INFRABEL
Right On Track

The future of data coming from energy meters

Eress Forum

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Energy Management

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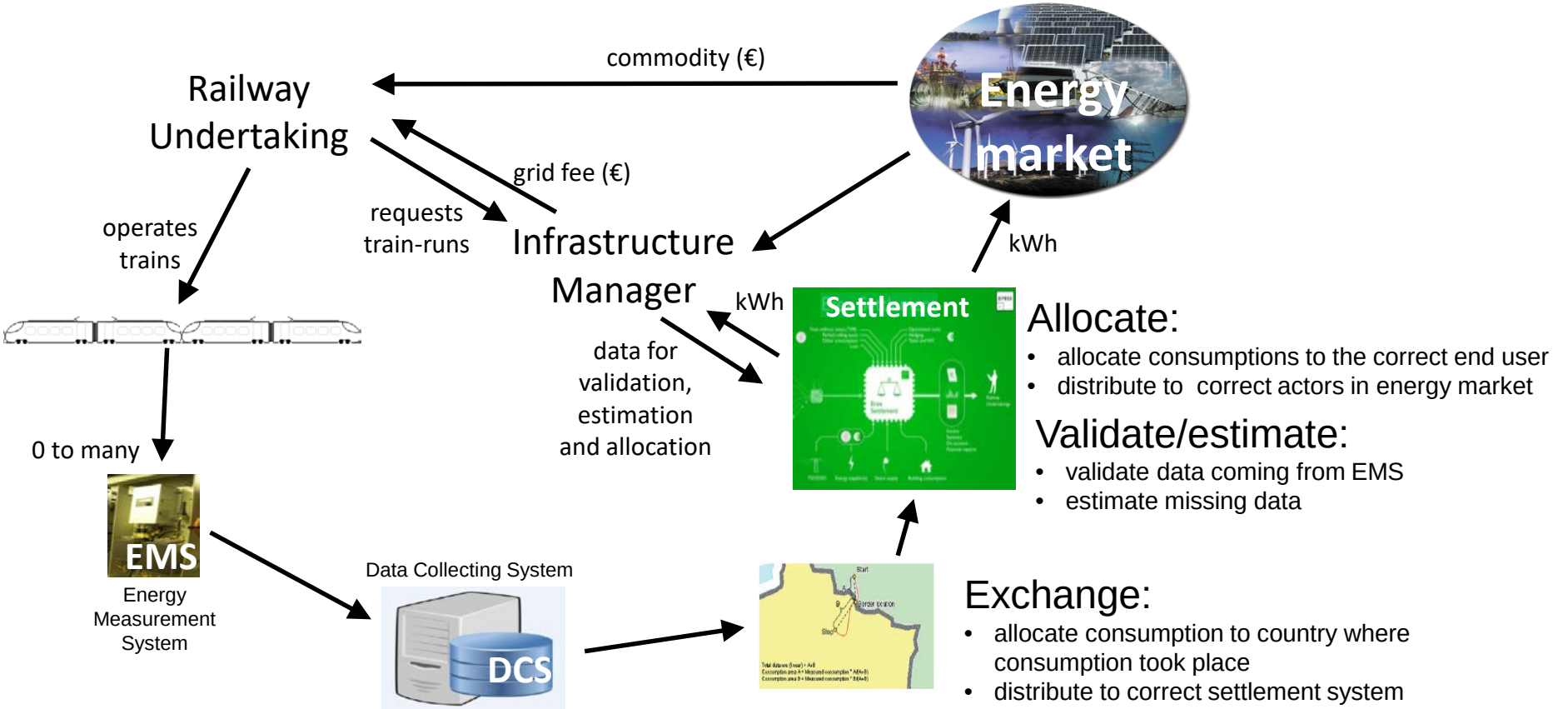
Framework from metering to billing



Allocate:

- allocate consumptions to the correct end user
- distribute to correct actors in energy market

Validate/estimate:

- validate data coming from EMS
- estimate missing data

Exchange:

- allocate consumption to country where consumption took place
- distribute to correct settlement system

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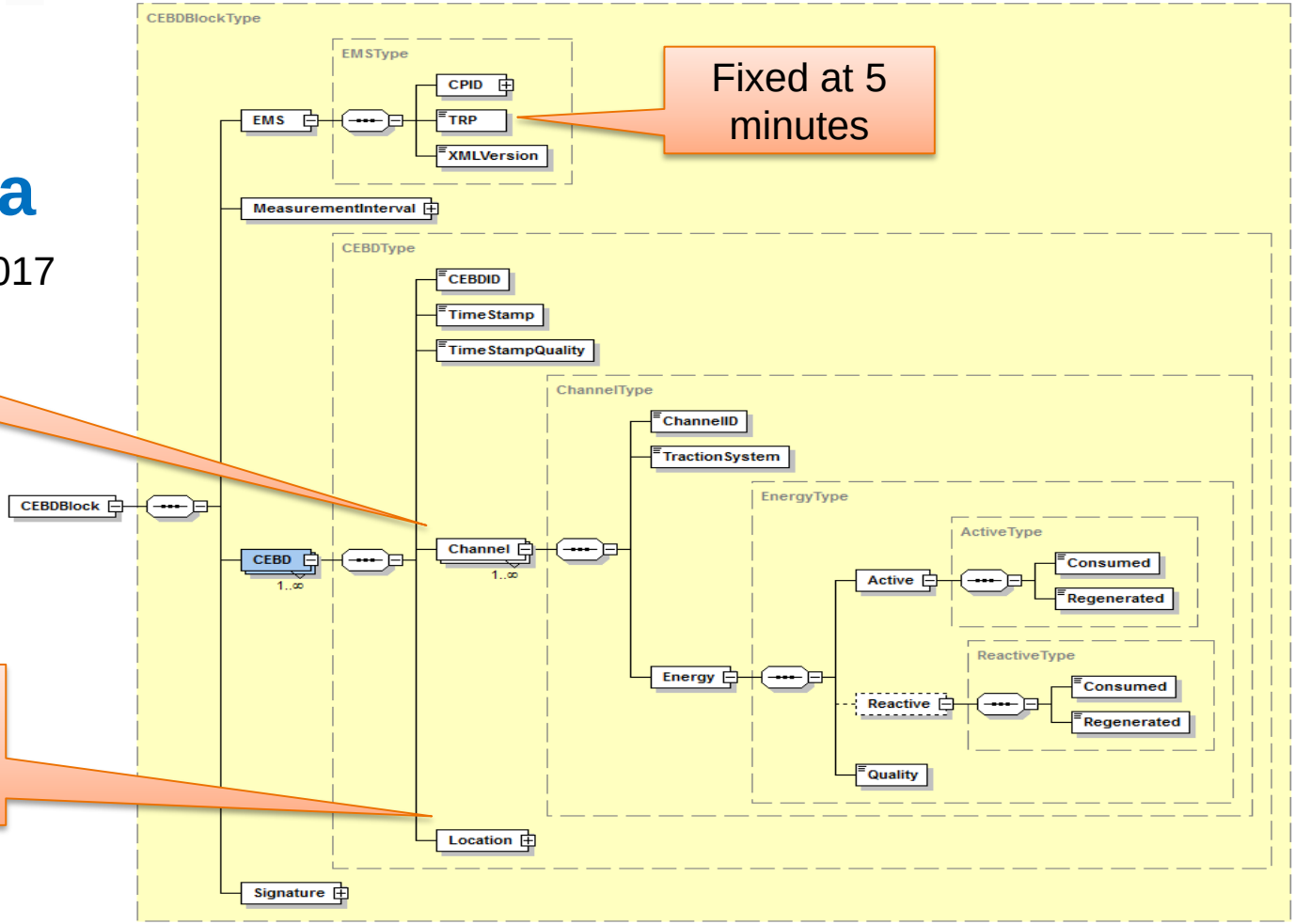
Metering data

Defined in EN 50463-4:2017

Multiple channels

Position at the end of CEBD

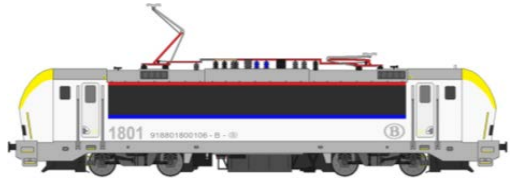


Case 1: correct energy billing

Metering data

EVN A

EVN B



Identified by: 918801800106 - B - Ⓑ

Train-run data

- Customer: based on TAP/TAF messages
- Distance (km): based on detections on the infrastructure
- Composition: reference to EVN's (TAP/TAF messages)
- Temperature: e.g. from weather stations of switch heating
- Mass (tonnes): based on TAP/TAF messages

Estimation

e.g. (33 + 0,63 * D1 + 0,63 * D2) Wh/tonnes-km

Combining

Match EVN's in train with EVN's of meters

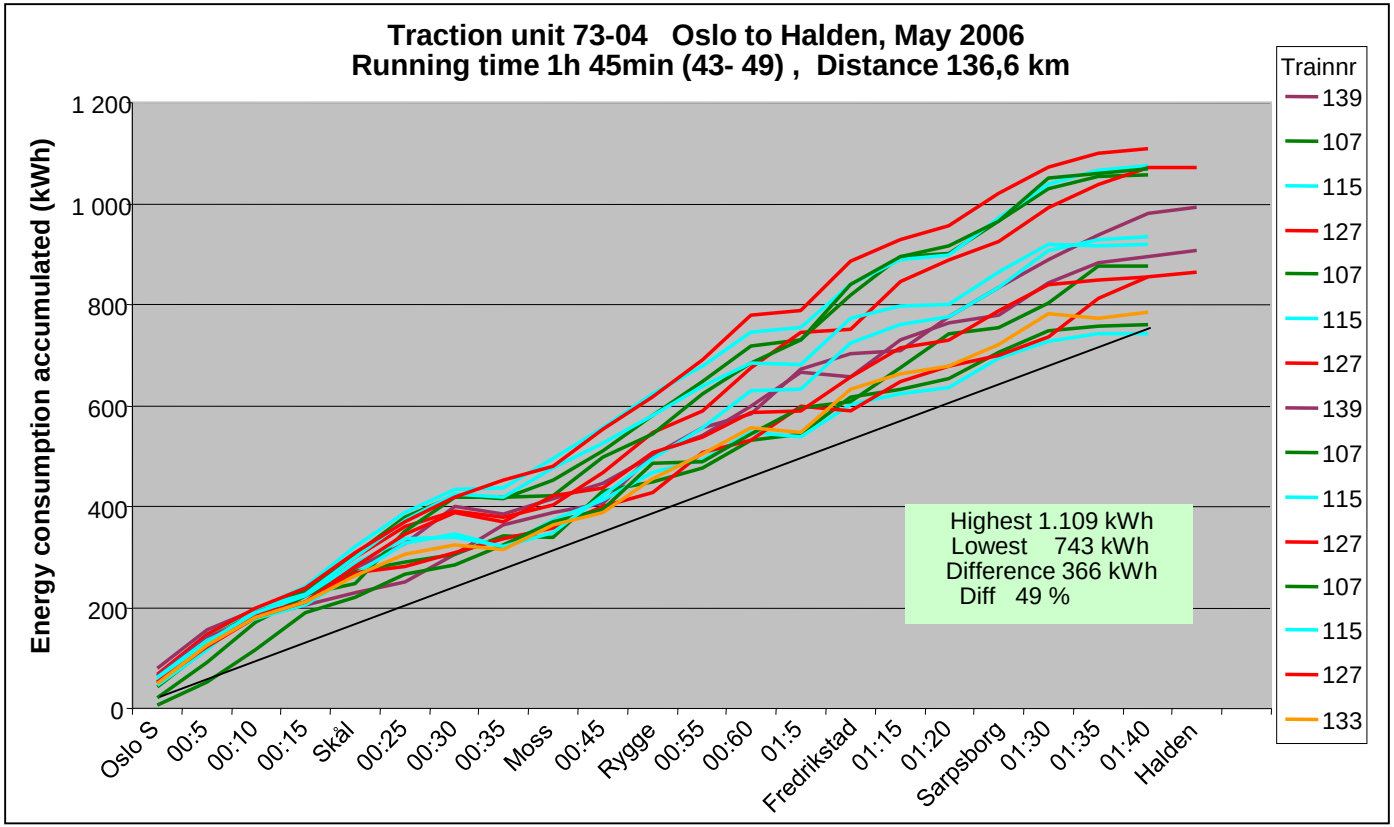
Validation

Positions match
Consumption acceptable

Allocation

Invoice based on meters to customer from train-run data

Case 2: huge potential for energy savings

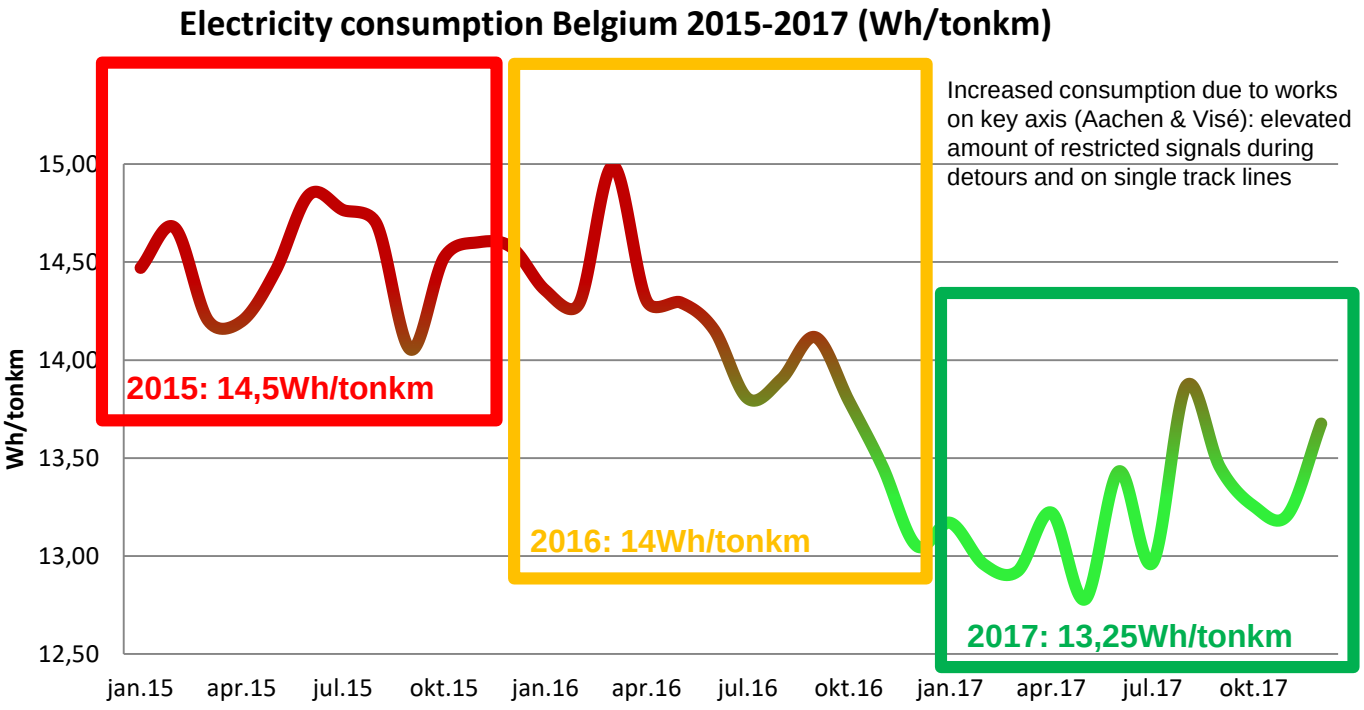


Data of energy meters was used to compare energy consumptions of train-runs in same month and on same line.

On-board metering enables eco-driving as invoices are based on the real consumption.

Case 2: huge potential for energy savings

Lineas: (Measured) consumption decrease of **8,75%** over the last 2 years



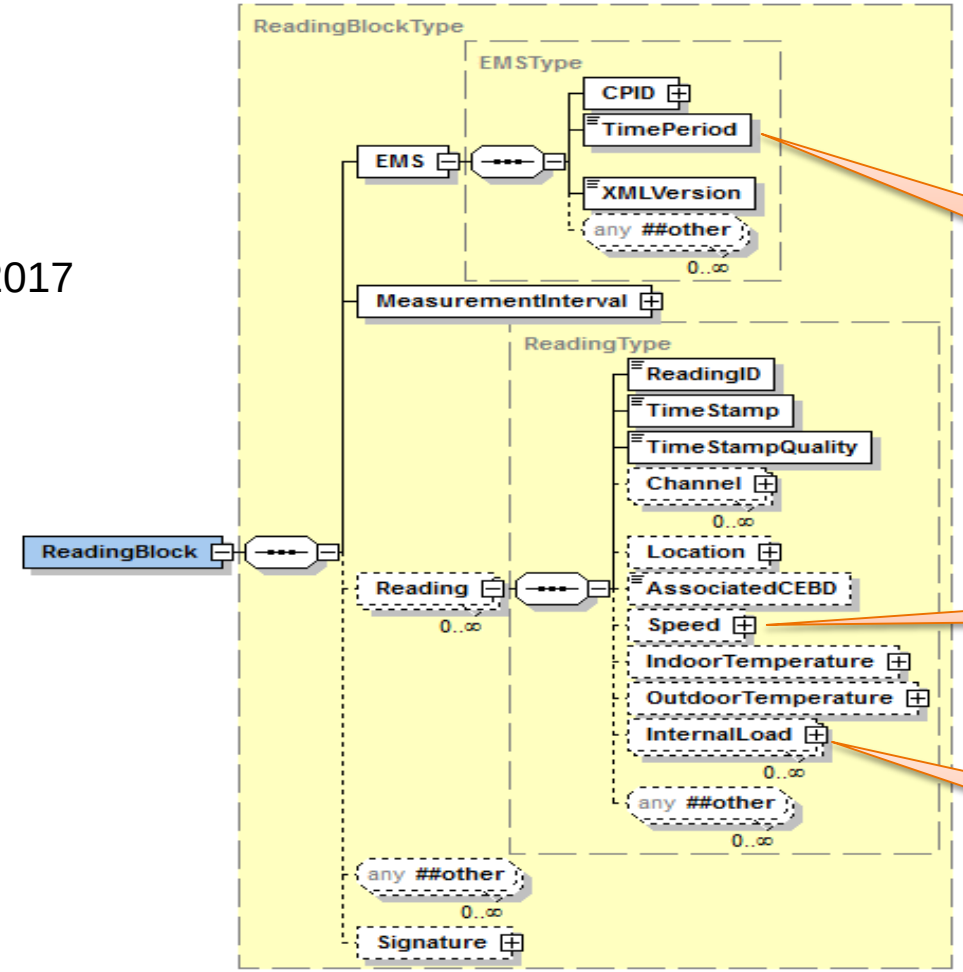
Golden ECO-driving rules

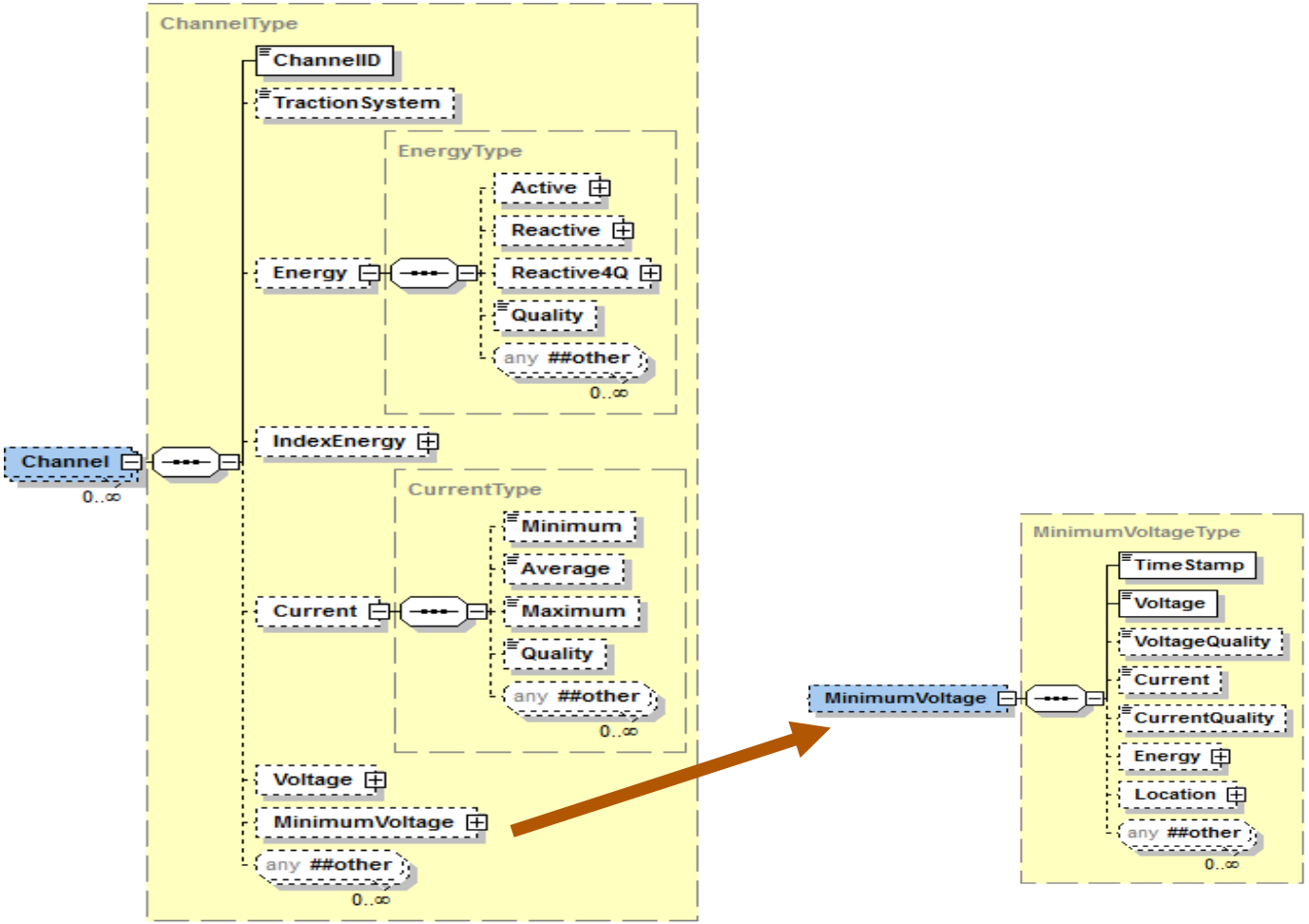
- ✓ Traction + coasting (avoid cruise control)
- ✓ Use of electrical brake (>10% regeneration)
- ✓ Anticipate conflicts & unnecessary stops

No use of any technological aid (eg. C-DAS or Traffic Control)

Other data

Defined in EN 50463-4:2017




ChannelType
ChannelID
TractionSystem
EnergyType
Active
Reactive
Energy
Reactive4Q
Quality
any ##other
0..∞
IndexEnergy
Channel
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Minimum
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Voltage
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TimeStamp
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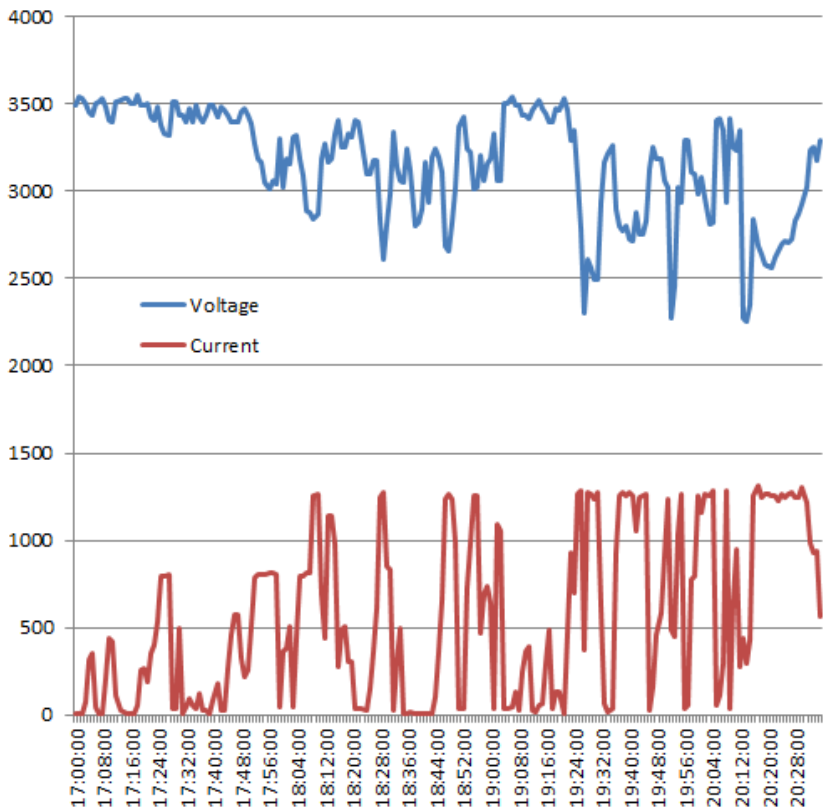
Case 3: monitoring voltages and currents

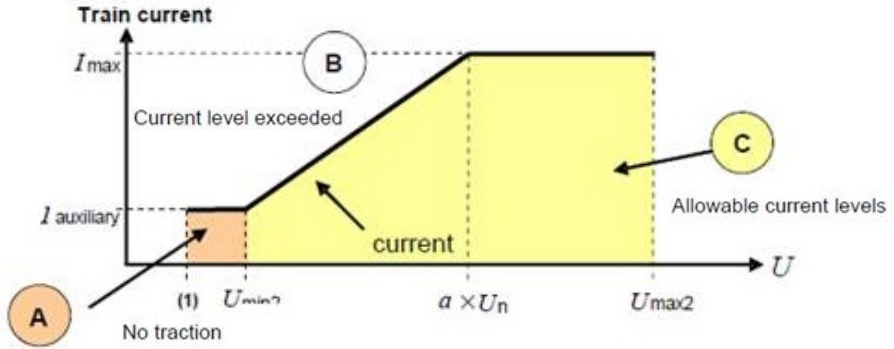


Energy meter can also register voltages and currents.

The higher the current, the bigger the voltage drop.

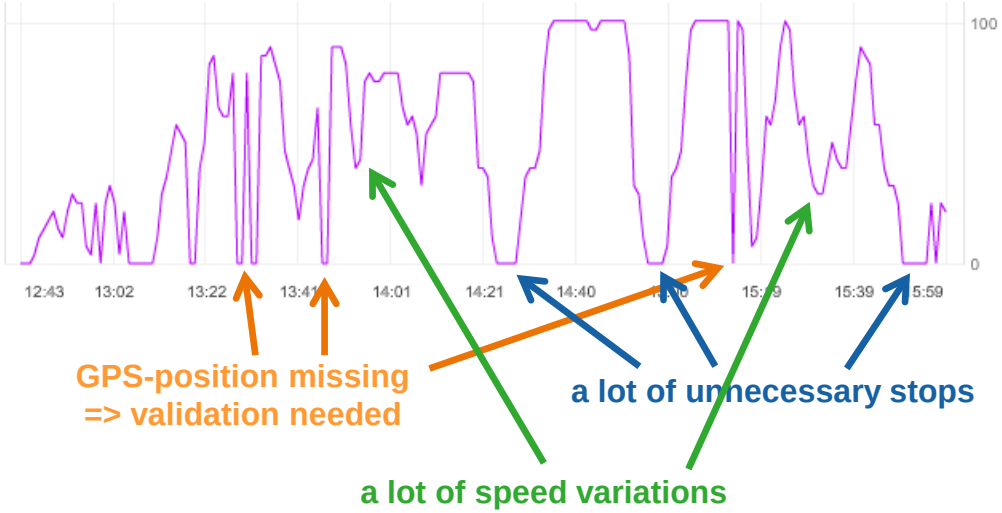
In normal circumstances, the voltage on a 3 kV DC network should remain above 2700 V (ENE TSI clause 4.2.4.2 regarding mean useful voltage).

In case voltage drops below 2700 V, trains should automatically limit current offtake (LOC&PAS TSI clause 4.2.8.2.4 regarding maximum current from the overhead contact line).

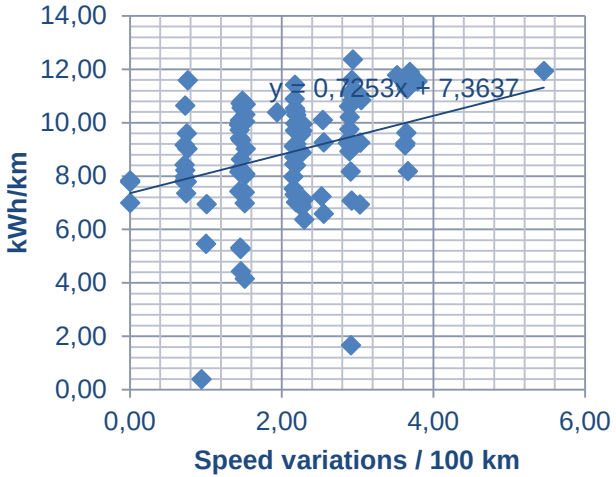


Case 4: correlations between data

Speed diagram of cargo train (0 to 100 km/h)



Correlation between stops / speed variations and specific consumption



Each extra stop increases consumption with 4%.

Voting app

Question only for EMS suppliers

Will you add ReadingBlock to your EMS?

1. Yes, already available
2. Yes, latest in 2020
3. Yes, if requested
4. No, not planning to do this

Voting app

The data of ReadingBlock is useful
to Infrastructure Managers (IM) and Railway Undertakings (RU).

Who should have access to this data?

1. Only the RU (that is operating the train)
2. Only the IM (for data related to its network)
3. Both IM and RU
4. All concerned parties
   (IM, RU, entity in charge of maintenance of traction unit, EMS-responsible, …)