Heat Recovery in industry: streamSAVE's practical guidance on standardized savings methodologies

June 6th, 2023

Elisabeth Böck (Austrian Energy Agency)

This project has received funding from the Horizon 2020 programme under grant agreement n°890147. The content of this presentation reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

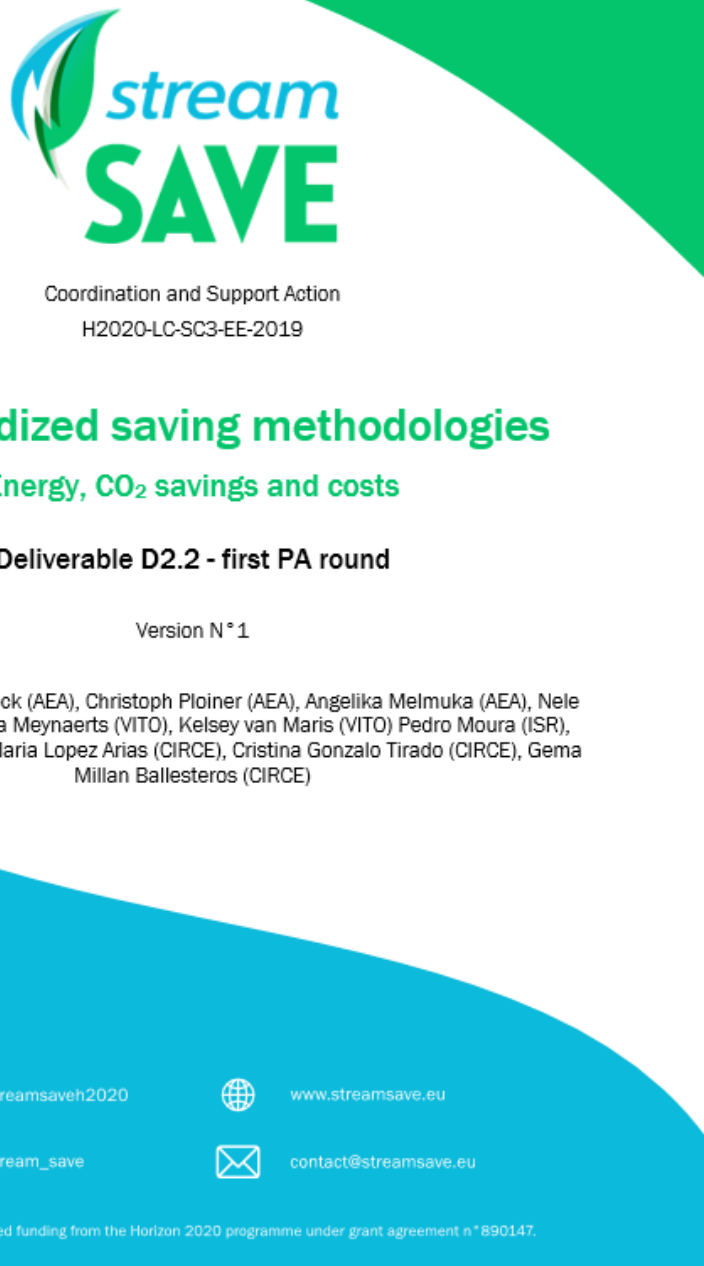
Guidance document

16 newly developed bottom-up calculation methodologies:
Estimation of energy savings:

- Calculation formula for Article 7 & Article 3 savings
- Indicative calculation values
- Explanation of methodological aspects
- List of data sources

- Estimation of relevant costs connected to energy savings actions
- Estimation of GHG savings

https://streamsave.eu/wp-content/uploads/2022/08/D2.2_PracticalGuidance_final.pdf



Heat Recovery in industry:
Bottom-up calculation methodologies

Methodologies developed

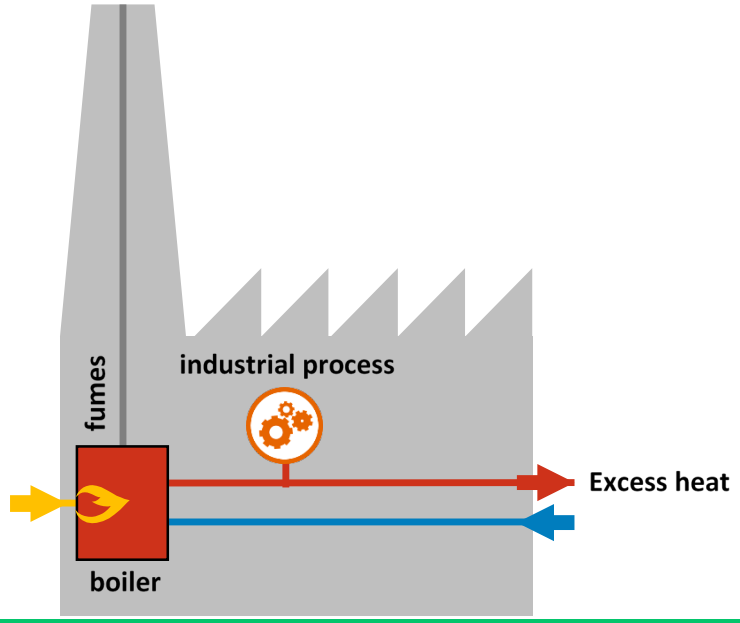
- Heat recovery for on-site use in industry – feedback of excess heat into process
- Heat recovery for on-site use in industry – use of excess heat for on-site applications
- Heat recovery for feeding into a district heating grid

Term of final energy savings

- In 2014 – 2020 period, Article 7 savings referred to "energy sales to final customers"
- Since the 2018 update, the Article 7 savings target is based on final energy consumption
- For heat recovery, this can lead to changes in eligibility due to some areas being considered part of the energy transformation sector and not final energy consumption

Baseline situation

- Heat production to operate an industrial process.
- Excess heat will be cooled down or get lost due to:
  - unusable temperature level after the process
  - different temperature levels in between production steps
  - Timely discontinuity of process cycles (e.g. shift operation of production)



Heat recovery: feedback into same process

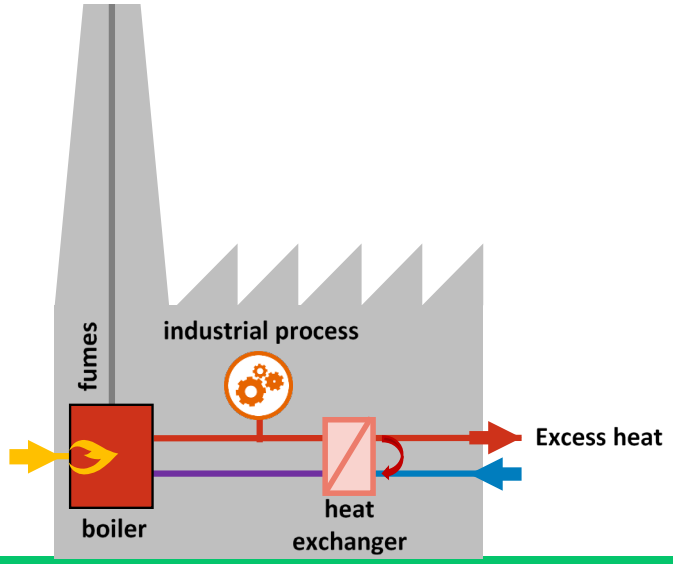
- Reduces the energy input by feeding back excess heat into the same process
- Final energy saving within the affected process

Calculation formula

specific energy consumption action

$$TFES = \left(\frac{FEC_{Baseline}}{po_{Baseline}} - \frac{FEC_{Action}}{po_{Action}} \right) \cdot \mathrm{po}_{Action}$$

specific energy consumption baseline



TFES	Total final energy savings [kWh/a]
FEC	Final energy consumption [kWh/a]
po	Production output [units/a]
Baseline	Index for the baseline situation of the action
Action	Index for the situation after implementing the action

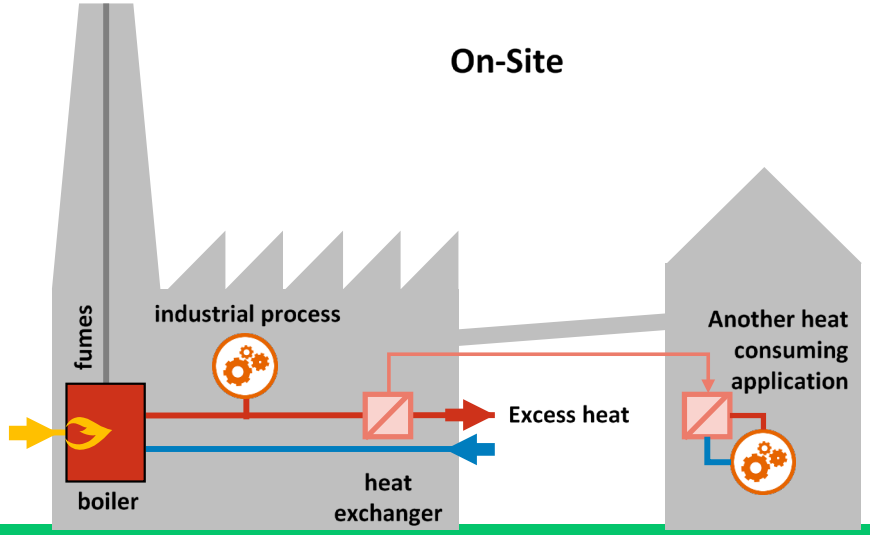
Do not forget the power inputs of auxiliary systems (i.e. additional pumping energy)

Heat recovery: feeding another application

- Reduces the energy input of another heat consuming application (e.g. space heating of on-site buildings, drying plants)
- Final energy saving on-site

Calculation formula

$$TFES = Q_{rec} \cdot \frac{1}{eff_{mhs}} \cdot f_{BEH}$$



TFES	Total final energy savings [kWh/a]
Q_{rec}	Recovered heat consumption of the application [kWh/a]
eff_{mhs}	Conversion efficiency of the main heating system of the relevant application [dmnl]
f_{BEH}*	Factor for correction of behavioural effects [dmnl]

* in case relevant; e.g. increased space heating temperature

Heat recovery: feeding into district heat

- Reduces the energy input of final customers (difference to reference heating system)
- Final energy savings occur at the final customer:

Conversion efficiency of a reference heating system

(e.g. combination of heating systems installed according to national/regional statistics)

VS

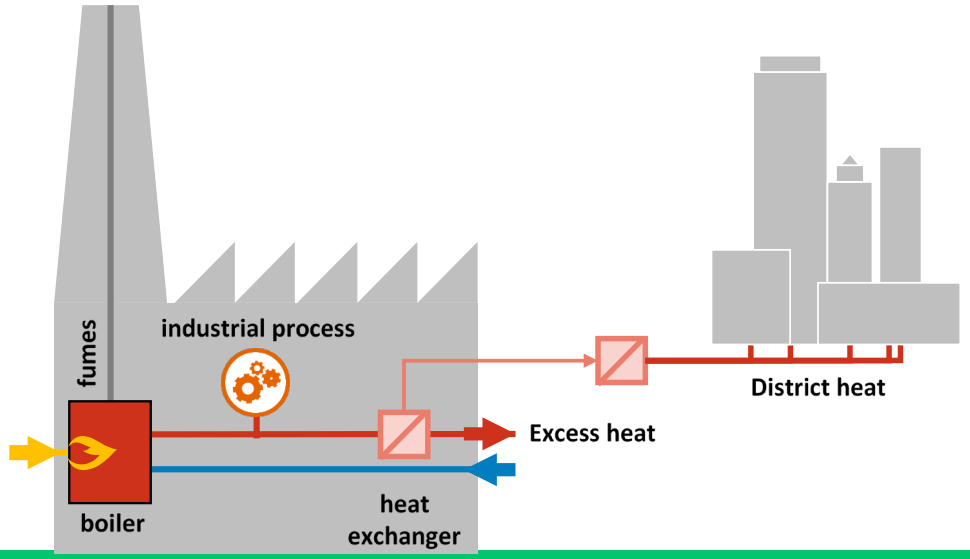
Conversion efficiency of district heating

Heat recovery: feeding into district heat grid

Calculation formula

$$TFES = Q_{EH} * (1 - HL_{DHG}) * \left(\frac{1}{eff_{Baseline}} - \frac{1}{eff_{Action}}\right) * (1 - f_{ei}) * (1 - fBEH)$$

baseline energy consumption | savings | extrinsic effects



TFES	Total final energy savings [kWh/a]
Q_{EH}	Excess heat fed into the district heating grid [kWh/a]
HL_{DHG}	Heat losses in the district heating grid [dmnl]
$eff_{Baseline}$	Conversion efficiency of the reference heating systems [dmnl]
eff_{Action}	Conversion efficiency of the district heat consuming heating systems [dmnl]
f_{ei}	Factor to calculate extrinsic incentives [dmnl]
f_{BEH}	Factor to calculate rebound effects [dmnl]

Thank you

Get in touch for more information!

Project coordinator - Nele Renders, VITO

All project reports will be available for download on the streamSAVE website www.streamsave.eu

Email the project at contact@streamsave.eu

Follow the project on LinkedIn @streamSAVEH2020

Follow the project on Twitter @stream_save