



# ELECTRIC LOCOMOTIVES – GLOBAL MARKET TRENDS

Forecast, Fleet, Suppliers, Procurement Projects

## **ELECTRIC LOCOMOTIVES – GLOBAL MARKET TRENDS**

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**This study entitled “Electric Locomotives – Global Market Trends” provides a comprehensive overview into the structure, installed bases, procurements, manufacturers and development trends in the rail vehicle segment analysed.**

Based on current developments in rail transport, this study, entitled “Electric Locomotives – Global Market Trends”, delivers an analysis and sound estimate of the market for electric locomotives. Based on the successful preceding study from 2014 and experience from more than 2 500 projects in the field of railway technology, in the past few years SCI Verkehr has verified the central input data and optimised its forecasting methodology. We have reviewed and updated all chapters of the preceding study. In addition, SCI Verkehr has performed an improved product segmentation for valuation of installed bases and age structures.

**In concrete terms, this MultiClient market study on electric locomotives includes:**

- A regionally differentiated overview of the worldwide market for electric locomotives including an in-depth analysis of all relevant markets of individual countries
- A comprehensive analysis of the current fleet stocks in terms of operational purposes, quantities and age structures as well as future procurement potential
- An overview of the most important drivers behind procurement and refurbishment
- Analysis of market shares of manufacturers as well as a forecast of vehicle demand
- An overview of electric locomotive manufacturers including a brief description of their current range of products and services
- A condensed presentation of the most important fleet-specific features of electric locomotives in diagramme form
- A list of operators’ vehicle fleets and the current electric locomotive procurements in the annexe to the study.

All in all, the study provides a well-founded analysis of the worldwide market for electric locomotives. The study therefore provides both companies established in the railway industry as well as active and potential operators with important information for operational and strategic planning.

SCI Verkehr analyses markets from the bottom up: based upon systematic observation of the railway markets, a detailed worldwide database of the installed base and projects forms the basis for in-depth studies on the various segments of the railway industry and the most important regional focus markets. Through the continuous production of its MultiClient Series, SCI Verkehr systematically analyses 24 core countries and more than 100 individual markets for railway industries.

The Multi Client Study “**Electric Locomotives – Global Market Trends**” is available in English from April 2016.

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Extract from the text:

Market Overview


Africa/Middle East			E-Locos	Trend
	Installed base	Units 2015	2 100	↑
		Average development 2015-2020 (p.a.)	1.6 %	
		Average age 2015 (in years)	27	
	Market for new vehicles	Average volume 2014-2016 (EUR million p.a.)	250	↑
		Average development 2015-2020 (p.a.)	7,8 %	
		Volatility market volume 2015-2020 (SAW)	102.4 %	
	Market for after sales	Average volume 2014-2016 (EUR million p.a.)	230	↑
		Average development 2015-2020 (p.a.)	4.2 %	
		Volatility market volume 2015-2020 (SAW)	0.6 %	
↑ Boom/strong growth   ↗ small growth   → stagnation   ↘ small decrease   ↓ clear decline				

Figure 1: Market overview electric locomotives Africa/Middle East

(...)

Market environment/transport market

Infrastructure:

Africa as a railway market is largely characterised by severely economically underdeveloped areas with poorly developed and outdated infrastructure. Existing rail networks in Africa are generally in relatively poor condition and require upgrades to rail infrastructure, (...)

Conventional railway route length in km 2015	Electrified conventional railway route length in km 2015	Electrification grade in % 2015	Important voltage
Xxx xxx	Xx xxx	xx	3 kV DC 25 kV 50 Hz AC

(...)

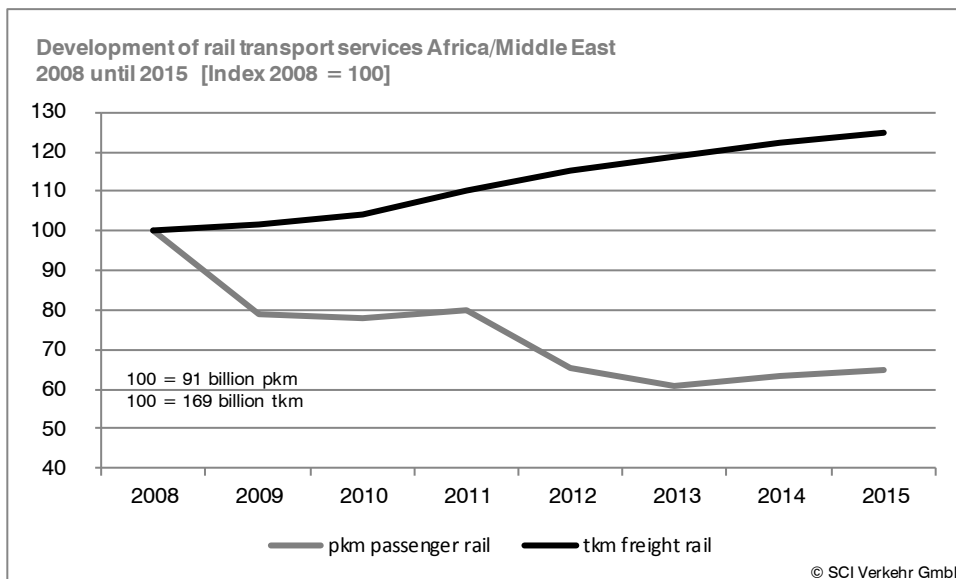


Figure 2: Rail transport performance and development Africa/Middle East in the period 2008–2015

Rail passenger transport:

With the investments carried out in modern passenger transport systems in Northern Africa, rail passenger transport has developed positively, although this is at a low level in view of the size of the region's population and compared to past years. (...)

(...)

Rail freight transport:

(...)

**Installed base/age structure**

Around 2 100 electric locomotives are being operated in Africa and the Middle East. (...)

(...)

Only operators in five countries in the market region have electric locomotives in stock at the moment. (...)

(...)

**Age structure of installed base [Number of Units]**

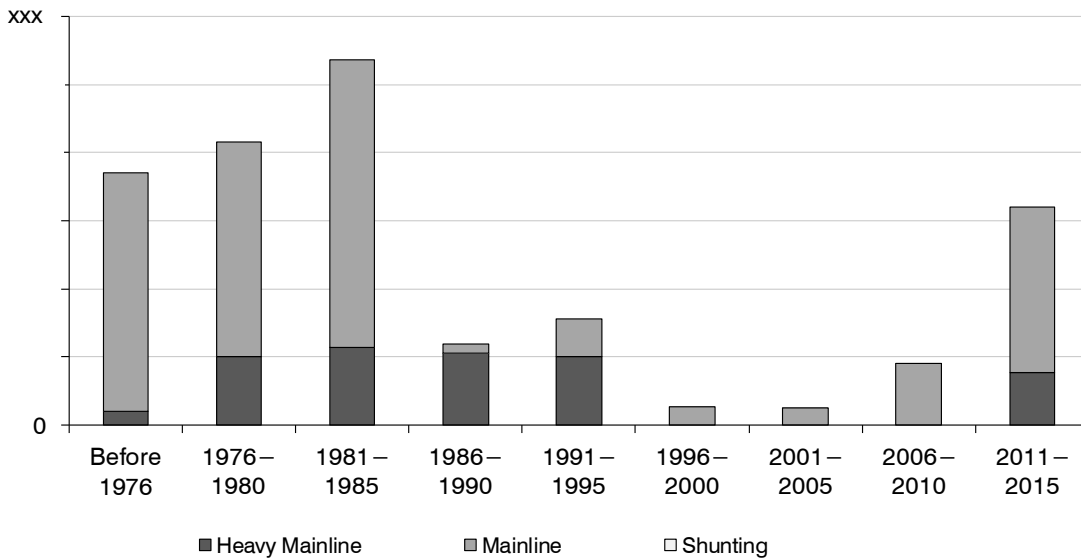


Figure 67: Age structure electric locomotives Africa/Middle East 2015 (number of locomotives)

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**Manufacturers/Products/Market Shares**

All orders for new electric locomotives in the last five years were placed by South African freight transport operator Transnet or South African passenger transport operator Prasa. (...)

(...)

Market shares of manufacturers 2011 to 2015

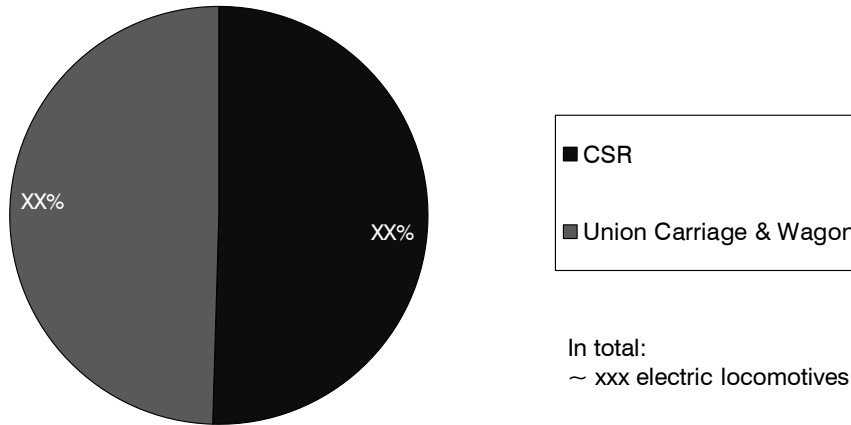


Figure 3: Market shares electric locomotives Africa/Middle East in the period 2011–2015 (number of locomotives)

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(...)

Market volume/market development

The current market volume for new electric locomotives in Africa/the Middle East is around EUR XXX million p.a.; for after-sales services, around EUR XXX million.

This market development is influenced by the following drivers:

Drivers of procurements	Brief description	Relevance	Trend	
			short term	medium term
Infrastructure	In the market region, there are hardly any connected track systems. Limited upgrading has occurred, but the lines can still be characterised as relatively low axle-load, low-speed, small-scale and undercapitalised networks. (...)		↗	↗
Transport demand	(...)		↗	↗
Investment funds	(...)		↗	↗
Fleet structure	(...)		→	→

The current sales volume in the market region is at a high level with about XX new electric locomotives per year. (...)

Market volume [EUR million]

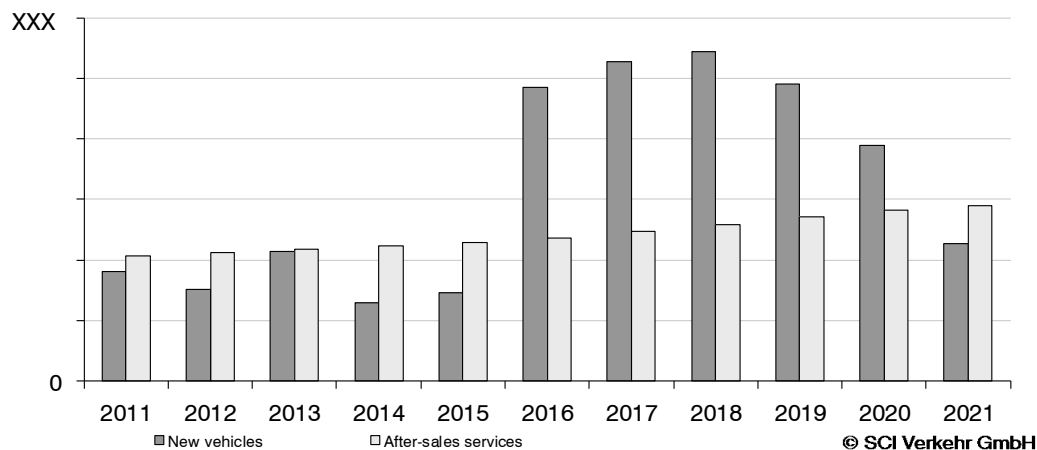


Figure 4: Market volume of new vehicles and after-sales in Africa/ Middle East in the period 2011-2021

(...)

### Important current and planned procurement projects

The following table does not include procurement plans of the countries considered in detail (Iran and South Africa), these are summarised in the respective country chapters. Only in Ethiopia and Israel, new electric locomotives were ordered in the last few years.

Country	Type	Units	Power [kW]	Delivery	Remarks
Ethopia	HXD 1	35	7,200	2015-2018	In June 2014, a contract for CZR Zhuzhou to supply 35 electric locomotives for the future Addis Abeba – Djibouti standard gauge line was signed. (...)
Israel	Traxx AC	62 (+32)	5 600	2017-2019	In September 2015, Bombardier Transportation signed a contract to provide 62 Traxx AC locomotives to Israel Railways (IR). (...)





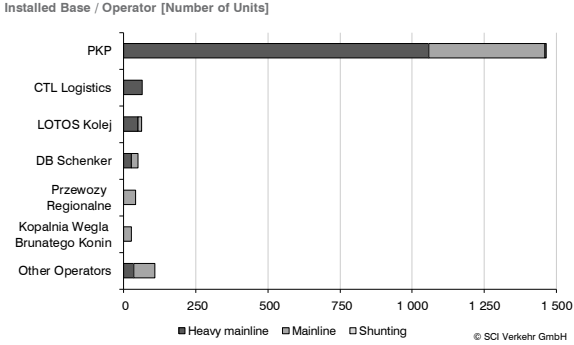
## Pesa Bydgoszcz

Overview			
Head Office:	Zygmunta Augusta 11, Bydgoszcz, Poland		
Website:	www.pesa.pl		
Shareholders:	92% of Pesa shares are owned by eight private investors, including members of the management		
Management:	Tomasz Zaboklicki (President and CEO)		
Employees (2014):	4,000		
Turnover (2013):	EUR 450 million <sup>o</sup>		
Profit:	undeclared		
<p>Pesa has a history of more than 150 years as a repair workshop for rolling stock. On July 24th 1991, ZNTK Bydgoszcz was separated from the PKP organisation and established as an independent company. Under the new management, the company continued to grow and develop into one of the largest passenger rolling stock manufacturers in Europe.</p> <p>Pesa Bydgoszcz develops and produces rolling stock primarily for Polish customers. Other than manufacturing, Pesa is also active in the field of refurbishing and repairing of rolling stock.</p> <p>In 2008, Pesa acquired a majority of 60% shares in Minsk Mazowiecki ZNTK, later increasing it to 85%. The acquisition significantly strengthened Pesa's refurbishment capabilities but also enhances its production capacity if needed. The site had 700 employees.</p> <p>In 2013, Pesa generated revenues of around EUR 450 million (PLN 1 billion). Around 80% of its revenues are generated from the sale of new rolling stock.</p> <p>Pesa is continuing its gradual expansion beyond its home market Poland. Pesa and Uralvagonzavod (UVZ) agreed in 2014 to establish a joint venture for light rail vehicles which was in discussion for several months. After a first order of 60 units, another 60 units followed. Also in 2014, the company announced its intentions to initiate production of metro vehicles. While the company took part in its first metro vehicle tender, it has not been successful yet. Among various batches of multiple units and LRVs, Pesa is currently delivering electric and diesel locomotives of type Gama.</p>			
Production sites (Electric locomotives)			
Pesa mainly performs rolling stock production at its plant in Bydgoszcz. In Warsaw, Pesa has additional capacities through its refurbishment daughter ZNTK Mińsk Mazowiecki.			
Sites of final assembly			
Country	Site	Products	Remarks
Poland	Bydgoszcz	D-loco, EMU, DMU, PC, LRV, FW, E-loco	Employees: 2,700 Production capacity: >200 locomotives and cars p.a. <sup>o</sup>
Product information		Market shares (2011-2015)	Comment
E-loco	PESA Gama	<1% (Europe)	<p>Pesa introduced its new Gama platform in 2012. The Gama locomotives are equipped with 3 kV DC traction and hence especially designed for the Polish market. A last-mile diesel engine for this locomotive type is available.</p> <ul style="list-style-type: none"> <li>In 2014 Koleje Mazowieckie also selected Pesa to supply two 3 kV DC electric locomotives.</li> <li>Additionally, PHU Lokomotiv has purchased the Gama Marathon demonstrator locomotive in 2015 and ordered at the same time two more units.</li> </ul> <p>The "Gama" family includes also a multi-system 111 MS locomotive for 3 kV DC, 1.5 kV DC, 15 KV AC and 25 KV AC power supply.</p>

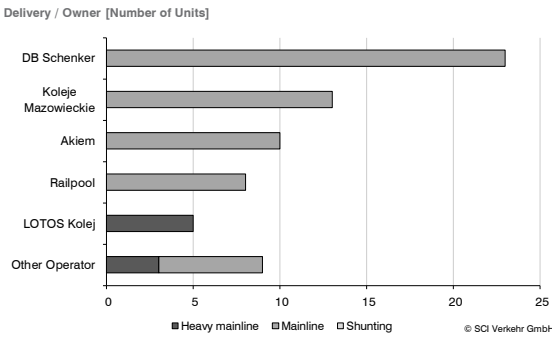
Annex B: EXAMPLE

Poland

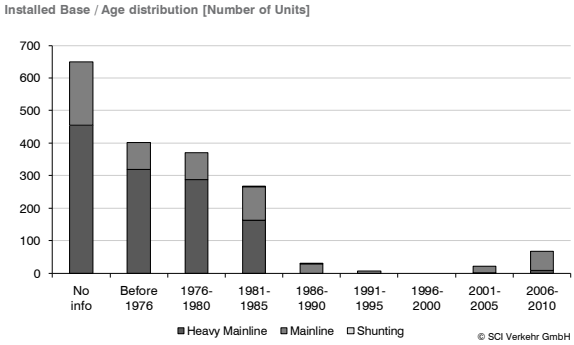
Installed Base / Operator



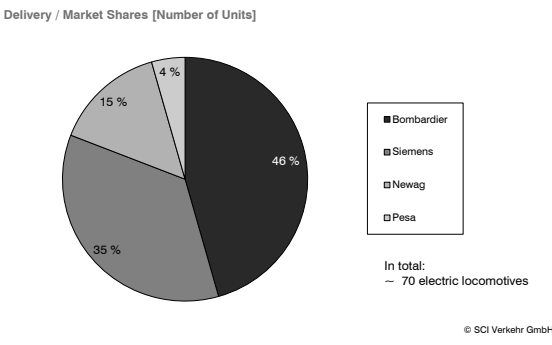
Delivery 2011 – 2015 / Operator



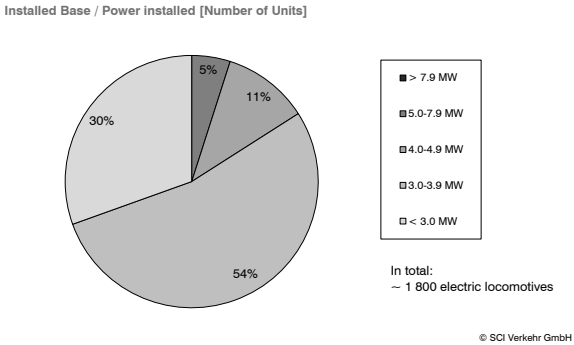
Installed Base / Age distribution



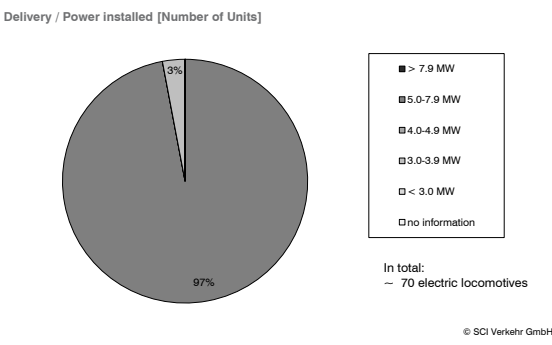
Delivery 2011 – 2015 / Market Shares



Installed Base / Power installed



Delivery 2011 – 2015 / Power installed



Annex C: EXAMPLE

Region	Country	Operator	Type	Units	Delivery	Main supplier
AF	Algeria	Algerian National Railways	6FE	14	1995 - 1995	GEC, Alstom, ACEC
AF	Congo, Democratic Republic of	Congolese National Railroad Company	2500	4	1969 - 1969	Hitachi
AF	Congo, Democratic Republic of	Congolese National Railroad Company	2600	9	1976 - 1976	Hitachi
AF	Iran	Iranian Islamic Republic Railways	TM2	12	2002 - 2002	CSR Zhuzhou
AF	Iran	Iranian Islamic Republic Railways	TM1	6	1997 - 1997	CSR Zhuzhou
AF	Iran	Iranian Islamic Republic Railways	RC4	8	1985 - 1985	Asean
AF	Iran	Tehran Urban & Suburban Railway Company	SS5	12	2003 - 2005	Zhuzhou Electric Locomotive Works
AF	Iran	Iranian Islamic Republic Railways	TM3	42	2010 - 2010	CSR Zhuzhou
AF	Morocco	Morocco Railways	E 1200	8	1982 - 1982	Hitachi
AF	Morocco	Morocco Railways	E-1400 / PRIMA II	20	2009 - 2010	Alstom
AF	Morocco	Morocco Railways	BB36000	7	1998 - 1998	Alstom
AF	Morocco	Morocco Railways	E 1250	12	1984 - 1985	Hitachi
AF	Morocco	Morocco Railways	E 1300	18	1991 - 1992	GEC Alstom
AF	Morocco	Morocco Railways	E 1100	22	1977 - 1977	Hitachi
AF	Morocco	Morocco Railways	E 1350	9	2000 - 2000	GEC Alstom
AF	Morocco	Morocco Railways	E 1000	3	1975 - 1976	Pafawag, Dolmel
AF	South Africa	South African Railways	10E1	97	1990 - 1993	UCW, GEC
AF	South Africa	South African Railways	19E	110	2010 - 2013	Toshiba, Union Carriage
AF	South Africa	South African Railways	21E	100	2014 - 2016	CSR Zhuzhou Electric Locomotive
AF	South Africa	South African Railways	15E	44	2011 - 2012	MARS, Venus Railway Solutions
AF	South Africa	South African Railways	15E	32	2013 - 2014	Venus Railway Solutions
AF	South Africa	South African Railways	14E	2	1990 - 1990	SLM, Siemens-50 c / s group

## Extract from the study

Country	Type	Units	Power [kW]	Delivery	Remarks
Argentina	CKD8G/ CDD8H	20	2 200	<b>2013-2014</b>	In 2013, the first of 20 locomotives supplied by CNR's Dalian subsidiary entered service in Argentina. (...)
Argentina	n/a	20	n/a	<b>2015-2016</b>	In January 2015, CNR Beijing announced the signing of a contract of 20 diesel-electric locomotives for Argentina. The locomotives will be used for the Belgrano railway renovation project.
...	...	...	...	...	....

# Order form MC Electric Locomotives



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FAO Ms. Ann Kathrin Arntz

I would like to order the Multi Client Study “Electric Locomotives – Global Market Trends”

Quantity	Issue	Language	Single price <sup>1</sup>	Total price <sup>1</sup>
	PDF Issue	English	3,300 €	
	PDF + Print Issue	English	3,700 €	
			<b>Total price*</b>	

Company

Contact person (Title, first name, surname)

Position

Address (Street, town, postcode)

VAT Number (for customers in member states of the European Union)

or other invoicing address or order number

Tel

Fax

Email

I would like to pay by prepayment  / I would like to pay by credit card<sup>2</sup>  / Invoice

For payment by credit card please use the online shop or ask Ms. Arntz a.arntz@sci.de

Orders subject to our general terms and conditions. Place of jurisdiction is Hamburg.

Date

Signature / stamp

<sup>1</sup> All prices exclude delivery costs and VAT

<sup>2</sup> Additionally 5% credit card payment charges



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