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## **Snow White and the clean dwarf**

By Walt Patterson

When I told a friend I was off to Hammerfest, he asked 'Does that involve drinking a lot of good beer?' The answer is 'Yes', but not for the reason my friend had in mind. Hammerfest is not a beer festival. It's the most northerly city on earth, on the northern tip of Norway, well inside the Arctic Circle. The beer in Hammerfest comes from the Mack brewery in Tromsø, the world's most northerly brewery, and is eminently drinkable; but that's not why I was headed north. The head of the local electricity company had recruited me to his small but feisty Hammerfest Resource Group; and I was eager to find out the latest. Hammerfest embarked on electric innovation nearly 125 years ago; and it's still going strong.

If you live where the sun does not rise at all for two months, you really appreciate electric light. In 1880 the Siberian steamship *Dallman* lying in Hammerfest harbour tested its on-board arc-light system. The town fathers were impressed enough to establish a fund for electric lighting. By 1890, after detailed study, they were building their first generating station, using the abundant water-power close by, when a devastating fire wiped out two-thirds of the town. Recovering from the disaster, they at once decided to continue and complete the electricity system, to enable them to continue through the long dark winter, rebuilding. In February 1891 Hammerfest became the first European city with public electric street lighting.

In January 1945 the retreating German army blew up the power station and leveled the town, leaving only one chapel standing. But Hammerfest rose again from the ashes, with a new power station on the site of the old. In 1991 Hammerfest El. Verk, its symbol a shining street-lamp, celebrated its centenary, supplying electricity to more than 10 000 people scattered across what must be one of the most spectacular and inhospitable service areas in the world. But it was not standing still.

In the mid-1990s, Norway's government-owned oil company Statoil discovered the first of what was to become a series of major gasfields in the Barents Sea, north and east of Norway. The Snovit - SnowWhite - field lies some 130 km northwest of Hammerfest. The island of Melkoya, on the northern edge of Hammerfest harbour, is now the landfall for Statoil's undersea pipeline, delivering the output from Snovit into a huge plant, now under construction, to produce liquid natural gas for tanker shipment to Europe, the US and elsewhere. Statoil contracted with Hammerfest El. Verk to supply electricity to the construction work on Melkoya, effectively doubling the little company's cash flow.

Statoil also announced plans to build its own 240MW gas-fired power station on Melkoya. Norway's electricity has always been almost entirely hydroelectric, emitting no carbon dioxide. Plans to build gas-fired generation have been intensely controversial, increasing Norway's carbon dioxide just when the country is already having trouble meeting its international commitments to reduce greenhouse gases. On Melkoya, Statoil is planning to separate the entrained carbon dioxide from the Snovit production and return it through a parallel pipeline, to be injected into the Tubaaen aquifer beneath Snovit (MPS, July 2004, p20). But Statoil does not propose to capture the carbon dioxide from its gas-fired power station.

Hammerfest El. Verk has other ideas. It wants to build a 100MW gas-fired power station on the

coastline opposite Melkoya, incorporating carbon-dioxide capture, sending the captured carbon dioxide through Statoil's return pipe into the aquifer beneath the Snovit field. When the idea was first broached, Statoil flatly rejected it, saying it had no pipeline capacity. Hammerfest El. Verk then commissioned independent research from two Norwegian universities, which found that pipeline capacity would be ample. Hammerfest El. Verk also arranged to have the findings revealed in the presence of senior politicians from Oslo. Reflecting the disparity in size between Statoil and Hammerfest El. Verk, one Norwegian newspaper reported the issue under the headline 'SnowWhite and the Clean Dwarf'.

Hammerfest El. Verk is now raising funds for its gas-fired plant, and hopes to have it in operation by 2007. Although it has selected the carbon-capture technology for this pilot plant, it also wants to establish a test-rig in Hammerfest for different carbon-capture technologies, with the longer-term aim of producing carbon-free electricity from Barents gas on a much larger scale, possibly even with HVDC links to southern Scandinavia. The test-rig would be located in the precincts of the original 1890 power station and its successors, just uphill and inland from Hammerfest harbour, in what the company plans to call its Energy House. The Energy House plans are still evolving, but they will have plenty of innovations to exhibit. The gas-fired plant will also produce hot water, to be used for heating and possibly also fish-farming. A related plan, for an integrated scheme on the offshore island of Soroya opposite Hammerfest, is also emerging. Meanwhile, half an hour south of Hammerfest, invisible underwater in the Kvalsund channel, the first 300kW tidal generator is now delivering power to the area, with many more to be added.

In 2003 the company changed its name to Hammerfest Energi, acknowledging that it is becoming much more than just an electricity company. In Hammerfest itself, derelict fish factories along the harbour front are to be replaced by a culture centre and upmarket housing; and Hammerfest Energi wants to help make the new buildings showplaces for energy performance. The Energy House, too, will reinforce this theme, with educational exhibits and materials and even a conference centre. Ere long Hammerfest Energi may become Hammerfest Energi Services. Small, agile and fast-moving, it may appear to be on the outermost fringe but it's right in the thick of the action. Its founding fathers would be proud.

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