DHC business models and pricing

Parallel session

HeatNet Final conference 15.09.2020

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Ownership

Fully public vs hybrid vs fully private

Factors influencing the ownership's structure

1) Return on investment for project investors
2) Objectives
3) Degree of control and risk appetite
4) Regulatory reasons
5) Ability to access capital
6) Market opportunities

Public ↕ Private

Option	Description	Risk allocation	Example
1	Entirely public sector led: entirely publicly funded, developed, operated and owned	Public sector retains all risk	Public sector procures contracts for equipment purchase only. Procurement could be direct, or via a publicly owned arm's length entity (e.g. an energy services company)
2	Public sector led: entirely publicly funded, greater use of private sector contractors	Private sector assumes design & construction risk, and possibly operational risk	Public sector procures turnkey asset delivery contract(s), possibly with maintenance and/or operation options
3	Public sector led, private sector invests/takes risk in some elements of the project	Private sector takes risks for discrete elements (e.g. generation assets)	As 2, with increased private sector operational risk, and payment or investment at risk
4	Joint venture – public sector & private sector partners take equity stakes in a special purpose vehicle	Risks shared through joint participation in JV vehicle / regulated by shareholders agreement	Joint Venture – both parties investing and taking risk
5	Public funding to incentivise private sector activity	Public sector support only to economically unviable elements	Public sector makes capital contribution and/or offers heat/power off-take contracts
6	Private sector ownership with public sector providing a guarantee for parts of project	Public sector underpins key project risks	Public sector guarantees demand or takes credit risk
7	Private sector ownership with public sector facilitating by granting land interests	Private sector takes all risk beyond early development stages	Public sector makes site available and grants lease/licence/wayleaves
8	Total private sector owned project	Private sector carries all risks	No or minimal public sector role (e.g. planning policy / stakeholder management)

Source: Scottish Futures Trust

Interreg HeatNet NWE resource:
Guide For Public Sector Organisations

Objectives

Interreg HeatNet NWE resource:
Guide For Energy Companies

Risks

1) Technical risk

Are concerned errors in design & construction, operational risk and unmet defined quality service standard

2) Financing risk

Costs of capital subject to market fluctuations and return rates on investment

3) Demand risk

Inaccurate consumption and/or number of connexion prediction, connection delays, unexpected disconnection

4) Commercial risk

Risk linked to a mismatch between incurred and invoiced costs

5) Regulatory risk

Changes in the regulatory framework

Wholly public projects – *quick reminder*

Often starts within the existing structure of the public authority…

or trough a subsidiary such as municipal utility holding company

Sometimes multiple municipalities combine their resources into one common energy company

Besides, the public authority can tender certain operations while retaining ownership

Reasons for transferring ownership to private actors

Organisational purposes

- Lack of expertise and regulatory complexity
- Project is growing to much

Administrative

- Regulations on public procurement
- Limitation to the territorial jurisdiction of public authorities

Accounting

- Accounting rules for public authorities are stricter and more complex than for enterprises
- Easier to assess the profitability of an operation when a separate entity possesses its own balance sheet and accounts

Fiscal

VAT optimisation

- Public authorities may be excluded from the scope of VAT
- ➢ An organisation subject to VAT can benefit from VAT deductibility
- ➢ Complexity of correctly choosing the VAT level (if applicable)

Taxation of profits

- Corporate taxpayers can benefit from tax deductions

Financing - Ability to access capital

- Similar to the accounting reason, an entity with its own balance sheet and accounts appears more attractive to investors

- Externalisation can reduce the financial burden on the public authorities' finances
  Furthermore, losses are not (solely) the responsibility of the PAs

- Some legal entity cannot borrow money or accept external funds
  There are sources of subsidies only accessible for private companies

Project partners

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MINE WATER, A BASIS FOR SUSTAINABLE ENERGY
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Avec le soutien de la Wallonie

Thank you!

MAX IV
”Prosumers”
Price tariff for LTDH consumers
Price tariff for small LTDH producers

Price tariff for LTDH *consumers – background*

- Supply temperature 65 °C
- Return temperature 35 °C.
- A new type of distribution pipes made out of plastic → easier and cheaper to build.
- A solitary LTDH system with constant heat production cost, backed by a traditional DH system.

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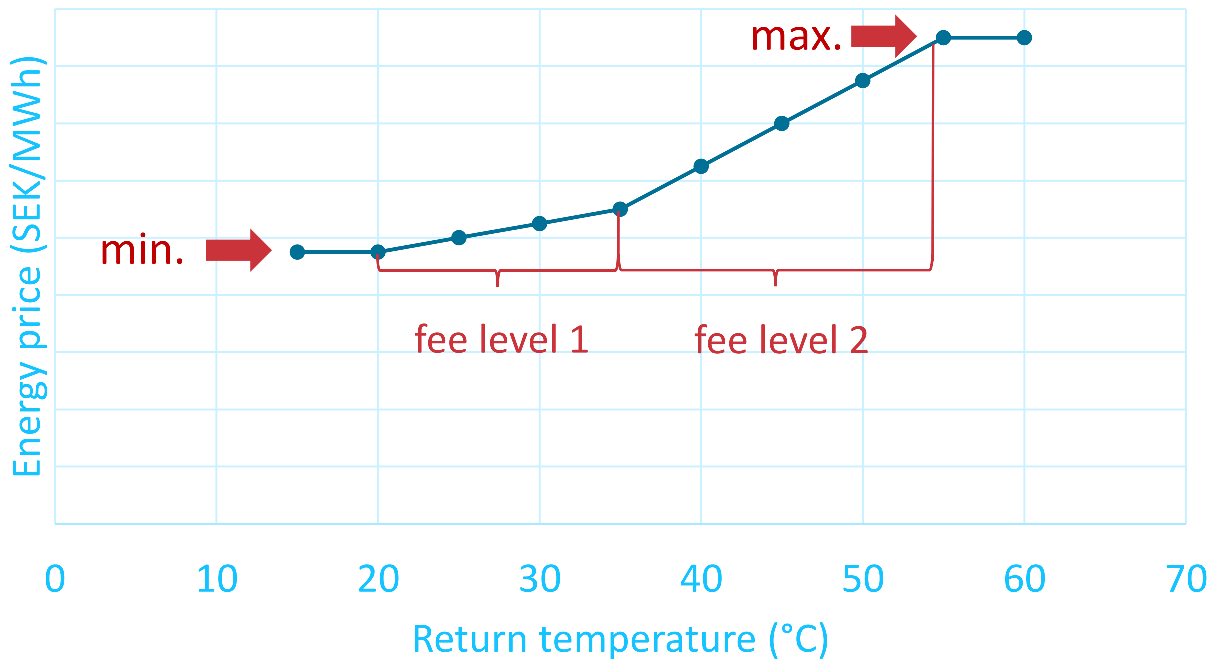
Price tariff for LTDH *consumers* – *result*

- Connection fee
- Energy price based on the average monthly return temperature (weighted), two levels:
  - 20 – 35 °C: X SEK/°C
  - 35 – 55 °C: Y SEK/°C
- Minimum energy price and maximum energy price



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Benefits and development potential

- Simple for customers to understand.
- Favors well-functioning substations.
- Soft values can include:
  - Provide heat exchanger installation instructions to the customers.
  - Offer help with dimensioning of heat exchangers as well as maintenance.
  - Perform yearly maintenance visits.
  - Apply remote reading and control of substations.

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Prosumers – pros, cons and questions

- DH RESILIENCE
- ALTERNATIVE USES OF CAPITAL
- HEAT FORECASTS
- PB
- HEAT QUALITY AND VALUE
- PROSUMER STABILITY
- INVESTMENTS

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Price tariff for small LTDH *producers* – *prerequisites*

- Minimum supply temperature. (Brunnshög: 65-67 °C)
- “Alternative production cost” variable:
  - Invariant production price? → Fixed compensation! (ex. Brunnshög/MAX IV)
  - Varying production price? → “Market price” compensation! (ex. Stockholm Exergi Ltd.)
- “Outdoor temperature” variable:
  - Fixed outdoor temperature demand of YY °C,
    … and/or the compensation decreases with increasing outdoor temperature.
  - Fixed season demand,
    … and/or the compensation varies with the seasons.

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Thank you!

http://www.cooldh.eu/reports/business-plans-and-legislation/

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Business Case for Waste Heat Suppliers & Customer Service Levels

John O’ Shea - Codema

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codema Dublin’s Energy Agency

Heat Sources

17 Heat Source Types Investigated – Approx. 70 different data sources used

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Commercial:

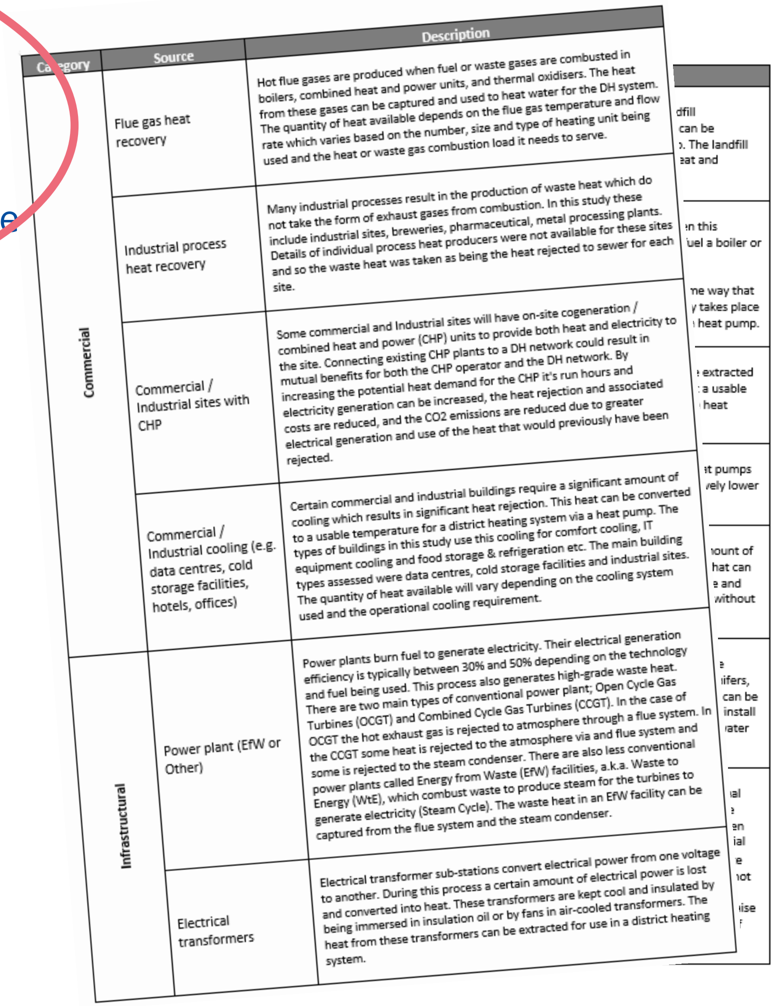
- Flue gas heat recovery
- Process heat recovery
- CHP excess heat
- Existing Biomass
- Commercial/Industrial Cooling with Heat Offtake (e.g. Data Centres)

Infrastructural:

- Electrical power plants (CCGT, OCGT, EfW)
- Electrical transformer substations
- Landfill biogas
- Landfill waste heat
- WWTW biogas
- WWTW waste heat
- Sewer waste heat (EPA Licence data)

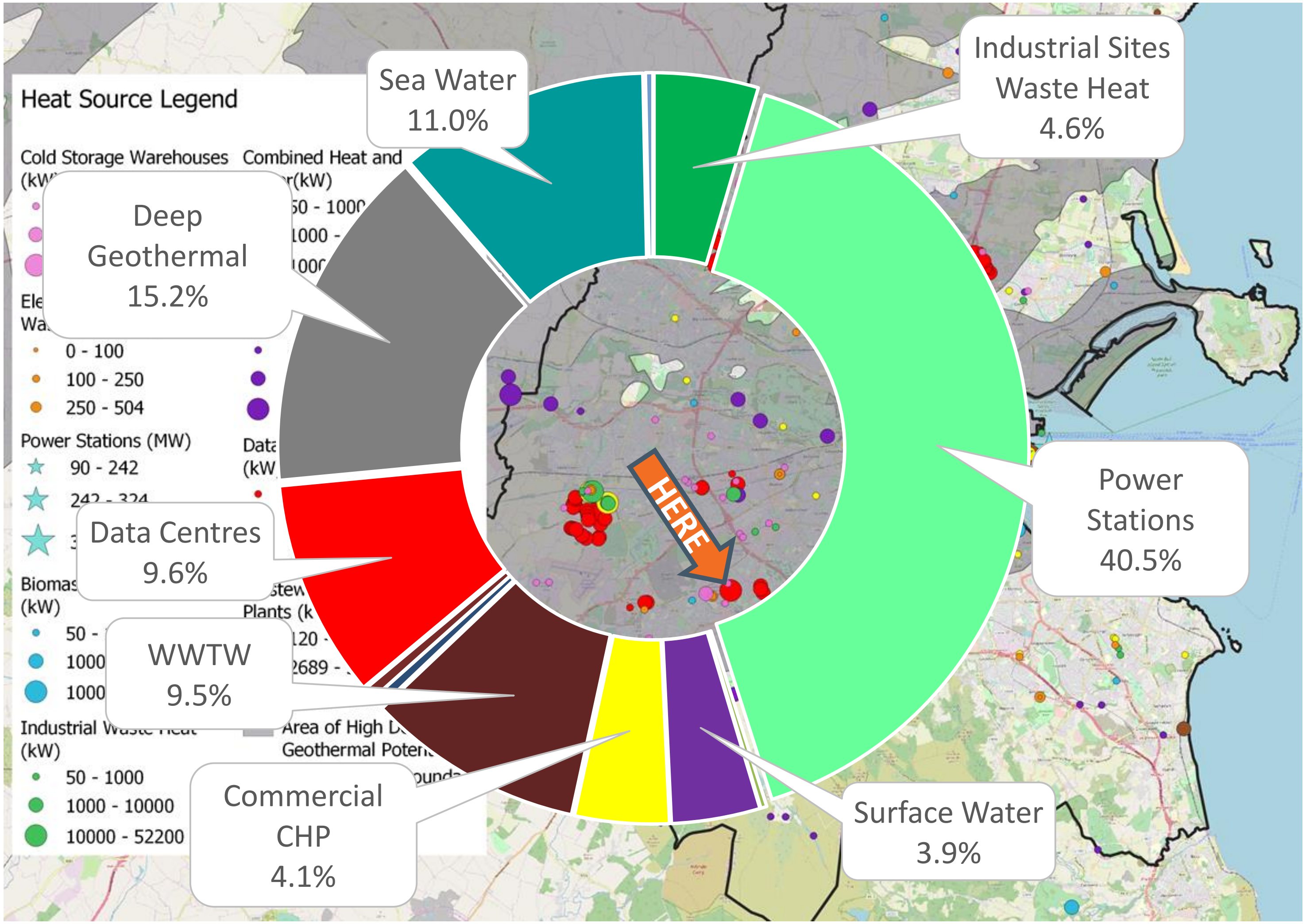
Environmental:

- Air (ASHP)
- Surface water (HP)
- Ground (GSHP) – SEAI suitability map
- Deep Geothermal
- Mine water



Category	Source	Description
Commercial	Flue gas heat recovery	Hot flue gases are produced when fuel or waste gases are combusted in boilers, combined heat and power units, and thermal oxidisers. The heat from these gases can be captured and used to heat water for the DH system. The quantity of heat available depends on the flue gas temperature and flow rate which varies based on the number, size and type of heating unit being used and the heat or waste gas combustion load it needs to serve.
	Industrial process heat recovery	Many industrial processes result in the production of waste heat which do not take the form of exhaust gases from combustion. In this study these include industrial sites, breweries, pharmaceutical, metal processing plants. Details of individual process heat producers were not available for these sites and so the waste heat was taken as being the heat rejected to sewer for each site.
	Commercial / Industrial sites with CHP	Some commercial and Industrial sites will have on-site cogeneration / combined heat and power (CHP) units to provide both heat and electricity to the site. Connecting existing CHP plants to a DH network could result in mutual benefits for both the CHP operator and the DH network. By increasing the potential heat demand for the CHP it's run hours and electricity generation can be increased, the heat rejection and associated costs are reduced, and the CO2 emissions are reduced due to greater electrical generation and use of the heat that would previously have been rejected.
	Commercial / Industrial cooling (e.g. data centres, cold storage facilities, hotels, offices)	Certain commercial and industrial buildings require a significant amount of cooling which results in significant heat rejection. This heat can be converted to a usable temperature for a district heating system via a heat pump. The types of buildings in this study use this cooling for comfort cooling, IT equipment cooling and food storage & refrigeration etc. The main building types assessed were data centres, cold storage facilities and industrial sites. The quantity of heat available will vary depending on the cooling system used and the operational cooling requirement.
Infrastructural	Power plant (EfW or Other)	Power plants burn fuel to generate electricity. Their electrical generation efficiency is typically between 30% and 50% depending on the technology and fuel being used. This process also generates high-grade waste heat. There are two main types of conventional power plant; Open Cycle Gas Turbines (OCGT) and Combined Cycle Gas Turbines (CCGT). In the case of OCGT the hot exhaust gas is rejected to atmosphere through a flue system. In the CCGT some heat is rejected to the atmosphere via and flue system and some is rejected to the steam condenser. There are also less conventional power plants called Energy from Waste (EfW) facilities, a.k.a. Waste to Energy (WtE), which combust waste to produce steam for the turbines to generate electricity (Steam Cycle). The waste heat in an EfW facility can be captured from the flue system and the steam condenser.
	Electrical transformers	Electrical transformer sub-stations convert electrical power from one voltage to another. During this process a certain amount of electrical power is lost and converted into heat. These transformers are kept cool and insulated by being immersed in insulation oil or by fans in air-cooled transformers. The heat from these transformers can be extracted for use in a district heating system.

Heat Sources Map



The Opportunity for Waste Heat Producers

- Green credentials & CSR – more tangible than a PPA & not an “accounting exercise”.
- Added value to the local community
- Free cooling
- Heat sink (CHP run hours)
- Revenue from heat (currently has no value)
- Reduce on-site plant requirement (space & cost)
- Reduce capacity charges (electricity &/or gas)
- Reduced water consumption/cost
- Additional system health monitoring (HR is ESCo’s primary business)

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Concerns for Waste Heat Producers

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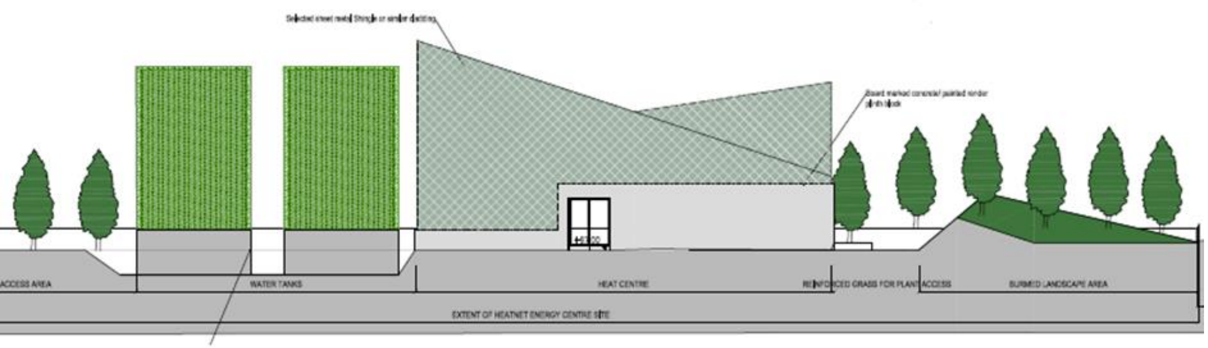
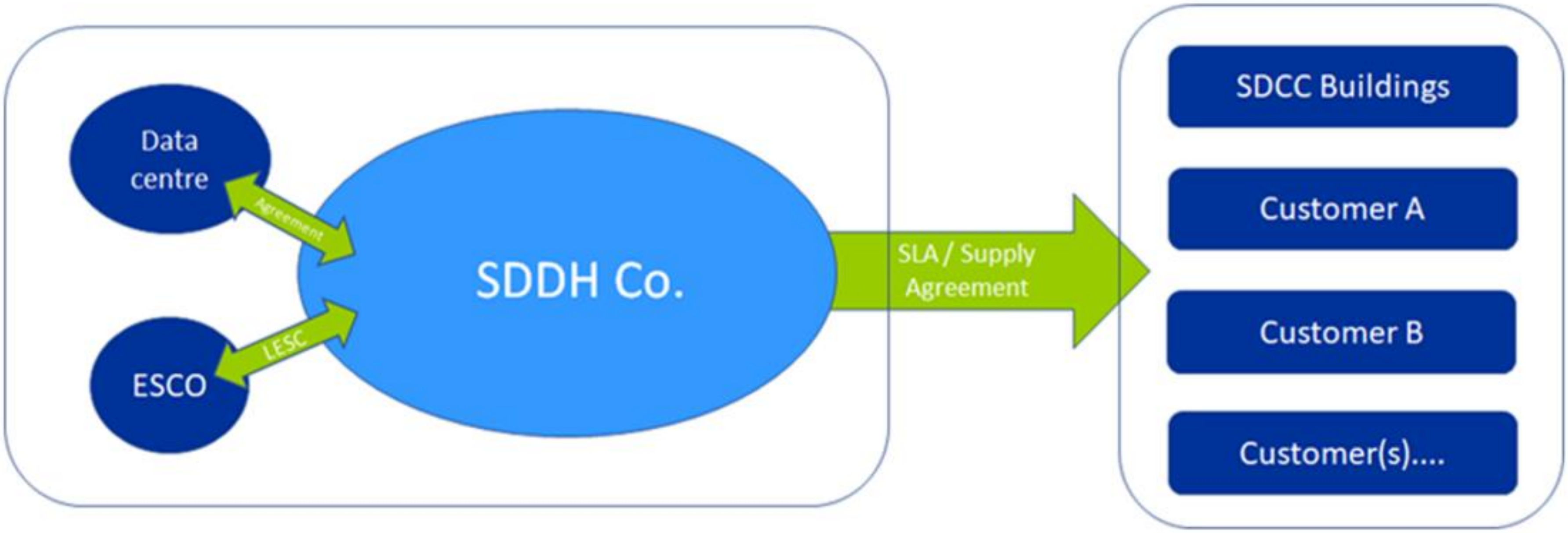
- ~~Disruption to production~~ **Scheduling & design**
- ~~Reluctance to be a "guinea pig"~~ **Operating successfully for decades**
- ~~Engagement in EE & CO2 reduction~~ **Now key across all businesses, big savings**
- ~~Availability of capex – competition for investment internally~~ **Returns available - business case**
- ~~Knowledge, awareness or time to fully investigate options~~ **Analyse bills, meters**
- ~~Access~~ **Planning**
- ~~Reluctance to ensure security of supply~~ **Find contractual balance risk v return**
- ~~Impact on quality of product or service~~ **Scheduling & design**
- ~~Query paybacks~~ **Verify independently**
- ~~System control~~ **Build in overrides**



Tallaght District Heating Scheme

Source: Data Centre Waste Heat

Contract & Agreement Flowchart

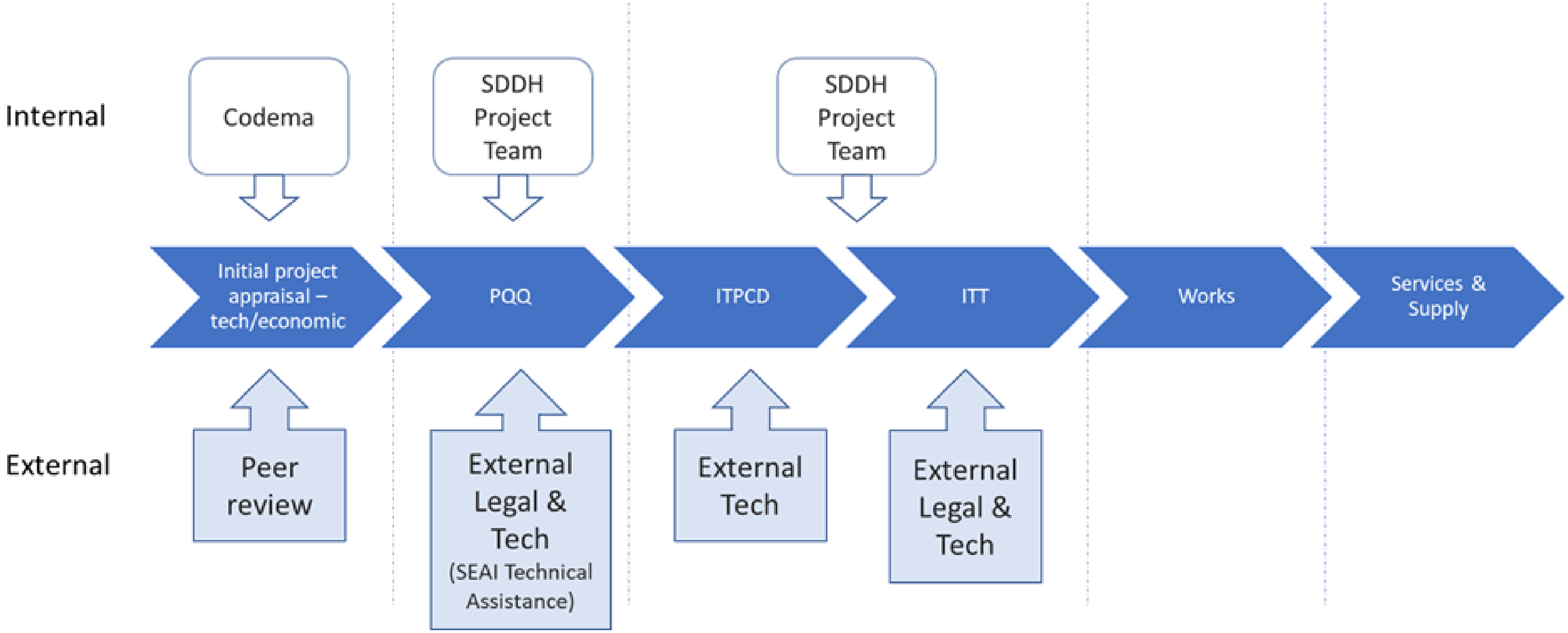


TDHS Procurement

- Output led procurement approach – set out client requirements to be met (CO_2/MWh, RE/MWh etc.) and bid in with a heat supply price
- Technical risk was assigned to the ESCo but DH Co. retain control/ownership of the asset
- SDDH Co. commits a % of the capital up front (supported with capital funding from CAF and HeatNet) – remainder supplied by ESCo
- A portion of the capital expenditure by ESCo is paid back as a fixed monthly payment over the duration of the contract

Example TDHS Procurement Flowchart

- External legal advice relates to the development of the **energy supply contract**



Customer Heat Price & Level of Service

- Heat prices are currently being developed with customers
- Heat price for customer needs to be competitive with the counterfactual
- Will likely have adjustment based on the return temperature
- Connection fees may be included up front or spread over the supply contract using more of a HaaS model (or a mixture of both) – will depend on preference
- Potential to use building thermal mass for load shifting/storage
- Heat supply to customer will need to be of the required quality in terms of temp and/or flow requirement throughout the year (comfort and legionella), availability,

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For any follow-up to this Webinar please contact Codema:

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Thank you!