

HYDROGEN TRAIN – the Danish way



A feasibility study by the Hydrogen Innovation and Research Centre (HIRC)

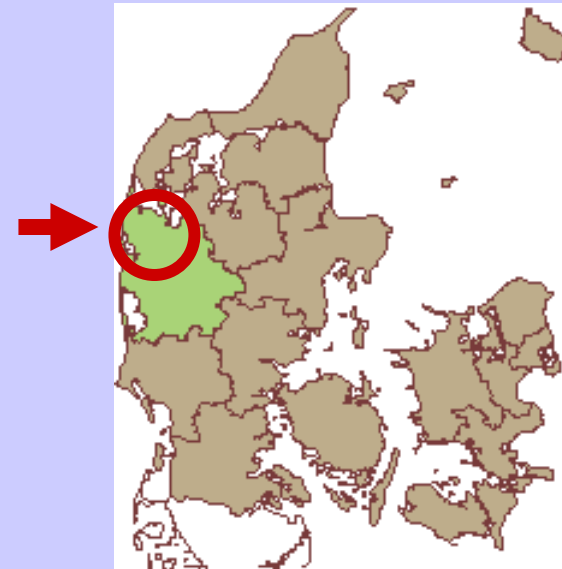
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THE RAILWAY LINE

Placed at the northwestern part of Ringkoebing County, near the North Sea coast of Jutland.

37 miles length, passing through a flat landscape with only moderate gradients.

250.000 passengers per year .20 % of them are (mostly foreign) tourists.



A single hydrogen train unit in a full daily timetable will need 30-35 tonnes of hydrogen per year

THE TRAIN

Currently the line is operated with older diesel trains.

The study will consider different hydrogen solutions in a modern light weight train (ICE, fuel cell, fuel cell/battery hybrid)

ENERGY FOR THE TRAIN

In Ringkoebing County windpower is on yearly basis covering more than 35% of the electricity consumption.

During windy periods the wind turbines deliver more energy, than can be used locally, and hydrogen production for transport could be an option.



180 t H₂/y

2 MW wind turbines placed along the northern part of the railway line. Each of them could produce 180 t hydrogen per year. A nearby chemical plant has a yearly surplus production of 700 t.



700 t H₂/y

WESTERN JUTLAND – A TEST SITE FOR NEW ENERGY TECHNOLOGIES



Vestas factory



Hydrogen truck

1979/80: Danish wind turbine manufacturers Vestas and Bonus established.

1994: Wind/hydrogen production at a Center for Renewable Energy.

2001: Ford Focus with ICE modified for hydrogen. (www.folkecenter.dk)

2000: Test site for wave energy generators.

2002: National test station for big (2-5 MW) off-shore wind turbines.

2004: Hydrogen truck prototype with fuel cells. (www.h2logic.com)

2004: Hydrogen Innovation and Research Centre. (www.hirc.dk)

2005. Feasibility studies: Hydrogen Link and Hydrogen Train.

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