

Energy Charging Model in Croatia

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Introduction to the Charging Model for Electric Energy for Trains in Croatia

- Croatia's railway infrastructure manager, HŽ Infrastruktura, supplies traction current (electric energy) to all railway undertakings in a transparent, non-discriminatory manner upon request.
- HŽ Infrastruktura acts as the electricity market buyer, purchasing energy via public procurement and delivering it to railway undertakings as end users
- The charging model is detailed in Chapter 5.4.1 of the Network Statement, covering the supply, measurement, and billing of electric energy for train operations.



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Structure of Charges

- HŽ Infrastruktura pays the supplier for:
 - Electricity consumption charge (includes active energy, renewables incentive fee, excise duty for business use of electricity)
 - Transmission network fee (includes electricity, peak power demand at higher daily tariff period, excessive reactive energy, metering)
- These costs are passed on to railway undertakings using a charging model that mirrors the supplier's tariff items



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Measuring and Reporting Consumption

- Railway undertakings must submit monthly energy consumption data from onboard metering devices by the 5th of the following month.
- Data must be structured in a specified CSV format and cover all 5- or 15-minute intervals for the month.
- If data is missing or incomplete, consumption is calculated using specific consumption rates based on train (passenger, freight, and locomotive trains) and line categories (lowland lines (≤ 10 daN/t resistance) and mountain lines (> 10 daN/t resistance))



Calculation and Allocation of Charges

- Charges are calculated per metering point and include:
 - Active energy (kWh) at higher/lower daily tariff
 - Renewables incentive fee and excise duty (per kWh)
 - Transmission network fee (per kWh)
 - Peak power demand (calculated based on individual user share of active energy consumed during higher daily tariff periods)
 - Excessive reactive energy (applied when reactive energy exceeds 33% of consumed active energy at each metering point)
 - Metering point charge (equally distributed to all users of traction current during the billing period)
- If actual metering is unavailable, charges are based on gross tonne-kilometres multiplied by category-specific consumption factor



Final Charge and Special Considerations

- The total charge combines all individual tariff items according to the supplier's structure
- After calculating total charges, any difference between calculated amounts and actual supplier invoices is proportionally distributed among users based on their consumption share
- Special considerations include:
 - Preheating / precooling of passenger trains have dedicated codes and calculation rules
 - Multiple traction vehicles split calculated consumption proportionally
 - Incomplete measurement data defaults to specific consumption calculations
 - Tariff periods (higher/lower daily) depend on daylight saving time; all rules ensure transparent, fair, and accurate cost allocation for electric traction



Thank you for your attention and time.