

# CONCRETE DEVELOPS SOCIETY

**JAN ELDEGARD**

## **Abstract**

*During 2011, the Norwegian concrete industry jointly developed this project which presented how concrete has been the central part of developing the towns, industries and infrastructure of countries like Norway. In order to communicate the positive effects of concrete in modern societies, the importance of the value-chain of concrete industry was documented. Finally, the project presented how concrete may help modern societies when preparing for future challenges linked to urbanization and more severe climate.*

## **Keywords**

Value-chain, concrete, cement, future, challenges, society, urbanisation, infrastructure, climate, development

## **Biographical notes**

Mr Jan Eldegard, Managing Director of [www.byggutengrenser.no](http://www.byggutengrenser.no)

[www.byggutengrenser.no](http://www.byggutengrenser.no) ("Brilliant Building") is a project which was established in 2003 and is jointly owned by companies in the concrete and masonry industry in Norway. The task is to communicate for society the unlimited possibilities for utilizing concrete and masonry in buildings. The organization coordinates activities on behalf of about 70 companies within masonry- and concrete industry in Norway.

Main activities are education for students of architecture, seminars for architects and engineers, presentation of environmental properties of building materials, presentation of best practice in architecture via web and seminars, public relations and initiate potential improvement projects for masonry and concrete industry.

Jan Eldegard is also having a position as Senior Project Manager, HeidelbergCement Northern Europe AB,

## 1. Introduction

At the end of 2009, Norsk Betongforening (Norwegian Concrete association) initiated a R&D-workshop aiming at developing a list of projects/subjects which companies in the concrete industry gave priority with respect to common R&D-challenges. One of three top priorities was defined to be the documentation of the importance of concrete when developing communities, towns and infrastructure in Norway. The background for the conclusion was that concrete industry didn't have updated information on the link between development of modern society and use of cement-based solutions. Such data was looked upon as very important both for political purposes and as a basis for developing the industry itself.

Norsk Betongforening decided to initiate and finance a pre-study to define the goal and content in such project. This first study was completed in the first half of 2010 and the proposal for the main project was to organise the work in three individual studies during 2010-2011. These were:

1. Link between building of modern Norwegian society and use of concrete
2. Value-chain of concrete industry in Norway
3. Vision concrete – how concrete may support modern society.

## 2. Projects

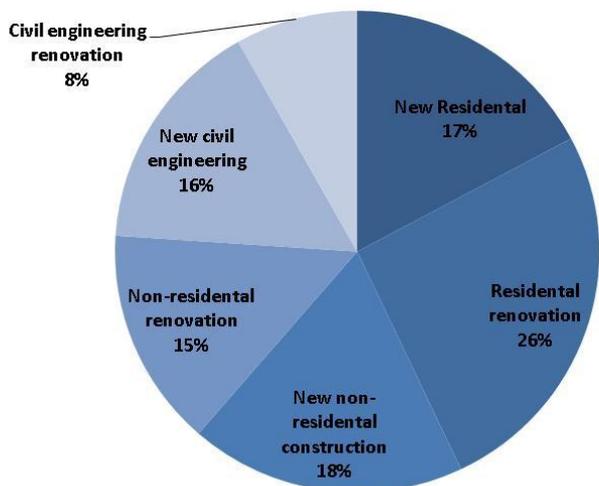
Byggutengrenser.no was in the second half of 2010 given the task to organize and finance the project which was completed in June 2011 and the main conclusions are presented in this paper

### 2.1 Link between building modern Norwegian society and use of cement

This first sub-project was performed by the Norwegian company "Prognosesenteret"- the construction market's leading analysis company in Norway. Their task was to present how investments in the different segments of the construction sector are closely connected to the use of concrete. Figure 1 gives the split for investments in the European construction sector in 2009.

Figure 1:

**2009. Total construction for Euroconstruct Countries,  
million euro at 2009 prices**

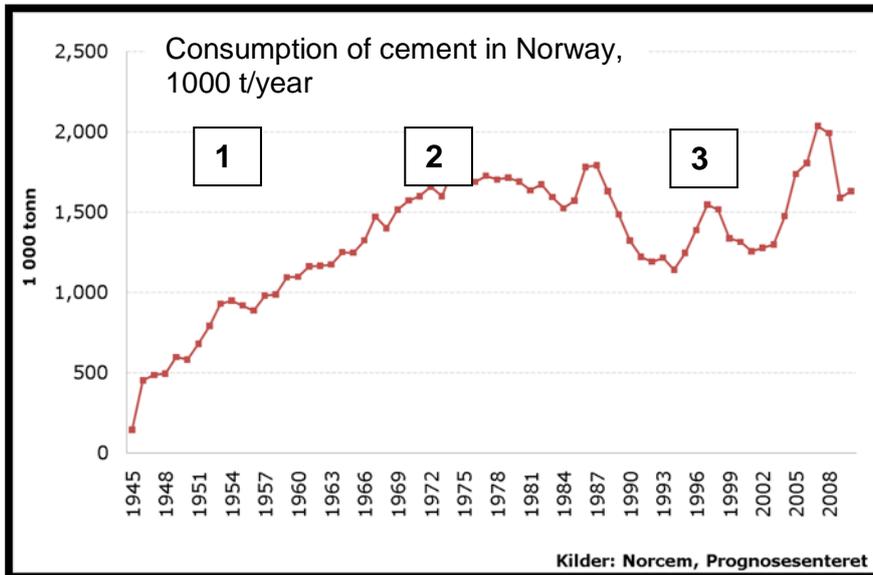


Kilde: Euroconstruct

The chart in figure 1 shows that about 60% of the investments are linked to new constructions of buildings and civil engineering and about 40% to renovation of buildings. These figures however, are not representative for the use of concrete in these segments in Norway. Only 5% of the consumption of concrete is for renovation of buildings.

By studying the consumption of cement as a 'proxy' for the use of concrete in the period 1945-2009, we can show how concrete has been and is a very important part of the growth of modern Norway.

Figure 2:

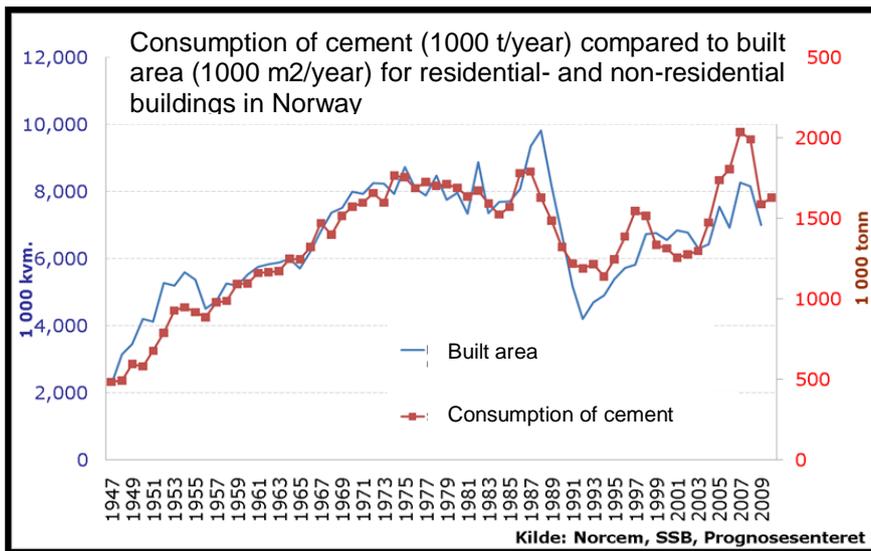


The use of concrete shows that the different phases (or years) have in different ways utilized the material for the economical-, financial- and technical challenges which dominate that period, shortly described below:

- Period 1:** Reconstruction after w.war 2, investments in hydropower, industry and infrastructure
- Period 2:** Construction of concrete oil platform in the north sea, residential building-programs
- Period 3:** Deregulation of financial sector, sensitive financial market in open market economy, very fluctuating level of investments- both private and governmental projects

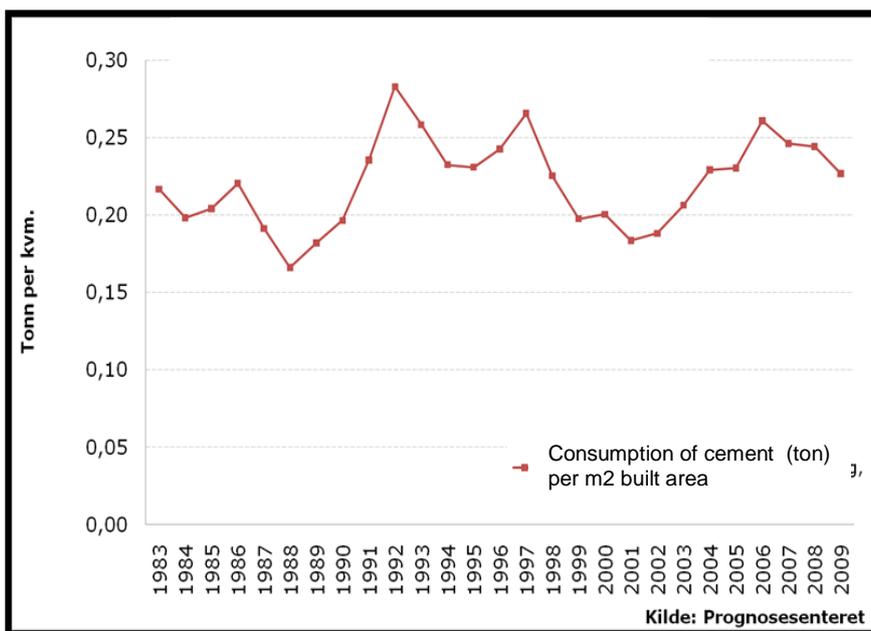
When studying the consumption of concrete (using cement as proxy) and compare it to the built area for residential and non-residential buildings in figure 3, we find a very good correlation. However the investments in the civil engineering-sector will bring in variations in the period of sensitive financial markets (marked 3 above). The last years, government has tried to use the construction sector as a tool to stimulate investments in infrastructure and buildings when private investments are low. Indirectly, the concrete industry is an important tool for government for keeping stable activities and investments in housing and infrastructure.

Figure 3:



When calculating the use of concrete (using cement as proxy) per m2 of built area for residential and non-residential buildings in the period 1983-2009, we see in figure 4 that the factor is mainly varying within a narrow span of 0,20-0,25 ton cement/m2. This means that concrete is- and will be closely tied to building our common future

Figure 4:



The conclusion in this report is that concrete industry is an important partner for politicians, government and other decision-makers when planning investments-strategies for housing, infrastructure, energy, water systems and other types of constructions. The changing- and more severe climate is also introducing new challenges for constructions and concrete structures will offer good and sustainable solutions,

## 2.2 Value-chain of concrete industry

The second sub-project was performed by the Research Department at BI, Norwegian Business School in Oslo, and their task was to present value-creation and geographical structure within concrete industry, effect of market fluctuations and the importance of our industry in local communities.

The created values are in this study defined as:

*Values created = paid salaries + interests on capital + paid tax + paid dividends*

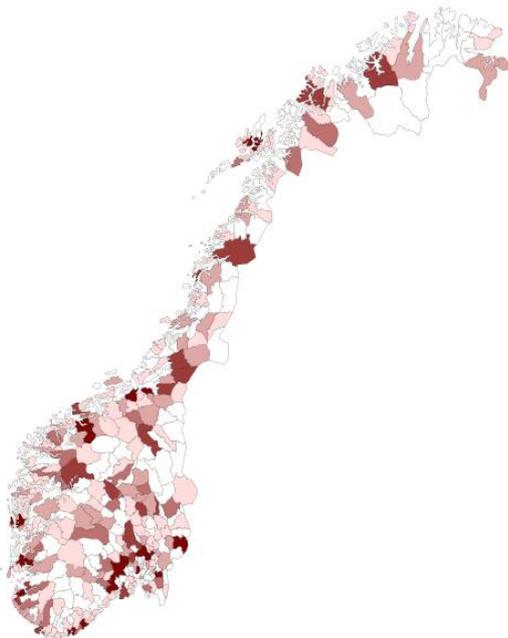
The concrete industry was defined as the total value-chain of production, including companies in production of raw materials (cement and aggregates), production of other materials (additives and pozzolans), production of ready-mix concrete, precast concrete elements and other concrete products. Contractors are defined as neutral to type of products/materials and not included in the definition of concrete industry.

A total of 530 Norwegian-based companies were studied, representing (February 2012: 1 EUR = 7,50 NOK):

- turnover of 21 billion NOK,
- values created of 5,9 billion NOK,
- 7500 employees.

Figure 5 shows how the companies in concrete industry is spread in all districts of Norway hence making the industry very important for local economy and employment

Figure 5

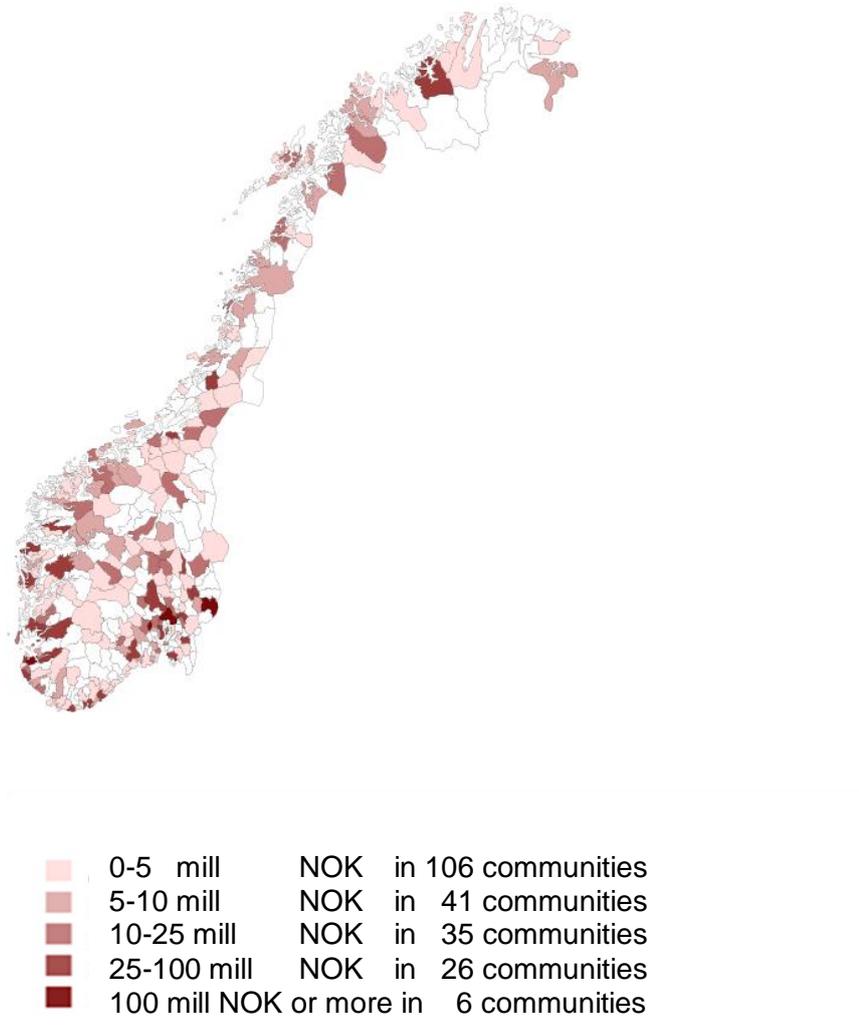


Communities with number of companies in each

- 1 company in 117 communities
- 2 companies in 54 communities
- 3 companies in 23 communities
- 4 companies in 21 communities

Figure 6 is showing the local value-creation in NOK per year. The companies in concrete industry is creating high values in all regions of Norway – also in districts which normally is looked upon as farmland and forestry-regions. These figures are highlighted when approaching local politicians and communities to explain the importance of our industry.

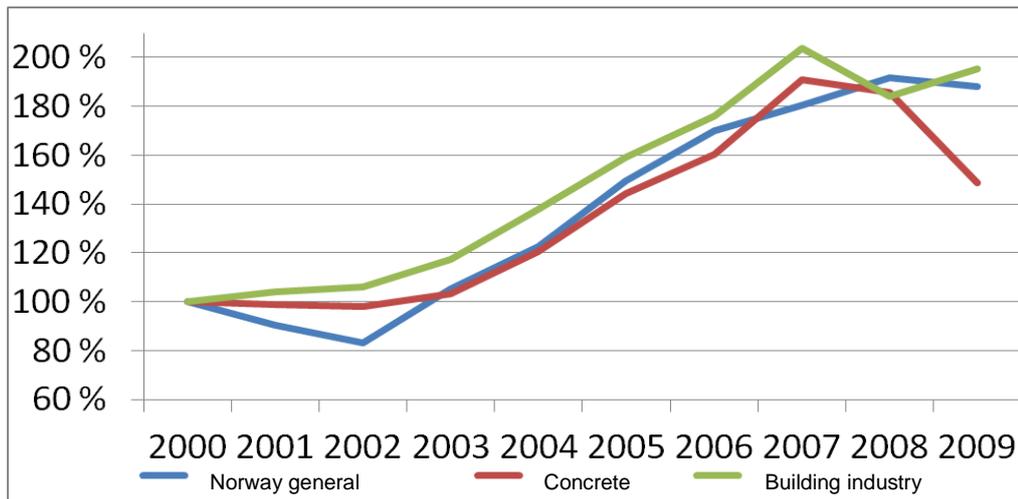
Figure 6:



The study also did some calculation on how concrete industry developed with regard to creation of values when comparing to Norwegian companies in general and the building industry in average. Figure 7 shows this development as an index where year 2000 was used as reference.

We see that concrete companies followed the rest of the Norwegian industry till the financial crisis hit in 2008. As from then, the drop for concrete industry was dramatic, while rest of industries had a flat developed due to compensating actions taken by government. Most of these compensating actions were within the short-term renovation-sector which we in the first sub-project explained was low concrete-intensive. In other words; the concrete industry saved it's own challenges without short term 'money-injections from government.

Figure 7, index of value creation



### 2.3 Vision for concrete – how concrete may support modern society.

The third and last sub-project was a study of future potentials for concrete based on the history of the materials up till 2011. The task was solved by Mr Erling Dokk Holm, an active writer in Norwegian newspapers focusing on urban development, architecture and trends in society. Mr Dokk Holm wrote a comprehensive essay describing a future built on- and with concrete under the subtitle: *“Future will not be carved out in stone, it will be casted in concrete”*.

His clear views have been presented by himself as an inspiring lecturer and speaker in conferences and through several articles in newspapers. It will not be fair to try to include all of mr Dokk Holm’s views in this short article. However, the concrete and masonry industry through the organisation byggutengrener.no has established some of his ideas in a list of actions to be used as our guidelines for our work.

The population in Norway is growing. In 2011 we were 4.8 million people- not very many, and we are spread out all over country. In 2030 the estimates show a total of 6 mill people living and working here. Main industries are oil & gas, aquamarine and fisheries, energy production and metal/process-industry. Most of these companies are located along the coast from south to north hence putting strong pressure on infrastructure and transportation-costs. As for most other countries, our biggest cities are getting bigger and the need for houses, roads, railroads and tunnels in central areas are getting more clear for everybody. In the Oslo-area, the population is estimated to be doubled in 2030 compared to 2010. There are strong resistance to use the green belt outside city centre for new expansions and the battle for how to solve urbanisation is ongoing.

There is one factor which is very important in such debates: The challenges for future will not be solved without including the concrete industry in the processes. The industry’s proposals are presented in the next chapter.

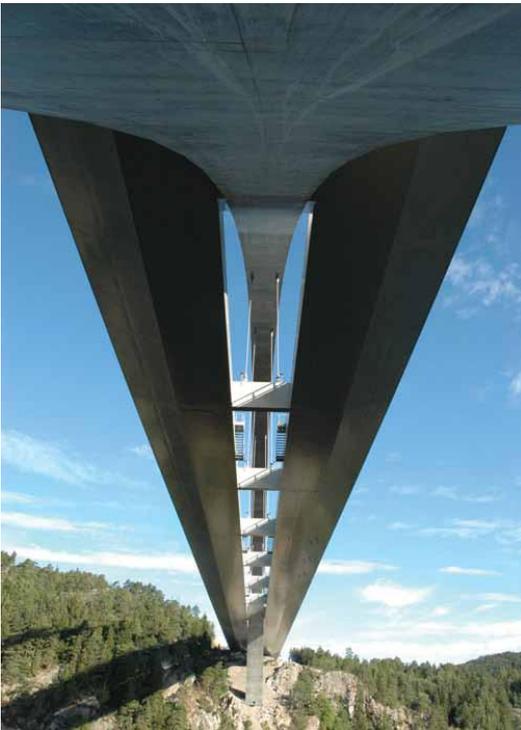
### 3. Concrete- what now?

The concrete industry's actions in order to help development of society are summarized in the following 8 sentences:

1. *Focus on more robust buildings, define lifetime to minimum 100 years*
2. *Change regulations for allowing higher buildings in cities and towns to preserve green zones*
3. *Increase safety in traffic by separating traffic and build wider roads and highways*
4. *Motivate for directing city traffic below surface in tunnels or on top of bridges*
5. *Build safer buildings witch withstand more severe climate and accidents*
6. *Eliminate the need for cooling office buildings by developing good solutions for utilization of thermal mass in construction*
7. *Define- and use life-time evaluations when defining environmental properties of concrete*
8. *Focus on sustainability more than just environmental factors*

Figure 8

The Svinesund concrete bridge connecting Sweden and Norway is a good symbol for the role of concrete- both in history and when future societies are built



#### 4. References

- 4.1 Rapport 1, Betong utvikler samfunnet: Hva kan forklare betongforbruket i Norge i perioden 1945-2010? By Janne S. Hougen, Kjell Senneset, Karl Johan Haarberg og Eivind Hansen, Prognosesenteret, Oslo 8. February 2011.
- 4.2 Rapport 2, Betong utvikler samfunnet: Den norske betongindustrien. Verdiskapning i perioden 2000-2009  
By Lena E. Bygballe og Eskil Goldeng, Senter for byggenæringen, Handelshøyskolen BI; Oslo 1. June 2011
- 4.3 Rapport 3, Betong utvikler samfunnet, Betong- et essay, by Dr. Erling Dokk Holm, Oslo 1. June 2011