ONE OF THE WORLD'S BEST ELECTRIC DRIVE EXPERTS

In heavy duty commercial vehicles segments up to 40 tons gross vehicle weight

electromega

OUR FAMILY

We are a second-generation family-run and owned business

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THE VALUES OF A FAMILY-RUN COMPANY

Best customer experience with personal responsibility

With more than 30 years` experience, DANIELLA GROUP is a family-run company that is continuously developing its business, can make quick decision and **act completely independently**.

Priority is always given to values such as **reliability**, **trust, loyalty** and ensuring both customers and employees are always satisfied.

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THE GROUP

Four companies providing specialized products and services.

DANIELLA

Wholesale

Electronical products wholesale company since 25 years, one of the biggest in Hungary.

- Founded: 1992
- Employees 2018: 450
- Turnover 2018 MRD HUF: 23

daniella ipari park kft.

Real Estate

Facility management and real estate improvement projects.

- Founded: 2000
- Employees 2018: 10
- Turnover 2018 M HUF: 700

energocell

Real Estate

From recycled glass manufactures the best insulating foam glass granulate.

- Founded: 2014
- Employees 2018: 36
- Turnover 2018 M HUF: 233

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Automotive

Develops and assembles the leading 100% electric propelled waste collector trucks.

- Founded: 2013
- Employees 2018: 12
- Turnover 2018 M HUF: 33

WHO WE ARE ELECTROMEGA

Prototypes ready for serial production which attracted attentions from University and Government

DEBRECENI EGYETEM
Elektromos Járműfejlesztő Kihelyezett Tanszék

Bartha István - *Címzetes Egyetemi Docens*

Electromega is a private Hungarian Enterprise, 100% owned by local Investors.

The Company is located in Debrecen, a major Hungarian City in the East of the Country.

As from the beginning, we are working closely together with Technical Faculty of Debrecen University and our Workshop is also accommodating Vehicle Development Department of the University with a small, but talented Crew of Engineers, PLC-Specialists and Technicians – this is the Team and place, where our unique electric powertrain is originated.

Successful product development efforts have also attracted the attention of the Ministry of National Economy of Hungary, thus Electromega has been awarded of the Prize for the 'Best Start-Up of the Month' in October 2017

MEDIA COVERAGE

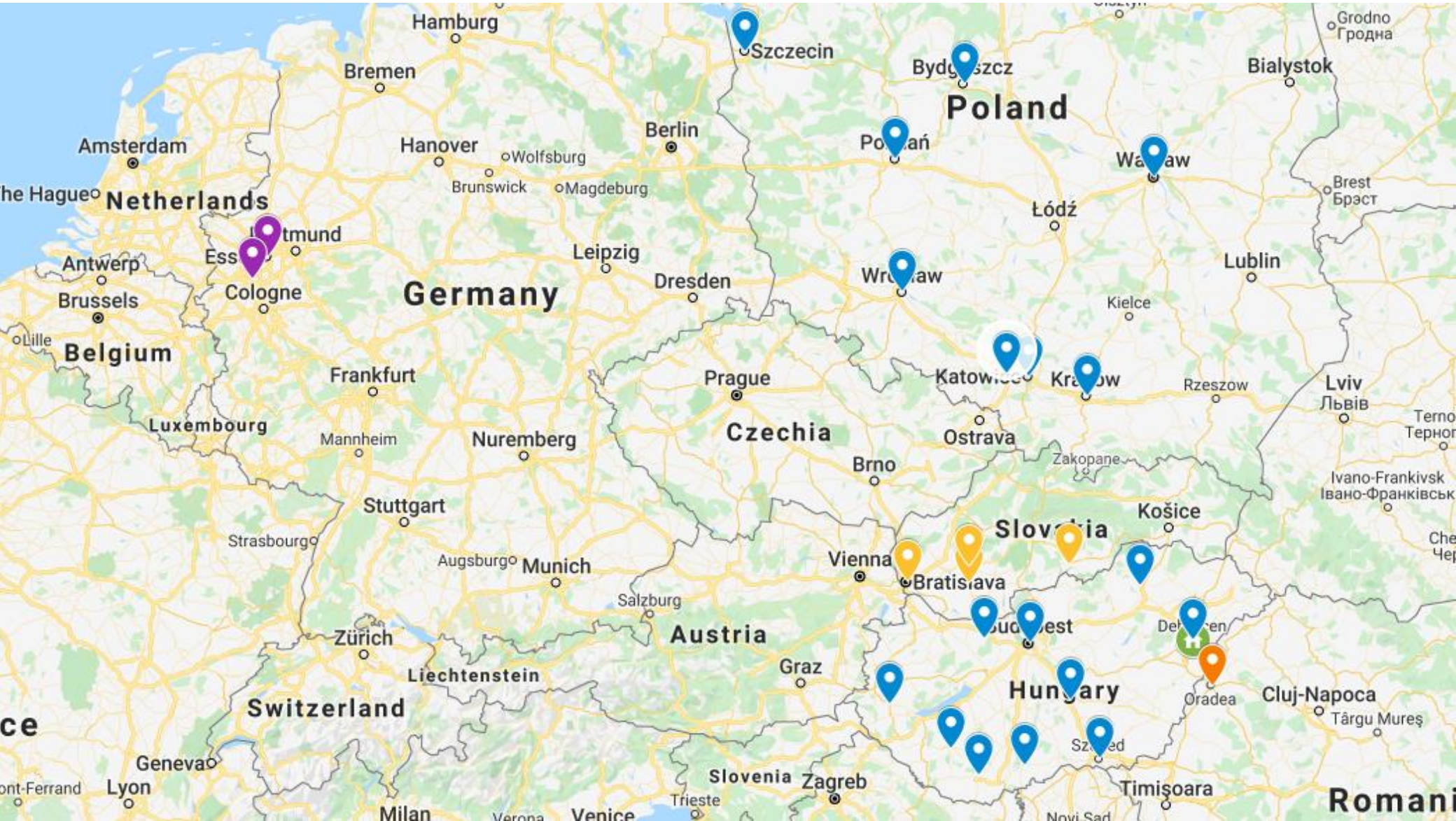
We have been futured in the following media platforms and participated events like

Düsseldoforf BeSmart! HungaryTechDay

Futurescope és a **Dublin-Budapest** Smart City Forum rendezvény

WHAT WE DID IN E-MOBILITY SO FAR

Well known companies was testing our electric powered garbage truck in EU



WHAT IS IN IT FOR ME

A clean energy for clean cities solution avaialble today

Service and maintenance

- No engine
- No transmission
- No exhaust system
- No clutch
- No fuel tanks
- No shifting arm
- No used oil
- No add blue system

Improved OPEX

- Less maintenance
- Less fuel for driving
- Less parts present
- Less tons/euro collection cost
- Less sick leaves
- Less repair and downtime
- Less lost business opportunities
- Less

EU regulations and decisions

- Funds available to support e-mobility
- EU directives must be implemented, solving businesses compliance

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THE PRODUCT

PRODUCT – ELECTRIC POWERTRAIN FOR TRUCKS

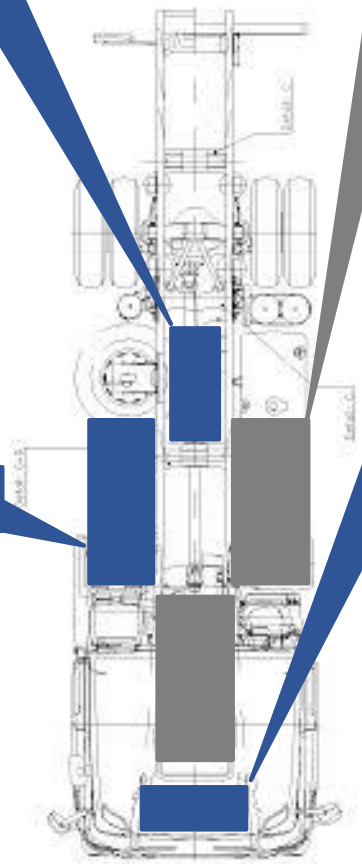
Electromega develops and manufactures an electric drive system which converts trucks into e-trucks

Asynchronous AC motor

- Peak power is 200 kW
- Liquid cooling
- Robust, durable housing
- **Maximum torque is 8,000 (on driven axle)**
- **No transmission system, thus no clutch or gear box**

Control via inverters

- Patented control concept
- Unique software programming
- Control cabinet IP67 protection
- Onboard charger (22kW)



Energy – LFP type battery pack

- Cells: LiFePo4
- Capacity 113 – 202 kWh
- Voltage 400 – 750V
- Current 100 – 400A
- Lifetime up to 2,500+ cycles of usage in case of dash charging and using
- Charges from 380V/32A or 64A socket
- **Certified by Kraftfahrt Bundesamt of ECE R100 Rev2**

Auxiliaries – vehicle and container

- All auxiliaries are running on the battery:
  - Bin lifter,
  - Waste compactor/press,
  - Steering aid
  - Cab heating/cooling, etc.
- Dashboard – an additional TFT screen is built in with data retrieved from the electric powetrain, the driver can see information in real time

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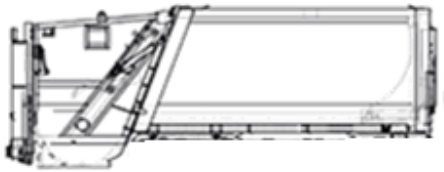
THE INTEGRATION OF THE PRODUCT

Electromega integrates the battery pack, powertrain and chassis before selling it on to a body manufacturer

	Component	Manufacturer	Notes
Integrated by Electromega	Battery pack 	THIRD PARTY	▪ The Company the integrates the powertrain with the battery pack and the chassis ▪ Electromega then uses its proprietary Software technology to control the powertrain effectively and efficiently ▪ Once the three elements have been integrated be Electromega, they are sold to body manufacturers
	Powertrain and control  * illustration	ELECTROMEGA	
	Chassis 	THIRD PARTY	
Third Party	Body 	THIRD PARTY	▪ The body manufacturers are instructed by Electromega on how to connect the body to the power train and the battery pack ▪ At this point the refuse collection truck is fully operational

* This is a picture of a diesel powertrain used solely for illustrative purposes

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RECYCLING LOGISTICS

Available product versions are in service already

MIDI Series

URBAN Series

MEGA Series

	MIDI Series	URBAN Series	MEGA Series
Size and usage profile	▪ 13 tons ▪ Narrow streets and city centers	▪ 18 tons ▪ City centers and residential areas	▪ 26 tons ▪ Suburban areas
Versions available	▪ One fully built	▪ Two fully built	▪ Two fully built
Performance characteristics	▪ 128 kWh battery ▪ 120-130 km driving range ▪ 90 kW motor power ▪ 1,700 Nm torque ▪ 8-10 hours charging	▪ 160 kWh battery ▪ 120-130 km driving range ▪ 110 kW motor power ▪ 3,300 Nm torque ▪ 8-10 hours charging	▪ 192 kWh battery ▪ 120-150 km driving range ▪ 160 kW motor power ▪ 4,800 Nm torque ▪ 9-11 hours charging
	80-100 km work range 15% climbing ability with full load		
Other	▪ Renault chassis available	▪ Scania, Renault chasses available	▪ Renault chasses available
	FAUN, MUT, Seres bodies available		

Test results show that on a single charge, trucks are able perform two full cycles of collect & unload representing 8 hours of total work time at least.

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DISTRIBUTION LOGISTICS

Available product version in service already

SENI Series

Size and usage profile

- 40 tons
- From warehouse to/from factory

Versions available

- One fully built

Performance characteristics

- 192 kWh battery
- 120-240 km driving range
- 236 kW motor power
- 7,000 Nm torque
- 8-10 hours charging

120 km minimum work range
15% climbing ability with full load

Other

- Scania chassis available

The powertrain bodies available

Specifications

Motor	150 kW, Asynchronous motor Max. Power 275 kW / 360 hp Max. Torque 7,000 Nm
Gearbox	No gearbox, Direct drive
Battery packs	6 pcs. Standard battery pack 6x LFP / 1P36S / 277Ah / 32kWh Capacity: 192.3 kWh
Charging	On-board charger, 20 kw (12 h charging time) 400V 32A (5-pin industrial socket with 16Ah input power) 400V 64A (5-pin industrial socket with 50Ah input power)
Range	up to 240 km range without load max. loaded 110 km range
Uphill	Climbing ability 12%
Max. speed	Max. Speed 80 km / h

Chassis
We can electrify used and new chassis
Our powertrain is independent from chassis brand

Manfacturer
Electromega Ltd.
Electromega Ltd is an electric drive expert specialized for commercial trucks
We have electric powertrains available from 12 tons up to 40 tons GWV

Contact:
Web: www.electromega.eu
Phone: +36 20 315 9998
E-mail: ruben.banto@electromega.hu

Test results show that on a single charge, trucks are able perform 16/24 number of loads & unload representing 16 hours of total work time at least.

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PRODUCT BENEFITS

Eletromega e-trucks offer significant benefits over diesel or CNG trucks

LOW NOISE

- Electric trucks make a lot less noise, especially at low speed
- On average, electric truck's noise emission is 51 dB(A), while diesel trucks' 71 dB(A) and CNG trucks' 66 dB(A)

ZERO EMISSION

- Zero emission during operation, electric trucks leave only clean air behind

LOW COST

- Total cost of operation of diesel trucks is significantly higher than that of electric trucks

Electric garbage trucks help waste management companies win tenders.

These trucks are not only cheaper to operate than their diesel counterparts, but are also better for the environment.

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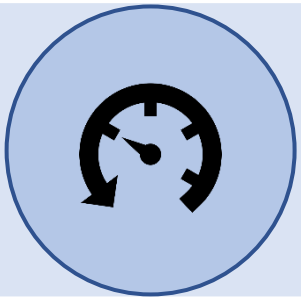
FIT FOR PURPOSE

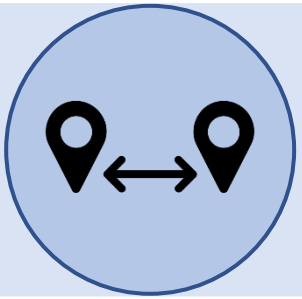
Prototype's performance proves perfect fit for purpose

START-STOP USE



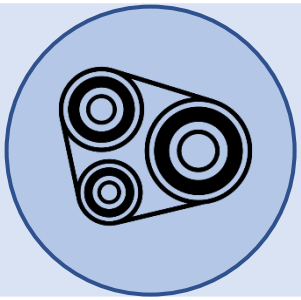
- Because trash bins are usually 10-20 meters apart, garbage trucks accelerate for a very short period.
- This use results in 1l / 1-1.5km consumption for diesel trucks in certain areas. E-Trucks use the braking period to re-charge the battery pack.

SHORT DISTANCES



- Garbage trucks usually run for about 50-80 km per day on average*.
- Electromega Series have a working range of about 80 – 100 km.

ROBUST BUILD



- Normal usage wears the parts considerably, even if drivers use clutch and gearbox as instructed. But usually drivers use those uncaringly further decreasing the lifetime of the parts.
- Electromega's trademark powertrain has no clutch, no gearbox, therefore fewer and less costly maintenance is required.

Electrification among garbage collection trucks is beneficial for all stakeholders.

Electromega's products not only rival the performance of a combustion engine, but are also eco-friendly

* *Electromega's tests show 75 km average work distance in urban setting per day.*

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SIGNIFICANTLY MORE EFFICIENT THAN DIESEL TRUCKS

Testing over 30 days shows that electric garbage trucks are 70% more efficient than diesel garbage trucks

Consumption cost comparison of an 18t Scania over a 30 day testing period			Savings with an electric truck	
	Diesel garbage trucks	Electric garbage trucks		
Average cost per day*	EUR 42	EUR 12	**EUR 29****	70%
Average cost per tonnes*	EUR 3.4	EUR 1.0	**EUR 2.4**	70%

Summary

- Recently, the Company carried out **4 separate tests,** in Hungary and Romania comparing the fuel efficiency between an 18 tonnes diesel garbage truck and an electric garbage truck, both of which were fitted on a Scania chassis.
- This trial is an aggregate of 4 separate tests, which were carried out over a total of 30 days, during which each truck collected a total of 367 tonnes of garbage.
- Each truck travelled a total distance of 2,238km, averaging 75km a day.
- The testing demonstrated that an average **electric truck is 70% more efficient to operate than a diesel truck** in terms of daily OPEX.

No clutch replacement is included, which is a significant cost burden of diesel trucks

* *According to management calculations.*
** *Numbers do not add up due to rounding.*

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FEEDBACK FROM POTENTIAL CLIENTS

Client testimonials prove outstanding performance

ECOLOGIC SERVICE ORADEA SA

„Work shift is not that tiring because there is no vibration and no noise."

„Electromega's invention brings what you can expect for a refuse truck."

BIOKOM Pécsi Városüzemeltetési és Környezetgazdálkodási Kft.

FKF FŐVÁROSI KÖZTERÜLET-FENNTARTÓ NONPROFIT ZRT.
BUDAPESTI VÁROSIGAZGATÓSÁG ZRT.

„It is perfect for garbage trucks!"

„It is a usable truck for the industry!"

AKSD Városgazdálkodási Kft.
www.aksd.hu
Felelősséggel a mindennapokban.

SZEGEDI HULLADÉKGAZDÁLKODÁSI NONPROFIT KFT

Miskolci Regionális Hulladékgazdálkodási Közszolgáltató Nonprofit Kft.

„We are all positive after testing Electromega's electric truck!"

Client testing feedback

- Electromega's e-trucks have been tested over several days, multiple times, by a number of potential clients.
- Overall, clients reacted very positively and expressed strong enthusiasm for the product, on the basis of their tests and experiences.
- Particular highlights included the higher level of comfort for the drivers, zero noise emissions and efficiency of the trucks which rival diesel trucks.

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EXECUTION

HISTORY OF THE COMPANY

The origin of the idea of electric drive system dates back to 2009, professional approach since 2014

2009

Start of R&D

The company started its research and development activities on site, which scaled up the existing electric propulsion experience.

2011

Founded

Electromega Ltd. was founded in 2009. It owns the propulsion patent and manufacturing rights. It's a second generation Family business.

Early success

The initial R&D brought its fruit, the team won an electric university race with their proprietary electric drive technology.

2013

2015

First E-Truck

Our team has built their very first 100% electric truck. It's already travelled 15.000 km flawlessly. Great user feedback.

Prototype

Second e-truck, nearly twice better than its predecessor. The model (licence plate: NNB-804) was homologated and tested by an independent waste management organization.

2016

2017

Scaling up

Prototypes have been validated, working in departments, better price. 5+ pieces of electric garbage trucks for national and international markets.

Client case studies

Seven different clients tested our e-trucks for shorter-longer periods. All feedback were positive.

2019

THOUGHT LEADERS

The Company is led by highly qualified and experienced engineer, entrepreneurs and business professionals

8 years in sales and marketing

Ruben Bántó
Sales & Marketing

Dániel Kőszegi
CEO

30 years of entrepreneurship

7 years of Electric Powertrain R&D

Attila Vitéz
Chief Architect R&D Lead

Zoltán Gáti
Production Director

20 years in manufacturing

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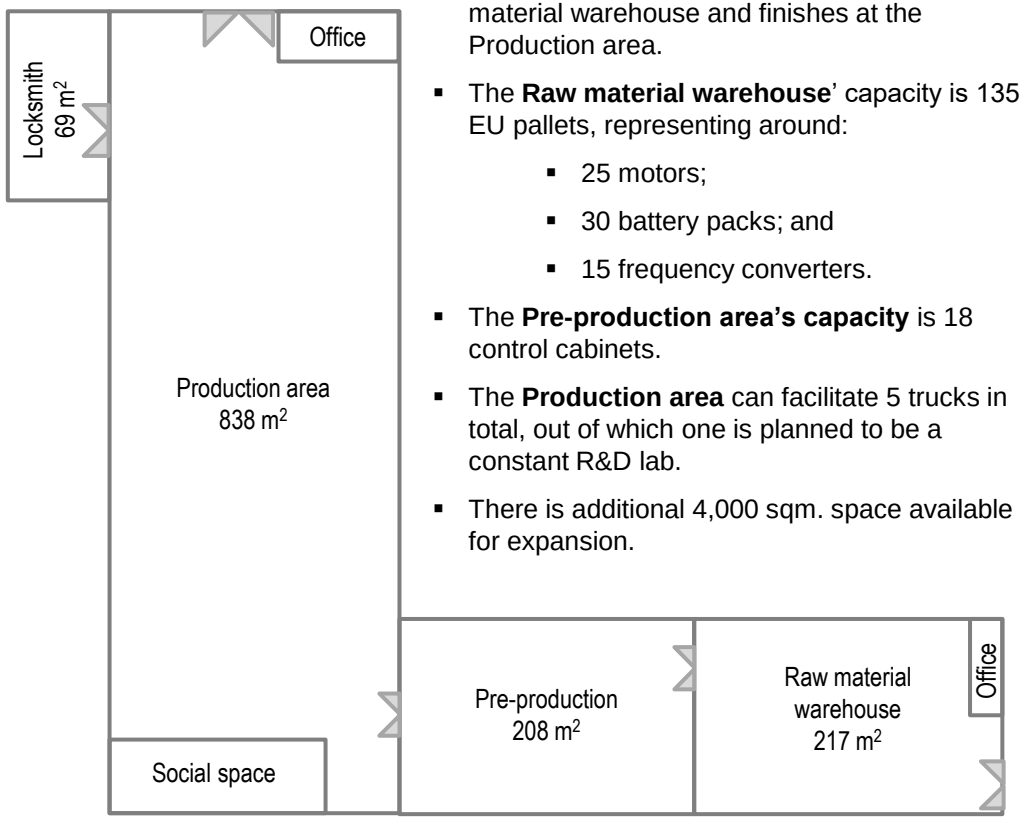
PRODUCTION SITE

The production site can accommodate work on 5 trucks simultaneously

Layout



Comments

- The total floor area is 1,332 m2. The material flow is one directional. It starts from the Raw material warehouse and finishes at the Production area.
- The **Raw material warehouse**' capacity is 135 EU pallets, representing around:
  - 25 motors;
  - 30 battery packs; and
  - 15 frequency converters.
- The **Pre-production area's capacity** is 18 control cabinets.
- The **Production area** can facilitate 5 trucks in total, out of which one is planned to be a constant R&D lab.
- There is additional 4,000 sqm. space available for expansion.

Location and outlook

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LOCAL APPLICATION

E-GARBAGE TRUCK PERFORMANCE

Clean cities powered by electromega' garbage truck with very low noise and no emission

PERFORMANCE IS LIKE COMBUSTION VEHICLE, BUT ELECTRIC IS WORKING SILENT & CLEAN

range on the road: up to **160 km**
when driving at 60 km/h

range at work: up to **100 km**
~2 rounds of waste collection

working time: up to **8 hrs**
~2 rounds of waste collection

hill climbing ability: up to **15%**
can start on a slope of 15% with full load

bin dumping cycle: **8 sec**
bin size:from 120 to 1100 litre

charging time: **12 hrs**
from 380V/32A standard socket

very low noise
noise level: **51 dB** (combustion vehicle: 71 dB)

no emission
cleaner cities, healthier people

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TOTAL COST TO OWN

The numbers proves long-term solutions which is beneficial for all stakeholders

ELECTRIC VEHICLE IS RUNNING AT HIGHLY FAVORABLE OPERATIONAL COSTS

Total Cost of Ownership (TCO) for 10 years lifetime – electric vs combustion:

ELECTRIC VEHICLE

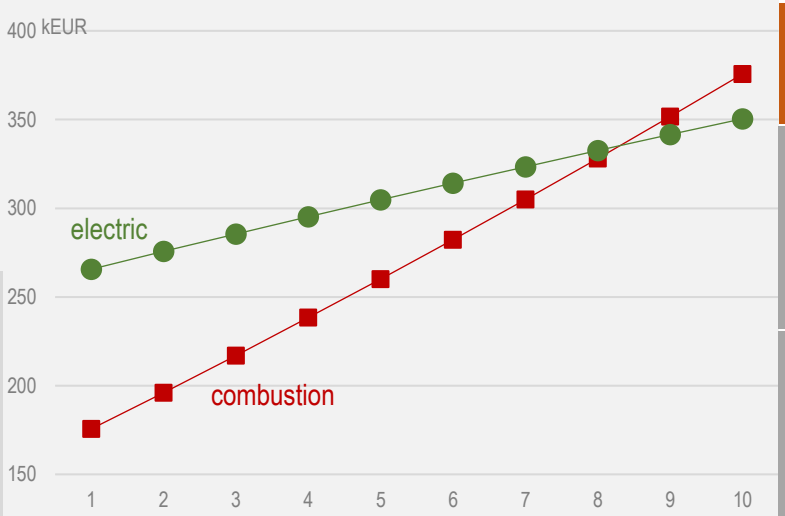
TCO (for 10 years): **350 kEUR**

of which vehicle price: 258 kEUR
fuel: 71 kEUR
maintenance: 21 kEUR

COMBUSTION VEHICLE

TCO (for 10 years): **376 kEUR**

of whic vehicle price: 163 kEUR
fuel: 150 kEUR
maintenance: 63 kEUR



Why is an electric vehicle more favorable?

low **fuel** cost (due to better efficiency)

savings
in 10 yrs: 79 kEUR
annual: 8 kEUR

low **maintenance** cost

savings
in 10 yrs: 42 kEUR
annual: 4,2 kEUR

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LOCAL SERVICE POINTS

The most important thing for our future customers: to be in contact with locally present stuff

- We operate our vehicles with telemetric technology
  - **Level 1**: educate local service crew
  - **Level 2**: service starts with online troubleshooting
  - **Level 3**: Our service truck will be present within 24h with parts to be changed

* with proper and available infrastructure, the vehicle can work next working day

- Different service packages are available to support a seamless operation

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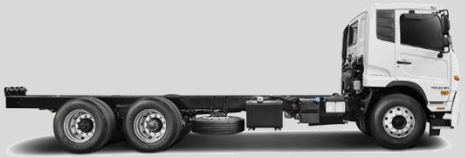
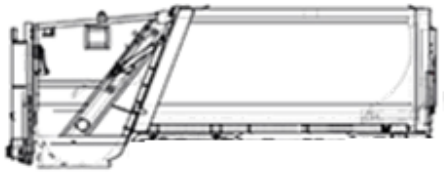
WARRANTY TERMS AND CONDITIONS

Will be professionally trained local service representatives supporting our customers

	Component		Warranty
Coordinated by Electromega	Battery pack		3 YEARS
	Powertrain and control	 * illustration	3 YEARS
	Chassis		1 YEARS
As above	Body		1 YEARS

Notes

It can be extended for +1, +2, +3 years for 5-8-12% of the net purchase price under an extended warranty, optionally

After discussing with manufacturers we plan to proceed as business as usual

* This is a picture of a diesel powertrain used solely for illustrative purposes

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SERVICE PACKAGES

Creating the right synergy between manufacturer, local service points and end user

- Maintenance
- Spare Parts
- Telephone Service
- Training

SERVICE BASIC

„Service packages was designed to experience the most appropriate manufacturer support for a seamless operation."

- Maintenance
- Spare Parts
- Telephone Service
- Training

SERVICE PLUS +

- Exclusive Services Hotline
- Express Processing for Spare Parts
- Guaranteed Reaction Time
- Personal Service Manager

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CHARGING

Charging from a 3-phase industrial charging socket,Type2 is possible where applies

Type	Lithium
System voltage	658 V
Battery small	capacity: 1x 176kWh Charging time*: 8 hours Charging time with CCS Type 2**: 1,3 hours Range: up to 120 km Weight: 870 kg
Battery medium	capacity: 1 x 193kWh Charging time*: 10 hours Charging time with CCS Type 2**: 1,3 hours Range: up to 150 km Weight: 1’416kg

*80 % SoC at 22 kW
**80% SoC at 150 kW DC

- ✓ Charging requires a 5-pole, 3-phase, 32A industrial charging socket
- ✓ Charging, with: 20 kW onboard charger, base model
- ✓ Charging station option available
- ✓ GEN 2 Type 2 Plug Male/Female 32A/7.2kW for Electric Vehicle - 3 Phase

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THE USED CASES

SIGNIFICANT OPEX OPPORTUNITY

18t electric garbage truck

COST OF FUEL ANALYSIS OF REFUSE COLLECTION

electric vehicle vs.
diesel powered vehicle

Scania 2-axle chassis
electric powertrain
Seres body
gross vehicle weight: 18 t

Electromega Kft. Debrecen

SUMMARY:

- ✓ 140 kWh battery pack
- ✓ With 1 charge
- ✓ **Working range:** 71 km collection range
- ✓ **Collected waste:**
  - ✓ 1st load: 7.76 t
  - ✓ 2nd load: 8.34 t
- ✓ **Temperatures**: +41 Celsius (fully working air conditioner)

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TEST RESULTS IN HUNGARY

Szeged - SZKHT

Pécs – BIOKOM

Kecskemét - DTKH

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL
Electromega Kft. Debrecen

type of the vehicle	Scania 18t	
test location	Szeged	commercial
test period	2017. VIII. month	
type of waste	communal	elect

TEST SUMMARY DATA

			F
test duration	2	days	
collected garbage	23,740	tons	
daily average	11,870	tons	
distance travelled	111	km	
daily average	55,5	km	

diesel powered vehicle		
total	58	Eur
daily avg..	29	Eur/day
specific	2	Eur/ton

THE POINT

COST

electric vehicle c

total

specific

date	start time	arrival time	working hours daily hours	number of loads	1.rou
total					
8. 3.			5,50	2	6
8. 7.			7,50	2	8

date	diesel powered vehicle			electric powered vehide		
	consumption litre	cost Eur	spec. cost Eur/tons	consumption kWh	cost Eur	spec. c Eur/to
total	72,26	57,58	2,43	224	18,01	
8. 3.	31,90	25,42	3,27	98	7,88	
8. 7.	40,36	32,16	2,02	126	10,13	

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL
Electromega Kft. Debrecen

Huf/Eur 0,00313

type of the vehicle	Scania 18t	
test location	Kecskemét	
test period	2018. XI. month	
type of waste	communal	

Basic info

commercial gas net unit price	0,993	Eur/l
vehicle consume	60,0	l/100km
electricity net unit price	0,084	Eur/kWh

TEST SUMMARY DATA

test duration	12	days
collected garbage	119,360	tons
daily average	9,947	tons
distance travelled	771	km
daily average	64,3	km

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	459	Eur	total	133	Eur
daily avg..	38	Eur/day	daily avg..	11	Eur/day
specific	3,85	Eur/tons	specific	1,12	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	326	Eur	71%
specific	2,73	Eur/t	71%

date	start time	arrival time	working hours daily hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total			104,85				119 360	771
11. 7.	6:00	15:10	9:10	9,17	2	6 680	5 000	11 680	66
11. 8.	6:00	15:30	9:30	9,50	2	5 980	5 620	11 600	59
11. 9.	6:00	13:00	7:00	7,00	2	6 280	1 160	7 440	64
11. 12.	6:00	15:10	9:10	9,17	2	6 380	4 160	10 540	75
11. 13.	6:00	14:30	8:30	8,50	2	5 500	5 160	10 660	56
11. 14.	6:00	14:30	8:30	8,50	2	5 700	4 120	9 820	58
11. 15.	6:00	15:19	9:19	9,34	1	6 400		6 400	66
11. 16.	6:00	14:30	8:30	8,50	2	5 480	5 520	11 000	64
11. 20.	6:00	15:30	9:30	9,50	2	6 380	5 900	12 280	59
11. 21.	6:00	14:30	8:30	8,50	2	5 760	4 160	9 920	70
11. 22.	6:00	15:40	9:40	9,67	2	6 980	3 840	10 820	66
11. 23.	6:00	13:30	7:30	7,50	2	5 900	1 300	7 200	68

date	diesel powered vehicle			electric powered vehicle			cost advantage electric vs diesel		
	consumption litre	cost Eur	spec. cost Eur/tons	consumption kWh	cost Eur	spec. cost Eur/tons	Eur/day	Eur/tons	%
total	462,60	459	4	1 577	133	1	326	3	71%
11. 7.	39,60	39	3	131	11	1	28	2	72%
11. 8.	35,40	35	3	131	11	1	24	2	68%
11. 9.	38,40	38	5	131	11	1	27	4	71%
11. 12.	45,00	45	4	131	11	1	34	3	75%
11. 13.	33,60	33	3	131	11	1	22	2	67%
11. 14.	34,80	35	4	131	11	1	23	2	68%
11. 15.	39,60	39	6	131	11	2	28	4	72%
11. 16.	38,40	38	3	131	11	1	27	2	71%
11. 20.	35,40	35	3	131	11	1	24	2	68%
11. 21.	42,00	42	4	131	11	1	31	3	73%
11. 22.	39,60	39	4	131	11	1	28	3	72%
11. 23.	40,80	40	6	131	11	2	29	4	73%

* Recharging the whole battery pack of 127 kWh from a SOC level of 10% involves a 15% charging loss

Huf/Eur 0,00313

Basic info

gas net unit price	0,88	Eur/l
vehicle consume	65,1	l/100km
icity net unit price	0,084	Eur/kWh

ANYAGKÖLTSÉG

	elektromos üzemű jármű		
	total	90,88	Eur
	daily avg..	9,09	Eur/day
s	specific	1,41	Eur/tons

SAVINGS

ost advantage over diesel

183,39	Eur	67%
2,85	Eur/t	67%

garbage weight, kg			distance
nd	2.round	total	km
		64 260	478
120	0	6 120	43
380	0	6 380	50
880	4 300	9 180	60
120	0	7 120	43
540	0	6 540	51
720	0	4 720	51
420	0	4 420	39
780	3 160	7 940	40
420	1 920	6 340	62
500	0	5 500	39

	cost advantage electric vs diesel		
ost ns	Eur/day	Eur/tons	%
1	183	3	67%
1	16	3	65%
1	20	3	69%
1	21	2	62%
1	18	3	73%
2	19	3	66%
2	21	5	73%
2	14	3	63%
1	14	2	60%
1	26	4	74%
2	13	2	58%

TEST RESULTS ORADEA, RO

Company name: Rer Ecologic Service Oradea S.A.

- https://www.oradea-online.ro/stiri/index.php?q=RER
- https://www.bihon.ro/stirile-judetului-bihor/o-gunoiera-electrica-in-proba-la-rer-vest-79585/
- http://bihorstiri.ro/nu-fum-nu-zgomot-masina-100-electrica-testata-de-rer/
- https://www.ebihoreanul.ro/stiri/ultima-or-31-41/e-gunoiera-a-trecut-testul-141512.html

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL

Electromega Kft. Debrecen

Huf/Eur 0,00313

type of the vehicle	Scania 18t
test location	Oradea - RO
test period	2018. IX. month
type of waste	communal

Basic info

commercial gas net unit price	0,79	*Eur/l*
vehicle consume	68,1	*l/100km*
electricity net unit price	0,096	*Eur/kWh*
RON/HUF	66,84	

TEST SUMMARY DATA

test duration	6	days
collected garbage	159,960	tons
daily average	*26,660*	tons
distance travelled	878	km
daily average	*146,3*	*km*

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	475,34	Eur	total	139,66	Eur
daily avg..	*79,22*	*Eur/day*	*daily avg..*	*23,28*	*Eur/day*
specific	2,97	Eur/tons	specific	0,87	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	335,7	Eur	71%
specific	2,10	Eur/t	71%

date	start time	arrival time	working hours daily hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total			106,00				159 960	878
4. 13.			10,00	2	7 040	7 460	14 500	89
4. 17.			9,00	2	8 620	7 280	15 900	67
4. 18.			10,00	2	6 840	5 580	12 420	89
4. 19.			9,00	2	8 260	8 440	16 700	75
4. 20.			4,00	2	4 180		4 180	42
4. 23.			9,00	2	7 240	7 720	14 960	90
4. 24.			10,00	1	8 020	5 500	13 520	57
4. 25.			8,00	2	7 320	5 280	12 600	61
4. 30.			9,00	2	6 820	6 880	13 700	86
5. 1.			8,00	2	7 540	3 400	10 940	55
5. 2.			10,00	2	7 640	6 320	13 960	93
5. 3.			10,00	2	8 340	8 240	16 580	74

date	diesel powered vehicle consumption litre	cost Eur	spec. cost Eur/tons	electric powered vehicle consumption kWh	cost Eur	spec. cost Eur/tons	cost advantage electric vs diesel Eur/day	Eur/tons	%
total	597,92	475	2,972	1 451	140	1	336	2	71%
4. 13.	60,61	48	3,32	131	12,6	0,9	35,5	2,45	74%
4. 17.	45,63	36	2,28	131	12,6	0,8	23,6	1,49	65%
4. 18.	60,61	48	3,88	131	12,6	1,0	35,5	2,86	74%
4. 19.	51,08	41	2,43	112	10,8	0,6	29,8	1,79	73%
4. 20.	28,60	23	5,44	108	10,4	2,5	12,3	2,95	54%
4. 23.	61,29	49	3,26	114	11,0	0,7	37,8	2,52	77%
4. 24.	38,82	31	2,28	105	10,1	0,7	20,8	1,54	67%
4. 25.	41,54	33	2,62	125	12,0	1,0	21,0	1,67	64%
4. 30.	58,57	47	3,40	93	8,9	0,7	37,6	2,75	81%
5. 1.	37,46	30	2,72	137	13,2	1,2	16,6	1,52	56%
5. 2.	63,33	50	3,61	131	12,6	0,9	37,7	2,70	75%
5. 3.	50,39	40	2,42	131	12,6	0,8	27,4	1,65	68%

TEST RESULTS IN SLOVAKIA

KOSIT a.s.

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL

Electromega Kft. Debrecen

Huf/Eur 0,00313

type of the vehicle	Scania 18t
test location	SK
test period	2019. VII. month
type of waste	communal

Basic info		
commercial gas net unit price	0,993	*Eur/l*
vehicle consume	60,0	*l/100km*
electricity net unit price	0,084	*Eur/kWh*
vehice consume	1,56	*kWh/1km*

TEST SUMMARY DATA

test duration	3	days
collected garbage	32,880	tons
daily average	*10,960*	tons
distance travelled	198	km
daily average	*66,0*	*km*

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	118	Eur	total	26	Eur
daily avg..	*39*	*Eur/day*	*daily avg..*	*9*	*Eur/day*
specific	3,59	Eur/tons	specific	0,79	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	92	Eur	78%
specific	2,79	Eur/t	78%

date	start time	arrival time	working hours daily	hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total				0,00				32 880	198
7. 17.	5:20	12:40	7:20		2			11 840	58
7. 18.	5:20	12:40	7:20		2			9 380	74
7. 19.	5:20	12:40	7:20		2			11 660	66

date	diesel powered vehicle consumption litre	cost Eur	spec. cost Eur/tons	electric powered vehicle consumption kWh	cost Eur	spec. cost Eur/tons	cost advantage electric vs diesel Eur/day	Eur/tons	%
total	118,80	118	4	309	26	1	92	3	78%
7. 17.	34,80	35	3	91	8	1	27	2	78%
7. 18.	44,40	44	5	116	10	1	34	4	78%
7. 19.	39,60	39	3	103	9	1	31	3	78%

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COST OF FUEL

26t electric garbage truck

COST OF FUEL ANALYSIS OF REFUSE COLLECTION

electric vehicle vs.
diesel powered vehicle

Renault 3-axle chassis
electric powertrain
MUT body
gross vehicle weight: 26 t

Electromega Kft. Debrecen

SUMMARY:

- ✓ 154 kWh battery pack
- ✓ With 1 charge
- ✓ **Working range:** 77 km collection range
- ✓ **Collected waste:**
  - ✓ 1st load: 9.54 t
  - ✓ 2nd load: 5.23 t
- ✓ **Temperatures**: +25 Celsius, ambient working temperature

electromega

TEST RESULTS IN POLAND

Krakow – PL, Remondis

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL

Huf/Eur 0,00313

Electromega Kft. Debrecen

type of the vehicle	Renault 26t
test location	Kraków - PL
test period	2018. VII. Month
type of waste	communal

Basic info		
commercial gas net unit price	0,89	Eur/l
vehicle consume	79,0	l/100km
electricity net unit price	0,12	Eur/kWh
PLN/HUF	75,20	

TEST SUMMARY DATA

test duration	2	days
collected garbage	19,100	tons
daily average	9,550	tons
distance travelled	124	km
daily average	62,0	km

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	87,62	Eur	total	27,73	Eur
daily avg..	43,81	Eur/day	daily avg..	13,86	Eur/day
specific	4,59	Eur/tons	specific	1,45	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	59,89	Eur	68%
specific	3,14	Eur/t	68%

date	start time	arrival time	working hours daily	hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total								19 100	124
7. 26.				8,50				11 800	66
7. 27.				11,00				7 300	58

date	diesel powered vehicle consumption litre	cost Eur	spec. cost Eur/tons	electric powered vehicle consumption kWh	cost Eur	spec. cost Eur/tons	cost advantage electric vs diesel Eur/day	Eur/tons	%
total	97,96	88	5	236	28	1	60	3	68%
7. 26.	52,14	47	4	125	15	1	32	3	68%
7. 27.	45,82	41	6	110	13	2	28	4	68%

Sczecin – PL, Remondis

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL

Huf/Eur 0,00313

Electromega Kft. Debrecen

type of the vehicle	Renault 26t
test location	Szczecin - PL
test period	2018. IX. month
type of waste	communal

Basic info		
commercial gas net unit price	0,89	Eur/l
vehicle consume	86,25	l/100km
electricity net unit price	0,12	Eur/kWh
PLN/HUF	75,20	

TEST SUMMARY DATA

test duration	6	days
collected garbage	67,280	tons
daily average	11,213	tons
distance travelled	215	km
daily average	35,8	km

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	165,86	Eur	total	48,08	Eur
daily avg..	27,64	Eur/day	daily avg..	8,01	Eur/day
specific	2,47	Eur/tons	specific	0,71	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	117,8	Eur	71%
specific	1,75	Eur/t	71%

date	start time	arrival time	working hours daily	hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total								67 280	215
9. 18.				8,00				1 480	35
9. 19.				9,50				1 340	29
9. 20.				7,50				16 440	41
9. 21.				8,00				14 100	32
9. 24.				6,00				17 800	36
9. 25.				7,50				16 120	42

date	diesel powered vehicle consumption litre	cost Eur	spec. cost Eur/tons	electric powered vehicle consumption kWh	cost Eur	spec. cost Eur/tons	cost advantage electric vs diesel Eur/day	Eur/tons	%
total	185,44	166	2	409	48	1	118	2	71%
9. 18.	30,19	27	18	67	8	5	19	13	71%
9. 19.	25,01	22	17	55	6	5	16	12	71%
9. 20.	35,36	32	2	78	9	1	22	1	71%
9. 21.	27,60	25	2	61	7	1	18	1	71%
9. 24.	31,05	28	2	68	8	0	20	1	71%
9. 25.	36,23	32	2	80	9	1	23	1	71%

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TEST RESULTS IN POLAND

Bydgoszcz – PL, Remondis

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL Huf/Eur 0,00313

Electromega Kft. Debrecen

type of the vehicle	Renault 26t
test location	Bydgoszcz - PL
test period	2018. VII. Month
type of waste	communal

Basic info		
commercial gas net unit price	0,89	Eur/l
vehicle consume	79,0	l/100km
electricity net unit price	0,12	Eur/kWh
PLN/HUF	75,20	

TEST SUMMARY DATA

test duration	19	days
collected garbage	110,360	tons
daily average	5,808	tons
distance travelled	959	km
daily average	50,5	km

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	677,63	Eur	total	214,44	Eur
daily avg..	35,66	Eur/day	daily avg..	11,29	Eur/day
specific	6,14	Eur/tons	specific	1,94	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	463	Eur	68%
specific	4,20	Eur/t	68%

date	start time	arrival time	working hours daily	hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total								110 360	959
8. 18.				8,00				6 120	50
8. 20.				9,50				7 920	59
8. 21.				7,50				9 260	44
8. 22.				8,00				4 820	50
8. 23.				6,00				2 340	49
8. 24.				7,50				5 540	54
8. 27.				6,50				8 240	42
8. 28.				7,00				9 180	41
8. 29.				5,00				2 340	57
8. 30.				6,50				3 180	48
8. 31.				5,00				2 860	68
9. 5.				6,00				9 540	32
9. 6.				5,50				2 560	51
9. 7.				7,50				5 700	66
9. 10.				6,50				9 740	38
9. 11.				6,50				9 740	41
9. 12.				6,50				1 800	63
9. 13.				6,50				3 100	50
9. 14.				6,50				6 380	56

IF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL Huf/Eur 0,00313

nega Kft. Debrecen

he vehicle	Renault 26t
tion	Bydgoszcz - PL
od	2018. VII. Month
waste	communal

Basic info		
commercial gas net unit price	0,89	Eur/l
vehicle consume	79,0	l/100km
electricity net unit price	0,12	Eur/kWh
PLN/HUF	75,20	

	diesel powered vehicle			electric powered vehicle			cost advantage electric vs diesel		
	consumption litre	cost Eur	spec. cost Eur/tons	consumption kWh	cost Eur	spec. cost Eur/tons	Eur/day	Eur/tons	%
	757,61	678	6	1 822	214	2	463	4	68%
.	39,50	35	6	95	11	2	24	4	68%
.	46,61	42	5	112	13	2	28	4	68%
.	34,76	31	3	84	10	1	21	2	68%
.	39,50	35	7	95	11	2	24	5	68%
.	38,71	35	15	93	11	5	24	10	68%
.	42,66	38	7	103	12	2	26	5	68%
.	33,18	30	4	80	9	1	20	2	68%
.	32,39	29	3	78	9	1	20	2	68%
.	45,03	40	17	108	13	5	28	12	68%
.	37,92	34	11	91	11	3	23	7	68%
.	53,72	48	17	129	15	5	33	11	68%
.	25,28	23	2	61	7	1	15	2	68%
.	40,29	36	14	97	11	4	25	10	68%
.	52,14	47	8	125	15	3	32	6	68%
.	30,02	27	3	72	8	1	18	2	68%
.	32,39	29	3	78	9	1	20	2	68%
.	49,77	45	25	120	14	8	30	17	68%
.	39,50	35	11	95	11	4	24	8	68%
.	44,24	40	6	106	13	2	27	4	68%

electromega

TEST RESULTS IN HUNGARY

Zalaegerszeg – ZKN Kft.

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL — Huf/Eur 0,0033

Electromega Kft. Debrecen

type of the vehicle	Renault 26t
test location	Zalaegerszeg - HU
test period	2019. XI. Month
type of waste	communal and selectiv

Basic info	
commercial gas net unit price	0,92 Eur/l
vehicle consume	72,00 l/100km
electricity net unit price	0,080 Eur/kWh
consumption of electric vehicle	1,50 kWh/KM

TEST SUMMARY DATA

test duration	15	days
collected garbage	27,400	tons
daily average	1,827	tons
distance travelled	185	km
daily average	12,3	km

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	122,54	Eur	total	22,20	Eur
daily avg..	8,17	Eur/day	daily avg..	1,48	Eur/day
specific	4,47	Eur/tons	specific	0,81	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	100,3	Eur	82%
specific	3,66	Eur/t	82%

date	start time	arrival time	working hours daily	hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total								27 400	1
11. 25.	6:15:00	12:25:00		6	2	6 600	3 280	9 880	4
11. 26.	5:50:00	11:35:00		5	1	8 120		8 120	3
11. 28.	10:30:00	14:10:00		3	1	3 800		3 800	4
11. 29.	5:50:00	10:40:00		4	1	5 600		5 600	6

date	diesel powered vehicle consumption litre	cost Eur	spec. cost Eur/tons	electric powered vehicle consumption kWh	cost Eur	spec. cost Eur/tons	cost advantage electric vs diesel Eur/day	Eur/tons	%
total	133,20	123	4	278	22	1	100	4	82
11. 25.	32,40	30	3	68	5	1	24	2	82
11. 26.	23,76	22	3	50	4	0	18	2	82
11. 28.	33,84	31	8	71	6	1	25	7	82
11. 29.	43,20	40	7	90	7	1	33	6	82

Kaposvár – KHG Kft.

COST OF FUEL ANALYSIS OF REFUSE COLLECTION - ELECTRIC vs DIESEL — Huf/Eur 0,0033

Electromega Kft. Debrecen

type of the vehicle	Renault 26t
test location	Kaposvár - HU
test period	2019. X. Month
type of waste	communal and selectiv

Basic info	
commercial gas net unit price	0,92 Eur/l
vehicle consume	72,00 l/100km
electricity net unit price	0,080 Eur/kWh
consumption of electric vehicle	1,50 kWh/KM

TEST SUMMARY DATA

test duration	15	days
collected garbage	87,340	tons
daily average	5,823	tons
distance travelled	709	km
daily average	47,3	km

FUEL COST

diesel powered vehicle			electric powered vehicle		
total	469,64	Eur	total	85,08	Eur
daily avg..	31,31	Eur/day	daily avg..	5,67	Eur/day
specific	5,38	Eur/tons	specific	0,97	Eur/tons

THE POINT

COST SAVINGS

electric vehicle cost advantage over diesel

total	384,6	Eur	82%
specific	4,40	Eur/t	82%

date	start time	arrival time	working hours daily	hours	number of loads	garbage weight, kg 1.round	2.round	total	distance km
total								87 340	709
10. 11.	5:45:00	11:20:00		5	1	3 020		3 020	43
10. 14.	5:45:00	13:50:00		8	2	4 040	3 000	7 040	58
10. 15.	5:45:00	12:40:00		6	2	3 680	900	4 580	76
10. 16.	5:55:00	13:05:00		7	1	3 080		3 080	50
10. 17.	5:45:00	11:00:00		5	1	2 780		2 780	49
10. 18.	5:45:00	9:35:00		3	1	3 200		3 200	37
10. 21.	4:45:00	11:25:00		6	1	9 780		9 780	39
10. 22.	5:45:00	12:50:00		7	1	7 600		7 600	53
10. 23.	5:45:00	12:35:00		6	1	2 580		2 580	36
10. 25.	5:45:00	11:35:00		5	1	5 740		5 740	49
10. 28.	4:50:00	10:45:00		5	1	8 340		8 340	37
10. 29.	5:50:00	13:00:00		7	1	8 880		8 880	48
10. 30.	6:00:00	13:10:00		7	2	2 840	1 700	4 540	48
10. 31.	5:45:00	13:30:00		7	1	7 360		7 360	56
11. 4.	5:45:00	10:15:00		4	1	8 820		8 820	30

date	diesel powered vehicle consumption litre	cost Eur	spec. cost Eur/tons	electric powered vehicle consumption kWh	cost Eur	spec. cost Eur/tons	cost advantage electric vs diesel Eur/day	Eur/tons	%
total	510,48	470	5	1 064	85	1	385	4	82%
10. 11.	30,96	28	9	65	5	2	23	8	82%
10. 14.	41,76	38	5	87	7	1	31	4	82%
10. 15.	54,72	50	11	114	9	2	41	9	82%
10. 16.	36,00	33	11	75	6	2	27	9	82%
10. 17.	35,28	32	12	74	6	2	27	10	82%
10. 18.	26,64	25	8	56	4	1	20	6	82%
10. 21.	28,08	26	3	59	5	0	21	2	82%
10. 22.	38,16	35	5	80	6	1	29	4	82%
10. 23.	25,92	24	9	54	4	2	20	8	82%
10. 25.	35,28	32	6	74	6	1	27	5	82%
10. 28.	26,64	25	3	56	4	1	20	2	82%
10. 29.	34,56	32	4	72	6	1	26	3	82%
10. 30.	34,56	32	7	72	6	1	26	6	82%
10. 31.	40,32	37	5	84	7	1	30	4	82%
11. 4.	21,60	20	2	45	4	0	16	2	82%

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www.electromega.eu