SUSTAINABLE ASSET MANAGEMENT:

Reducing the environmental effects related to maintenance and partial replacement of climate systems

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INTRODUCTION

The research determines which factors play a significant role in the environmental effects related to heating and ventilation systems.

The following variables are assessed:

- different concepts for heating and ventilation systems, and the use of alternative materials in these systems;
- the timing of maintenance and replacements activities;
- the transportation of maintenance workers during activities;
- gas use for space heating and electricity use for climate system operation.

AIM

To assess which (combinations) of the variables mentioned have the greatest potential to lessen the environmental effects related to heating and ventilation systems in dwellings.

METHODOLOGY

- LCA-based scenario study
- CML 2000 method, ecoinvent 2.0 database
- Gallery flat reference building, 70 dwellings
- Energy use according to Dutch EPBD calculations.

RESULTS reference scenario

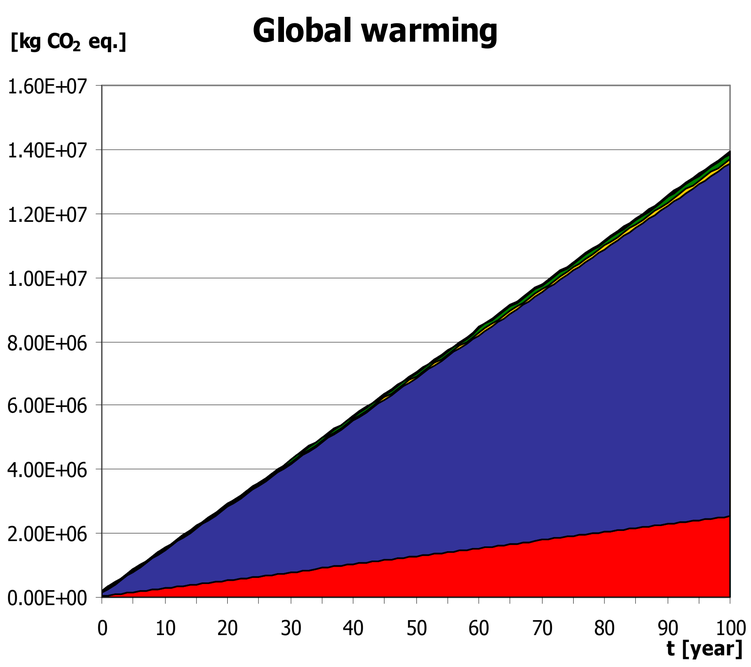
Heating system

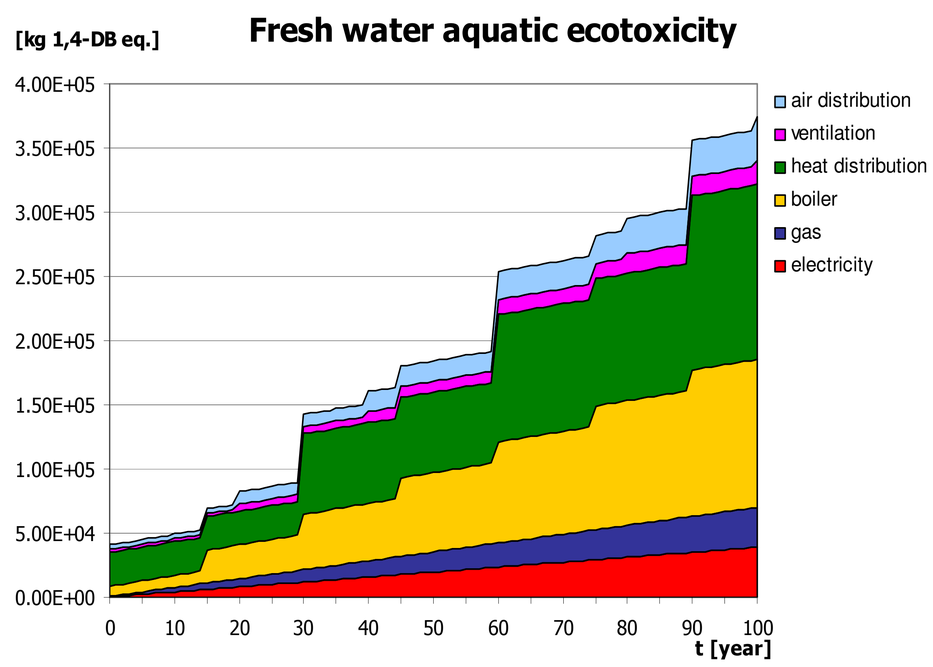
- individual HE107 boiler (15)*
- high temperature
- steel piping (100)*
- steel radiators (30)*

Ventilation system

- collective mechanical exhaust (roof & duct ventilators) (20)*
- stainless steel ducts (20)*

*) service life





CONCLUSIONS

- Gas en electricity combined cause **>70%** of the contribution to **8** out of 9 environmental effects.
- Gas contributes most to **5** out of 9 effects, electricity to **3** out of 9 effects.
- The climate systems are responsible for **>80%** of the contribution to fresh water aquatic ecotoxicity.

DISCUSSION

- Increasing energy efficiency of climate systems is most important to decrease environmental effects.
- The type of energy used will influence the environmental sustainability of systems, e.g. the use of renewable energy sources.
- Improving the design of the climate systems will further reduce environmental effects, e.g. alternative materials and lengthening the service life.