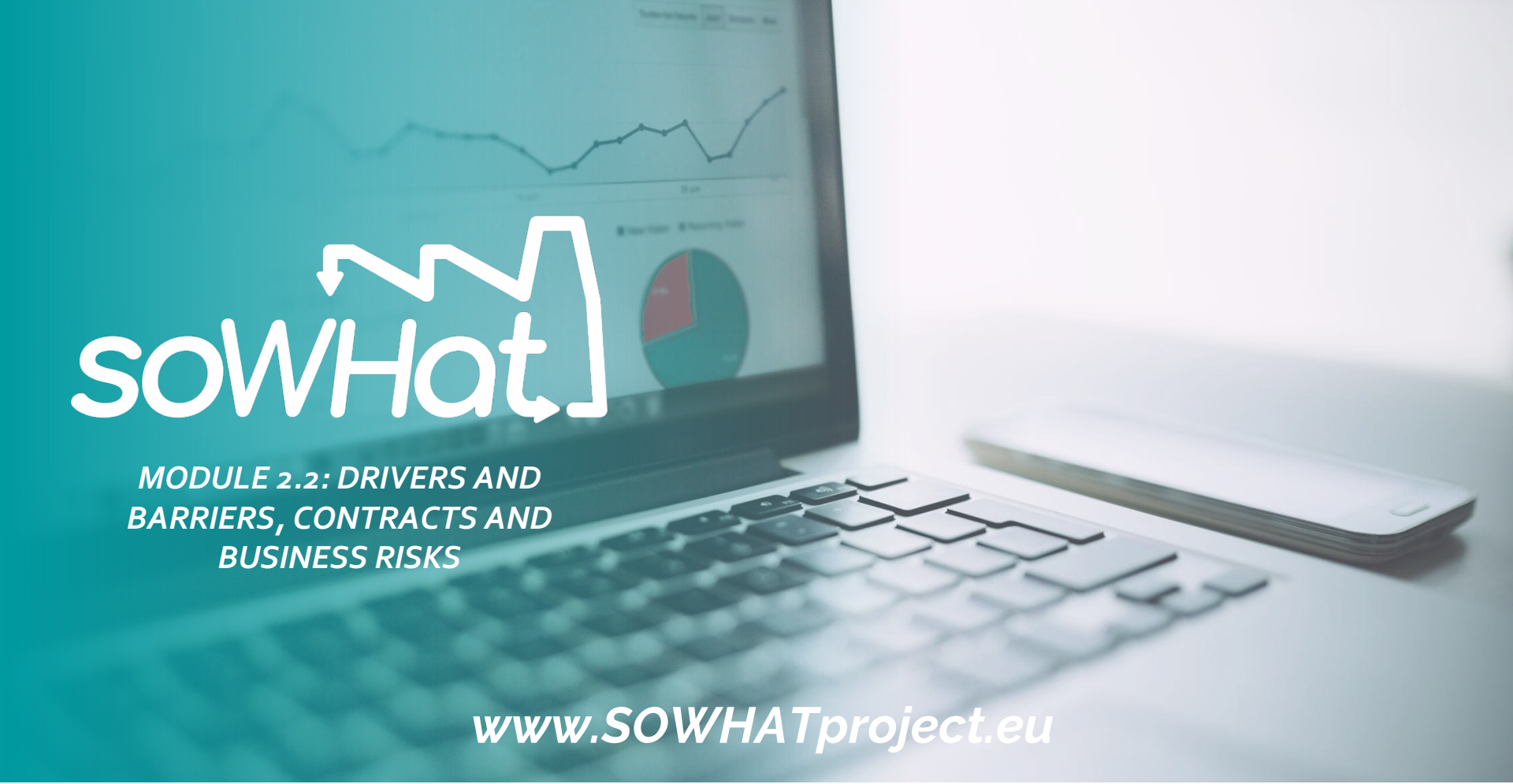

SOWHAT

MODULE 2.2: DRIVERS AND BARRIERS, CONTRACTS AND BUSINESS RISKS

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This Project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement N. 847097

Summary

Drivers and barriers	•Efficient resource use, reduced cost and emissions •High initial cost, difficulty to agree on pricing, ownership and responsibilities
Business risks	•Dependence on external partners •Lack of know-how and legal framework in some countries
Contractual arrangements	•Win-win collaboration •Ownership and responsibilities •Time of commitment •Exit paragraph

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DRIVERS AND BARRIERS TO UTILISATION OF INDUSTRIAL EXCESS HEAT

Industrial excess heat is a valuable energy resource that can replace fuel and electricity. Why isn't it already made use of?

Drivers

Efficient resource use is a major driver for exploitation of excess heat, since no one likes to see valuable resources being wasted. In addition, there are economic and environmental drivers.

1. Costs may be saved when fuel and electricity use is replaced.
2. Cost saving when active cooling, such as cooling towers, is not needed to discard the heat at large industries.
3. Replacing fossil fuels, e.g. natural gas, will reduce green house gas emissions.

On a regional or national scale, there may be further drivers, such as reduced dependency on imported energy, or job creation.

Industrial excess heat is a resource that often goes up in smoke.

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Barriers

Barriers to utilisation of industrial excess heat can be divided into two categories:

1. Barriers which deteriorate the business case
    - Low cost of current heating, e.g. natural gas.
    - High initial investment cost for piping and other technology.
    - Policy promotes other energy alternatives than industrial excess heat in some countries.

1. Barriers which remain even though the business case is profitable:
    - Lack of regulations is a barrier in some countries, e.g. permission process for piping.
    - Lack of technical know-how is a barrier in some countries.
    - Wish to be independent from external partners.
    - Risk of industry moving or closing.

Piping cost is a large part of the investment.

Many of the barriers may be handled by contractual arrangements.

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BUSINESS RISKS WITH EXCESS HEAT COLLABORATION

All investments involve risks. What risks are largest in the context of heat collaboration? How can the risks be mitigated?

Business risks

There is no such thing as an risk-free investment. Depending on local prerequisites, the risks related to excess heat collaboration will be quite different. One watershed is if there is an existing district heating or cooling network, or if that technology is lacking in the region or even in the country.

Genaral risks

- Dependency on external partner – resources outside of own control.
- The heat source is the only/main one – risk of large disruption for the heat costumers.
- Difficulty to agree on price of heat – implies an increased risk of continued difficulties at renegotiation of the contract.
- Unpredictable heat flow – involves risk for unexpected costs.
- Risk of industrial closure.
- Risk of end-users changing to other energy resource – cost competetive other forms of heat supply.

Additional risks if no existing DH/C network

- Lack of regulations and policy
- Lack of technical know-how

Reduced risk

By adding industrial excess heat to an excisting district heating network, the risk exposure to fuel prices can be reduced.

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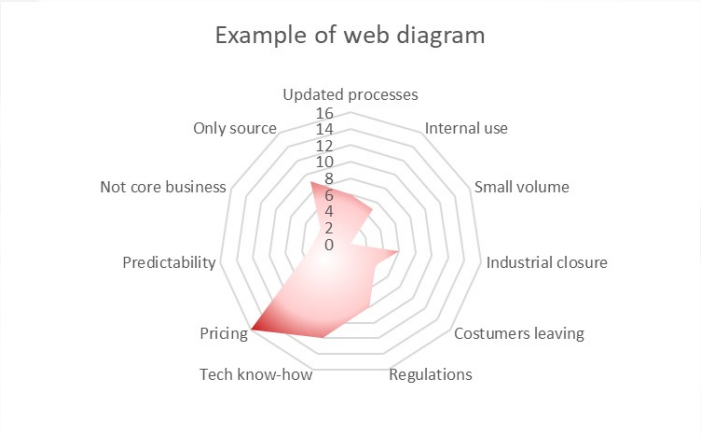
Risk heat mapping

A risk assessment can be made through risk heat mapping of a specific investment. The likelihood and consequence of the major risks are estimated. Then, by multiplying consequence x likelihood, the *heat* of each risk is calculated. This gives an overview of the most important risks to mitigate, and an indication of risk premium that should be applied for investers.

		Consequence				
		Very small (1)	**Small (2)**	**Medium (3)**	**Large (4)**	**Very large (5)**
Likelihood	**Very large (5)**	Moderate (5)	High (10)	High (15)	Catastrophic (20)	Catastrophic (25)
	Large (4)	Moderate (4)	Moderate (8)	High (12)	Catastrophic (16)	Catastrophic (20)
	Medium (3)	Low (3)	Moderate (6)	Moderate (9)	High (12)	High (15)
	Small (2)	Low (2)	Moderate (4)	Moderate (6)	Moderate (8)	High (10)
	Very small (1)	Low (1)	Low (2)	Low (3)	Moderate (4)	Moderate (5)



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Risk mitigation

The vast part of the risks can be mitigated with well-designed contracts and well-thought-through partner arrangements: facilitating for the parties involved to learn about each other's processes.

Examples of risk mitigation measures

- Issues regarding building DHN and piping could be simplified through involving a third party (ESCO). Such a party can, for example contribute with needed expertise.
- The most important mitigation activity is to have clear contract outlining responsibility and what happens in the case of failure to deliver waste heat at given volumes and temperatures.

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CONTRACTUAL ARRANGEMENTS

How can contract be used to overcome barriers, share the benefits and reduce risks?

Contractual arrangements

What to include in the contract?

- Ownership of different parts of the system.
- Pricing.
- Responsibilities – e.g. what happens in the case of failure to deliver waste heat at given volumes and temperatures?
- Contract period – when and how to renegotiate.
- Exit paragraph – how long in advance a partner needs to announce that it is leaving the collaboration and how costs that occur as a result of that will be divided between the partners.

The contract should ensure that the collaboration will be a win-win.

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THANK YOU FOR YOUR PARTICIPATION

SOWHAT TEAM

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