A2 – Methodology Diagrams

1. Buildings – Domestic heating technology assignment - Methodology

Domestic



Appendix A2 – Methodology Diagrams

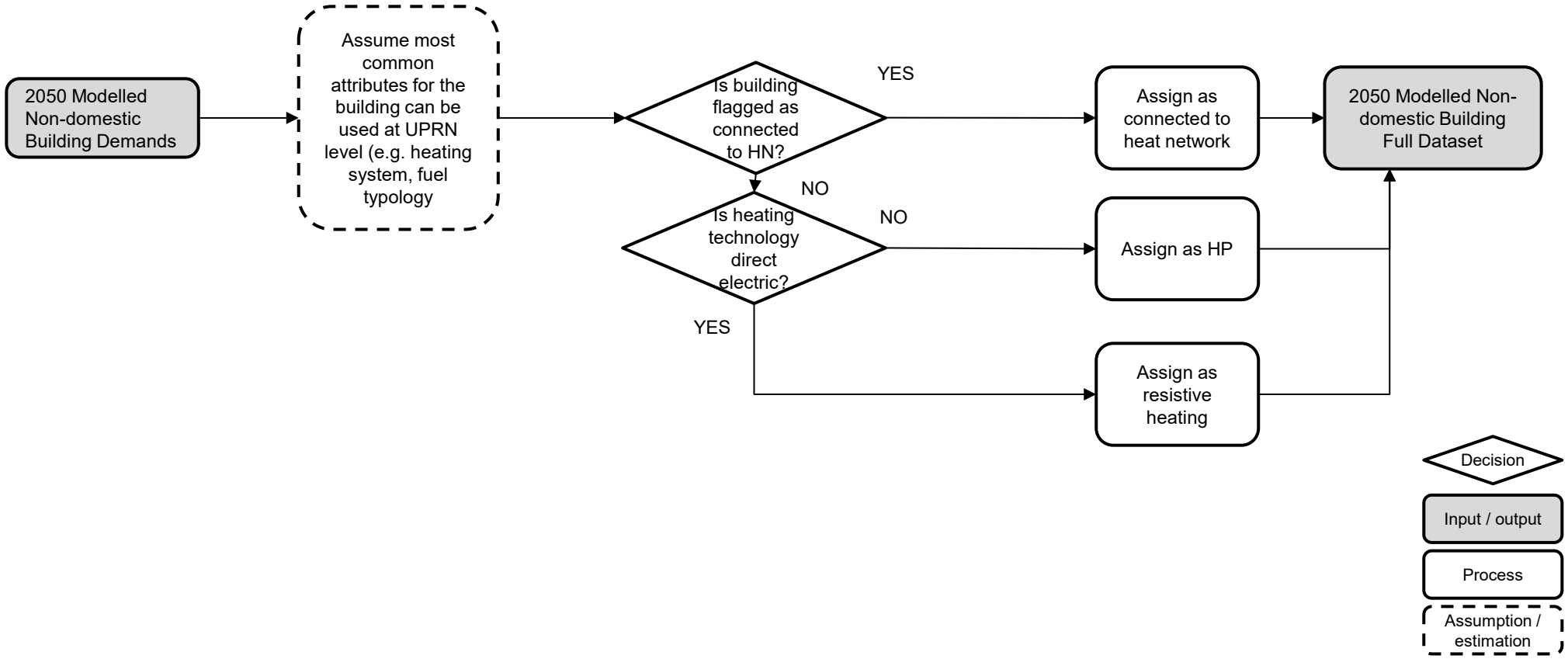
1. Buildings – Non-domestic heating technology assignment – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Intermediate_3	2050 Modelled Non-domestic Building Demands	2050 non-domestic building stock dataset with retrofit demands	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Outputs								
Intermediate_5	2050 Modelled Non-domestic Building Full Dataset	2050 non-domestic building stock dataset with demands following retrofit and technology assignment	Arup	N/A	N/A	N/A	Building location	N/A

Appendix A2 – Methodology Diagrams

1. Buildings – Non-domestic heating technology assignment - Methodology

Non-Domestic



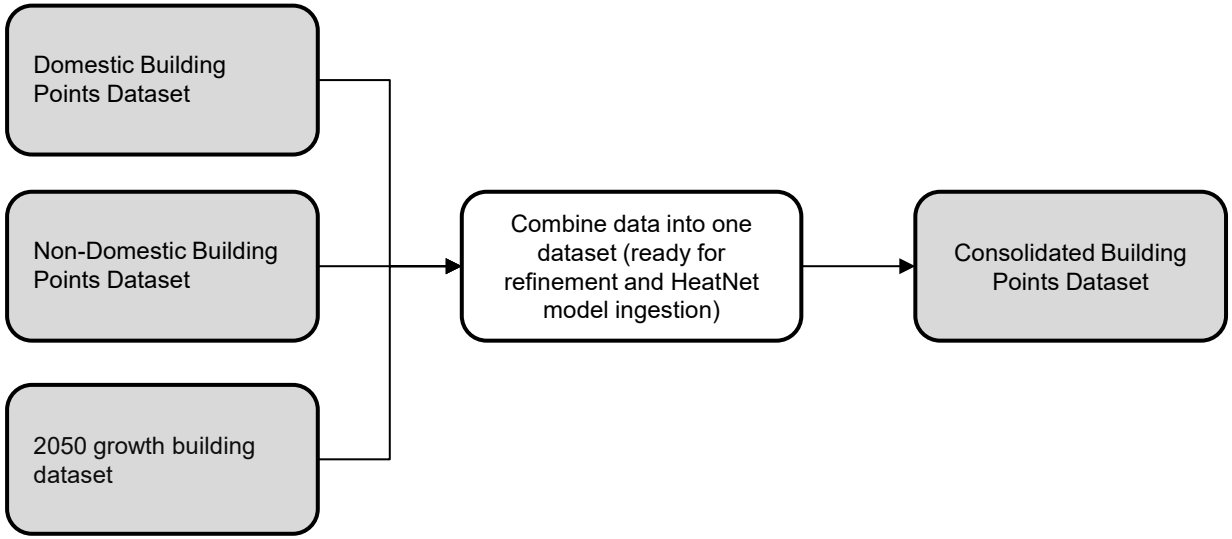
Appendix A2 – Methodology Diagrams

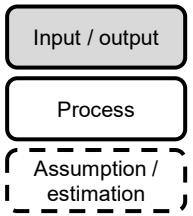
2. Heat networks (consolidated buildings dataset) – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_01	Domestic Building Points Dataset	Point data set of domestic buildings in LAEP area with demand	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Output_02	Non-Domestic Building Points Dataset	Point data set of non-domestic buildings in LAEP area with demand	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Output_28	2050 growth building dataset	Growth data (planned and new developments, with estimated heat demands)	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Outputs								
Intermediate_6	Consolidated Building Points Dataset	Dataset combining baseline domestic, baseline non-domestic and growth buildings demands	Arup	N/A	N/A	N/A	Building location	N/A

Appendix A2 – Methodology Diagrams

2. Heat networks (consolidated buildings dataset) - Methodology





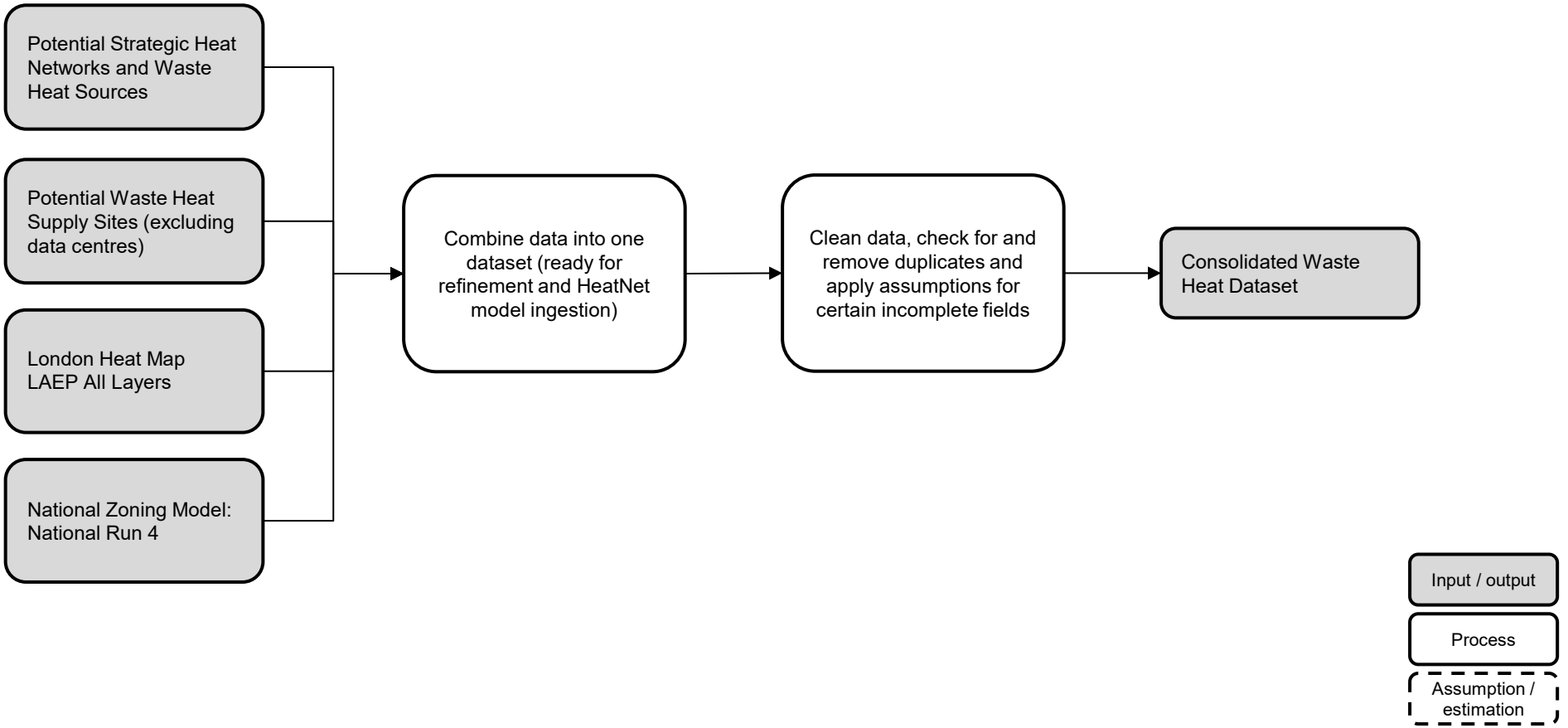
Appendix A2 – Methodology Diagrams

2. Heat networks (consolidated supplies dataset) – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0101	Potential Strategic Heat Networks and Waste Heat Sources	A set of potential strategic heat networks which are indicative to illustrate the opportunity for strategic cross-borough heat networks utilising London's largest known recoverable waste heat sources.	GLA	London Heat Map	29/05/2025	Periodically	Project extent	Public
Input_098	Potential Waste Heat Supply Sites(excluding data centres)	A set of point locations where there is potential waste heat that can be used to provide heat to existing and new heat networks. The data is gathered from various sources and should only be used to provide indicative information to users.	GLA	https://apps.london.gov.uk/heatmap/data/context-layers/ctx_hndu_waste_heat	11/03/2025	Unknown	Point location	Public
Input_022	London Heat Map LAEP All Layers	SSE and SSEN; Waste heat layer; CBEM; LHM waste; Existing heat networks	Greater London Authority	London Heat Map	29/05/2025	Periodically	Point location	Public
Input_0106	National Zoning Model: National Run 4	Includes: Zones, Heat demand, Number of buildings, Heat supply and Network	Department for Energy Security and Net Zero	N/A	08/04/2025	Periodically	Mixed	Restricted
Outputs								
Output_34	Consolidated Waste Heat Dataset	Full dataset of relevant waste heat opportunities for LAEP area	Arup	N/A	N/A	N/A	Point location	N/A

Appendix A2 – Methodology Diagrams

2. Heat networks (consolidated supplies dataset) - Methodology



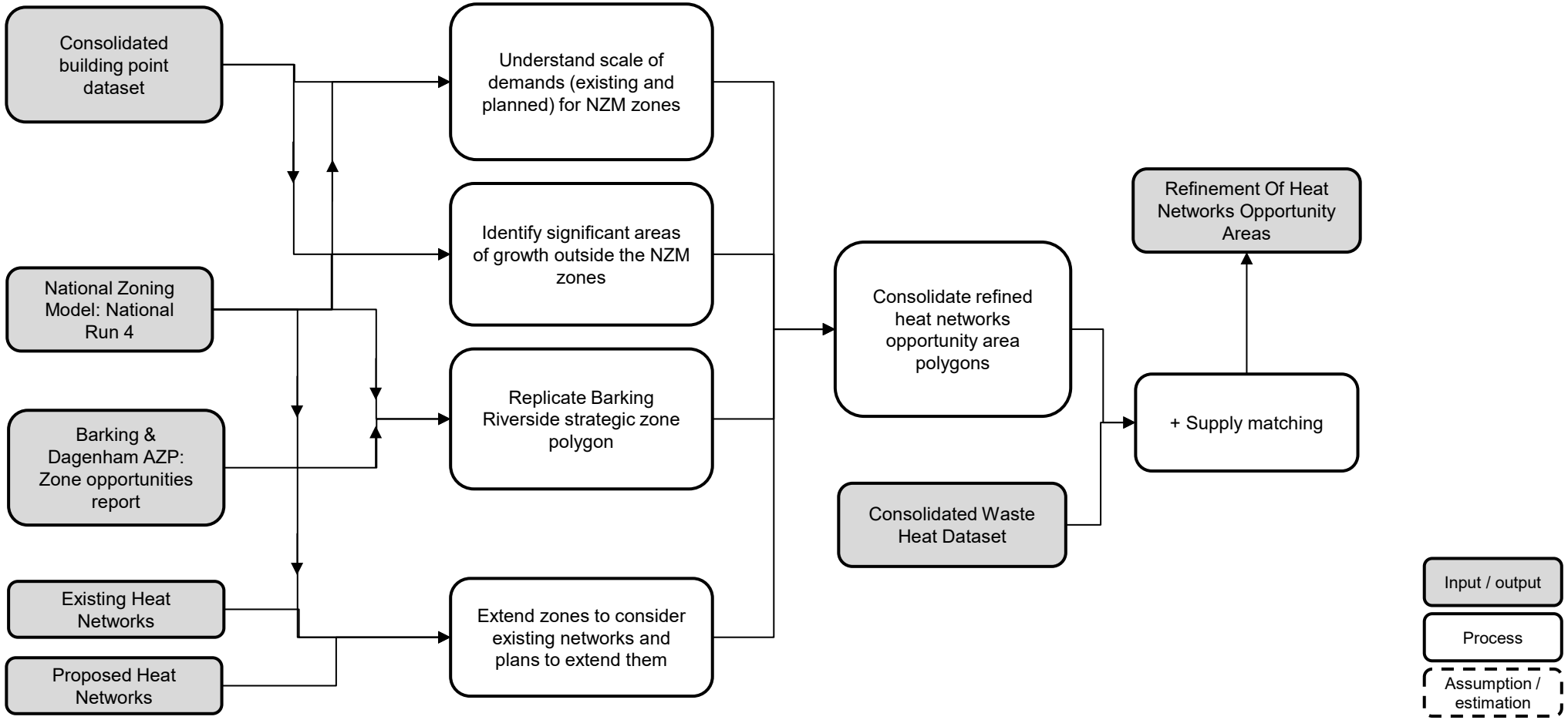
Appendix A2 – Methodology Diagrams

2. Heat networks (refinement of heat networks opportunity areas) – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Intermediate_6	Consolidated building points dataset	Dataset combining baseline domestic, baseline non-domestic and growth buildings demands	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Input_099	Existing Heat Networks	A set of existing heat networks. Data from the GLA. The data in this layer is periodically updated.	GLA	London Heat Map	29/05/2025	Periodically	Project extent	Public
Input_0100	Proposed Heat Networks	A set of proposed heat networks. Data from the GLA. The data in this layer is periodically updated.	GLA	London Heat Map	29/05/2025	Periodically	Project extent	Public
Input_0106	National Zoning Model: National Run 4	Includes: Zones, Heat demand, Number of buildings, Heat supply and Network	Department for Energy Security and Net Zero	N/A	08/04/2025	Periodically	Mixed	Restricted
Input_0118	Barking & Dagenham AZP: Zone opportunities report	Heat network feasibility study as part of Advancing Zoning Programme	London Borough of Barking & Dagenham	N/A	N/A	N/A	Mixed	Restricted
Output_34	Consolidated Waste Heat Dataset	Full dataset of relevant waste heat opportunities for LAEP area	Arup	N/A	N/A	N/A	Point location	N/A
Outputs								
Output_33	Refinement Of Heat Networks Opportunity Areas	Dataset of refined heat network opportunities in LAEP area	Arup	N/A	N/A	N/A	Mixed	N/A

Appendix A2 – Methodology Diagrams

2. Heat networks (refinement of heat networks opportunity areas) – Methodology

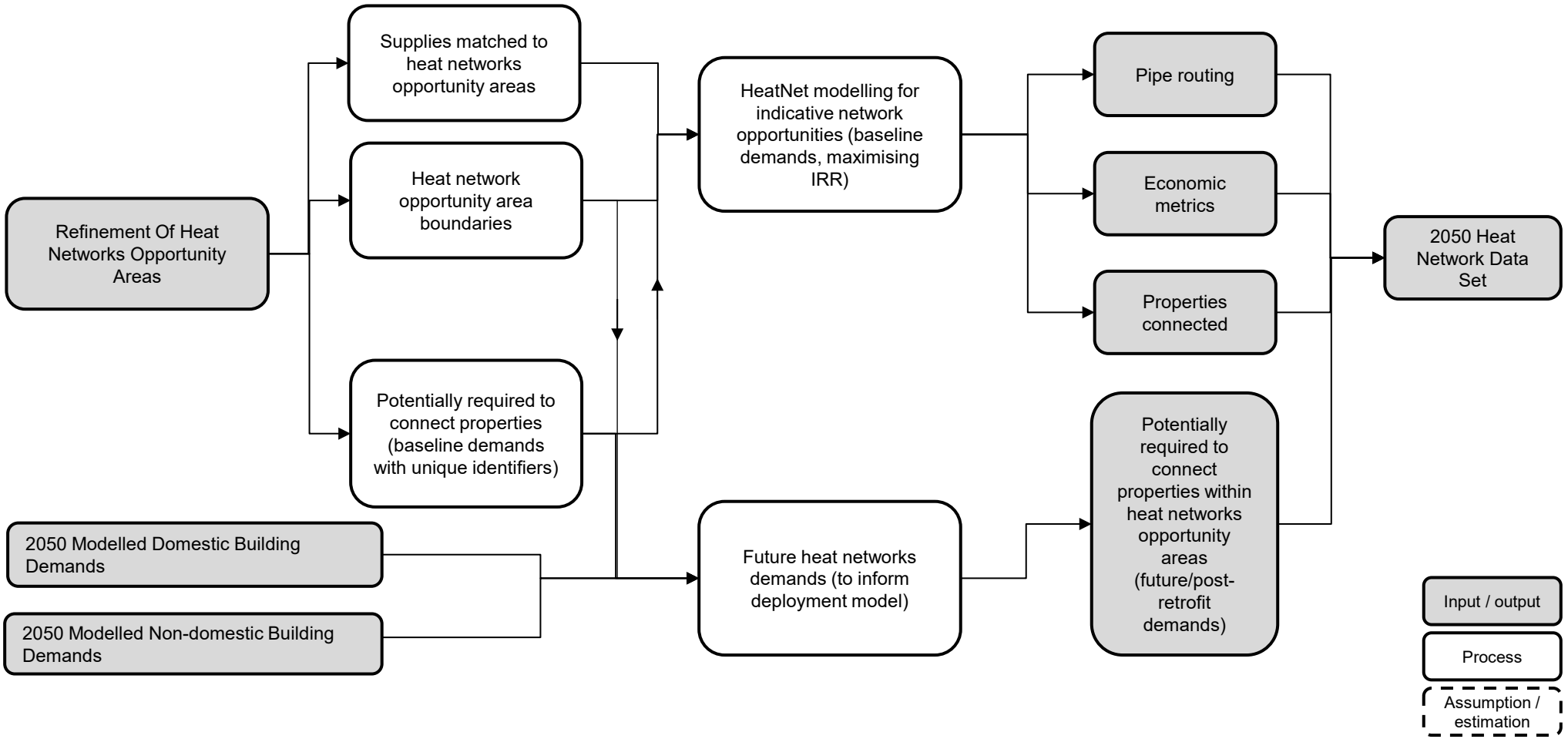


Appendix A2 – Methodology Diagrams
2. Heat networks (high-level) – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_33	Refinement Of Heat Networks Opportunity Areas	Dataset of refined heat network opportunities in LAEP area	Arup	N/A	N/A	N/A	Mixed	N/A
Intermediate_4	2050 Modelled Domestic Building Demands	2050 domestic building stock dataset with retrofit demands	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Intermediate_5	2050 Modelled Non-domestic Building Demands	2050 non-domestic building stock dataset with retrofit demands	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Outputs								
Output_084-086	Heat Network Data Set	Full heat network data set including pipe routing, economic metrics and buildings connected for key identified zones, and additional building connections for further heat network opportunity	Arup	N/A	N/A	N/A	Mixed	N/A

Appendix A2 – Methodology Diagrams

2. Heat networks (high-level) – Methodology



Appendix A2 – Methodology Diagrams
3. Renewables – Solar PV – Data contents

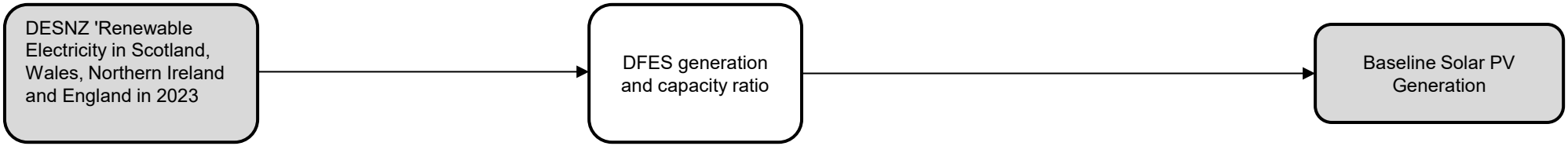
Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_074	London Solar Opportunity Map (LSOM)	The LSOM identifies opportunity areas for installing solar and storage in homes and businesses. The London Solar Opportunity Map is based on the interpretation of LiDAR data. It provides an initial estimate of the amount of electricity that could be generated from panels both on rooftops and at ground level.	GLA	N/A	21/01/2025	N/A	Point	Open
Output_01	Domestic Building Points Dataset	Point data set of domestic buildings in LAEP area with demand	Arup	Output from previous flow	N/A	N/A	Building level	N/A
Output_02	Non-Domestic Building Points Dataset	Point data set of non-domestic buildings in LAEP area with demand	Arup	Output from previous flow	N/A	N/A	Building location	N/A
Input_092	LSOA Boundaries	December 2021 Lower Layer Super Output Areas	ONS	Lower layer Super Output Areas (December 2021) Boundaries EW BSC (V4) | Open Geography Portal	20/02/2025	Unknown	LSOA	Public
Input_0119	Accelerated Green Scenario Data	Accelerated Green Scenario data – Solar targets from Zero Carbon Pathway tool	GLA	N/A	N/A	N/A	N/A	N/A

Appendix A2 – Methodology Diagrams
3. Renewables – Solar PV – Data contents

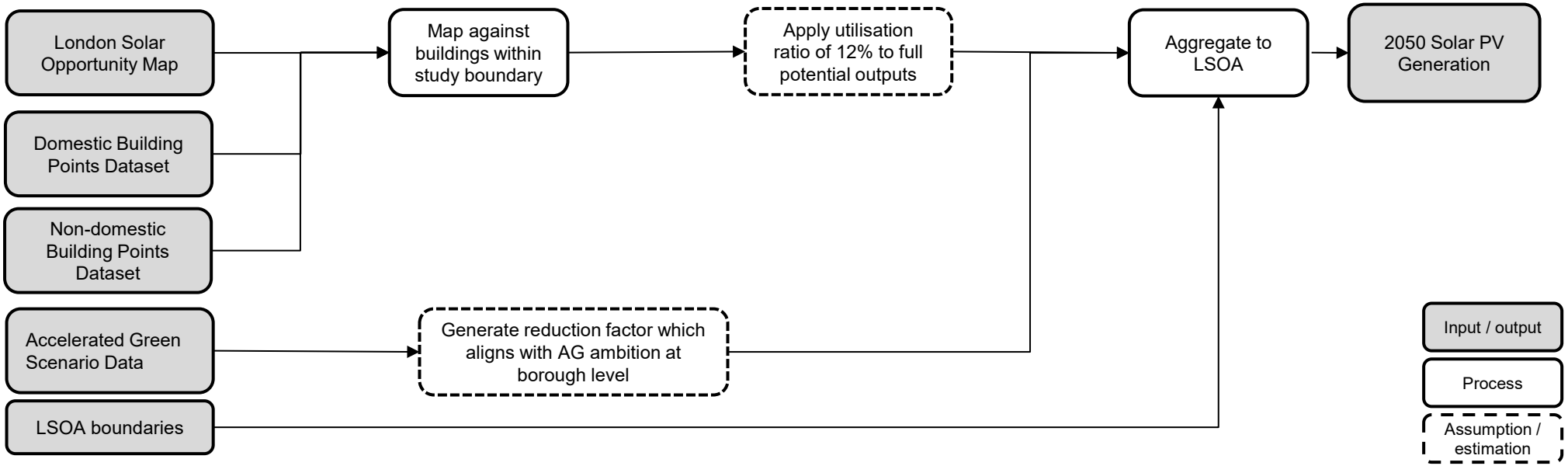
Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0120	DESNZ 'Renewable Electricity in Scotland, Wales, Northern Ireland and England in 2023	Overview of current solar PV capacity at LSOA level	DESNZ	https://assets.publishing.service.gov.uk/media/68da76d2c487360cc70c9e9d/Renewable_electricity_by_local_authority_2014_-_2024.xlsx	24/07/25	Unknown	LSOA	Public
Outputs								
Output_064	Baseline Solar PV Generation	Baseline solar PV generation per LSOA in LAEP area	Arup	N/A	N/A	N/A	Borough	N/A
Intermediate_7	2050 Solar PV Generation	Modelled 2050 solar PV generation per LSOA in LAEP area	Arup	N/A	N/A	N/A	LSOA	N/A

Appendix A2 – Methodology Diagrams

3. Renewables – Solar PV – Methodology



Future Scenarios



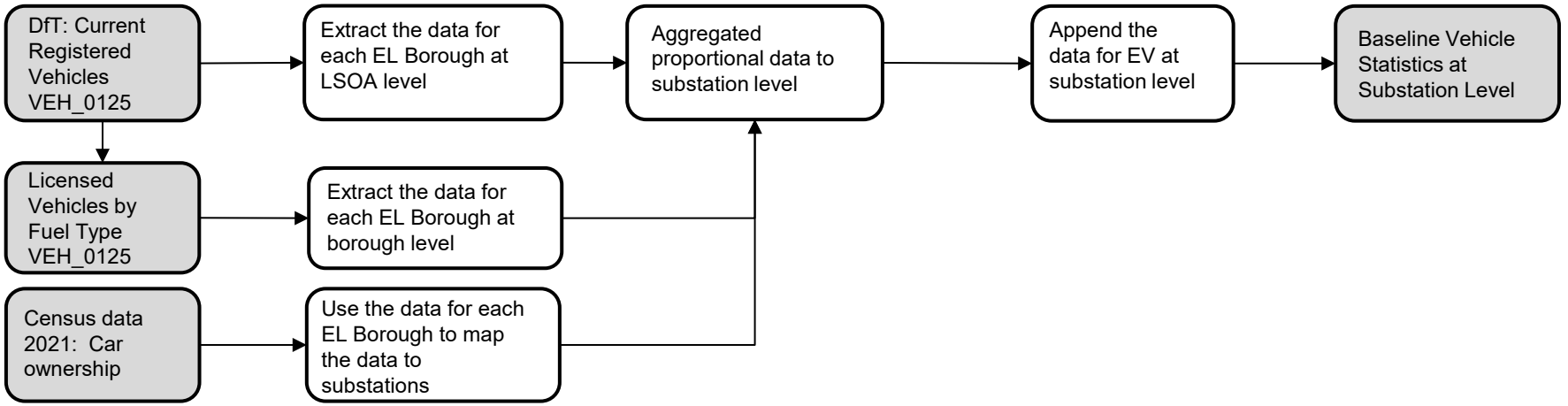
Appendix A2 – Methodology Diagrams
4. Transport – Vehicle statistics – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_023	DfT: Current Registered Vehicles VEH_0125	Vehicles at the end of each quarter by licence status, body type, keepership and Lower Layer Super Output Area (LSOA). Includes only areas with ≥5 vehicles; others are grouped into "Miscellaneous."	Department for Transport & Driver and Vehicle Licensing Agency	https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-files	26/02/2025	Quarterly	LSOA	Open Government Licence v3.0 (OGL)
Input_062	Licensed Vehicles by Fuel Type	Number of licensed vehicles in the UK by propulsion/fuel type (e.g., petrol, diesel, battery electric, hybrid), reported quarterly.	Department for Transport & Driver and Vehicle Licensing Agency	https://www.gov.uk/government/statistical-data-sets/veh01-vehicles-registered-for-the-first-time	02/05/2025	Quarterly	Local Authority District (LAD)	Open Government Licence v3.0 (OGL), with some components subject to Crown copyright
Input_094	Census data 2021: Car ownership	This dataset provides Census 2021 estimates on the number of cars or vans available to members of households for England and Wales. The estimates are as at Census Day, 21 March 2021.	ONS	https://www.ons.gov.uk/peoplepopulationandcommunity/housing/methodologies/housingqualityinformationforcensus2021	20/02/2025	every 10 years	LSOA	Office for National Statistics (ONS), released 5 January 2022, ONS website, methodology, Housing quality information for Census 2021.
Input_0114	NEVIS Transport Data	NEVIS transport data; current and projected until 2050	Cenex	N/A	07/05/2025	Unknown	Borough	Restricted
Outputs								
Output_52	Baseline Vehicle Statistics at Substation Level	Baseline vehicle statistics per substation in LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_53	2050 Vehicle Statistics at Substation Level	Modelled 2050 vehicle statistics per substation in LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

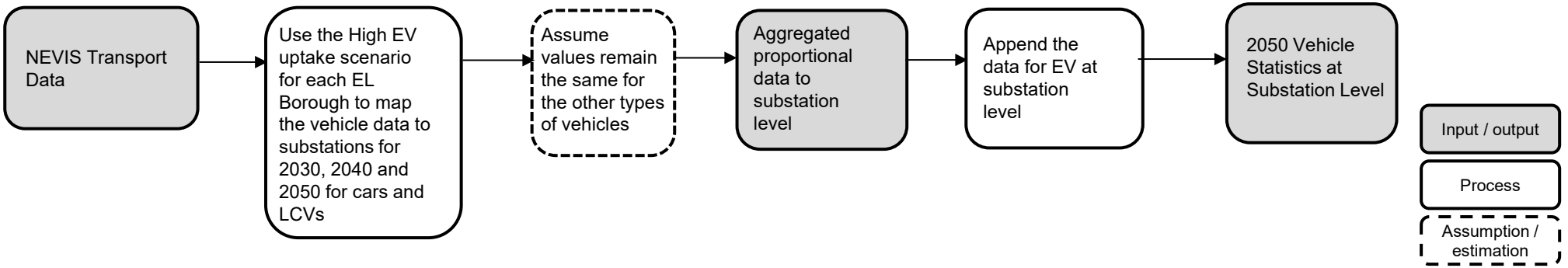
Appendix A2 – Methodology Diagrams

4. Transport – Vehicle statistics – Methodology

Baseline



Future Scenarios



Appendix A2 – Methodology Diagrams
4. Transport – Mileage– Data contents

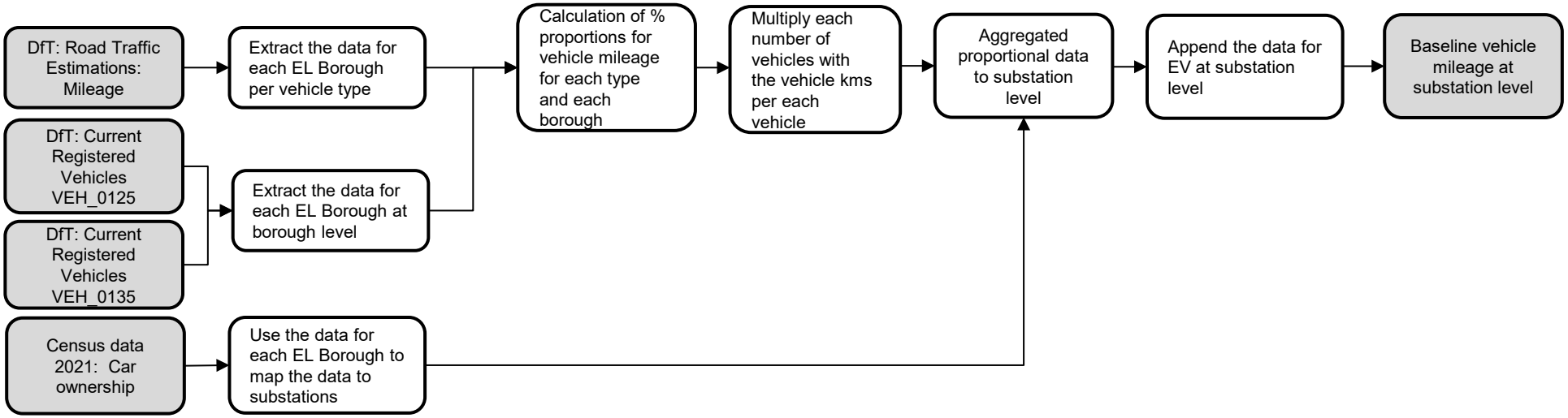
Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_061	Road Traffic Estimates by Local Authority	Estimated vehicle kilometres travelled by all motor vehicles on roads within each local authority in Great Britain, by year.	Department for Transport (DfT)	https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra	2052025	Annually	Local Authority District (LAD)	Open Government Licence v3.0 (OGL), with some components subject to Crown copyright
Input_026	DfT: Current Registered Vehicles VEH_0135	Vehicles at the end of each quarter by licence status, body type, keepership and Lower Layer Super Output Area (LSOA). Includes only areas with ≥5 vehicles; others are grouped into “Miscellaneous.”	Department for Transport & Driver and Vehicle Licensing Agency	https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-files	26/02/2025	Quarterly	LSOA	Open Government Licence v3.0 (OGL)
Input_023	DfT: Current Registered Vehicles VEH_0125	Vehicles at the end of each quarter by licence status, body type, keepership and Lower Layer Super Output Area (LSOA). Includes only areas with ≥5 vehicles; others are grouped into “Miscellaneous.”	Department for Transport & Driver and Vehicle Licensing Agency	https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-files	26/02/2025	Quarterly	LSOA	Open Government Licence v3.0 (OGL)
Input_094	Census data 2021: Car ownership	This dataset provides Census 2021 estimates on the number of cars or vans available to members of households for England and Wales. The estimates are as at Census Day, 21 March 2021.	ONS	https://www.ons.gov.uk/peoplepopulationandcommunity/housing/methodologies/housingqualityinformationforcensus2021	20/02/2025	every 10 years	LSOA	Office for National Statistics (ONS), released 5 January 2022, ONS website, methodology, Housing quality information for Census 2021.

Appendix A2 – Methodology Diagrams
4. Transport – Mileage– Data contents

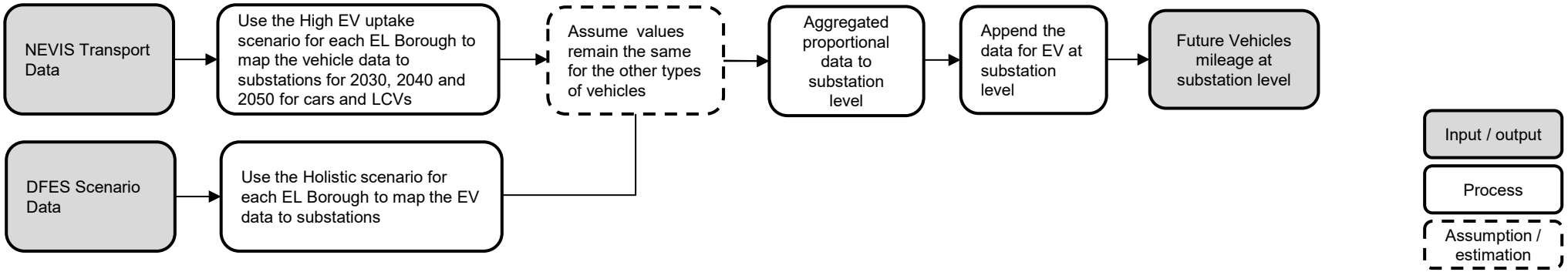
Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0114	NEVIS Transport Data	NEVIS transport data; current and projected until 2050	Cenex	N/A	07/05/2025	Unknown	Borough	Restricted
Input_0121	DFES Scenario Data	DFES 2050 Scenario data	DFES	https://dso.ukpowernetworks.co.uk/distribution-future-energy-scenarios	01/05/2025	Annual	LSOA	Open
Outputs								
Output_56	Baseline vehicle mileage at substation level	Baseline transport energy dataset with modelled mileage at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_57	Future Vehicles mileage at substation level	2050 transport energy dataset with modelled mileage at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

Appendix A2 – Methodology Diagrams
4. Transport – Mileage – Methodology

Baseline



Future Scenarios



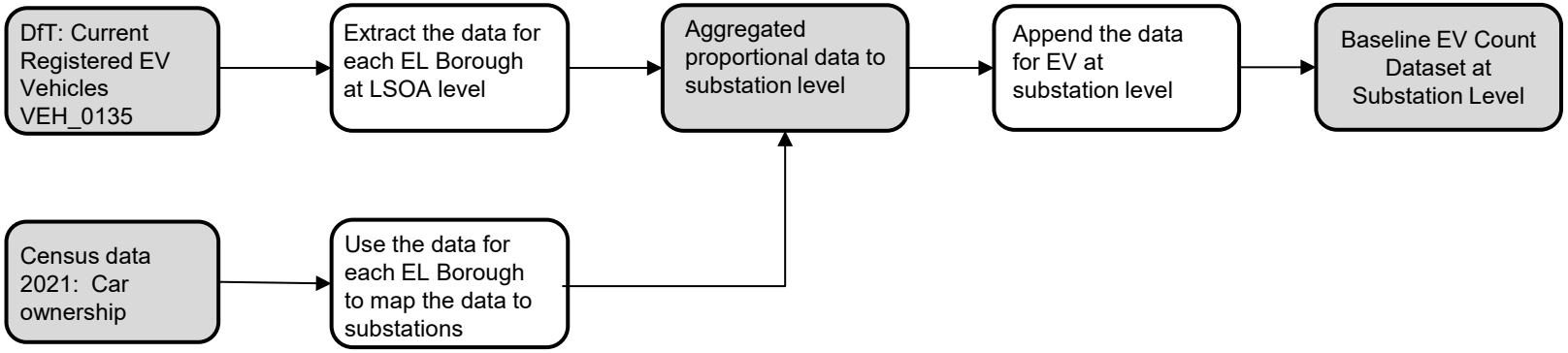
Appendix A2 – Methodology Diagrams
4. Transport – Electric vehicles – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_026	Current Registered EV Vehicles VEH_0135	Vehicles at the end of each quarter by propulsion type and Lower Layer Super Output Area (LSOA). Includes only areas with ≥5 vehicles; others are grouped into “Miscellaneous.”	Department for Transport & Driver and Vehicle Licensing Agency	https://www.gov.uk/government/statistical-data-sets/veh01-vehicles-registered-for-the-first-time	02/05/2025	Quarterly	Local Authority District (LAD)	Open Government Licence v3.0 (OGL), with some components subject to Crown copyright
Input_094	Census data 2021: Car ownership	This dataset provides Census 2021 estimates on the number of cars or vans available to members of households for England and Wales. The estimates are as at Census Day, 21 March 2021.	ONS	https://www.ons.gov.uk/peoplepopulationandcommunity/housing/methodologies/housingqualityinformationforcensus2021	20/02/2025	every 10 years	LSOA	Office for National Statistics (ONS), released 5 January 2022, ONS website, methodology, Housing quality information for Census 2021.
Input_0121	DFES Scenario Data	DFES 2050 Scenario data	DFES	https://dso.ukpowernetworks.co.uk/distribution-future-energy-scenarios	01/05/2025	Annual	LSOA	Public
Outputs								
Output_56	Baseline EV Count Dataset at Substation Level	Existing number of EVs at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_57	2050 EV Count Dataset at Substation Level	2050 number of EVs at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

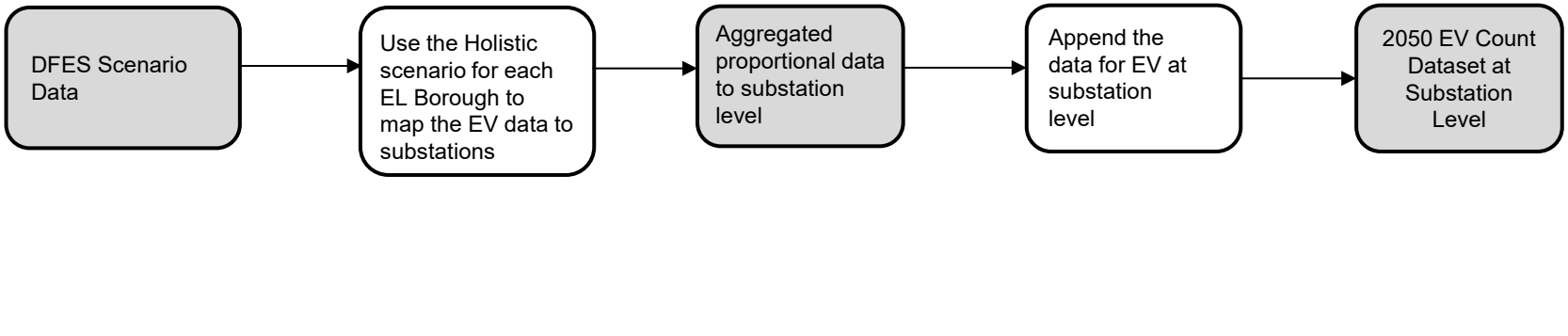
Appendix A2 – Methodology Diagrams

4. Transport – Electric vehicles – Methodology

Baseline



Future Scenarios



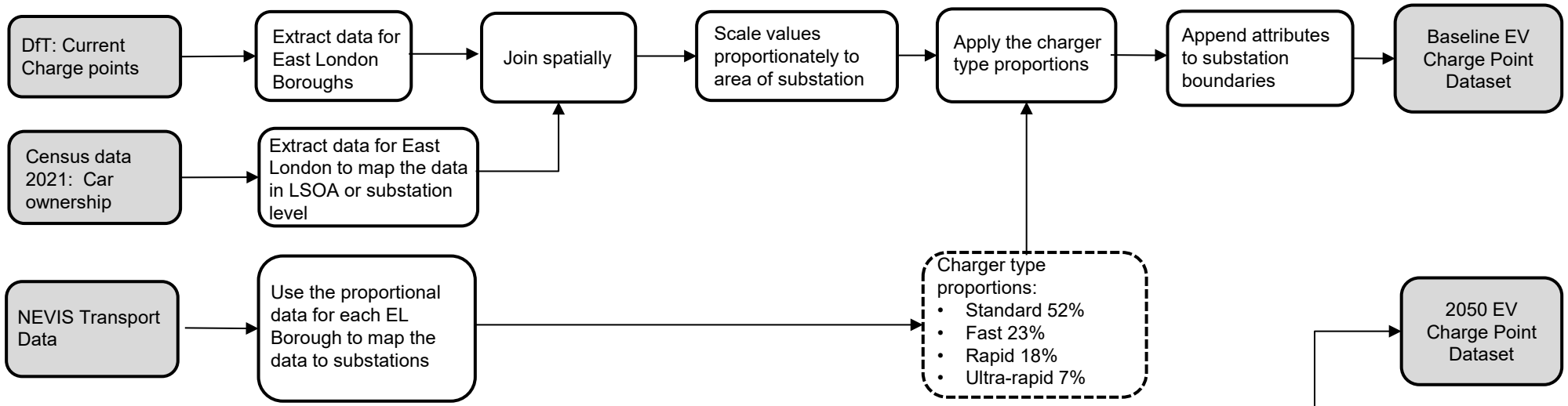
Appendix A2 – Methodology Diagrams
4. Transport – EV Charge points – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0114	NEVIS Transport Data	NEVIS transport data; current and projected charge points and types of EV devices until 2050	Cenex	N/A	07/05/2025	Unknown	Borough	Restricted
Input_0122	DfT: Current Charge points	EV publicly available electric vehicle charging devices for each borough	DfT	https://www.gov.uk/government/statistics/electric-vehicle-public-charging-infrastructure-statistics-july-2025	20/05/2025	Every 3 months	Borough	Open
Input_094	Census data 2021: Car ownership	This dataset provides Census 2021 estimates on the number of cars or vans available to members of households for England and Wales. The estimates are as at Census Day, 21 March 2021.	ONS	https://www.ons.gov.uk/peoplepopulationandcommunity/housing/methodologies/housingqualityinformationforcensus2021	20/02/2025	Every 10 years	LSOA	Office for National Statistics (ONS), released 5 January 2022, ONS website, methodology, Housing quality information for Census 2021.
Outputs								
Output_46	Baseline EV charge point dataset	Baseline EVs charge point dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_47	2050 EV charge point dataset	2050 EVs charge point dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

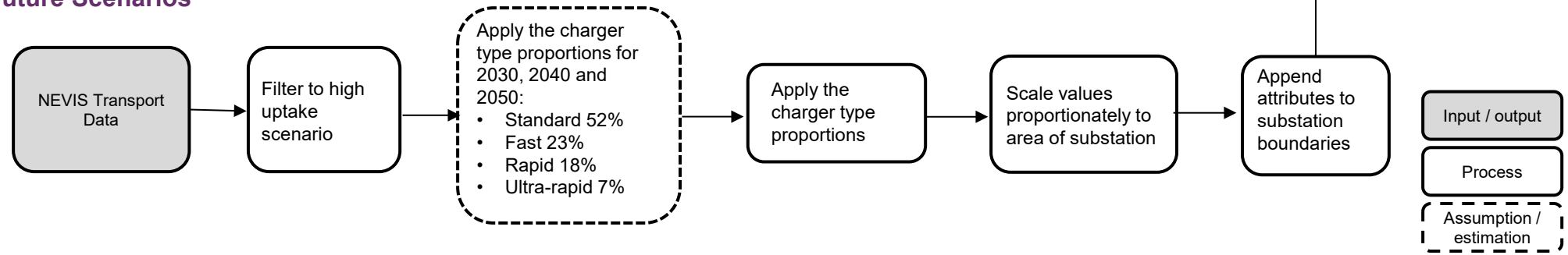
Appendix A2 – Methodology Diagrams

4. Transport – EV Charge points – Methodology

Baseline



Future Scenarios



Appendix A2 – Methodology Diagrams

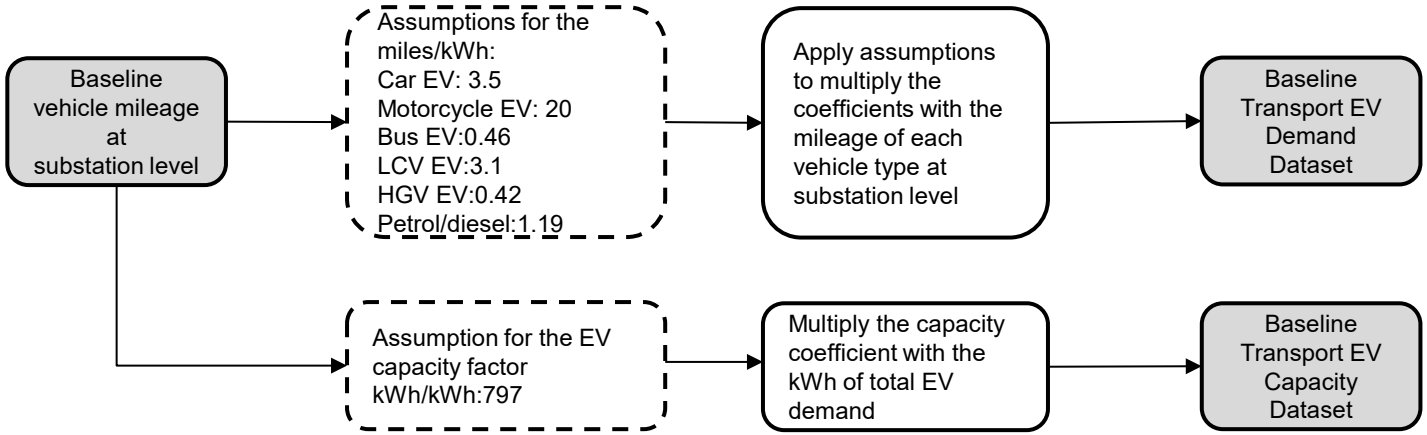
4. Transport – EV capacity and EV demand – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_56	Baseline vehicle mileage at substation level	Baseline transport energy dataset with modelled mileage at substation level in the LAEP area	Arup	Output from previous flow	N/A	N/A	Substation	N/A
Output_57	Future Vehicles mileage at substation level	2050 transport energy dataset with modelled mileage at substation level in the LAEP area	Arup	Output from previous flow	N/A	N/A	Substation	N/A
Outputs								
Output_50	Baseline EV Charger Installed Capacity Dataset	Baseline EVs charger installed capacity dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_48	Baseline EV Demand Dataset	Baseline EVs demand dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_51	2050 EV Charger Installed Capacity Dataset	2050 EVs charger installed capacity dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_49	2050 EV Demand Dataset	2050 EVs demand dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

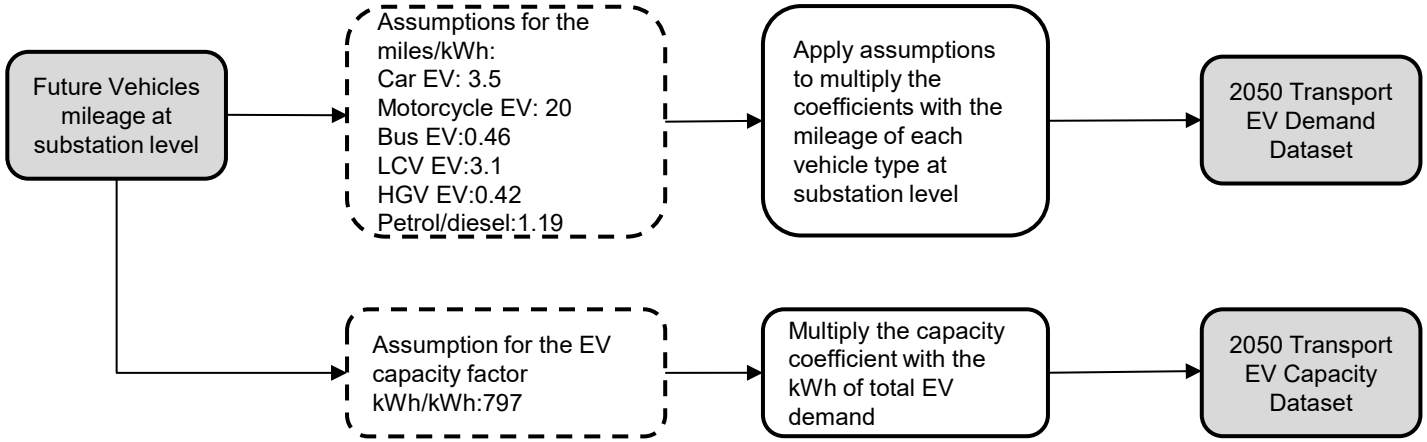
Appendix A2 – Methodology Diagrams

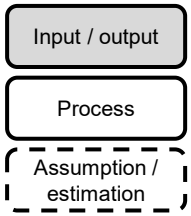
4. Transport – EV capacity and EV demand – Methodology

Baseline



Future Scenarios





Appendix A2 – Methodology Diagrams

4. Transport – EV Charge points and Capacity in Car Parks – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_033	TFL Charge Points	TFL Chargepoint data for LAEP area	TFL	N/A	24/05/2024	Unknown	Point location	Restricted
Input_0114	NEVIS Transport Data	NEVIS transport data; current and projected until 2050	Cenex	N/A	07/05/2025	Unknown	Borough	Restricted
Input_076	LOTI EV Chargepoint Dashboard	Ev charge point dataset managed by the GLA for the LOTI EV Chargepoint dashboard	London Councils	N/A	26/02/2025	Unknown	Point	Restricted
Input_0104	OS OpenMap Local Car Charging Points	OS Open Map – Local (OML) is one of the most detailed generalised open mapping products available and is designed to provide contextual mapping for your applications or web pages. It offers users a clear contextual view of the world whilst also enabling the undertaking of analytical activities.	Ordnance Survey	OS OpenMap Local | Data Products | OS	28/05/2025	Unknown	Point location	Public
Input_0108	Open Charge Map EV Chargers	Existing EV charger locations extracted using Open Charge Map API	Open Charge Map	Open Charge Map - API Documentation	09/07/2025	Unknown	Project extent	Creative Commons Attribution 4.0 International (CC BY 4.0).Input_0
Input_069	London Fire Brigade EV Chargers	List of EV chargers at LFB fire stations	London Fire Brigade	N/A	N/A	Unknown	Address	Restricted

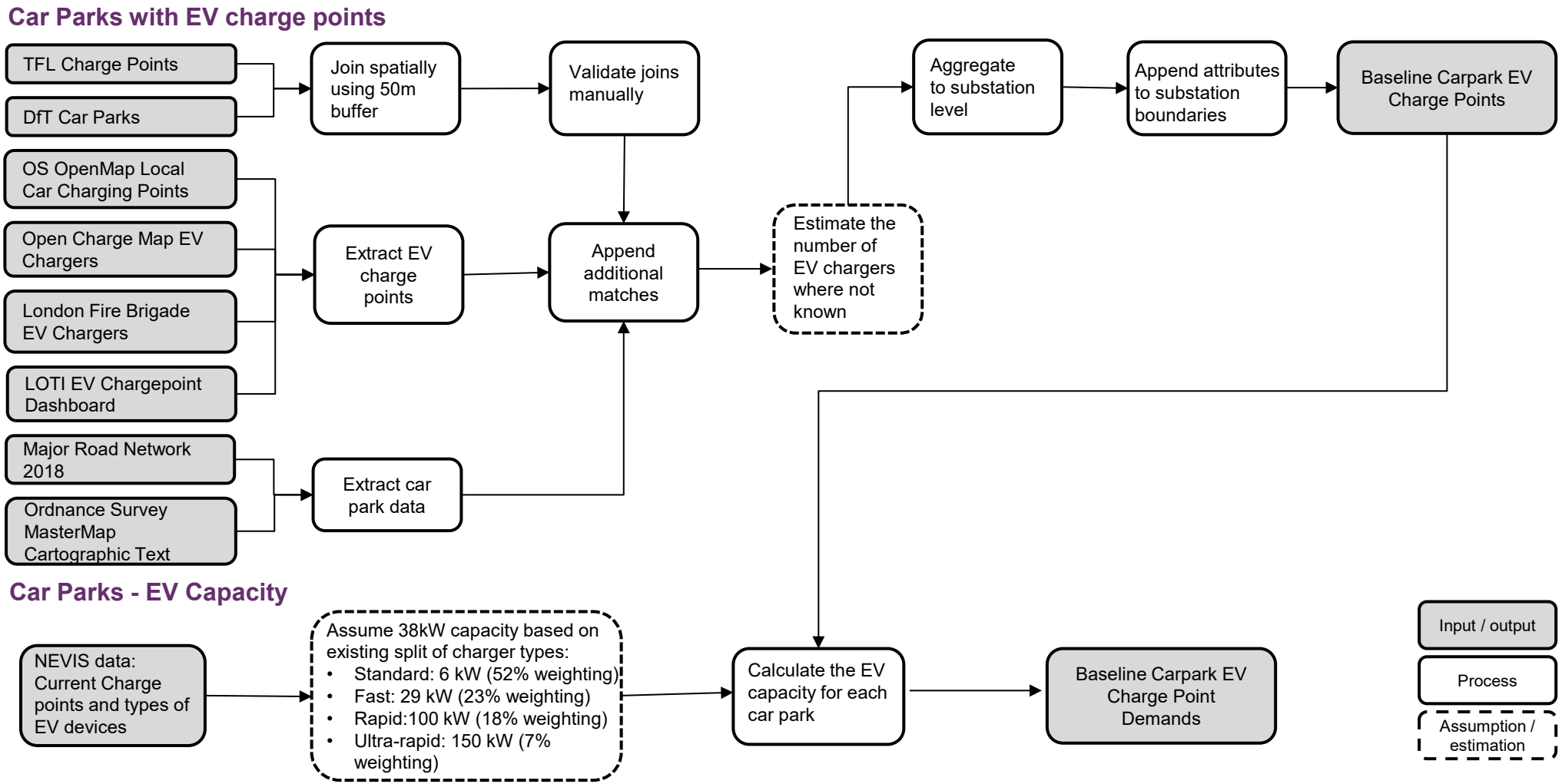
Appendix A2 – Methodology Diagrams

4. Transport – EV Charge points and Capacity in Car Parks – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0105	Major Road Network 2018	OS Open Roads Shapefile containing links pertaining to the Major Road Network, as created by the Department for Transport in 2018.	Department for Transport (DfT)	Major Road Network - data.gov.uk	03/06/2025	Unknown	Road segment	Open Government LicenceInput_0
Input_0111	Ordnance Survey MasterMap Cartographic Text	OS MasterMap Topography Layer includes cartographic text, which refers to the labels and annotations on the map, such as road names or building labels.	Ordnance Survey	https://www.ordnancesurvey.co.uk/products/os-mastermap-topography-layer	17/07/2025	Monthly	Point	Licenced under OS Contractor licence
Input_0103	DFT Car Parks	UK Car Parks in great Britain.This is a point feature service which shows UK Car Parks in great Britain. It was created for the Transport Direct Journey planning website.	Department for Transport (DfT)	Department For Transport : UK Car Parks | Transport for West Midlands	21/05/2025	Unknown	Point location	Public
Outputs								
Output_95	Baseline Carpark EV Charge Point Demands	Baseline carpark EVs chargepoint demands at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_29	Baseline Carpark EV Charge Points	Baseline EVs chargepoint numbers dataset at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

Appendix A2 – Methodology Diagrams

4. Transport – EV Charge points and Capacity in Car Parks – Methodology



Appendix A2 – Methodology Diagrams
4. Transport – Transport hubs - Methodology

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0110	NHS Ambulance Stations	List of EV chargers at NHS Ambulance Stations	NHS	N/A	05/10/2022	N/A	Point	Open
Input_04	LFB Fire Stations	List of EV chargers at LFB fire stations	London Fire Brigade	N/A	01/05/2024	N/A	Point location (address)	All data provided must remain confidential and not to be shared other than in processed and aggregated outputs that would sufficiently hide any sensitive data.
Input_0113	OS Open Map Local Police Stations	Footprints of important buildings (Police Station, Bus & Coach Stations, All Hospitals)	Ordnance Survey	https://www.ordnancesurvey.co.uk/products/os-open-map-local	17/07/2025	Bi-annually	Point location	Open
Input_0115	OS Open Map Local Railway Stations	OS Open Map Local Tran Stations	Ordnance Survey	https://www.ordnancesurvey.co.uk/products/os-open-map-local	28/05/2025	Bi-annually	Point location	Open
Input_016	TFL Zero Emission Fleets	TfL EV chargepoints for Bus Fleets	TfL	N/A	24/05/024	N/A	Point location	Confirm with TfL
Input_016	TFL Bus Garages and Depots	TfL EV chargepoints in Bus Garages and Depots	TfL	N/A	24/05/024	N/A	Point location	Confirm with TfL
Input_015	UKPN Primary Substation Areas	This dataset is a geospatial view of the areas fed by primary substations. The aim is to create an indicative map showing the extent to which individual primary substations feed areas based on MPAN data.	UK Power Networks	UK Power Networks Primary Substation Distribution Areas — UK Power Networks	06/01/2025	Ad-hoc	Substation	Open
Output_46	Baseline EV Charge Point Dataset	Baseline EVs charge point dataset at substation level in the LAEP area	Arup	Output from the previous flow	N/A	N/A	Substation	N/A

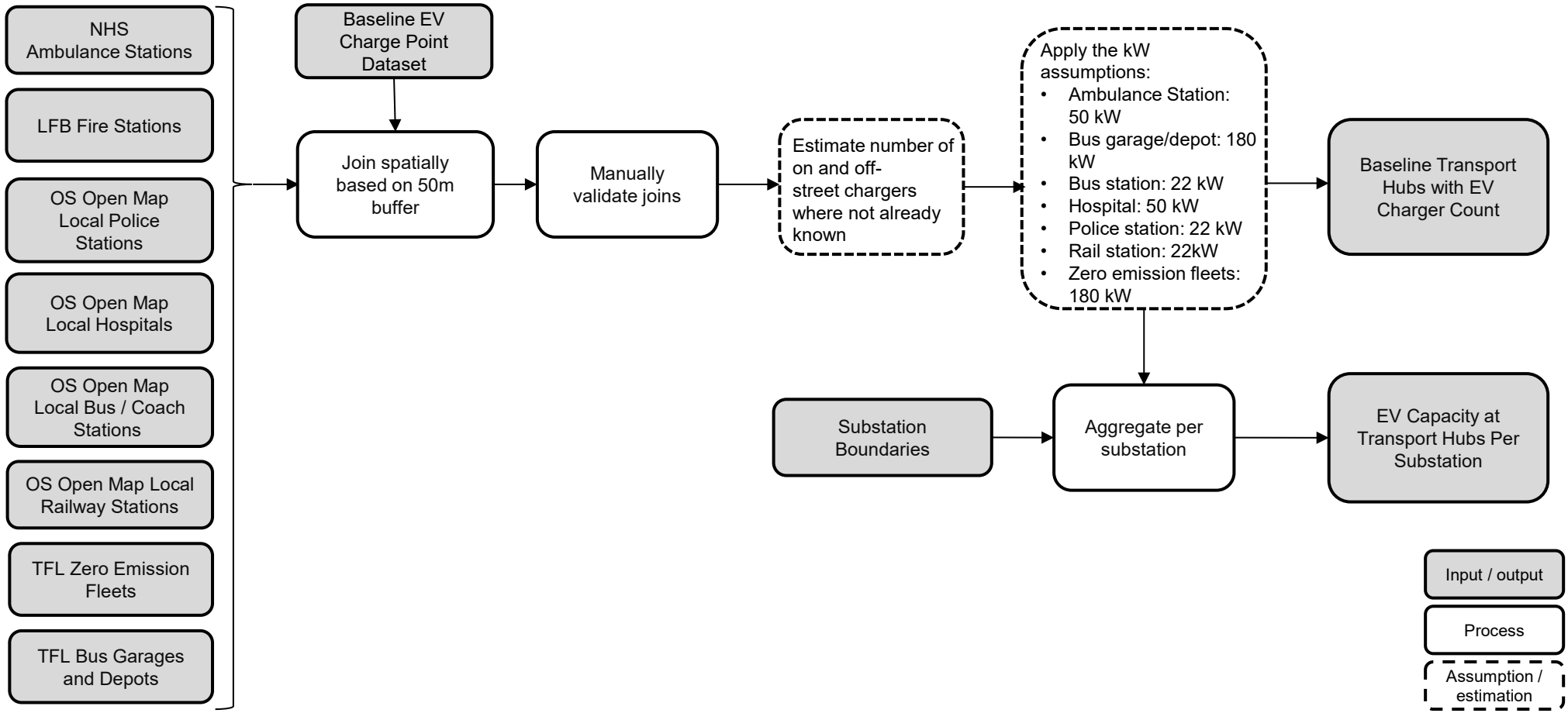
Appendix A2 – Methodology Diagrams

4. Transport – Transport hubs - Methodology

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Outputs								
Output_67	Baseline Transport Hubs with EV Charger Count	Baseline EVs charge point numbers dataset in Transport Hubs at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A
Output_71	EV Capacity at Transport Hubs Per Substation	Baseline EVs capacity dataset in Transport Hubs at substation level in the LAEP area	Arup	N/A	N/A	N/A	Substation	N/A

Appendix A2 – Methodology Diagrams

4. Transport – Transport hubs - Methodology



Appendix A2 – Methodology Diagrams

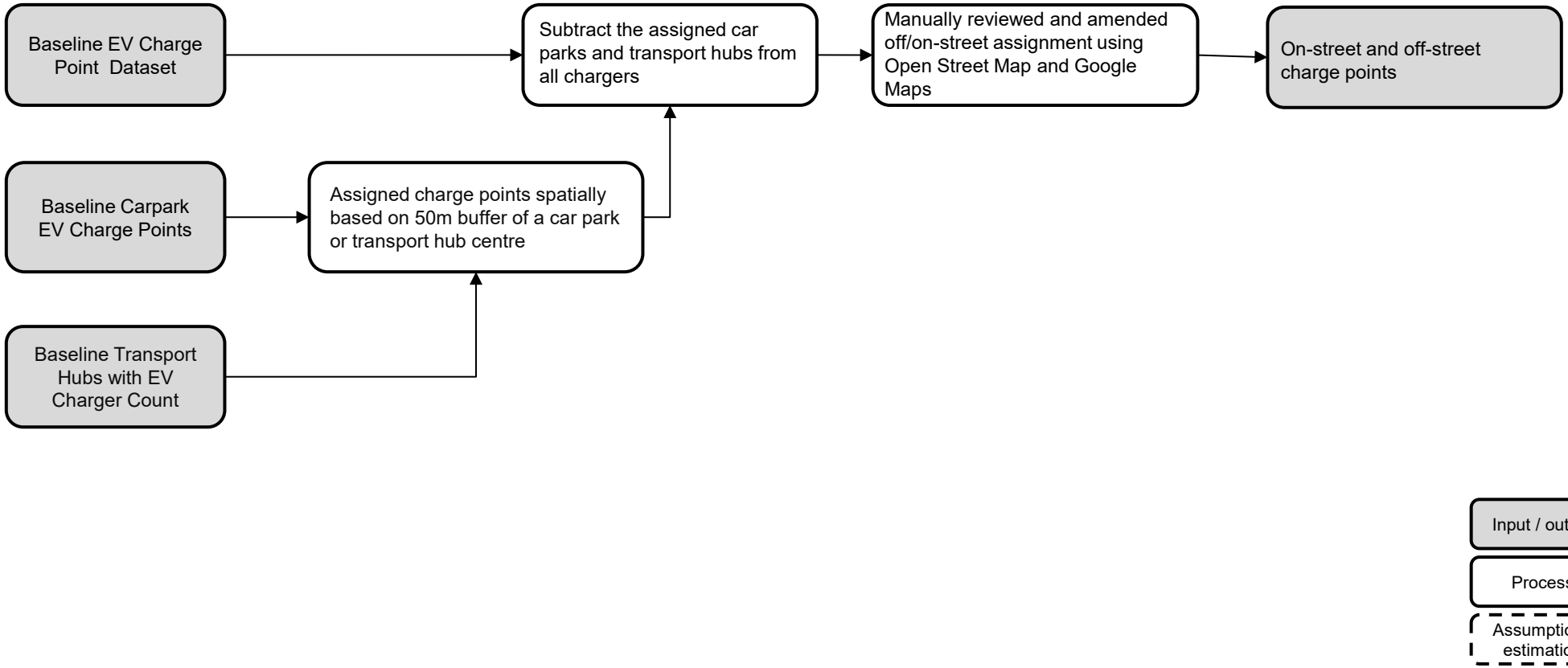
4. Transport – Off-street and on-street EV charge points

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_46	Baseline EV Charge Point Dataset	Baseline EVs charge point dataset at substation level in the LAEP area	Arup	Output from the previous flow	N/A	N/A	Substation	N/A
Output_29	Baseline Carpark EV Charge Points	Baseline EVs charge point numbers dataset at substation level in the LAEP area	Arup	Output from the previous flow	N/A	N/A	Point	N/A
Output_67	Baseline Transport Hubs with EV Charger Count	Baseline EVs capacity dataset in Transport Hubs at substation level in the LAEP area	Arup	Output from the previous flow	N/A	N/A	Point	N/A
Outputs								
Output_38	On-street and off-street charge points	Baseline EV on-street and off-street charge points at substation level in the LAEP area	Arup	N/A	N/A	N/A	Point	N/A

Appendix A2 – Methodology Diagrams

4. Transport – Off-street and on-street EV charge points

Baseline



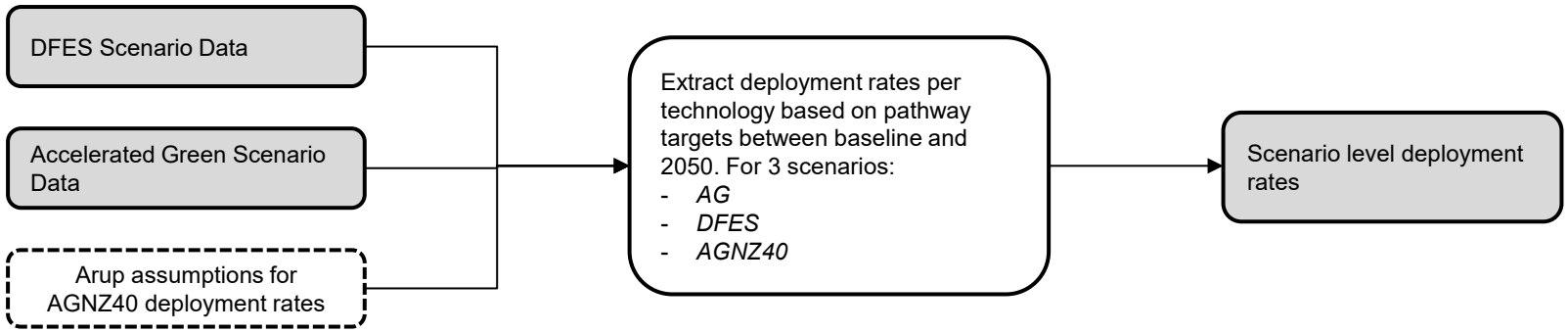
Appendix A2 – Methodology Diagrams

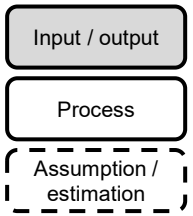
5. Scenario modelling – Deployment rates – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Input_0121	DFES Scenario Data	DFES 2050 Scenario data	DFES	https://dso.ukpowernetworks.co.uk/distribution-future-energy-scenarios	01/05/2025	Annual	LSOA	Public
Input_0119	Accelerated Green Scenario Data	Accelerated Green Scenario data	GLA	N/A	N/A	N/A	N/A	N/A
Outputs								
Intermediate_10	Scenario level deployment rates	Deployment rates for each borough for each technology over time to 2050.	Arup	N/A	N/A	N/A	Borough	N/A

Appendix A2 – Methodology Diagrams

5. Scenario modelling – Deployment rates – Methodology





Appendix A2 – Methodology Diagrams
5. Scenario modelling – Building – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Intermediate_6	Consolidated building points dataset	Dataset combining baseline domestic, baseline non-domestic and growth buildings demands	Arup	N/A	N/A	N/A	Building location	N/A
Intermediate_4	2050 Modelled Domestic Building Demands	2050 domestic building stock dataset with retrofit demands	Arup	N/A	N/A	N/A	Building location	N/A
Intermediate_5	2050 Modelled Non-domestic Building Demands	2050 non-domestic building stock dataset with retrofit demands	Arup	N/A	N/A	N/A	Building location	N/A
Intermediate_10	Scenario level deployment rates	Deployment rates for each borough for each technology over time to 2050.	Arup	N/A	N/A	N/A	Borough	N/A
Input_092	LSOA Boundaries	December 2021 Lower Layer Super Output Areas	ONS	Lower layer Super Output Areas (December 2021) Boundaries EW BSC (V4) | Open Geography Portal	20/02/2025	Unknown	LSOA	Public
Outputs								
Output_88	Future AG Retrofit Non-Domestic Demand Per LSOA	Annual heat demand under AG scenario for non-domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A

Appendix A2 – Methodology Diagrams
5. Scenario modelling – Building – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Outputs								
Output_89	Future AG Retrofit Domestic Demand Per LSOA	Annual heat demand under AG scenario for domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_81	Future AG Building Electricity Demand Per LSOA	Annual electricity demand under AG scenario for domestic and non-domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_90	Future DFES Retrofit Non-Domestic Demand Per LSOA	Annual heat demand under DFES scenario for non-domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_91	Future DFES Retrofit Domestic Demand Per LSOA	Annual heat demand under DFES scenario for domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_82	Future DFES Building Electricity Demand Per LSOA	Annual electricity demand under DFES scenario for domestic and non-domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A

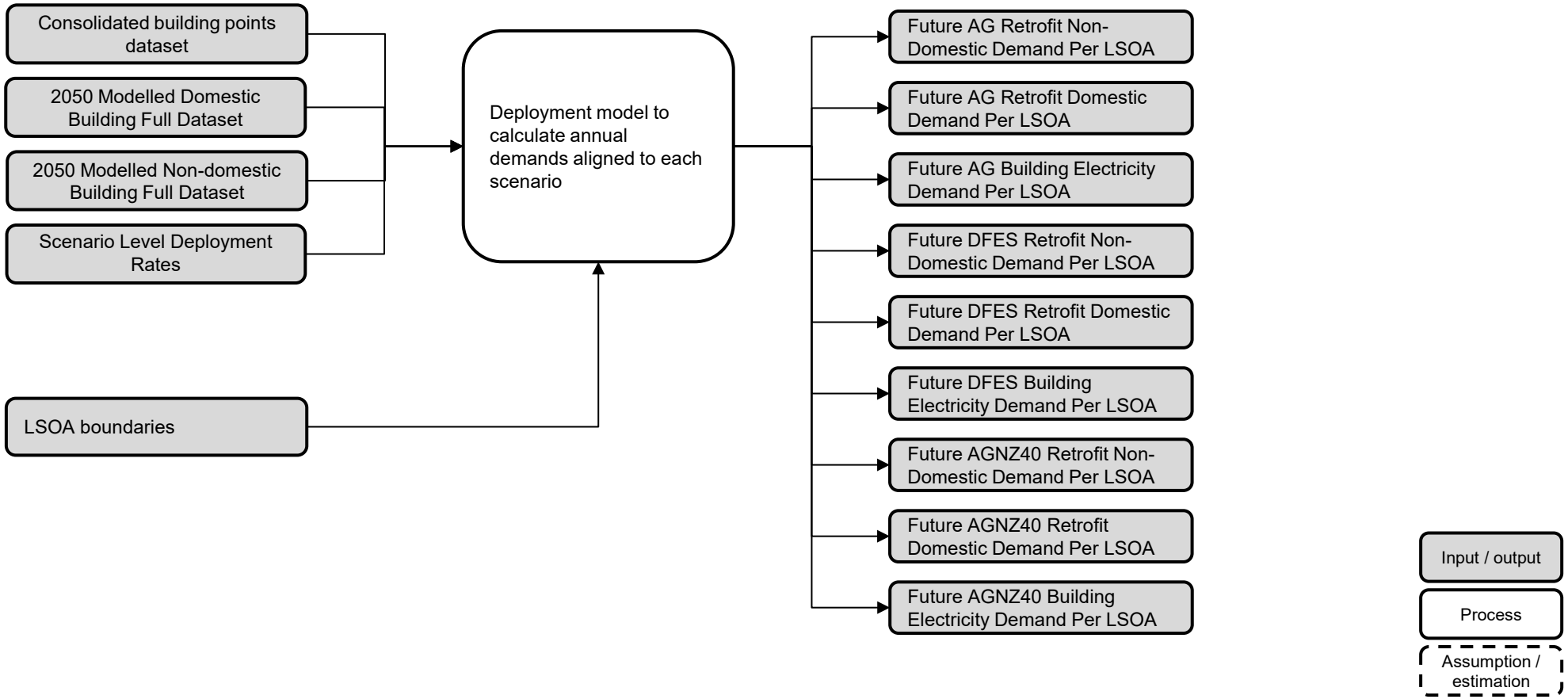
Appendix A2 – Methodology Diagrams
5. Scenario modelling – Building – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Outputs								
Output_92	Future AGNZ40 Retrofit Domestic Demand Per LSOA	Annual heat demand under AGNZ40 scenario for non-domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_93	Future AGNZ40 Building Electricity Demand Per LSOA	Annual heat demand under AGNZ40 scenario for domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_83	Future AGNZ40 Retrofit Non-Domestic Demand Per LSOA	Annual electricity demand under AGNZ40 scenario for domestic and non-domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A

Appendix A2 – Methodology Diagrams

5. Scenario modelling – Building – Methodology

Building Data



Appendix A2 – Methodology Diagrams
5. Scenario modelling – Renewables and EV – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_064	Baseline Solar PV Generation	Baseline solar PV generation by borough in LAEP area	Arup	Output from previous flow	N/A	N/A	Borough	N/A
Intermediate_7	2050 Solar PV Generation	Modelled 2050 solar PV generation per LSOA in LAEP area	Arup	Output from previous flow	N/A	N/A	LSOA	N/A
Output_48	Baseline EV Demand Dataset	Baseline EVs demand dataset at substation level in the LAEP area	Arup	Output from previous flow	N/A	N/A	Substation	N/A
Output_49	2050 EV Demand Dataset	2050 EVs demand dataset at substation level in the LAEP area	Arup	Output from previous flow	N/A	N/A	Substation	N/A
Intermediate_10	Scenario level deployment rates	Deployment rates for each borough for each technology over time to 2050.	Arup	N/A	N/A	N/A	Borough	N/A
Input_092	LSOA Boundaries	December 2021 Lower Layer Super Output Areas	ONS	Lower layer Super Output Areas (December 2021) Boundaries EW BSC (V4) | Open Geography Portal	20/02/2025	Unknown	LSOA	Public
Input_015	UKPN Primary Substation Areas	This dataset is a geospatial view of the areas fed by primary substations. The aim is to create an indicative map showing the extent to which individual primary substations feed areas based on MPAN data.	UK Power Networks	UK Power Networks primary substation distribution areas — UK Power Networks	06/01/2025	Ad-hoc	Primary substation	Open

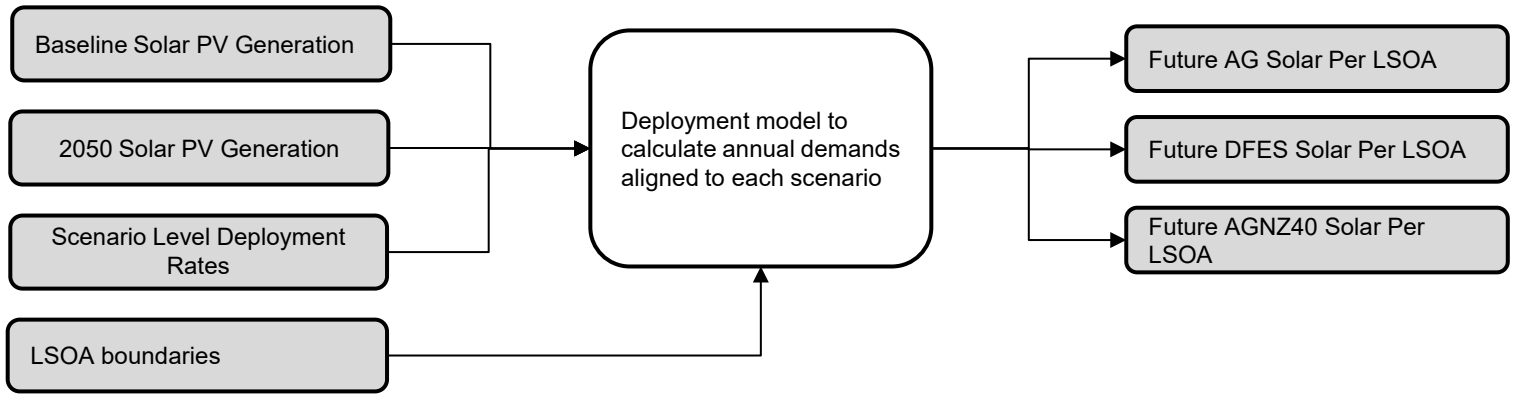
Appendix A2 – Methodology Diagrams
5. Scenario modelling – Renewables and EV – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Outputs								
Output_78	Future AG Solar Per LSOA	Annual generation of rooftop solar under the AG scenario	Arup	N/A	N/A	N/A	LSOA	N/A
Output_79	Future DFES Solar Per LSOA	Annual generation of rooftop solar under the DFES scenario	Arup	N/A	N/A	N/A	LSOA	N/A
Output_80	Future AGNZ40 Solar Per LSOA	Annual generation of rooftop solar under the ANZ40G scenario	Arup	N/A	N/A	N/A	LSOA	N/A
Output_49	Future EV Charger Demand Per Substation	Annual EV demand per substation level for all three scenarios, AG, DFES and AGNZ40	Arup	N/A	N/A	N/A	Substation	N/A

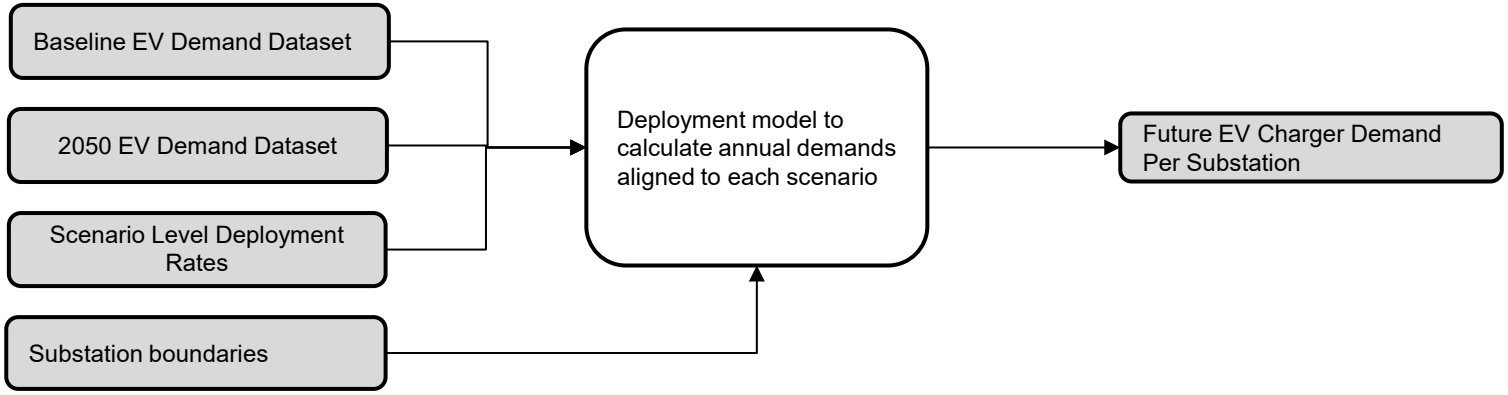
Appendix A2 – Methodology Diagrams

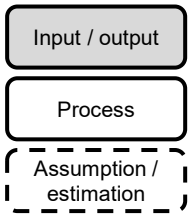
5. Scenario modelling – Renewables and EV – Methodology

Renewables



Electric vehicles





Appendix A2 – Methodology Diagrams

5. Scenario modelling – Electricity demand – Data contents

Identifier	Name	Description	Data Owner	Source URL	Date of Harvest	Data Refresh Frequency	Spatial resolution	Data licence details
Inputs								
Output_93	Future AGNZ40 Building Electricity Demand Per LSOA	Annual heat demand under AGNZ40 scenario for domestic buildings per LSOA	Arup	N/A	N/A	N/A	LSOA	N/A
Output_49	Future EV Charger Demand Per Substation	Annual EV demand per substation level for all three scenarios, AG, DFES and AGNZ40	Arup	N/A	N/A	N/A	Substation	N/A
Input_015	UKPN Primary Substation Areas	This dataset is a geospatial view of the areas fed by primary substations. The aim is to create an indicative map showing the extent to which individual primary substations feed areas based on MPAN data.	UK Power Networks	UK Power Networks primary substation distribution areas — UK Power Networks	06/01/2025	Ad-hoc	Primary substation	Open
Outputs								
Intermediate_10	Scenario level deployment rates	Deployment rates for each borough for each technology over time to 2050.	Arup	N/A	N/A	N/A	Borough	N/A

Appendix A2 – Methodology Diagrams

5. Scenario modelling – Electricity demand – Methodology