

# Project descriptions



## Products and technologies

### **Køle VirksomhedsCenter Alsion "Cooling Cluster"**

The Cooling Cluster is based in Southern Denmark with a high representation of cooling related companies, and spreading into Denmark and over the border to Germany.

KVCA is established to increase innovation and knowledge sharing between our members and in the cooling industry as a general. This will be established through technological and samfundsmæssige projects cross the members. KVCA has also a task to ensure future innovation through training and the new established educations to attract youth into cooling.

KVCA is a member based knowledge centre offering expert knowledge for the Cooling Cluster and the cooling industry through:

- Development projects cross the companies in the cluster
- Specified education and training programs within cooling technology
- Initiation and management of public funded research projects in a cooperation between companies, universities and research institutions.
- Ensuring recruitment basis through activities in engineering educations.

### **Project themes**

We are looking for your help with one or more of the below mentioned project themes. These themes have been selected from many as being the ones with the highest interest of our members and also the business areas with the best growth potential in the near future. Depending on your interests, it being a term project, a bachelor or master thesis, or an internship, your project description can combine elements from one or all of the below themes. For all projects there will be a strong connection with our member companies and you will have good opportunities to extend your personal network.

### **Sea water cooling/heating**

KVCA has along with UBST (Loose translation: University and building institute) and others investigated the possibilities of utilising sea water as an energy resource for cooling and heating purposes in buildings.

As a conclusion to this investigation it is the goal of KVCA to have built a test plant here on Alsion which can exploit the energy in Allsund. to achieve this goal we need to have carried out a number of studies concluding in a specific plan to how this test plant should be designed and constructed and what application possibilities we are looking at. This project is quite extensive and is potentially a large project or many small projects joined together.

### **District cooling**

District cooling is a service in growth nationally and globally. In large cities around the world more and more district cooling plants are being built and also in Copenhagen a large plant is being finalised and will when running cover the cooling needs of large buildings in a substantial part of

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inner central Copenhagen. The potential lies in replacing smaller locale cooling plants with highly efficient large district plants in the same way as today's district heating.

### Waste heat based cooling/Absorption cooling

There are many processes in the industry and in the district heating network where excess heat is lost and not utilised. Within the cooling technology there are several ways of exploiting this excess heat resource. One is absorption cooling.

### Heat pumps

Heat pumps are more and more widely used in Denmark but not nearly as much as could have been expected when looking at low energy prices and good performance. Especially when looking at the current situation of frequent peaks of excess electrical power in the power network which is costing the power companies a lot of money to regulate.

Therefore we see a great potential in the possibilities of controlling a large number of Heat pumps in a kind grid community which could be controlled collectively. With this it could be possible to absorb these excess power peaks at a very profitable price or completely cut off consumption in low periods.

We also see possible projects about small heat pumps specially made for Low-energy-houses. Current the tendency is that the heat pumps currently on the market are too large for this application and therefore not sufficiently effective. In today's low-energy-houses cooling is often needed more than heating because of the extensive insulation used.

### Energy optimisation

Within the cooling industry energy optimisation is always in focus. Intelligent control on a system scale, choice of material and technologies, flexibility in consumption, buffers, storage, control are all interesting in this field.

### Natural refrigerants

When using refrigerants there are a number of challenges in various product specific conditions, side products or side effects to take into consideration in relation to the environment, flammability, toxicity, temp/pressure a.o. This is the case for both Chemical and natural refrigerants, however, we see it logic to pursue the natural refrigerants where side effects and conditions are know and documented whereas the chemical refrigerant again and again have surprised us with hidden effects. (see factors as ozone depletion and global warming potentials). Projects concerning natural refrigerants and focussing on removing the barriers that are slowing the current progress.

### Small refrigerant charges

There is a wish within the industry to develop systems with small refrigerant charges. Some of the advantages with small charges are reduced use of materials, minimised loss during leaks, low cost charges, higher performance on restricted charge sizes.

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### Energy storage (cold/varm storage)

One of the main challenges in working with heating and cooling is that you never need it when you have plenty of it. In winter when it is cold you need heating and in summer when it is warm you need cooling. If you could only store the heat of summer to use in the cold of winter or vice versa. If we could use the energy when we have an excess and thereby save when energy is scarce.

At Alsion this technique is actually used because the building structure is cooled down during the night simply by opening all windows and during the day the structure itself will balance the temperature.

The main philosophy should be that regardless of how low the efficiency is when energy is in excess it might still be worth the effort as long as the excess is large enough and otherwise just wasted. The large scale gain could be substantial. Let the innovation begin.

Contact:

If any of these project ideas should appeal to you or you have questions you need answered regarding the projects please contact Hans A Pedersen by phone 65508091 or email [hap@kvca.dk](mailto:hap@kvca.dk).

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