

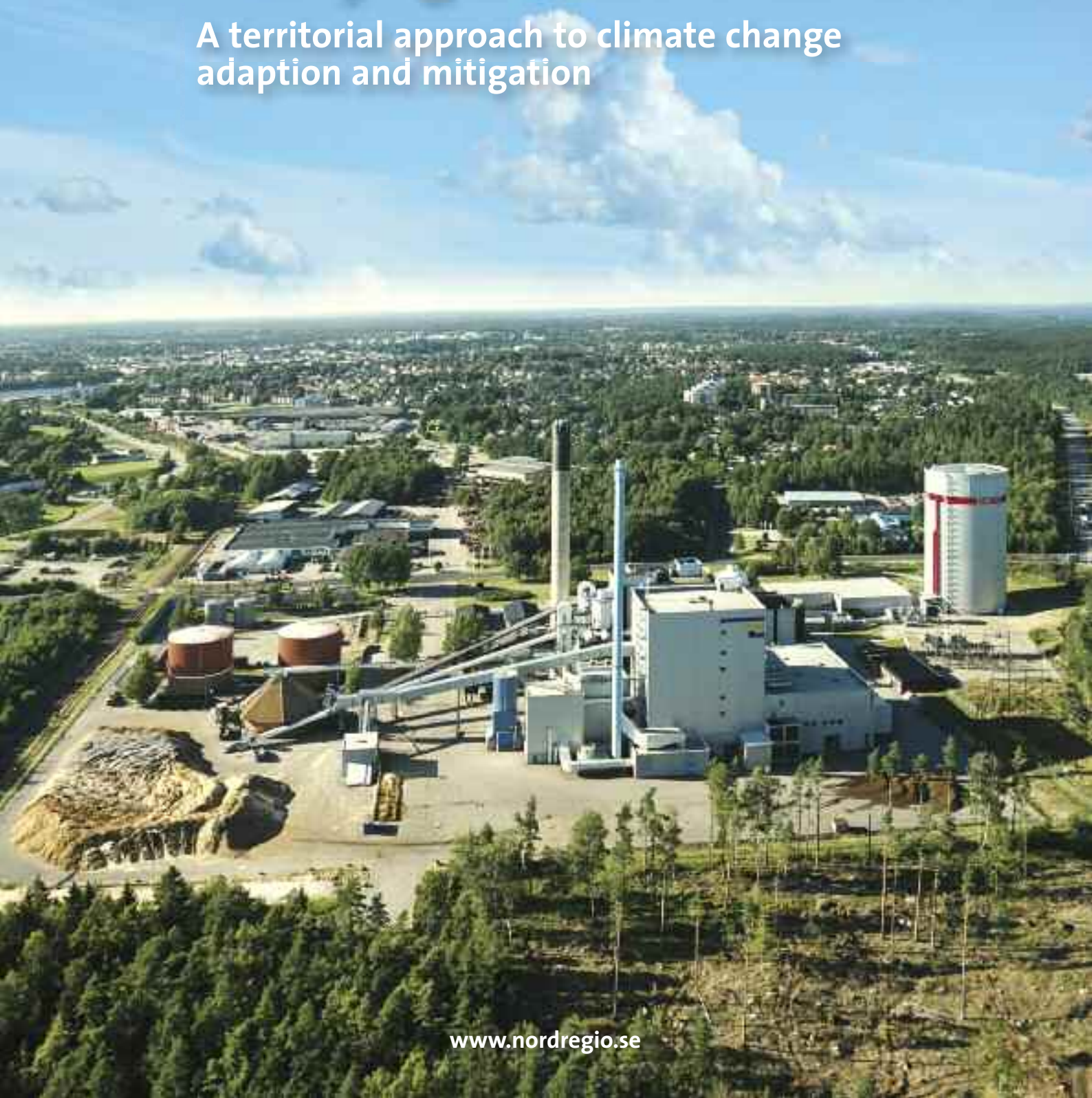


JOURNAL OF NORDREGIO

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- Växjö greenest in Norden

A territorial approach to climate change
adaption and mitigation



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Front page: In terms of greening maybe the most impressive achievements of the Nordic countries so far has been the extensive building of smaller heat and electricity plants burning local left-overs and rubbish. The photo show such a plant in Växjö, the “greenest” city in Europe. Photo provided by Växjö municipality.

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Nordregio is a centre for research, education and documentation on spatial development, established by the Nordic Council of Ministers.

“Adaptigation”

A municipality decides to plant a new forest along a local river. Is this a mitigation response to climate change, or an example of adaptation? We would see it as both, at the same time, and the integrated planning required for this is what we call adaptigation.

A conclusion from our recent research on the varieties of climate change response is that the separation of planning for mitigation and for adaptation is becoming obsolete. In studying how different administrations have acted with regard to climate change there has recently been a dramatic emphasis on adaptation policy. This comes after years of focusing almost exclusively on mitigation activity. Such radical shifts in emphasis have at times led to contradictory measures. Let’s consider for a moment what the two terms mean.

The most authoritative and exhaustive source of knowledge about climate change is the Intergovernmental Panel on Climate Change, or IPCC. According to the IPCC, “Mitigation means implementing policies to reduce greenhouse gas emissions and enhance sinks.” When it comes to our new forest, it helps to reduce greenhouse gas emissions by storing carbon in its biomass; it is a sink. Climate change is mitigated.

When it comes to adaptation, the IPCC states, “Adaptation means initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects.” Our new forest helps to strengthen the riverbanks against the increased rainfall that is anticipated from climate change. We are adapting to the hazards of climate change.

Good planning integrates both perspectives. As anybody who has ever tried to integrate anything knows, the process of doing so is different from simply combining them. The concept of synergy is just one example of the qualitative difference implied. In order to signal this insight about integration in planning for climate change, we have coined the term “adaptigation.” Adaptigation is a response to climate change that integrates a focus on adaptation with a focus on mitigation, to avoid conflicts and create synergies (Langlais, 2009; Langlais & Dymén, 2009). Seeing a forest as both an adaptation—it buffers the impact of flooding—and as mitigation—it absorbs carbon—is smart planning.

Looking for adaptigation-smart alternatives helps us to avoid conflicts, too. Planning greater housing density, for example, might be good as mitigation, by reducing transportation needs, but might also result in filling in green areas that otherwise are good for adaptation. Keeping adaptigation in mind at least alerts us to potential conflicts and helps us to “think outside the box.” We might decide to keep just a part of the forest, but have more trees on the rooftops. While these are all just examples, the important insight remains: adaptation and mitigation can be outcomes of the same measures, and an integrated approach is probably more sustainable.



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Nordic responses to climate change



Transport - the difficult challenge

The rest of the world sees the Nordic countries as leaders in green thinking, whether on sustainability, the environment, or climate change. Indeed, as this issue of the Journal goes to press, the world's attention is focused on Denmark and the Copenhagen climate change meeting, COP 15. Another Nordic country, Sweden, is chairing the meeting, since it holds the current presidency of the European Union. The "Nordic flavour" of COP 15 is not lost on anyone. But, what is it that the Nordic countries really can show the world when it comes calling?

Efforts to reduce CO₂-emissions, for example, have a long history on the Nordic agenda. Energy is in the main used for transportation, heating and industrial production. What is it possible to save on energy and reduce greenhouse gas emissions? The Nordic countries in fact introduced taxes on such emissions back in the early 1990s. It was "out" with oil and "in" with rubbish and the leftovers from the forest-industry and even the agricultural sector. The emissions taxes put in place made such changes even more profitable.

A practical example of what such changes have led to is evident in the small Swedish city of Växjö (see pp 6-9), which has been acclaimed as the "greenest" city in Europe. The reportage highlights key lessons for climate adaptation and mitigation at the local level.

In Växjö, the change in emphasis in energy production spurred the expansion of the city's heat- and electricity-generation plant. With that, the city not only became much "greener," but was able to do so without reducing its energy consumption. In fact, its energy consumption has grown, roughly in line with population expansion.

A rapidly growing number of Nordic communities are now experiencing something similar. Most common is the construction of refuse-burning district heating plants. To avoid pollution at the same time as remaining financially viable, a minimum number of users are necessary.

Many other communities, however, have still not fully applied this technology – particularly in the combination of electricity and heat generation. On the other hand, it is probably only a matter of time before the application of this technology reaches its saturation point. Stockholm, for example, claims that by 2020 it will be using almost no oil for heating at all. (*Dagens Nyheter* 26/11/09).

Almost all new buildings in the Nordic countries consume less energy than has been the norm. This is primarily because they are much better insulated and wind-tightened. Recapturing of heat through the ventilation systems also reduces the need for external energy supplies. Similar gains are achieved, although on a smaller scale, through solar heating, heat pumps etc. Changes in building regulations combined with the need for economic savings are the driving forces here.

For the older building stock the actual energy-consumption in many houses would be cut almost in half by insulating better. This measure alone provides the potential for reductions in the national consumption level by maybe as much as 15%. Progress for this type of energy-reduction is however rather slow.

Regarding territorial matters, a major issue on the climate agenda is the question of how to plan and build our cities. As indicated in the Journal No 2-09, some cities think that as long as they build densely (and often high) things are going in the right direction. Their main argument is saving on transport. Of the Nordic capitals, Oslo and, to some extent, Stockholm, are those that adhere most to this philosophy.

It is likely that this drive for densification will increase city-centre temperatures in the summer, while also providing ready-made conduits for ice-cold winds in the winter. This is one of the questions raised in the article on pp 24-25.

For most communities without heavy industries, contributing to mitigation of climate change is more than anything the reduction of emissions from the transport sector. A growing number of municipalities, including Växjö, are currently constructing new plants for the production of vehicle fuel. In Malmö (pp 14-17) for example, all the city's buses already run on non-fossil fuel.

Many owners of private cars would also like to switch to such fuels assuming that they do of course not cost more. The raw material needed for their production, however, is often not readily available. To what extent wooded areas should be used for timber, cellulose, or the production of this type of fuel, remains unclear.

This is not only an economic issue but also a question of societal priorities. So far, political debate of this issue particularly at the national level, has been sparse. On this and numerous other climate change-related issues, the participants from around the world who come to the COP 15 meetings will find much to puzzle over in the Nordic approach to climate change. Our hope is that they will both bring something constructive of their own to the table and leave with good impressions of the Nordic approach intact.



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First global exercise in climate-consultation

On the 26th of September 2009 simultaneous exercise in global citizen consultation on global warming was undertaken in 38 countries across Europe, North America, South America, Africa, Asia and Oceania. The message from the participants was clear, they demanded strong action at the COP 15 – the United Nations Climate Change Conference in Copenhagen, due to be held in December 2009.

The idea behind the project is that citizens across the world will have to live with climate change as well as with the decisions taken by world leaders at the COP 15 and thus it is fair to involve citizens in these deliberative processes. The Swedish partner in the World Wide Views alliance is Nordregio.

Nordregio chose to undertake the citizen consultation event in Borlänge in collaboration with the Municipal Council which had already displayed the ability to take concrete action in its climate change response plan. Fifty two citizens, led by facilitators, met in Borlänge to discuss in groups, and then individually vote on 4 different themes related to climate change and global warming.

The chosen themes are directly relevant to the COP 15 negotiations. All countries followed the same method for recruitment and deliberation, in order to be better able to compare the results between countries afterwards. The 4 different themes were as follows:

- Climate change and its consequences
- Long-term goal and urgency
- Dealing with greenhouse gas emissions
- The economy of technology and adaptation

The general conclusions demonstrate that the Swedish participants believe that climate change is an urgent and important question on the political agenda. Somewhat surprising however the Swedish results show that 100% of the participating citizens think that it is urgent to do a global climate deal at COP 15, and 100% think that Swedish politicians should sign the contract. The figures for Sweden's closest neighbours were broadly comparable while for the UK they were slightly less.

The level of knowledge among the participating citizens in Sweden as well as the level of concern regarding global warming is slightly higher as compared to the average for other northern European countries. In Sweden 52% of the participants knew a lot about climate change before joining WWViews, compared to the northern European average of 43%.

The same goes for the level of concern where 67% of Swedish participants are very concerned about climate change compared to the average of 50% in the rest of northern Europe. In Denmark only 27% of participants were very concerned.

Not surprisingly however, low income countries are much more concerned, with 86% of the participants being very concerned about climate change. One explanation here is that the consequences of climate change are harder to deal with in

developing countries given the reality of less resources and infrastructure being available for adaptation.

When it comes to the question of justice and the distribution of resources worldwide the Swedish participants in general believe that countries that do not meet their commitments under a new climate deal should be subjected to a severe or significant punishment. In Sweden 61% of the participants thought the punishment should be severe compared to 48% globally and 51% in the rest of northern Europe.

Moreover, in general, Swedish participants were less understanding of the problems faced by the developing countries when compared to the northern European average, insisting that they should also significantly contribute to emission reductions, (see figure 1).

Perhaps even more interesting is the fact that participants among the least developed countries – such as Tanzania, Uganda and the Maldives - to a larger extent than participants from the northern European countries argue that the lower income developing countries should have the same emission targets as the developed ones. Among the participants in the least developed countries 19% voted for the above mentioned statement as compared to only 7% among northern European participants.

In addition, the Swedish participants think in general that all countries except for the least developed ones should be committed by a new climate deal to pay for climate change adaptation and the reduction of greenhouse gas emissions. 27% voted that all countries should be committed and 67% voted that all countries except the least developed ones should be committed to pay by a new climate deal. In Northern Europe the equivalent figures are 26% for all countries and 64% for all countries except for the least developed ones.

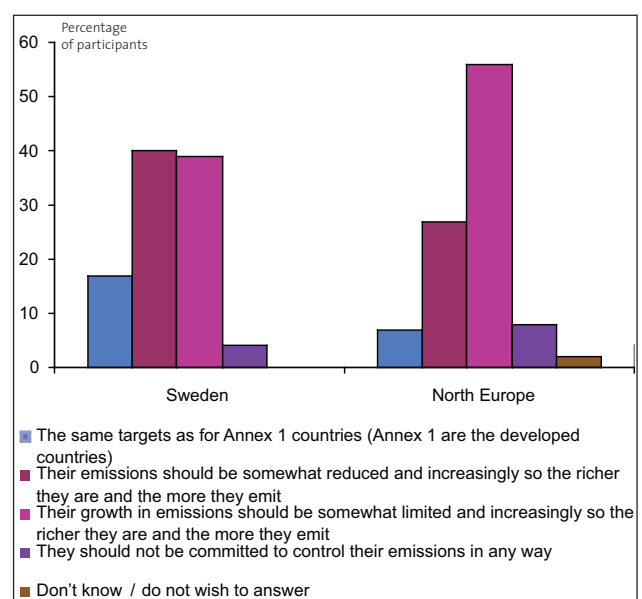


Figure 1: What do you think the short term target should be for lower income developing countries?

Somewhat surprising however the least developed countries voted similarly. Of the least developed countries 28% voted that all countries should be committed to pay and 56% that all countries except for the least developed ones should pay. What we can see in general is that participants in both the developed and the least developed countries have similar thoughts and ideas about who should contribute or not to a new climate deal.

At the end of the day there was an additional session that allowed each group, consisting generally of five citizens, to formulate their own recommendations for the COP 15 delegates. The recommendations which received most votes in each of the participating Nordic countries all mainly focus on climate change mitigation as compared to climate change adaptation (See box 1). Sweden and Denmark focus on the urgency of reducing greenhouse gas emissions, whereas Norway focuses on introducing fuel taxes which should be used to introduce a UN governed carbon fund. Finland focuses on the introduction of a carbon footprint calculation.

The results of the citizen consultation process in Borlänge and in all other countries will be presented to the world's decision-makers at the COP 15 through the Danish Minister of Climate and Energy – Connie Hedegaard – who is also the ‘ambassador’ for the project. World Wide Views on Global Warming consists of partners from 38 countries from all continents and is led by the Danish Board of Technology. The results of the consultations were instantly uploaded for comparison during the WWViews day and can be found on www.wwviews.org.

To conclude then, it is important to understand that when comparing results between different countries one should recall that even though all countries had the ambition to follow the same recruitment criteria, including participation from citizens with diverse demographic characteristics, the citizens that finally participated do not necessarily represent the opinions of the general public in these countries. Recruiting citizens that are indifferent or very sceptical to climate change is not an easy task and we can, at least in the Swedish case, state that such people were underrepresented. Finally the very small sample size used for each country again suggests that caution should be used in attempting to chart the significance of cross-national differences in responses which may in the end represent only very small differences in the number of votes cast.



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The Swedish citizen exercise received good local and national media visibility. The national daily newspaper *Dagens Nyheter* (see above) reported several times from WWViews and initiated a public debate. More than 250 persons commented on the articles at www.dn.se

Quotes from the Nordic recommendations

Sweden: “Be brave! Take far-reaching and binding decisions regarding large emission reductions now!”

Denmark: “Reduce greenhouse gasses Now! Make all countries accede to an agreement on greenhouse gas reductions”

Norway: “Introduce international CO₂ taxes on fossil fuels - taxes that among others will curb international air transport. The taxes should go to a UN-governed carbon fund.”

Finland: “Carbon footprint on every product! Carbon footprint is calculated throughout the life cycle of products”

For further information see
World Wide Views on Global Warming
www.wwviews.org

The “greening” of Växjö gathers pace

Seen from the air Sweden looks like a green ocean. Move towards to the south and somewhat to the east and you find Växjö. In 2007 the BBC visited the place. They titled it the greenest city in Europe. The town's officials really enjoyed this and decided to use it as their slogan. What is behind it all? We took the train to Växjö to find out.

- We have to go back to the 1970s during the first oil-crisis, when fossil-fuels rocketed in price. In Växjö this led to some key decisions being made, and primarily that the municipality should build a combined heat and power plant based on surpluses, or leftovers, from the forest-industries; tree-tops, branches, bark, sawdust etc. We thought, why not use it as a source of heat rather than just leave it to rot, explains Sarah Nilsson.

Ms. Nilsson is the head of strategic planning in the municipality and has closely followed environmental developments within the municipality for many years.

- Economically it was not very profitable at the start, but we stuck with it nonetheless. The second half of the 1980s saw low electricity-prices in Sweden, the result, in part, of the significant investment made in nuclear power. However a turning-point came in 1991 when the Swedish government introduced the concept of CO₂-taxation. Thereafter we were in a position to really compete with the more traditional oil-burners. We could provide both cheaper *and* cleaner energy.

The city is relatively flat and tubes with warm water for district-heating have now, more or less, been laid everywhere within the central areas. The operation is run through the municipality-owned *Växjö Energi AB*. At present the company delivers 30% of all the electricity consumed in the city and 100 % of all district-heating used. Some 92% of all heating in the municipality is based on renewable sources.

The ordinary consumer pays 55 öre per kWh for heating, a price that is substantially lower than other alternatives on the open market. For electricity the rates are similar to those of its competitors. The company is currently profitable and doing quite well.

Växjö has continued to expand local heat and power production. New plants have been built and older ones made more efficient.



Växjö combined heat and power plant at Sandviken. Photo provided by the Municipality of Växjö.

The increase in the popularity of solar-energy production and the drive for better insulated buildings have also been added to the positive outlook in terms of the heating-and energy equation. Several lakes have been cleaned and there are now ample opportunities to go for a swim within the city.

The outcome of these efforts has been that the city has seen a reduction of no less than 84% in CO₂ emissions from heating – mostly of buildings. Including transport and all other energy-consuming activities these CO₂-reductions are measured at an impressive average of 35% - per inhabitant. In both cases here we are talking about the period 1993-2008.

Emissions from kerosine (jet fuel) sold at the local airport are included. Emissions generated from flights by Växjö-citizens from other airports are not. On the other hand, Växjö-airport is used by the whole region and has 160 000 passengers annually.

The city has grown by some 10 000 inhabitants or close to 15% since 1993. The majority of this increase is however students at the constantly expanding Växjö University. At present there are more than 16 000 of them and in fact more than 3 000 live on the University campus located just outside the city-centre. Few students have cars but many have bicycles. The city claims that 46% of all households in the municipality (including students) do not own a car.

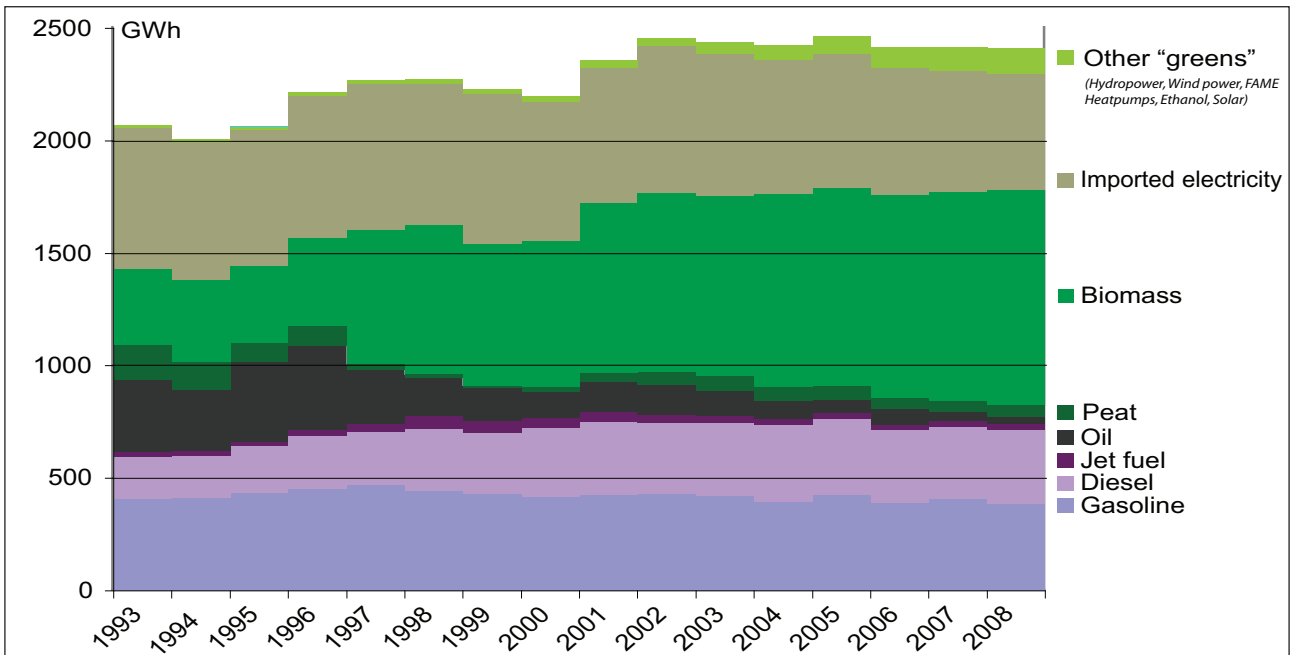
- Your statistics show that for the transport-sector there has been an increase of 10% in emissions from 1993 to 2008?

- This is measured *per capita*. The explanation is primarily that people have become richer, have more cars and drive more. It is really the transport-sector that is our unsolved problem. In Malmö for example all buses now run on locally produced bio-fuel but here they are still running on fossil fuels underlines Sarah Nilsson.

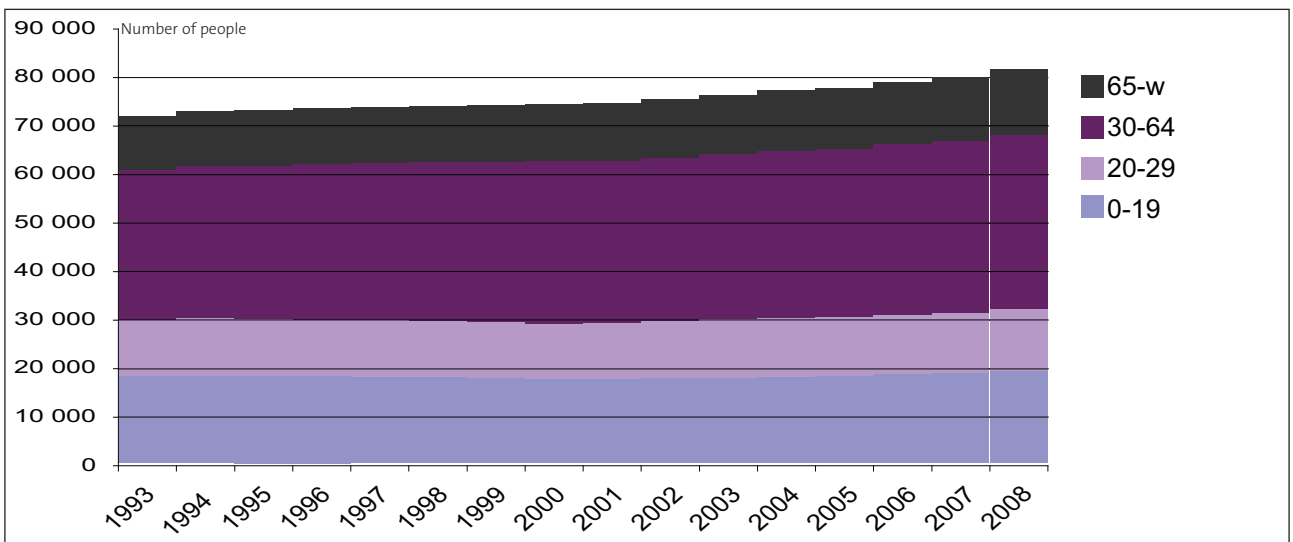
- We manage however to produce enough bio-fuel (bio-gas) for some fifty private and municipality-owned vehicles. In addition, there are another fifty private car-owners really interested in joining the scheme. And we have plans to expand, adds the city's strategic planner.



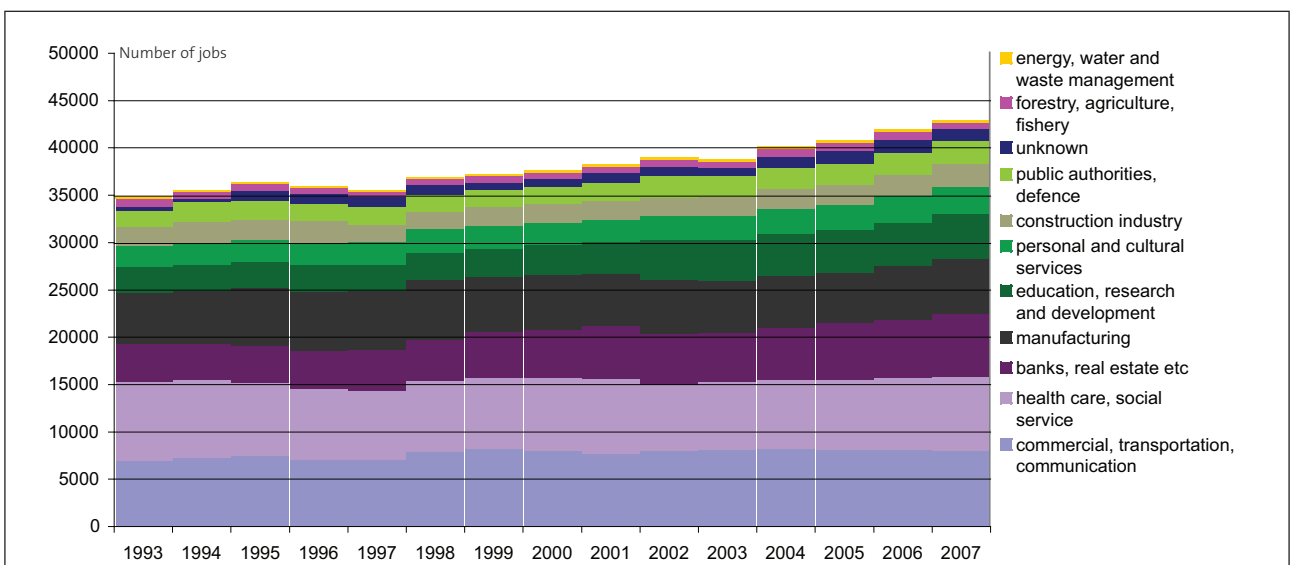
Sarah Nilsson, Head of Strategic Planning in Växjö. Photo: Odd Iglebaek



Energy consumption in Växjö 1993 - 2008. Note the effects of the change from oil to biomass (for heating etc.) as well as the overall growth in energy-consumption. All figures are provided by the Municipality of Växjö.



Population growth in Växjö 1993 - 2008



The development of jobs in Växjö 1993 - 2007



Part of the "greening" process in Växjö is the drive to build passive houses and large wooden structures. Top to left shows the record eight storey high wooden houses in Limnologen. Bottom left is Portvakten Söder built in 2008 combining high-rise wooden structures with the passive-standard. Outside cladding is cement-fibre plates. Inside is gypsum. Window-photo to show thickness of finished wall. Top right Erik Hallonsten, Senior Manager of *Hyresbostäder Växjö* shows model illustrating the insulation-construction in the passive house. All photos: Odd Iglebaek

In the official brochure *Fossil Fuel Free Växjö* the municipality's energy-goals are spelt out thus:

- To reduce fossil carbon dioxide emissions per inhabitant by at least 50% by 2010 and by 70% by 2025, as compared to 1993.
- To reduce the consumption of electrical energy by at least 20% per inhabitant by the year 2015 compared to 1993
- To increase cycle traffic by 20% by 2015 as compared to 2004
- To increase the use of public transport by at least 20% in the city and 12% in the region by 2015, as compared to 2002
- To end the municipality's use of oil for heating, other than for complementary use, by 2010
- To reduce fossil carbon dioxide emissions from the municipality's transport services by a minimum of 30% by 2025 compared to 1999.

"In Växjö we do business the Småland way (...) We know how to make plenty out of what looks like nothing", boasts the municipality in a brochure on the region's entrepreneurial spirit. The city has 7600 companies and 82 000 inhabitants.

- One example of this could be that most of the ash end product from the power/heat plants is returned to the woods as fertilizer. However, we have not started to burn the roots yet, so the potential to expand remains, comments the planner Sarah Nilsson.

- What spurred this greening of Växjö?

- Mostly the initiatives have come from civil servants rather than from politicians. However, I should mention that there is no major political disagreement within the municipal council on this subject. All parties are in favour. I also think this will continue as long as the green spirit creates jobs and incomes as well as fame for Växjö.

Växjö has received several international prizes in relation to its effort to generate a better climate. Each year the city has more than 600 official visitors who come to learn from their experiences. In fact the municipality has its own officer, Mr. Johan Thorsell, dealing with international relations.

- Of course we enjoy all this attention, but it takes quite a bit of time to do it properly. Therefore we are currently looking into the business-opportunities opened up by our efforts in this field. In-house we already call ourselves 'The European Climate Protection Valley', he explains.

By Odd Iglebaek



Växjö municipality from the air

The total area of the municipality of Växjö = 192 785 hectares.
Largest landuse categories:
Forest = 135 011 ha
Inland water = 25 143 ha
Pasture and arable land = 23 196 ha
Marsh- and heatland = 12 160 ha
Built up (locality) = 4 194 ha

Photo provided by the municipality of Växjö.



Improving the national or regional transport-infrastructure can easily increase local noise or pollution. Photo: *Banverket*.

Environmental concerns in Swedish Infrastructure Planning

In 2008 the Department of Urban Planning and the Environment in Sweden was engaged in a collaborative project together with the National Rail Administration and the National Road Administration. The objective of the project was to scrutinize current planning processes for rail and road projects. Ultimately the ambition was to analyse and discuss how the effectiveness of the process can be improved.

Effectiveness was seen from two dimensions. First, the amount of resources used in terms of time and money. Second, the extent to which implemented projects met the objectives and goals set. In this respect environmental concerns played a key role.

All infrastructure projects *per se* have environmental impacts. Negative impacts are often direct, e.g. noise and pollution along a new road. Positive impacts are often indirect, e.g. a new commuter train link can increase public transport and reduce road traffic.

Whose perspective?

Perhaps the most important finding however is that environmental concerns have not been handled in an effective way. Vast resources have been allocated to various projects seeking to minimize negative environmental impacts and to promote environmental quality.

Despite both the stated level of ambition and of investment undertaken the results thus far can only be characterized as sub-optimal. The resources available could undoubtedly have been used more effectively if they had been allocated differently. The

core of the problem is the inherent tension between local and regional/global perspectives. One conclusion from our research is that local environmental impacts are given substantial attention while regional/global effects are often neglected.

A number of case studies dealing with infrastructure projects were carried out. The findings from the case studies amply illustrate this problem. Following the construction of the bridge between Malmö and Copenhagen Malmö Region is now growing fast. In the region itself sustainable urban growth has been afforded top priority on the political agenda.

The railroad system is being developed and extensive investment has been made in expanding commuter train services. The rail link between Malmö and Lund is however characterized by congestion and a substantial future increase in demand is forecast. In consequence, plans have been laid to double the number of tracks from two to four. This project is logical given the objectives of sustainable urban development.

Burlöv acts local

Along the line between Malmö and Lund lies the municipality of Burlöv. The local environment of Burlöv will be negatively impacted by the new tracks and additional train traffic. The frequency and level of noise will increase. In parallel it should be noted that the municipality of Burlöv will not itself see any direct gains from the new tracks, as to a large extent they will only be used for long distance services which will pass through Burlöv without stopping.

The plan to expand the number of tracks in Burlöv has met with fierce local resistance. Local interest groups and local politicians point out that the new tracks will severely damage the local environment. The level of protest encountered, moreover, ensured that the project came to a standstill for some time with implementation being substantially delayed.

From an academic perspective the core of the problem lies in the tension between the local and the regional and global environmental impacts of such a planning decision. Primarily the issue highlights the paucity of methods and the absence of mechanisms available to adequately compare the impacts of such a decision at the various levels of geographical impact.

Värmdö is revolting!

Experiences parallel to the case described above are frequent in our research project. One case dealt with a proposed new navigable route from the Baltic Sea to Stockholm. The current route has obvious disadvantages. It is long and winding, and some parts are narrow increasing the risk of accidents.

The new route proposed by the Swedish Maritime Administration has obvious advantages. It is shorter and thus it will lead to lower levels of CO₂ emissions, it is safer and it is located in such a way that it will have less negative impacts on water and marine life.

Despite these substantial advantages the proposed new route has met with strong resistance in the municipality affected, Värmdö. In spite of the obvious benefits seen from a regional economic and environmental perspective local Värmdö interests oppose it. The new route creates no value for the municipality of Värmdö. No ships on their way to Stockholm will make intermediate stops in Värmdö, and the new route will cause negative impacts in terms of waves from the ships and other disturbances in the calmness of the archipelago's landscape.

Even though these negatives might seem to be marginal when compared to the regional and global environmental advantages they nevertheless formed the basis for Värmdö's resistance to the project. Värmdö's behaviour is not based on ignorance or on a lack of information. Rather the municipality's resistance can be explained by the lack of incentives offered to support the project. Negative municipal impacts, even if they are only marginal, are more important than substantial positive regional and global impacts.

Birdlife is important

In the case of the new railroad between Umeå and Örnsköldsvik (*Botniabanan*) the project was delayed more than a year and implementation was conditioned on the basis of the promise of numerous environmental investments. All in all, additional costs due to such environmental demands exceeded 1 billion SEK.

The delays were due, in the main, to protests and legal processes based on environmental concerns. Much of the environmental focus was directed at the point where the railway crossed the Umeå River (*Umeälven*) and on the assumed negative impacts on the birdlife in the delta area.

The arguments raised by those opposing the project have however been questioned by environmental experts. At the same

time our research has shown that the project, in addition to these local impacts, also has significant positive global environmental impacts. The new railroad will lead to a substantial decrease in road traffic as it provides a timely and cost effective alternative for goods as well as passenger traffic.

Summing up the findings of our project case studies we conclude that current planning and decision-making procedures are ineffective. These arrangements for planning and for the implementation of infrastructure investments have been set up with the best of intentions, not least to safeguard environmental qualities. In reality however these ambitions are simply not being met.

"The road to hell is paved with good intentions" but it is undoubtedly the case that current procedures often lead to sub-optimal results in respect of environmental quality. Our research clearly shows that local environmental impacts play a vital role in the planning process for infrastructure (even though they are often relatively less important) while regional and global impacts (even though often significant) are forgotten or afforded only a subordinate role.

A holistic approach

Current arrangements for assessing and handling environmental impacts in infrastructure projects are thus ineffective. They are time consuming, costly and do not safeguard environmental interests in an effective manner.

The way ahead to more effective practices lies in holistic assessments of the impact of a project. These assessments must include an analysis of, and the giving of weight to, local as well as regional and global environmental impacts.



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The project is presented in the book *Bana väg för infrastruktur* (Cars, Göran, Malmsten, Bo and Tornberg, Patrik). Royal Institute of Technology (KTH) Department of Urban Planning and Environment, Scientific report 2009.

GHGs and Norway's Municipalities

In Norway the municipalities and counties are the acknowledged authorities for spatial planning, community development and service provision. In a great deal of municipal work knowledge and proximity to the local population and to private entrepreneurs is central. This gives the municipalities the ability to design and implement well-adapted climate policies for the local community. The local authorities as a whole can therefore play an important role in reducing greenhouse gas emissions in Norway and in easing society's adaptation to climate change.

Today emission levels relating specifically to local authorities amount to 21 million tons of CO₂-eq. per year, which is approximately one half of the land-based emissions total produced in Norway.

Of these emissions 49% stem from road traffic and 60% from various kinds of mobile sources (tractors, off-road machines, etc). Emissions from agriculture amount to 20%, from stationary energy consumption 13%, and from waste treatment 6%. Emissions from industrial processing, the oil industry and air and sea transport are regarded as falling outside the local authority sector.

There are 430 municipalities in Norway. Some 40% of emissions related to local authorities come from municipalities with a population of more than 20 000 (11%), 37% from those with a population between 5 000 and 20 000 (34%) and 23% from those with a population of less than 5 000 (55%).

Individual municipalities can forward a number of reasons for not giving priority to cutting emission levels. From a global perspective the effect of each municipality on global warming is practically negligible. Moreover, the effects of each municipality's own efforts in this respect are also rather difficult to measure. Work on reducing emissions may often be in conflict with other local goals such as economic growth and increasing employment. In addition, financing emissions reductions often requires the transfer of resources away from other much needed purposes.

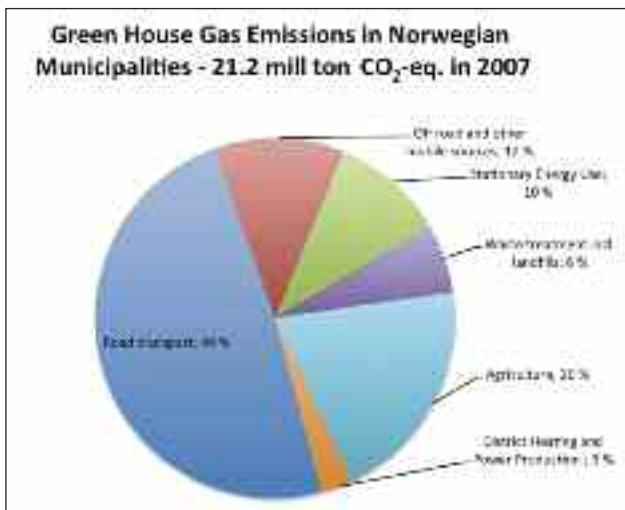
Despite this many municipalities in Norway are engaged in making a contribution to the creation of a good national climate policy. They are trying to the best of their abilities to transform national goals into their own local goals. The activity of municipalities in this field can to a large extent be explained by the existence of local idealists and of strong interests in national and local political party organisations. The municipalities' own organisation KS, has declared the climate question to be one of its main policy areas of interest in the coming years.

Increasing activity in the municipalities

There is already a considerable amount of activity ongoing in Norwegian municipalities in respect of emissions reduction. Three out of four municipalities have already published emissions reduction goals, made plans for reductions or at least decided to begin work on the subject. The largest and most populous municipalities are in the forefront here while the smallest lag somewhat behind.

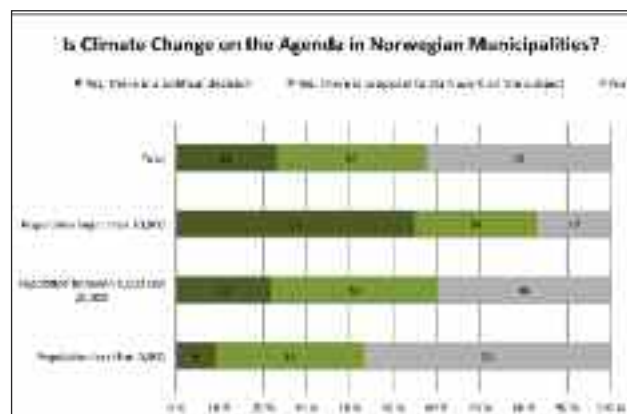
A recently adopted National Planning Guideline under the Norwegian Planning and Building Act has now made the provision of municipal plans for emissions reductions compulsory. The Government expects all municipalities to have such plans politically adopted by July 2010.

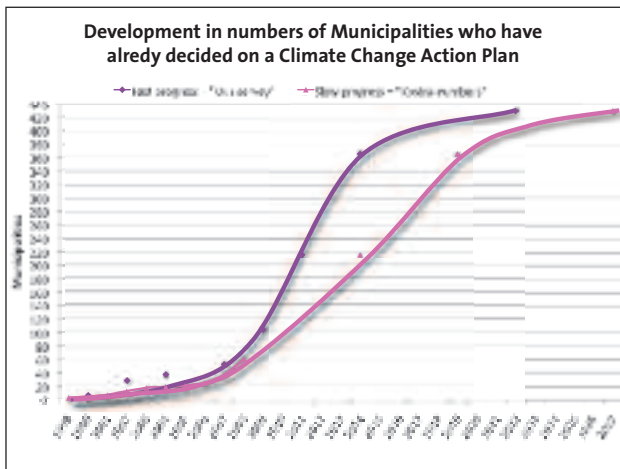
In our opinion however the effect of this requirement on progress towards the drawing up and adoption of such plans remains uncertain in a situation where the work done up to now has been



Norwegian Emission Inventory and emissions in the municipalities

Total Norwegian emissions in 2008 amounted to 55 million tons CO₂-eqv., according to the emissions inventory in line with the IPCC guidelines. Emissions from the municipal sector, approximately 21 million Tons CO₂-eqv., are exclusive of emissions from offshore oil- and gas, aviation above 100 metres, ships more than 800 metres offshore and process industries. The source "stationary energy use" is mainly oil- and gas boilers used to heat buildings. This share is low because a large amount of the electricity used in heating (approximately 80% of the demand), and 95-99% of Norwegian electricity production is hydropower-based with zero GHG emissions. (www.ssb.no)





voluntary. Based on the progress made thus far we have outlined two different “prognoses” for progress; the fastest sees the requirement having an immediate effect while the slowest sees no effect over the baseline prognosis occurring.

In the faster prognosis 50% of the municipalities will have emissions reduction plans by 2011, the vast majority (85%) by 2014 and all municipalities by 2022. In the slower prognosis 50% will have emissions reduction plans by 2014, the vast majority by 2019 and all municipalities by 2027.

Aggregation of municipal climate goals to the national level

The targets and measures which the municipalities have launched, or have decided to launch, generally relate to stationary energy consumption; i.e. a shift away from oil based heating and the expansion of district heating, followed by goals and measures related to waste treatment and recycling. Far fewer municipalities have goals and measures related to agriculture; i.e. fertilizing plans, or related to land use and transportation; i.e. long-term measures to facilitate high density development around public transportation nodes.

Three alternative methods are discussed in terms of using individual municipalities’ climate goals and measures to estimate an emission-cut-potential for the local authority sector as a whole. The calculation based on 51 different municipalities, with more or less precisely quantified targets, shows that the total potential emission cut is in the order of 6-7 million tons (a third of the total) of CO₂-eq. per year compared to the trend situation for 2020.

The aggregation of local measures is however based on only a very small number of municipalities which have already specified measures and estimated their effects. The actual measures to be undertaken in various municipalities are quite similar. As such, it is possible to aggregate the emissions reduction potential at the national level with a reasonable level of accuracy. The calculation shows that the total potential emissions reduction is in the order of 2.4 million tons of CO₂-eq. per year compared to the trend situation for 2020.

There is however a gap between goals and measures in these municipal climate reduction plans but the gap is not unreasonably

large and may have an understandable explanation; i.e. that many of the goals assume the effects of national measures (taxation, etc) and technological development.

Stated local authority climate targets and measures

The results of our study reveal a significant variation in stated climate targets and in the formulation of climate goals and measures. The goals vary considerably; from specific quantified targets for reduction to more visionary goals for a carbon-neutral local community. In many cases however these goals should be seen as mere visions to strive for rather than programmes that can be implemented in practice. This implies that when formulating the goals and measures the municipalities still to a significant extent continue to lack basic knowledge on the subject.

The municipalities are capable of implementing various local tasks on emission cuts but they cannot be made solely responsible for this strategy. Greenhouse gas emission reduction is a state responsibility. The state, counties and municipalities must be viewed as one system. Within this system the municipalities must be met with both requirements and support. Idealism is not enough to attain results of the required magnitude.

In this light a proposal for a system where national authorities can buy emission reductions from local and regional authorities has recently been drawn up by *Civitas* on behalf of KS. The proposal is based on a broad review of existing and possible new measures. The system could be used as an alternative to purchasing climate quotas internationally. The municipalities receive economic incentives and the national authorities get access to significant domestic emission cuts for a predictable price.

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Västra Hamnen in Malmö with the Turning Torso. Will there be a wall to protect the seafront from rising sea-levels? Photo provided by the Municipality of Malmö.

Urban Planning challenges for “Sweden’s most climate-smart city”

“A good built environment” is one of the 16 Swedish national environmental goals. In Sweden, physical planning is regarded as one of the main tools in climate change and sustainability work. Climate responsiveness and ecological sustainability are set out as explicit political goals leading to economic growth. Branded with the vision “Sweden’s most climate-smart city”, Sweden’s third biggest city, Malmö, intends to take the lead. Will they succeed?

Citizens constitute the city’s backbone. Preferably they will have the choice to live and dwell in a climate-friendly and sustainable way. That makes the development of housing areas a significant challenge for physical planners. Neither spatial nor economic resources are unlimited however.

In coastal areas the threat of rising sea levels will in many cases contribute to less land being available for housing or for recreation and economic activity while less affluent areas may simply lack the resources to offer a sustainable choice.

In this context two important questions have to be raised: What are the challenges for housing development from a climate responsive and sustainable urban planning point of view? And, will the choice of climate responsive and eco-friendly living be available for all?

With approximately 290 000 inhabitants, Malmö is located in the heart of the dynamic Öresund region. This coastal city is renowned for its green parks, its bicycle-friendliness and its 43 kilometres of coastline. Formerly known as a heavy industry town with the *Kockums* wharf as its pounding engine, central Malmö is the site of a recent visual transition. The building projects in *Västra Hamnen* (Western Harbour), site of the Santiago Calatrava-

designed landmark ‘Turning Torso’, have transformed the character and usage of the extensive harbour area.

East-west division

Moreover, as cities often are, Malmö is a heterogeneous place. The multiethnic diversity and differences in socioeconomic affluence is in Malmö geographically stratified along an east-west partition. The same goes not only for the character but also the quality of urban housing. Of Malmö’s 146 000 dwellings, 82% consist of apartment blocks and the remaining 18% of self contained houses. The population is growing and in some parts of the city, household density is increasing above levels of what is already defined as ‘confined living conditions’. Regardless of ambitions and detailed planning, last year less than 500 new housing construction works were initiated, partly due to the recession.

Therefore, not only from a planning perspective but also from the perspective of fairness in social and economic sustainability, the political goal of urban eco-sustainability and climate-sensitive housing development is under pressure to translate into real political solutions.

All parties say yes to densification

Among all political parties the political vision for spatial growth in Malmö is urban densification. Building the compact city has become a solution that is sensitive to citizens’ preferences for the traditional multifunctional city structure and reflective of the reluctance to exploit the surrounding fertile farmland.

However, areas attractive for conversion, such as the old harbour areas or other industrial grounds, are close to the coastline and often located lower than three metres above sea level. Other attractive



Sketch for possible barriers in Malmö. Map provided by *Malmö Stadsbyggnadskontor*

areas are located along the low-lying south-western coast. These areas are potentially subject to the same problems of flooding and storm surges and often consist of fertile agricultural land.

The municipal commissioner of urban planning the social-democrat Anders Rubin argues that with the current population increase of approximately 7000 people a year, urban densification of the already-built environment may not be enough and that some rural land has to be claimed. Talking about built area densification in the outskirts of the municipality the aim would be to build close to public transport networks. - With a normal population increase, the discussion would have been different, he says.

In already developed areas densification could pose a significant problem. Citizens may want to protect their open spaces and functionality opportunities might be constrained by earlier detailed planning.

Who shall pay?

The general development plan limits new construction work to areas more than 2.5 metres above sea level. Whereas a one metre increase in the sea level would put an area of 229 *ha* at risk, threatening the modest number of 20 taxation units, a 2.5 metre increase however raises the numbers to 1392 *ha* and 1820 units respectively. A scenario seeing an increase of 3 metres almost doubles these numbers.

The city of Malmö estimates that in current scenarios, anticipated problems are manageable through coastal protection by earthworks, walls and sea barriers. One issue yet to be dealt with however is that of cost.

- Legally it is the property owners who have the overall responsibility for their properties and formally the municipality cannot of course be responsible for an increase in the sea-level although we are planning counter measures. At some stage also the regional- and state-authorities will have to get involved, but when or where as yet remains unclear, says Anders Rubin.

Most property buyers are nevertheless putting their faith in the hope that potential problems will be taken care of by the authorities. The risk of flooding or run off is a question very seldom raised in negotiations, as pointed out by two separate private actors; real estate agent Håkan Sköld and the national representative for *Skanska/BoKlok*, Ulrika Norborg.

In spite of the potentially quite threatening picture, buyers in general are not really thinking about the exposure. - There is a clear expectation that the public purse will pay for efforts in the shape of embankments and other forms of protection, Håkan Sköld pronounces. This can be further illustrated by the long waiting list for individual building sites in western Malmö, also in the coastal zone. There, the average housing price is also about 30% higher.

Is climate responsiveness for all?

One conclusion seems obvious: it is not the effects of climate change in themselves that are driving spatial development. Speaking visions and determination, there is no doubt that urban spatial planning in the city of Malmö is at the forefront both in terms of climate responsiveness and ecological sustainability.

Nevertheless, when developing climate-friendly housing and marketing eco-sustainability, attractiveness such as closeness to coastal recreation areas provides a strong incentive. The capacity to pay is fundamental to the system. In attractive areas the market through the paying customers is a strong driver. This leaves the less attractive areas to be more dependent on the individual as a tax-payer, which in the long run may make room for different solutions and more deliberative approaches.

The most expensive climate change adaptation measure will probably be the safeguarding of the coastline. What if sea-levels rise above the manageable one metre level? Will resources be taken from the more needy eastern parts of the city to protect those in more affluent areas?

Anders Rubin argues however that it is not only Malmö that will have problems if the rise in sea-levels reaches three metres. - If this were to occur, national needs would prevail over local needs, and the whole thing would become a question for the state rather than the municipality.

All in all then, while climate responsiveness is in many respects driven by economic interests a basic level of insecurity remains in respect of who will pay. If the emphasis turns out to be on individual responsibility, other measures regarding availability, choice and influence are needed so as not to consolidate social and economic segregation.

Therefore, synchronizing space, time and resources still poses a challenge for the city of Malmö in achieving eco-sustainable livelihood options for all.



By Tanja Stähle, Research Assistant
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Malmö towards a carbon neutral future

The vision is clear: By the year 2020 the internal organisation of the city of Malmö is to have achieved carbon neutrality and by 2030 the whole city will be provided with 100% renewable energy.

To put carbon neutrality into practice and make it sustainable does not however simply mean exchanging out of carbon-based sources of energy. Energy consumption also has to decrease, many argue. In new and old buildings alike this is visible in at least two ways. The buildings should consume as little energy as possible, and preferably actually store energy; and the inhabitants should limit their energy consumption. What then does Malmö's road to carbon neutrality look like?

The public housing corporation *Malmö Kommunala Bostadsföretag* (MKB) is, with its 22000 apartments, Malmö's largest provider of rental property. As a municipal company it has the role and the responsibility of realising public visions. Since 2008 MKB has only used wind-powered electricity and in the same year the first solar cell installation was set up to test a new technique for self-support.

In planning both the Western Harbour and the newer Hyllievång area, the national template dialogue, held between the local government and the building proprietors (*ByggaBo-dialogen*) was employed. Addressing the basic issues of sustainability, the purpose of this model is to construct a national sustainable construction and housing sector by 2025. Within areas such as architecture, green spaces and low energy consumption, the focus is on reaping high rewards at feasible costs.

Put forward as the national example of sustainable urban planning, the most common illustrations of its climate smartness are panoramic views of these two newly developed areas. But with most of the city's apartment blocks built after the Second World War the majority of the city's inhabitants live elsewhere.

In already built areas other forms of dialogue are taking place. In Rosengård, home to somewhat less than 10% of Malmö's population, a local stakeholder dialogue on sustainability was completed last year. The area has a high level of energy consumption and the goal of the City is now to provide Rosengård with entirely renewable energy by 2015.

One strategy is to make the flows of energy more visible by using sun panels, solar cells and urban wind mills thus moving the production of energy closer to the inhabitant. (The same strategy is applied in new areas under development in the Western Harbour). This stakeholder dialogue model is soon to be replicated in other parts of the city.

From the ground, the most visible example thus far of urban sustainability measures in already built areas is the eco-city of Augustenborg. Located south-east of the city centre, it is known for its green and blue adaptation measures such as green roofs and open surface water management. These tools are not only adaptive, but also control the flows of energy through insulation and heat storage. In this neighbourhood the focus on citizen involvement has been strong, providing the inhabitants with 'know-how' and support for their own initiatives.

Many large actors in the construction business are now putting energy streamlining and climate responsiveness at the forefront of their construction agendas. With shared visions and explicit environmental policies, private actors seek their share of the market.

The 'passive house standard' is one alternative here. In the new development area in the Western Harbour the ambition is that one third of the projects are built with a passive house standard and the remaining two thirds built as low energy houses (a total yearly energy consumption of 45 kWh/m² and 65 kWh/m² respectively, the nationally recommended level is 110 kWh/m²).

South-east of the city centre is the residential area of Tygelsjö. The construction company *Skanska* and furniture giant *Ikea* will soon start building apartments within the common endeavour *BoKlok*. As with most new developments the focus here is on sustainability and cutting carbon emissions is a priority in the project description. One important pillar in *BoKlok* is the aim that individual residential units are "affordable for the single mother with one child". To reach this target, buildings are factory-made in big volumes.

Between 1965 and 1975, large residential developments were built in the context of the national *Miljonprogrammen* ("the Million Programmes"). In the city of Malmö Almost 22 000 apartments were built during this period. Renovating these is one local government approach to unifying all parts of the city and making these residential units both attractive and sustainable.

More recently, the reconstruction of some of these often very high energy consuming houses into passive houses has gained in support. There are already a number of good examples of this in the Gothenburg area (see *Journal of Nordregio* 2/2008).

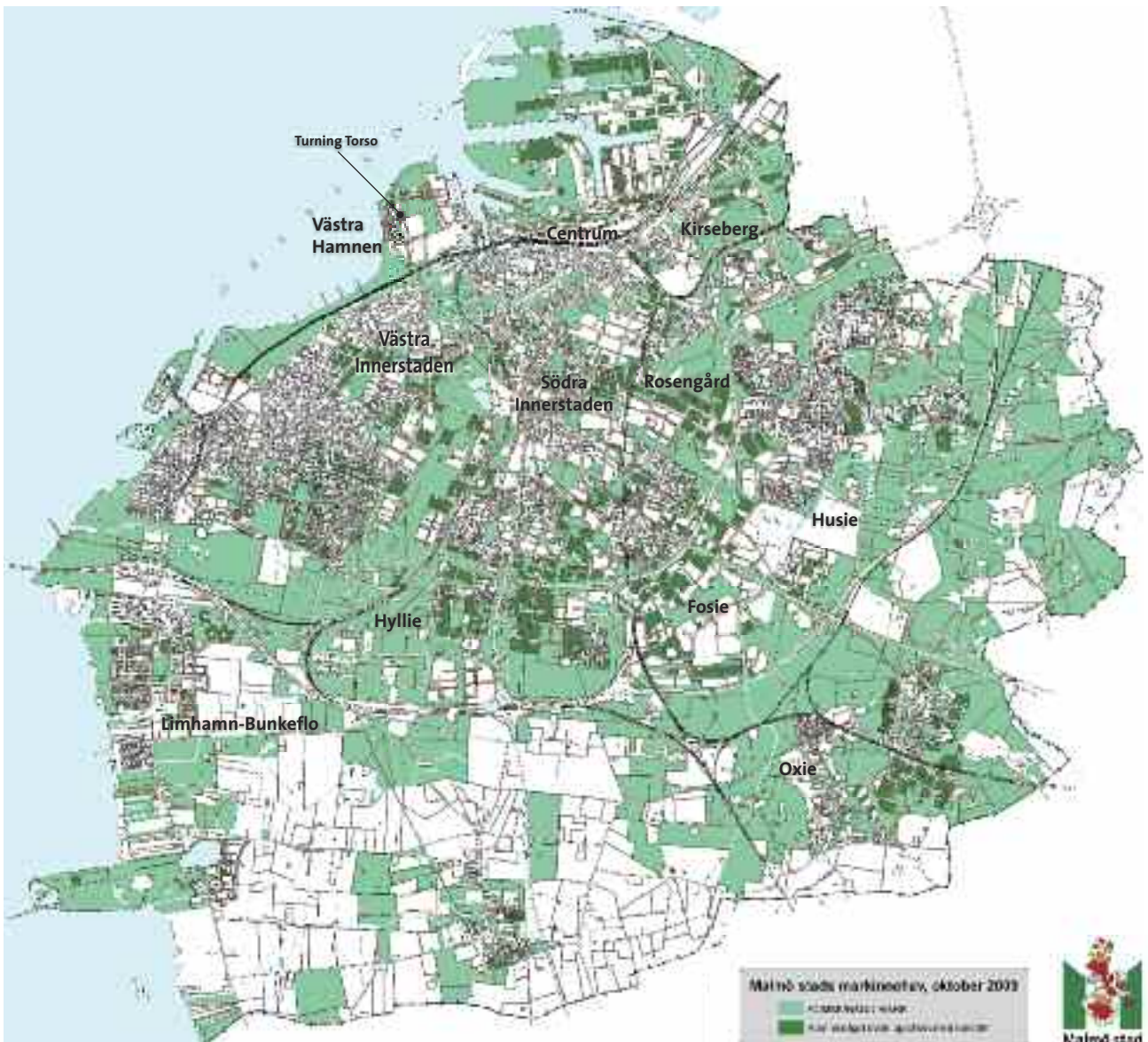
The city of Malmö, together with the Institute for Sustainable Urban Development (ISU) among others is currently increasing the options for small and medium-sized construction companies in the region to develop sustainable solutions for postwar housing areas through the EU project ERUF EKO (Ecological Restructuring of Buildings of the Postwar Era). Alternatives in respect of climate responsive solutions are under evaluation in an apartment block in southern central Malmö. These include self-regulation of ventilation, heat and water.

Increased partnership and dialogue hold the potential to bridge ideal visions and real politics. Following the explicit intent of the city of Malmö, will these initiatives become mainstreamed rather than remaining only as a list of good examples? To make the goal of carbon neutrality sustainable in its broadest sense, combining the climate responsiveness of the market-oriented building proprietors and the local development of ecologically sustainable practices and solutions, may well become a necessity in all areas alike.

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Above aerial photo of Malmö. Picture from the City of Malmö. The white tower is the Turning Tower. On map below: Green areas are owned by the Municipality. White indicates predominately private (or state) ownership. Provided by *Malmö Fastighetskontor*.





Sheep on their way to the slaughter house. Narsaq September 2008. Photo: Ole G. Jensen/arc-pic.com

Climate and planning in Greenland

In recent years and especially leading up to the COP15, Greenland has seen considerable focus placed on its CO₂ reduction strategy. In connection with this, Greenland has continually pointed to the fact that as a developing country it and indeed other Arctic regions, should have a transitional scheme with a longer time horizon than that applied to Denmark and the other Nordic countries which have had the opportunity to initiate the process far earlier. Such a scheme would make a transition to renewable and CO₂-neutral energy possible.

One of the next big tasks will be to put an adaptation strategy in place. As with many other places across the globe Greenland is faced with the challenge of responding to the social aspects of changes in precipitation, water levels, wind speed and temperature. In addition, as an Arctic nation, Greenland has an additional and rather special factor, i.e. permafrost, to take into consideration.

One of the central tools used to deal with the social adaptation of these changes is physical planning (spatial planning). In connection with this, three of the most significant factors are: infrastructure, industry and population.

Infrastructure

Greenland is characterised by a small but dispersed population of 56 000 people divided into 75 inhabited areas (1 January 2009). There are no roads between the individual inhabited areas. Most of the housing stock is grounded on bedrock and thus the

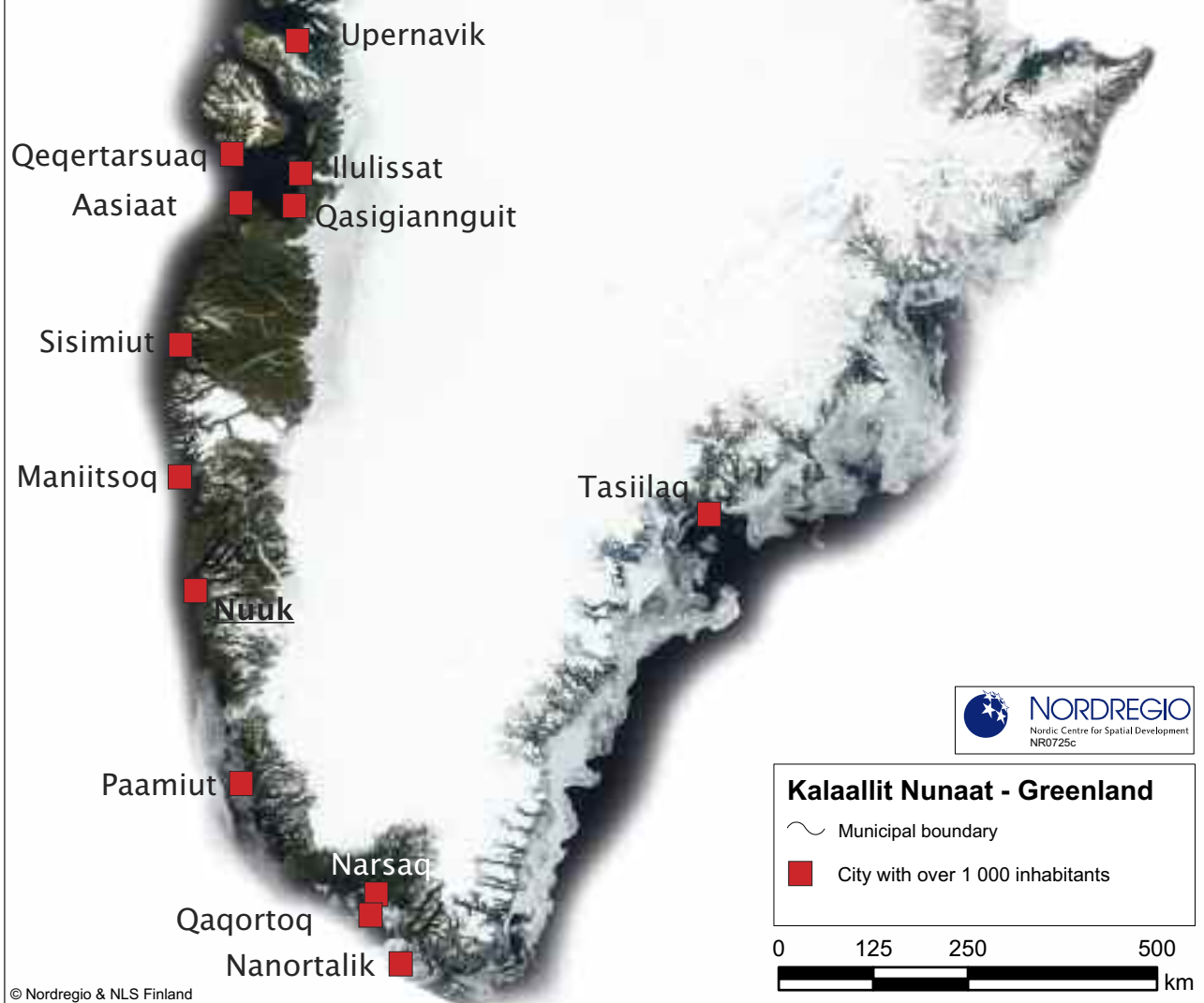
loss of permafrost is not a significant problem in relation to buildings. The thawing of permafrost will however have severe consequences for the road and sewer systems of some towns. Similarly, it is likely that the airport runways will also be affected.

Greenland is accustomed to violent storms and there is no tree coverage to speak of, thus the increasing frequency of storms is not expected to have a major impact on the infrastructure endowment. Increases in the sea water level will however have an impact on the nation's harbour facilities. Most of the 75 inhabited areas have a harbour. We already know that tidal differences vary up to five metres but if the highest water level was to rise even further then harbour facilities will need to be reorganised.

Industry

The occupational structure in Greenland varies a lot depending on where you are in the country. Furthest to the north and in East Greenland, sea mammal hunting remains the dominant way of life. There is no doubt that the disappearing sea ice is highly influential on these traditions.

According to the recent results produced by Rasmus Ole Rasmussen, who has conducted research on living conditions in the Arctic, there is a relatively limited group of older people who will be negatively affected. These are the sea mammal hunters



The southern parts of Greenland already has some areas which can be used for rearing sheep and growing potatoes.

who are not capable of converting from hunting with a dog sledge to alternative methods. A majority of hunters however expect to be able to amend their techniques in line with the changing climate and ice conditions and many of the younger people are expected to be able to take advantage of the fact that less sea ice leads to better opportunities for fishing from boats.

In the central part of West Greenland, where most of the inhabitants live, industrial fishing is one of the dominant industries. As a consequence of climate change the changes in the marine ecosystems around Greenland are expected to be comprehensive. The ecosystems that will be changed are very complex and there is no way to predict with certainty whether these changes will entail a basis for more or less commercial fishing in the waters around Greenland.

In the southern part of Greenland there is a well functioning agriculture industry. For example potatoes are grown, but the main industry is sheep breeding and around 20 000 lambs are slaughtered each year. Expectations have already been raised that the agriculture industry in South Greenland will benefit from the coming climate changes. The growth season will be prolonged and it will be possible to utilise new areas of land. Furthermore, in the coming years animal husbandry is likely to be expanded to include cattle.

Mining, oil and gas extraction and mega industry are the areas which the *Kalaallit Nunaanni Namminersorlutik Oqartussat* (Greenland home rule government) aims to extend. Because of the reduction of the Arctic sea ice cover, potential offshore oil and gas

extraction will benefit from climate change and the warming of the oceans, as companies will increasingly benefit from opportunities to operate in areas which were previously unavailable.

There are clearly new opportunities for expansion in the areas where the inland ice is retracting and thereby exposing new unexplored areas of land potentially containing quantities of raw materials which could be of commercial interest. Recently, corporations with energy demanding production have also discovered the CO₂-friendly energy potentials of exploiting Greenland's hydropower opportunities.



Summer in Nuuk, the capital in Greenland. Photo: Greenland Tourism



The settlement of Igaliku, where sheep rearing is the main industry Photo: Greenland Tourism

Population

In addition to the common tendencies in Greenland's societal and infrastructural development occupational changes in the coming years will be of significant importance for population development, including demographic development.

A large and recently conducted mobility study, along with other studies, points to the fact that a significant part of the population are relatively mobile and that up to two thirds are now considering moving elsewhere within Greenland. Furthermore, the attractions of globalisation are now gaining acceptance with the younger generations who know what the world's major cities have to offer and therefore to a greater extent see themselves as urban inhabitants, with the social opportunities that exist in these places, rather than as rural residents.

In combination these changing conditions suggest that in the coming years a significant redistribution of the population in relation to the 75 currently existing settlements is to be expected.

Planning

These immense transitions which can be predicted specifically in Greenland, and probably for all of the Arctic communities in general, set very high demands on the task of physical planning in these communities.

In Greenland, a digital geo-data platform, NunaGIS (see www.nunagis.gl) where the many different measurable factors will be made visible, has recently been established. Only by making visible the changes in all of the different parameters on a collective platform will societal physical planning be able to remain at the forefront of the significant transitions which are to come.

The changes which are caused by climate change should be registered and made visible along with other data. As such, a

useful planning tool for future political decision making will be created, which will, in part, be conditioned by climate change and partly also by the general development of society.

Many of the changes which will take place in the Arctic will be of a transnational character and this will involve a special set of challenges which can only be overcome through close cooperation between the various Arctic nations. All of the Arctic communities are aware of this and a common Arctic Spatial Digital Infrastructure strategy is thus currently being drafted - an Arctic SDI strategy - which aims to ensure that the natural and societal changes of the coming years will be registered and made visible on a common Arctic digital geo-data platform.

If the necessary economic foundation is ensured, this trans-arctic planning tool will help the whole world to follow the radical changes in the Arctic in the coming decades. These changes will in the main relate to the climate changes caused by CO₂ emissions in other parts of the world, but changes in the Arctic will have a 'boomerang effect' on the rest of the world. Therefore it is in everyone's interest to ensure the success of the Arctic SDI strategy and its matching planning tools.



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The article was translated by Lise Smed Olsen

The Nordic research programme

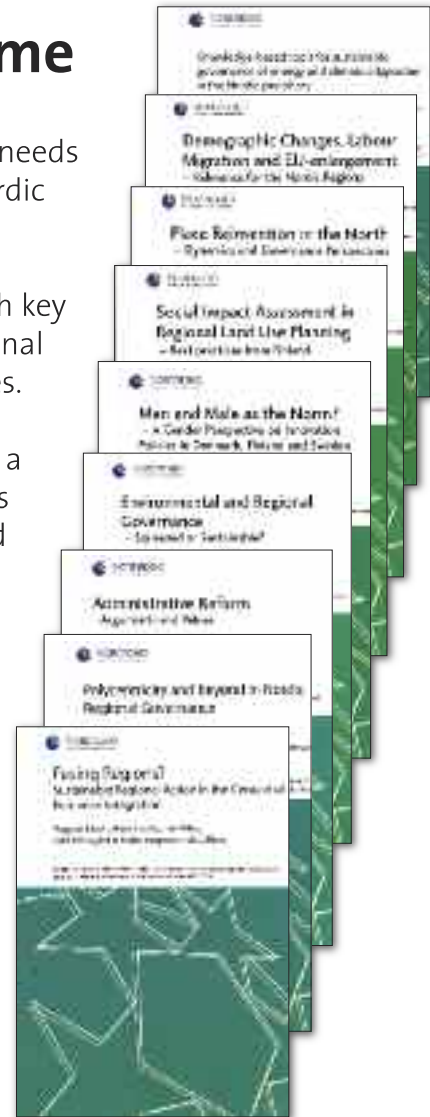
“Internationalisation of regional development policies – needs and demands in the Nordic countries” funded by the Nordic Council of Ministers has now come to a close.

The aim of the research programme has been to research key issues in need of new knowledge for the benefit of regional development policies and debates in the Nordic countries.

Ten projects were funded and the results are reported in a series dedicated to the programme. The first nine reports are now published, while the tenth report will be printed in December 2009.

A report cutting across the entire programme will be published in spring 2010.

All reports can be ordered from nordregio@nordregio.se or downloaded free of charge from www.nordregio.se.



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Seminar:

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Tuesday 15th of December 2009, 13.00 - 16.30

Nordregio, Skeppsholmen, Stockholm

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Key speakers:

Territorial Implications of the Global Economic Crisis for the Future of the European Space
– Professor Klaus Kunzmann, world leading expert on European spatial transition

Designing Macro-Regions: the future of European territorial policy?
– Sigrid Hedin & Peter Schmitt, Nordregio

European Space: the outside-in perspective
– Alexandre Dubois & Lisa Van Well, Nordregio



The Journal of Nordregio No 2-2008 provides background information for the seminar.



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The seminar is free of charge but the number of participants is limited. Please register ASAP with stefanie.lange@nordregio.se

Nordic national climate responses

The Nordic countries differ in their institutional settings but share similar targets for their climate policies particularly in respect of mitigation strategies. It remains clear however that knowledge gaps remain and that more research is thus needed in order to be able to set realistic targets for adaptation and mitigation.

Thus far, Nordic governments have been quick to translate international conventions into national strategies and they are committed to reducing their greenhouse gas emissions in order to create low-carbon societies before 2020¹. A number of measures have been addressed by the insurance companies with a view to reducing emissions and bringing social and environmental responsibility into business strategies in order to better tackle the risks and consequences related to climate change.

Research and development activities are emphasized in the Nordic Prime Ministers' Declaration² as the key strategies in coping with climate change. A joint research programme entitled "Top Level Research Initiative" established by the Nordic Council brought several organisations and institutions together in 2008 – primarily focusing on developing environmentally friendly technologies during 2009-2013.

Furthermore, close co-operation with business and industry will be of key importance for the utilization of the research results which could contribute by promoting international solutions through cross-border cooperation. Investments will be made in terms of research on energy efficiency and renewable energy sources as well as carbon capture and storage technology.

On 7 September 2009, the energy ministers of Sweden and Norway announced their agreement on the establishment of a common market for green electricity certificates by 2012. This is expected to improve the security of energy supply for both countries. The development of national adaptation strategies³ covers agriculture, forestry, water and energy management, health, biodiversity, finance and insurance.

The Nordic countries began incorporating concerns for climate change into their energy policies such as initiatives on CO₂ taxes as far back as the early 1990s. In addition, carbon pricing has always been considered a challenging yet crucial part of Nordic climate policy.

The various national strategies highlights the existence of often quite different institutional approaches to climate change. For instance, while Finland considers sector adaptation strategies, Denmark and Sweden emphasize the role of local or regional actors in the carrying out of adaptation efforts.

Denmark - better information coordination

The Danish Energy Agency (*Energistyrelsen*) published the Danish strategy in March 2008. The main objectives are the establishment of a platform for the authorities at various levels, industrial sectors and individuals to implement information initiatives and consider adaptation in their planning schemes.

The key steps are:

Assigning inter-ministerial working groups to coordinate and assess the realisation of the strategy by helping to exchange information on adaptation.

Establishment of an information tool⁴ located under the Ministry of Climate and Energy to inform a wider audience and develop planning tools for governmental authorities to encourage collaboration among national and international research centres.

Denmark places emphasis on *autonomous adaptation* whereby authorities, stakeholders and communities are seen as the main actors. An Information Centre for Climate Adaptation has been established in the Ministry of Climate and Energy and a Coordination Unit for research in climate adaptation is located at the National Environmental Research Institute of the University of Århus.

The creation of a shared risk system to cover the effects of damage generated by extreme weather impacts such as storm surges and high winds is now also under debate in Denmark. On September 26 2009, The Danish Board of Technology and the Danish Cultural Institute organized the first-ever global citizen deliberation "World Wide Views (WWViews)-Global Citizen Consultation on Climate Policy". See separate article on pp 4-5.

Finland - comprehensive adaptation

The Finnish adaptation strategy was prepared by the Ministry of Agriculture and Forestry and published in March 2005. Being the first country in the EU to adopt such a strategy Finland has inspired the Nordic as well as countries in Europe to move forward on this issue.

Finland emphasizes the synergy between mitigation and adaptation (see p 2). In November 2008, the government began revising the strategy to include "planning" including identifying the risks in flood-sensitive areas.

A recent report 'Evaluation of the implementation of Finland's national adaptation strategy to climate change 2009' by the Ministry of Agriculture and Forestry (4a/2009) outlines the experience gained thus far.

Iceland - climate friendly technology

Iceland's climate change strategy was published by the Ministry for the Environment in 2007. The strategy put forward the government's long-term vision; primary focus on mitigation plans and 50-75% reduction of greenhouse gas (GHG) emissions by 2050 compared to 1990 figures.

The country is a recognized leader in clean technologies, especially in geothermal power and hydrogen fuel use. There are almost zero emissions from stationary energy production since it is based on hydro-power or geothermic sources.

The government aims to further the development and the use of these renewable resources as well as improving energy efficiency and other climate friendly technologies. The next step involves tackling the emissions produced by the transport industry. The

government has set financial incentives for low emission cars. Currently, the main objectives for Iceland are as follows: To focus on international commitments under the UN Framework Convention on Climate Change as well as the Kyoto Protocol by improving its infrastructure.

Further reduction of fossil fuels usage and more emphasis on renewable energy sources & environment-friendly fuels.

Increasing carbon sequestration through renewed vegetation including forestation, wetland recovery and land use change.

Promoting the transfer of Icelandic expertise in renewables and environment-friendly technology.

Norway- carbon capture and storage

Norway has taken a comprehensive approach to securing energy efficiency, focused on renewable energy sources while also joining the EU's trading scheme in 2008. Energy relevant research and development activities have been prioritized within Norwegian climate policy.

On 15 May 2008, the government presented its report "*Climate change adaptation in Norway*" emphasising that adaptation measures do not necessarily demand changes in administrative setups.

Drafting of Norway's adaptation strategy (Official Norwegian Report (NOU) on climate change adaptation) is still in progress under the Directorate for Civil Protection and Emergency Planning (DSB) and is due for publication in the autumn of 2010. The strategy aims to assist in the information exchange between different sectors and administrative levels acting as a guide to local and regional planners.

Norway's climate policy is, by 2020, to reduce 1990 emission levels by 30% and ultimately to become carbon neutral by 2050. The Government is also investigating the possibility of using hydrogen technologies by setting up all new gas plants using climate friendly technologies. In particular Norway is trying to develop carbon capture and storage. In addition, building a global system for the trading of emission quotas has for many years been high on the official Norwegian agenda.

Sweden - a decentralized approach

The Swedish agenda in respect of climate change was developed between 1996 and 2003 through the Swedish Regional Climate Modelling Programme (SWECLIM) to provide a platform for planners and decision-makers within industry, public administration and other political bodies.

In addition, the Swedish Meteorological and Hydrological Institute (SMHI), under the Ministry of Environment, has provided scientific information⁵ while the Swedish Environmental Protection Agency (EPA) has been responsible for the dissemination of information and raising awareness on climate change and adaptation⁶.

In June 2005, an advisory committee, "*Klimat och*

sårbarhetsutredningen - The Swedish Commission on Climate and Vulnerability" was established within the Ministry of Environment to develop assessments on the regional and local impacts of climate change on society.

Its first report "*Sweden facing climate change – threats and opportunities* (SOU 2007:60)" was published in October 2007, emphasising that strategic planning and policy development are crucial for reducing vulnerability. According to the report; Sweden might face challenges in Baltic Sea ecosystems, the increasing risk of floods, landslides and erosion. However, opportunities may arise in respect of both forest growth and improved agricultural production.

Sweden's approach is *not* to develop a national adaptation strategy. Rather regional administrative boards have been assigned to steer the work.

In 2009, the Swedish Government submitted two bills; the Climate Policy Bill targeting reductions in GHG emissions and the Energy Policy Bill; presenting proposals for the energy sector. These two bills were designed to constitute "An Integrated climate and energy policy", setting an ambitious target of a 40% reduction in emissions by 2020.

The set of mitigation-oriented measures proposed for 2020 includes:

50% renewable energy

20% more efficient energy usage

10% renewable energy in the transport sector.

The fund allocated for the Swedish climate research strategy has been increased and the Swedish Energy Agency⁷ has been assigned to support the research activities.



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¹ EU Member States have agreed upon a short-term target to reduce emissions in the range of 20% in the trading scheme by 2020, compared to 1990 levels.

² The Nordic Prime Ministers' Declaration on Climate change was agreed on 16 June 2009, in Egilsstaðir, Iceland.

³ In all of the Nordic countries, except Sweden, government authorities have a central position in steering climate adaptation. In Sweden, the responsibility is shared between the local and regional authorities.

⁴ www.klimatilpasning.dk/da-dk/sider/forside.aspx

⁵ www.smhi.se

⁶ www.naturvardsverket.se

⁷ www.energimyndigheten.se/en/Research/

Spatial planning and climate change

In the Nordregio project, *The Future Nordic City (Framtidens Nordiska Stad)* a set of six toolkits were identified as being crucial for urban planners in their efforts to respond to climate change. In a follow up study - *Spatial Planning and its Contribution to Climate Friendly and Sustainable Transport Solutions* – the objective was to assess the usefulness of the toolkits by introducing three new cases from Helsinki, Stockholm and Bornholm, mainly with regard to climate change mitigation. The test was undertaken using the “toolkit terminology” to explain the cases.

This article presents the cases from that study, arguing that the set of toolkits in general seem to be useful in tracking the Nordic urban and regional response to climate change.

The tested toolkits are:

1. Spatial planning – governance - of the toolkits outlined below
2. Changes in attitudes and behaviour
3. Investments which facilitate acting in climate friendly ways
4. Economic incentives
5. Changes in legislation
6. Physical and transport planning

Spatial planning as the main toolkit

The main toolkit is *Spatial planning and governance*. Spatial planning concerns the creation of strategies which seek to enhance the synergies between the above-mentioned toolkits on the local, regional and national levels. It is also about finding ways to prioritise the reduction of greenhouse gas emissions in a wider sustainable development context such as climate change adaptation.

One such example is the discussion of the compact city. Creating the compact city is often used as an argument to help reduce greenhouse gas emissions, for instance, in the need for greater public transport capacity and the promotion of walking and cycling.

Whether or not it is a good strategy its relation to the issue of climate change adaptation is crucial. A compact city demands great efforts be made when it comes to climate change emergencies such as flooding and heavy rain.

A compact city also implies warmer surfaces which may however become increasingly unusable as global warming continues. Compact cities therefore need well planned green areas.

This is simply to highlight the fact that climate change mitigation and other dimensions of sustainability such as climate change adaptation cannot be seen as separate issues. The ways in which synergies between adaptation and mitigation can be found are being developed using the concept of “Adaptigation” (Langlais & Dymén, 2009). The concept is intended to signal that unexpected results can emerge in developing our strategies.

Furthermore, the discussion of reducing greenhouse gas emissions in a wider sustainable development context forces planners to considerate the issues of time, space and stakeholders.

Stockholm – congestion tolls and sustainable transport

Stockholm provides an example of the need to adopt a multi-faceted approach to achieving sustainable transport goals in a



Helsinki with metro entrance. Photo: Odd Iglebaek

Nordic metropolitan area given the long-term problems with congestion which are viewed, not only as a threat to the environment, but also as a threat to the economic growth capacity of the region and to the country as a whole. We can observe the role of *Spatial Planning* here as the main toolkit in addressing the economic, social and environmental dimensions of sustainability in an attempt to understand the consequences of congestion.

The two main measures addressed in this section are promotion of the use of clean vehicles and the introduction of congestion charges. The first measure, enhancing the use of clean vehicles, was introduced by the City of Stockholm in 2005. The goal here is primarily to influence the air quality while also reducing greenhouse gas emissions and noise.

An additional goal is that all vehicles should use at least 50% of their fuel from renewable energy sources. This shows that there is an ambition here to address the social, economic and environmental aspects of sustainability.

Reducing noise and improving air quality has a direct social and economic dimension for certain groups of stakeholders, whereas reducing greenhouse gas emissions is more of an environmental issue in a long term perspective.

The second measure, congestion charges, is a very clear example of the toolkits *Economic incentives*, *Changes in legislation* and *Investments which facilitate acting in climate-friendly ways*. The congestion charges were first tested during a one-year trial period in 2005-2006 together with the provision of increased public transport connections.

<The result was that the number of cars in the city centre was reduced by 20-25% (approximately 100 000 cars) and emissions by 14%. The congestion charge system was made permanent in 2008. One journey costs 10-20 SEK with higher charges during rush hour periods. Another perhaps unsuspected result of the congestion charge is the increase in sales of alternatively-fuelled vehicles by about 23 % across Stockholm County during 2008. The major reason for this being that clean vehicles registered before the end of 2008



Congestion tolls in Stockholm. Photo: Knut S. Vindfallet

were exempted from congestion charges. This is a concrete use of the toolkit *Economic incentives*. This Stockholm city policy increased significantly the sale numbers of alternatively fuelled vehicles. In 2008 sales grew at a record pace. One third of all cars sold in Stockholm were alternatively-fuelled cars.

Helsinki – Sustainable Structure for the Metropolitan Area

The METKA-project (Sustainable Structure for the Metropolitan Area) was carried out during the period 2007-2008 with the aim of creating workable methods for sustainable urban and traffic planning in the Helsinki Metropolitan Area - consisting of Uusimaa Region, Häme Region, Itä-Uusimaa Region, Päijät-Häme Region and Kymenlaakso Region.

The project brought together actors across administrative borders in the area, such as regional councils, route authorities and the environmental administration. The purpose here was to study and discuss the possibilities in respect of finding better methods to control the early phase of strong metropolisation.

To create a model that illustrates a desirable future for the Helsinki Metropolitan Area up to the year 2050, four different scenarios were generated. All describe the possible development of urban centres and the connections between them. These scenarios allocate new urban development according to the accessibility offered by the transport system.

The four regional scenarios were described as: Sprawling “Old Way”; Rail-oriented “Rail Necklace”; Transport arteries-based “Strong Connections”; and Multi-centred “Balanced Centres”. These alternative scenarios were then analysed and compared with the end product resulting in the METKA model. The model aims at the densification of current centres and the rail corridors between them.

To achieve this cooperation between the various actors a number of regulatory measures would be necessary. The project did not focus on the creation of practical decisions or measures to change planning policy but it did undoubtedly increase awareness of the changes required.

One outcome of the process is the growing level of mutual understanding in the regions of basic spatial development principles. It will probably however take several years before the results are translated into planning practice,

The METKA project in particular demonstrates the use of the toolkits *Spatial planning and governance* and *Physical and transport*



Modern electric vehicles at Bornholm. Photo www.oestkraft.dk

planning. The social, economic and environmental consequences will influence stakeholders across the regions in the long term through the creation of improved living environments and a lesser impact on climate change.

In the short term, the question remains how should the seemingly inevitable consequences of climate change be dealt with without compromising longer term mitigation activities.

Bornholm – EDISON project

A recent Nordic project designed to increase the potential usage of electric vehicles commenced on the Danish island of Bornholm in February 2009. The project represents an investment by several public and private actors.

The peripheral island with a population of 40 000 people produces a large amount of electricity via wind energy. This was the major reason for choosing the island as a test bed for the project.

The knowledge needed includes - technical, organisational (how to manage the distribution net), economic (how to manage the economic risks at start-up) and environmental factors in respect of how electric cars are used, operated and maintained.

The expected advantages are energy-efficiency savings and reduced greenhouse gas emissions as well as improvements in the urban environment with less noise and harmful emissions from cars. The effects of such a policy approach on spatial structures are potentially numerous.

The EDISON project is narrower in scope compared to the examples outlined for Stockholm and Helsinki above. The case deals mostly with the toolkits *Spatial planning and governance*, *Investments that facilitate acting in climate-friendly ways* and *Economic incentives*. The expected results from the project demonstrate significant benefits when it comes to the social, economic and environmental dimensions of sustainability.

The environmental benefits relate to reduced greenhouse gas emissions on a long term basis. Higher energy efficiency is primarily a short term result, highlighting the economic dimension of sustainability. The social dimension relates to improved urban environments as well as to less noise and less harmful emission levels from cars.

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Gender, climate change and women

How can gender and climate change be considered in two diverse countries such as India in the South and Sweden in the North?

My response to this question was to turn to the existing though limited literature on the subject of climate change and gender. Two themes recurred throughout – women as vulnerable or women as virtuous in relation to the environment. The literature makes two things seemingly obvious: women in the South will be affected much more adversely by climate change than men in those countries and that men in the North pollute much more than their female counterparts. Common to both places is that women are not part of the decision making bodies, as it is predominantly the men in their societies who affect policy making often to the detriment of women. In other words, women in the South are extremely vulnerable to climate change while women in the North are much more conscientious when it comes to dealing with climate change, possessing virtues of environmentalism which men with their propensity for long distance travel and meat eating do not have.

These assumptions can be found in policy statements and other government documents. Women as *the particularly vulnerable subjects of climate change* is the only reference made to gender in the Indian Government's National Action Plan on Climate Change (2008:14), "The impacts of climate change could prove particularly severe for women. With climate change there would be increasing scarcity of water, reductions in yields of forest biomass, and increased risks to human health with children, women and the elderly in a household becoming the most vulnerable. [...] Special attention should be paid to the aspects of gender." The Swedish Bill on climate and energy policy (*Regeringens Proposition* 2008:220) echoes some of these sentiments but with its own prejudices attached. "Many developing countries are especially vulnerable to climate effects because of poverty, conflicts, *lack of gender and social equality*, environmental degradation and lack of food" (*my emphasis*). The Bill regards gender equality and women's role in development as having an important bearing on work with climate change in the South and as being relevant in Sweden basically in the transport sector.

These ideas echo early debates on women and development when the different work and interests of women in relation to the environment began to be documented. The gender and climate change literature also reiterates ideas about women's poverty, vulnerability and virtuousness. Some of these arguments, although apparent in a commonsensical way, have not always proven to be empirically or statistically rigorous, leading instead to the discounting of the importance of gender and other crosscutting axes of power in environmental management and policy making. I found two arguments about women in relation to climate change. One is that women in the South are the poorest of the poor and hence more vulnerable to the vagaries of climate change. Second, women in the North are more environmentally conscious than men and tend to be more open to change. This led me to dig deeper into the research on which these statements are based.

It has been recognized that the effects of climate change will be harshest in tropical countries in the South and will affect the poor the most. According to Hemmati & Röhr, women represent a

disproportionate share of the poor and are likely to be disproportionately vulnerable to the effects of climate change (2007:7). Others note that 70% of the 1.3 billion people in the developing world living below the threshold of poverty are women (Denton 2002:10; Röhr 2006). Johnsson-Latham, points to a World Bank study that claims that gender differences are greatest among the poorest families. Women also eat last and least in poor families (2007:42). The Swedish Defence Agency's base data report professes to present the major gender issues in climate adaptation from a Swedish perspective, "Since climate adaptation has a high degree of international interdependence, if gender aggravates climate problems in other countries, this can have significant indirect effects in Sweden" (Hansson 2007:9). Similarly Oldrup & Breengaard (2009:47) write, "In developing countries, women's needs are often not taken into consideration, and their participation in the climate change processes and debates is not sufficient at the national level."

It is also believed that women and children are 14 times more likely to die than men during disasters (Brody *et al.* 2008:6).^{*} Women's vulnerability is ascribed to cultural and gender mores in many texts. Taking the example of the Asian Tsunami where the largest numbers of fatalities were women and children under the age of 15, Brody *et al.* write that it has been documented that women in Bangladesh did not leave their houses during the floods due to cultural constraints on female mobility and those who did were in any case often unable to swim in the flood waters.

Women are also considered more sensitive to risk, more prepared for behavioural change and more likely to support drastic policies and measures on climate change (Brody *et al.* 2009:15 drawing on Hemmati (2005)). The willingness of women to embrace attitudinal change is a recurring theme in the literature on countries in the North. According to Johnsson-Latham from Sweden (whose report has been cited extensively by those working on climate change and gender), one must start by asking, who are the polluters? The unequivocal answer there, she believes, is 'men' who need to start paying for the pollution. In her view, gender specific patterns show in general that the polluter is a man, whether poor or rich (2007:34). She points out that instead, the focus of attention when it comes to dealing with climate change is on technology and technicians as a professional group – most of whom are men – and are portrayed as the solution to the problem (2007:26).

Based on research on transportation in Europe she highlights the fact that men own more cars and travel longer distances to work, thus emitting much more carbon into the atmosphere. Latham writes that women on the other hand, tend to travel shorter distances and most often by public transport, use cheaper alternatives like the bicycle or walk and tend to make socially rational choices. "Whereas women represent a more human perspective by showing more consideration for road safety etc., it is men who dominate decision-making" (2007:44-60). She concludes by saying that women globally live in a more sustainable way than men, leave a smaller ecological footprint and cause less climate change. Other researchers have also pointed out that men's meat consumption surpasses that of women and since livestock rearing accounts for 18% of all greenhouse gas consumption, they are thus more polluting (Fagt 2006 in Oldrup and Breengaard 2009:25). However, Latham mentions additionally

that well educated and better paid women also travel further. So it would appear that it is in fact women, but mainly poor women, who are most virtuous and conscientious in relation to the environment.

Vulnerable or virtuous?

Chant writes that the assertion that women make up 70% of the poor, anecdotal rather than empirically or statistically rigorous, is usually coupled with the deeply problematic assertion about the feminisation of poverty. On the one hand while it has been useful in garnering resources for women, on the other, it simplifies the concepts of poverty and gender (Chant 2010:1). The unfortunate term "feminization of poverty", writes Jackson, has come to mean not (as gender analysis would suggest) that poverty is a gendered experience, but that the poor are mostly women leading to the fallacy that poverty alleviation would automatically lead to gender equality (1996:491).

Gender and poverty are two distinct forms of disadvantage (Jackson 1996:497). Jackson asks, "Are there no gender issues among those who are not the deserving poor?" In her article 'Gender and the Poverty Trap' she carefully shows the inconsistencies - in the assumption that all women headed households are poor, in the invalidity of the time-series (due to high intra-group variations) on which they base their assumptions (Ahmad and Chalk 1994) and in the arguments about food bias that are being seriously questioned (e.g. Lipton and Payne, etc). She shows further that the increases in mortality during famines affect men more than women, that women tend to have a greater life expectancy though they may not have better health, that violence has to do with other things than poverty and points to empirical evidence that shows that gender relations are in fact more equitable in many poor Indian households than in wealthier ones (Ibid).

The claim that more women die in natural calamities is true of several instances. However, research has shown that women do die more but where socio-economically disadvantaged – as soon as the socio-economic level rises, this difference tends to disappear (Neumayer and Plumper 2007). Gender is important but needs to be seen in its particular context. For example on the question of energy, Skutsch writes, "Basically it is very difficult to make a strong case for a real gender difference, not least because income factors may have a much more important and confounding influence on energy use than gender" (2002:33). Gender is thus so much more than poverty and women are not a homogenous category. Women can be rich or poor, urban or rural, from different ethnicities, nationalities, households and families all of which produce specific results. *A poor man in India is unlikely to be as polluting as a woman in Sweden or for that matter as much of a polluter as a rich woman in India.* By insisting merely on women's vulnerability or virtuousness (based sometimes on questionable statistics or beliefs) we neglect to see the important gendered aspects of climate change and *how* they may effectively be dealt with.

Gender is not considered as important in the North (or at least not as important in Sweden as it is supposed to be in the South), as is evident in the Bill as well as in the Defence Agency's report. The obvious answer to this is of course that in many countries in the South, such as in India, natural resources are a question of livelihoods in a more direct way. But the distance of the resource from a direct

source of livelihood should not blind us to the fact that gender in environmental matters is as important in Sweden as it is in India (see Arora-Jonsson 2009). According to Jackson it was easier to make gender an issue of poverty than to view gender disadvantage as crossing boundaries of class and ethnicity, and directing attention to the gendered character of development agencies themselves.. (...). the subordination of women is not caused by poverty. Women who are not poor...(.) experience subordination of different kinds (1996:501). The evidence for gender violence against women spreads across all regions, classes, cultures and age groups and there are no grounds for believing that it is alleviated with increasing prosperity (Richters 1994 in Jackson 1996:501).

Unequal gender relations do not cause climate change. But gender relations do determine how the environment is managed. Arguments about women's vulnerability in the South and their virtuousness in the North are an effort to keep women and gender on the climate change map from where their presence is all too easily erased. However, it is dangerous to attribute responsibility by gender (c.f. Skutsch 2002:34). It is easy to discredit such assumptions and more importantly we ignore the interrelated factors and axes of power that would help us understand how best to deal with the problems of climate change and its unequal effects.



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* Brody *et al* cite an IUCN/WEDO (2004) report as do several others who make this statement, sometimes as a statement of fact. On being contacted IUCN further refers this citation to a report by another author. When we wrote to the author of the report, it appeared that the statement was made at a presentation at a natural hazards workshop between 1994-96, with the author subsequently including it in a report. This statement has since then been picked up and presented as a 'fact' in innumerable documents on natural disasters.



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22 April 2010, Malmö, Sweden

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