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Försäkrings Förbundet

CO2 Emissions

associated with the management of water and fire damage in the Nordic countries

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Abstract

Every year, fire and water damage to buildings in the Nordic countries results in hundreds of thousands of insurance claims. Apart from inconveniencing policyholders, this damage involves high restoration costs and leads to negative environmental impact via CO2 emissions when materials are destroyed. In this report, an estimate is made of current CO2 emissions in the four Nordic countries – Denmark, Finland, Norway and Sweden – in connection with fire and water damage and a number of proposals for damage prevention measures are presented. In 2007, total emissions associated with fire and water damage are estimated at about 126 000 tonnes. Even if this is a relatively low figure in a larger context, it shows that emissions associated with fire and water damage are not insignificant.

Awareness of the importance of active environmental and climate work has steadily increased in the insurance industry. Consequently, insurance companies in the Nordic countries are now more vigorously involved in damage prevention measures to reduce both the occurrence and effects of damage, which contributes to reducing CO2 emissions. However, the insurance industry cannot work on damage prevention measures on its own. Many different actors need to work together to develop construction materials, improve logistics efficiency in connection with damage, review the regulatory framework, etc. In this way, a win-win situation for all parties can be achieved, with lower CO2 emissions, lower costs for insurance companies and lower premiums and costs for their customers.

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Contents

Preface

This report was prepared for the Nordic Climate Conference in Copenhagen on 17 September 2009. The report is a part of the Nordic insurance industry's initiative to work actively to prevent climate change and adapt society to the consequences of the climate changes we are facing. The report includes estimates of CO2 emissions in connection with fire and water damage in Denmark, Finland, Norway and Sweden in 2007. The report also includes proposals for a number of loss-prevention measures that can be taken to reduce CO2 emissions.

The work presented in this report is partly based on a report by the SP Technical Research Institute of Sweden that was prepared on the instructions of the Swedish Insurance Federation, and partly on discussions held in a working group made up of representatives of Swedish insurance companies under the leadership of the Swedish Insurance Federation[1]. Members of the working group were legal advisor Staffan Moberg (Swedish Insurance Federation), economist Eva Erlandsson (Swedish Insurance Federation), Peter Andersson (If), Claes-Göran Bjursten (Folksam), Gunnar Burström (Trygg-Hansa), Kenth Edström (If), Bengt Johansson (Länsförsäkringar AB), Hans Magnusson (Trygg-Hansa) and Ari Partanen (Länsförsäkringar AB).

[1] Blomqvist, P. and Simonson McNamee, M., (SP Note 2009:13), "Estimation of CO2 Emissions from Fires in Dwellings, Schools and Cars in the Nordic Countries".

1. Introduction

Every year insurance companies in the Nordic countries pay compensation for hundreds of thousands of claims arising from fire and water damage to buildings. Repair and restoration of buildings is thereby made possible via various insurance solutions. Besides the costs to the insurance companies, each damage incident and repair also has an impact on the climate in the form of CO2 emissions. Active measures taken by insurance companies and other actors together could contribute to reducing CO2 emissions, reducing the number of claims, and to more cost-effective repairs. In this way, a win-win situation for all parties can be achieved, with lower CO2 emissions, lower costs for insurance companies and lower premiums and costs for their customers.

The purpose of this report is to increase awareness among insurance companies and other actors in the claims management process of how they can influence their own work from an environmental and climate perspective. The report gives an estimate of current CO2 emissions associated with fire and water damage as well as concrete examples of different loss prevention measures that can help to reduce these emissions. Measures may include influencing construction methods, and encouraging contractors and repairers to choose environmental and climate-friendly alternatives, or amending regulations to prevent damage and minimise its effects.

The report does not aim to compare the Nordic countries as regards insurance conditions, CO2 emissions, etc but concentrates on the total emissions for the entire Nordic area and what can be done about them. Due to the differences between the Nordic countries with regard to population and number of buildings, the estimates presented in the sections below are not directly comparable between the countries. The statistics for the different countries have not been weighted; it is the actual number of incidents leading to claims and their effects in terms of CO2 emissions that are stated. The statistics only reflect the claims submitted to the insurance companies.

The report begins in Section 2 with a description of the statistics used and how CO2 emissions can be estimated. Estimates of CO2 emissions from water and fire damage for the different countries are then presented. Section 3 contains an analysis of the results and Section 4 presents a selection of loss prevention measures that can be taken to reduce future CO2 emissions. The conclusions are summarised in Section 5.

2. Calculation of CO2 emissions

2.1 Statistics

There are no exact statistics on the number of fires or water damage incidents or their extent. This report is therefore partly based on qualified estimates. Data on the number of water damage incidents has been obtained from insurance industry statistics and consists of claims submitted to insurance companies. The data on the number of fires and amount of fire damage comes from public analyses in the Nordic countries.[2]

By tradition, insurance cover differs on the basis of experience, risk and other economic solutions in the Nordic countries. Consequently, not all the fire and water damage losses that occur in the Nordic countries are insured. One example is insurance for water damage in wet rooms or resulting from a natural disaster, which is covered by insurance in some countries but not in others. As this report does not aim to analyse the effects of different insurance conditions in the Nordic countries, we have not explored this in any more depth. However, this means that the statistics on which our estimates are based may to some extent disagree in that more damage has probably occurred, and with higher total CO2 emissions as a result. Our estimates are therefore probably an underestimation of total CO2 emissions.

2.2 Factors affecting CO2 emissions in connection with claims management

There are three main factors affecting CO2 emissions in connection with building repairs:

- Demolition of damaged material and installation of new material
- Transport of material and tradespeople to and from the site
- Electric power for dehumidification/drying

CO2 emissions in connection with these activities can be measured using various electronic spreadsheet and workflow systems for repairs. In recent years, it has become increasingly common for insurance companies to acquire such systems to keep control of the CO2 emissions that arise in connection with claims management. In our calculations, we have used the MEPS building cost calculator.[3]

2.3 Water damage management

According to the MEPS building cost calculator, water damage on average consists of:

- demolition waste 700 kg
- new material 700 kg
- transport of people 200 kilometres
- transport of materials 150 kilometres
- electric power for dehumidification/drying 1000 kWh

The calculations were made based on the following:

- impact of material, from manufacture to disposal, in accordance with the IVL Swedish Environmental Research Institute materials database
- transport using small truck
- electric power in accordance with Swedish production mix

[2] The Swedish data was extracted from the IDA database, whereas data from the other Nordic countries was taken from statistics published on the Nordstat.net website, www.nordstat.net.
[3] The former Svensk Normtidsdata AB developed the system, which is now owned and developed by MEPS Sweden AB.

Using the Anavitor software application, MEP's data was then transferred to environmental impact in kilogrammes of CO_2.

On the basis of the above data, the MEPS building cost calculator indicates that one water damage incident and its management and restoration have an environmental impact of about 300 kg of CO_2. Table 1 shows the distribution of CO_2 emissions from the various activities in connection with a water damage incident.

Table 1 CO_2 emissions from the management of a water damage incident

Activity	**Kg CO2**
Demolition and new installation of material	210
Kilometres driven to transport people and material	80
Electric power consumption for drying and dehumidification	10
Total	300

Source: Miljöpåverkan av vattenskador (Environmental impact of water damage), Länsförsäkringar AB

As shown in Table 1, demolition and new installation of material accounts for the largest volume of CO_2 emissions. This includes the work of tearing out damaged material, destroying it, manufacturing new material and installing it. Transport includes transport of material and transport of people to carry out repairs (tradespeople). Electric power consumption is the environmental impact factor involved in drying and dehumidification. This item has the smallest environmental impact of the three and can also be affected by the choice of electricity supplier and that supplier's main source of energy.

Table 2 shows the number of water damage claims in Denmark, Finland, Norway and Sweden and the estimated CO_2 emissions by activity. As the amount of water damage is unknown, the estimate is relatively rough.

Table 2 CO_2 emissions in tonnes in connection with water damage in the Nordic countries in 2007

	Denmark	**Finland**	**Norway**	**Sweden**
Number of water damage claims	*32 000*	*20 000*	*45 000*	*67 000*
Demolition and new installation of material	6 720	4 200	9 450	14 070
Kilometres driven to transport people and material	2 560	1 600	3 600	5 360
Electric power consumption for drying and dehumidification	320	200	450	670
Total	9 600	6 000	13 500	20 100

Thus total CO_2 emissions in the Nordic countries associated with the management of water damage amount to about 49 ktonnes per year.

2.4 Fire damage management

Direct CO2 emissions

To estimate CO2 emissions from fires, the Swedish Insurance Federation commissioned a report from the SP Technical Research Institute of Sweden.[4] The report includes calculations of direct CO2 emissions, i.e. emissions from the actual fires in respect of various insurable object (building) categories: houses, flats, summer houses and schools/preschools. The results of the study are given in Table 3.

Table 3 Direct CO2 emissions in tonnes from fires in houses (including summer houses), flats and schools/preschools

Country/Estimated CO2 emissions (tonnes)	Denmark	Finland	Norway	Sweden
Houses	2 872	6 514	6 138	14 101
Blocks of flats	1 257	364	290	1 417
Schools	3 305	616	1 182	5 947
Total per country	**7 434**	**7 494**	**7 610**	**21 465**

Source: Blomqvist, P. and Simonson McNamee, M., (SP Note 2009:13), p. 30

The table shows that total direct emissions of CO2 amount to about 44 ktonnes for the four Nordic countries. The high figure for Sweden is partly because, compared with Norway and Finland in particular, Sweden has considerably more buildings; as regards Denmark, it reflects the fact that a very high proportion of Danish houses are made of stone, while houses in Sweden are mainly made of wood.

Indirect CO2 emissions

Besides the CO2 emissions from the fire itself in the various building categories, indirect CO2 emissions are also generated by the subsequent management of fire damage. In the estimates made in this respect, the same statistics are used as in the report mentioned above. The purpose of these estimates is to gain an understanding of the magnitude of CO2 emissions associated with repair/restoration after fires. Moreover, it should be pointed out that fire damage often goes together with water damage after firefighting operations. This damage is therefore also included in the estimates.

Länsförsäkringar AB has calculated CO2 emissions from the management of a medium fire damage incident (see Table 4a) on the basis of the MEPS system. We then assumed the amount of repair for a medium claim for a number of other types of building. As these are rough assumptions we also round off the emission figures considerably. However, in our opinion, we have been conservative in our assumptions and our estimates should therefore be on the low side as regards CO2 emissions.

[4] Blomqvist, P. and Simonson McNamee, M., (SP Note 2009:13), “Estimation of CO2 Emissions from Fires in Dwellings, Schools and Cars in the Nordic Countries”.

Reporting of the indirect CO2 emissions is broken down into the different building categories: house, flat, summer house and school/preschool. The first table (a) for each category reports the emissions in connection with fires in the different building categories. The subsequent table (b) reports total emissions of CO2 in connection with fires in the relevant building category broken down by country.

Table 4 Fire damage to houses

Table 4a CO2 emissions from repair after fire damage to houses, kg/CO2

	Kg / CO2
Demolition and new installation of material	2 100
Kilometres driven to transport people and material	200
Electric power consumption for drying and dehumidification	10
Total	2 310

Table 4b CO2 emissions in tonnes from repair after house fires (1)

	Denmark	**Finland**	**Norway**	**Sweden**
Number of fire incidents	*2 161*	*987*	*866*	*2 723*
Demolition and new installation of material	4 500	2 100	1 800	5 700
Kilometres driven to transport people and material	400	200	200	500
Electric power consumption for drying and dehumidification	-	-	-	-
Total	**4 900**	**2 300**	**2 000**	**6 200**

(1) As shown in Table 4a, we have adjusted the figures for demolition and new installation by a factor of 10 compared with water damage alone.

If the total figures for each country are added together, total indirect CO2 emissions in connection with management after a house fire in the four Nordic countries amount to about 15.4 ktonnes.

Table 5 Fire damage in flats

Table 5a CO2 emissions from repair of fire damage to flats

	Kg/CO2
Demolition and new installation of material	1 000
Kilometres driven to transport people and material	100
Total	1 100

Table 5b CO2 emissions in tonnes from repair after fires in flats (2)

	Denmark	Finland	Norway	Sweden
Number of fire incidents	*1 817*	*644*	*457*	*2 946*
Demolition and new installation of material	1 800	650	450	2 950
Kilometres driven to transport people and material	200	100	50	300
Total	**2 000**	**750**	**500**	**3250**

(2) CO_2 emissions from demolition/new installation are estimated to be half of those for houses, as flats are smaller in area and transport distances are normally shorter.

If the total figures for each country are added together, total indirect CO_2 emissions in connection with management after a fire in a flat in the four Nordic countries amount to about 6.5 ktonnes.

Table 6 Fire damage in summer houses

Table 6a CO2 emissions from repair of fire damage in summer houses

	Kg/CO2
Demolition and new installation of material	1 500
Kilometres driven to transport people and material	200
Total	1 700

Table 6b CO2 emissions in tonnes from repair after fires in summer houses (3)

	Denmark	Finland	Norway	Sweden
Number of fire incidents	*224*	*179*	*123*	*317*
Demolition and new installation of material	300	250	200	450
Kilometres driven to transport people and material	50	50	50	50
Total	**350**	**300**	**250**	**500**

(3) Total loss is assumed for summer houses as they are often in more secluded places and response times are consequently longer. The distances for transporting material and tradespeople are also longer.

If the total figures for each country are added together, total indirect CO_2 emissions in connection with management after a fire in a summer house in the four Nordic countries amount to about 1.4 ktonnes.

Table 7 Fire damage in schools/preschools

Table 7a CO2 emissions from repair after fire damage in schools/preschools

	Kg/CO2
School 400–600 square metres/material	10 000
Total	10 000

Table 7b CO2 emissions in tonnes from repair after fires in schools/preschools (4)

	Denmark	Finland	Norway	Sweden
Number of fire incidents	*258*	*55*	*98*	*534*
CO2	2 500	550	1 000	5 400
Total	**2 500**	**550**	**1 000**	**5 400**

(4) Schools of 400–600 square metres correspond to a house multiplied by a factor of 5.

If the total figures for each country are added together, total indirect CO2 emissions in connection with management after a fire in a school/preschool in the four Nordic countries amount to about 9.5 ktonnes.

Total indirect emissions of CO2 as a result of repair and restoration of damaged houses, flats, summer houses and schools/preschools amount to about 33 ktonnes of CO2 in the Nordic countries every year.

3. Analysis of the results

Altogether, total CO2 emissions associated with fires, including both direct and indirect emissions in connection with damage repair, amount to about 77 ktonnes for the four Nordic countries. To this can be added emissions associated with the management of water damage, about 49 ktonnes. In total, this amounts to 126 ktonnes of CO2 emissions as a result of fire and water damage in the Nordic countries.

For Sweden, emissions associated with fire and water damage amount to a total of just under 57 ktonnes. As a comparison, this can be seen in relation to the emissions in Sweden from other sources, which the SP report also describes in more detail; for example, it finds that CO2 emissions from domestic railway transport amount to 68 ktonnes and emissions from domestic road transport to 19 369 ktonnes.[5] The conclusion that can be drawn from this is that CO2 emissions in a larger context are relatively limited, but at the same time not insignificant.

The view of what action can be taken should not, however, be restricted to the relative magnitude of emissions. If initiatives taken jointly by insurance companies and other actors could contribute to reducing CO2 emissions, reducing the number of claims and to more cost-effective repairs, then the insurance industry considers that it is reasonable to take these initiatives. The following sections specify a number of measures that can be taken to reduce CO2 emissions associated with damage.

4. Damage prevention measures

Environment and climate considerations are increasingly important for insurance companies. Consequently, insurance companies in the Nordic countries are now more vigorously involved in attempts to reduce both the occurrence and the effects of damage, which also contributes to reducing CO2 emissions associated with

[5] Blomqvist, P. and Simonson McNamee, M., (SP Note 2009:13), "Estimation of CO2 Emissions from Fires in Dwellings, Schools and Cars in the Nordic Countries", p. 33.

damage. Awareness of the importance of active environmental and climate work is steadily increasing, but the insurance industry cannot work alone on these damage prevention measures. More actors must join in the work. Other aspects may include public regulation, development and regulatory framework of the construction industry, materials development, tradespeople, haulage companies, etc. Apart from the positive effects of such measures on the environment, they also benefit customers, through lower premiums and lower costs, and the insurance companies.

We in the insurance industry want to encourage all actors to take responsibility. In the following, we specify a number of different measures that could contribute to both reducing the number of incidents and their magnitude, and ensure that repair/restoration is done correctly so as to reduce the environmental and climate burden on coming generations.

It should be added that the following is a selection of measures insurance companies can take to build a more robust society and consequently lower CO2 emissions. There are many more measures that can be taken jointly by different actors.

4.1 CO2 and damage prevention measures common to water and fire

The measures listed below could help to prevent CO2 emissions from both fire and water damage.

- When buildings are repaired, several different tradespeople with different specialities are normally hired; for example, carpenters, tilers, plumbers, painters, electricians. This involves a large number of journeys to and from the building. Transport could be reduced by using tradespeople with a broader range of skills, i.e. who can do different types of repairs that at present require several occupational categories. Why not train special ‘wet room specialists’ to deal with water damage?

- Transport to and from the repair site could be based on more efficient logistics, thus contributing to a reduction in the number of journeys. For example, this could be done by several tradespeople travelling together, flexible working hours and avoidance of rush hours, using environmentally friendly vehicles and buying materials that are locally produced. In this context, the insurance companies can set the requirements for contractors.

- The choice of repair materials is important. Efforts should be made as far as possible to use KRAV certified materials. Choosing the right materials can also lead to better potential for partial repairs. Moreover, more durable materials stand up better to damage.

- Setting up a plan for waste management should be a requirement and the tradespeople hired should comply with it. This allows materials to be recycled. Insurance companies should also exert influence to ensure this is also done when the policyholder carries out the repair work.

- Energy-saving alternatives for repairs should be encouraged, for example drying and dehumidification instead of replacing materials.

- Risk inspections of buildings to be insured should be encouraged as a damage prevention measure.

4.2 CO_2 and damage prevention measures for water

There is a great deal of water damage in the Nordic countries. Most claims result from leaking taps and pipes. Rain and rising lakes and rivers can cause water damage. Water damage is the most common cause of damage to houses. There are numerous measures that can be taken to reduce this type of damage:

- Increased use of more durable materials, i.e. materials that can better withstand water and damp, and increased use of drying and dehumidification, can reduce CO_2 emissions considerably. There is constant product development in this area where both new materials and methods are developed to reduce water damage in buildings. However, it is important that these materials are thoroughly tested before they are put into use.

- Increased potential for partial repairs. At times, repairs to buildings are more extensive than is necessary. With new materials – that are already on the market – it is possible to carry out partial repairs even in wet rooms. The insurance industry has called for a differentiation between wet rooms and wet zones, the latter being the area that is directly exposed to water and damp, such as shower areas.

- About 75–80 per cent of flood damage resulting from rising lakes and rivers are back pressure damage in which water runs in through floor drains. Increased use of check valves in the water and sewage connection to the building reduces this damage. Greater dimensioning of municipal water and sewage systems and better maintenance in the form of clearing reduces the risk.

- Planning of drainage surfaces or storage of rainwater from cloudbursts over state-owned developed land.

- Simple shutting off or opening of water, for example by means of water seals for water supply to a building.

- The use of tested building materials that are water resistant.

- The use of construction methods that prevent water saturation in walls and floors. For example test to ensure that surface and sealing layers work effectively together.

- The use of damp-proof environmentally classified materials that can be repaired in wet rooms.

4.3 CO_2 and damage prevention measures for fire

Preventive work for fire damage has come a very long way in the Nordic countries. This is probably to do with the risk of loss of life in connection with fires. Apart from fire prevention and fire alarms, we should also consider fire prevention solutions to reduce climate impact..

- Installation of sprinkler systems that produce a water mist should be used to a greater extent. The systems are at least as effective as current systems, but cause less extensive water damage as a result of the management of fire damage.

- Allow camera surveillance in schools. Many school fires could be prevented and suppressed if cameras were installed.

- Make smoke alarms in houses and summer houses obligatory.

- Certification of equipment for solid fuel heating.

- Lightning protection should be installed in areas prone to lightning damage.

- Basic fire investigations. The cause of a fire far too often remains unknown. For effective preventive work, basic fire investigations must be carried out to a greater extent than is the case today.

5. Summary of conclusions

This report gives an estimate of the CO_2 emissions that arise from fire and water damage for which insurance companies pay compensation. Total CO_2 emissions for the Nordic countries – Denmark, Finland, Norway and Sweden – amount to about 126 000 tonnes. This figure is probably an underestimation as it was necessary to make relatively rough assumptions as regards the damage incurred, and these assumptions were conservative.

There is an awareness today of the importance of active environmental and climate work in the insurance industry. The purpose of this report was to contribute to further increasing this awareness by showing the extent of the emissions associated with fire and water damage and by showing what damage prevention measures can be taken. Certain of these measures can be taken by the industry on its own, for example by requiring that transport to and from the place where repairs are being made be based on more efficient logistics, or by imposing waste management requirements. In other respects, the industry cannot work alone. Other actors must also be involved. Examples of such measures are training tradespeople with a broader range of skills, for example in both carpentry and tiling, which could reduce the number of journeys. The choice of materials is also important. By developing and using more durable materials that better withstand water and damp and increased use of drying and dehumidification, CO_2 emissions can be considerably reduced. In the same way, changing definitions to make a distinction between wet rooms and wet zones can make it possible to carry out partial repairs to a greater extent.