

Nordic Countries

The Nordic countries, or the Nordics, are a geographical and cultural region in Northern Europe and the North Atlantic. The term includes Denmark, Finland, Iceland, Norway, and Sweden, as well as Greenland and the Faroe Islands – which are both part of the Kingdom of Denmark – and the Åland Islands and Svalbard archipelagos that belong to Finland and Norway respectively. The term Scandinavia in local usage covers the three kingdoms of Denmark, Norway, and Sweden. The majority national languages of these three belong to the Scandinavian dialect continuum and are mutually intelligible North Germanic languages. Finnish language is completely different, related to Hungarian and Estonian languages.

The Nordic countries are sparsely populated and characterized by cold climate (see **Table 1**). Regarding the energy use and sources, they are very different. Energy use per capita is quite high except in Denmark. This is mainly due to energy intensive industry (forest and metallurgy) in Finland, Norway and Sweden. Main source of electricity generation in Norway is hydro power. Finland has high percentage

of nuclear which is still increasing. In all countries the share of renewable sources is much higher than in EU on average, but from different reasons. In Norway it is due to hydro power, in Finland and Sweden it is due to the forest industry, which uses all waste material from the wood processing for electricity generation. In Denmark the high percentage of electricity is mainly due to wind power.

Table 1. Some basic information of Nordic countries and their energy use.













				
	Denmark	Finland	Norway	Sweden
Population, million	5.8	5.5	5.4	10.3
Land area, 1 000 km ²	43	338	324	450
Population density, people per km ²	135	16	17	23
Member of EU since	1 973	1 995	non member	1 995
Heating degree days, °Cd, base 18°C	3 072 Copenhagen	4 331 Helsinki	4 465 Oslo	4 005 Stockholm
NZEB primary, HVAC energy requirement for apartment buildings, kWh/m ² , a	30+1000/A (A=heated floor area)	56	66	82
Energy use, MTEO	13	24	21	32
Share of renewable sources in energy use	33	43	58	53
CO ₂ emission, ton per capita per year	5.8	8.8	9.4	4.5
Electricity use, kWh/capita per year	5 720	14 732	24 006	12 853
Production capacity of electricity by energy source in %	Fossil 46 Nuclear 0 Hydro 0 RES 54	Fossil 41 Nuclear 17 Hydro 20 RES 23	Fossil 3 Nuclear 0 Hydro 93 RES 4	Fossil 5 Nuclear 22 Hydro 42 RES 32

Table 2. HVAC associations in Nordic countries.

	DANVAK  	FINVAC The Finnish Association of HVAC Societies FINVAC ry  	NORWAC NemiTek - Norsk VVS Energi- og Miljøteknisk Forening  	SWEDVAC Swedish HVAC Society - Society of Energy and Environmental Technology  
Number of members	2 000	4 associations with totally 5 500 members	4 700	7 000
Who can be a member	All persons in the HVAC- branch	All persons in the HVAC-branch (in FINVAC's member associations)	All persons in the HVAC- branch	All persons in the HVAC- branch
Membership fee	150 euro	70–120 euro	130 euro	75 euro
Established	1946	1930	1924	1909
Number of supporting members	none	200 (in FINVAC's member associations)		none
Journal(s)	<ul style="list-style-type: none"> The HVAC Magazine (in cooperation with TechMedia) 	Journals of FINVAC's member associations: <ul style="list-style-type: none"> Talotekniikka (HVAC Journal in Finnish language) vvs värme- och sanitets-teknikern (HVAC Journal in Swedish language) Sisäilmautiset (Indoor air Journal in Finnish language) 	<ul style="list-style-type: none"> Norsk VVS Rørfag Byggdrifteren Kulde Norsk Energi Maleren Matindustrien 	<ul style="list-style-type: none"> Energi & Miljö (Energy and Environment, Journal of Heating, Ventilating and Sanitary Techniques, Indoor Climate)
Major annual events	Yearly Danvak Day and Installation conference	Yearly Energy seminar and Indoor climate seminar	Yearly Operations conference and HVAC-days	Biannually Nordbygg Expo and yearly seminars in Stockholm
Most important source of funding	Courses and conferences	Projects, courses and seminars	Journals and conferences	Membership fees (and for the journal, advertising revenue)

Co-generation and district heating have very significant role in all Nordic countries. Natural gas is not used as much in heating of buildings, due to limited gas pipe network.

Energy efficiency of buildings has traditionally been good, partly due to cold climate, but also due to dependency on imported fuels, except Norway. The NZEB criteria are quite stringent, however, could be better.

Due to cold climate and demand for good indoor environment the teaching of HVAC technology has been for long time in the curricula of the universities. The professors from Nordic Universities have been well recognized in the academic world like prof **Ole Fanger** from Denmark, prof **Eystein Rodahl** from Norway, prof **John Rydberg**, **Folke Peterson** and **Tor-Göran Malmström** from Sweden. The long tradition for HVAC has also been one reason to establish engineering societies. The oldest is the Swedish society, 110 years old, youngest Danish one, close to 70 years old. The number of members in the Nordic societies is high, almost one from one thousand inhabitant is a member (Table 2).

Due to cultural similarities there has also been interest in collaboration between the Nordic societies. Already in 1948, the Danish Association initiated Nordic cooperation and in 1953 the first Scandinavian HVAC conference was arranged in Copenhagen. Two Scanvac conference series are running still today. RoomVent conference, focusing on air flows in rooms and buildings, was held the first time in 1987 in Stockholm and the Cold Climate HVAC conference in 1994 in Rovaniemi, Finland.

SCANVAC (Scandinavian Federation of Heating, Ventilation and Sanitary Engineering Associations in Denmark, Finland, Iceland, Norway and Sweden) was established the same year as the Cold Climate HVAC conference, to get a better structure and rules for the cooperation. **Ole Fanger** was elected as the first president of SCANVAC, followed by **Per Rasmussen** and then **Olli Seppänen**. ■

OLLI SEPPÄNEN, President of SCANVAC

SIRU LÖNNQVIST, Secretary General of SCANVAC