Technology Fact Sheet

Regenerative braking in trains[i] /http://climatetechwiki.org/technology/regenerative_braking_in_trains/

General description

Employing regenerative braking in trains can lead to substantial CO_2 emission reductions, especially when applied to full stop service commuter trains (8 – 17%) and to very dense suburban network trains (about 30%). Regenerative braking applied to freight trains can also lead to CO_2 emission reductions, albeit considerably lower than for full stop service trains (about 5%). When regenerative braking is employed, the current in the electric motors is reversed, slowing down the train. At the same time, the electro motors generate electricity to be returned to the power distribution system. Regenerative breaking is a mature technology. It can be more easily applied to AC powered trains than to DC powered systems. In DC powered railway systems usually higher investment costs are needed.

Implementation

Regenerative braking is a mature technology. In Europe, from country to country, implementation of this technology differs significantly, however the overall penetration rate is high. Various types of trains can be equipped with regenerative braking: electric trains, hybrid diesel locomotives and subway trains. The more frequently a train stops, the more it can benefit from regenerative breaking. Virtually all locomotives are diesel-electric, so the capacity to do regenerative braking is available.

It is assumed that regenerative braking will be applied to 50% of available locomotives in the country, including passengers locomotives and maneuvering in train stations.

Implementation barriers

GHG emissions reduction (megatons CO_2 equivalent) – 4.6 thousand tons CO_2 in 2030.

Impact on development priorities:

a) *social and economic*

- Contribution by the use of regenerative breaking to socio-economic development is expected to be low.

b) environmental

The effects of regenerative braking on air quality depend mainly on the way the electricity is produced. In general, the introduction of regenerative braking on electric trains and subway trains will have no direct effect on the local air quality. However, lowering the electricity demand will lower the emission of air pollutants, like NO_x, SO_2 and particulate matter in power generation, if power generation is based on fossil fuels.

For diesel powered locomotives, hybridization can have a positive direct effect on air quality, depending on the usage pattern. Locomotives used solely on a marshalling yard can achieve very high reductions in emissions, due to frequent need for braking. However, the reduction in local air pollution will be limited when the locomotive is used in long-haul freight trains.

c) other

Investments - cca.10 thousand USD per train, implementation for 50% of locomotives requires investments of $ 0.76 million.

Operation and maintenance costs – cost

GHG reduction cost – 1.856 $/ton CO_2.

Technology lifetime – 10 years.

Other

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[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change mitigation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**