# bia

## **Smart Charging for eBus Fleets**

### ASTSBC: TRA25-03

March 2025

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## **Bia Smart Charging** Why Bia is the leader in eBus smart charging...

## Bia is optimising charging for the largest eBus depot in Europe

235 DC sockets 300 eBuses 15 MW power

**Complex integrations** 

100% fleet uptime 🖌

40% lower peak loads 🗸

20% lower charging costs 🗸

55% fewer power penalties 🗸

### Efficient, cost-effective and clean charging

Advanced charge optimization that considers power constraints, fleet schedules, dynamic electricity pricing and onsite solar generation

#### 100% fleet uptime

Bia ensures the fleet is always ready to leave on schedule, providing full visibility of all real-time and historical charging sessions

#### **Seamless Integrations**

Bia integrates multiple charger brands, onsite solar, ERP system and 5 levels of the depot's electrical infrastructure

#### **Grid Services & V2G**

Bia's ability to accurately identify and forecast flexibility ensures this depot can confidently participate in capacity markets without compromising uptime



### Trusted by...





Bia's Smart Charging integrates with all your fleet systems to control and optimise charging



Monitor and manage your chargers and fleet in real-time



**Simulate and forecast** fleet electrification costs and energy requirements



**Optimise charging** according to your business priorities



Enable revenue generation through grid flexibility services

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## **Bia Smart Charging** *Priority Balancing - the <u>first layer</u> of our smart charging solution*

### **Bia Priority Balancing**

#### EXAMPLE: Depot with 200 kW power capacity

STATIC BALANCING







DYNAMIC BALANCING (Industry Standard using SoC)

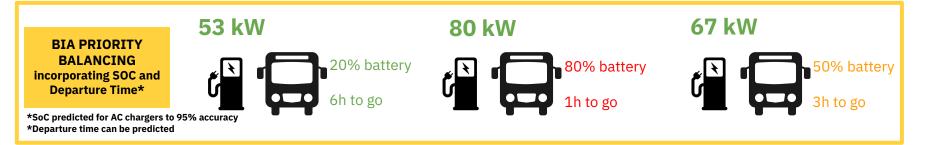


20% battery



70 kW

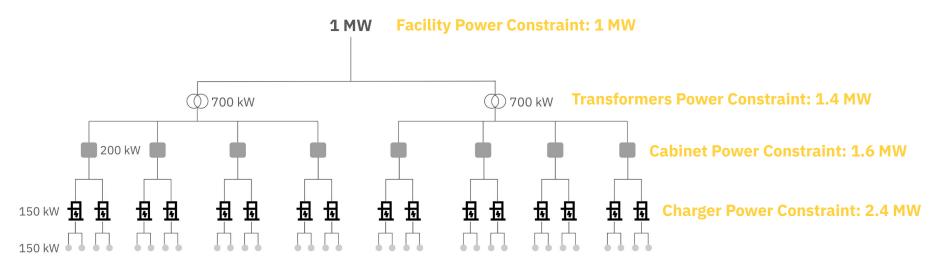
50% battery



### **Bia Priority Balancing**

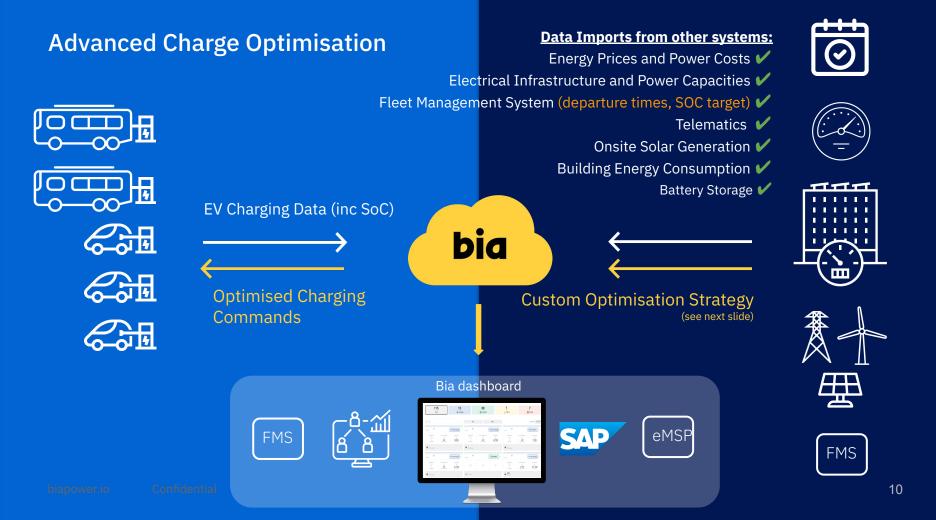
Developed for **Bia's Priority Balancer** not only uses SoC and departure time, it also incorporates 5 levels of electrical infrastructure - **Charger, Cabinet, Transformer, Feeder, Facility** 

#### **MULTI-LEVEL BALANCER**



**Results:** can enable 20% faster charging if required

## **Bia Smart Charging** Advanced Charge Optimisation



A charge optimisation strategy can be customized according to a particular charging site's priorities - whether that be reducing peak loads, energy costs, CO2, battery degradation - or all of the above.

#### **Peak loads**

Bia operates the charging infrastructure with minimal impact on the electrical installation, allowing the **operation of more chargers by avoiding or delaying costly energy infrastructure upgrades**.

> up to 80% less power required



### **Energy costs**

The platform sends optimal schedules to all chargers to consume energy when the electricity tariff is the cheapest and energy penalty optimisation.

up to 50% charging costs reduction

up to 70% carbon footprint reduction

CO<sub>2</sub> footprint

renewable energy from either onsite

generation (self-consumption) or the

Bia incentivizes charging with

grid.



**Battery health** 

Bia's algorithms look after EVs, avoiding battery dwelling at high state of charge and **reducing its degradation**.

up to 40% less battery degradation



Bia optimisation improves operations and ensures 100% fleet uptime

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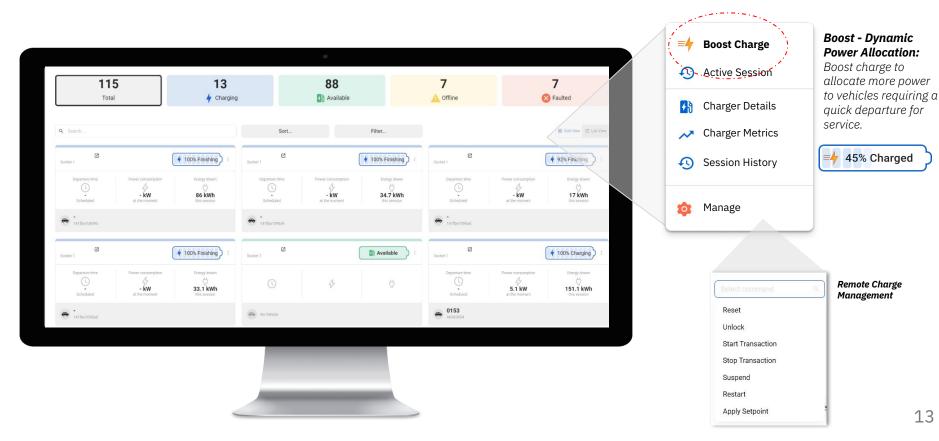
## **Bia Smart Charging** The Dashboard - real-time and historical monitoring, management and reporting

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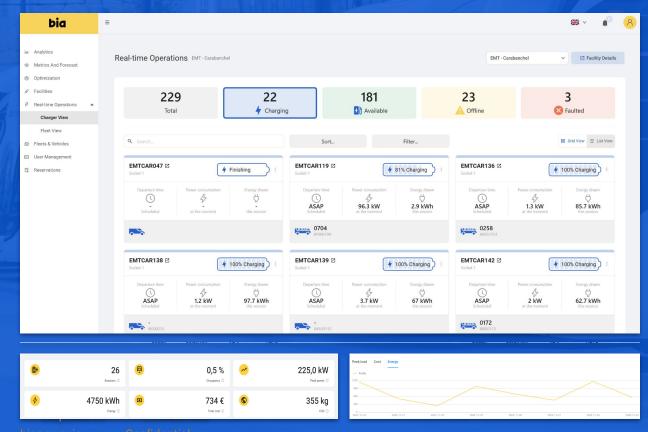
Confidential

#### **REAL-TIME OPERATIONS**

#### Real-time and historical monitoring and management of all charging sessions



#### **REAL-TIME OPERATIONS**



- Filter according to charger status
- Metrics per charger Number of charging sessions Charger Occupancy Charger energy consumption
- Session history per charger

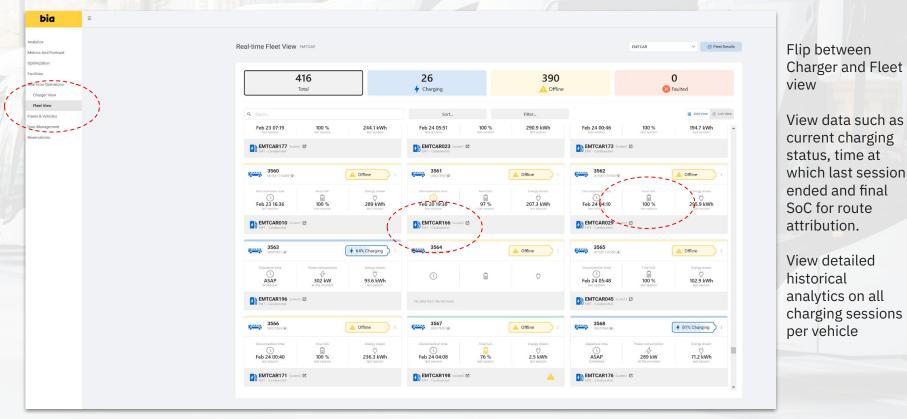
•

- Unlock command Terminate transaction & unlock socket
- Reset command
   Stop transaction & reboot

<sup>•</sup> Notifications

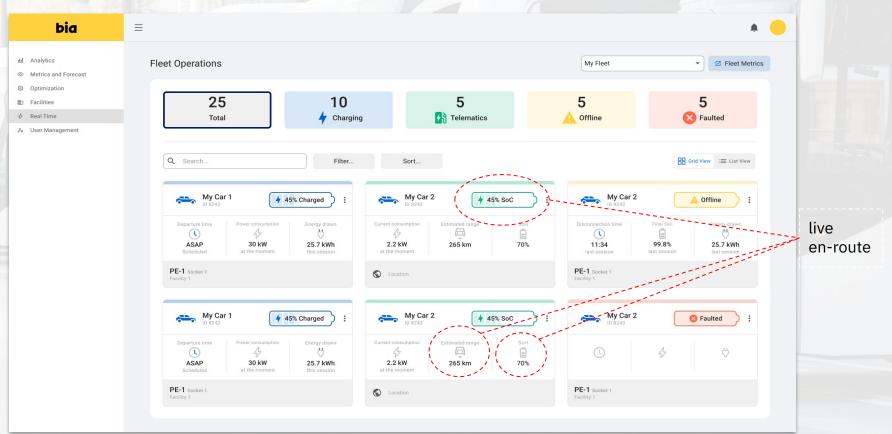
#### **REAL-TIME VEHICLE TELEMATICS INTEGRATIONS**

#### Dashboard incorporating Fleet View of vehicles (Q2 2025 release)



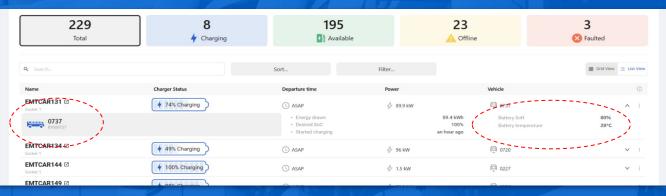
#### **REAL-TIME VEHICLE TELEMATICS INTEGRATIONS**

#### Dashboard incorporating *en-route* vehicle telematics (Q2 2025 release)

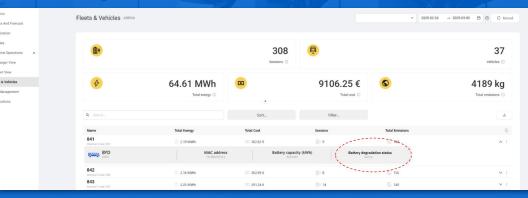


#### **REAL-TIME BATTERY MONITORING AND INSIGHTS**

Real-time battery monitoring and data reporting would require **Out of Scope work** and be dependent on a **telematics integration and/or data being reported by the charger**. The below images are mock-ups of how the data can be presented in our dashboard



In the Real-Time Monitoring tab, the battery temperature and SoH can be reported



In the Fleets & Vehicles tab, battery data insights such as degradation status can be reported

#### **REPORTING - CHARGE SESSION**

#### Detailed historical reporting on every charge session

bia	=									Sis v	
				Energy ③		Total cost 🤇				C02 ①	
lat Analytics		1500								,	~
Metrics And Forecast	i	Charging sessions									4-
Optimization	_	Charging Station \$	Socket \$	Connection Time \$	Disconnection Time 🗘	Energy (kWh) 💠	Cost (€) ‡	User tag 🗘	Vehicle	1 1	1.
		EMTCAR194	1	2025-02-21 14:50:42	2025-02-21 15:48:51	26.94	0.32	SB026659	3528	۲	
	•	EMTCAR155	1	2025-02-21 14:48:08	2025-02-21 15:36:41	59.20	1.57	BY000809	0809	۲	
Charger View Fleet View		EMTCAR155	1	2025-02-21 14:46:14	2025-02-21 14:46:29	0.10	0	BY000809	0809	۲	
向 Fleets & Vehicles		EMTCAR155	1	2025-02-21 14:33:36	2025-02-21 14:38:06	6.30	0.16	BY000809	0809	۲	
🖾 User Management		EMTCAR148	1	2025-02-21 14:22:19	2025-02-21 15:02:15	0	1.60	AK668101	0255	•	
Reservations		EMTCAR184	3	2025-02-21 14:09:35	2025-02-21 14:17:34	19.21	0.36	SB026648	3517	۲	
		EMTCAR162	1	2025-02-21 13:59:56	2025-02-21 14:02:52	0	0	AK668101	0255	۲	
		EMTCAR136	1	2025-02-21 13:46:28	2025-02-21 13:47:07	0.40	0	IR000186	0186	۲	
		EMTCAR136	1	2025-02-21 13:44:47	2025-02-21 13:45:33	0.70	0.00	IR000186	0186	۲	
		EMTCAR136	1	2025-02-21 13:42:39	2025-02-21 13:43:42	0.90	0.04	IR000186	0186	۲	
								< 1	2 3 4 5 ••• 28	32 > 10 / page Y	



Detailed charging session data is available to download in .csv format or automatically feed into an ERP via API

- Per charger
- Per IDtag
- Connection/disconn ection time
- Number of sessions
- Costs
- Energy drawn (kWh)
- Peak Power (kW)
- Co2 (kg)

#### **REPORTING - PER VEHICLE**

### See cost breakdowns, energy requirements and emissions per vehicle over a specific time frame

leets & Vehicles Urbaser Barcelona				2025-02-2	4 → 2025-03-03 🖻 🁌 C Reload
Bt		<b>1,138</b> Sessions ①	<b>e</b>		153 Vehicles ①
\$	5.96 MWh		<b>667.16 €</b> Total cost ⊙	0	429 kg
Q. 0051	0	Sort	Filter		لك
Name	Total Energy	Total Cost	Sessions	Total Emissions	٥
4002-NISSAN NV	🔆 0 kWh		<u>∭</u> + 0	S 0	v :
4003-NISSAN NV Internal Code: 4033	🗇 0 kWh		<u>⊜</u> + 0	S 0	v :
4020-DSFK Internal Code: 4020	🔆 6.21 kWh	◎ 0.41 €	⊕+ 8	© 0	v :
4021-DFSK Internal Code: 4021	🔆 8.04 kWh		<u>⊞</u> + 2	© 1	v :
4022-DFSK Internal Code: 4022	🔆 27.38 kWh		<u></u> + 10	S 2	v :
4023-DFSK Internal Code: 4023	🔆 16.44 kWh	. 1.08 €	<u>□</u> + 8	© 1	v :
4024-DFSK Internal Code: 4024	🔆 29.73 kWh		<u>∏</u> + 6	S 2	v :
4025-DFSK Internal Code: 4025	💛 31.46 kWh		∰ 10	© 2	<b>v</b> :
4026-DFSK Internal Code: 4026	🔆 29.00 kWh	. 1.47 €	<u>⊜</u> + 9	© 2	V :
4027-DFSK Internal Code: 4027	🔆 45.06 kWh	. 3.69€	13	S 3	<b>v</b> :
4028-DFSK Internal Code: 4028	🔆 46.33 kWh	Image: 2.68 €	∰ 10	© 3	<b>v</b> :

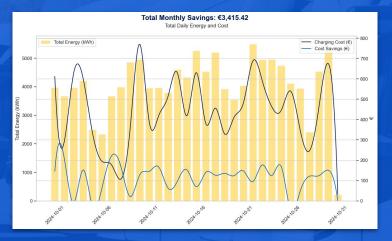
#### **REPORTING - VEHICLE TELEMATICS INTEGRATIONS**

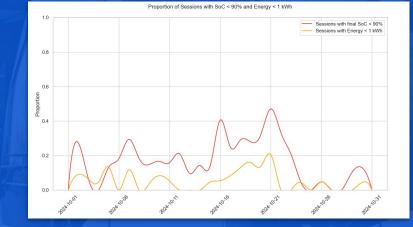
An example of integrating mileage via an telematics API integration to enable the bus operator to calculate energy efficiency performance

	=									Bia	a v	1
		47		41.267 kWh Energy ©			8497€ Total cost ©			3916	<b>kg</b>	
orecast		Charging sessions						<u>778</u>			(L	
		Charging Station \$	Socket \$	Connection Time \$	Disconnection Time \$	Energy (kWh) \$	Cost (€) \$	Mileage (km) <sup>①</sup> 🗘	User tag 🗘	Vehicle		
perations '	·	PE-Alcorcón-1	1	2025-01-21 10:20:29	2025-01-21 13:05:05	94.44	21.20	D	141FBA1689D8	914 ©		
it View		PE-Alcorcón-3	1	2025-01-21 01:44:18	2025-01-21 04:28:11	227.57	44.04	0	141FBA1689D8	914 🐵		
s & Vehicles		PE-Alcorcón-3	2	2025-01-21 01:43:30	2025-01-21 04:22:17	90.59	17.51	107492.00	141FBA13521D	854 @		
Management		PE-Alcorcón-6	1	2025-01-21 01:41:26	2025-01-21 05:19:08	309.64	59.12	134219.90	141FBA1302C5	842 ©		
vations		PE-Alcorcón-1	1	2025-01-21 01:38:33	2025-01-21 07:08:25	331.88	65.65	179488.70	141FBA135B58	852 @		
Onboarding	*	PE-Alcorcón-5	2	2025-01-21 00:17:22	2025-01-21 01:44:03	116.75	24.85	141756.40	141FBA1302D4	843 ©		
Imin		PE-Alcorcón-1	2	2025-01-20 23:59:23	2025-01-21 05:58:58	369.04	72.70	142086.60	141FBA135228	856 @		
		PE-Alcorcón-4	1	2025-01-20 23:57:28	2025-01-21 03:24:54	327.08	67.13	137723.00	141FBA10F2C4	848 @		
		PE-Alcorcón-7	1	2025-01-20 23:42:41	2025-01-21 04:12:30	318.28	63.07	144015.40	141FBA10F2C2	844 @		
		PE-Alcorcón-3	1	2025-01-20 23:39:38	2025-01-21 01:28:22	66.06	14.18	.0	141FBA1689D8	914 @		
									< 1 2 3	4 5 16 > 10/1	page V	
		Daily series Peak load Cost Energy									0	
		- Optimized - Unoptimized 2000 - 1500 - 1000 - 500 -										

#### **REPORTING - DOWNLOADABLE REPORTS**

Bia can provide automated monthly reports (below), or ASTSBC can download data in csv format directly from the dashboard





#### Q、 5 ♂ ♂ ♂ 100% ▼ | ٤ % ·♀ ·♀ 123 | Defaul... ▼ | − 10 + | Β Ι ↔ <u>Α</u> | ♣ ⊞ 원 ▼ ] ₹ ▼ ↓ ▼ | ┾ ▪ Α ▼ | ☞ ⊞ ∞ [ ⊞ ∞ ]

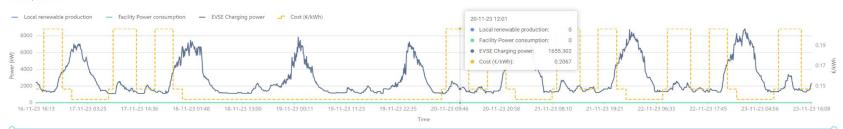
	8	✓ fx Charger-017															
		A	В		с	D	E	F	G	н	I.	J	K	L	М	N	
	1	id	facility_name	evs	e_name	socket	id_tag	connection_time	disconnection_time	duration_s	energy_kWh	cost_eur	co2_kg	vehicle	initial_soc_%	final_soc_%	
	2	679d24343b54084a3ad77c91	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-31T20:27:48+0	2025-01-31T21:02:08+01:	2060	43,99	11,03	4,81	6022	89	97	
	3	679cbb703b54084a3ad77a1c	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-31T13:00:47+0	2025-01-31T14:37:09+01:	5782	120,27	27,54	5,77	6022	70	97	
	4	679c09323b54084a3ad7704f	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-31T00:20:18+0	2025-01-31T00:21:22+01:	64	0,00	0,00	0,00	6022	100	100	
	5	679bcb6b3b54084a3ad76c79	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-30T19:56:43+0	2025-01-30T20:18:21+01:	1299	28,68	7,21	2,10	6022	92	97	
	6	679b6e3e3b54084a3ad76974	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-30T13:19:10+0	2025-01-30T14:46:25+01:	5235	98,14	22,12	4,25	6022	75	97	
	7	679b04c43b54084a3ad76629	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-30T05:49:08+0	2025-01-30T06:40:48+01:	3100	47,33	9,95	2,29	6022	88	97	
	8	679ac7f73b54084a3ad76011	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-30T01:29:42+0	2025-01-30T05:43:50+01:	15247	156,41	32,74	7,77	6022	48	88	
	9	67998c923b54084a3ad750ca	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-29T03:04:01+0	2025-01-29T05:12:29+01:	7708	137,95	28,83	6,68	6022	65	97	
	10	6798f90a3b54084a3ad74720	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-28T16:34:33+0	2025-01-28T17:36:41+01:	3728	88,02	17,56	1,19	6022	72	94	
	11	6797e05c3b54084a3ad7389b	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-27T20:36:59+0	2025-01-28T01:52:02+01:	18903	228,16	50,31	8,76	6022	41	97	
d	12	6796d7a73b54084a3ad72fc0	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-27T01:47:35+0	2025-01-27T01:48:39+01:	64	0,00	0,00	0,00	6022	100	100	
u	13	679564593b54084a3ad723af	Carris - Pontinha	Cha	rger-017	2	187064008	2025-01-25T23:23:20+0	2025-01-26T03:55:16+01:	16316	115,88	23,35	5,87	6022	71	97	
	14	6704951a549776148fd0f9e	Carrie - Pontinha	Cha	rger-017	2	187064008	2025-01-25T09-05:36+0	2025-01-25T09-06-41+01-	65	0.00	0.00	0.00	6022	100	100	

#### **REPORTING - METRICS & FORECAST**

The dashboard provides load profile metrics over a defined period of time, as they relate to multiple datasets (for example energy prices, facility power consumption, onsite solar production etc)

• Costs optimization

#### **Facility metrics**

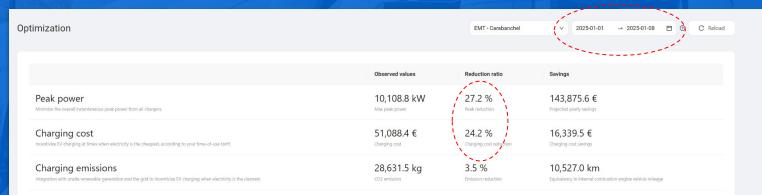


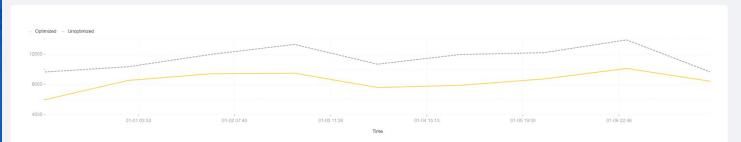
#### • On-site solar production & building consumption



#### **REPORTING - CHARGE OPTIMISATION RESULTS**

The dashboard shows charge optimisation results over a defined period of time, including charging cost, peak loads, emissions and optimised load profile (vs baseline)





#### **REPORTING - API**

Multiple Bia customers use Bia's API to integrate charging data with third party systems such as an ERP (see EMT Madrid slide 39) or a fleet management system

by the

config



Post Create or update a facility's opti configuration
Create or update a facility's opti configuration.
Minimum permission level required: Manage .
<ul> <li>If an opti configuration already exists for a given facility, it will be entirely replace contents of the payload.</li> </ul>
HTTP Request
POST https://beta.biapower.io/api/v1/facilities/ <facility-uri>/opti</facility-uri>
URI parameters
Parameter Description

facility-uri URI of the facility. Must comply with Bia URI format restrictions.

#### Request payload

	Parameter	Туре	Required	Description
	tou	Float	True	Specific weight assigned to time-of-use vertical in the optimization equation. It reduces the facility's overall peak demand of energy (in watts). <b>Must be greater than or equal to @</b> .
a.	peak	Float	True	Specific weight assigned to the peak shaving vertical in the optimization equation. It incentivises charging when the electricity tariff (time-of-use) is the cheapest or when local renewable generation is available. <b>Must be greater than or equal to 0</b> .

curl --request GET 'https://beta --header 'Authorization: rqFQr --header 'Content-Type: applic --data '{ "cou": 0.08, "peak": 0.01, "co2": 0.01, "battery": 0.01 ) ASTSBC can access Bia's API using these credentials:

https://docs.biapower.io/

Username: beta-doc Password: SyWpk87w4T

#### FACILITIES

#### Visualize all your facilities and chargers in one place

#### Facilities

Q Search.



Name \$	City 💠	Address 🗢	Total charging stations power 💲	Administrator \$	
BSM Estacio Nord	Barcelona	Ali Bei	65 kW	BSM	View
BSM Cardenal	Barcelona	Cardenal Sentmenat	65 KW	BSM	View
Test	Barcelona	No street	7.4 kW	BSM	View
Cimalsa	Reus	CIM El Camp	60 kW	Cimalsa	View
Agbar_ETAP	Sant Joan Despi	Ctra de Sant Boi s/n	30 KW :	Agbar	View
Agbar_Cornella	Cornella de Llobregat	Ctra de Sant Joan Despi	230 KW	Agbar	View

#### • General data & statistics per facility



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#### **ONBOARDING - CHARGERS**

## Using our Onboarding tool, charger groups can be created with a maximum power level defined for each group

sset onbodiulity - Fa	cility EMT-Carabanchel 🖉 🗖				EMT - Carabanchel	
TAILS CABINETS CHARGE	RS TARIFF OPTIMIZATION					
abinets						
Name	Power	Cabinet sensor	Sensor code	Parent		
> ACOMETIDA-PE	120000W	Inactive			2	0
> ACOMETIDA1	7000000W	Inactive			Z	0
> ACOMETIDA2	6750000W	Inactive			Z	0
> EMTCAR-C1	650000W	Inactive		EMTCAR-TR1	Z	0
> EMTCAR-C2	500000W	Inactive		EMTCAR-TR1	Z	0
> EMTCAR-C3	500000W	Inactive		EMTCAR-TR1	Z	0
V EMTCAR-C4	500000W	Inactive		EMTCAR-TR1	۷	0
Charger Name		Power (W)		Socket number		
EMTCAR048		100000		1		
EMTCAR050		100000		1		
EMTCAR046		100000		1		
EMTCAR049		100000		1		
EMTCAR047		100000		1		
EMTCAR045		100000		1		
> EMTCAR-C5	550000W	Inactive		EMTCAR-TR2	Z	0
> EMTCAR-C6	550000W	Inactive		EMTCAR-TR2	Z	0
> EMTCAR-C7	550000W	Inactive		EMTCAR-TR2	2	0
				EMTCAR-TR2		

Biapowerrid nc.

#### **ONBOARDING - VEHICLES**

Vehicle onboarding can be completed via the Bia dashboard. In Bia, fleets are linked to charging facilities to ensure seamless interoperability of bus among depots and whitelist management

ssets Onboarding - Veh	Create Vehicle			×		Carris - F	Pontinha
	Create New Vehicle						
hicles Q. Search	" Vehicle Model:	Vehicle Model	× +			+	
ame \$ Plate Number	* Name :	Enter name	' Battery Capacit	Enter battery capacity Wh	AC \$		
122	Plate number:	Enter plate number	Fleet Internal Code	Enter fleet internal code	0187064008	2	٥
123	Range:	Enter range	MAG	Enter mac	0187069D7A	2	٥
127				Please, enter MAC without colons (;). Should be 12 characters 0-9 and A-F	0187069CAB	2	0
128					0187063FCF	2	٥
33					0187069CB7	۷	0
34				Cancel Apply	0187066A0B	L	0
35	0030		400000		ud0187063FCC	٤	0
21	6021		400000		000187066A53	٤	0
24	6024		400000		000187066876	۷	٥
26	6026		400000		0001870668A6	2	•

ets & Vehicles Carris - Pont	inha		Carris - Pontinha	v 2024
Bt		121 Sessions ①	<b>P</b>	
4	8.59 MWh Total energy ©		1265.10 € <sub>Total cost</sub> ⊙	0
Q Search.		Sort	Filter	
Name	Total Energy	Total Cost	Sessions	Total Emissions
6021 Internal Code: 6021	🔆 0 kWh	⊡ 0.00 €		S 0
6022 Internal Code: 6022	🔆 1.53 MWh	220.92 €	<u></u> 16	S 126
6023 Internal Codec 6023	🔆 1.54 MWh	□ 217.58 €	<u>∭</u> + 19	§ 165
Toyota-Caetano	MAC address coo187069D7A	Battery cape	acity (kWh)	
6024 Internal Codie: 6024	🗇 1.38 MWh	⊡ 201.67 €	<u>∰</u> + 18	S 136
6025 Internal Code: 6025	🔆 1.06 MWh	⊡ 160.70 €	14	S 103
6026	1.12 MWh	176.65 €	17	S 146

#### **ERROR LOG PROVISION**

OCPP logs are available from the Bia platform for each managed charger. Messages like StartTransaction, StopTransaction, MeterValues, Authorize, StatusNotification and other internal logs can be audited to assess the behavior of the chargers and minimize its downtime.

Here is an example of an OCPP error log for the customer depot that can be queried:

> i	23:26:37.626	≢ ocpp16-054 2025-02-08 22:26:37,625 INFO [io.bia.evs.cor.ocp.req.han.AbstractOcppEventRequestHandler] (Thread-12047032) MeterValuesRequest, sessionIndex=4876a736-b261-4821-b9c1-54a0df5dd36d, facilityUri=bia:fac-
> (	23:26:09.702	≢ ocpp16-054 2025-02-08 22:26:09,701 INFO [io.bia.evs.cor.bal.ser.BalancerService] (executor-thread-27402) Balancer for facility bia:facility:133: availablePower=150000, transactions=2, input=[(evseUri=bia:evse:-
> (i)	23:26:07.542	≢ ocpp16-054 2025-02-08 22:26:07,542 INFO [io.bia.evs.cor.ocp.req.han.AbstractOcppEventRequestHandler] (Thread-12046078) MeterValuesRequest, sessionIndex=4876a736-b261-4821-b9c1-54a0df5dd36d, facilityUri=bia:fac-
> ()	23:25:39.439	😝 ocpp16-054 2025-02-08 22:25:39,438 INFO [io.bia.evs.cor.bal.ser.BalancerService] (executor-thread-27393) Balancer for facility bia:facility:133: availablePower=150000, transactions=2, input=[(evseUri=bia:evse:-
> ()	23:25:37.886	😝 ocpp16-054 2025-02-08 22:25:37,886 INFO [io.bia.evs.cor.mes.man.FacilityScheduleManager] (executor-thread-27396) Processing Schedule for facilityUri bia:facility:133: {"header": {"timestamp": "2025-02-08722:25-
> ()	23:25:37.885	😝 ocpp16-054 2025-02-08 22:25:37,885 INFO [io.bia.evs.clo.mes.con.MessageConsumer] (Thread-12045187) schedule received {"header": {"timestamp": "2025-02-08T22:25:37.879Z", "domain": null, "responseTopic": null}, -
> ()	23:25:37.697	≢ ocpp16-054 2025-02-08 22:25:37,696 INFO [io.bia.evs.cor.ocp.req.han.AbstractOcppEventRequestHandler] (Thread-12045183) StatusNotificationRequest, sessionIndex=4876a736-b261-4821-b9c1-54a0df5dd36d, facilityUri=_
× 1	23:25:37.401	<pre>copp16-054 2025-02-08 22:25:37,401 INF0 [io.bia.evs.cor.ocp.req.han.AbstractOcppEventRequestHandler] (Thread-12045176) StartTransactionRequest, sessionIndex=4876a736-b261-4821-b9c1-54a0df5dd3dd, facilityUri=bia:facility:133, evseUri=bia:evse:2011, request=StartTransactionRequest{connectorId=2, idTag=VID:000187069CDB, meterStart=0, reservationId=null, timestamp="2025-02-08T22:25:37.211Z", isValid=true), confirmation=StartTransactionConfirmation{idTagInfo=IdTagInfo{expiryDate="2025-02-09T03:25:37.401Z", parentIdTag=VID:000187069CDB, status=Accepted}, transactionId=21525180, isValid=true}, error=null, additionalData=null</pre>

### **CUSTOMIZABLE NOTIFICATIONS AND ALARMS**

Bia can customize the type of notifications operators want to receive and their trigger thresholds. Below a couple of examples we currently support:

- Massive outage at more than X% of the chargers
- Charger going offline (or in fault mode)
- Charger is back online
- Charging session at charger Y interrupted at SOC lower than X%
- Active charging session at charger Y reached SOC X%
- Vehicle Y at charger X won't be ready at its expected departure time (hh:mm)
- It's currently hh:mm, and the following vehicles are still at SOC lower than X%: A, B, C...

#### Notifications and Alarms can be sent via email and SMS

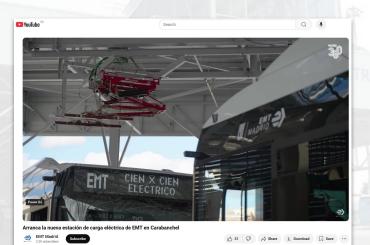
	tome +	Hola Bia El vehiculo conectado al cargador la ubicación ha terminado de cargar con un nivel de carga de 63%, que es más bajo que el umbral predeterminado.	€n I
Bia. All rights reserved. Legal notice     Legal notice		© Bia. All rights reserved. Legal notice	

## **Bia Smart Charging** *Bus Operator Case Studies*





### Click here to see a video of the EMT Madrid Carabanchel Depot



2.6K views 11 months ago

Bia Power



*Sector:* Public Transport Operator *Scope*: Monitoring and control of 235 chargers from the Carabanchel depot (scaling up to 413). *Integrations*:

- **Chargers**: four brands of OCPP-compliant chargers (both connector and pantograph).
- **ERP system**: charging data for each vehicle is automatically reported in their system.
- **Fleet management system**: vehicle departure times are retrieved by Bia to inform charge optimisation.
- **Onsite energy assets**: Bia also monitors energy loads via Modbus TCP to make sure charging load balancing is done safely, from an electrical infrastructure perspective, and efficiently from a fleet uptime perspective.
  - **Preconditioning**: via the bus OEMs cloud platform to ensure all vehicles are fully charged and preconditioned before the driver arrives. VDV 261 will be used for the chargers that implement it.
    - Preconditioning ensures the vehicle's cabin reaches a comfortable temperature before departure using grid energy instead of the battery, preserving autonomy. Bia will provide the scheduled departure time and ambient temperature (if available via OCPP) so the vehicle can autonomously plan and activate preconditioning. It will also factor in the extra energy needed based on external conditions, ensuring charging optimization does not interfere with this function.

#### Monthly stats:

•

- **Sessions**: 6000
- Energy: 850 MWh
- Energy cost (with Bia): 130 k€
- Power penalties (with Bia): 100 k€
- Average charger occupancy: 15% of the time

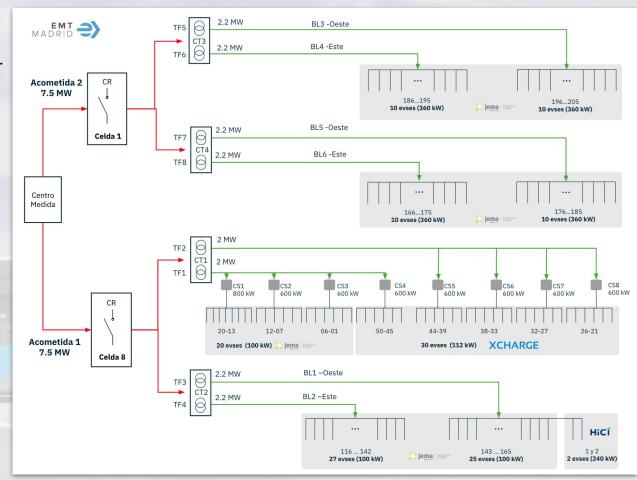
Energy cost (without Bia): 155 k€ Power penalties (without Bia): 220 k€

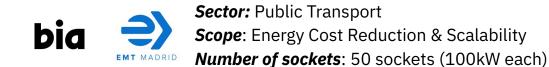
## Fleet uptime 100% maintained, with 0 electrical outages, and minimum power penalties



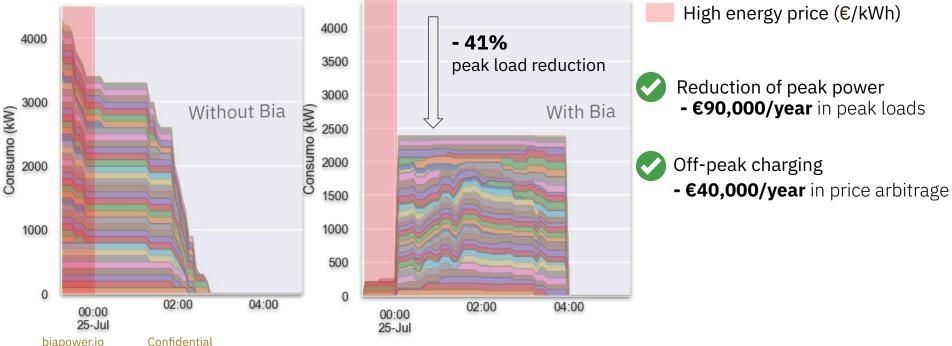
#### Bia's priority balancing applied at 5 different levels:

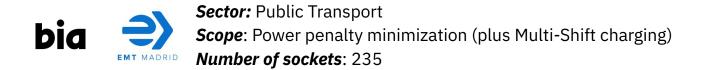
- Facility
- Feeder
- Transformer
- Cabinet
- Charger



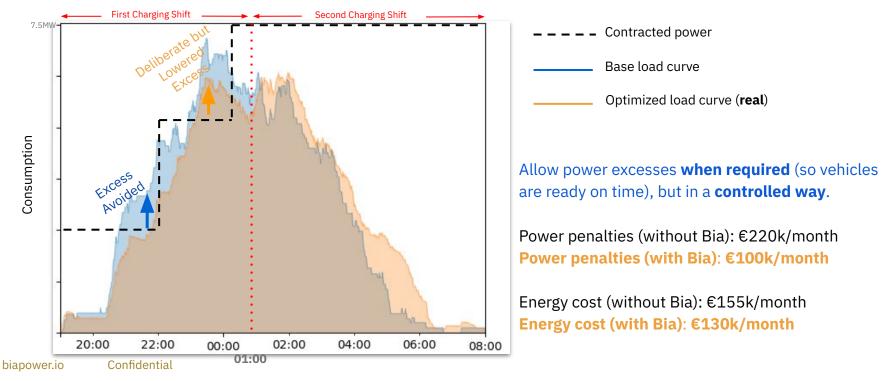


By postponing charging to a cheaper tariff and levelling the load curve, peak loads and energy costs are significantly reduced





Bia's optimization also considers power penalties - in some cases avoiding a power penalty while in others deciding to take a penalty to ensure vehicle uptime whilst factoring in multi-shift charging requirements





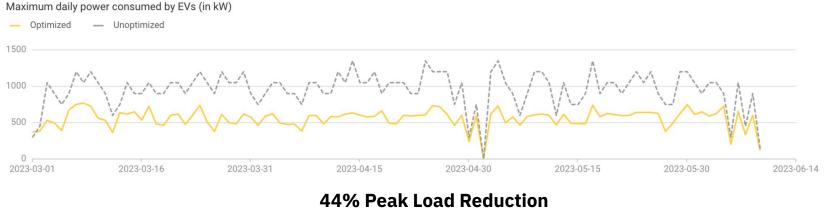
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## HOW WE OPTIMIZE - Reducing Peak Load



Sectors: Arriva - Public Transport Iberdrola - Utility Scope: Peak Load Reduction Number of sockets: 16

Over the course of 3 months, peak loads are significantly reduced resulting in lower costs but also enabling installation of new chargers without impacting electrical infrastructure



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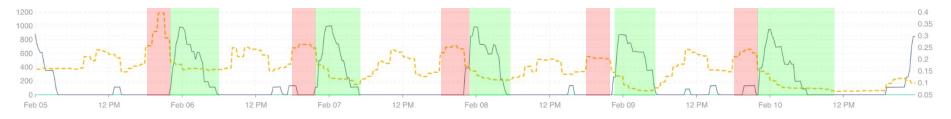
Confidential

€1350/month Energy Bill Reduction

bia



**Sectors**: Arriva - Public Transport / Iberdrola - Utility **Optimization Strategy**: Electricity Costs & Peak Load Reduction **Number of sockets**: 16



EV load



Electricity Tariff

Peak Hours

**Off-Peak Hours** 

25% variable electricity cost savings: €3000/month 24% slower charge (reduces battery degradation)

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# **Heavy Duty Vehicle Operator**

# **bid** USE CASES - Heavy Duty eTruck

## **Assets and integrations**:

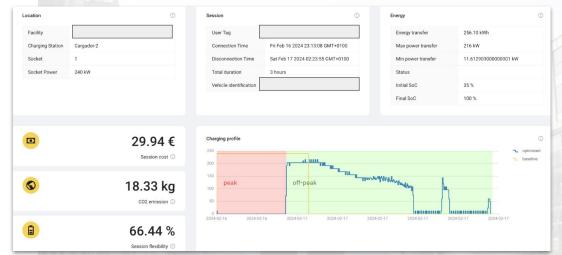
- Heavy-duty trucks (600 kWh capacity)
- 8 double 240kW chargers (16 sockets)
- Large logistics center with big cooling needs
- •**;** Solar PV installation (1 MWp)
- Fleet management system (for departure times)

### **Custom Smart Charging Strategy:**

- ✓ 100% vehicle readiness
- Charge during cheapest energy price
- Reduce peak loads to avoid power penalties
- ✓ Integrate 1MW of solar energy production whenever possible

#### **Daily Stats:**

- $\Box$  20 charging sessions  $\Box$   $\in$  300 of variable energy costs
- $\Box$  3MWh of energy
- ☐ 130kg of CO2 from grid electricity

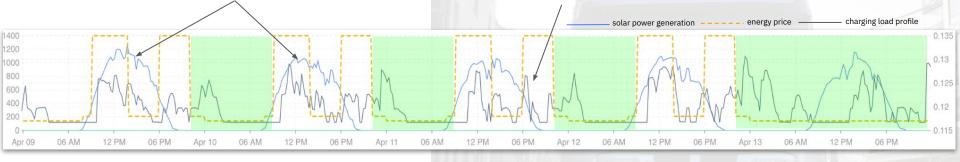


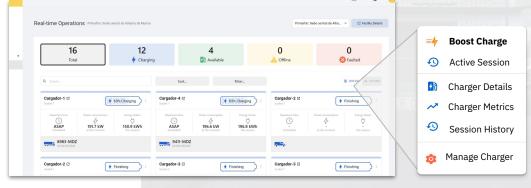
In the above graphic, you can see how charging is **postponed** until off-peak energy hours, **balanced** with the depot electrical infrastructure (to avoid exceeding power limits) and finished in time for **departure**. The variable departure time and target SoC were integrated from the fleet management system **via API**.

In the next slide you will see how the charge load profile changes to integrate onsite **solar energy production.** 

# **bia** USE CASES - Heavy Duty eTruck

Bia's optimization engine **synchronizes EV charging with on-site solar power generation**, maximizing self-consumption of clean energy and minimizing grid dependence. This translates to significant cost savings and a reduced carbon footprint for the fleet, **ultimately lowering the TCO**. To **ensure fleet readiness**, EV charging will be prioritized even during periods of low solar generation. In such cases, the system will seamlessly switch to grid power, minimizing disruption and ensuring your vehicles are charged and operational, even if grid electricity costs are higher.





Bia's real-time monitoring dashboard includes in-depth charger and vehicle monitoring, alarms and notifications and the ability to remotely boost charging sessions and manage the charger

# **Bia Smart Charging** Hardware Agnostic - EVSEs

**Bia is hardware agnostic**, with extensive experience working with the following charger brands, plus many more...

	<b>XCHARGE</b>	POWER ELECTRONICS	
<b>EKO SMART ENERGY SYSTEMS</b>	Circutor	ABB	Schneider Gelectric
EV BOX	Ingeteam	<b>La legrand</b> ®	LUDBINSEN
heliox	BLILIOUS	44 SIEMENS	1- Hellonext

## Additional Capabilities that may be of interest to ASTSBC (additional costs may apply)

#### **Carbon Market**

Bia can play a key role in the carbon markets with its smart charging system, which integrates real-time network emissions factors as well as on-site renewable energy production to precisely calculate the carbon footprint of the managed depots. Some of these depots are already optimizing their operations based on their carbon footprint thanks to Bia. participating in the carbon Bv markets. Bia could validate the source of emission reductions, track and certify CO2 savings, and enable the businesses operating these depots to obtain carbon credits. These credits could be used to offset their own emissions or traded on carbon markets, generating revenue while contributing to the fight against climate change. Bia could also play a role in monitoring on-site renewable energy production assets, ensuring these installations fully contribute to decarbonization efforts.

#### **Flexibility Services**

As a major energy consumer, a school bus operator like ASTSBC can participate in flexibility markets, which allow the valorization of charging flexibility with the electrical grid operator, whether through a supplier or an aggregator. This participation not only helps optimize electricity costs but also supports the overall balance of the grid.

Bia, as a provider of smart charging solutions capable of detecting, anticipating, and exploiting this flexibility, offers its clients the opportunity to participate in these mechanisms, such as the demand response market. In this context, Bia will encourage fleet charging when the grid has an energy surplus and may delay charging when the demand is too high. This flexibility helps reduce energy costs and, in some cases, eliminates them.

Moreover, flexibility mechanisms, such as demand response, help meet the growing capacity and energy needs of the grid while offering financial benefits to participants, such as compensation for demand reductions or adjustments requested by RTE or an aggregator.



## Additional Capabilities that may be of interest to ASTSBC (additional costs may apply)

#### **Battery State of Health Estimation**

Based on telemetry variables, both historical and real-time data collected during charging, a machine learning engine will be trained to improve the state of health (SoH) and lifespan of the battery.

Some of the most relevant variables for this optimization include:

- The ΔkWh/ΔSoC ratio for each charging interval (or charging session).
- The  $\Delta Ah/\Delta SoC$  ratio for each charging interval (or charging session).
- The battery voltage at different charge levels.
- The ΔVoltage/ΔkWh ratio for each charging interval (or charging session).
- The ΔVoltage/ΔAh ratio for each charging interval (or charging session).

Moreover, our dashboard will allow identifying vehicles that can complete their service with a charge level capped at 80%, thereby extending the lifespan of the batteries (charges between 20% and 80% are ideal to ensure the long-term functionality of the batteries).

#### **Predictive Maintenance for Chargers**

Based on all telemetry data from the chargers managed by Bia since its inception, a machine learning model is trained to identify anomalies and inconsistencies in the telemetry reported by the equipment. This allows us to anticipate potential failures.

This will help reduce downtime for the charging infrastructure and anticipate any issues or inconsistencies reported by the chargers (e.g., rejection of OCPP commands, telemetry unit discrepancies, etc.).



#### V2X

We have already developed our own bidirectional charging algorithms, currently used in the Spanish market via the OCPP protocol, and which will be compatible with OCPP 2.0.1 in the next two years. With this technology, vehicles will serve as energy storage units, allowing the use of energy stored in the bus batteries when energy costs are high, to power other parts of the facility (V2B - Vehicle-to-Building) or even the grid (V2G - Vehicle-to-Grid). The vehicles will then be recharged when energy costs are lower, optimizing energy expenses.

In addition to significantly reducing electricity costs, V2X offers the possibility of making them negative in certain scenarios. Furthermore, V2B (or V2G) can also be used as a safety mechanism to discharge the bus batteries in the depot according to the manufacturer's recommendations, ensuring optimal management and extending their lifespan.

# **Support and Maintenance**

UNLIMITED SERVICE	Definition	and the second second
Troubleshooting Bia Related Issues	Addressing and resolving problems specifically related to the Bia platform in accordance with the Bia SLA. This includes diagnosing issues, providing solutions, and ensuring the system functions smoothly.	Unlimited Hours (if Bia Related Issue)
LIMITED SERVICES	Definition	
Non-Bia Technical: Fossil Transactions	Troubleshooting and addressing 'Fossil Transactions'. Examples: duplicate, simultanious, telemetry reported after charging session is closed, burst of multiple OCPP messages, unrequested priority charge, charge delay or other related data	Limited Hours (see pricing)
Non-Bia Technical: Telemetry	Troubleshooting and addressing non-Bia related 'Telemetry' issues. For example: *Charger-Bia communication failure (degraded mode should be configured) *Charger does not establish OCPP connection correctly and appears Offline in Bia *Charger doesn't send Available StatusNotification and is shown Offline in Bia *No telemetry data sent by charger (StartTransaction, StopTransaction, or MeterValues) *Anomaly in telemetry data (typically in the MeterValues message) *Degraded Mode configuration (AllowOfflineTransactions and DefaultTxProfile)	Limited Hours (see pricing)
Non-Bia Technical: Hardware	Troubleshooting problems related to the hardware equipment (display, emergency button, power modules, firmware)	Limited Hours (see pricing)
Non-Bia Analysis	Troubleshooting and analysis that results in non-Bia issue	Limited Hours (see pricing)
System Integrations Maintenance	Includes maintenance and troubleshooting to 3rd party system integrations for example FMS, ERP, PV, energy sensors etc. Any new integration or additional features of existing integrations will be priced on a case-by-case basis	Limited Hours (see pricing)

LIMITED SERVICES	Definition	
Customer Calls	Customer Calls outside of SLA definitions and protocols	Limited Hours (see pricing)
Update Optimisation parameters	This involves 'post deployment' adjusting power limitations at facility, charger and sockets level. Modifying vehicles departure rules, energy tariff, custom balancer settings, or optimization criteria (cost, CO2, battery health).	Limited Hours (see pricing)
Customer Training	Including initial training for new users and ongoing training for updates or new features.	Limited Hours (see pricing)
Customer Meetings	Scheduled and unscheduled Customer meetings (Partners and Facility Managers) to discuss progress, troubleshoot, gather feedback, and plan future actions.	Limited Hours (see pricing)
3rd Party Meetings	Scheduled and unscheduled meetings that include third parties (utilities, OEMs, vendors, consultants) for technical advisory, technical troubleshooting, testing and planning.	Limited Hours (see pricing)
Custom Analytics	Providing custom analysis and reports on charging metrics.	Extra Charge
Simulations	Running simulations for reconfiguring optimisation parameters, for new sites, new energy tariffs, scale up and scale down of operations.	Extra Charge
New System Integrations	New system integrations or updating functionality and data sets to existing integrations that Bia has integrated at onboarding, for example: Adding new chargers, offboarding chargers, FMS, ERP, energy sensors, onsite solar, onsite battery, additional meters etc	Extra Charge
Out of Scope work	Any research, development and product work that has not been agreed in the initial scope of work.	Extra Charge

# bia

## Thank you

## **Steve Johnson**

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