Energy savings potential from more precise calculation of station dwell times on commuter rail service

Andreas Schöbel

Institute of Transportation

Department for Railway Engineering, Traffic Economics and Ropeways

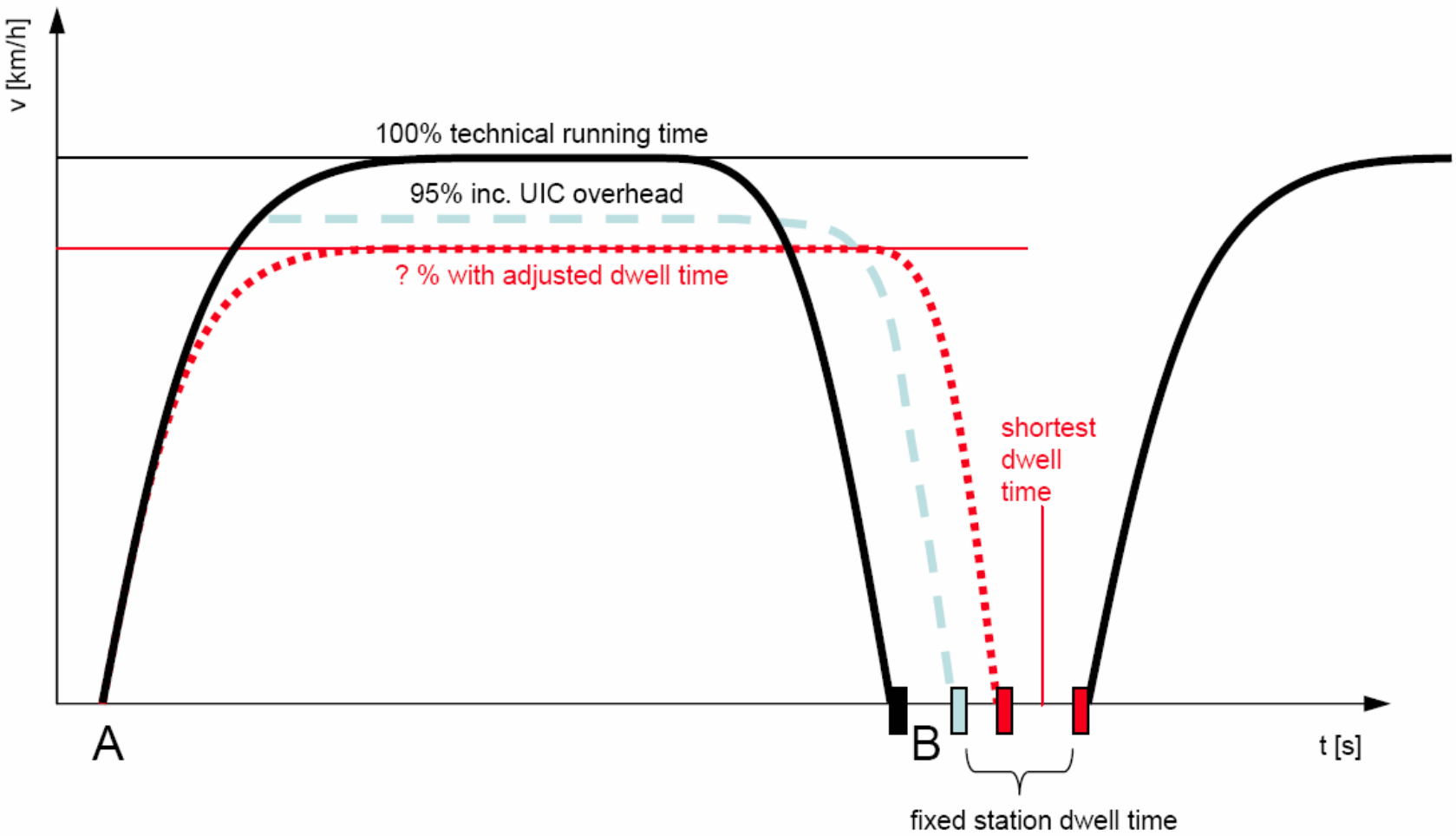
http://www.eiba.tuwien.ac.at

Vienna University of Technology

Karlsplatz 13 / 230-2

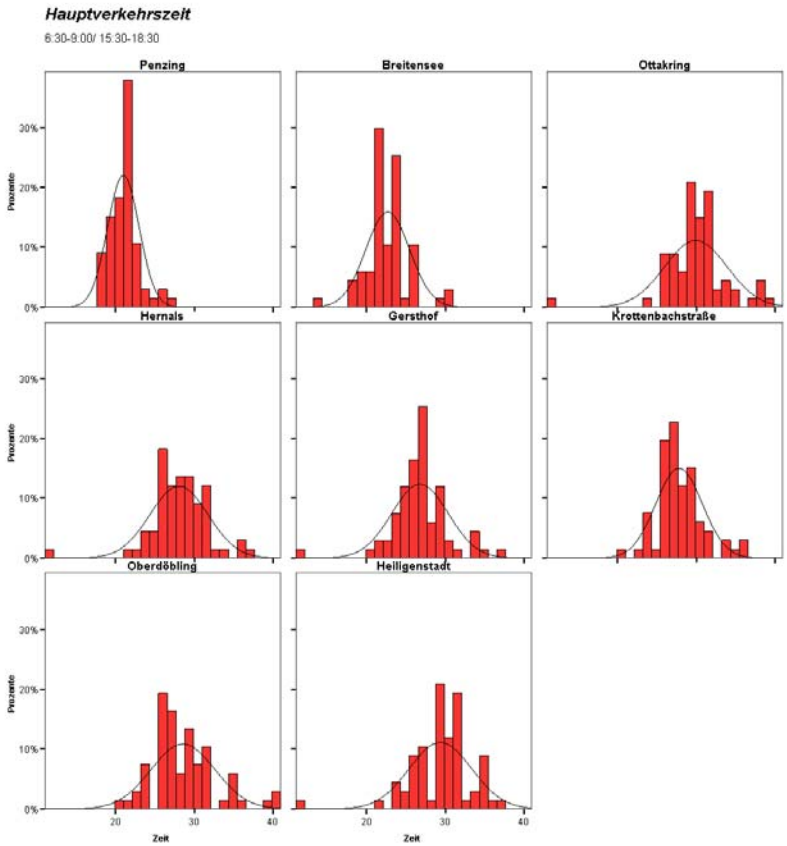
Wien, 1040

Conceptual Approach

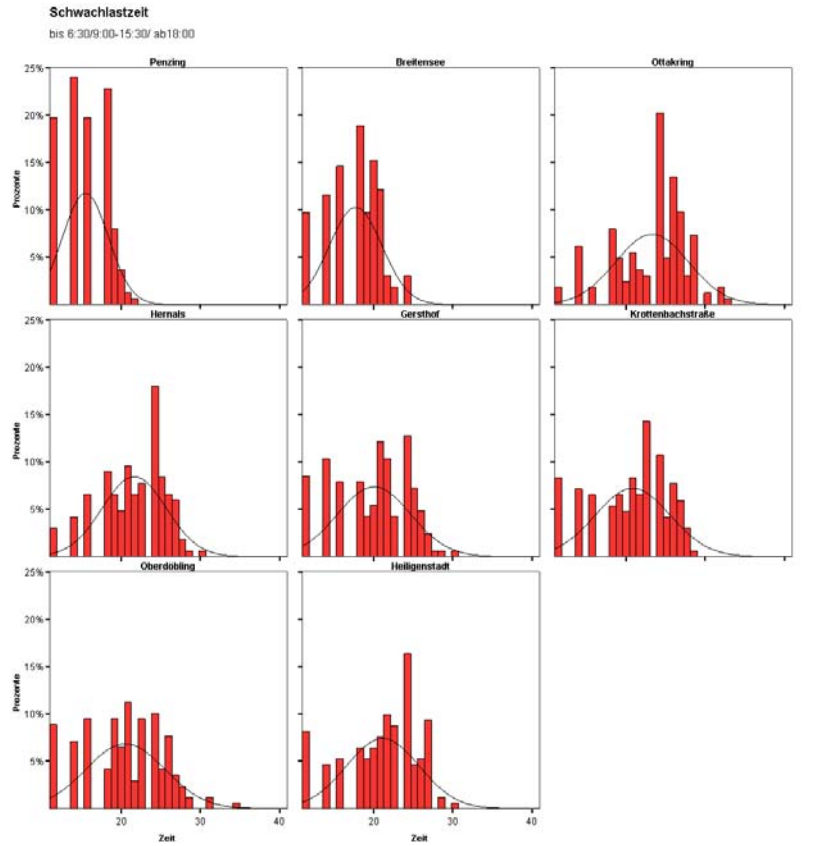


Passenger Boarding/Alighting Time

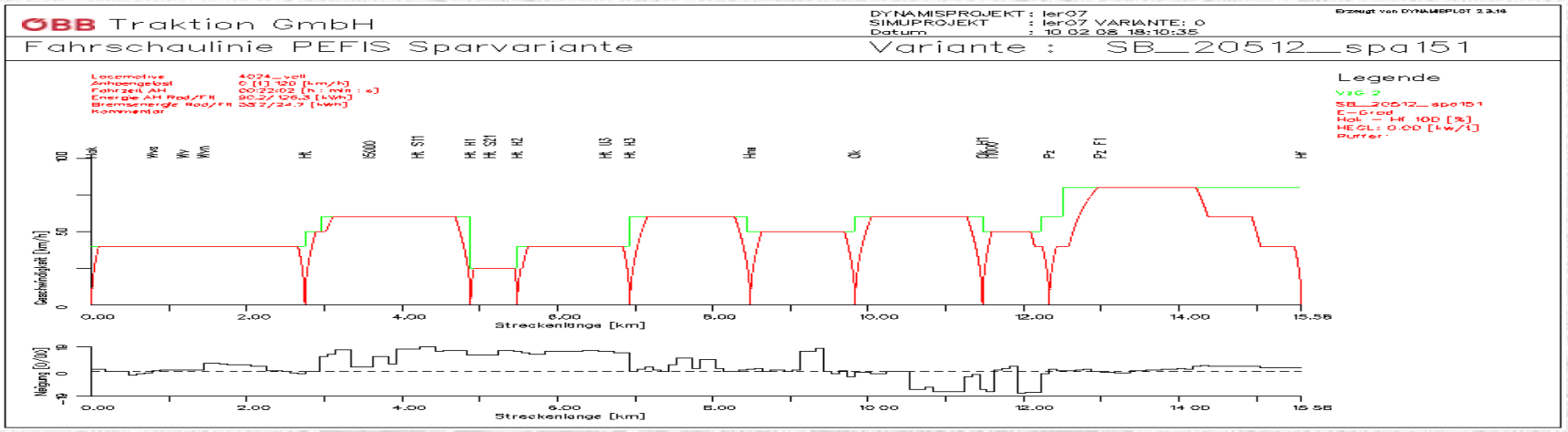
Rush hour

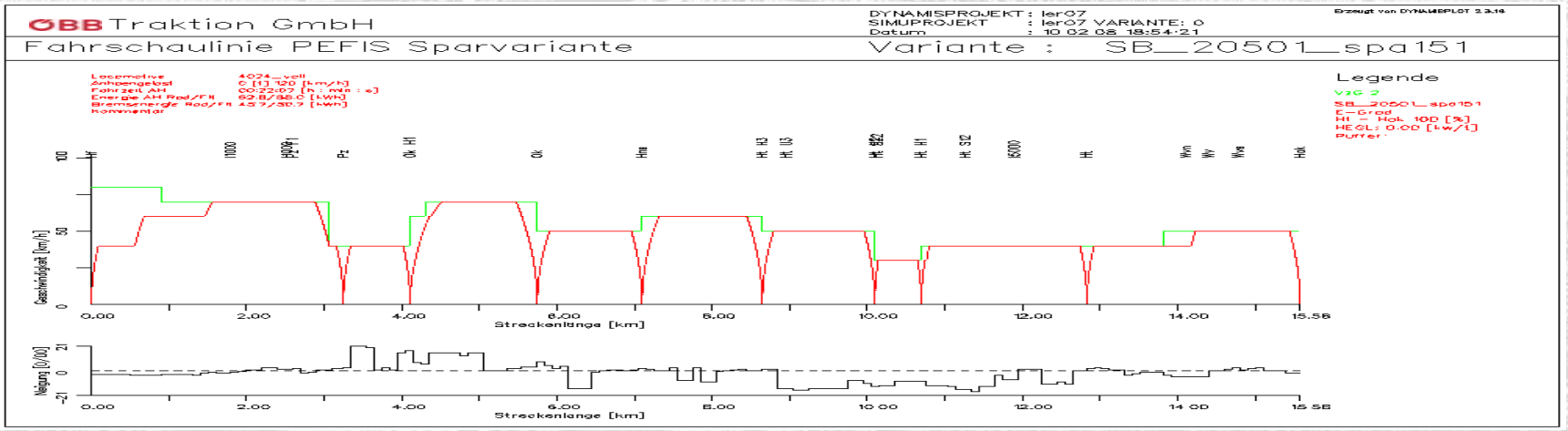


Peak-Off-time



Example: Vienna Commuter Line





Velocity rounded to 5 km/h-steps

Estimated Energy Consumption

section	energy consumption [kWh]		
	shortest	normal	dwell-time
Hak - Ht	15,092	13,543	13,128
Ht - Ht H1	19,802	19,802	19,792
Ht H1 - Ht H2	14,338	8,399	7,123
Ht H2 - Ht H3	26,223	16,837	16,109
Ht H3 - Hns	16,953	11,033	11,033
Hns - Ok	19,417	9,01	9,009
Ok - Ok H1	18,298	5,898	3,946
Ok H1 - Pz	11,48	2,679	2,669
Pz - Hf	39,18	18,83	18,841
sum	180,783	106,031	101,65

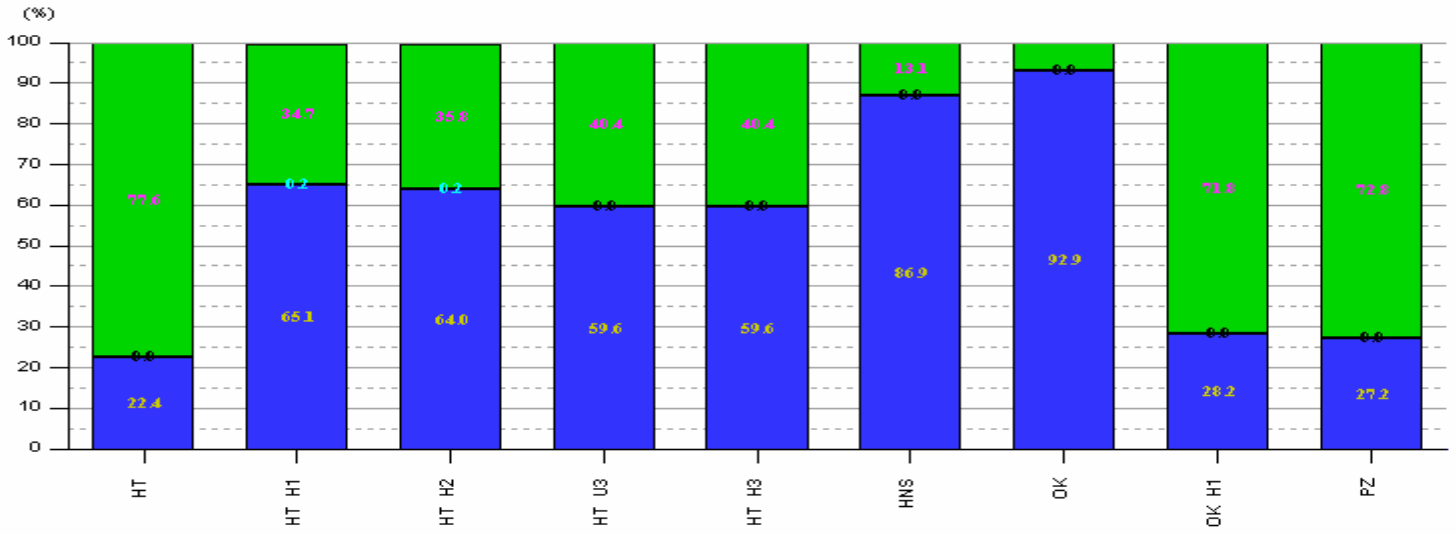
- 4 %

section	energy consumption [kWh]		
	shortest	normal	dwell-time
Hf - Pz	17,277	12,822	10,938
Pz - Ok H1	9,923	8,62	8,136
Ok H1 - Ok	16,46	14,765	16,46
Ok - Hns	6,796	6,806	5,573
Hns - Ht H3	7,091	7,081	7,082
Ht H3 - Ht H2	3,63	0,332	0,342
Ht H2 - Ht H1	3,559	2,166	0,243
Ht H1 - Ht	1,375	-0,044	-0,71
Ht - Hak	12,542	9,916	9,286
sum	78,653	62,464	57,35

- 9 %

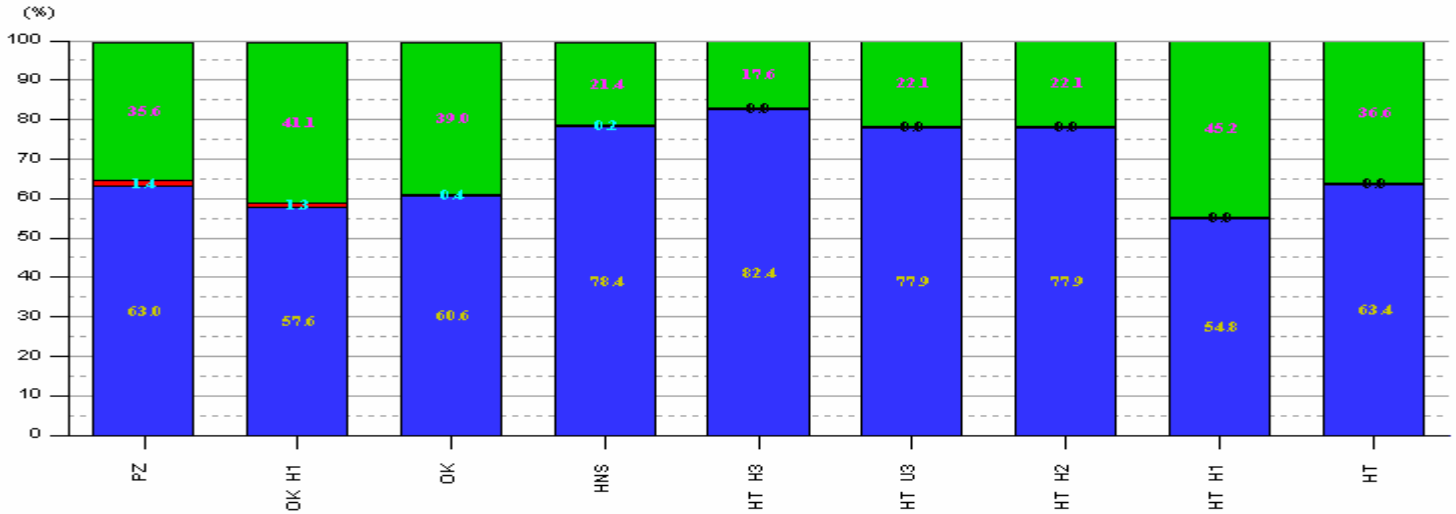
Note: Results include estimated energy recuperation.

Simulation Driving Strategy Distribution



- 1 %

Legende
R2
Minimal
Energie



- 2 %

Legende
R1
Minimal
Energie

Conclusions

- Method can reduce energy use by up to 9%;
- No need to change signalling regulations & infrastructure;
- Simple on-board solution: paper and/or electronic alternative timetable;
- Problem: variation in daily passenger volume (-> video surveillance).