



Heat as a service: How to decarbonize commercial and industrial heat use with third-party capital investments

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Preface

This guide provides commercial and industrial companies with an introduction to heat as a service (HaaS). It explains the benefits and critical role of HaaS, when HaaS is likely to be a particularly suitable solution, what the key commercial considerations are and how to efficiently develop HaaS solutions.

Its purpose is to inform and empower companies to navigate the complexity that inhibits the use of HaaS at scale, to enable better decision-making throughout the development process and, ultimately, to accelerate the deployment of corporate HaaS solutions.

We have written this guide for those sustainability, strategy, procurement and operations professionals who are driving the HaaS development process within companies.

While companies can leverage HaaS to source heat from all types of energy sources, we have written this guide for companies that are looking for a financial instrument to introduce sustainable heat. We use the term “low-carbon heat” to refer to heat solutions that consume energy resources with close-to-zero greenhouse gas (GHG) emissions, ranging from solar thermal, geothermal and sustainable bio-energy to electrification with low carbon electricity coming from e.g., wind or solar photovoltaic (PV) systems.

Although this guide has been written with a focus on heat provision using HaaS, many elements of this guide will be equally applicable to Cooling as a Service (CaaS) solutions.

STRUCTURE

- Chapter 1 provides an introduction to HaaS
- Chapter 2 compares HaaS to business as usual (BaU) and provides examples of the most common solutions
- Chapter 3 summarizes the key benefits of and the conditions that are particularly suitable for HaaS
- Chapter 4 lists and explains key accounting considerations for HaaS
- Chapter 5 elaborates on key contractual considerations, and how to manage and mitigate risks associated with HaaS
- Chapter 6 outlines how companies should look to develop HaaS solutions



Executive summary

The growing climate emergency and corporate net-zero goals demand further urgent action from business. Companies have made good progress decarbonizing their electricity use, driven by the vastly improving economics of renewable electricity solutions and rising awareness of corporate low-carbon purchasing options, but the decarbonization of heat has been lacking. Leading companies are shifting their focus to heat, which represents 50% of global final energy consumption, and often makes up the majority of a company's energy use – particularly in industry.

One increasingly popular solution is heat as a service (HaaS): instead of a company investing directly in a new renewable heat solution, HaaS enables a third party to bear the capital costs and guarantee its performance over the lifetime of the contract. The company buying HaaS essentially pays off the investment through its operating expenditure (OPEX) over a long-term contract. As such, HaaS provides a tremendous opportunity for companies to decouple capital allocation from their decarbonization journey, free up capital for core business investments, and benefit from

immediate operational cost savings. HaaS solutions might not appear on the company's balance sheet – a critical consideration for companies keen to keep leverage ratios low.

HaaS also enables accelerated uptake of renewable heat solutions by inviting additional expertise and capabilities – usually from an energy services company (ESCO), who would become responsible for the design, construction, operation and maintenance of the solution. ESCOs can leverage their expertise across novel energy technologies and evolving energy markets to ensure the solution is optimally designed and managed throughout the contract lifetime.

While this heat as a service concept is not new, corporate uptake has been limited. To capture the opportunity that HaaS provides, companies require a mindset shift from owning heat generation assets to buying the needed heat from a supplier. Trust in such a long-term arrangement is key. They also need to commit to an appropriate development process to ensure the HaaS solution is fully aligned with corporate strategic priorities, which requires the collaboration of many company stakeholders, including the executive office, operations, sustainability, legal, procurement and finance.

Over time, HaaS adoption and its benefits will grow. As companies create internal capabilities to source HaaS solutions, and build partnerships with preferred suppliers, development timelines and implementation efforts will diminish. Equally, ESCOs will become more attuned to company needs and start to achieve greater efficiencies and economies of scale, lowering costs during construction, operation and maintenance.

WBCSD believes that HaaS is a critical component of scaling lower-cost, low-carbon heat solutions. To realize its full potential, companies are encouraged to use this guide to investigate how HaaS can help them accelerate their net-zero journey and develop solutions aligned with their strategic needs.

1 Introduction



1 Introduction

Many companies are committed to decarbonizing their businesses. They have made sustainability commitments to internal and external stakeholders and strive to further integrate environmental, social and governance (ESG) requirements.

Most companies have initially focused on decarbonizing their own operations, often first addressing electricity use given the competitive pricing of solar and wind technologies that has emerged over the years. Companies have used a variety of instruments to source sustainable power, from renewable certificates through to long-term offtake agreements (also known as power purchase agreements or PPAs) that have enabled renewable power developers to attract financing and build new renewable power-generating assets.

Heat is the next big challenge on the corporate decarbonization journey, particularly for companies in the light industrial sector, such as the food and beverage industry. Many of these companies require substantial amounts of heat for their manufacturing processes – often in the form of steam – and many have committed to decarbonizing their own asset base before 2030.

There is no one-size-fits-all solution for sustainable heat. Most companies will use a variety of commercially available technology solutions to decarbonize their thermal energy use, depending on the particular climatic conditions, market dynamics, fuel source availability and policy environments across their asset base.

The World Business Council for Sustainable Development (WBCSD) has previously collaborated with Bloomberg New Energy Finance to outline [which G20 countries are likely to offer the best conditions for decarbonizing heat in light industry](#).

Key technology solutions include:

- Electrification – through heat pumps, boilers and steam generators
- Solar thermal
- Biogas or biomass
- Deep geothermal
- Third-party waste heat

These heat solutions have common barriers to their implementation. For instance, companies may struggle to get budget for low-carbon heat projects because they have competing capital needs, and investments in core business often take priority. In addition, many low-carbon solutions are capital-intensive and often do not meet the minimum rate of return on an investment that will offset its costs, especially in jurisdictions where there is no significant cost attached to emitting carbon. In such cases, HaaS offers a solution. HaaS connects investors looking for long-term, low-risk investment opportunities with companies that need to decarbonize and need to do so through their operating expenses rather than through their capital expenditures. This applies to all of the above technologies, making HaaS technology-agnostic.

THE OPPORTUNITY

Externally financed solutions are of increasing interest to companies worldwide. Akin to PPAs, HaaS sees a third party invest in a low-carbon asset and sell the energy generated through a long-term offtake agreement. For companies, this means an opportunity to decouple capital expenditure (CAPEX) from their decarbonization journey. It instead creates the ability to decarbonize through operational expenditure (OPEX) routes, which allows businesses to prioritize investments in core business and improve their return on assets and capital employed.

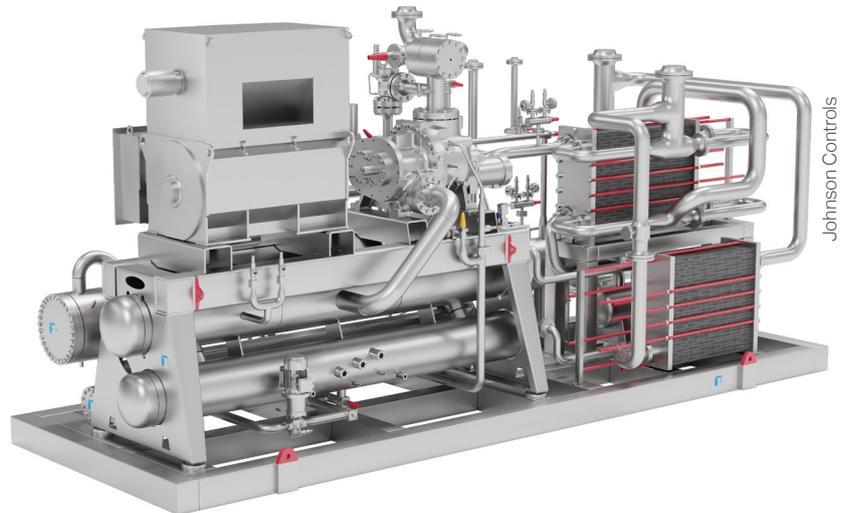
HaaS is not just attractive from a financial perspective. Technologies providing low-carbon heat are evolving rapidly and thus need specialized expertise to design, operate or maintain. Having a third party provide that expertise and deliver an optimized, reliable service can be highly valuable as organizationally and operationally it allows companies to focus on their core business and innovation to maintain their competitive edge.

The opportunity for corporate carbon and cost savings within heat is huge: almost half of total final energy consumption globally is associated with heat, and the vast majority is consumed within industrial and commercial facilities. The biggest HaaS opportunity is at companies willing to enter into longer term supply agreements, with predictable future heat demand, and in locations where heat service providers can leverage technological and power market developments to deliver immediate savings.

THE COMPLEXITY

The uptake of HaaS within industry has, however, been limited to date. One reason is that, whether a low-carbon energy source powers the thermal solution or not, HaaS contracts often need well-considered answers to difficult questions, such as:

- How long will the company manufacture what volumes at this site?
- To what extent does the company want to own and operate these facilities and assets?
- How does the company deal with stranded assets and the residual value of investments?
- What are the fallback scenarios if the HaaS approach fails?



To answer such questions and develop HaaS solutions efficiently, it is essential to have executive management buy-

in, the contributions of various functions within organizations, and commitment to an intensive development process.



② Heat as a service vs. business as usual



② Heat as a service vs. business as usual

Historically, heat supply solutions have been rendered in-house. In a business-as-usual (BaU) solution, the company owns the heat facilities and has full control over the design process, as well as its operation and maintenance. The company can elect to perform elements of the design, construction or operation or use selected contractors to perform them. It can also tailor the construction process to its risk appetite, from taking on all the capital investment and associated risks versus a low-risk, fixed-price, date-certain, turnkey engineering, procurement and construction contract.

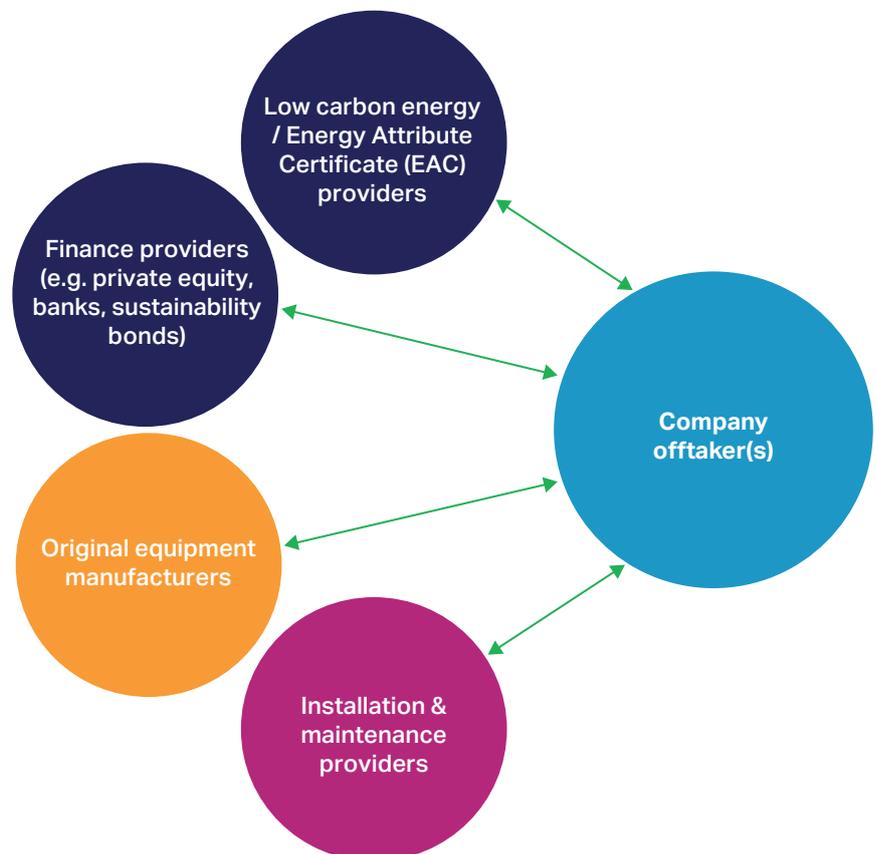
The company is also free in its financing approach, such as through corporate lending, no – or limited recourse finance or through various leasing options. Figure 1 illustrates a typical ownership structure for heat facilities in a BaU setting.

Moving to low-carbon heat solutions often requires expertise that companies may not have. Taking ownership of a technology solution unrelated to the company's core business might be inefficient – companies are often not set up to operate things like biomass boilers or secure feedstock over a 15-year contract term. This may be a reason to engage a third-party supplier who will provide the expertise and be responsible for the procurement of the fuel source and the system's operation and maintenance.

In the HaaS business model, companies engage and pay an energy service company to provide an optimized, tailored thermal energy solution as a service. The services an ESCO renders may vary from an energy savings performance contract (ESPC), under which the ESCO will provide guaranteed performance and operation and maintenance services, to a full HaaS solution where the ESCO takes responsibility for the design, financing, construction and ownership of the facility and for the (low-carbon) energy source.

An ESCO may provide a broad range of energy solutions, including technical design, energy conservation and efficiency measures, low-carbon energy/heat supply and contracting. ESCOs can vary from being a global utility company that has specialized services, to an energy service company that only works on service contracts. The importance of the ESCO is it has the necessary expertise to optimally operate the HaaS facility and to understand the company's operational requirements.

Figure 1: Business-as-Usual (BaU) ownership structure for heat facilities



In a BaU solution, the company thus owns the heat facilities and either:

- a) Designs, constructs, operates and maintains the heat solution itself; or
- b) Contracts others to do so under its management and control.

Conversely, one of the main characterizations of HaaS transactions is that a single counterparty – the ESCO – takes on most of these responsibilities. HaaS solutions are usually tailor-made business deals between the company and the ESCO based on the business needs of the company.

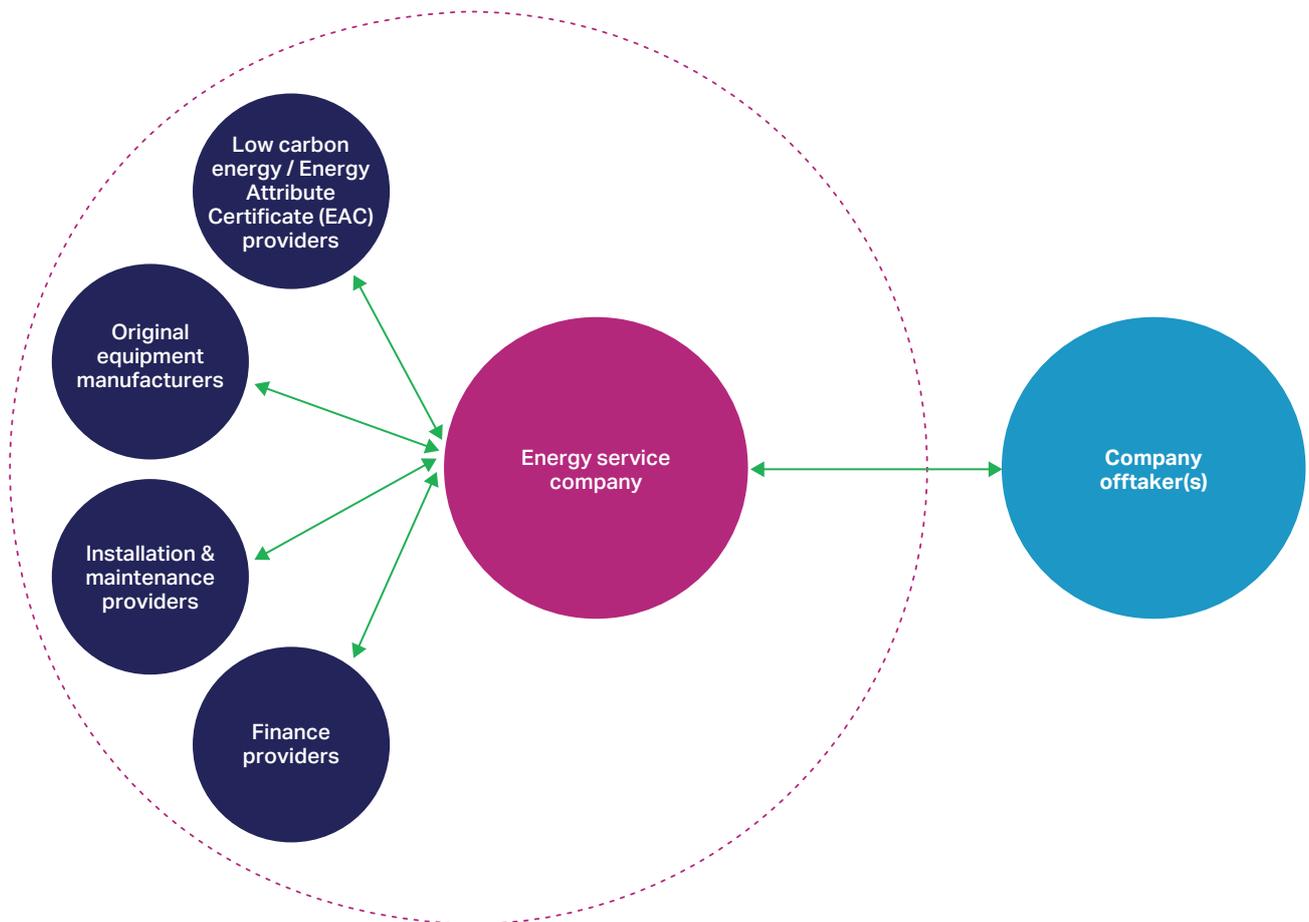
They often involve the ESCO to outlay substantial capital based on the projected project cash flows paid by the company to the ESCO for heat services rendered.

HaaS contracts are usually long-term because the expenses paid for the heat services need to be competitive. This means the ESCO will either require a long-term contract or a higher unit price to make its desired return on the investment. If companies cannot commit to long-term agreements they must accept that the periodic costs or unit price for the heat will be higher.

In a BaU solution, the company principally bears all the risks involved in the project but may be able to contract those out through the agreements that form the project. In the HaaS approach, the company outsources this complexity in exchange for a contractual relationship with only one party – the ESCO.

It is important to note that any complexity in the HaaS solution has not diminished. It has simply disappeared from the company's view and the ESCO and the parties working for the ESCO have taken it on.

Figure 2: HaaS structure for heat facilities



HAAS IN THE CONTEXT OF OTHER HEAT OUTSOURCING OPTIONS

ESCOs have been around since the 1980s and their energy-as-a-service business models have evolved with time. There are a variety of services available with varying levels of outsourcing. We describe three common services

in which the ESCO guarantees the performance of a heat asset over the duration of the contract:

1. Energy savings performance contract
2. Lease
3. HaaS

Factors like the type of services to be performed, financing

needs, asset ownership and price structure distinguish these contract structures. When comparing these contract structures with BaU it becomes evident that companies can outsource an increasing number of responsibilities – all of which come with additional benefits, risks and costs. Figure 3 visualizes key components of the three common contract structures.

Figure 3: Common contract structures



Energy savings performance contracts

- The company designs, owns and finances the assets but operation, maintenance and performance guarantees rest with the ESCO. This is a model that most closely matches the situation where a company retains control over the project.
- The ESCO takes over the performance and operation and maintenance (O&M) part of the solution. The following underwrite its performance:
 - Minimum asset availability and performance guarantees, with pre-agreed financial compensation for underperformance; or
 - A shared savings agreement where the ESCO and the company divide financial gains, either using a pre-agreed division over the duration of the contract or a division that increasingly favors the company to reflect system efficiency improvements as the ESCO optimizes operational strategies.

Lease

- The ESCO owns and finances the assets, but the company operates them to its benefit. The difference between HaaS and a lease is that in a lease the asset is on the balance sheet of the company and the company has the right to:
 - Direct how and for what purpose the asset is operated; or
 - Operate the asset.
- The company has designed the asset or has had significant input in the design.
- Pricing can be according to a shared savings model or fixed fee but always needs to be structured around the cost of capital and profit to the ESCO as well as repayment, interest and other financing terms.

Heat as a service

- The ESCO designs, builds, owns, operates, maintains and finances the asset.
- It supplies heat as-a-service, and guarantees availability and performance of the asset.
- Pricing can be according to a shared savings model or fixed fee.
- There may be balance sheet advantages – see chapter 4.

③ Inherent benefits of and optimal conditions for HaaS



3 Inherent benefits of and optimal conditions for HaaS

HaaS offers certain inherent benefits, many of which are akin to the better-known Power Purchase Agreements (PPAs) for low-carbon electricity. This section summarizes the benefits of HaaS solutions and highlights key considerations that might make HaaS particularly appealing.

INHERENT BENEFITS

- **Sustainable development:** Low-carbon HaaS arrangements expedite the achievement of net-zero carbon emission ambitions where capital is a challenge. In most cases, a company would look at replacing an existing fossil fuel heating source with a low-carbon alternative and would need to invest capital and time to design the solution, develop new capabilities and operate the new facilities. This expertise is not always found internally, but these capabilities are, however, the core business of ESCOs and they have access to investors who seek long-term and low-risk investments. As such, companies may move faster on their decarbonization journey through collaboration with an ESCO.

- **Capital deployment benefits:** HaaS arrangements can lead to immediate cost savings without the need for substantial capital investments, shifting CAPEX from the company to the ESCO and essentially offering an OPEX route to decarbonize heat. This allows companies to retain financial savings and flexibility to deploy capital in accordance with their own core mission and expertise.

ESCOs can also be best positioned to operate and maintain low-carbon heat solutions, being able to leverage economies of scale, market clout and market expertise – leading to lower energy supply costs and more competitive O&M offers.

- **Technology use:** Proficient ESCOs can more readily tap into technological innovations, given that is their core area of expertise. They can also use their in-depth knowledge of energy markets to leverage any changes in market design to maximize value from the asset.
- **Reputational advantages:** The decarbonization of operations with credible low-carbon solutions improves a company's brand and leadership position.

OPTIMAL CONDITIONS

- **Long-term contracting:** HaaS requires the ESCO to make capital investments to provide services to the company. To keep heat costs competitive with prices paid by the company, the ESCO will favor long-term contracting. As such, HaaS is particularly appealing if the company has limited restraints on the length of time that it wants to commit itself contractually.
- **Bankability of assets and creditworthiness:** ESCOs often finance HaaS assets directly or through a special purpose vehicle. The HaaS arrangement must be set up in a bankable manner and may lead to potential ownership, liability and insurance issues that some companies cannot accept. For the same reason, ESCOs also tend to require credit assurances through either credit ratings or guarantees. As such, HaaS is particularly appealing if the company has excellent credit ratings and can provide corporate or bank guarantees to limit the cost of financing.

- **Balance-sheet treatment:** Getting PPAs for low-carbon electricity off a company's balance sheet has become fairly straightforward in many regions. This is not the case for all HaaS solutions, although there are circumstances where it can be done within the context of the International Financial Reporting Standards (IFRS) especially if the heat solution is not designed for one single company. As such, HaaS is particularly appealing if:
 - The company is ambivalent about including the asset on its balance sheet;
 - The solution provides multiple companies with heat;
 - The company has limited specific design, use or control requirements.
- **Third-party integration and operation:** Some companies may not allow the integration of the ESCO's heat solution into their own technical heat systems and prefer a "fenced-in" solution on adjacent land. This may be for technical reasons but may also be grounded in the operational and legal considerations of entrusting a third party to operate site utilities. Many companies must comply with strict mandatory health, safety and environmental (HSE) regulations and have correspondingly strict guidelines and protocols. The ESCO must follow them as well as its own HSE protocols.

Chapter 4 provides further considerations on IFRS accounting.

The PPA market has seen many innovative solutions emerge to break-down barriers to uptake. We expect a similar trend for HaaS as the energy value chain mobilizes around it and builds capacity to deploy it at scale.

④ IFRS balance sheet treatment for HaaS



4 IFRS balance sheet treatment for HaaS

A key benefit of HaaS business models is that a third party makes the investment to satisfy the company's heat needs, while the corresponding assets are not necessarily accounted for as the company's assets. They are "off-balance sheet" for the company. If such off-balance sheet treatment is critical for the company, it needs to consider this early on in the development process as it will influence solution design and operation.

The decision tree in figure 4 analyzes whether the project is to be considered a supply agreement or a lease.

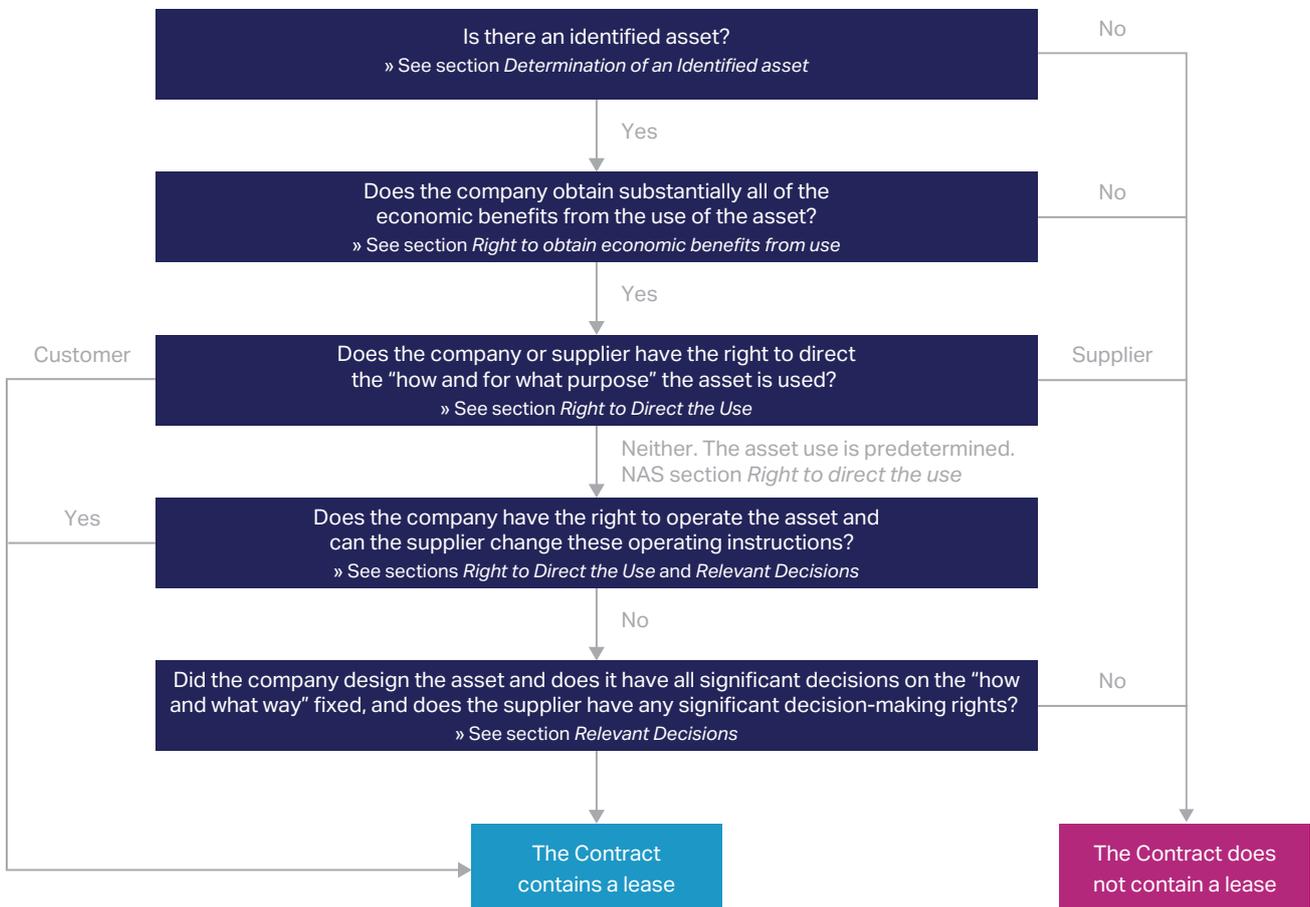
When deciding whether a HaaS must be included in the company's balance sheet, it is critical to determine whether, for accounting purposes, it should be regarded as a lease or a supply agreement.

If the contract contains a lease, the heat solution will need to be on the company's balance sheet. IFRS 16¹ shows how to determine whether a company should consider HaaS solutions as a lease.² As accounting

and financing teams do the reporting and assessment under IFRS 16, their involvement early in the development process is necessary. We recommend that finance and accounting representatives provide the project team with a workshop on IFRS 16 accounting.

This section is not intended as an IFRS accounting guide.³ Instead, it elaborates on key questions and considerations related to the on- and off-balance sheet treatment of assets and financial reporting so that companies may take these into account when developing HaaS solutions.

Figure 4: IFRS 16 accounting guidelines



- **Is there an identified asset?** In a HaaS solution there would be an identified asset to supply heat.
- **Does the company obtain substantially all of the economic benefits from the use of the asset?** The answer to this question may be nuanced for HaaS. In a model specific to the company's needs, the company would usually obtain all economic benefits. This may, however, be different in a collaborative offtake structure, for example where:
 - The company is part of an offtake grid and there are multiple parties enjoying the economic benefits.
 - The company receives a pre-agreed base load of heat, subject only to periodic, non-material renegotiation.
 - The ESCO derives other economic benefits from the asset. This may be through combined-heat-and-power (CHP) generation delivering power to the grid or another offtaker, or through grid services that the ESCO renders to grid operators, such as demand-response or flexibility services. In terms of biofuels, the ESCO can also receive economic benefits by importing various wastes.
- **Does the company or supplier have the right to direct the "how and for what purpose" the asset is used?** The request for proposals (RfP) is crucial when considering this question. If done correctly, the company will not need to intervene in the operation of the facility. To that end, the RfP should clearly state what the company will use the asset for and should include a detailed load profile of the heat requirements using the past as

a basis and any potential future plans. This load profile should remain for the duration of the contract, with a caveat that from time to time there may be operational changes (see chapter 5).

If the company removes existing heat assets and relies on the ESCO's solution, the functional project design has to be detailed enough that during the duration of the contract, the company does not need to direct the ESCO in operations of their asset. This is often difficult in low-carbon heat supply projects. A solution may be steam storage (for instance through buffers) to take peaks, thereby providing short-term solutions but not requiring that the company direct the operation of the asset.

Companies can often rely on remaining legacy or stranded assets for when the new HaaS solution does not deliver heat. In such instances, determining which party decides what assets are running at any given time will be critical. In such a case, the company would often have a separate agreement with the ESCO to operate and maintain the legacy asset.

If the ESCO incorporates the legacy assets into an integrated heat solution and determines when to use the legacy or new asset – and the benefits of this arrangement flow to the ESCO – the contract would generally not be considered a lease and would be off-balance sheet for the company. The company should clearly define the preferred set-up in the RfP and ensure its inclusion in the resulting contract.

- **Does the company have the right to operate the asset and can the supplier change these operating instructions?**

This question is less complex and can usually be answered with a "no". In many HaaS solutions, the ESCO will build, own, operate and maintain the asset. If the ESCO guarantees certain savings to the company, it will insist that the company is not able to change or modify any of the operations without preapproval from the ESCO as these actions may negatively impact the savings guarantee. It should be clearly written in the contract that the company can operate the asset only under certain conditions.

If the company expects increases or decreases in heat volumes, it should clearly state this in the contract. If material renegotiations are necessary, the company (or its accountants) could interpret this to be a right to operate, which may tilt the balance sheet evaluation towards a lease and thus grant on-balance sheet evaluation to the company.

- **Did the company design the asset and does it have all significant decisions on the "how and what way" fixed, and does the supplier have any significant decision-making rights?** To avoid a "yes" to this question (and avoid this solution being on the company's balance sheet), it is crucial that the supplier design the solution. The RfP is important here and the internal company team must be aligned to have a clear, unequivocal functional description of what is required – while leaving space for the supplier to optimize a solution to meet these needs. This usually requires both a functional specification and clearly defined technical requirements, leaving the actual technical design of the asset, its integration into the company's facility and its prescribed use to the ESCO.

5 HaaS procurement and contractual considerations



5 HaaS procurement and contractual considerations

A tailored contract between the company and the ESCO underpins HaaS arrangements. As indicated in chapter 2, in HaaS contracts, the company exchanges the complexity of a BaU approach for a contract with only one party – the ESCO. Thus, the HaaS contract dictates all rights and obligations of the company and the ESCO over the lifetime of the contract.

This includes company needs and expectations, the technical solutions to meet them, the collaboration between the parties, the services offered by the ESCO and the payment structure. Such a contract must also provide options for how the parties can react or make changes when markets, regulatory requirements or other boundary conditions change.

HaaS contracts are not new and many of the key contract clauses are used in other long-term commercial deals involving production assets. The procurement and contractual considerations for HaaS contracts are conceptually similar to other service arrangements. Typically, HaaS contracts are long-term (10-20 years), their scope may involve a combination of new and existing or redundant assets, and their basis tends to be a low-carbon heat generation element.

ESCOs can offer solutions if a company is not familiar with HaaS. Usually, the ESCO drafts the contract(s) according to the company's functional specifications, heat demand requirements and site conditions. While there are certainly contract precedents, there are no industry templates or standards as company requirements vary. Although an ESCO can draft a project-specific contract, it is crucial for a company to understand its HaaS requirements and thus shape the contract accordingly. It is often beneficial for the company to include specific clauses in the RfP as a basis to ensure company needs are well known in advance and addressed in the initial draft as supplied by the ESCO.

To provide an overview of what HaaS contracts look like and inform companies of what to expect, we highlight several key considerations and how to approach them below. We address three topics that are crucial to a successful HaaS arrangement:

1. Demand uncertainty
2. Technical performance
3. Energy and fuel costs

Furthermore, we highlight two topics that are not HaaS-specific but are important given the binding nature and long duration of the contract:

4. Commercial performance
5. Regulatory change

DEMAND UNCERTAINTY

Investments in new heating solutions, whether in a BaU or HaaS approach, require a company to estimate its future heat demand and profiles. Typically, heat solutions are designed for a specific heat profile – and the associated financial outlays and returns will vary if heat demand changes. Changes in heat demand may result from varying operating hours. Changing capacity factors may affect the asset's operational efficiencies and economic returns.

Using BaU, a company may design its facilities to readily accommodate changes in demand as the company controls the heat source and related facilities, although changes in demand will usually affect returns. HaaS is different because the ESCO needs to design the performance of the heat assets on the basis of the company's expected demand. The company will have long-term obligations for the offtake of heat energy at specified rates over time. These expectations will need to be agreed beforehand and the HaaS contract may grant only limited room for (re) negotiation of the heat demand during the term.

Demand uncertainty is less of an issue if reliable historic demand profiles are available. However, accurate historic demand profiles might not be available or not suitable to project future demand. If the expected heat demand is uncertain, then it is advisable to conservatively estimate the amount of heat required and build sufficient flexibilities into the contract.

Some technology solutions might be less suitable to deal with demand uncertainty and demand variability. For example: bio-energy solutions could struggle with the technical challenge of ramping up heat production instantaneously. This can be solved, for instance, by adding a heat buffer to soften demand peaks and troughs, but sufficient storage capacity may be expensive and diminish project returns – an issue of commercial viability. If the storage capacity is too expensive or insufficient, then the company should consider a different low-carbon energy source.

Oversizing the heat solution can be costly and uncompetitive. Undersizing it to provide only base-load mitigates that issue but requires assets outside of the HaaS solution to meet the company's demand peaks above base-load. For this purpose, ESCOs can incorporate existing, redundant company assets to optimally run the new and old heat solutions together to meet total variable demand. The new assets could then supply base-load and the existing company assets could meet peak demand. This, however, might not be a fully decarbonized solution presuming the company's existing heat assets use fossil fuels.

Contracting approach

There are two basic HaaS contracting options – a full-load and a base-load arrangement.

- HaaS full-load is when either the demand is predictable or a technical full-load solution is available, in which case a full HaaS solution can be agreed.
- HaaS base-load is either when:
 - The ESCO runs the HaaS solution for base-load heat delivery and the company's existing assets for peak-load; or

- The ESCO runs the HaaS solutions in base-load and the company runs the existing assets to meet its peaks.

For these contracting options, the company and the ESCO can agree on HaaS supply on the following supply basis.

- For HaaS full-load arrangements:
 - A customer-variable basis where, within an agreed bandwidth, the company may incidentally ramp up or down its heat demand at agreed times during the term of the contract, such as for scheduled plant shutdowns or maintenance; or
 - A customer-demand basis where the ESCO continually supplies heat as demanded by the company within an agreed bandwidth, such that the supply continuously tracks heat demand variations as they occur in the company's production processes.
- For HaaS base-load arrangements:
 - A system-supply basis where delivery is based on the actual generation profile achieved by the heat generation system; or
 - A guaranteed performance basis where delivery is based on specific guaranteed volumes and the availability and performance characteristics of the heat generation system guaranteed by the ESCO.

TECHNICAL PERFORMANCE

Ensuring that HaaS solutions provide heat reliably is critical for companies. In a BaU setting the company principally controls the construction and operations of the heat facilities and is therefore exposed to all risks associated with construction, technical performance and operations. Turnkey solutions providing a fully designed and integrated heat solution can mitigate construction risks and companies may obtain limited guarantees for specific pieces of equipment with the aid of maintenance contracts.

In the HaaS setting, however, the ESCO takes on the responsibilities for construction, technical performance and operations – guaranteeing on-time construction and commissioning of the new heat solution, as well as the availability and performance of the heat solution over the lifetime of the HaaS contract.

ESCOs are set up to design tailored heat solutions, guarantee operational efficiencies and maximize the value of the energy assets, so availability should therefore be equal to or better than the existing heat solution in a BaU setting. Economies of scale and market clout should also give ESCOs competitive advantages and lead to lower energy supply costs from which the company may benefit.

Subject to the HaaS project scope and heat demand, a company may wish to invest in – or maintain – ancillary back-up capacity where its main production processes are concerned if deemed a requirement for emergency situations. But such redundancy may come at a cost and the company should consider a cost-benefit analysis.

Contracting approach

The starting point of the HaaS contract is a clear project description and clear technical interface descriptions. Delineation of responsibilities and project boundaries are key to any HaaS arrangement and describe where the heat assets are located on – or near to – the company's premises. These form the basis for numerous arrangements, such as:

- Compliance with regulatory requirements, such as permits or HSE regulations;
- Transfer of ownership and risk of the HaaS and existing company assets, so that it is clear who owns which assets and bears the risk that they may be damaged or lost;
- Security rights in HaaS assets, which may be required as a result of third-party financing of the HaaS assets;
- Responsibility for on-site personnel, so that it is clear who is responsible for on-site incidents caused by personnel working on the HaaS asset or existing company assets; and
- Insurance coverage, to determine the appropriate coverage packages for the company and the ESCO.

The following key clauses in the contract are related to technical performance:

- Performance specifications of the HaaS and existing company assets;
- Supply basis (full-load, base-load and supply approaches as described above);
- Heat-rate or power-curve guarantees for the heating and power generation assets; and
- Availability guarantees assuring the time-based, mechanical availability of the heating and power generation assets.

To avoid having the long-term HaaS solution locking the company into sub-optimal arrangements, the HaaS contract should provide sufficient flexibility to amend the existing solution or allow for the introduction of new technologies altogether. The latter option is particularly relevant to many renewable technologies that are still evolving and improving. Parties could agree that the ESCO makes improvements to the project throughout the term where and when appropriate, which could affect the terms of the agreement.

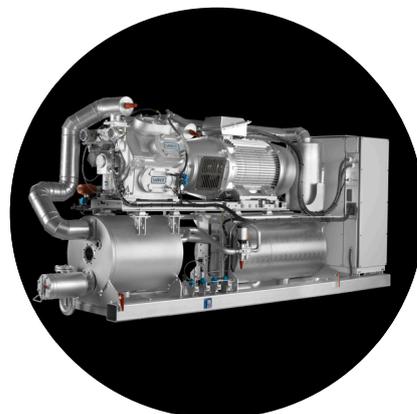
Although construction will be under the control and responsibility of the ESCO, when construction takes place on or near to the company's site, the company will want to coordinate its operational activities with the construction activities and have inspection, acceptance and reporting rights. The company may want to secure the option to vary demand to accommodate the interface with its own installations. The company needs to have a clear understanding of the construction schedule and critical project path and have a guaranteed:

- Mechanical completion date, after which acceptance testing and take-over can take place;
- Commercial operation start date when heat supply with the agreed parameters will commence on a continuous basis;
- Delay-damages scheme to compensate the company for construction delays;
- Capacity shortfall scheme to compensate the company for a potential shortfall in the generating capacity of the assets;
- Commercial operation long-stop date, at which time the company may elect to terminate the HaaS agreement due to default by the ESCO to achieve the commercial operation date.

ENERGY AND FUEL COSTS

HaaS agreements might be subject to changes in energy sources and power price volatility and the ESCO will wish to protect itself against such volatility, either by making hedges (at additional cost) or by passing the price risk on to the company through an agreement that the company will pay any energy and heat cost increases. This may or may not be preferable depending on the company's procurement strategy for utilities. Regarding renewable energy sources, the company and the ESCO should agree on the procurement process that the ESCO will implement. The company typically may not have the procurement expertise in renewables and may want to rely on the ESCO as the expert in this market.

Given that price volatility is a key risk for both the company and the ESCO, the company will need to negotiate and contractually agree on the price such that the company is protected from unexpected price volatility and can anticipate a steady operational expenditure with the HaaS. The ESCO, as a service provider, should have a good understanding of these renewable fuel and electricity markets and be able to provide the company with options to deal with price volatility.



Johnson Controls

Contracting approach

We recommend that companies include one of the following key price protection clauses in its HaaS contract:

- **Sharing of savings:** The ESCO promises to save costs when compared to the company's BaU solution and agrees with the company to share the savings. The company may structure the variable component in the savings-sharing price model to incentivize the ESCO to achieve greater savings or may include minimum savings targets as part of the price structure.
- **Market-based price adjustment:** The company and the ESCO agree to a fixed price if an agreed market reference price does not fluctuate too much. However, they should plan to look at other relevant market prices if:
 - The market reference price moves outside an agreed price collar; or
 - The market reference price drops below an agreed floor.
- **Energy-based price adjustment:** The company and the ESCO agree to a fixed and variable component of the unit price. The variable component is typically an energy cost but the company enjoys price protection against excessive fluctuations of the variable (energy) component. This price protection may take the form of:
 - A market-following energy price with a fixed or percentage discount, so that the company always enjoys a discount on the market price;

- A market-following energy price with an agreed cap or collar so that the company's cost can never exceed an agreed maximum energy price (and with a collar the cost will also never go below a certain energy floor price); or
- A fixed-for-floating price structure where the ESCO offers a fixed energy price even though the market price floats.
- **Other capped variable price components:** The company and the ESCO agree that the ESCO can charge another variable price component, such as labor or materials, to the company but that the variable price component is subject to an agreed cap. If the cap is exceeded, the ESCO cannot charge the excess to the company.
- **Capped indexation:** The company and the ESCO agree that the price is subject to indexation, such as labor or material prices that change with inflation, but that price increases due to indexation are subject to an agreed cap. If the cap is exceeded, the ESCO cannot charge the excess to the company.

ESCO COMMERCIAL PERFORMANCE

When a company seeks BaU solutions, it decides with whom to enter into the various project contracts and typically has direct control over the heat supply. In HaaS solutions, the company relinquishes control through the use of a single service arrangement. As such, the commercial performance and dependability of the ESCO become important considerations for the company. Thus, it is advisable for the company to

ensure the technical and financial ability of the ESCO to properly perform the HaaS contract throughout its term.

This becomes even more pressing when realizing that, other than under common construction contracts, ESCOs generally limit their liability in relation to their periodic revenue under the HaaS contract. If that limit is exceeded, the company bears any excess costs.

Contracting approach

We recommend companies take the following contractual steps to safeguard their heat supply, preceded by appropriate due diligence to ensure the ESCO's commercial, technical, financial and reputational standing.

- In the HaaS contract the company should include the following key clauses:
 - A break or cancellation clause assuring that in case of a serious ESCO default, the company can take over the assets at a pre-agreed annual value and receives compensation for having to look for another service-provider;
 - A change-of-control clause enabling the company to do the same if a third party that does not meet adequate commercial, technical, financial or reputational standards;
 - A non-assignment clause giving the company the same rights if the ESCO divests the heat project to such a third party;

- A parent company guarantee, bank guarantee or letter of credit from an investment-grade party to secure the company against the consequences of the ESCO defaulting under the HaaS contract;
- A warranty that the ESCO is in good financial standing and will ensure and maintain the financing during the term of the agreement; and
- Assurance from the ESCO that the company will not be involved in or affected by any bank's security interest in the heat assets and in the HaaS contract.

REGULATORY CHANGE

As a long-term contract, HaaS arrangements may be subject to changes to national and international regulatory frameworks. These changes may be environmental-, social- or government-driven due to mandatory reductions in greenhouse gas emissions, minimum living wages or working conditions, or changes in safety procedures, operations, taxes or costs. Changes may also relate to market indices used to agree on heat prices. The ESCO should bear the risks of regulatory changes during project realization. Thereafter, the parties should avoid undue hardship on either party through renegotiation.

Contracting approach

We recommend companies deal with regulatory changes through key contract clauses in their HaaS contract:

- **Force majeure clauses** excusing unforeseeable events hindering or preventing performance and granting extensions of time for performance during construction. Changing regulations may fall into this category but not if they are project- or ESCO-specific and are general in nature. For example, a change in regulations that only applies to the heat project at hand generally would not be regarded as force majeure but a change that applies to all heat projects might be. Companies often insist that this distinction be included in these clauses.
- **Change in law clauses** providing a mechanism for the parties to address regulatory changes that materially alter the main rights and obligations that the company and the ESCO negotiated, through renegotiation of the contract. An example may be a change in the way environmental attributes (such as guarantees of origin) are allocated or transferred. Companies often insist that any renegotiations under these circumstances should not lead to higher costs for the company, nor should they be achieved through binding third-party expert resolution.
- **Material adverse change clauses** doing the same as the change in law clauses but applied on a broader scale than just to regulatory changes: the change may have any cause as long as it has a material and adverse effect on the main rights and obligations that the company and the ESCO negotiated. If it does, the clause leads to renegotiation or to a termination right for affected parties. Companies often insist on the same terms as with change-in-law clauses and also often negotiate a termination value to be paid if the contract is terminated.
- **Market disturbance clauses** providing a mechanism to deal with market disruptions that cause payment difficulties or make calculations difficult because indices are discontinued. The company and ESCO may anticipate these issues by agreeing on alternative payment methods, markets or indices.

⑥ The HaaS development process and resourcing



6 The HaaS development process and resourcing

The benefits of Haas can be economic, environmental and operational but setting up Haas requires careful planning and an integrated, collaborative approach from both the company and the ESCO. At the outset of the development process, the company must clearly define the project's objectives, decision criteria and phases. It also must allocate resources and assign roles.

DECIDING WHETHER HAAS IS THE RIGHT SOLUTION

Setting up heat as a service, especially for the first time, may be daunting for companies as it requires a mindset shift from building, owning and controlling the source of heat to procuring heat as a service. The required mindset shift is to see "heat" in the same way as electricity: an energy stream that can be bought for a price, albeit under different contractual conditions.

To enable this mindset shift and decide whether HaaS is a potential solution, we encourage companies to ask the following questions in deciding between a BaU and HaaS approach:

- What are the business objectives and how does HaaS support them?
- To what extent does HaaS accelerate the process of reducing the carbon footprint and support sustainability goals?

- Are low-carbon energy sources and ESCO services locally available and does the facility or manufacturing site lend itself to HaaS?
- How do the project economics compare for HaaS and BaU?
- For a BaU solution, is the required CAPEX available for the project? What is the financing cost of this CAPEX? What other projects that are competing for the CAPEX could the company free up to implement HaaS?
- Is long-term service contracting for and outsourcing of the heat supply acceptable? How important is the operational control of the heat source?

If the company deems HaaS preferable to BaU, then it needs to make many further decisions as part of selecting an ESCO and the HaaS solution. A company may decide to work with one ESCO or consult with several ESCOs in parallel. A single ESCO might not be proficient with all low-carbon heat technologies across all markets in which a company operates.



RESOURCING THE HAAS DEVELOPMENT PROCESS

Given the fundamental differences between the HaaS and BaU project scopes, team resourcing requirements differ as well. Typically, in a BaU scenario, fewer stakeholders are involved as the company will follow its internal CAPEX procedures. The engineering team usually leads this process and is responsible for project scope, capital budget and operations. Procurement would be involved in managing contractors and purchasing material and equipment.

With the HaaS solution many elements of the development process change, including project identification, supplier selection and contract negotiation. As a result, the HaaS development process relies on the effective collaboration of many company stakeholders (or disciplines) covering

technical, financial, legal, operations, procurement and management expertise. Given that many company stakeholders need to communicate effectively with their appropriate counterparts within the ESCO, project team members within the company should have clear roles and responsibilities and defined criteria for decision-making and create an effective stakeholder engagement and management plan.

Bearing in mind that the HaaS solution will likely involve a long-term commitment with an operational impact, as well as a bank or parent company guarantee, we recommend holding an initial, early-stage kick-off meeting to secure executive approval before proceeding with developing the HaaS solution in detail.

Executive management should also ensure the commitment of all relevant stakeholders within the

company – from those responsible for operations, procurement and sustainability to those focusing on legal, insurance and accounting.

Given that HaaS is a relatively new solution for many companies, there is often an extended team of experts at corporate headquarters who share best practices, coordinate efforts across a portfolio of sites, and guide the HaaS development team. Figure 5 provides an indicative overview of the stakeholders that could be involved. Which function leads the development process and which stakeholders need to be consulted will differ depending on the company and its size, although it is evident that a breadth of functional expertise is required to make informed decisions during the development process. Smaller companies that cannot tap into a variety of functional expertise should engage energy advisors to help shape the most appropriate HaaS contract.

Figure 5: Indicative stakeholder mapping



SHORTLISTING ESCOs TO WORK WITH

Screening ESCOs before deciding on any particular HaaS solution is an important step in the HaaS development process.

Different ESCOs may offer different technical solutions to meet the company's needs, so the company may not be in a position to compare like-for-like solutions as part of this procurement process – something it would be able to do under BaU, where it defines the solution first instead of defining its needs first. As such, pre-selecting and screening ESCOs is crucial to minimize what can be a time-intensive HaaS development process, which may be a re-iterative decision-making process depending on the project's complexity.

Companies should also be specific about the preferred guarantees and contractual flexibilities from the outset, as not all ESCOs will be equally sophisticated and able to meet the company's particular needs. It is helpful to articulate the main clauses that companies want in the RfP.

Key questions to consider in the ESCO screening and selection process:

- Which existing HaaS providers (ESCOs) should the company consider and to which ESCOs will it send RfPs for the purpose of comparison and ESCO selection?
- Does the company already do business with the ESCO?
- How many HaaS arrangements/ how much experience does the ESCO have with similar customers?
- What is the ESCO's reputation, credit rating and financial standing?

- Does the ESCO have a global, regional or local presence? Does it have a local presence for operation, maintenance and spare parts?
- Is the long-term heat demand predictable and is it possible to account for uncertainties via sufficient contract flexibility?
- What types of guarantees are offered for the key considerations articulated in chapter 5?

ARTICULATING ADDITIONAL DECISION CRITERIA

The decision-making process for a particular HaaS solution will be more efficient if a company defines themes with clear decision criteria and identifies the relevant decision-maker(s) within the company. The listing below offers a guide on themes, decision criteria and key questions to consider in addition to the ESCO screening questions.

Theme: Technical scope and operational impacts

Decision criteria (examples): Construction feasibility, carbon footprint, reliability of supply, operational uptime, spare part availability and operational staffing requirements

Key questions:

- Does the company have enough physical space on – or adjacent to – its premises to implement various low-carbon technologies or is it limited as to what it can implement?
- What other existing facilities will the various HaaS solutions impact?
- What are the operational disruptions and how will the company manage them?

- What are the project timelines for the HaaS solutions?
- What operational and staffing benefits are associated with the HaaS solutions, and what resources are required to manage HaaS contracts long-term?

Theme: Project economics and financial accounting

Decision criteria (examples): Economic metrics, access to CAPEX, balance sheet and financing benefits

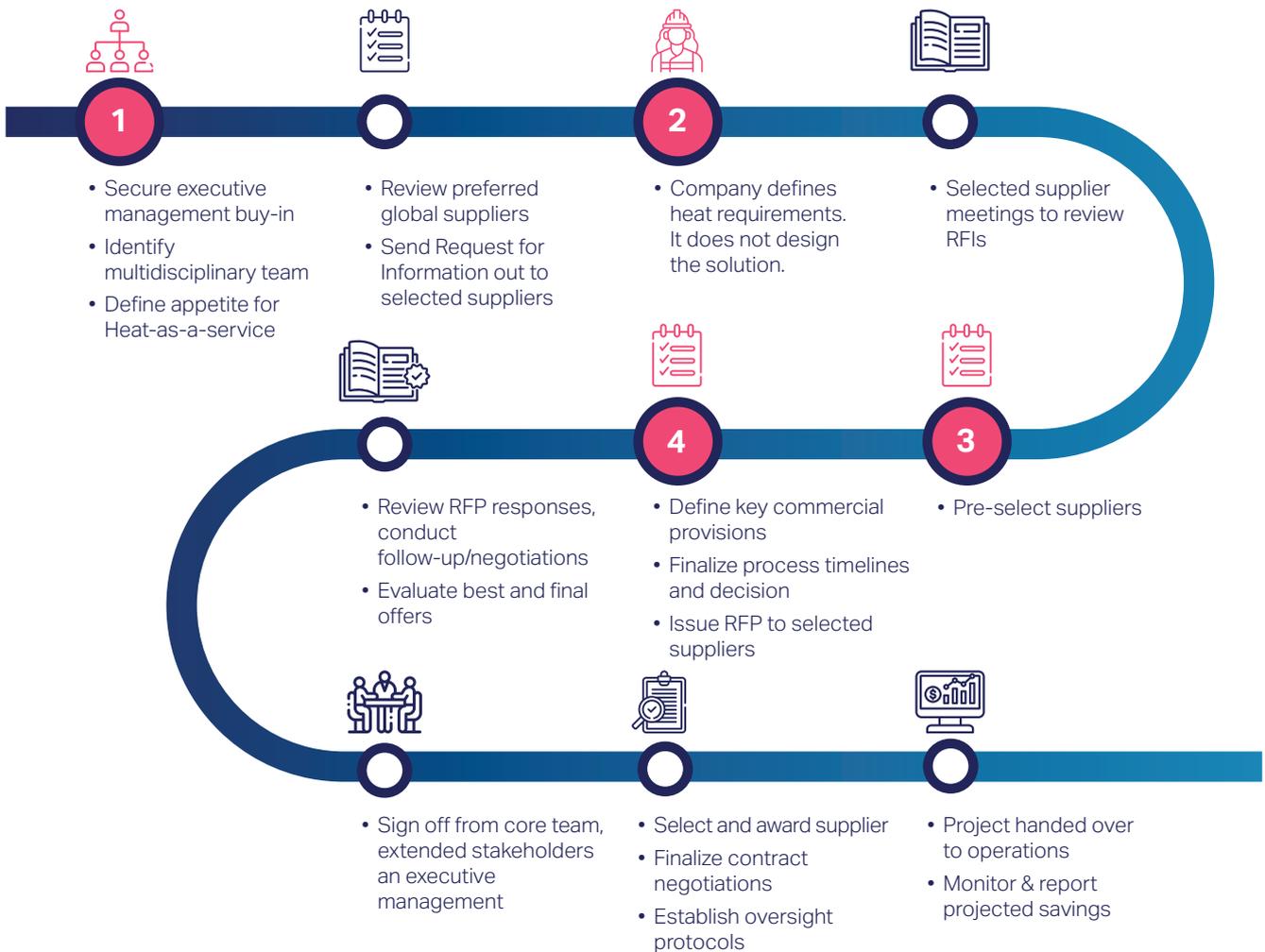
Key questions:

- What are the project economics of the HaaS solution? Financial benefits are primarily assessed in OPEX savings but net present value, internal rate of return and pay-back time can be gauged or calculated
- How does the total cost of ownership for the term of the agreement compare between BaU and HaaS?
- What are the financial accounting benefits of HaaS for the company as a whole (including gearing implications, financing costs and access to capital)?

UNDERSTANDING KEY CHANGES TO THE PROCESS

The exact development process for HaaS will differ depending on, amongst other things, the company, the ESCO, and the technology solution(s) envisioned.

Figure 6: The HaaS procurement process



- 1** Executive management must understand key elements of a HaaS solution, mobilize appropriate internal stakeholders and steer the direction of the project.
- 2** Operations and engineering teams must define technical requirements only, not the actual solution which is to be designed by the ESCO – something which could be particularly important in light of balance sheet treatment.

- 3** Companies are to pre-select ESCOs before the RFP phase given that HaaS proposals can be time-intensive to develop and the solutions provided by the ESCOs will not be comparable on a like-for-like basis.
- 4** Companies are to define key commercial, financial and accounting needs and preferences, ensure suppliers only development solutions in line with strategic priorities.

Call to action

Heat as a service offers a tremendous opportunity for companies to move beyond low-carbon electricity procurement, introduce low-carbon heat sources into their operations and free up capital for core business investments.

At the same time, it allows companies to leverage the technological and market expertise of an ESCO to source low-carbon energy, benefit from future advances in renewable energy technologies, and maintain and operate new technological solutions that facilitate their net-zero journey.

We encourage companies to:

- **Embrace a change in mindset – away from owning and controlling heat assets**
- **Investigate the advantages of HaaS, its ability to accelerate the decarbonization journey and deliver immediate cost savings**

- **Assemble an internal HaaS development team that brings together all functional responsibilities and expertise to design HaaS solutions that further a company's strategic objectives while outsourcing what is not core to their business**
- **Leverage WBCSD's energy and climate projects and cross-sectoral membership to learn more about HaaS, as well as other business models and financial mechanisms driving commercial and industrial decarbonization**
- **Share their needs and lessons learned to drive innovation and ensure HaaS realizes its full potential as the next step toward lower-cost, low-carbon heat solutions**

Over time, as the renewable heat sector matures, the adoption and benefits of HaaS will grow. Once companies have developed their first HaaS solution, built corporate capacity to implement HaaS and built partnerships with ESCOs, future development time and efforts for subsequent HaaS projects will diminish. Equally, ESCOs will become more attuned to company needs and start to achieve greater efficiency and economies of scale, lowering costs during construction, operation and maintenance.

At WBCSD, two dozen leading global companies from across the energy value chain are actively working together on low-carbon heat in industry – building capacity to overcome barriers and unlocking value using new technical, commercial and financing solutions.

All companies, initiatives and sector stakeholders wrestling with similar challenges are invited to join this work to tackle these challenges together.



Endnotes

- ¹ IFRS 16 can be found at <https://www.ifrs.org/issued-standards/list-of-standards/ifrs-16-leases/>.
- ² We do not cover US Generally Accepted Accounting Principles (GAAP) at all in this document, although some principles apply across financial reporting standards.
- ³ WBCSD's [*IFRS accounting outline for Power Purchase Agreements*](#) tackles some of the same questions.

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WBCSD is the premier global, CEO-led community of over 200 of the world's leading sustainable businesses working collectively to accelerate the system transformations needed for a net-zero, nature-positive, and more equitable future.

We do this by engaging executives and sustainability leaders from business and elsewhere to share practical insights on the obstacles and opportunities we currently face in tackling the integrated climate, nature and inequality sustainability challenge; by co-developing "how to" CEO-guides from these insights; by providing science-based target guidance including standards and protocols; and by developing tools and platforms to help leading businesses in sustainability drive integrated actions to tackle climate, nature and inequality challenges across sectors and geographical regions.

Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD \$8.5 trillion and 19 million employees. Our global network of almost 70 national business councils gives our members unparalleled reach across the globe. Since 1995, WBCSD has been uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

Together, we are the leading voice of business for sustainability, united by our vision of creating a world in which 9+ billion people are living well, within planetary boundaries, by mid-century.

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