



SOR – Company Introduction



Ing. Jindřich Chudý – Commercial Director
Oslo, January 11, 2013



HISTORY AND GROWTH

- 1991** Establishment of the SOR company
- 1993** First prototype of SOR C 7.5 intercity bus - length 7,5 m
- 1995** 30 buses produced and sold, type C 7.5
- 1997** Opening process of Product line development
-
- TODAY** Complete Product portfolio for Public Bus Transportation

SOR - MARKETS



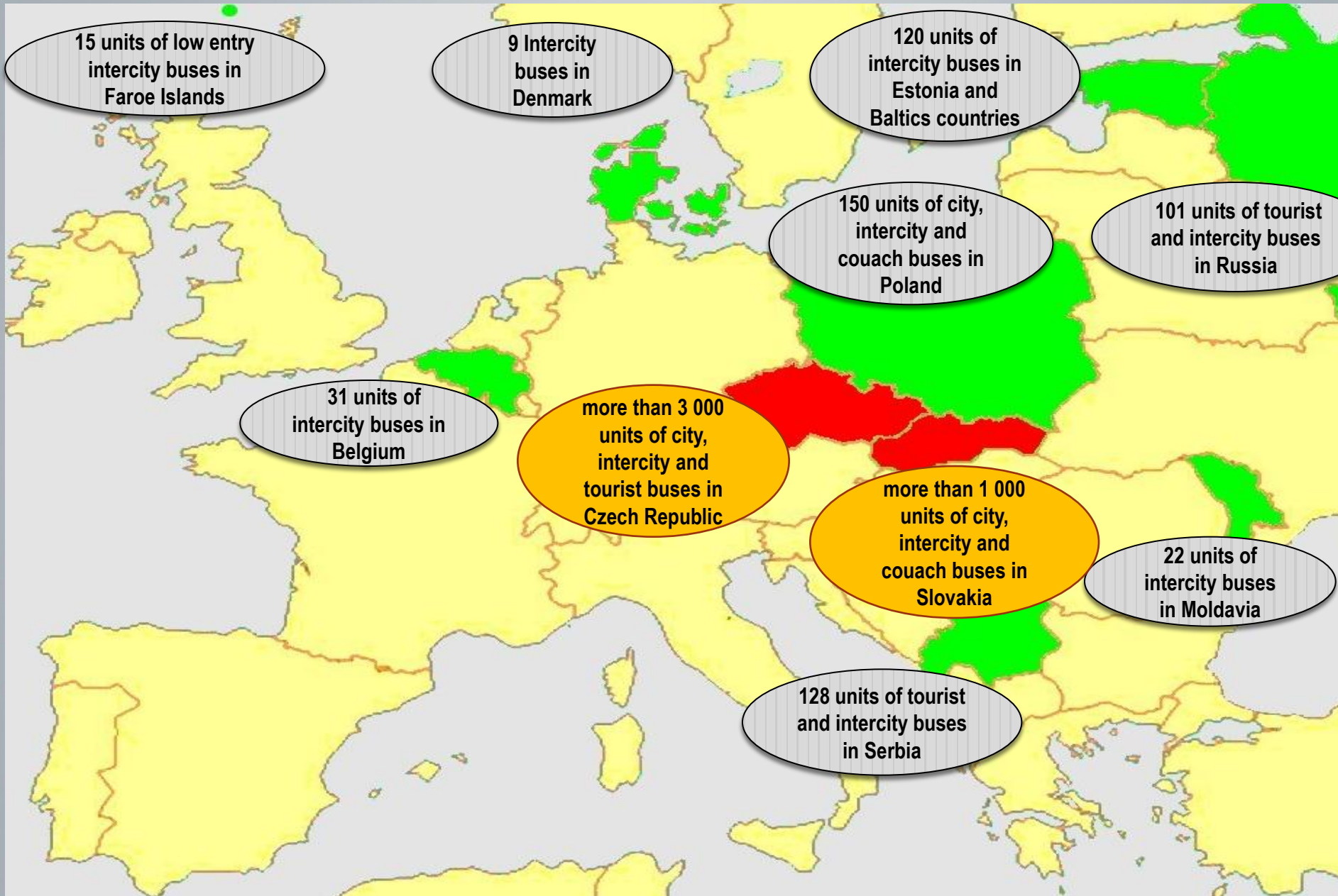
City transport



Intercity transport



Tourist transport





SOR - TODAY

- **COMPANY WITH STRONG TECHNICAL AND ECONOMICAL BACKGROUND**
 - ✓ **LONGTERM POSITIVE ECONOMICAL RESULTS**
 - ✓ **LONGTERM KNOWLEDGE IN BUS CONSTRUCTION/PROTOTYPING**
 - ✓ **LONGTERMS KNOWLEDGE IN BUS PRODUCTION**
 - ✓ **OPENESS TO NEW MATERIALS/TECHNLOGIES**

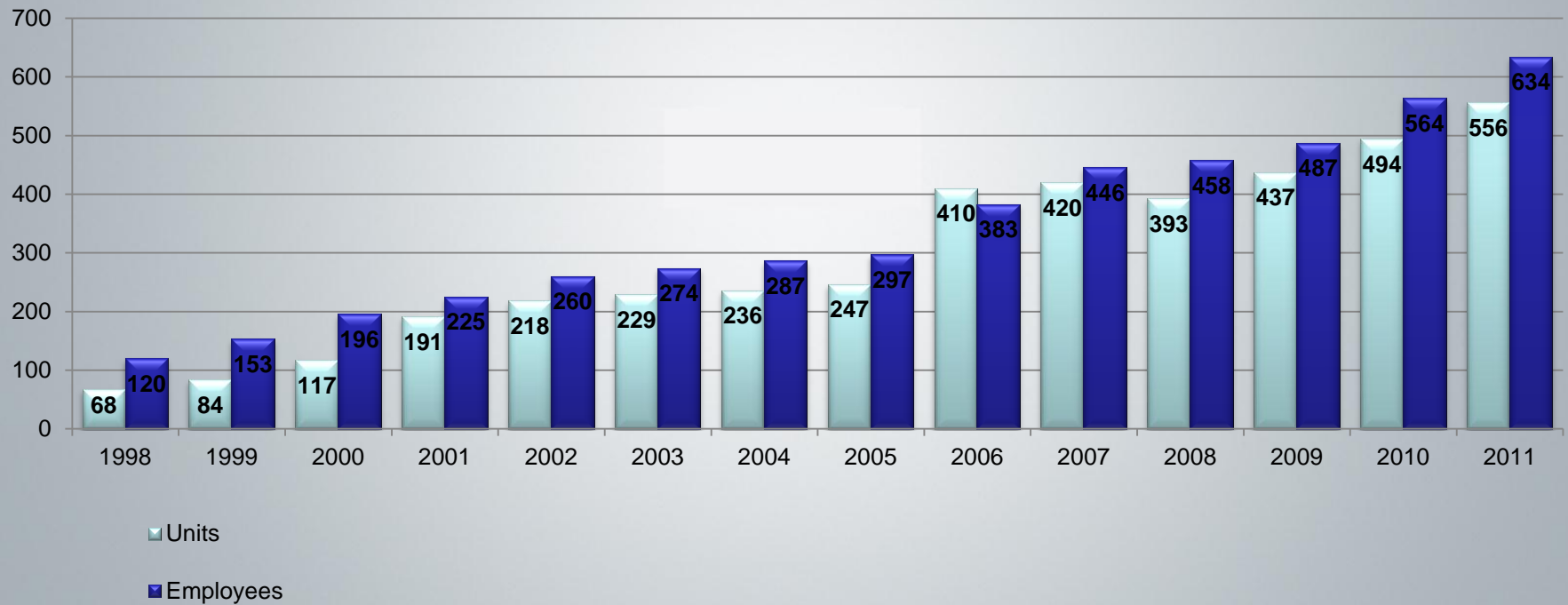
- **COMPANY WITH STRONG STRATEGIC OWNER**
 - ✓ **MEMBER OF ENERGETICKÝ A PRŮMYSLOVÝ HOLDING = ONE OF THE BIGGEST FINANCIAL AND INDUSTRIAL GROUP IN THE REGION**

- **COMPANY WITH COMPLETE PRODUCT PORFOLIO**
 - ✓ **INTERCITY**
 - ✓ **CITY**
 - ✓ **ALTERNATIVE ENGINES**

- **RELIABLE PARTNER FOR MAJOUR BUS OPERATORS IN THE AREA**

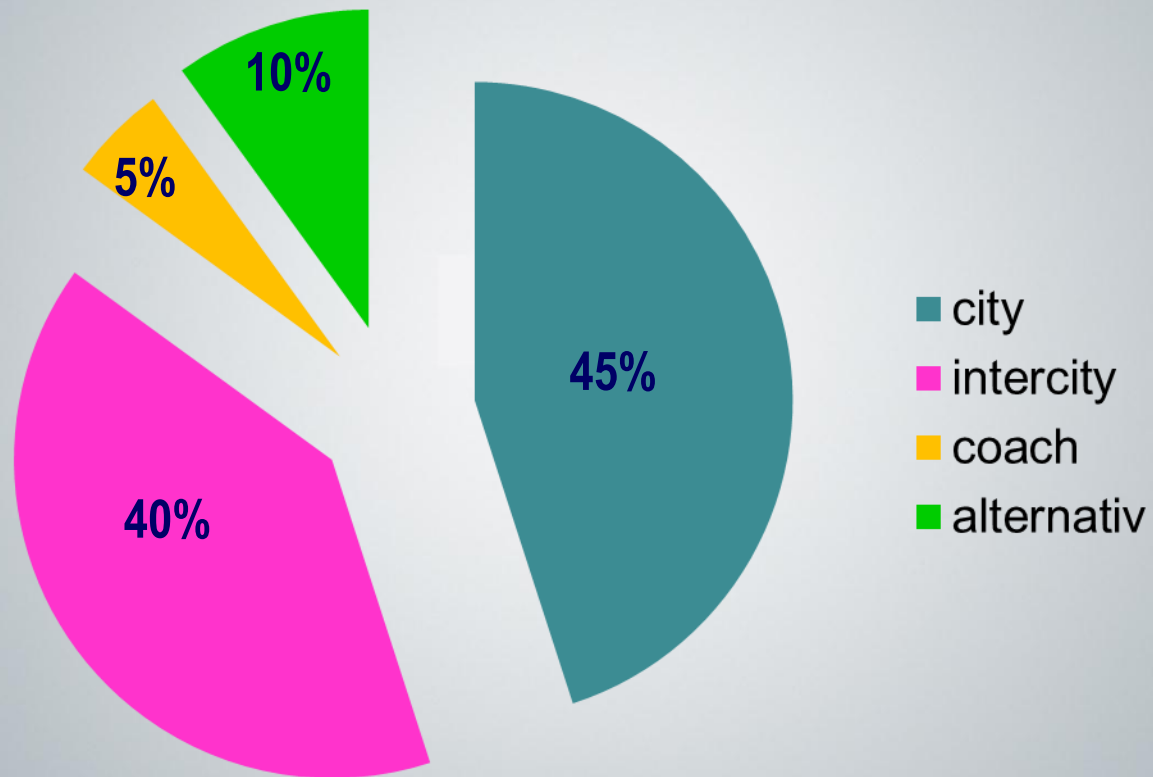


HISTORY AND GROWTH





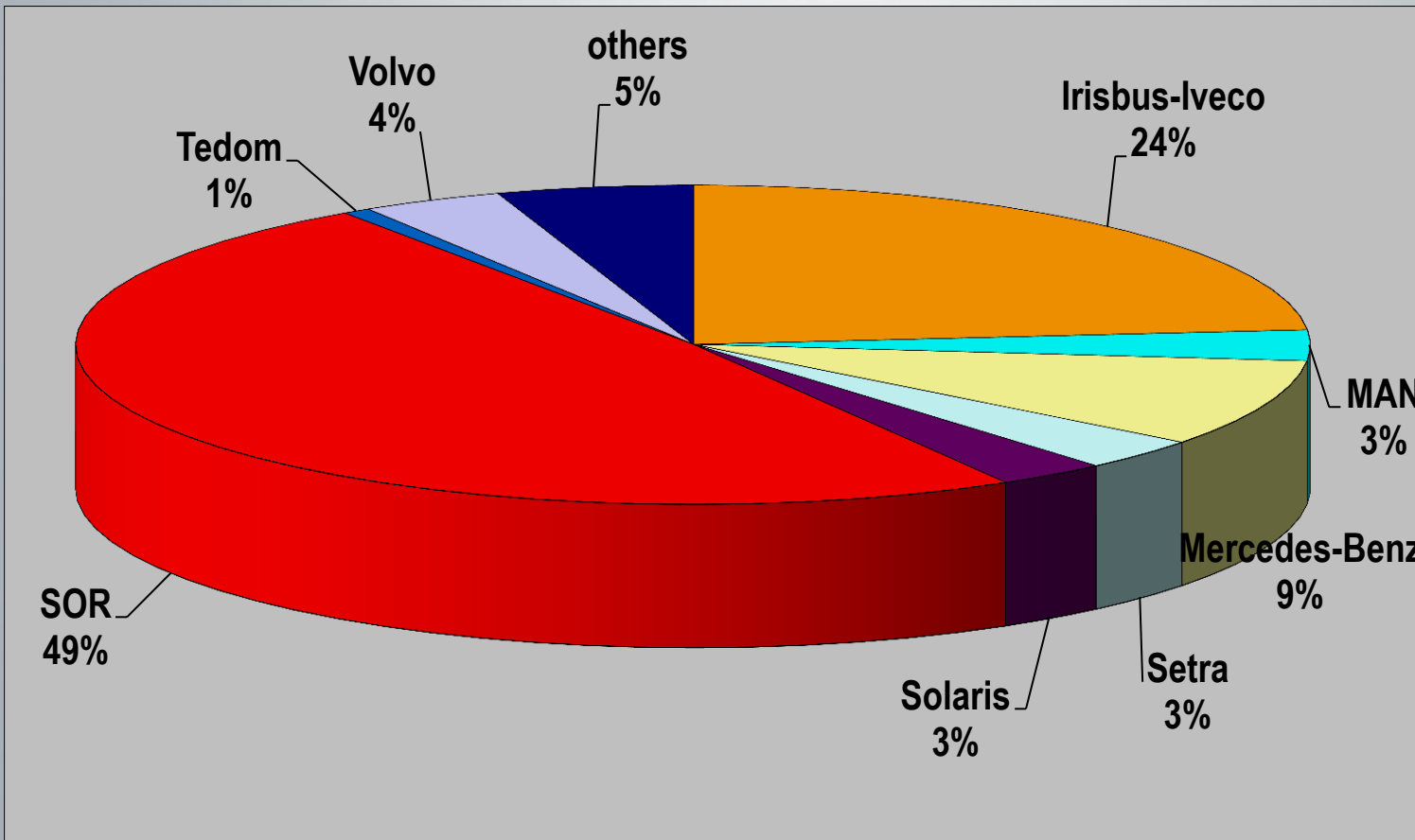
SPLIT OF THE PRODUCTION





MARKET SHARE

Sale shares of the new buses sold in the Czech Republic (2011)



837 - total number of registered new buses



Městská doprava



Meziměstská doprava



Turistická doprava

WEIGHT REDUCTIONS – THE WAY TO LOWER FUEL CONSUMPTION



Městská doprava

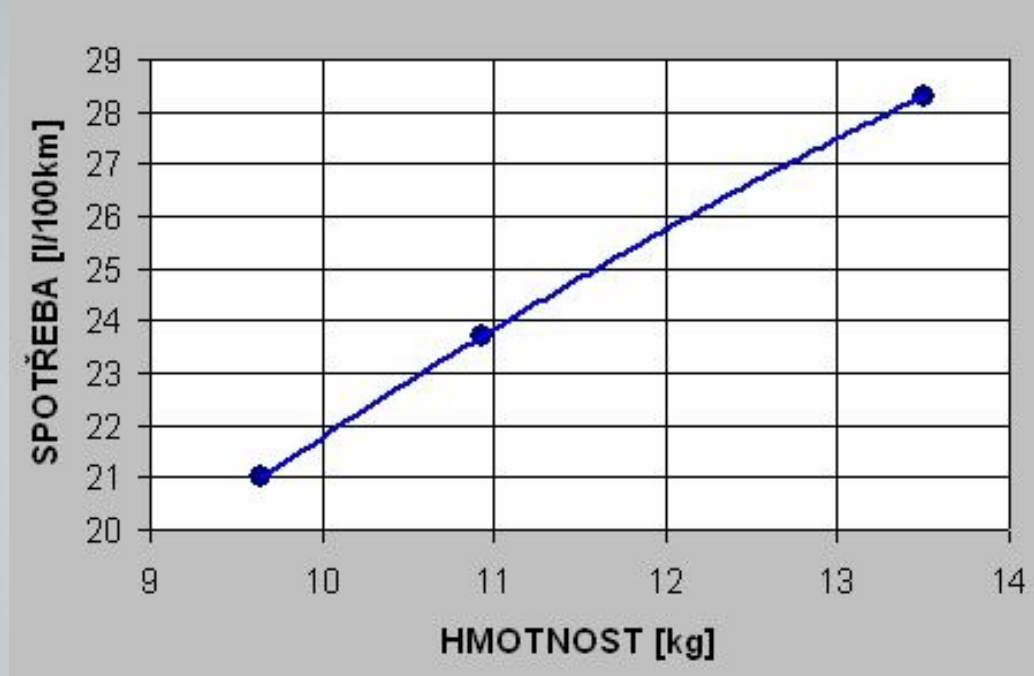


Meziměstská doprava



Turistická doprava

INTERCITY TRANSPORTATION



CONCLUSION:

In intercity service conditions the 1 ton weight reduction brings fuel consumption reduction giving circa 1,9 litre / 100 km;

2 ton curb weight reduction represents fuel consumption reduction reaching 13,4 %.

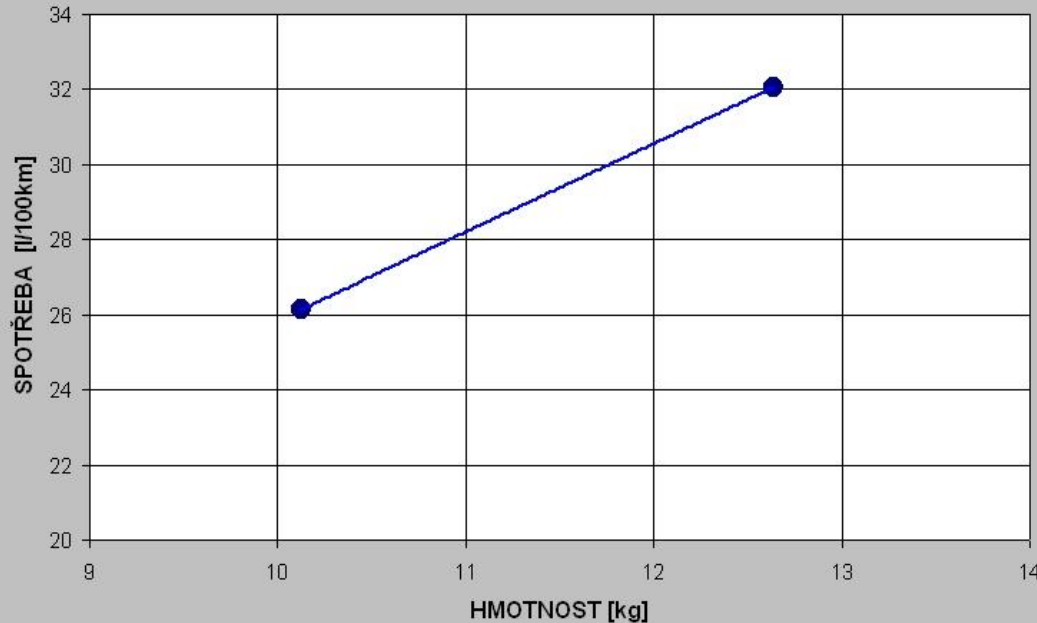


Městská doprava

Meziměstská doprava

Turistická doprava

CITY TRANSPORTATION



CONCLUSION:

In city service conditions the 1 ton curb weight reduction brings fuel consumption reduction giving circa 2,35 litre / 100 km;

2 ton curb weight reduction represents fuel consumption reduction reaching 14,7 %.



SUMMARY:

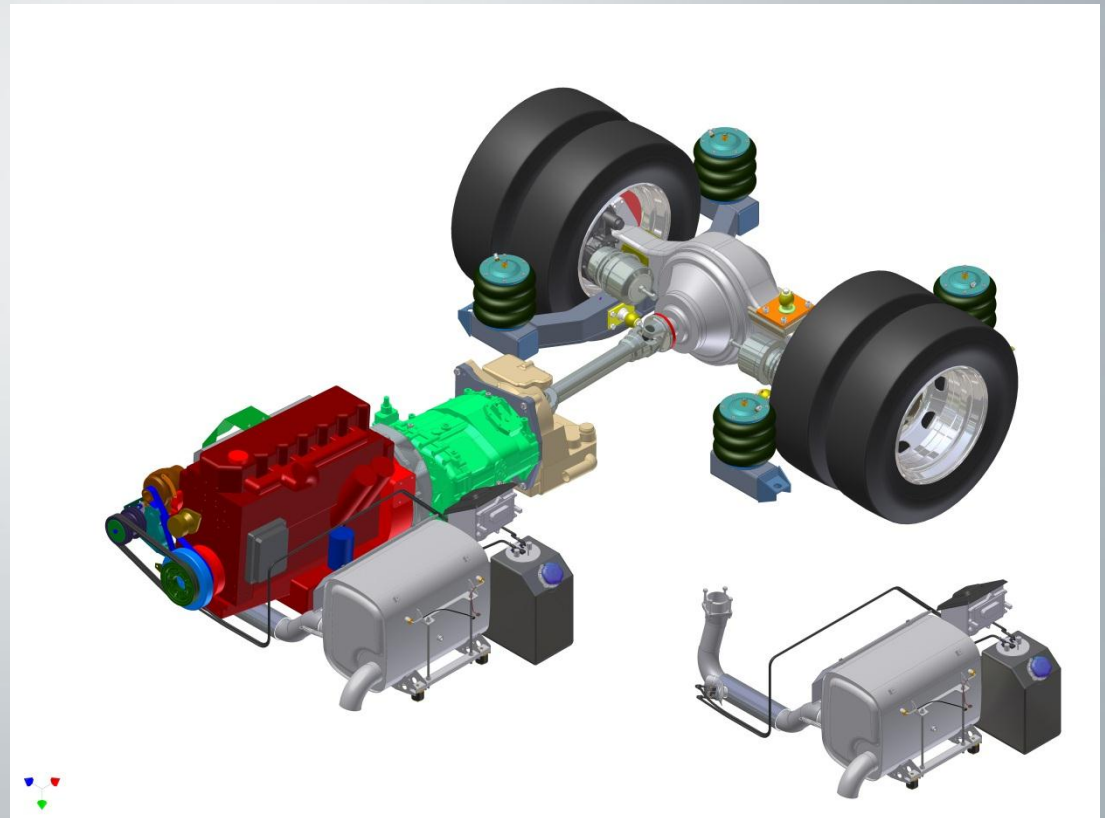
2 ton curb weight reduction represents following fuel savings:

OPERATING MODE	FUEL SAVINGS [%]	
	<i>theoretical solution</i>	<i>service data evaluation</i>
city	13 ÷ 13,3	14,7
intercity	12 ÷ 12,3	13,4



3.1 *MAIN UNITS SELECTION*

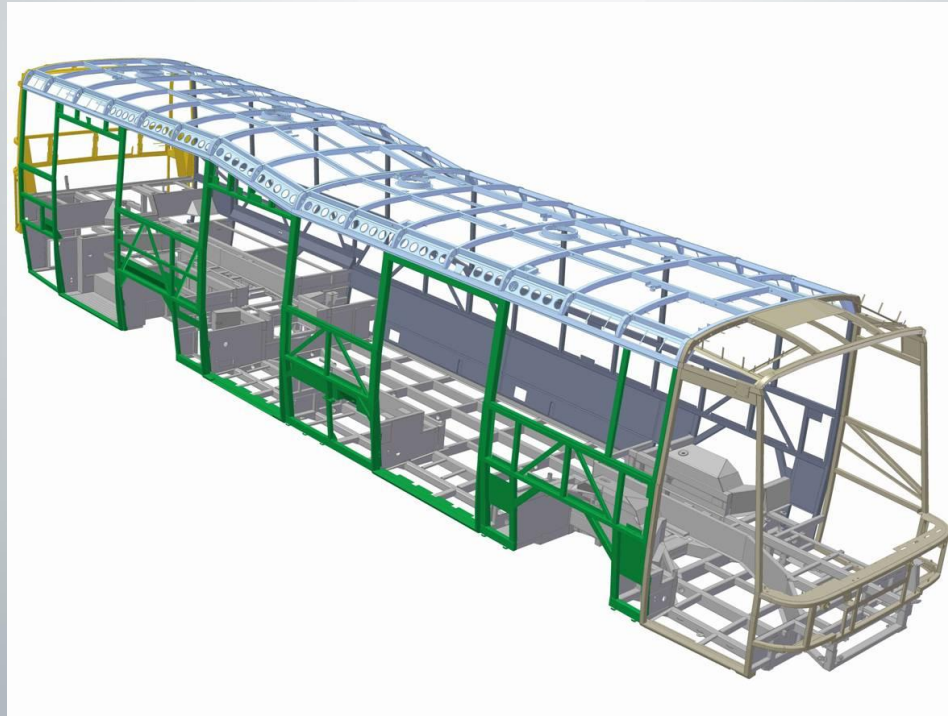
- ENGINE
- GEARBOX
- AXLES
- WHEELS





3.2 *MATERIAL SELECTION WITH REFERENCE TO WEIGHT REDUCTIONS*

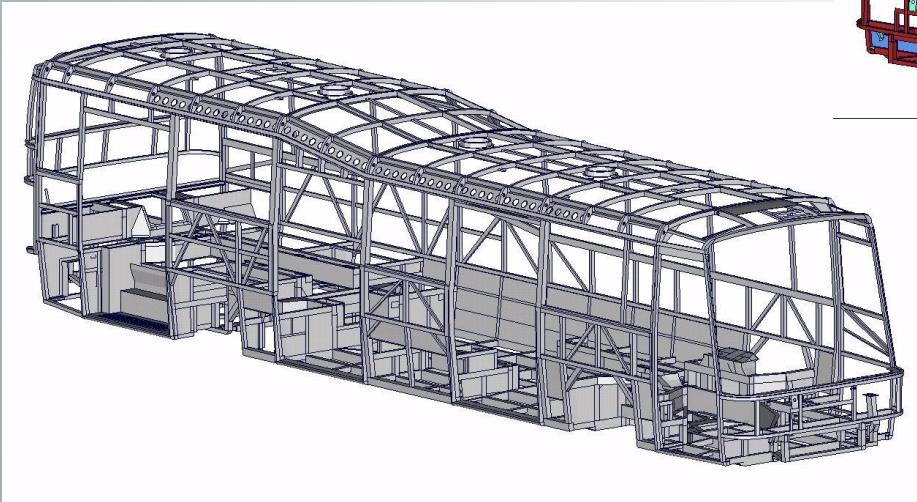
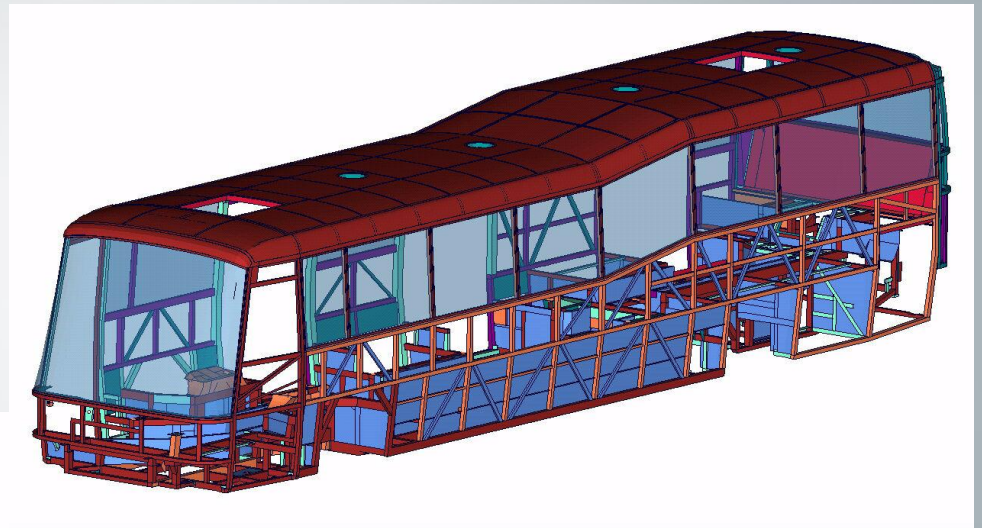
PLASTICS
GLUING
STAINLESS STEEL
ALUMINIUM





3.3 COMPUTER ASSISTED BODY STRUCTURE OPTIMISATION

- Strength calculations
- Durability calculations
- Virtual tests



LOW FUEL CONSUMPTION



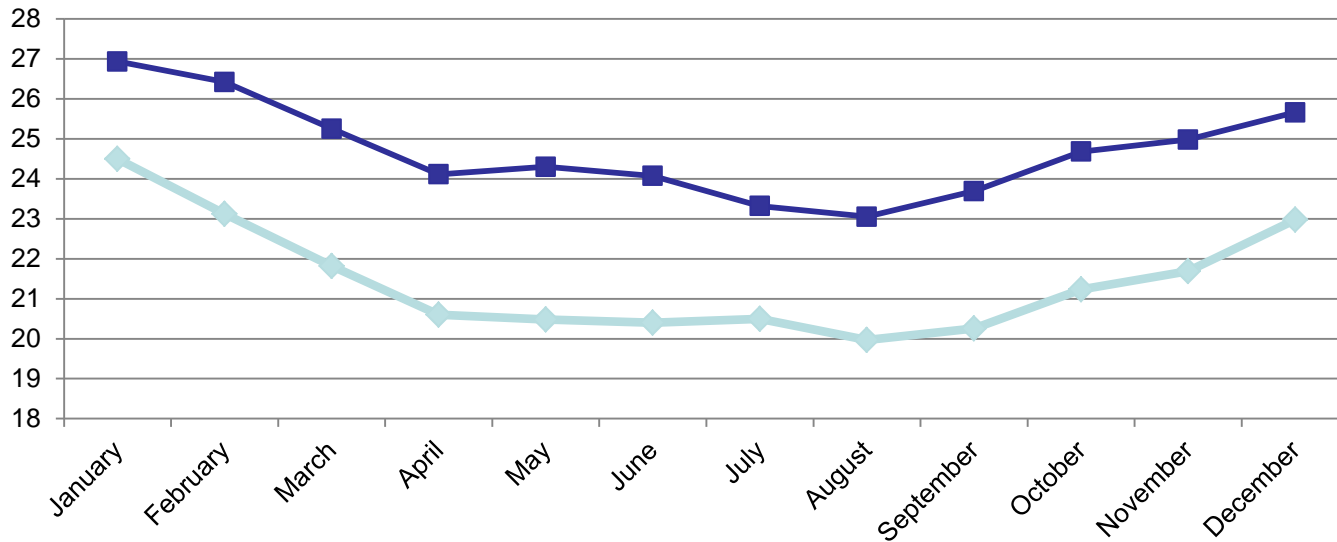
City transport



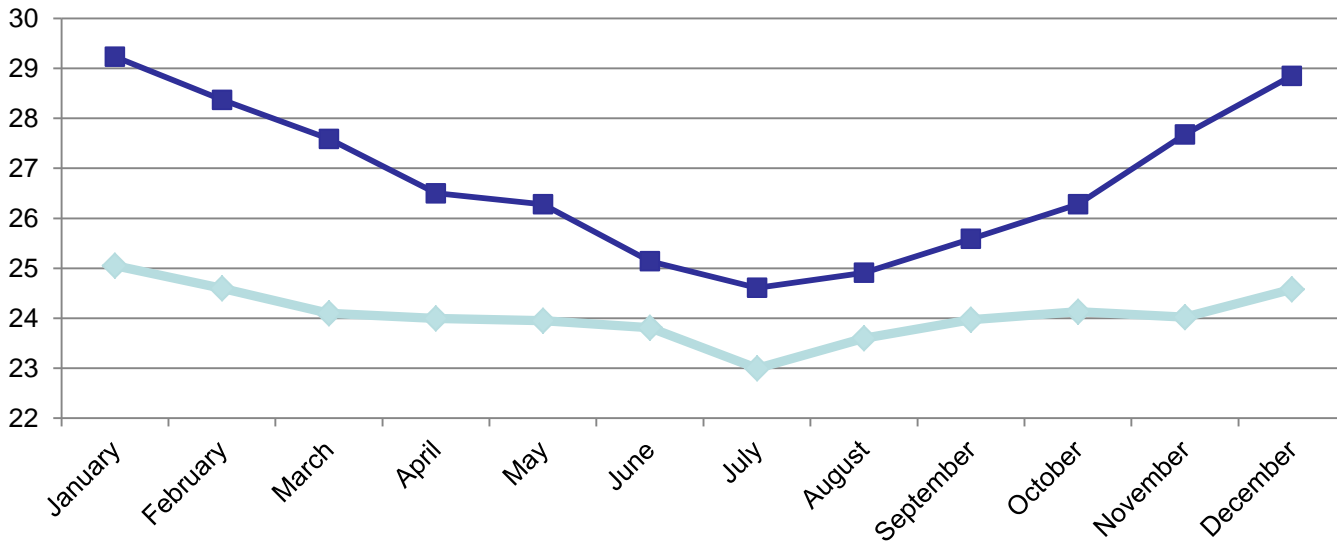
Intercity transport



Tourist transport



SOR C 10,5



SOR C 12

Consumption of fuel in litres per 100 km



City transport



Intercity transport



Tourist transport

PRODUCT PORTFOLIO – CITY BUSES – LOW FLOOR AND LOW ENTRY



SOR NB 18

18m

Diesel, CNG

Up to 150 passengers



SOR NB 12

12m

Diesel, CNG

Up to 102 passengers



SOR BN

8,5m 9,5m 10,5m 12m

Diesel, CNG

Up to 57- 83 passengers



City transport



Intercity transport



Tourist transport

PRODUCT PORTFOLIO – INTERCITY BUSES – LOW-ENTRY AND STANDARD FLOOR



SOR CN

8,5m 9,5m 10,5m 12m 13,5m
Diesel, CNG
Up to 57 - 83 passengers



SOR C

9,5m 10,5m 12m
Diesel, CNG
Up to 62 -82 passengers



SOR LC

9,5m 10,5m 12m
Diesel, CNG
Up to 62 -82 passengers



City transport



Intercity transport



Tourist transport

PRODUCT PORTFOLIO – TOURIST BUSES / COACHES



SOR LH

9,5m 10,5m 12m

Diesel

Up to 35 -51 passengers

PRODUCT PORTFOLIO – SPECIAL BUSES FOR LOW TEMPERATURE

SOR LC





City transport



Intercity transport



Tourist transport

PRODUCT PORTFOLIO – ALTERNATIVE / ELECTRIC DRIVES



Hybrid

18m

Up to 140 passengers



Trolleybus

12m and 18m

Up to 98 - 166 passengers



Electric bus

8m and 10,5m

Up to 51 - 85 passengers



Městská doprava



Meziměstská doprava



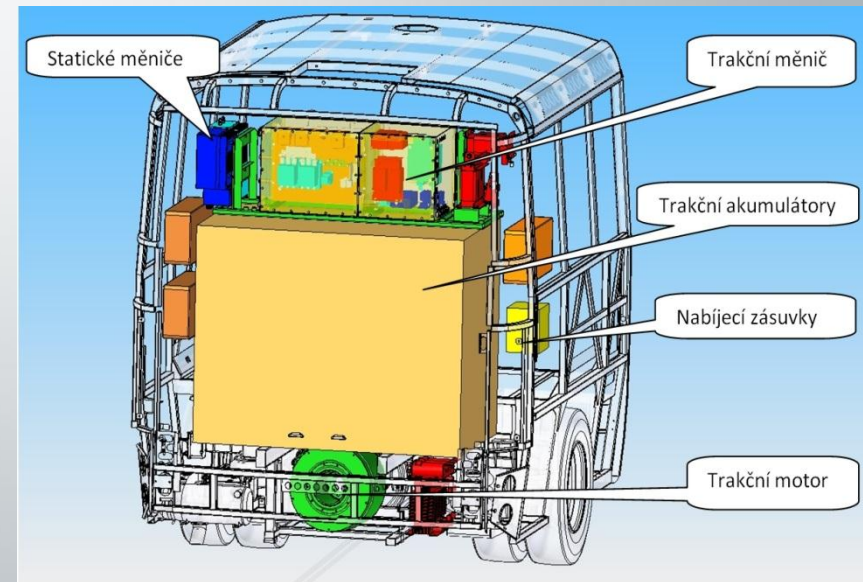
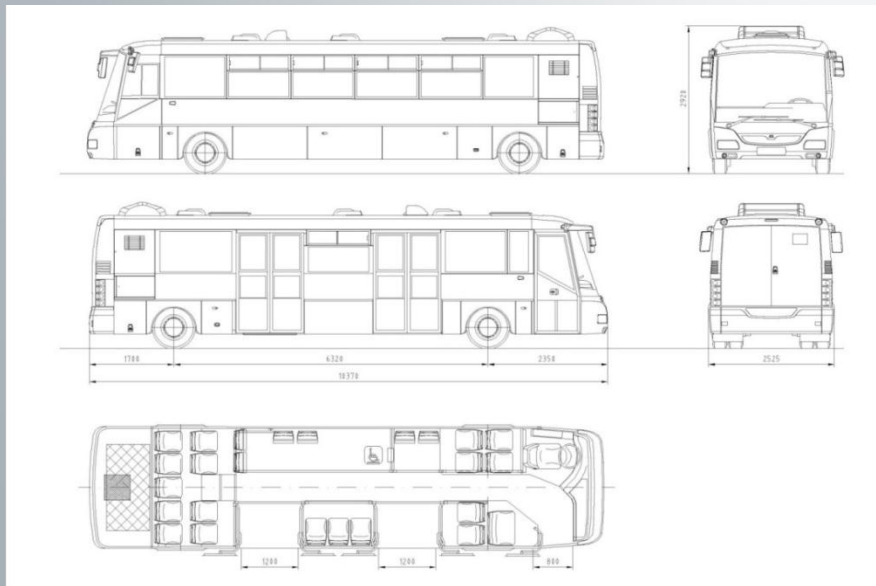
Turistická doprava

ELECTRIC BUSES SOR



Basic requirements

- optimization of capacity and travel range
- space for traction battery
- reduction of weight
- optimization weight on axles





Operating of the electric buses SOR

- 7 electric buses EBN 10,5 currently in service, thereof:
 - 4 electric buses EBN 10,5 operating in the public transport company in Ostrava. Total mileage over 200 000 km. The oldest EBN 10,5 made in 2010 = mileage over **70 000 km**
 - One electric bus EBN 10,5 operating as a skibus in Tatranska Lomnica in Slovakia for 3 years
 - The promotion electric bus EBN 10,5 presented in majour cities of Czech Republic, Germany and during winter 2012 used as skibus.
 - The promotion electric bus EBN 8 was presented during year 2012 in cities of Germany and now was sold to Grevesmuhlen



Městská doprava



Meziměstská doprava



Turistická doprava

Experience with E-bus in traffic

The empty electric bus travel range in the intercity operation is up to 230 km (cca 0,75 kWh/km)

Average electric energy recuperation is 32%

Travel range with the average passenger capacity 50% (13,2 t) for 1 charge :

- intercity operation 160 ÷ 170 km (0,8 kWh/km)**
- city operation 130 ÷ 150 km (0,9 kWh/km)**



City transport



Intercity transport



Tourist transport

Charging time

Slow

Rapid

300 Ah	T nab 80%		T nab 70%		T nab 50%		T nab 30%		T nab 25%		T nab 20%	
	Inab [Aac]	0,8C	h:m	0,7C	h:m	0,5C	h:m	0,3C	h:m	0,25C	h:m	0,2C
16	14,58	14:35	12,76	12:45	9,12	9:06	5,47	5:28	4,56	4:33	3,65	3:38
24	9,58	9:34	8,38	8:23	5,99	5:59	3,59	3:35	2,99	2:59	2,40	2:23
32	7,27	7:15	6,36	6:21	4,54	4:32	2,72	2:43	2,27	2:16	1,82	1:49
40	5,84	5:50	5,11	5:06	3,65	3:39	2,19	2:11	1,83	1:49	1,46	1:27
63	3,71	3:42	3,24	3:14	2,32	2:19	1,39	1:23	1,16	1:09	0,93	0:55
80	2,90	2:54	2,54	2:32	1,81	1:48	1,09	1:05	0,91	0:54	0,73	0:43
100	2,32	2:19	2,03	2:01	1,45	1:27	0,87	0:52	0,73	0:43	0,58	0:34
125	1,86	1:51	1,63	1:37	1,17	1:09	0,70	0:41	0,58	0:34	0,47	0:27
160	1,46	1:27	1,27	1:16	0,91	0:54	0,55	0:32	0,45	0:27	0,36	0:21
200	1,16	1:09	1,02	1:00	0,73	0:43	0,44	0:26	0,36	0:21	0,29	0:17
250	0,93	0:55	0,81	0:48	0,58	0:34	0,35	0:20	0,29	0:17	0,23	0:13
320	0,73	0:43	0,64	0:38	0,45	0:27	0,27	0:16	0,23	0:13	0,18	0:10



ELEKTROBUS SOR EBN

OSTRAVA!!!

Srovnávací kalkulace nákladů

Položka kalkulačního vzorce	Elektrobus 10,5 m	Autobus 10,5 m	Trolejbus 12 m *
(k 31.5.2012)	Kč/vozkm	Kč/vozkm	Kč/vozkm
Úplné vlastní náklady (v DP Ostrava) Complete costs	32,84	33,66	41,91
z toho:			
Trakční zdroje (cena el. energie, nafty) Traction energy	1,89	9,75	3,39
Opravy a udržování DP (* - odborný odhad) Maintenance bus	5,17 * (v záruce 2,17)	5,67	12,09
Opravy a udržování DC (vč. nabíjení) Other maintenance	0,08	0,06	2,42
Odpisy DP (vše. druhých AKU) Deprecitation of bus, 2 AKU	13,125	6,25	7,10
Odpisy DC - napájení, nabíjecí zařízení, měnič, kabeláž, vrchního vedení	0,64	0,01	2,03
Ostatní FN (mzdy řidičů + OON, včetně SP a ZP) Salary, insurance	11,93	11,93	14,88





Městská doprava



Meziměstská doprava



Turistická doprava

View to the future

- 1. Breaking of economic barriers**
 - reduction of price (bus, batteries)
- 2. Development of infrastructure**
 - rapid charging (smaller batteries, bigger passenger capacity)
- 3. Increasing of technical parameters**
 - new batteries with low weight and bigger capacity
 - low weight of bus body
- 4. Increasing of passenger capacity**
 - 3-axles E-bus
 - Articulated E-bus



Městská doprava



Meziměstská doprava



Turistická doprava

New projects

EBN 9, EBN 8



AFTERSALE SERVICES



OUR STANDARD

- ✓ **SERVICE CENTRE AND CENTRAL SPARE PARTS DISTRIBUTION FROM LIBCHAVY**
- ✓ **TRANSPORT OF SPARE PARTS TO OUR SERVICE POINTS WITHIN 24/48 HOURS**
- ✓ **WIDE NET OF SERVICE CENTERS**
- ✓ **24/7 TECHNICAL SUPPORT**
- ✓ **ON-LINE INTERNET SPARE PARTS CALOGUE AND E-SHOP**
- ✓ **TRAINING FOR MAINTANANCE**
- ✓ **TRAINING FOR DRIVERS – ECONOMICAL DRIVING**





Městská doprava



Meziměstská doprava



Turistická doprava

Thank you for your attention



SOR Libchavy spol. s r.o.

Libchavy 48

561 16

Tel.: +420 465 519 411

obchod@sor.cz

www.sor.cz

