Recommendations to address barriers to the uptake of relevant renewable and efficient cooling solutions

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Stakeholders' identification

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Stakeholders and actors involved in the regulation of buildings

Interested actors for renewable cooling technologies' includes relevant stakeholders for the uptake of renewable cooling in Europe. These stakeholders can be divided into:

- **Regulators**: Policy bodies at local, regional and national level (municipal planners, energy managers in public authorities responsible for decisions in the energy field); Standards bodies.
- **Demand-side stakeholders**: individual building owners and landlords of houses and apartments; building managers of condominiums and multi-property structures, offices, shopping centres and health care institutions.

Stakeholders and actors involved in the regulation of buildings

- **Supply-side stakeholders**: Specialists involved in the Geothermal HP, Solar thermal and other RES industry (HVAC engineers, installers, drillers, designers, architects); SMEs from the construction industry; Energy Service Companies (ESCOs)/ engineering companies, energy advisers, etc.); Associations in the European built sector.
- **Other stakeholders**: Scientific Community and Educational Institutions; public entities, chambers of commerce and industry, development agencies, energy agencies, centres of environmental expertise, professional associations, journalists & media; general public.

Recommendation 1

Integration of cooling in the energy system

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Integration of cooling in the energy system

Actors to target: regulators and supply-side stakeholders

System integration is key to be able to provide cooling solutions with lower costs.

- For the **integration of cooling applications into the heating sector**, major advantages arise from the possibility of combined heat and cold generation in Combined Cold, Heat and Power plants (CCHP) or heat pumps and the possibility to utilize 'waste' heat of cooling applications as a heat source for heat pumps.
- The **integration into the electricity sector** enables the integration and utilization of renewable energy sources like wind and solar energy. In addition, cooling applications can offer flexibility for the electricity sector and open up the possibility of adapting generation to the changing conditions of volatile renewable energy sources by utilizing integrated thermal energy storages.

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Integration of cooling systems applications into heating applications

5th generation district heat and cold (5GDHC) grid

- 5GDHC grids **enable the exchange of energy** between the actors involved in order to exploit synergies that occur when different purposes are considered collectively.
- For example, the heat generated during refrigeration can be fed back into the heating network and used by other participants.
- With the **possibility of storing heat and cold seasonally** through e.g. mine water, seasonal hot water storage, geothermal boreholes, this system also enables the **integration of many renewable energy sources** such as waste heat or solar energy.

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Integration of cooling systems applications into heating applications

Best Practice Example: Minewater 2.0 Heerlen

- **Energy exchange instead of only energy supply**: cluster grids were deployed to exchange heat and cold between buildings inside a cluster and between the cluster grids through the central mine water grid. The grid became a bidirectional grid able to supply heat and cold at any time. **Each user becomes a prosumer**.
- **Energy storage**: use of the minewater reservoir as a seasonal storage, actively regenerated by the surplus of heat and cold in the grid during the year in addition to the geothermal regeneration to increase the renewable capacity.

The energy station is situated in the basement of the Heerlerheide Centrum (HHC) Picture: Sciencedirect

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Recommendation 2

Taxation and financing framework

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Taxation and financing framework

Actors to target: regulators, supply-side stakeholders, other stakeholders

- **Taxes account for a significant share of the final prices consumers pay for energy** around the EU and can have a strong impact on consumption and investment patterns, the type of energy consumed and their use.

- This is reflected by the different rates of energy taxation in different EU countries, with important variations between households and industrial use, between different energy sources and with **rates that bear little relation to the energy content or externalities, such as CO2 emissions or air pollution.**

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Taxation and financing framework

Actors to target: regulators, supply-side stakeholders, other stakeholders

- Taxation policy is also an important instrument for governments to **ensure the achievement of the energy union objectives**, and in particular to facilitate the clean energy transition.

A reduced taxation of electricity used for renewable HC production is an important policy driver

Taxation of energy products

The Finnish example

By letter of 6 August 2021, following the procedure laid down in Article 19 of Directive 2003/96/EC (Energy Taxation Directive), Finland requested an **authorisation to apply a reduced rate of taxation to electricity supplied to heat pumps and electric boilers** that generate heat for the district heating network, to heat pumps with a nominal thermal output of at least 0,5 MW not connected to the district heating network, and to recirculating water pumps in geothermal heating plants.

On 17 June 2022, the Commission **authorised this legislation for the period from 1 January 2022 until 31 December 2027**.

Taxation of energy products

- A **reduced rate of taxation on electricity supplied to renewable cooling solutions** must be promoted.
- To push for cooling solutions based on renewable energy sources, it is necessary to **not limit in time the applicability of legislative measures such as the Finnish ones**.
- Similar solutions should be taken in other Member States to create a **levelled playing field for renewables based DHC networks.**

Recommendation 3

The right business model for each situation

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The right business model for each situation

Actors to target: supply-side stakeholders, demand-side stakeholders, legislators

3 different perspectives:

- Cities
- Industries
- Citizens

Cities perspective

a) Public ownership projects

- Public projects driven by municipal authorities (France) or local utilities (Germany),
  - The local public entity develops the projects during all phases and contacts private companies to supply services, supply of equipment and works. It operates the network and fixes the price.
  - This model is beneficial to local projects supplying heating and cooling to building blocks or residential networks.
- An example is the **Freiham's (Munich, Germany) district heating and cooling plant**. Stadtwerke München (SWM), Munich's municipal utility company, has been heating and cooling the Freiham district and neighbouring districts in the west of Munich since Autumn 2016.

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Cities perspective

b) Public-private partnership (PPP) to develop and operate the plant and the system.

- This private-public partnership (PPP) includes a private utility or private company in addition to the local public authority or utility.
- It has been the traditional business model of geothermal district heating systems in France since the 80s.
  - Here, the **municipality is the one taking the risk and having the responsibility** of the project development.
  - However, it **contracts a private entity to develop the project**.
  - This standard PPP model is used in the geothermal project schemas from ENGIE and Dalkia in France.

Industry perspective: corporate sourcing

- Corporate sourcing of energy is used by corporations or public authorities to secure their supply of renewable energy. More conventionally they have been used – notably beyond the EU in markets such as the US – by utilities to source power capacity, for instance from renewables.
- The benefit of corporate sourcing is to **provide certainty for both parties**:
  - the energy producer has a **higher certainty on income** with a stable customer at a predetermined price.
  - the consumer benefits from **certainty on price in the long-term**.

Industry perspective: corporate sourcing

- Suitable policy and regulatory frameworks are needed to enable the development of this practice.
- The framework for corporate sourcing of renewable energy needs to be flexible enough to **allow the various type of schemes and business models that can be implemented**.
- For the cooling sector, this could specifically apply to data centres.

Industry perspective: corporate sourcing

Heat and/or cool purchase agreements

- A heating and/or cooling purchase agreement is concluded directly between an energy producer and a consumer company.
- The company commits a renewable energy developer or energy supplier to purchase a given volume of energy at a predefined price (fixed, indexed, bounded, etc.) for a period of 3 to 20 years.
- In the case of green heat or cooling, the production assets (biomass boiler, biomass cogeneration, waste treatment plant, geothermal system, solar thermal…) are necessarily located near the site or on the site and are connected via a dedicated network.

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Empowering citizens: energy communities

Energy communities enable collective and citizen-driven energy actions to support energy project development and operation.

- These energy communities contribute to **increasing public acceptance of renewable energy projects** and making it easier to **attract private investments in local energy assets**.
- By empowering citizens to **drive their energy supply locally**, they also **benefit from better energy efficiency**, lower bills, and security of energy supply.
- Energy communities also allow local communities from surrounding cities to join forces and invest in common energy projects.
- Energy communities act as a single entity, they can then **access to electricity, heat and cold markets on a level playing field with other energy market actors**.

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