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Heat Network Infrastructure Innovations to Reduce Capital Costs

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All-Energy

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AECOM

ENGIE

Total Flow

COWI

Loughborough University

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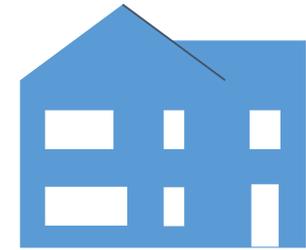
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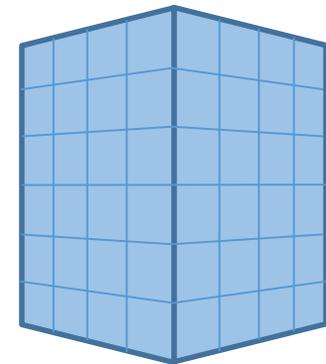
DHNs in the UK

For a cost effective energy system, heat networks need to be deployed in much greater quantities than they are now.

- Heating buildings accounts for ~20% of UK CO₂ emissions
- Heat networks offer an effective, long term and low carbon solution for areas of high heat density
- 56% of building heat demand is located in only 4% of the geographical area of the UK
- However, only 1-2% of buildings are currently connected to a DHN (which is low compared to other European countries, e.g. nearly 70% in Denmark)



12.4m



2.9m



Why UK DHN Deployment Currently Stands at only 1-2%

- The UK Government has identified that a key barrier to wider uptake of district heating is the high initial capital investment for network installation
- The DH distribution system can account for 60% or more of the overall DHN cost
- Installing heat network pipes in the UK is estimated to be up to £1000 per metre
 - Excavating is expensive, causes disruption and needs to navigate sub-surface infrastructure
 - Installing and welding pipes is labour intensive.
 - The capital cost of the pipes themselves is substantial.
- Relatively high supply cost of HIUs (£1500 HIUs vs £500-1000 for gas boiler)

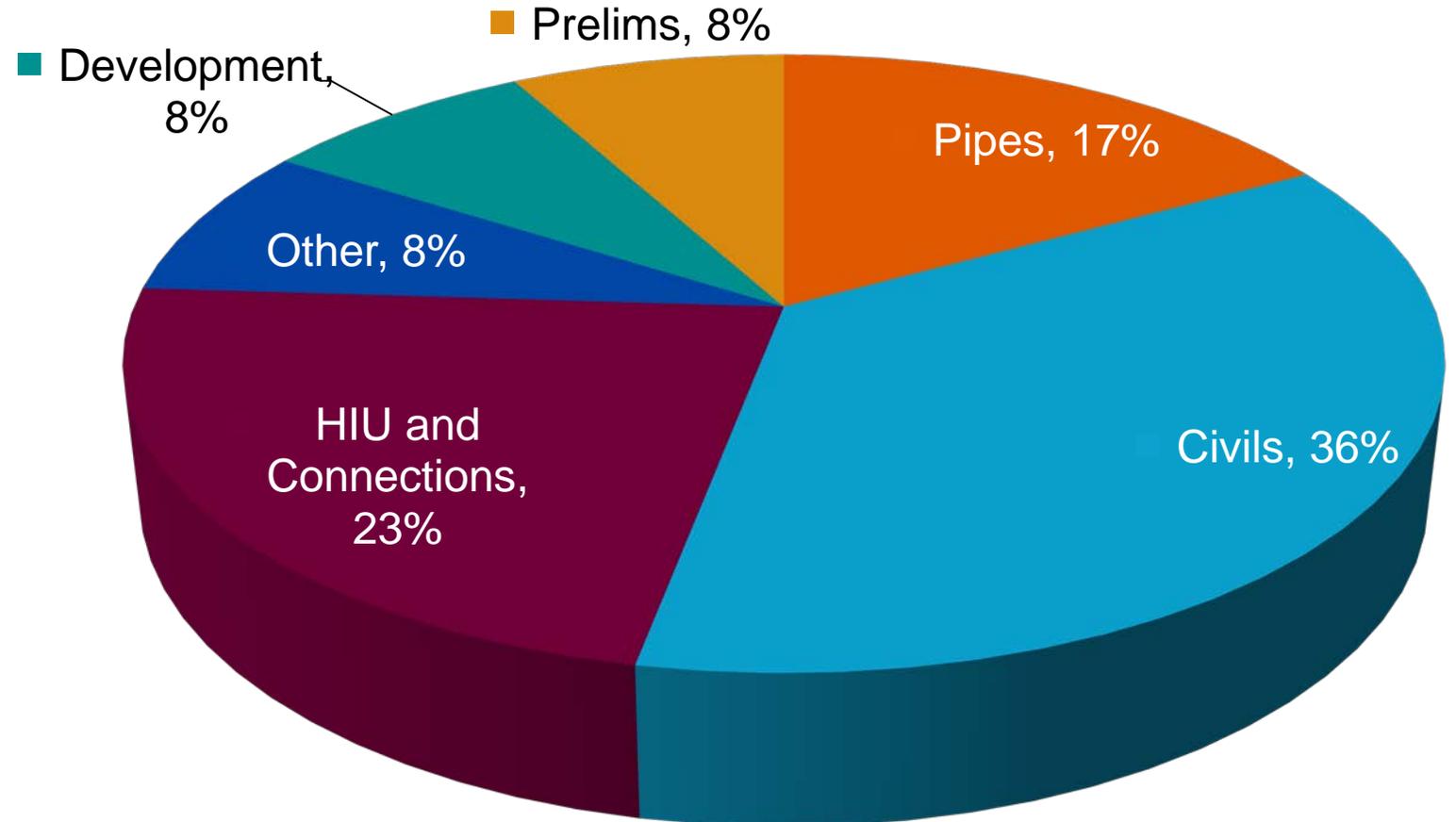


Representative Network Costs

Total CAPEX;

- 72% from the network
- 28% from the energy centre

Installation costs based on delivery of good practice in the UK (CIBSE/ADE Heat Networks Code of Practice)





The Heat Infrastructure Development Project

- Identify innovative solutions that would deliver a step change reduction in the capital cost of heat network infrastructure (whilst contributing to overall lifecycle cost reduction)
- Results would be used to assess:
 - what impact solutions could have
 - where DHNs could be deployed economically
 - what opportunities there are for technology development

and to inform stakeholders across the industry and policy makers



Installation of DH pipes
Courtesy of CPC Civils Ltd



Project Team

- AECOM (PM): Experts in district heating design, civil engineering design and cost consultancy
- ENGIE: Market leader for district heating in the UK responsible for design, construction and operation of 7 major schemes including the Olympic Park
- Total Flow: Value proposition design and the industrialisation of processes and products
- COWI A/S: Major Danish consultancy with particular specialism in district heating DH design and operation
- Loughborough University: Range of academic expertise including experts in energy, buildings and civil engineering



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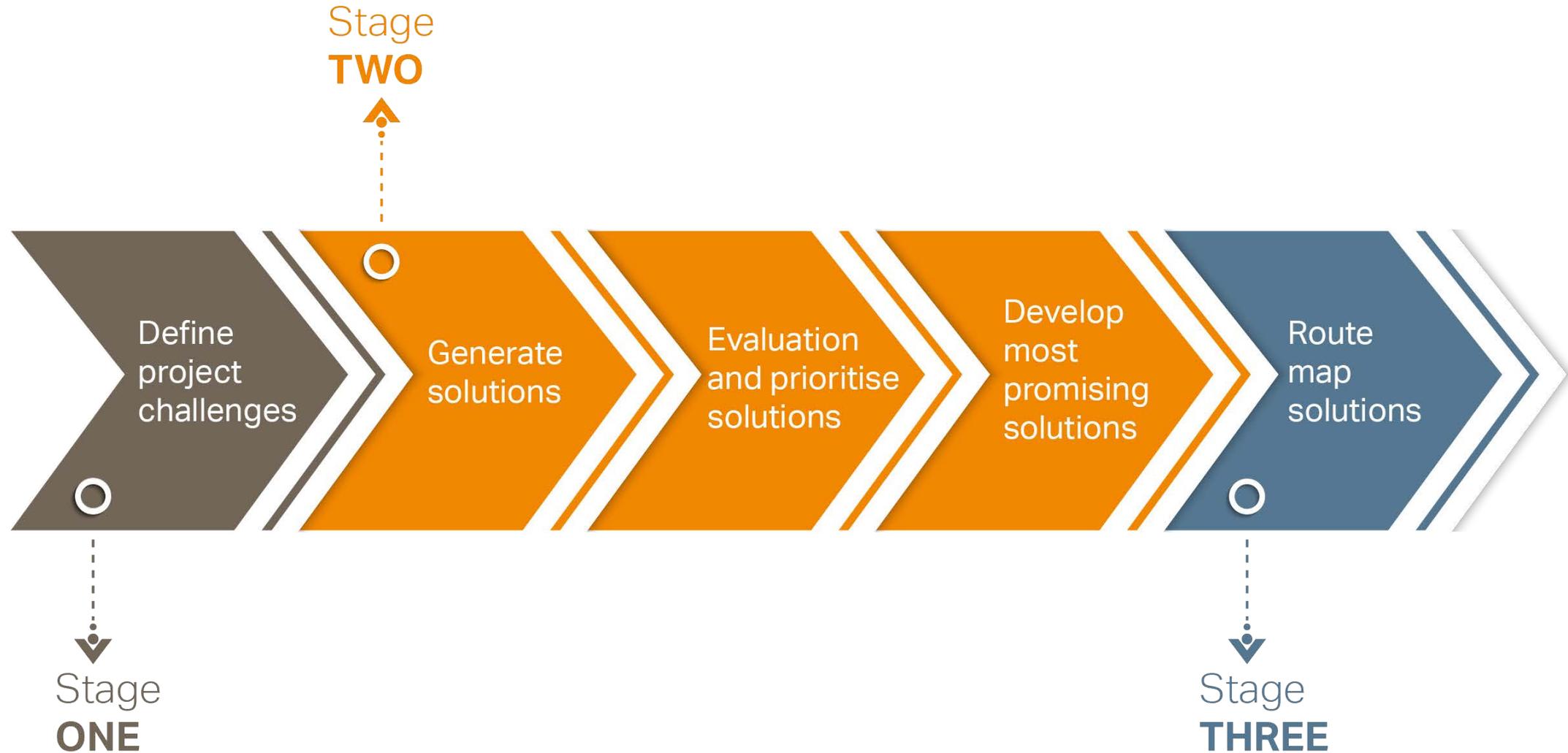
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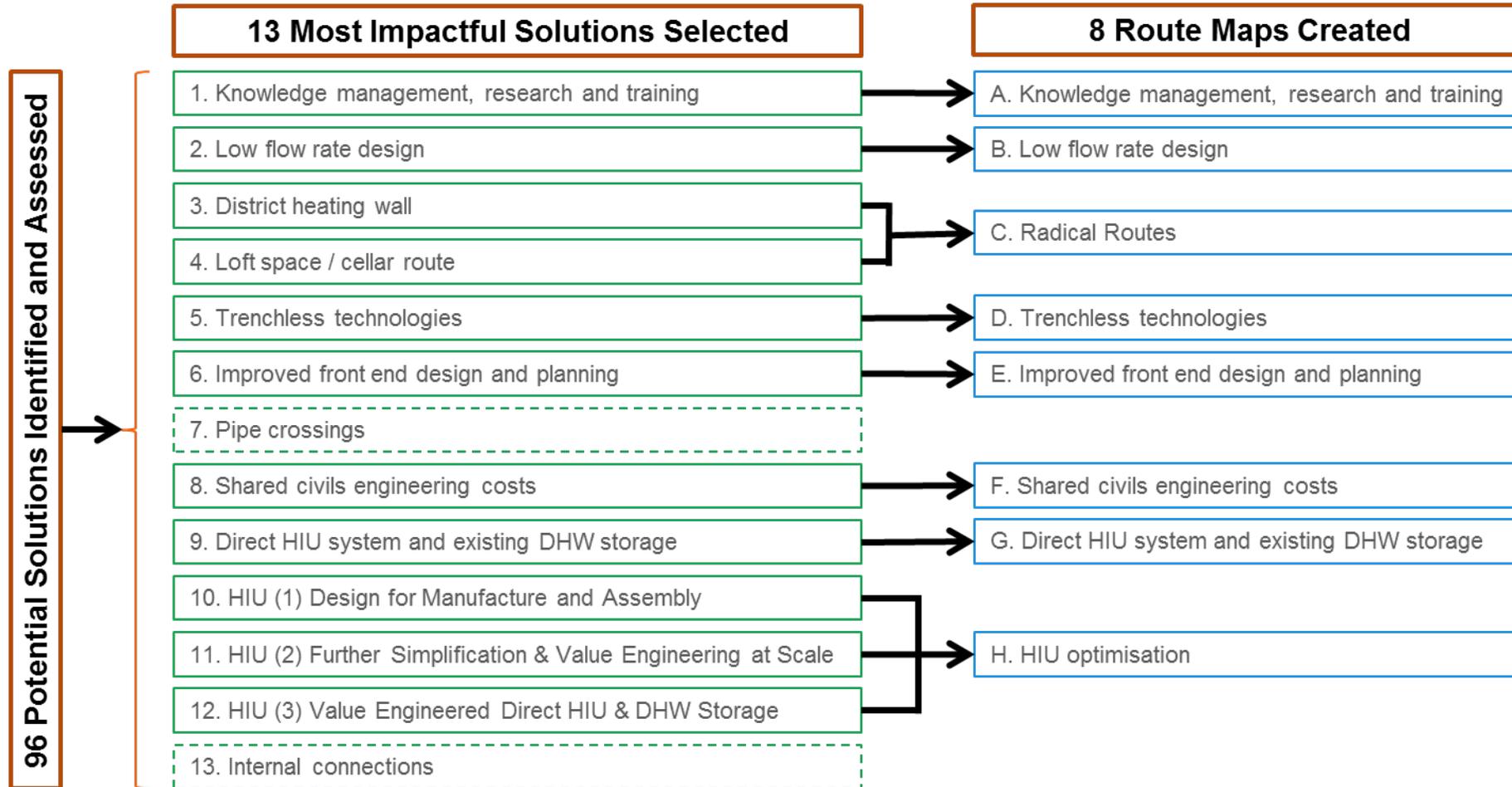


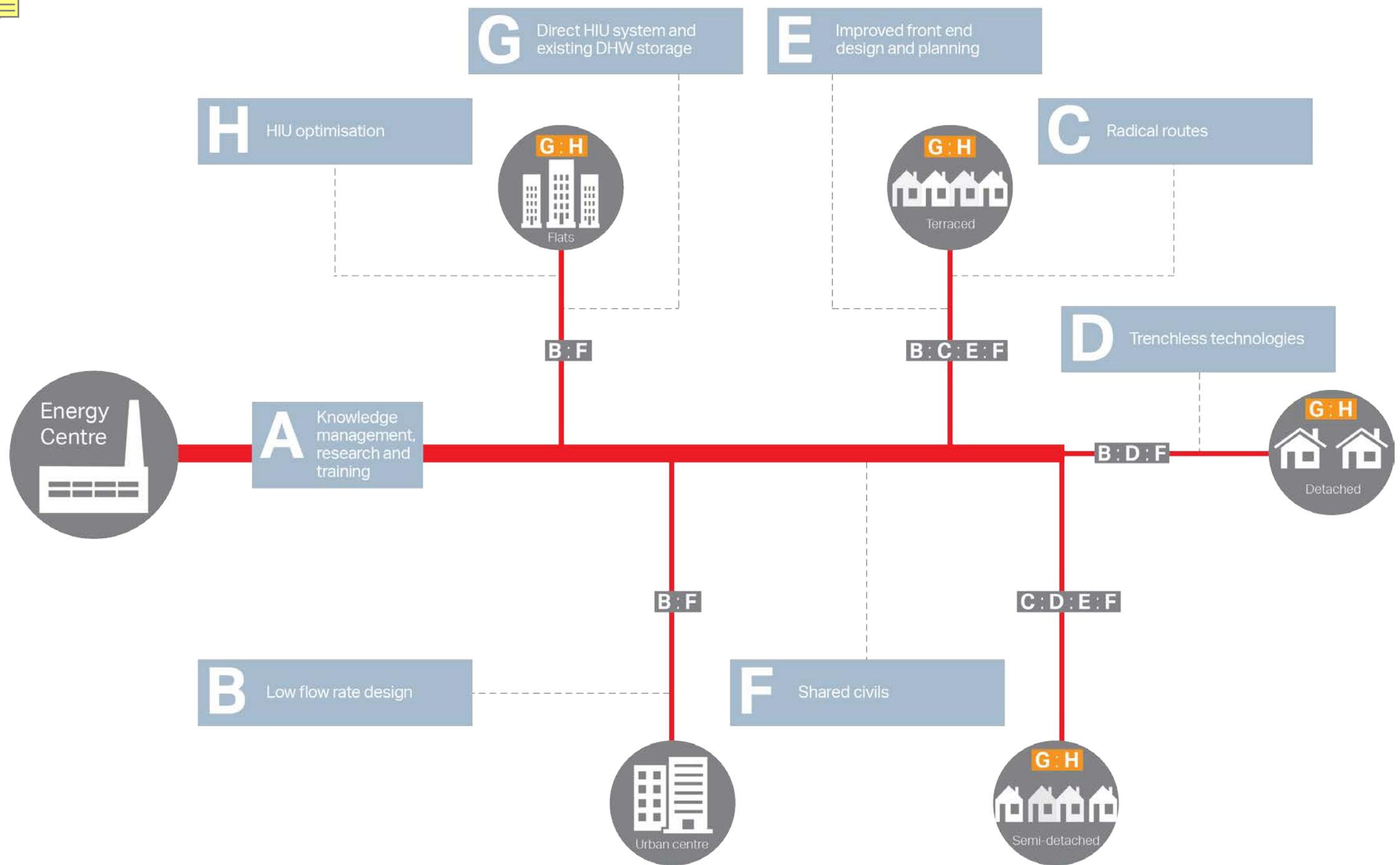
Overview





Route Map Development



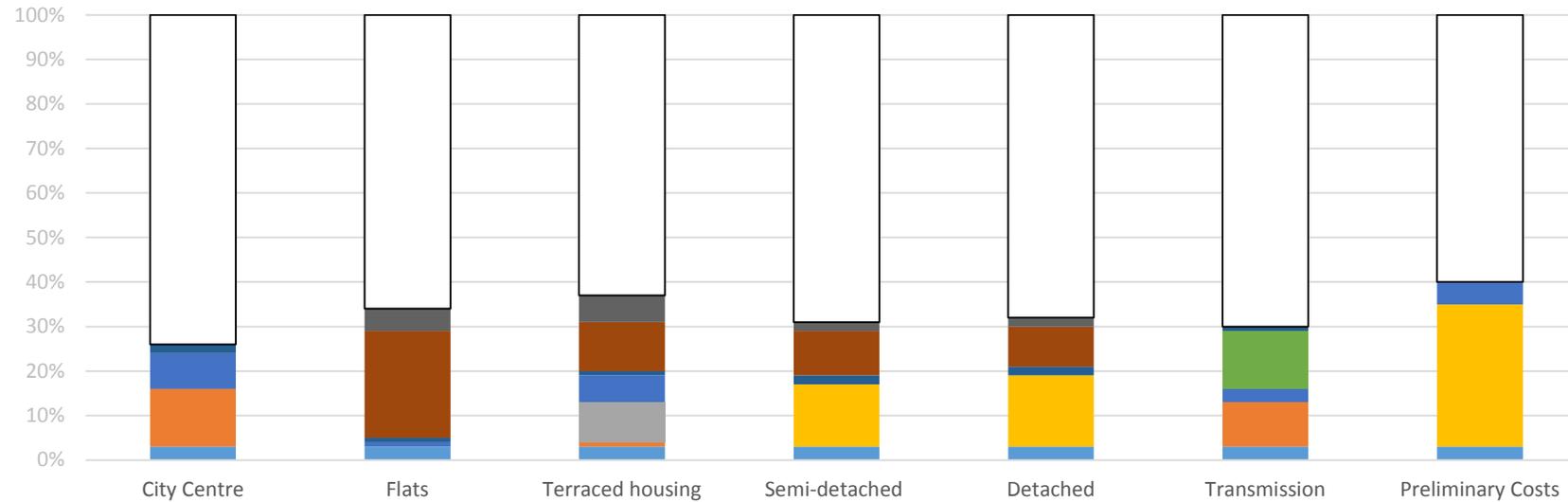




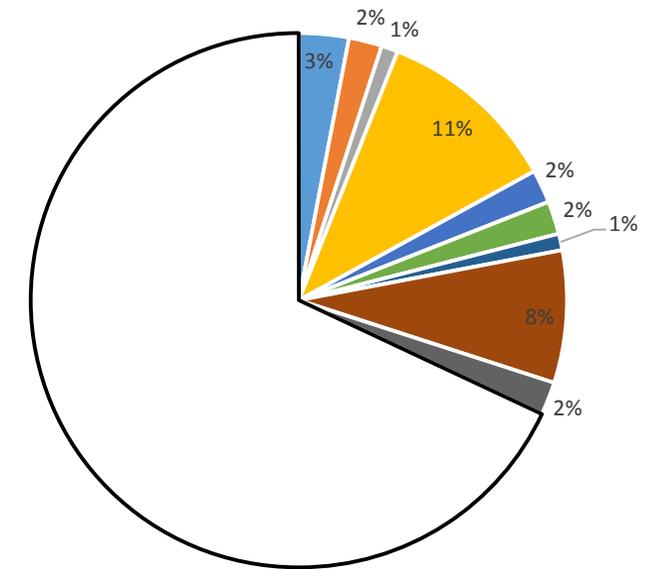
Overview

- Knowledge Management
- Low Flow Rate Design
- Radical Routes
- Trenchless Solutions
- Improved Front End Design
- Pipe Crossings
- Shared Civils
- All HIU innovations
- Internal Connections

% Cost Reductions from Each Innovation on Different Urban Areas



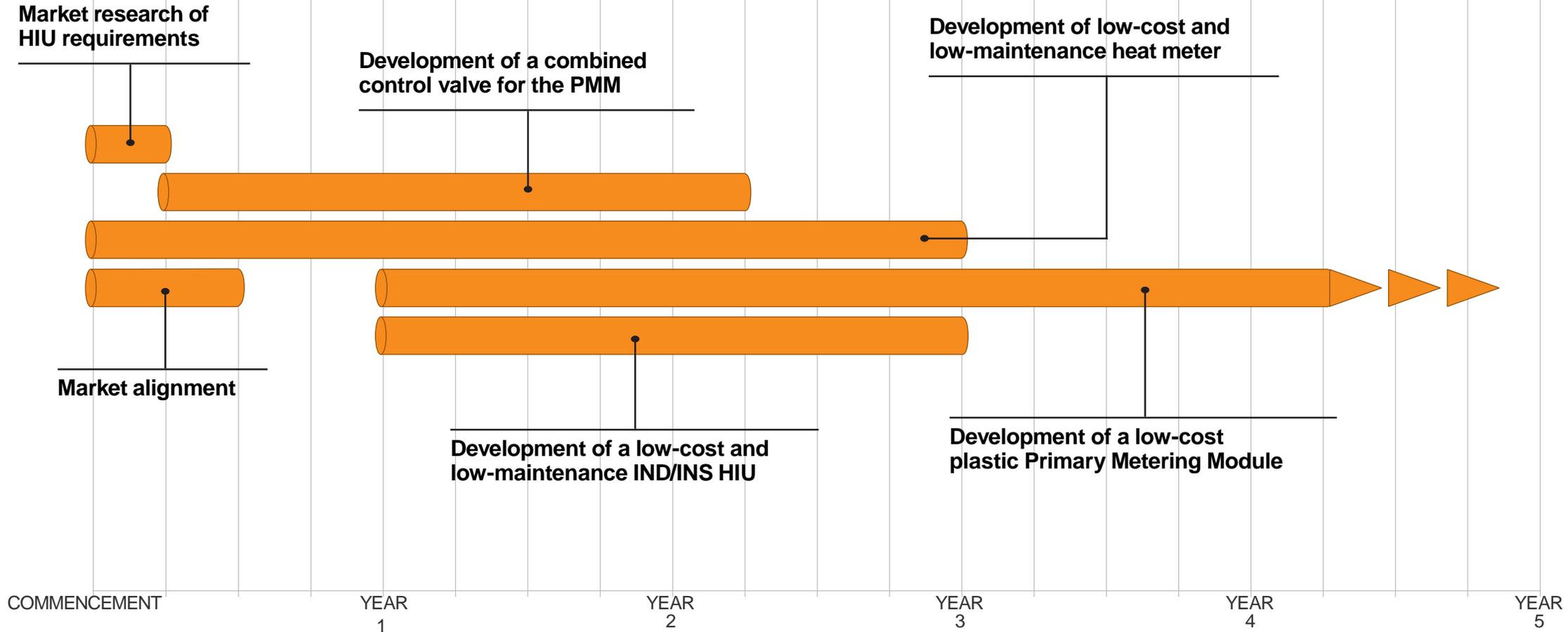
Cost Reductions on Total Network Cost





Structure of the Route Maps – Example is Route Map G

Overall cost for development: £7.6 million





Summary of Project Outcomes

- This project has identified innovation opportunities which could deliver around a **40% reduction in the cost of DH networks**
 - This has the potential to save the UK an estimated **£30billion** in network capital costs
- **Route Maps** set out the activities to develop, implement and commercialise the solutions, in order **to achieve widespread commercial deployment**
 - The route maps can be delivered in **4 years**, with **commercially-attractive industrial investment** and some **£10m of public funding support**
 - This sum is modest and significantly **enhances impact** of the investment in DHN construction through the £300m Heat Networks Investment Project (HNIP)
 - Both public and private sector stakeholders have **key leadership roles** in implementation, to enable and take advantage of the changes required



Publications



AECOM **Total Flow** **ENGIE** **Loughborough University**

Heat Infrastructure Development Project
Deliverable EN2013_D01
Requirements, Baseline Analysis and Target Setting Report

August 2016 (Updated August 2017)

This report is produced under the Heat Infrastructure Development project, commissioned and funded by the ETI

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Heat Infrastructure Development Project
Deliverable EN2013_D03
Solution Development, Analysis and Selection Report

March 2017 (updated Aug 2017)

This report is produced under the Heat Infrastructure Development project, commissioned and funded by the ETI

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Heat Infrastructure Development Project
Deliverable EN2013_D04
Solution Route Maps Report

August 2017

This report is produced under the Heat Infrastructure Development project, commissioned and funded by the ETI

AECOM **energy technologies institute**

Reducing the capital cost of district heat network infrastructure

Routes to implement innovative solutions

Summary report from the 'Heat Infrastructure Development' project, commissioned and funded by the Energy Technologies Institute

August 2017

AECOM and ETI in association with: **ENGIE** **Total Flow** **Loughborough University** **COWI**

Summary report: Reducing the Capital Cost of District Heat Network Infrastructure

All available from the Energy Technologies Institute Website





Thank You

Please get in touch with any questions

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