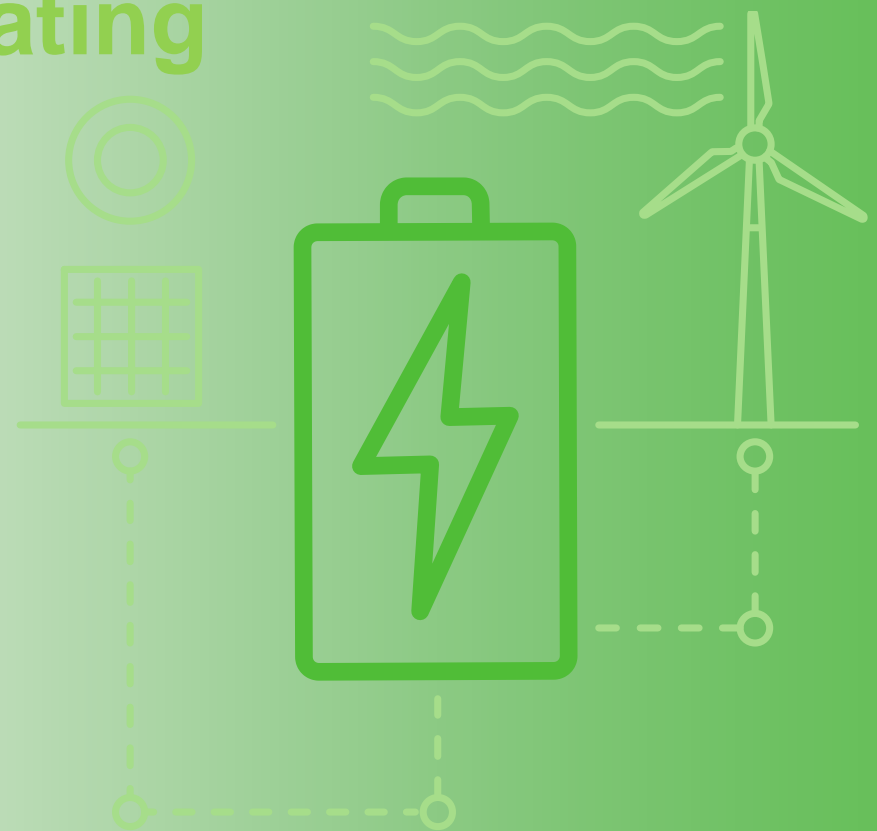


# 4<sup>th</sup> generation district heating - an investor perspective

Aalborg 27 Sept 2016

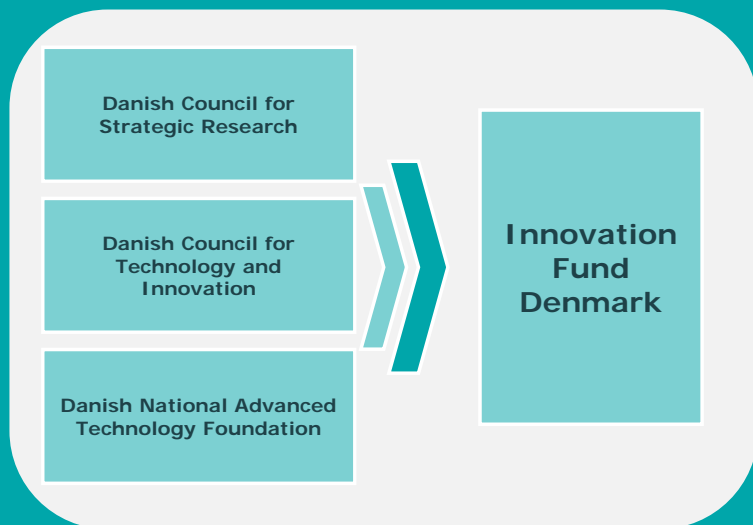


**Tore Duvold**  
Executive Vice President  
**Innovationsfonden**  
FORSKNING, TEKNOLOGI & VÆKST I DANMARK



# Three funds are gone – a new fund was born in 2014

## New principles



Grant >>> Investment

+14 different entries >>> 3 main entries

Different criteria >>> Similar criteria

Secretariat >>> Foundation

Compartmentalised >>> Value chain

Reports >>> Dialogue



# Mission: Create growth and employment based on science

- The entire value chain
- Novelty and top notch research
- Small , Medium and Large businesses
- Strong industry-university collaboration
- Ambitious (high risk)
- **Clear value proposition**



# Innovation Fund Denmark

## Our three entries



Industrial Researcher  
Entrepreneurial Pilot



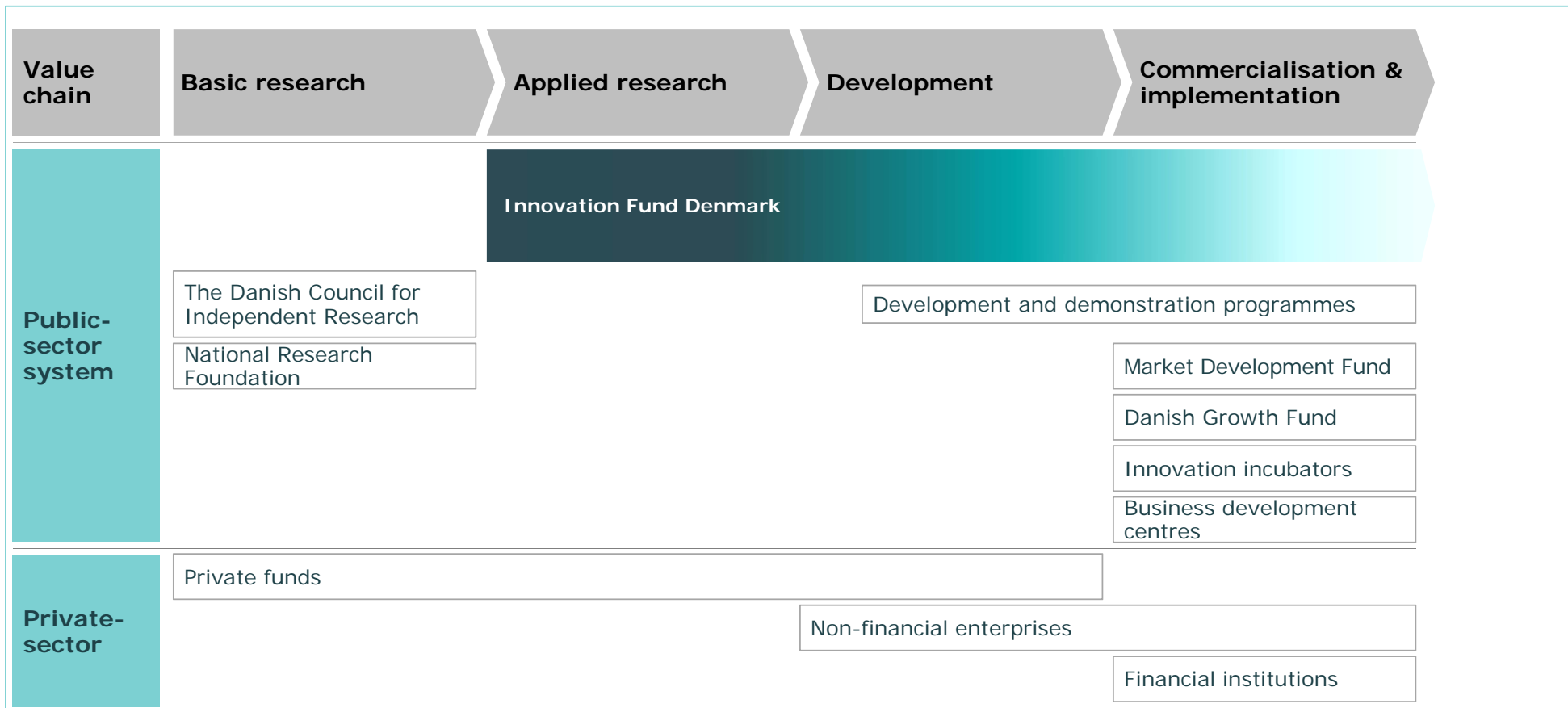
InnoBooster – SME's/Start-ups



Grand Solutions



# An integral part of the Danish innovation system



# Our assessment criteria

## Quality and novelty/originality

- Clear objectives
- Excellence in science and technology
- Quality of scientific hypothesis

## Strategic significance and impact

- Solutions to unmet needs
- Value for society, industry and academia

## Efficiency and implementation

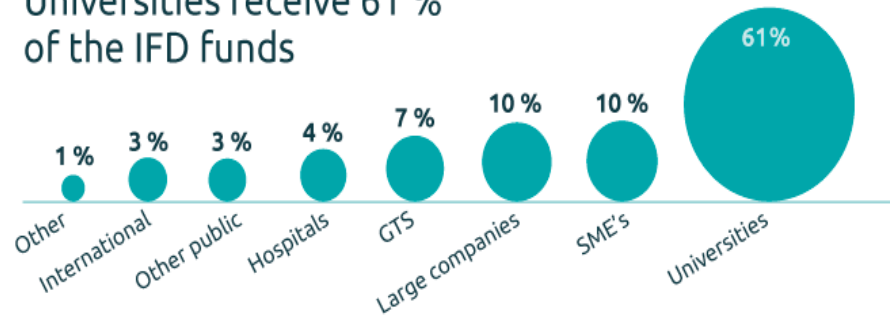
- Project execution and organisation
- Economic efficiency
- Implementation
- Beneficiary/user



# Grand Solution Projects in 2015

## General Statistics

Universities receive 61 % of the IFD funds

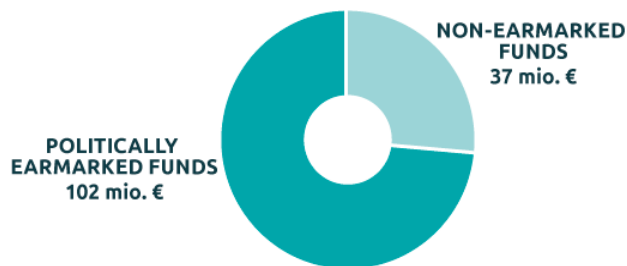


Investments in a value chain



557 projects applied for funding  
- 63 were chosen

Almost 75 % of the funds are politically earmarked



APPLICATIONS



SUCCESS RATE: 11 %

FUNDING



SUCCESS RATE: 13 %

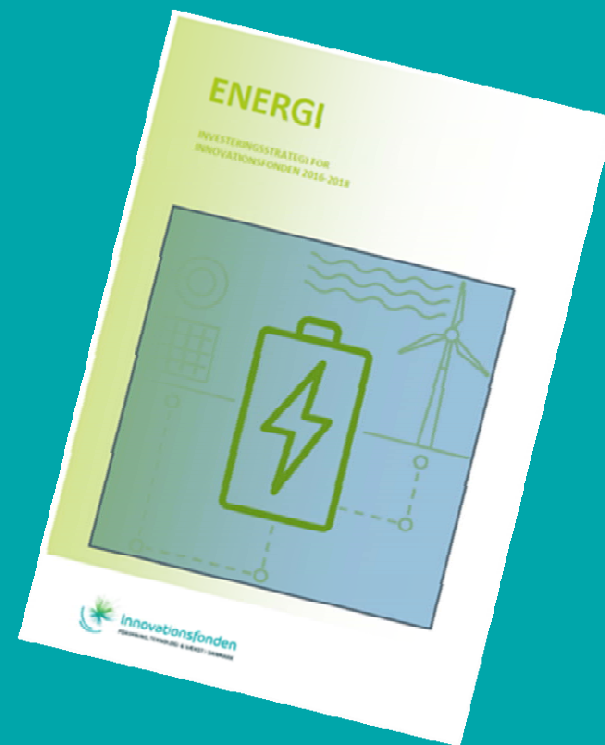


# Energy research and innovation – Innovation Fund DK

Innovation Fund DK has **100** Grand Solutions projects in the energy portfolio. A total investment of

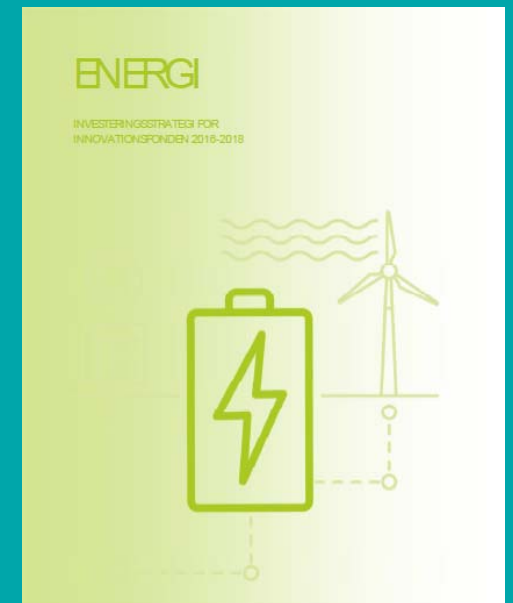
**2 bill. DKK**

+ energy related international and InnoBooster projects





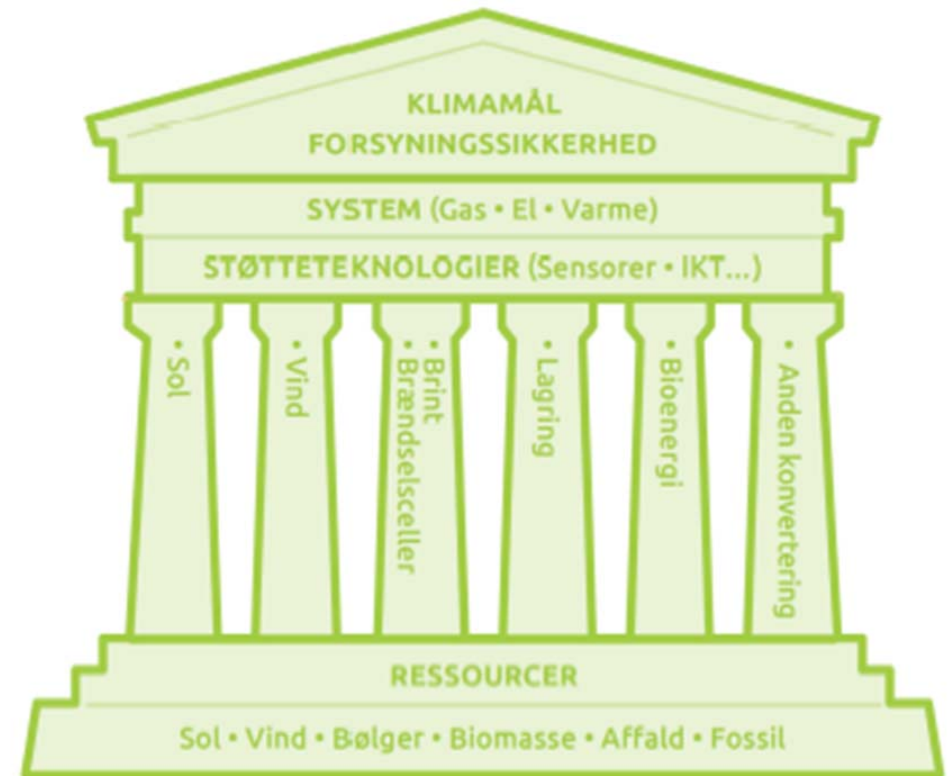
# Investement strategies



# An active investor

## Radical and incremental innovation in:

- Efficient and flexible use of energy
- Renewable energy technologies and technologies for energy storage and system integration
- Supporting technologies for energy technologies and systems i.e. ICT, effect electronic, energy materials



Integration of electricity-, gas and heating systems is an important area!





# Research for 4th generation heating technology

Denmark has a target of becoming fossil free by 2050 , and currently has a district heating share of approximately 50 percent, which provides the basis for large fuel savings , integration of renewable energy and utilization of low temperature sources

4DH is optimizing, reorganizing and developing a new type of district heating technology

Denmark as a showroom and provider of solutions



# Key figures - 4DH Strategic Research Center



- **Period:** 2012 – 2017, Funding year: 2011 (former Danish Council of Strategic Research now Innovation Fund Denmark)
- **Own financial contribution:** 26,92 mill. DKK, Grant: 37,00 mill. DKK – (32,4 mill. DKK spent up till now.)
- **Funding rate:** 58%, Project budget: 63,90 mill. DKK
- **Partners:** AAU, SDU, DTU-Byg, DTU-Risø, University of Zagreb, CTR, Rambøll, NIRAS, Aalborg Forsyning Varme, HOFOR (tidl.Københavns Energi), AffaldVarme Aarhus, COWI, Vestforbrænding, Ringkøbing-Skjern Kommune, PlanEnergi, Danfoss, Logstor, EMD, Fjernvarme Fyn, Tsinghua University, VEKS, Desmi, SPX, Kamstrup, Ribe Jernindustri (udtrådt okt. 13), Halmstad University, Chalmers University of Technology, Linnaeus University, Efsen Engineering (udtrådt okt. 13), Wallenius AB, Viborg Fjernvarme (ny pr. okt. 13)
- Important: Danish Industry and international partners.



# 4DH - Grant from 2011

## Strategic Research Centre

The 4DH Centre will **generate knowledge** in, among others, the following areas:

- Design of future district heating network technologies including the development of components and concepts
- Planning and management tools based on Geographical Information System (GIS)
- Tools for decision-making support for the involvement of production units in electricity markets

### Focus in 2011:

- **Quality:** Excellent research and research education – Scientific publications
- **Relevance:** Societal challenges
- **Effect:** Involvement of end-users, cooperation between academia and industry, international cooperation, dissemination activities



# 4DH Research changed the direction of EU heating...

Five years ago, the EU's focus was firmly set on reducing the heat demand and electrifying the heat supply. District heating was on the periphery of EU energy policy.

The whole perception of heating has changed in the Commission over the last few year.

4DH made a contribution to this change with partners from Halmstad University, University of Flensburg, PlanEnergi, Ecofys, and the University of Zagreb and 4DH industry partners





## 4DH – Anticipated results in 2011

- ***better scientific understanding** of the 4GDH concept based on technology theory,*
- ***innovation of potential future district heating** network technologies and designs*
- *further development of combined coherent **spatial databases**, data infrastructures and **energy planning tools** and software tools for decision-making*
- ***companies with a focus** on the integration into emerging electricity markets,*
- *the identification of **future sustainable heating concepts***
- ***energy system analysis tools, methodologies and theories** to conduct studies and scenarios of future sustainable energy systems in order to identify the role of district heating systems and technologies*
- ***theories and methodologies** as well as the design of specific public regulation measures at the local, national and supranational levels to secure the implementation of these measures.*



# Next steps

## Achievements up till now – Wishes for final work

- Excellent research
  - Heat maps, solar atlas, development of Energy System Analysis Tools, demonstration projects, Test daily operation and bidding strategies etc.
- Publications etc., research education
- Dissemination activities – International conferences
- Effect on European policy in district heating

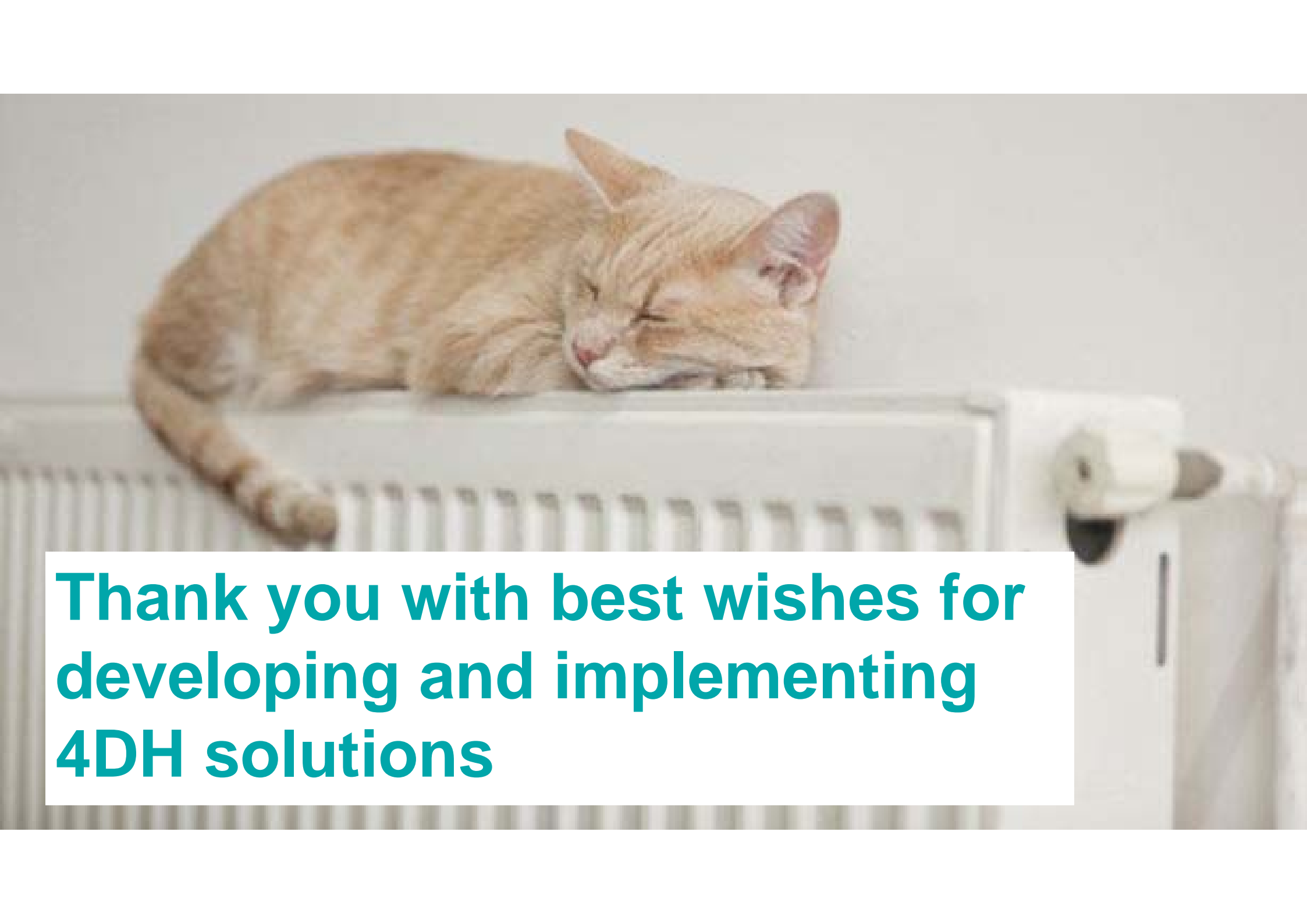
### Focus going forward:

- Societal readiness
- Identify and overcome barriers
- Cost effective solutions
- Value proposition to attract investors
- Implementation of results and a clear path for how the project can impact
- Export of technologies and know how from companies involved
- Denmark as showroom

**Problems can be complicated – solutions cannot**







**Thank you with best wishes for  
developing and implementing  
4DH solutions**

**innovationsfonden.dk**