



## **BEOS: more power for less money**

Most of the trains and all of the trams and metrocars in the Netherlands are supplied from a DC power system. The DC voltage is supplied to the catenary in so-called rectifier stations. In those stations, transformers and rectifiers convert the high voltage from the utility into a, relatively, lower DC voltage.

### **BEOS makes a DC power supply more efficient**

In order to deliver electrical energy to the trains with the lowest possible loss, the voltage at the catenary should always be as high as possible. At present, rectifier stations cannot do this very accurately. In particular during periods of a high demand for power, with resulting high currents in the catenary, the voltage drops considerably.

Exactly this is what BEOS can solve. BEOS can be added to every existing and newly-built rectifier station. The voltage at the catenary is controlled more accurately, resulting in lower energy losses and more power available for the train or the tram.

### **BEOS upgrades a DC power supply more economically**

BEOS offers an even greater advantage: A rectifier station equipped with BEOS can supply more power to the system. Without requiring additional land or buildings. This is because BEOS is very compact. In conclusion, an upgrade of a rectifier station with BEOS is, in terms of cost per unit of power delivered, much more economical than the construction of an additional rectifier station.

### **A comparative study for ProRail**

EM Power Systems has calculated that from 2005 up to 2020 ProRail, the company managing the Dutch railway infrastructure, will need to spend around 65 million Euros (price reference 2005) on newly constructed and refurbished rectifier stations, in order to accommodate a modest increase in energy consumption on the railways. If we would refer to the scenarios of Dutch Railways, which operates most of the train services in the Netherlands, the investment would have to be even higher. Part of the newly built rectifier stations could be avoided by the introduction of BEOS. The same upgrade of the power supply system would cost less than 50 million, not taking into account the savings of more than 6 million Euros on the energy bill as a result of lower losses.

### **Energy savings**

It would take approximately 10 years to install BEOS on every location where it would be economically attractive to do so. By a more efficient control of the catenary voltage the railways would then save some 12 GWh yearly, in other words 0.7% of the yearly energy bill. Which translates into 4400 tonnes of avoided CO2 emission per year, bringing the Dutch "Kyoto" target one step closer.

### **Rapid payback**

The savings are so high, that the development cost of BEOS can be recuperated from avoided investment costs in slightly more than one year after its introduction in the system. The graph shows the Net Present Value of the project, including the investment for development.

### **An international market**

The market potential for BEOS goes wide beyond the boundaries of the Netherlands. In every system supplying DC traction power, and in which an increase of available power or improvement of the quality of power is an issue, BEOS can find an application. EM Power Systems is now gathering partners for the technical development of BEOS.

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