The Challenge of Building a Sustainable Environment in the Arctic

Or

The Challenge of Sustainable Building in the Arctic Environment
Tove Lading

Architect MAA
Associate professor, DTU Civil Engineering / ARTEK

Lading architects + consultants A/S – since 1997
- sustainable building and construction
- refurbishment, social housing

Head of Department, Municipality of Copenhagen – 1993-96
- pilot projects on sustainable building and recycled materials
Question:

Why are construction projects in Greenland never a success?

(residential buildings, offices, institutions etc.)
What goes wrong?

- Economy
- Errors, mistakes, and failures
  - building envelope, energy consumption, etc.
- Moisture
- Bad indoor climate
What goes wrong?

• Economy
• Errors
  – building envelope, energy consumption, etc.
• Moisture
• Bad indoor climate

• MOLD!
Question:

**Why are construction projects in Greenland never a success?**

Designing a construction project is trying to figure out on behalf which product we will get
- but this prediction often fails.

Even the best assessments and calculations are often wrong.

There are impacts we fail to take into consideration.
Question:

Why are construction projects in Greenland never a success?

“Everybody believe in a calculation
- except the guy who made the programme”
Nuuk Centre – the Tower

Government offices and shopping centre

- 10 storeys
- 25,000 m²

- Builder/contractor: MTH A/S (DK / GL)
- Architect KHR A/S (DK)

Finished 2012
Renovated 2012 – mesh/windows
Renovated 2014 - new facades
Nuuk Centre – the Tower
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Low energy house – DTU / ARTEK, Sisimiut

2 apartments
• app. 250 m2

• Owner DTU
• Architect
  C.F. Møller A/S (DK)
• Engineer
  Rambøll A/S (GL / DK) + DTU
• Local contractors
• Grant from Velux-foundation

Finished 2005
Renovated 2007–10
- building envelope construction, windows, insulation, heat recovery system, ventilation
Renovation during the first 5 years
• façade construction
• windows
• insulation
• heat recovery system
• ventilation system
Students dormitory, Sisimiut – DTU + locals

Finished 2010
2011-12 - heating system, ventilation, solar panels, etc.
Why are construction projects in Greenland never a success?

Even the best assessments and calculations are often wrong.
Why are construction projects in Greenland never a success?

Even the best assessments and calculations are often wrong.

There are impacts we forget to take into consideration.
Why are construction projects in Greenland never a succes?

If you ask “people” in Greenland

- The wrong concept - we must find and follow “the right concept”
- The climate
- The infrastructure

- The human factor
Why are construction projects in Greenland never a success?

If you ask “people”
- We must follow “the right concept”
- The climate
- The infrastructure
- The human factor

If you ask me
1) The human factor
2) The human factor
3) The climate and the infrastructure

4) The concept
   - we seek solutions in a totally different context, not suited for the Arctic
Greenland

- 2.800 km North-South
- 1.000 km East-West
- Icecap covers 84%

- +70 inhabited places – all “islands”
- 57.000 inhabitants
  - approx. 10.000 Danes
  - approx.
    130 engineers in private business

- 16 “towns” / villages with +200 inhabitants

- 6 towns and “cities”
  - Nuuk (capital) 17.000 ↑
  - Sisimiut 5.500 ↑(↑)
  - Ilullisat 4.500 ↑→
  - Qaqortoq 3.200 ↓→
  - Asasiaat 3.200 ↓
  - Maniitsoq 2.600 ↓
Why are construction projects in Greenland never a succes? This was........

GTO type houses from 1950-60’s

Here in Kangaamiut
West coast, close to the Arctic Circle
Why are construction projects in Greenland never a succes? This was........ to some extent

Only one mistake:

Built by the Danes, with Danish craftsmen for the Greenlanders - NO Greenlanders allowed in the proces!

= No building culture in Greenland.
Why are construction projects in Greenland never a success? To-days concept:

Low-energy building
The concept of the passive house, developed in the South of Germany

1) airtight construction
2) balanced ventilation
3) heat recovery

1) works in Greenland
2) no ventilation engineers, no skilled labour, savings, culture / living conditions etc. ......
3) heat recovery doesn’t work ......
What’s the points?

LCAs, assessments, analyzes, and calculations that makes sense in most of the world

- often fails in the Arctic.
What’s the points?

Assessments, analyzes, and calculations that makes sense in most of the world

- often fails in the Arctic

Different context – different impacts.
What’s the points?

Assessments, analyzes, and calculations that makes sense in most of the world - often fails in the Arctic.

Different context – different impacts.

The concept – taken from at completely different context
The climate
The infrastructure
The culture
The human factor
The risk
What’s the points?

Assessments, analyzes, and calculations that makes sense in most of the world - often fails in the Arctic.

Different context – different impacts.
- The “wrong” concept
- The climate
- The infrastructure
- The culture
- The human factor
- The risk

The “profile of an expert” is different in the Arctic. Sustainable arctic solutions call for a holistic view.
What’s the point in doing research in Greenland?

57,000 people can’t change a lot in a world of 10 billion
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BUT

1. The potential is larger than the costs
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1. The potential is larger than the costs
2. 4 mio people living in the Arctic
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BUT

1. The potential is larger than the costs
2. 4 mio people living in the Arctic
3. Research and development of know-how and tools in an Arctic context has potential in all regions with extreme climate
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Thank you 😊