



Weather related damage in the Nordic countries – from an insurance perspective

Participants from the Nordic insurance associations

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1. Executive summary

The Nordic insurance associations (Danish Insurance Association (DIA), Finance Norway (FNO), Insurance Sweden and the Federation of Finnish Financial Services (FFI)) have worked together on climate issues since 2009, where the COP 15 took place in Copenhagen. The focus has been on weather related damage. The cooperation between the associations has shown that even though a number of insurance companies are present in several Nordic countries and even though our culture and legislation have similarities there still are a lot of differences.

The main objectives of this rapport are to show the similarities and differences between the Nordic countries with focus on insurance coverage, legal issues and climate activities.

- All Nordic countries face challenges due to climate changes. In recent years, we have seen a clear trend that weather related claims have increased tremendously. One of the main challenges for the insurance companies is urban flood.
- Some insurance companies no longer want to offer insurance cover for certain claims.
- There is an increase in conflicts and disputes between home owners, insurers and municipalities due to unclear laws regulating the liability - especially in Norway and Sweden.

The main conclusions of this report are:

- **The insurance cover in the Nordic countries differs.** There may be many reasons for the varying coverage in the Nordic countries. Some of the main reasons are probably the geographical and hydrological differences. Coverage also depends on the action taken by the party responsible for handling the water damage. Added to these are the countries' history and different traditions.
- **The legal basis in the Nordic countries differs.** It seems common for all the Nordic countries that the regulations on water damage are spread out on several acts (financial issues/ownership, environmental/pollution issues, water and sewage, waste water issues, urban flooding issues etc.).
- **The solutions of the decision makers in the Nordic countries differ.**
- **The insurance companies collect unique claims data.** Used in the right way, this data can provide knowledge for the state, municipalities and consumers about areas vulnerable to climate change, and thereby give the state, municipalities and consumers a better tool to prevent further damage from occurring.

The report contains a presentation of statistics and information geographically covering the Nordic countries. Furthermore, the report shows how the Nordic countries - in some instances - solve the task of climate changes differently. However, the Nordic insurance associations have a common goal to improve cooperation among stakeholders, authorities and experts in the Nordic countries, allowing the challenges of climate change to be dealt with in a wide sense and to be explored at many levels in order to prevent the increase in water damage.

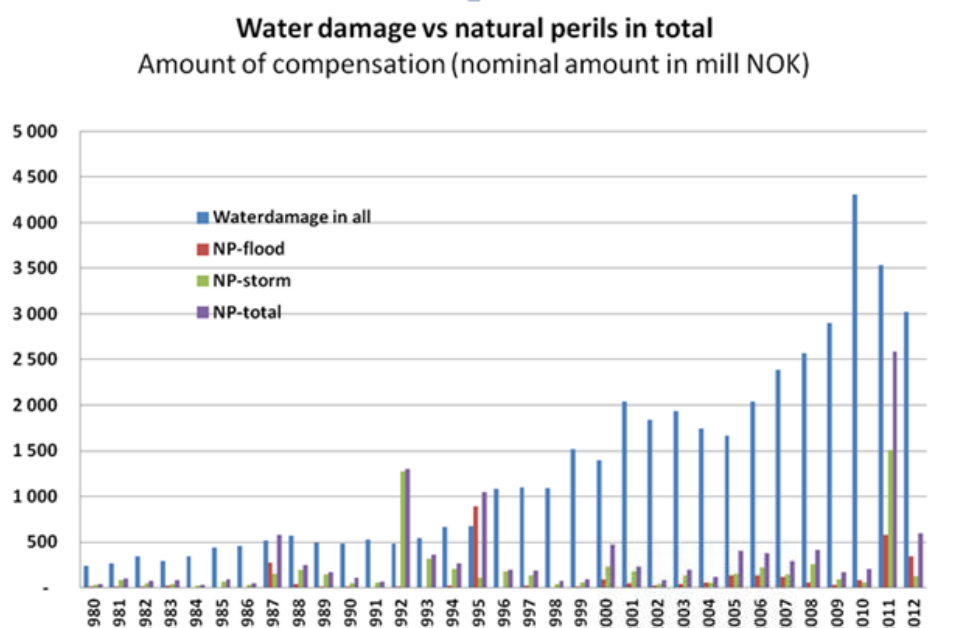
2. Introduction

In the last ten years, the Nordic countries have experienced a significant increase in weather related damage, which has caused a lot of claims damages. The idea to make this report and the cooperation among the Nordic countries originated from the common work in connection with COP 15 in Copenhagen and due to the heavy water damage in 2010 and 2011 (insurance claims of one billion Euros just in Denmark). This was combined with the fact that weather forecasts have predicted that all the Nordic countries in the future will experience an increase in the number of heavy cloudbursts and the intensity of these¹.

Besides insurance costs there are the socio-economic costs in form of lost working hours, personal inconveniences, frustrated customers, own risks and municipal expenses. And added to this are the multiple personal inconveniences such as closed roads and lost personal items. At the same time, we need to understand how the new climate situation will affect the insurance companies both in the short and the long run.

The insurance companies price both known and unknown (emerging) risks and have to be able to price these risks in the right way in a competitive market. In Denmark, the government has asked the insurance companies to make discounts for people who do something to prevent damage. This shows that the politicians want a system where price and risk are connected. This at the same time limits the possibility of a solidary system.

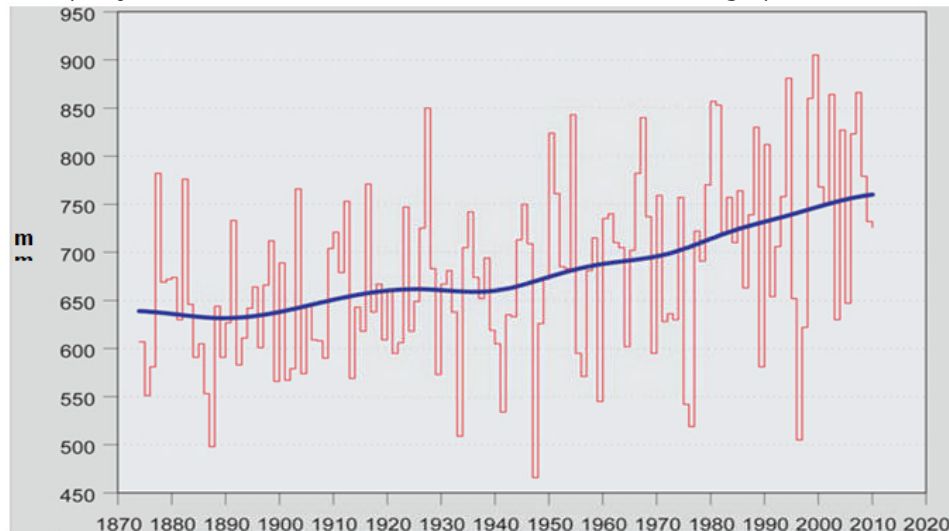
When we are talking about climate challenges in this report, we relate to water damage in one form or another. For the insurance companies, one of the main challenges turns out to be urban flood. Urban flood represents the major part of paid claims. This is illustrated in the graph below which shows the relationship between water damage and natural perils in Norway. The figure relates to Norway, but it is also representative for the development in the other Nordic countries². The red figure (NP-flood) relates to land flood, whereas urban flood is part of the blue figure; "water damage in all".



1 http://www.dmi.dk/dmi/index/klima/fremtidens_klima-2.htm
<http://www.smhi.se/en/Research/new-climate-projections-indicate-more-extreme-weather-1.12924>

2 The statistics for Denmark is shown here:
<http://www.forsikringogpension.dk/temaer/klima/klimaviden/Sider/statistikker.aspx>

Rain per year in Denmark from 1870 to 2010 is shown in the graph below:



The knowledge which the insurance companies obtain through their contact with the insured can be of use to other relevant climate stakeholders in order for them to optimize the effort in the fight against climate changes.

Our access to statistics and information from the insurance companies may prove to be a great value to society if it is coupled with other statistics, for instance the municipalities' risk survey for climate damage. Through openness and dialogue we as an industry have the opportunity to contribute with valuable societal knowledge which no other climate participants have access to.

One of the core elements of insurance is damage prevention, which is why the industry focuses on the future and wishes to take an active part in the effort against damage caused by climate changes. The insurance companies also give the customers financial security and manage society's value by for instance paying damages for claims on buildings.

The report aims at illustrating legal status and the role of the insurance companies in the Nordic countries. It contains a small-scale comparative analysis in order to get an overview of the individual countries' insurance coverage, number of water-related damage, statements from decision makers etc.

3. What is the solution to a successful climate adaption?

We believe that the insurance companies should play an important role in the climate change debate.

A good example is that the insurance companies collect unique claims data. Used in the right way, this data can provide knowledge to the state, municipalities and consumers about areas vulnerable to climate change, and thereby give the state, municipalities and consumers a better tool to prevent further damage from occurring.

Through claims handling and contact with injured parties, the insurance companies have valuable first hand information. Furthermore, the insurance companies have a common interest with consumers and municipalities to prevent or reduce damage on properties. The insurance companies follow the well known “polluter pay”- principle, which means that the price on insurance products depends on the risk. This has a positive effect on preventive measures. Therefore:

- The insurance companies wish to put focus on the climate through information and knowledge sharing.
- The insurance companies believe that it is necessary to cooperate and share know-how in order to adapt our society to the climate challenges of the future
- Access to statistics and information from the insurance companies may prove to be of great value to society if e.g. it is coupled with other statistics and e.g. hydrological maps.
- The municipalities and the stakeholders should use the information as a tool for proper decisionmaking and the creation of transparency. This way, the state and municipalities have the opportunity to make the right societal and economic choices.
- Successful climate adaptation can both prevent damage and create new jobs.
- There is a need for both an increased and clear-cut allocation of the responsibilities and a more coordinated effort.

Insurance companies should play an important role in the climate change debate.

4. Purpose and methods

4.1. Purpose

The primary purpose of the comparative analysis is to illustrate the consequences of cloudburst and flooding (compensation costs, societal costs and personal inconvenience) - both from a consumer perspective and the insurance industry perspective.

A secondary aim is to illustrate the initiatives of the insurance companies - and their influence on authorities, citizens, business etc.

4.2. Other limitations/level of ambition

The analysis attempts to identify differences and similarities between the countries and, where possible, to point to certain key political and structural or geographical factors which may help to explain those differences and similarities. The analysis focuses on tools and initiatives introduced in recent years and in place - or planned - today. They are not an attempt to describe a long process of development back through time.

4.3. Method

During 2012, the four Nordic insurance associations have gathered data and background knowledge and have completed a mapping exercise/small-scale comparative analysis. The Nordic insurance associations have subsequently discussed the similarities and differences in each country with their members. They have also discussed the reasons for the discrepancies in legal practice and insurance cover.

4.4. The definition of water damage

The water damage statistics comprise different information in the Nordic countries. In Norway, Finland and Sweden the statistics are based on all types of water damage. In Denmark, one of the statistics is based on the individual insurance type and it is possible to get statistics on water damage in general and on natural related water damage and cloudburst. The report operates with the following division:

- All types of water damage, e.g. natural related damage, non natural related damage, broken sewage, urban and land flooding, damage covered by pools
- Natural related water damage, e.g. storm surge, flooding from lakes and streams, urban and land flooding
- Intense cloudburst.

The EU is currently working on a consultation on the [Green Paper on the Insurance of Natural and Man-made Disasters](http://ec.europa.eu/internal_market/consultations/2013/disasters-insurance/index_en.htm)³ (hyperlink) which ends in July. The Nordic countries will follow the final work of the Green Paper.

The water damage statistics comprise different information in the Nordic countries.

³ http://ec.europa.eu/internal_market/consultations/2013/disasters-insurance/index_en.htm

5. Conclusions

5.1. Knowledge about climate adaptation

The insurance companies wish to focus on the climate through knowledge sharing. It is important that the information and knowledge is shared through teamwork among relevant participants. This knowledge sharing can be an important part of the damage prevention effort.

Climate-related insurance loss is well-known in all Nordic countries. It is mainly caused by cloudbursts, flooding, windstorms and snow pressure. The main focus is damage prevention and thus reduction of flooding and other climate related types of damage. The damage prevention is meant to entail that the insurance companies may still offer insurance products that allow most types of climate damage to be insured.

5.1.1. Responsibility for the state/municipalities/home owners

Common for the insurance companies is that they cover the incident and not the recurring incident. The insurance associations wish to help prevent damage and create permanent solutions to society. We believe that the state and municipalities have the opportunity to make the right societal and economic choices. The municipalities should react before the damage occurs and should calculate solutions and drawbacks of different solutions and make the best choice from a socio-economic point of view.

The insurance associations wish to help prevent damage and create permanent solutions to society.

The state should ensure a national strategy with a clear division of responsibilities. It is important that the state provides the municipalities with incentives to want to assess their risk of flooding and the methods to be able to do so. As regards the home owners, it is also necessary to provide them with incentives to handle water on their own property. The state should also ensure transparency for home owners.

Basically, we are able to obtain an interaction between the above participants and citizens if we have a common ownership to the processes. Through clear communication, we will create visible incentives for all stakeholders.

5.1.2. Experiences from the “downpour project”

Both Denmark and Norway work on “downpour” projects (see also paragraph 6.3), in which the insurance companies contribute with claims data to the municipalities. The “downpour” projects are carried out in cooperation between municipalities, insurance companies (in Norway the state is also involved). The first Danish experiences from the project are promising even though the final results of the project with the first municipalities in Denmark (Copenhagen and Frederiksberg) have not been made public. It is clear that the results will have an effect on the municipalities’ future climate adaptation and climate plans. For example, the initial report shows that if more advanced flooding models are used then it is possible to locate the damage more accurately. Furthermore, there is no connection between the actual compensation for the damage and the depth of the water. In some cases, the municipality used the claims data to conduct further questionnaires to the home owners in order to obtain more exact information about what happened during the flooding due to intense cloudbursts.

Another experience is that it is important to match expectations between the participants from the beginning. Claims data contributes with a realistic picture, particularly how to locate vulnerable areas, but it does not provide the answer to every question. The conclusion is that it is a good idea to draw up very detailed risk maps of densely populated areas and in that context use insurance claims data.

In Norway, this data will also be tested by the NVE (Norwegian Water Resources and Energy Directorate) in order to make improvements in the flooding maps.

5.2. Next step

The Nordic insurance associations expect to put more focus on the possibility of PPP (Public Private Partnerships) in the future. The PPP is cooperation between the state and the private companies with focus on prevention, risk management and insurance. This special construction could be of good use in the work with climate challenges.

The municipalities are facing a great challenge in connection with city climate adaptation. An interesting question is: How well are the municipalities prepared for the climate adaptation task? Do the municipalities have the sufficient tools to solve the challenge – and do they know how to go about the task? We encourage open dialogue in this regard.

5.2.1. Different challenges in each country

The climate debate in the Nordic countries has many common traits, but in some areas differences occur, which specifically appear from the comparative analysis (see paragraph 7).

The below facts also show some of the challenges that each country is met with in regards to water damage.

Norway

- The total amount of the insurance companies' payout in 2011 was EUR 234m / NOK 1748m in water damages (all types of water damage) and in 2010 the payout totalled EURO 132m / NOK 985m.
- Flooding (part of the Natural Perils pool) is included in these figures and amounted to approx. EURO 11m in 2010 and rising to 78m the year after.
- Every ten minutes a water damage occurs

Denmark

- It is estimated that the downpour intensity will increase by 20-40 per cent up until the year 2100.
- In 2011, the insurance companies paid damages in the amount of EUR 894m / DKK 6,658m for water damage claims. The previous year the figure was EUR 342m / DKK 2,567m for the same type of claims.
- The cloudburst on 2 July 2011 alone carried 150 millimeters of rain within a few hours.
- The cloudburst entailed more than 90,000 claims.

Sweden

- In 2011, the insurance companies paid water damages in the amount of EUR 400m / SEK 4bn of which the compensation of damages related to flood or heavy rain amounted to EURO 35m / SEK 300m.

Finland

- In 2010-2011, insurance companies paid an amount of EUR 2,2m to cover various flood damage in connection with exceptional floods
 - Heavy rain floods EUR 1,8m
 - Seawater floods EUR 250,000
 - River floods EUR 52,000
 - Others EUR 110,000
- At the same time, the state paid several flood damage claims on the basis of flood compensation law in the amount of EUR 600,000 on the average per year. In fifteen years, the state has compensated flood damage in the amount of EUR 9m.

6. General review of the comparative analysis

The main differences and similarities between the countries, which are identified by the analysis results (see paragraph 7), are presented in this chapter and are divided into the following categories: Insurance, liability and legal basis and climate adaption and activities. Each theme is a key issue in the debate on climate adaptation and the responsibilities and duties in the insurance companies. The analysis summarizes the main differences and similarities between the Nordic countries.

6.1. Insurance

The Insurance coverage and the definition of the weather related damage in the Nordic countries differ. In the following, an introduction to each theme in the insurance cover is given: cloudburst, storm, storm surge, snow pressure and heavy sudden thaw.

6.1.1. Cloudburst

The definition of intense cloudburst varies in the Nordic countries.

In Norway as in Sweden, the criteria is that the water must enter into the house from the ground floor in order for the insurance to cover.

In Denmark as in Finland, the overall definition is rain being so heavy that normally constructed, well maintained and unblocked drains are unable to lead the water away. It is not important where the water enters the house if these criteria are fulfilled.

When intense cloudburst is mentioned in relation to insurance coverage the most common criteria are:

In Norway, an intense cloudburst is defined on the basis of 50 year rain intervals. Generally, there is no metric requirement related to the insurance conditions.

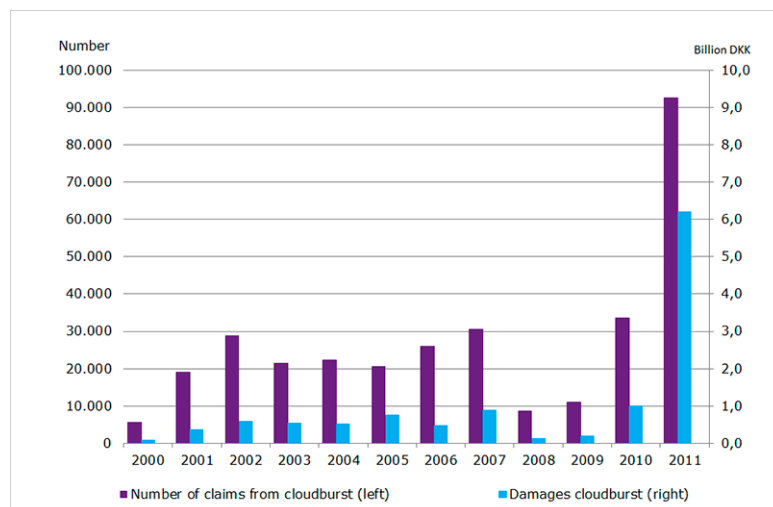
A 24 hour definition:

- In Denmark, the general requirement is more than 40 mm rain in 24 hours.
- The requirement in Swedish insurance conditions is more than 1 mm rain within 1 minute or 50 mm rain within 24 hours.
- In Finland, more than 75 mm rain in 24 hours is required before a cloudburst is defined as intense.

A 30 minute / 1 hour definition:

- In Denmark the definition requires more than 15 mm rain within 30 minutes.
- In Sweden the definition requires more than 30 mm rain within 30 minutes.
- In Finland the requirement is more than 30 mm rain/hour. Finland does not operate with a 30 minute definition.

The season for cloudbursts in Denmark normally runs from the beginning of June until the end of August. The development in cloudburst damage and paid damages in Denmark in the period 2000-2011 is shown in the graph below:



Statistics of number of claims due to cloudbursts in Denmark. Source: DIA

There is every indication that the total amount of damages paid due to an increase in cloudbursts will rise. It will influence the insurance companies' negotiations with the reinsurers, if the reinsurers deem that there is an increasing risk of wide and severe cloudburst.

6.1.2. Storm surge

The definition of storm surge varies in the Nordic countries and the countries have chosen different ways of handling damages caused by storm surge. Storm surge is one of the natural disasters that weather forecasters expect to occur on a regular basis in the future in the Nordic countries.

In Denmark, there is no insurance coverage. Damage is instead covered by the public storm surge scheme. The scheme is financed by a yearly fee of EUR 4,00 / DKK 30,00 included in the insured's fire insurance policy. Since October 2012, the storm surge scheme has been managed by the insurance companies on behalf of the Danish Storm Council. The total costs of storm surge related damage amount to EUR 76m / DKK 567m since 1991.

In Norway, the "Naturskadepool" also covers damage caused by storm surge. Norway has a similar system as Denmark, where damage due to storm surge is included in the insured's fire insurance policy. The insurance companies, however, are only liable in proportion to their market share and will be reimbursed by the Norwegian Natural Peril Pool/Norsk Naturskadepool. Damage to property which cannot be insured (e.g. crops) is covered under the state natural peril fund.

In Finland and Sweden damage caused by storm surge is normally insured through ordinary property insurance.

The conditions of storm surge are:

- Denmark – flooding caused by extraordinary rise in sea levels, which takes place statistically rarer than every 20 years .
- Norway - flooding caused by extraordinary rise in sea levels which takes place over the level of a 5-year return period
- Finland – exceptional rise in the sea water level, which occurs once in 50 years or less.
- Sweden - >110 cm above normal water surface (def.: Very high water level), warning starts from 80 cm.

6.1.3. Storm

Insurance coverage for damage caused by storm varies in the Nordic countries. The insurance policy covers damage caused by:

- Wind speeds of more than 17.2 m/s in Denmark
- Wind speeds of more than 20.8 m/s in Norway
- Wind speeds of more than 21 m/s in Finland
- Wind speeds of more than 21 m/s in Sweden

6.1.4. Snow pressure

Snow pressure is created when large amounts of snow accumulates on flat rooftops or on rooftops with little pitch and the pressure of the snow can make the roof collapse. This goes for house roofs, carports, annexes and large buildings such as barns and halls. Especially large amounts of sleet, which is heavier than new snow or frost snow, make for risk of collapse.

The Nordic countries have very different coverage for damage caused by snow pressure. There are restrictions in the cover for snow pressure in most countries. In Denmark and Norway, coverage for damage due to snow pressure such as roof collapse is covered. However, if the collapse is caused by a construction error or careless lack of maintenance, the insurance policy can reduce compensation or pay no compensation at all. If the damage includes personal injury, the accident insurance or the life- and pension scheme may come into play. In 2010, in Denmark, claims regarding snow pressure amounted to DKK 800m.

In Sweden, you will be compensated if the building has been built according to relevant building rules in the zone in which the building is situated.

In Finland there is no cover for damage due to snow pressure.

6.1.5. Sudden thaw

In Denmark there is no official definition of sudden thaw. It will rely on a concrete evaluation in which the following elements are important: temperature difference, the depth of the snow and rain, the wind and the location of the property. All companies offer a home insurance with minimum conditions and sudden thaw is therefore covered in Denmark. In the winter of 2011 thaw related claims reached DKK 900m.

In Finland there is no official definition and no cover.

In Norway, thaw is not covered as it is not considered a “sudden and accidental” incident and it is therefore not unforeseeable that a house must be able to with-

Enormous increase in claims = change in insurance conditions and price.

stand heavy rain fall. However, if the rain causes damage due to back flow or water suddenly enters the house (e.g. through the cellar window), the damage is covered.

In Sweden sudden thaw is not separately mentioned in the conditions, but the effect of sudden thaw is covered under flooding.

6.1.6. Facts - consequences of water damage

The consequences of water damage (compensation costs, societal costs and personal inconveniences) are enormous.

The damage statistics on water damage comprise different information in the Nordic countries. In Norway, Finland and Sweden the statistics have only the overall damage figures. In Denmark, the statistics are based on the individual insurance type. See paragraph 4.4.

One of the interesting key figures is the total number of damages paid in connection with water damage in the Nordic countries in 2011 - EUR 1,528m:

- Sweden - EUR 410m / SEK 3,618m
- Norway - EUR 234m / NOK 1,748m
- Denmark - EUR 894m / DKK 6,658m
- Finland - Not available yet.

This equals an increase of 140 per cent compared to 2009.

Due to the cloudburst in the summer of 2011, the insurers in Denmark alone have covered more than 90,000 incidents with water damage due to intense cloudburst and paid more than EUR 800m / DKK 6,200m in damages.

The insurers are meant to cover extreme occurrences such as cloudburst, which is why all types of damage are covered under the insurance provisions. Apart from the damages paid by the insurers, costs include excess coverage, self insured clients etc.

Water damage may entail consequential damage in the form of damp and mould in the house. This is both expensive to repair and can be a health hazard. Water damage is therefore characterized by becoming increasingly expensive the longer it takes before the dehumidification process is commenced. In practice, it can be difficult for the insurance companies to retrieve enough appraisers to assess the damage in the larger cities after a heavy cloudburst. Also, the demand for skilled workers can be very heavy. Thus, heavy cloudburst may entail a positive socioeconomic gain due to the rise in number of jobs in connection with the repair works.

6.1.7. Varying coverage in the Nordic countries

There may be many reasons for the varying coverage in the Nordic countries. The geographical and hydrological differences are probably some of the main reasons. Coverage also depends on the action taken by the party responsible for handling the water damage. Added to these are the countries' history and different traditions. Again, we see great variation in the Nordic countries. There is a rapid development of insurance products these years due to the increase in water damage. An increasing number of insurance companies offer e.g. a widened cover for water damage on the house insurance policy. Some

insurance companies in Denmark offer a discount to their customers, if they for example install a backwater valve or perform other damage preventing measures.

6.1.8. Solidarity – how to share the risks

The development in the number of water damage claims gives rise to a debate about solidarity. Who shall, and who should pay for the water damage? Is it the state, the municipality, the home owners, insurance companies or others? In practice, it is often difficult to place the responsibility for a specific water damage claim – especially if the case involves competing causes of damage.

The tendency in Denmark and Norway is moving towards more micro rating, meaning evaluating the risk based on individual risk and situations. This tendency is yet not seen in Finland and Sweden. In brief, micro rating implies that the insurance companies to a larger extent calculate the premium for the individual policyholder based on his or her risk. This entails that some policyholders will see an increase in insurance premium.

After the heavy floods of 2010 and 2011, many companies in Denmark introduced cover restrictions in basements and, in certain cases, technical demands. Restriction of cover for future events, unless certain changes are made (material, building methods) is also becoming a standard.

The insurance companies have to adapt to the new circumstances brought on by climate change. Both the insurance companies and the home owners are interested in preventing water damage, if possible, and the insurance industry is ready to enter into dialogue with home owners who invest in climate adaptation of their homes. Preventative measures is the best and cheapest solution for all parties, and this also spares the home owners the great personal costs associated with cleaning and with water damage to furniture, clothes, heirlooms and similar property with sentimental value, which for obvious reasons cannot always be financially compensated.

6.1.9. "Insurability" – Not everything can be insured

The companies' condition for cover is – as it has always been – that the claim arises out of a so-called insurable event. This means events during which it cannot be predicted who will suffer the damage or where it will occur.

The insurance industry is – especially in Denmark – focusing on the problem of private homes for which it is no longer possible – or will not be possible in the near future – to take out an insurance policy against water damage caused by rain water. The reason for this is that it is no longer a question of whether these houses will be subject to greater water damage in the future – it is a question of when.

Thus, the problem is the location of the houses when it is raining heavily and perhaps during a longer period of time. A house which is not located in a very exposed area today may be so in the near future, for instance because the road in front of the house is angled differently or is fortified with tiles etc. Add to this the problems that may arise out of a new type of house that is damaged because the water is held back in a wrong way on the property, and the house may find itself on "shaky ground", entailing serious settlement damage.

In April 2013, a partnership between the Danish Insurance Association and the Minister of the Environment was introduced. The partnership is focusing on finding a solution for the houses mentioned above. The partners have also paid for the development of a hydrological altitude model, which helps municipalities in

The tendency in Denmark and Norway is moving towards more micro rating. This is a risk evaluation based more on the individual risk situation.

In the future some homes will be uninsurable due to cloudbursts.

making better climate decisions. The model will be available to the public during the autumn 2013 and by use of the model you can see which way the water will run in case of heavy cloudburst.

Furthermore, the partnership will focus on communication with the citizen and work on developing better tools for the municipalities in order for them to be able to create better solutions in their climate adaptation process. The partnership will also focus on how the companies can create better prices on insurance products when the home owner climate adapts the house. But the actions of the Danish Insurance Association are limited in this matter because of the Danish Competition Act.

The above has not been subject to debate to the same extent in Finland and Sweden. This could be due to the fact that the responsibility to tackle the problem is considered to lie with the municipalities and that insurance coverage for water damage is still available for all.

The Norwegian trade association has developed a brochure to all home owners on how to prevent water damage and what to do if water enters the house. This brochure is created in cooperation between the National Federation of Home Owners and Norwegian Water BA (In Norwegian: Norsk Vann BA), a national association of water and wastewater works. Furthermore, Finance Norway is co-operating with these associations and also The Norwegian Association of Local and Regional Authorities (KS) in order to convince the Government/the Norwegian Ministry of the Environment to put more focus on water damage claims and to look at the laws and liability for such damage.

This process has convinced the Government to appoint a law committee to look into this issue.

6.2. Liability and legal basis

The clear trend is that insurance compensation for water claims due to the changed climate in the form of more frequent and more severe rainfalls are escalating.

It seems common for all the Nordic countries that the regulation on water damage is spread out on several acts (financial issues/ownership, environmental/pollution issues, water and sewage, waste water issues, urban flooding issues etc.).

The regulation on liability is fragmented and unclear.

From a financial, preventive and climate change aspect, overall expenses to the society such as insurance claim payouts stemming from urban flooding, are massive in comparison with Act and God happenings like flooding and landslides.

Norway and Denmark have established insurance pool systems regulated by law - although somewhat differing - for natural perils. There are no preventive measures in the mandate of these pools. In Denmark, however, with effect from 1 October 2012, a registration scheme has been introduced, which entails that storm surge damage resulting in coverage from the storm surge scheme (storm-

The increasing number of water damage triggers changes in the insurance contracts and a rise in the insurance premiums.

flodsordningen) is registered in the publicly accessible Danish building and residence registry (BBR-registret /Bygnings- og Boligregistret). At the same time, a "stairway model" has been introduced in the storm surge scheme, which entails that upon each payment from the storm surge scheme, the policy excess is increased.

Sweden and Finland have no such law/pool-systems - these natural perils are in most cases covered by the individual insurance company operating in the country.

6.2.1. Legal liability for municipalities or the waste water utilities

This chapter will briefly outline how a flooding incident which has caused damage covered by an insurance, may be handled in terms of determining whether a recourse claim can be filed against the municipality and or the waste water utility for the loss incurred by the insurance company. It is assumed that a claim covered by an insurance company will be filed by the claimant and that the insurance company as a consequence has suffered or will suffer a financial loss, which the company may seek reimbursed by the liable party (the municipality or a waste water utility).

The liability regulations on damage caused by water (between the home owner and the municipalities) varies between the Nordic countries. In Norway and Denmark, municipalities are almost immune as regards damage caused by undersized pipes. In Norway, however, a new supreme court case from October 2011 has defined that liability for damage due to lack of maintenance on the pipes is based on strict liability for the municipalities.

Legal liability for municipalities or the waste water utilities in case of faulty dimensioning of pipes:

Denmark

A waste water utility (which is normally owned by the municipalities) is basically responsible for its waste water plant being correctly and safely designed so that it does not cause flooding. It is not possible to require that a waste water plant must be designed so that flooding is prevented under all conceivable circumstances. But if the planning of the waste water plant is flawed, so that it is not designed according to standard requirements, and if this should have been realised based on the knowledge available at the time of the planning, then the waste water utility may be liable for any damage caused. Liability is culpa.

Sweden

Due to the Water services act (2006:412) the municipality or the company owned by the municipality has the responsibility to ensure that water pipe construction is correctly dimensioned and accurately runned and maintained so that safety is preserved. The dimension of pipes should be suitable to its purpose and take the risk of flooding into consideration.

Norway

The law regulating the liability for damage is based on strict liability for the municipalities. However, the Supreme Court (in a case from 2007 - Rt. 2007 s. 431) ruled that the law was not mandatory and gave the municipalities the right to insert a clause (in the conditions towards the home owner) basing the liability

on negligence. Due to this fact, the municipalities have various types of liability conditions towards the home owner today.

Finland

The basic principle is that the pipes are the owner's responsibility within the boundaries of the property. The pipes outside these boundaries are the responsibility of the municipality. Possible compensation from the municipality can be claimed based on the Damages Act (412/1974) and the Land Use and Building Act (132/1999). It can often be difficult for the property owner to prove that liability for the damage lies with the municipality.

Legal liability for municipalities or the waste water utilities in case of neglected pipes:

Denmark

If a flood is caused due to lack of maintenance etc., the insurance company may also file a claim against the municipality. In this connection, it is of vital importance that the waste water utility is in charge of for both maintenance and supervision of the plant. Liability is culpa.

Municipalities are also liable for damage caused by ruptured pipelines due to defects in materials. In practice, there is a tendency to make the municipality strictly liable for flooding due to ruptured pipelines.

Sweden

The municipality or the municipality's company is responsible for the water services and for the dimensioning and the maintenance of the pipes. Liability is nearly strict, if a breach of responsibility can be established.

Norway

The law regulating this form of liability is the same as on "faulty dimensioning", meaning strict liability for the municipalities. And here the Supreme court (in a case from 2011 - Rt-2011-1304) has followed the wording on the law.

The legal challenge is now how to interpret the wording in the law which states strict liability for "inefficient maintenance".

Finland

The basic principle is stated in the above section and again compensation may be sought based on the Damages Act of the Land Use and Building Act. There are no standards as to what is considered adequate maintenance of pipes. Also pipes are upgraded only when there is some reason to do this, i.e. there are no rules to systematically improve the situation.

Legal liability for municipalities or the waste water utilities in case of lack of contingency plans concerning heavy rain:

Denmark

Under the emergency response legislation, the municipalities have a basic responsibility to appoint an emergency response unit which is able to take effective action against personal injury and damage to property and environment due to accidents and disasters, including natural disasters. A municipality's failure to

comply with its obligation may render it liable if erroneous circumstances are present.

Sweden

The municipalities have a responsibility in connection with the construction of buildings under the Planning- and Building act and they should not approve new buildings in areas where there is risk of damage to individuals and property. Wrong decisions could lead to liability to compensate damage.

Norway

The laws regulating the liability in Norway is similar to what you find in Denmark. In recent years, the municipalities have been subject to strict legal obligations to have a clear understanding of the risk for natural perils. They must create plans on how to meet the climate changes. Such plans are created through analyses of risks and vulnerability in areas. The question, also on a legal base, is in what degree they are to have mechanisms and tools to plan for future changes and consequences of the new climate. The legal liability is mainly based on negligence.

Due to the legal uncertainty, lobbying, the political pressure and increase in conflicts and damages in this area, the government has (in May 2013) decided to set up a public working committee to review all the laws regulating urban storm water and sewage backup.

Finland

The state does not take responsibility for advance planning, which means it has been left to the municipalities. There are no clear rules on what this planning should entail and therefore the municipalities have until 2015 to have such plans in place. Until that time, it might be difficult for claimants to present a claim for compensation towards the municipalities.

6.3. Climate adaptation and activities

To be able to provide insurance cover for loss that will occur due to climate change, it is important that the insurance companies play an active part in finding solutions in connection with reduction of the damage and adaptation for future events.

The largest impact from climate change on the Nordic countries will be flooding from severe hard rains, rain over several days and higher sea levels. It is important that these effects are maintained, so that the insurance companies have a possibility to still cover the claims and provide the insured with safe and sound cover.

The Nordic insurance associations have been seeking cooperation with the governments, counties, municipalities and other stakeholders regarding the above. Therefore, the Nordic insurance associations frequently participate in conferences, where delegates speak of the need for better adaptation to be able to insure climate related damage in the future.

The Nordic insurance associations also participate in the climate work on a European level through the activities in the European association "Insurance Europe" in Brussels.

Each country has developed different climate initiatives which is mentioned in the section below.

Denmark

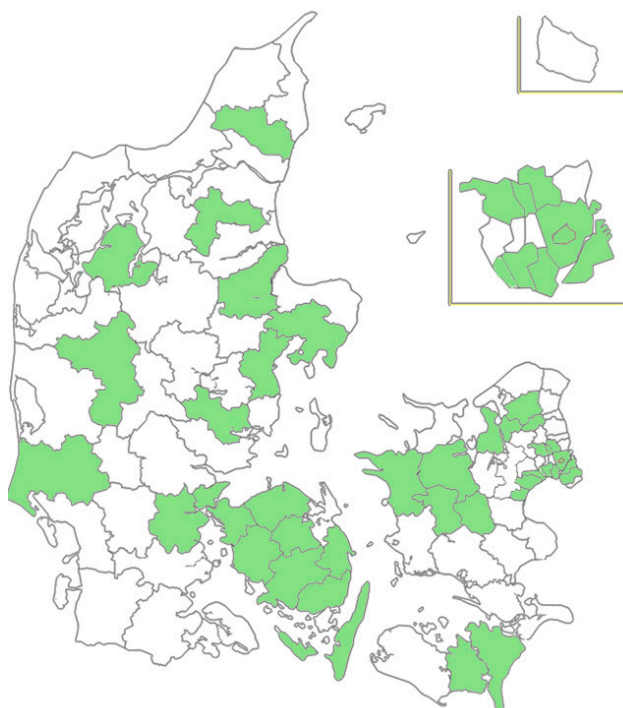
Downpour projects

In cooperation with the insurance companies and the Technical University of Denmark (DTU), the Danish Insurance Association has completed a “downpour” project in Risskov, Aarhus. The insurance companies have contributed knowledge about how flooding damage has occurred during the past 6 years in the municipality of Aarhus and the amounts paid in compensation. The result is a validated risk flooding map, which makes it easier for the municipality to make the right socio-economic decisions about investments in infrastructure etc. A similar “downpour” project has been initiated with the municipalities of Copenhagen and Frederiksberg cf. page 8. The results have not yet been made public but the initial report indicates that the results has an enormous effect on the municipalities future climate adaption and climate plans, see paragraph 5.1.2.

In 2013, another 33 municipalities have entered the “downpour project” and they have got data from the 8 biggest non life insurance companies in Denmark. The purpose of the project is to make claims data available for the municipalities, so that they may use it in the decision making process regarding where to initiate climate adaptation solutions. All municipalities in Denmark have to make climate adaption plans that can be send out to public hearing before the end of November 2013. Without claims data, it can be a challenge for the municipalities to assess where the greatest flooding risks are – since the theoretical models will always be subject to some uncertainty. The “Downpour project” in Denmark is an example of how valuable the insurance companies’ knowledge has proven to be to the authorities.

The green areas indicate the municipalities that have entered into an agreement with the Danish Insurance Association about use of insurance data in their climate plans. There is a very big focus on confidentiality and data security e.g. all data must be deleted after the ending of the project.

The 35 municipalities which participate represent 46.1 % of the entire population of Denmark.



Insurance weather www.forsikringsvejret.dk

In cooperation with the Danish meteorological institute "DMI" and the consulting engineers and planners at the company COWI, the insurance industry has developed the weather service "insurance weather" (www.forsikringsvejret.dk). When cloudburst, storm and lightning strike Denmark, all citizens can keep themselves updated hour by hour – with an accuracy of one square kilometer – on how and when the rough weather has been causing havoc.

The site offers a 48 hour weather forecast with the option of receiving an SMS message warning about rough weather on any given address, so that the home owner or the farmer etc. may have time to take the necessary precautions.

The claims handler in the insurance company also has access to exactly the same weather data etc. as the claimant. Forsikringsvejret.dk is, as far as it is known, the only service of its kind in the world. Development and operation is paid by the insurance industry.

Weather app: Husets VejrAlarm

The DIA has developed an app for mobile phones that warns municipalities and individuals about the risk of heavy rain or storm on their specific property. This is combined with i.a. sound advice on prevention and ideas for the home owners if the damage has occurred. So far, more than 8000 persons have downloaded the app.

The Danish Insurance Association will continue to develop the app. The Danish Insurance Association has paid for the development, but expects to offer the municipalities free use of all the information, so that they may develop their own municipality app for the citizens containing targeted local information.



Norway

Climate adapted buildings and better planning in Norway

The Norwegian insurance companies participate in a governmental project called the Cities of the Future, in collaboration with the Government and the 13 largest cities (municipalities) in Norway. As a member, you commit yourself to work actively on reducing greenhouse gas emissions and share ideas, projects and results on how to meet the new challenges due to climate change.

Testing the usefulness of insurance claims data

In Norway- Finance Norway- which represents nearly all insurance companies operating in Norway, has initiated a pilot project in close cooperation with the municipalities. The main goal of this project is to check if the data available from the insurance companies is sufficient enough and good enough to help water utilities plants and area planners in the municipalities estimate damage due to extreme water and flooding events understand where in the city and in the systems the problems are and prevent them. The project is also financially supported by the Ministry of Environment/Cities of the Future. The Norwegian insurance companies find it both useful and rewarding to take an active part in the ongoing processes related to climate change.

Sweden

Conference

Insurance Sweden has also focused on how insurance companies can reduce the effects of climate change. This has been done through an insurance conference with focus on how the individual insurance company can reduce emissions on their own premises, focus on placing demands on partners and contractors, focus on living up to their responsibility both as property owners and as insurers, i.e. to use the possibility of reducing emissions through sustainable insurance products, focus on how to place their capital in a responsible way and finally in the claims handling process.

Report on how to prevent backflow in the sewage system

In cooperation with the Swedish Environmental Institute, Insurance Sweden has also produced a report on how to prevent backflow in the sewage system. Technical solutions are proposed on threatened properties. The report has been sent to all municipalities in Sweden. You can find the report [here](#) (hyperlink)⁴.

Finland

A national strategy for climate adaptation

The Agriculture Ministry (MMM) made its first programme for Climate Adaptation in Finland in 2005. Now, the ministry is updating this programme and the insurance branch is cooperating the work. Finland has work out a [national strategy for climate adaptation](#)⁵ (hyperlink).

6.3.1. Cooperation within the insurance companies

The four insurance companies Tryg, If, Codan and Gjensidige are cooperating on climate adaptation. Since 2010, the four companies have donated EUR 0.13 / DKK 1.00 per home insurance policy and the money goes to climate adaptation activities.

The above mentioned four companies have entered into cooperation with the research center Nord-Star at Aarhus University in Denmark, which conducts research in climate changes in the North. The cooperation is to result in a so-called visualization technology, which will for instance inform people looking to buy a new home, if the area in which they are looking to buy is frequently flooded at present, but also if it is likely to be flooded in future. Further information is available at: www.nord-star.info

6.3.2. Involvement from the Nordic governments

The involvement differs between the Nordic governments, which is probably due to the awareness of the threat of climate change. The Nordic governments have created substantial activities regarding reduction of the effect of water related damage, especially before the [IPCC](#)⁶ (Intergovernmental Panel on Climate Change) meeting in Copenhagen 2010. Their activities regarding adaptation differ however. Due to specific weather related events, the governments' activity has been greater in Denmark and Norway than in Finland and Sweden.

4 http://www.svenskforsakring.se/Global/Rapporter/Vattenskador%20orsakade%20av%20baktryck%20i%20avloppssystem_B2029_PA18%202012.pdf

5 <http://www.mmm.fi/sv/index/amnesomraden/miljo/ilmastopolitiikka/ilmastomuutos.html>

6 <http://www.ipcc.ch/>

In Denmark, the government has established a climate adaptation task force. The task force is responsible for advising the municipalities concerning the climate adaptation plans, and to ensure that the EU's flooding directive is implemented .

In April 2013, the Danish Minister for the Environment and the Danish Insurance Association entered into a new partnership focusing on solving the problems about insurability mentioned above in paragraph 6.1.9.

The Swedish government does not take an active part in the climate adaptation in Sweden. It is considered to be a question mainly for the municipalities.

In Norway, the official report NOU 2010:10 "Adapting to a changing climate" was published in 2010. In the report, the insurance industry was encouraged to take more preventive action regarding climate changes. The industry responded by initiating an ongoing pilot project, which is mentioned earlier in this report.

In May 2013, the government followed up the NOU by a white paper (Meld.St.33 (2012-2013) "Climate adaptation in Norway". In the paper, it was announced that the government will establish a law committee to look into the challenges of urban flooding, how it is regulated today and what can be done to improve the framework regulation for this area.

7. Comparative analysis

7.1. Levels and definitions

Definitions	Denmark	Finland	Norway	Sweden
7.1.a. Intense cloudburst	<p>DMI (Danish meteorological institute): early warning is 15 mm rain within 30 minutes.</p> <p>Insurance conditions ≥ 40 mm rain within 24 hours or ≥ 15 mm rain within 30 minutes.</p>	<p>FMI (Finnish meteorological institute): early warning on three levels: long term rain 50/70/120 mm/24 hours short term rain 20/30/45 mm/hour</p> <p>Insurance conditions non-binding standard policy conditions: exceptionally heavy rain 75 mm rain within 24 hours or 30 mm rain within one hour</p>	<p>NMI (Norwegian meteorological institute): An intense cloud burst is defined on the basis of 50 years rain intervals. Generally there is no metric requirement related to the insurance conditions.</p> <p>Insurance conditions No definition in the policy cover</p>	<p>SMHI (Swedish meteorological institute): Intense cloudburst is defined as 1 mm/minute or 50 mm within 60 minutes</p> <p>Insurance conditions 50 mm rain within 24 hours or 1mm rain /minute 30 mm rain within 30 minutes.</p>

7.1.b. Sudden thaw – break in frost	<p>There is no definition.</p> <p>The following elements are important: the amount of snow, the amount of downpour, wind conditions, and whether the melt water is drained normally in a standard-design sewer system.</p> <p>Insurance conditions:</p> <p>All companies offer a home insurance with minimum conditions and sudden thaw is therefore covered.</p>	<p>No definition.</p> <p>Insurance conditions:</p> <p>No cover</p>	<p>No definition.</p> <p>Insurance conditions:</p> <p>Thaw is not covered as it is not considered a “sudden and accidental” incident and it is therefore not unforeseeable that a house must be able to withstand heavy rain fall. However, if the rain causes damage due to back flow or water suddenly enters the house (e.g. through the cellar window), it is covered.</p>	<p>No specific definition, but it is covered in the insurance conditions under flooding.</p> <p>Insurance conditions:</p> <p>In Sweden, sudden thaw is not separately mentioned in the conditions, but the effect of sudden thaw is covered under flooding.</p>
7.1.c. Storm surge	<p>Flooding caused by extraordinary rise in sea levels, which takes place statistically rarer than every 20 years</p> <p>Damages are covered by the public storm surge scheme.</p> <p>DMI (Danish meteorological institute) sends early warnings.</p>	<p>Non-binding standard policy conditions:</p> <p>Exceptional sea level rise, which is caused by storm winds, air pressure variation or flow in Danish straits.</p> <p>Exceptional rise in the sea levels, which occurs once in 50 years or less.</p> <p>FMI warning at three levels:</p> <p>1, 5 and 20 year’s frequency, which differs from 65-175 cm.</p>	<p>Flooding caused by extraordinary rise in sea levels (Over the level of a 5 years return period).</p>	<p>Definition of high water level > 110 cm above normal water surface (def.: Very high water level), warning starts from 80 cm.</p>

7.1.d. Storm	<p>DMI (Danish meteorological institute): average wind speed > 24 m/s.</p> <p>Insurance conditions: Wind speed of more than 17.2 m/s.</p>	<p>FMI: wind speed in 10 min average; 21-32 m/s.</p> <p>Insurance conditions: E.g. average wind speed of more than 21 m/s.</p>	<p>Insurance conditions: Wind speed of more than 20.8 m/s.</p>	<p>Insurance conditions: Wind speed or wind gust of more than 21 m/s (Beaufort 10).</p>
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Levels	Denmark	Finland	Norway	Sweden
<p>7.1.e. The total amount of the insurance companies' compensation for:</p> <ul style="list-style-type: none"> All water damage (all types of damage, including non natural water damage, flood and damage covered by pools, etc.). Natural related water damage. Cloudburst 	<p>2009: EUR 257,387m / DKK 1,916.578m</p> <p>2010: EUR 344,801m / DKK 2,567.803m</p> <p>2011: EUR 894,000m / DKK 6,658.768m</p> <p>Water damage covered by the storm surge scheme (pool)</p> <p>2009: EUR 2,537m / DKK 18,9m</p> <p>2010: EUR 0,785m / DKK 5,9m</p> <p>2011: EUR 1,141m / DKK 8,5m</p> <p>2009: EUR 29,470m / DKK 219,443m</p> <p>2010: EUR 105,692m / DKK 787,109m</p> <p>2011: EUR 656,306m / DKK 4,890.139m</p> <p>2009: EUR 25,949m / DKK 193,222m</p> <p>2010: EUR 133,800/ DKK 996,740m</p> <p>2011: EUR 832,100m / DKK 6,2m</p>	<p>Not yet available.</p> <p>In special cases amounts totalled 8 million euros, e.g. in the town Pori in 2007.</p> <p>(Intense cloudburst).</p>	<p>All water damage:</p> <p>2009: EUR 83m / NOK 619m</p> <p>2010: EUR 132m / NOK 985m</p> <p>2011: EUR 234m / NOK 1,748m</p>	<p>All water damage</p> <p>2009: EUR 300m / SEK 2,668m</p> <p>2010: EUR 420m / SEK 3,765m</p> <p>2011: EUR 410m / SEK 3,618m</p>

Statistics	http://www.forsikringogpension.dk/presse/statistik_og_analyse/statistik/forsikring/Sider/start.aspxring and http://www.forsikringogpension.dk/presse/Statistik_og_Analyse/statistik/forsikring/erstatninger/Sider/Erstatninger_for_vandskader.aspx		Source: VASK: FNOs water damage statistics, www.fno.no/vask	From Insurance Sweden you must subscribe to receive such statistics. www.insurancsweden.se
7.1.f. Does a national strategy for climate adaptation exist?	Yes as from March 2008. <hr/>	Yes as from 2005. Finland's National Strategy for Adaptation to Climate Change http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/5kqhLfz0d/MMMjulkaisu2005_1a.pdf	NOU 2010:10 (green paper) and the Government followed up with a white paper in May 2013: http://www.regjeringen.no/nb/dep/md/dok/regpubl/stmeld/2012-2013/meld-st-33-20122013.html?id=725930	No.
7.1.g. What is the percentage of municipalities, which have developed a climate adaptation plan?	All municipalities must have a climate adaptation plan that can be send out to public hearing before November 2013. http://www.klimatilpasning.dk/kommuner/klimatilpasningsplaner.aspx	7 % of municipalities have executed a climate adaptation plan (2009) http://www.localfinland.fi/en/authorities/living-environment/climate-change/Pages/default.aspx	Up to 50 % of the municipalities have adopted guidelines for climate adaptation http://www.regjeringen.no/nb/sub/framtidensbyer/forside.html?id=551422	Sweden has 290 municipalities. A questionnaire was created in 2011 where out of a 170 responding municipalities 66 (39 per cent) has adopted guidelines or a policy for climate adaptation. 90 per cent of the 170 respondents state that they in some way or another are working towards adapting society (in terms of physical planning) to climate change.

7.1.h. Is the level for flooding in the terrain each year determined by the municipalities?	Yes, according to The Committee of sewage, document no. 16 – 28. For common sewer property- and industrial areas - the acceptable occurrence frequency for flooding =10 years. For separate sewer property- and industrial areas - the acceptable occurrence frequency for flooding = 5 years.	Recommendations for acceptable building levels in various areas are laid down by regional environmental centres.	Recommended by NVE**: Property shall be constructed for a 200 year flooding **NVE: Norges vassdrag- og energidirektorat (Norwegian Water) Resources and Energy Directorate: www.nve.no	No. It varies significantly between municipalities.
7.1.i. If yes, are the citizens familiar with these levels?	Not likely.	Not to a larger extent.	Not likely.	No.

1.1. Detection of heavy rain, flooding - early warning

	Denmark	Finland	Norway	Sweden
7.2.a. Is any kind of early warning system established in your country?	Yes. DMI (Danish meteorological institute www.dmi.dk), The Danish Insurance Association via www.Forsikringsvejret.dk and a few insurance companies offer an early warning system (based on text message) and the application "Husets VejrAlarm".	Yes, FMI has established unusual rain and sea level warnings. www.environment.fi includes warning information about floods.	NVE+ MET (Meteorological Institute) – send out early warning prognoses for flooding and flow of water www.nve.no http://www.nve.no/no/Flom-og-skred/Farekartlegging/Flomsonekart/ http://met.no/ (weather forecast) http://www.varsom.no/	Yes, Sveriges Metrologiska och Hydrologiska Institut (SMHI) has an early warning system in three stages. www.smhi.se

	Denmark	Finland	Norway	Sweden
7.2.b. Do you have a public website related to climate/weather with information on how to prevent water damage?	Yes. http://klimatilpasning.dk/en-us/Sider/ClimateChangeAdaptation.aspx www.dmi.dk www.stormraadet.dk	Yes, on the website of Finland's environmental administration http://www.ymparisto.fi/default.asp?contentid=158898&lan=fi	http://www.regjeringen.no/nb/sub/framtidensbyer/forside.html?id=551422 http://www.regjeringen.no/nb/dep/md/kampanjer/klimatilpasning-norge-2.html?id=539980 http://www.dsb.no/no/Ansvarsomrader/Nasjonal-beredskap/ http://www.nve.no/no/Flom-og-skred/	There are several websites both from authorities and from municipalities, but no official website from the government. http://www.smhi.se/klimatanpassningsportalen
7.2.c. Are public pipes insurable?	Yes.	Yes.	Liability insurance (offered by the insurance market)	Only through liability insurance, but it would theoretically be possible to insure service pipes. No demand for such insurance today.
7.2.d. Are private pipes insurable?	Yes.	Yes. Generally the pipes are insured as part of standard real estate insurance, they are not insurable separately. The rules of normal civil procedure and administrative procedure can be applied to any disputes regarding the questions of burden of proof.	Yes, but deduction is made due to age.	Yes, private pipes are included in the home insurance both as property and under liability.

1.2. Coverage – insurance and public settlements

	Denmark	Finland	Norway	Sweden
7.3.a. Is it possible to insure damage caused by:				
- flooding?	<p>Yes. Standard insurance products.</p> <p>A few companies offer extended coverage, but still excluding cover of cloudburst damage.</p>	<p>Yes, flooding from lakes, rivers, creeks and ditches or sea, if it is caused by exceptional rain or high water levels.</p> <p>Occurrence frequency for floods is 50 years or less (non-binding standard policy conditions for flood 2009)</p>	<p>Covered under the "fire insurance" /home policy by law. Each insurance company is liable in proportion to its market share. The premium is set by the Natural Perils Pool which also coordinates the natural perils claims. For more info- see www.naturskade.no</p>	<p>Yes in standard comprehensive insurance conditions</p>
- storm surge?	<p>Damage is covered by the public storm surge scheme.</p> <p>Flooding caused by extraordinary rise in sea levels, which takes place statistically rarer than every 20 years</p>	<p>Yes.</p>	<p>Natural Peril Pool/NPP</p>	<p>Yes, in standard comprehensive insurance conditions</p>
- water from the lake/stream?	<p>Damage is covered by the public storm surge scheme.</p>	<p>Yes.</p>	<p>Natural Peril Pool/NPP</p>	<p>Yes, in standard comprehensive insurance conditions</p>
- uprising sewage?	<p>Yes.</p>	<p>Yes.</p>	<p>Yes – home insurance</p>	<p>Yes, in standard comprehensive insurance conditions</p>
- water running into the basement from the garden?	<p>Yes.</p>	<p>Yes.</p>	<p>Same – see above</p>	<p>Yes, in standard comprehensive insurance conditions</p>
- heavy rain (rain not considered as a cloud burst)	<p>Yes. There are different kinds of insurance products (standard and extended). It is possible to cover "normal rain" and "heavy rain".</p>	<p>Yes.</p>	<p>Yes. There are different kinds of insurance products (standard and extended). It is possible to cover "normal rain" and "heavy rain".</p>	<p>Yes, but not through roof or walls. However, flooding through vents, windows or doors is accepted.</p>

	Denmark	Finland	Norway	Sweden
7.3.b. Do you have a public settlement scheme to cover storm surge damage?	Yes. www.stormraadet.dk	No, insurable through private insurance.	Natural Peril Pool and State fond for natural peril damage (covers what the pool does not cover)	No, insurable through private insurance.
7.3.c. Do you have a public settlement scheme to cover flooding?	Yes – damage generated by prolonged heavy rainfalls that have lead to flooding of streams and lakes are covered. The flooding must have occurrence frequency of 20 years.	Yes, for flooding of streams and lakes. The flooding must have occurrence frequency of 20 years. This state flood cover system is going to be repealed in the beginning of 2014.	Same/see above.	No, insurable through private insurance.

1.3. Degree of differentiation/standardisation of insurance conditions

	Denmark	Finland	Norway	Sweden
7.4.a. Do all or some companies offer standard products (identical insurance conditions) or products with minimum conditions concerning:				
- intense cloudburst	All companies offer a home insurance with minimum conditions (the insurance is based on an agreement between the DIA and The Consumer Council). Intense cloudburst is covered. http://www.forsikringogpension.dk/medlemmer/branchesamarbejde/forbrugersforsikringer/Sider/familiens-basisforsikring.aspx	Some companies offer cover.	Yes, if the consequence of the rain is urban and land flooding which cause damage.	Yes, mostly included.
- sudden thaw	Sudden thaw is covered under the home insurance and the insurance of	No.	Yes – if penetrating property	Yes, mostly included.

	Denmark	Finland	Norway	Sweden
	<p>buildings.</p> <p>Sudden thaw is defined differently in the insurance companies' policy terms. Therefore, it is up to each company to determine whether the damage is covered.</p>		<p>suddenly from outside.</p> <p>Sudden thaw is defined differently in the insurance companies' policy terms. Therefore, it is up to each company to determine whether the damage is covered.</p>	
- storm	All companies offer a home insurance with minimum conditions (the insurance is based on an agreement between DIA and The Consumer Council). Storm is covered.	All companies offer storm coverage in home insurances.	Yes – via the Natural Peril Pool/NPP.	Yes, mostly included.
- storm surge	<p>Standard products. No insurance coverage.</p> <p>Storm surge is covered by a national settlement – a State-guaranteed special cover that must be included in all fire insurance policies (except from automobiles and boats).</p>	Yes.	Yes – via the Natural Peril Pool/NPP.	Yes, mostly included.
7.4.b. It is possible to take out an insurance policy with a supplementary coverage regarding water damage?	Yes.	Yes, but it differs between companies.	Yes, but the definitions vary between companies.	Differs between companies.
7.4.c. Is there some type of water damage for which insurance is compulsory?	No, but the home owner is obliged to pay a small amount to the public storm surge scheme through the fire insurance police.	No.	NPP (natural perils), otherwise no.	No, but water damage is included in the standard package policy.

1.4. Properties on risk - vulnerability, economics

	Denmark	Finland	Norway	Sweden
7.5.a. Is it possible to find information in a public register about flooding risk on a certain property?	Yes. In the BBR-register information about the number of paid damage from extreme flooding from streams, lakes and sea is available. http://www.bbr.dk/ The municipalities can to some extent also be helpful with information concerning floods.	Yes, flood maps on a website of Finland's environmental administration http://www.ymparisto.fi/default.asp?contentid=381917&lan=FI	Yes, flooding forecasting system and maps www.nve.no	No.
7.5.b. Is the buyer informed about any flooding risk when buying a property?	The owner of the property is obligated to answer questions in the home condition report about knowledge to earlier flooding. It is non-compulsory whether the owner wants to have a home condition report or not.	Probably not.	This is not part of the information given to the buyer. However, if the buyer asks, the seller is obliged by law to give all relevant information.	No. But seller and broker is obliged to answer sincerely upon request
7.5.c. Do the municipalities take the risk of flooding into consideration when they subdivide the land?	The municipalities should consider the flooding risk.	The municipalities should consider flood risks according to law.	Yes, the municipalities have to consider the flooding risk in relation to the Mandatory Risk and Vulnerability Analysis (ROS).	According to law the municipals shall take any risk into consideration.
7.5.d. Can the municipality refuse a planning permission because of the future expected flooding risk?	Yes.	Yes.	Yes, but since it is the municipality that decides the planning, it will be the Regional Authorities (Fylkesmannen) who eventually rejects the plan – this is becoming more common.	Yes, it is the municipality who gives the planning permission.

7.5.e. Are there examples of the municipalities having chosen to demolish a property because of the flooding risk in stead of rebuilding it?	Yes in Odense. http://www.danskekommuner.dk/Nyhedsarkiv/2011/juli/06/Nedrivning-forhindrer-oversvømmelser/	No.	Not that we are aware of/unlikely.	Yes, it has happened, but it is rare.
7.5.f. Do areas exist where property value has decreased due to the risk of flooding?	Yes – this is getting more and more common in Denmark.	Not yet.	Not that we are aware of.	No.
7.5.g. Are there examples of insurance companies that refuse to write insurance for properties because of the flooding risk?	Yes, and some companies have also increased the premiums and changed the insurance conditions for the property owners. Especially insurance of basements.	No, not yet.	Land flooding: automatically covered by the Natural Perils pool. Urban flooding (overvann): up to each insurance company to decide. No refusal at the moment.	There are a few cases where flooding has been excluded from personal lines. It has also happened in relation to commercial property.
7.5.h. Do you think it will happen in the future?	Yes.	Yes, especially after year 2013.	This will depend on future developments, (and if the climate is no longer "unforeseeable" - a condition to insure).	Yes.

1.5. Legislation – division of responsibility

	Denmark	Finland	Norway	Sweden
7.6.a. Is the water environment regulated in a principle act?	<p>The water environment is regulated in several principle acts. Each act has its own aim (drinking water, bathing water, wastewater, ground water etc.).</p> <p>http://www.naturstyrelsen.dk/Vandet/lovstof.htm</p>	<p>Yes, in several principle acts. Main acts are Water Act (587/2011), Environmental Protection Act (86/2000) and Water Services Act (119/2001).</p> <p>www.finlex.fi</p>	<p>Similar to Denmark; spread out onto various acts. The main provision for liability is § 24a in the Pollution Act (LOV-1981-03-13-6)</p> <p>www.lovdata.no</p> <p>In 2013, the government decided to form a public committee to look at questions concerning urban flooding and (sewer back up).</p>	<p>Environmental Act</p> <p>Water Service Act (2006:412)</p> <p>Planning and build Act (2010:900)</p>
7.6.b. Is the responsibility for the sewer system divided between the municipality and others?	<p>The municipalities have the overall responsibility for the well-functioning and correct sizing of the sewer system outside the land register.</p> <p>Within the land register, the property owner has the responsibility for the private drain pipes. As an exception this can be changed because of the registration.</p>	<p>The municipalities have the overall responsibility for the sewer system. From the border to the house the property owner is responsible.</p>	<p>The municipalities have the overall responsibility for the well-functioning and correct sizing of the sewer system outside the land register.</p> <p>Within the land register, the property owner has the responsibility for the private drain pipes.</p>	<p>The municipality has the responsibility for pumps and sewage systems to the private property. From the border to the house, the property owner is responsible.</p>
7.6.c. Are the property owners obligated by law to adapt to climate change?	<p>No not unless required to do so due to construction demands by the municipality.</p>	<p>No.</p>	<p>No not unless required to do so due to construction demands by the municipality.</p>	<p>No.</p>
7.6.d. Do standards for maintaining the sewer system exist?	<p>Yes.</p> <p>http://www.kloakviden.dk/love_og_bekendtgørelser.htm</p>	<p>No.</p>	<p>Yes.</p> <p>http://www.standard.no/no/Sok-og-kiop/Sokeresultater.htm</p>	<p>No each municipality has its own standard.</p>

	Denmark	Finland	Norway	Sweden
7.6.e. Do standards for maintaining the service pipes exist?	Yes. For municipalities and for the individual sewer contractor: http://www.kloakviden.dk/love_og_bekendtgørelser.htm	No.	No, but there are standard made to help the municipalities. http://www.norskvann.no/component/content/article/12-kompetanse/rapporter/513-ny-rapport-dimensjonering-og-utforming-av-va-transportssystem	No each municipality has its own standard.
7.6.f. What are the main conditions to be fulfilled in order to bring charges against the municipalities (remedy)?	<p>Main conditions:</p> <ul style="list-style-type: none"> liability economic loss causal explanation proximate cause limitation of damage. <p>Flooding caused by faulty dimensioning of pipes (liability: culpa)</p> <p>Flooding caused by capacity-problems in the sewer system (liability: culpa).</p> <p>There is a strict liability concerning pipeline-burst caused by a material defect.</p> <p>In case of lack of contingency plans in the event of heavy rain – the municipality may be liable. Special circumstances must be present.</p>	<p>Possible liability for damages can be based e.g. on Damages Act (412/1974) and The Land Use and Building Act (132/1999). www.finlex.fi</p>	<p>The responsibility of the municipalities has undergone changes due to recent court cases.</p> <p>Damage due to insufficient maintenance of pipes: the municipalities are strictly liable.</p> <p>Damage due to lack of capacity in the pipes: the claimant (home owner) must prove liability</p> <p>Heavy rain: according to the court the municipalities are not liable when the rainfall exceeds the 50 years interval.</p>	<p>Municipality is responsible for sufficient dimensioning of the pipes or if the pipes are insufficient in any other way. Due to the Water Service act and court cases the municipality is responsible for back-flow in sewage system.</p>

	Denmark	Finland	Norway	Sweden
7.6.g. Does the tax system include incentives for the property owners to adapt to the climate change?	Yes – deduction when establishing a fascine or the like.	No, at least we are not aware of that.	Can get reduction in investments, however mainly linked to CO2, see http://www.enok.no/	No.
7.6.h. Are the property owners or other insurance groups obligated to pay a specific annual tax for storm surge?	Yes. An annual tax of DKK 30,00. (Act on Compensation for Damages Caused by Storm).	No.	No.	No.
7.6.i. Does the building regulation address the need for climate adaptation?	Yes – to some extent. For instance the building code.	Yes, for instance the building code.	Yes. New climate related regulations in the building code.	No not directly. According to the Planning and build Act, the municipalities shall take all risk into consideration.

1.6. Prevention of water damage

	Denmark	Finland	Norway	Sweden
7.7.a. Examples of prevention of water on surface made by the individual?	Backwater valve Rain reservoir	Some flood defences, but they are made by the municipal.	Green roofs. But few think of this as their task.	Not aware of individual examples. Prevention is becoming more frequent in new building areas but is included in the planning process.

7.7.b. The most common examples of prevention initiatives taken by the municipalities?	<p>Mapping, dikes, drainage passages, backwater valves, floodgates.</p> <p>The majority of the municipalities identify sewage/wastewater and planning as their areas of priority with regard to climate change adaptation efforts in the years to come.</p>	Not yet many examples, but some canals and run off areas have been created. Flood mapping is also going on as well as flood information releases.	Flood roads, rain beds, green roofs, climate adaptation analysis, New legal requirements for the municipalities to analyse risk and vulnerable areas, marshy land and infiltration, GIS (Geographic Information System).	<p>Run off areas to slow flow of water, ponds, canals, flooding green areas and green roofs.</p> <p>Swedish Water Report P105 in 2011 – "Hållbar dag- och dränvattenhantering".</p>
7.7.c. Examples of prevention of water in public pipes?	A common, strategy with a catalogue of efforts and contingency plan. Television inspection of the sewer system.	Smart Alarm which alarms of a high water level in pipes.	Many municipalities, especially containing larger cities are now opening up old "flood roads" as the pipes can not take any more water.	Pumps, backwater valve, TV inspection in sewage system.
7.7.d. Is it a requirement in certain areas to establish a fascine/drain etc.?	Yes – some companies require that the property owner establish a drain.	No.	No requirement as of today.	No requirement, but often done if risk is recognised.
7.7.e. To what extent are initiatives launched by the insurance companies to prevent water damage?	<p>To a large extent.</p> <p>The insurance companies/the DIA have developed a website with good advice, www.forsikringsvejret.dk the application "Husets VejrAlarm" and a rain-project, where the insurance companies contribute with insurance data about the damage. Information to customers and municipalities.</p>	To a limited extent, e.g. valves in drains and the size of pipes.	Some insurance companies are sending out weather warnings on cell phone to their customers.	<p>Initiative on Height data base Back Flow study (IVL Report B2029 Mars 2012)</p> <p>Information to customers and municipalities. Subsidise backwater valves.</p>

7.7.f. To what extent are initiatives launched by the municipalities to prevent water damage?	It varies depending on the location. Some municipalities have launched a lot of initiatives. Work is in progress to map and establish strategies, as well as to establish measures on how to manage increased water volumes. A few municipalities are establishing measures in other areas and many municipalities lack knowledge and tools. http://klimatilpasning.dk/en-us/Sider/ClimateChangeAdaptation.aspx	Work is in progress.	The larger municipalities who have resources (and many claims) have launched a lot of initiatives. But this is mainly the "water and sewage" department. The planning departments are less "active". Work is in progress to map and establish strategies, as well as to establish measures on how to manage increased water volumes. Many municipalities lack knowledge and tools/local mapping.	Differs considerably since awareness of risk is not assessed in many municipalities
7.7.g. The most common examples of preventative measures taken by the citizens?	Rainwater-reservoir, raised bed, fascine, drain.	Nothing yet.	Raised bed, valves.	Pipes from roof disconnected from sewage system. Run off areas to slow flow of water, ponds, canals, flooding green areas, green roofs.
7.7.h. Are there examples where the insurance companies cooperate with the government – in Public Private Partnerships – in launching preventive initiatives?	Not yet.	RAVAKE (2013) Finnish Meteorological Institute has developed Heavy Rainfall Warning Process with insurance industry, the municipality and the government	Finance Norway is a member of "Cities of the Future" (a Government initiated and financed cooperation) A pilot project on sharing insurance claim data (initiated by insurance, supported by the Government)	Insurance Sweden and the government financing Swedish Environmental Institutes. Back Flow study (IVL Report B2029 Mars 2012)
7.7.i. Remedy opposite municipalities: Is it possible for the insurance company to enter into the rights of the claimant?	Yes	Yes	Yes.	Yes

7.7.j. Which burden of proof should the insurance company satisfy?	<p>Liability for dimensioning of drainage systems = fault based liability.</p> <p>Liability for operations and maintenance = fault based liability</p> <p>Liability for failure to initiate necessary measures against extreme rain = wastewater utility companies undoubtedly have an obligation to have appropriate contingency plans ready in case of extreme rain.</p>	Matters relating to rules on burden of proof are subject to normal Finnish civil law procedure. Basically, the claimant has to prove that the liable authority failed to fulfill its maintenance responsibilities (for example).	<p>Liability for dimensioning of drainage systems = fault based liability.</p> <p>Liability for operations and maintenance – based on strict liability</p> <p>Necessary measures: same as Denmark</p>	<p>The insurance company has to prove that the damage was caused by water entering e.g. as backflow from the drainpipe. If the insurance company can fulfil its burden of proof, the municipality has to prove that the dimension of the drainage systems is sufficient or that the maintenance is properly done in order to avoid liability.</p> <p>The liability for the municipality is close to strict.</p>
7.7.k. Has an insurer presented a matter of liability in connection with water damage in court?	Yes.	At least one relating case was settled in an out-of-court procedure several years ago.	Yes, 3 main Supreme Court decisions. . (One in 2007 and two in 2011)	Yes.
7.7.l. If yes, did the insurance companies win?	Yes, partly. In the case UfR 2002.639 V the municipality was deemed responsible for culpable conduct in connection with damage due to flooding of a clogged sewer pipe.	Unfortunately it cannot be specified.	Partly. But insurance companies are on "both sides of the table" as the municipalities have liability cover.	Some of the cases were won and some were lost. Some cases were settled. Important cases decided in the High Court of Justice are NJA 1993 page 764 and NJA 1997 page 468. These cases went in the insurance companies favor.

1.7. Pricing of insurance/risk assessment

	Denmark	Finland	Norway	Sweden
7.8.a. To what extent is insurance companies' pricing based on individual risk assessment (rather than standard/list prices)?	This is getting more and more common (depending of postal code, year of construction and the number of floors, with or without basement and the flooding risk etc.).	At the moment pricing is based on the risk with the total insurance. No individual risk assessment concerning floods. This will probably change in the future.	Yes, to a large extent in the private sector, less in the insurance companies.	Pricing is based on the risks with the total comprehensive insurance. No individual risk assessment on flooding concerning consumer and SME insurances. Commercial/Industrial insurance is individually risk based.

	Denmark	Finland	Norway	Sweden
7.8.b. Does the location of the property have any influence on the premium?	Yes – this is getting more and more normal. Yes- and also the size of the deductible.	Not yet.	Yes, this is getting more normal.	Yes.
7.8.c. Do you have numbers for the combined ratio for water damages?	No.	No.	No.	No.
7.8.d. Are there areas where premiums are automatically adjusted for the risk of water damages?	Yes - some companies have adjusted the premiums.	No.	Assessments done regularly in the companies due to increasing water damages. More common concerning commercial/industrial lines.	No.
7.8.e. Is it possible to achieve a reduction in the premium by taking preventive measures?	Yes – in some cases. For instance by installing a backwater valve	No, not yet.	Partly private insurance (magnetic backwater valve).	Not generally concerning consumer insurance, but it can occur to exposed areas. It is more common concerning commercial/industrial lines.
7.8.f. Is the installment of a drain/fascine a condition in order to be able to take out an insurance policy?	In some cases yes. After the heavy cloudburst 2/7- 2011 some companies have changed their conditions – and demand that the policyholder take action. It depends on the location, how often the property has been flooded etc.	No, but it may be a condition in order to receive insurance compensation.	No.	No.
7.8.g. Is a "green roof" insurable?	Yes, but it is rare and on case-by-case basis.	Yes, but it is rare and on case-by-case basis.	Yes, but it is rare and on case-by-case basis.	Yes.