Technology Collaboration Programme
by IEA

Annex Task Shared Project 6
Status assessment, ageing, lifetime prediction and asset management of District Heating pipes

Kick-off Meeting

25th April 2022

Stefan Hay (AGFW) in cooperation with

Nazdaneh Yarahmadi (Research Institut of Sweden) and Ingo Weidlich (HafenCity University)

Agenda

IEA DHC Annex TS6

Status assessment, ageing, lifetime prediction and asset management of District Heating (DH) Pipes

Agenda Kick-off Meeting (online)

25th April 2022 from 9 till 15:30 (CEST)

Access Data MS-Teams: Join the meeting

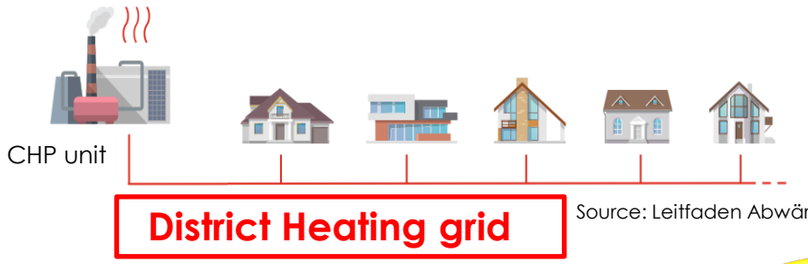
Introduction & Welcome (9:00 till 9:15) • IEA DHC Chair & Programme manager • Task manager
Annex Text (final version) (9:15 till 9:30) • Summery of the preparation phase • Overall Goals • Scope • Objectives and Challenges
Subtasks A (9:30 till 10:30): Contribution & collaborative work on subtask level • Let participants talk about their contribution (up to 45 min) • How to cooperate in the subtask (for example: Make an appointment about regular online meetings? Up to 15 min.)
Subtasks B (10:30 till 11:30): Contribution & collaborative work on subtask level • Let participants talk about their contribution (up to 45 min) • How to cooperate in the subtask (for example: Make an appointment about regular online meetings? Up to 15 min.)

INTERNATIONAL ENERGY AGENCY TECHNOLOGY COLLABORATION PROGRAMME ON DISTRICT HEATING AND COOLING

Subtasks C (11:30 till 12:30): Contribution & collaborative work on subtask level • Let participants talk about their contribution (up to 45 min) • How to cooperate in the subtask (for example: Make an appointment about regular online meetings? Up to 15 min.)
Break 12:30 till 13:00
Subtasks D (13:00 till 14:00): Contribution & collaborative work on subtask level • Let participants talk about their contribution (up to 45 min) • How to cooperate in the subtask (for example: Make an appointment about regular online meetings? Up to 15 min.)
Subtasks E (14:00 till 15:00): Contribution & collaborative work on subtask level • Let participants talk about their contribution (up to 45 min) • How to cooperate in the subtask (for example: Make an appointment about regular online meetings? Up to 15 min.)
Outro: Further steps in the TS 6 Project (15:00 till 15:30) • Questions • Date for the next meeting / workshop (online vs. face to face)

Technology Collaboration Programme by IEA

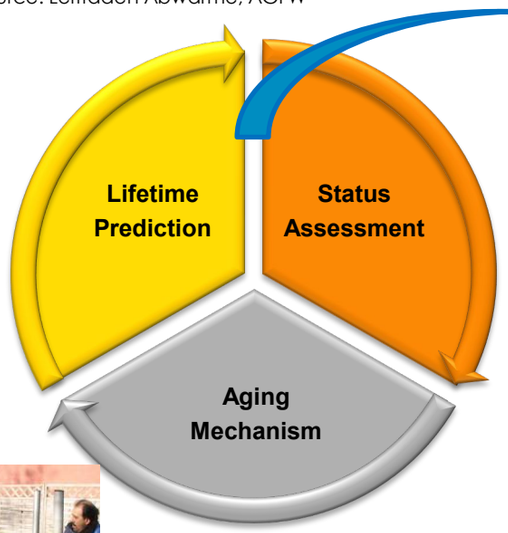
Motivation



Source: Leitfaden Abwärme, AGFW

Renewable, distributed, digitalized

Source: Cover EuroHeat&Power international III/2020, AGFW



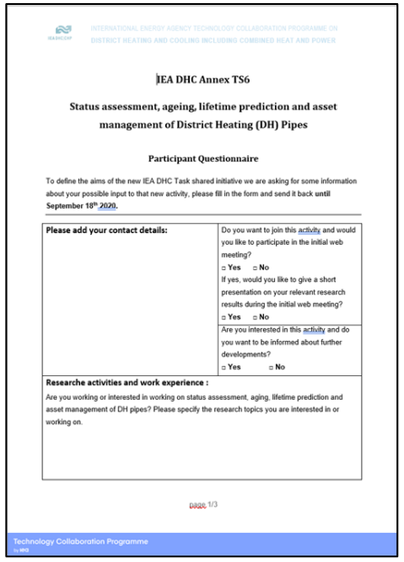
Improve knowlege and support activities of standardisation bodies

Asset Management Simulation / Tools

Future Perspective

The summery of the preparation phase

1. Workshop 09/2020



IEA DHC Annex TS6

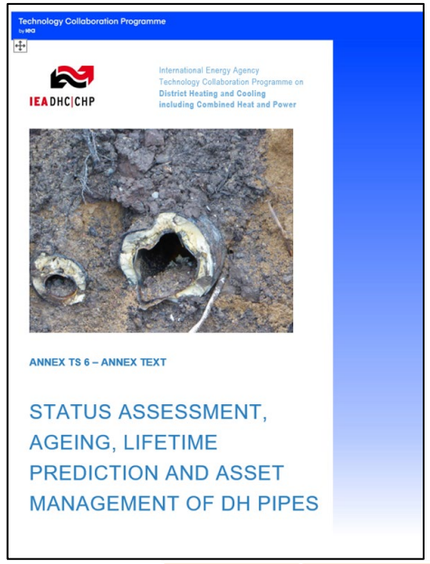
Status assessment, ageing, lifetime prediction and asset management of District Heating (DH) Pipes

Participant Questionnaire

To define the aims of the new IEA DHC Task shared initiative we are asking for some information about your possible input to that new activity, please fill in the form and send it back until September 18th 2020.

Please add your contact details:	Do you want to join this activity and would you like to participate in the initial web meeting? ☐ Yes ☐ No If yes, would you like to give a short presentation on your relevant research results during the initial web meeting? ☐ Yes ☐ No
	Are you interested in this activity and do you want to be informed about further developments? ☐ Yes ☐ No
Researche activities and work experience : Are you working or interested in working on status assessment, aging, lifetime prediction and asset management of DH pipes? Please specify the research topics you are interested in or working on.	

2. Workshop 05/2021



Technology Collaboration Programme

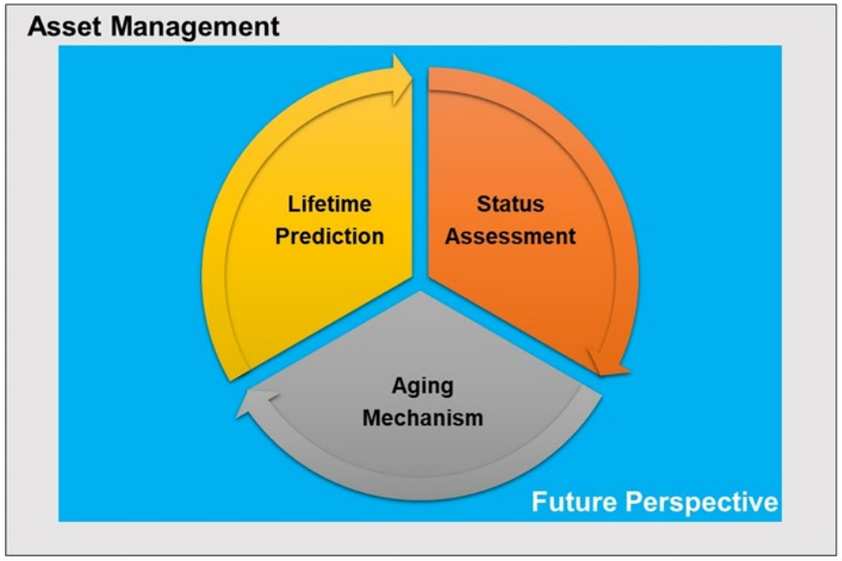
IEA DHC|CHP

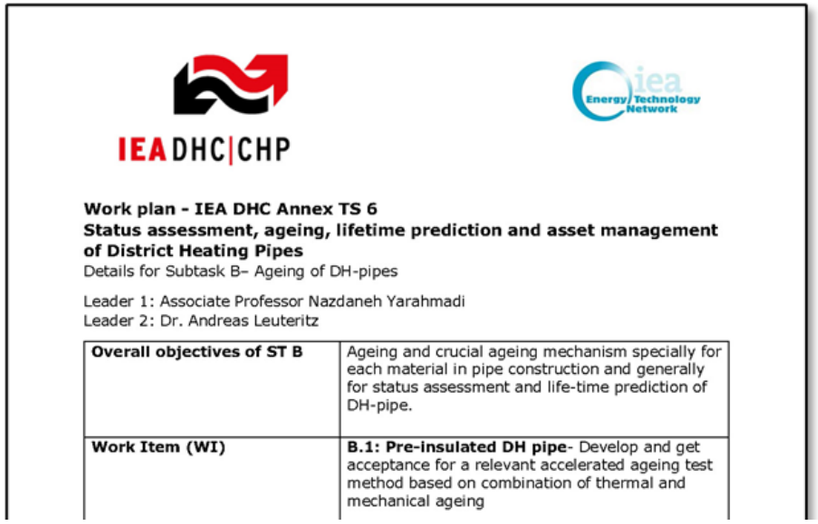
International Energy Agency
Technology Collaboration Programme on
District Heating and Cooling
including Combined Heat and Power

ANNEX TS 6 – ANNEX TEXT

STATUS ASSESSMENT, AGEING, LIFETIME PREDICTION AND ASSET MANAGEMENT OF DH PIPES

Workshop subtask by subtask 11/2021





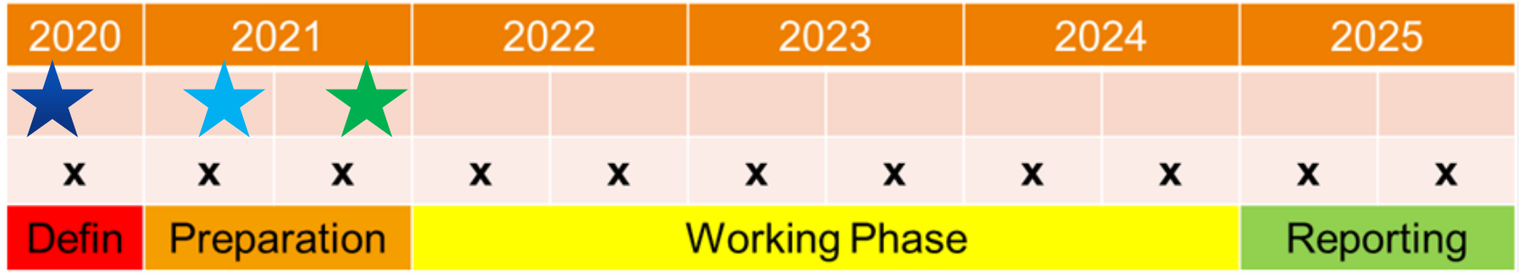
IEA DHC|CHP

Energy Technology Network

Work plan - IEA DHC Annex TS 6
Status assessment, ageing, lifetime prediction and asset management of District Heating Pipes
Details for Subtask B– Ageing of DH-pipes

Leader 1: Associate Professor Nazdaneh Yarahmadi
Leader 2: Dr. Andreas Leuteritz

Overall objectives of ST B	Ageing and crucial ageing mechanism specially for each material in pipe construction and generally for status assessment and life-time prediction of DH-pipe.
Work Item (WI)	**B.1: Pre-insulated DH pipe**- Develop and get acceptance for a relevant accelerated ageing test method based on combination of thermal and mechanical ageing



Project description

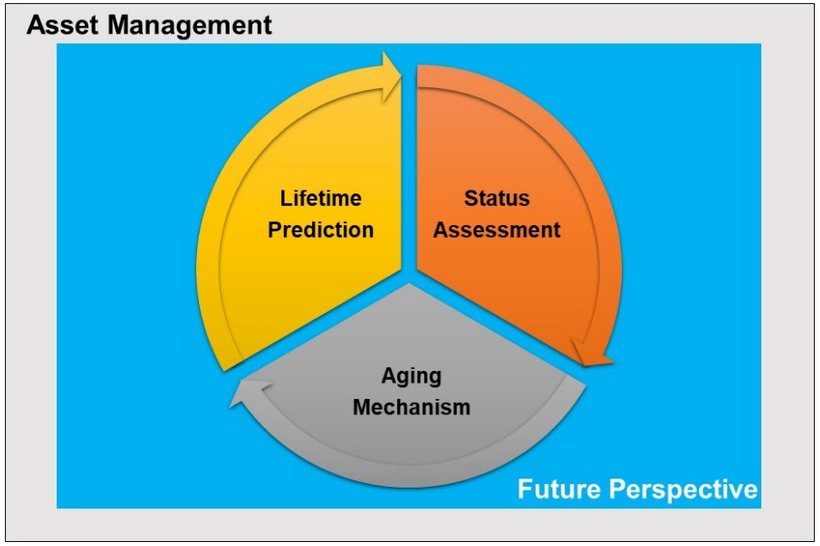
Overall Goals:

- Identify holistic and innovative approaches to aging and lifetime predictions of DH Pipes
- Gain and prepare results for standardisation bodies
- Improved Asset Management as an element for transformation strategies of DH systems towards a high rate of RES

Leading Questions are:

- How are obsolete pipes defined?
- How is this measured?

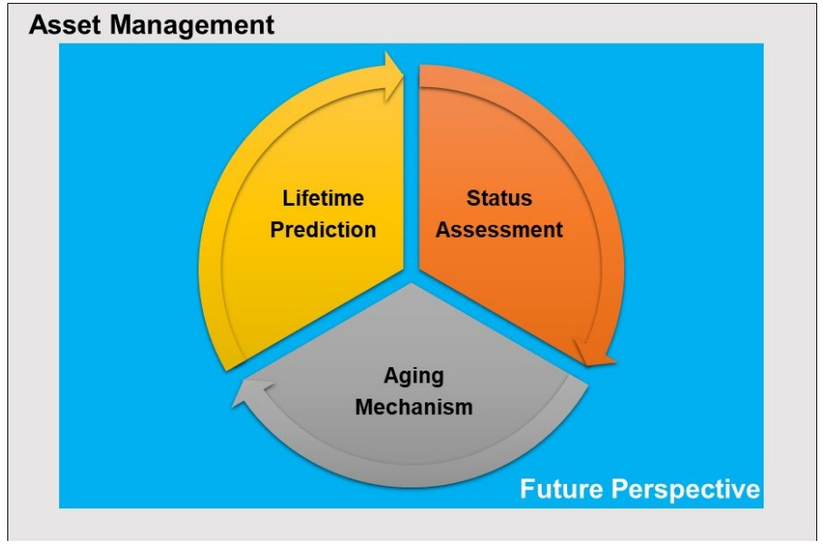
Project description



Scope on:

- **Directly buried DH pipes** (concrete ducts, pre-insulated bonded pipes, flexible / plastic service pipes)
- Aging processes in DH pipes
- Models and approaches for lifetime prediction
- Documentation of operating conditions
- Testing methods for remaining service life of DH pipes

Work plan Subtask A

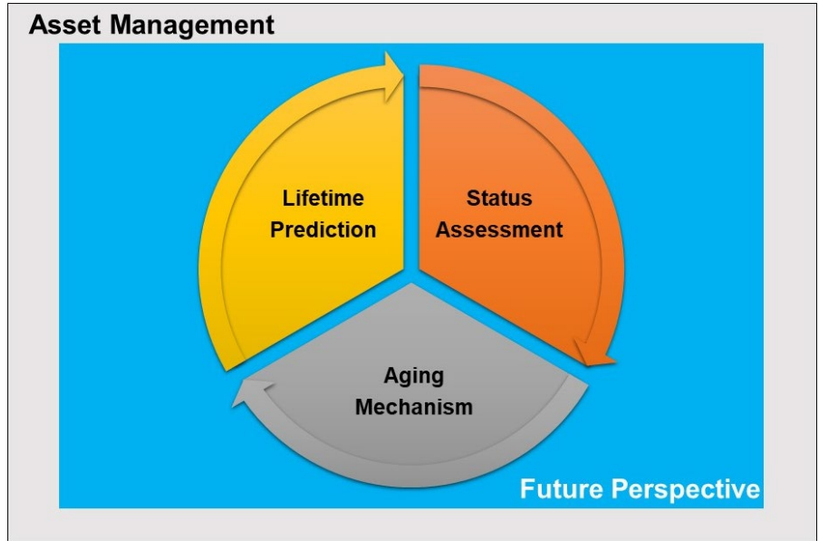


Subtask A – status assessment of DH pipes:

- **Work Item A.1:** Give a survey of types of DH networks and their share
- **Work Item A.2:** Status assessment of preinsulated bonded DH pipes
- **Work Item A.3:** Status assessment of flexible DH pipes
- **Work Item A.4:** Status assessment of concrete ducts for DH
- **Work Item A.5:** Quantify the status of DH networks in participating countries

Overall objectives of Subtask A: Improve the knowledge concerning the status of district heating (DH) networks in participating countries, status assessment methods and failure modes of DH networks.

Work plan Subtask B

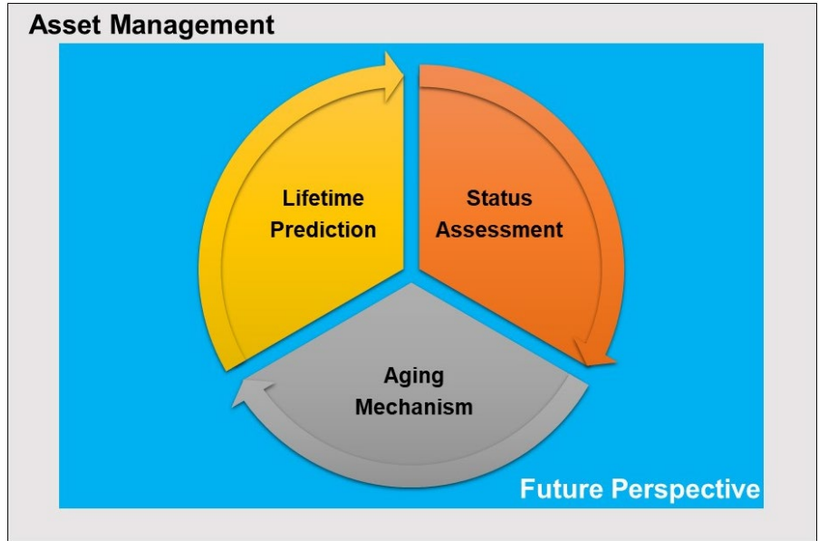


Subtask B - Ageing of DH-pipes:

- **Work Item B.1:** Pre-insulated DH pipe
- **Work Item B.2:** Concrete ducts for DH
- **Work Item B.3:** New material for each component in DH pipe
- **Work Item B.4:** Effects of ageing tests on status assessment for each kind of DH-pipe material
- **Work Item B.5:** Relevance of ageing tests on the other subtask countries

Overall objectives of Subtask B: Ageing and crucial ageing mechanism specially for each material in pipe construction and generally for status assessment and life-time prediction of DH-pipe. **When are Pipes obsolete?**

Work plan Subtask C

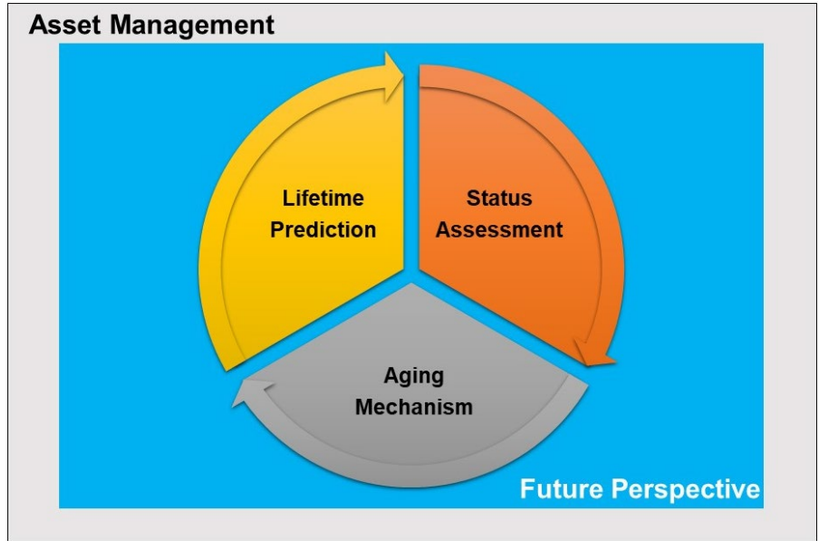


Subtask C – Lifetime prediction of DH-pipes:

- **Work Item C.1:** Lifetime prediction of pre-insulated bonded DH pipes
- **Work Item C.2:** Lifetime prediction of new polymer-based media pipes and insulation materials
- **Work Item C.3:** Lifetime prediction of concrete ducts and metal pipes
- **Work Item C.4:** Validation of lifetime prediction models

Overall objectives of Subtask C: To elaborate appropriate mathematical models that can allow extrapolation of short-time data to predict long-term performance of DH pipes

Work plan Subtask D

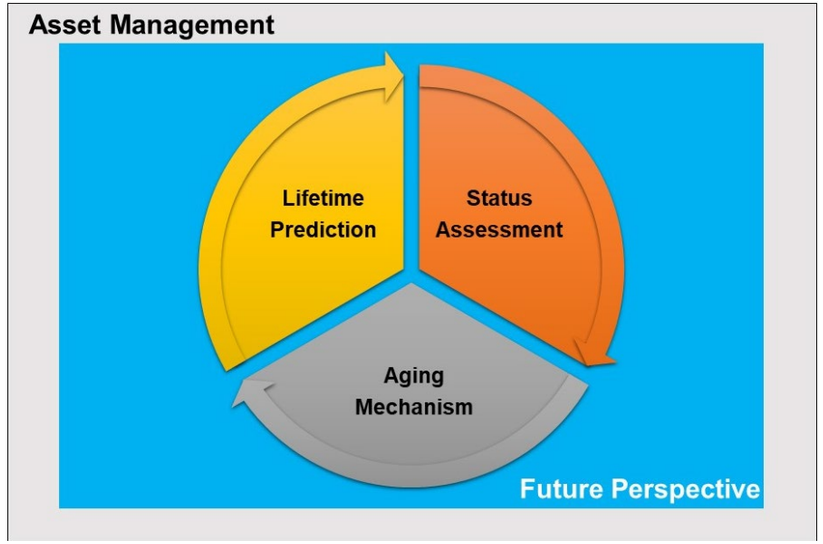


Subtask D – asset management (AM) of DH-pipes:

- **Work Item D.1:** Define AM processes within an AM framework for DH pipes and their relationship/interfaces
- **Work Item D.2:** Develop a KPI system for DH pipes
- **Work Item D.3:** Assessment of carbon footprint for DH pipes over lifetime
- **Work Item D.4:** Improve asset simulations by incorporating results from A,B,C and E, demonstration for one example tool
- **Work Item D.5:** Further development of AM (considering supply reliability)

Overall objectives of Subtask D: Establish an AM framework for the other 4 sub tasks in this annex: A, B, C and E thus, enabling effective and sustainable AM decisions in short- and long-term.

Work plan Subtask E



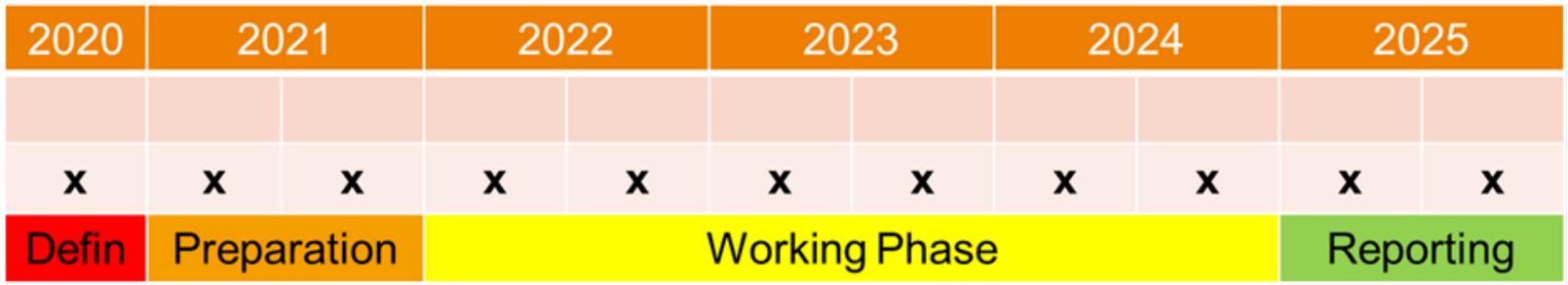
Subtask E – future perspective:

- **Work Item E.1:** Effect on future operation mode to life-time of DH-System in general
- **Work Item E.2:** Effects of digitalisation on district heating systems
- **Work Item E.3:** Assessment of environmental indicators to identify the best transformation path

Overall objectives of Subtask E: Transformation, development, optimisation, predictive maintenance, life-time prediction, ageing, influence of pipe materials on performance.

Next steps

- Organize the collaboration on **subtask level in detail**, elaborate time plans with the contributing partners
- **Summery** of the subtask sessions
- Find a possibility for a **face-to-face meeting** (autumn 2022??)
- Spread the idea of TS 6 connect to / organize further workshops for the DH companies



Outro: Next steps

- Task leader Meeting
- Invite organizations that contributed to the TS 6 to an AGFW TEAMS Channel → all Documents are available
- Minutes of the meeting as well as presentations
- Template on finished and ongoing R&D projects related to the TS 6 contribution of participating Organizations

Outro: Next steps

- **Summery** of the subtask sessions

→ Miro-Board: collected the contribution so fare & it will be possible to think about further contributions

→ Probably literature research done by students?

→ We need further meetings:

  → subtask level to enlarge the discussions,

  → on different DH pipes (Subtask A-C);

  → With stakeholders, manufacturers, standardization bodies (find dates that fits to their meetings?)

  → Connection with the TS 4 and other initiatives as well as EU Projects

- Find a possibility for a **face-to-face meeting** (autumn 2022??);
- Spread the idea of TS 6 connect to / organize further workshops for the DH companies

Contact us!

Contact:

Stefan Hay
+49 69 6304 345
s.hay@agfw.de

Ingo Weidlich
+49 40 4287-5700
ingo.weidlich@hcu-hamburg.de

Nazdaneh Yarahmadi
+46 10 516 59 21
nazdaneh.yarahmadi@ri.se