Electric Vehicle charging in London - Source London data

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The Source London Network

Source London is a London-wide electric vehicle charging network which was launched in 2011. The network was originally operated by Transport for London however as of September 2014 the network is operated by Bolloré Group.

Definitions:

- **Charging unit** = the physical charging post which is placed at a location. It is assigned an ID code and can have either 1 or 2 sockets.
- **Charging socket** = the actual point you plug into to charge your electric vehicle.

Summary:

In June 2013 there were 892 charging units across London with a total of 1,386 sockets between them.

In June 2014 there were 905 charging units with a total of 1,410 sockets.

Starting at the end of 2014 a further 4,500 sockets are due to be installed over the subsequent three years. Currently, the Source London network has an annual membership fee of £5 for new members with a free extension for existing members until 31/12/2014. The regular price of subscription is £10.

Customers are able to reserve a charging socket by using the Source London website (www.sourcelondon.net) in addition to being able to use a mobile application from 2015. Users then go to their charging unit, plug-in and charge with access granted by a Source London membership card. It is not compulsory to reserve a charging socket before use however Source London are eager for users to do so.

The Source London website maps the network of charging points. Although we did not request data for serviceable and unserviceable units, a look at the website suggests around a third of the units are currently out of use because they are either 'unavailable' or undergoing maintenance.

Source London charging network pattern:

Table 1:

	June 2013	June 2014	% change
Total number of charging sockets	1,386	1,410	+1.7%
Total number of charging units	892	905	+1.5%
Percentage of charging units with two sockets	71%	72%	+1.4%
Total number of charging sessions	2243	4678	+109%
- Percentage of which were at charging units with 2 sockets	66%	81%	+23%
Number of Electric vehicles in the UK*	6,226	11,373	+83%
Average number of charging sessions at every used charging unit that month.	10	14	+40%
Average number of charging sessions across all charge units.	3	5	+67%
Longest charging session and location (hh:mm:ss)	632:53:30 (Magdalen Street)	691:53:48 (NCP Great Eastern Street)	+9%
Mean charge duration (hh:mm:ss)	24:34:17	05:35:22	-72%
Median charge duration (hh:mm:ss)	03:01:19	02:45:56	-8%
Total electricity used (kWh)	10,716.71	29,632.81	+177%
- Percentage of which were at charging units with 2 sockets	75%	84%	+12%
Price of electricity at the average commercial rate for London (15p per kWh**)	£1,607.51	£4,444.92	+177%
Mean average electricity used per charging session (kWh)	4.78	6.33	+32%
The number of miles a 2014 Nissan Leaf*** would be capable of from the average electricity used in a session.	20 miles	26 miles	+32%
Total number of miles a 2014 Nissan Leaf would be capable of from all electricity used that month	44,653 miles	123,470 miles	+177%

*The number of Plug-in-Grant Eligible Cars in the UK at the end of Q2 for 2013 and 2014 respectively.
**Average annual domestic electricity bills for selected towns and cities in the UK and average unit costs (DECC: Annual domestic energy bills, Quarterly Energy Prices 2.2.3)
***A 2014 Nissan Leaf has an energy consumption of 0.24 kWh/mile and a maximum range of 124 miles from a full charge (NEDC).

Licensed Plug-in electric grant vehicles:

At the end of Q2 2013 there were 6,226 licensed vehicles which were eligible to receive the plug-in car and van grant in the UK. This has increased to 11,373 licensed vehicles by the end of Q2 2014. Of these 1,243 vehicles are registered in London and 3,031 are registered in the South East and East of England. Examples of vehicles eligible for the plug-in car grant include the BMW i3, Nissan Leaf and the Mitsubishi Outlander PHEV.

Table 2: Network usage

	June 2013	June 2014
Number of charging sessions	2,243	4,678
Number of units used (percentage of units used)	216 (24.3%)	324 (35.8%)
Percentage of charging units used daily in the network	0%	0.6%
Percentage of off-street* charging units in the Source London network	48.0%	49.5%
Percentage of off-street charging sessions**	25.6%	32.6%
Percentage of electricity used in off-street locations for all use charge sockets.	27.0%	37.1%

*This includes NCP, supermarket car parks and all other car parks excluding parkatmyhouse.

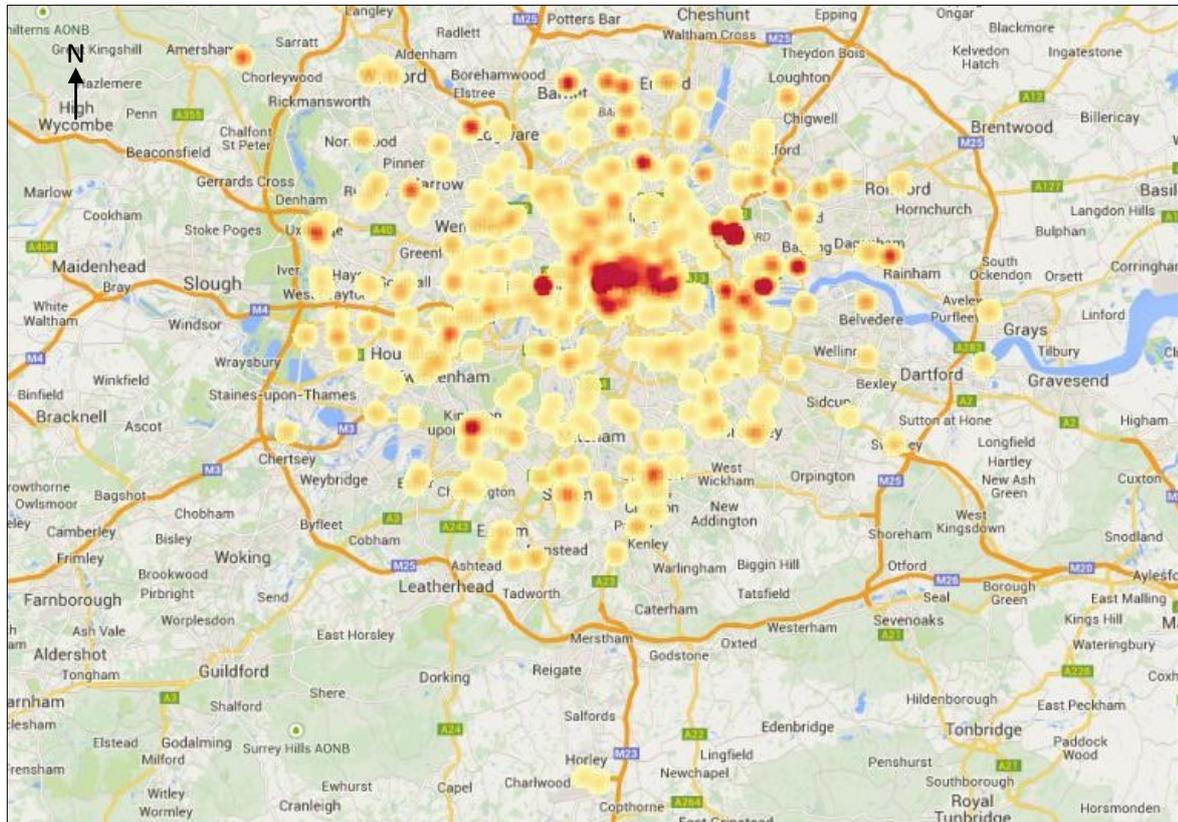** It is not possible to know if a charging unit was offline during June 2013 or June 2014.

Figure 1: Heat map of all charging units - June 2013
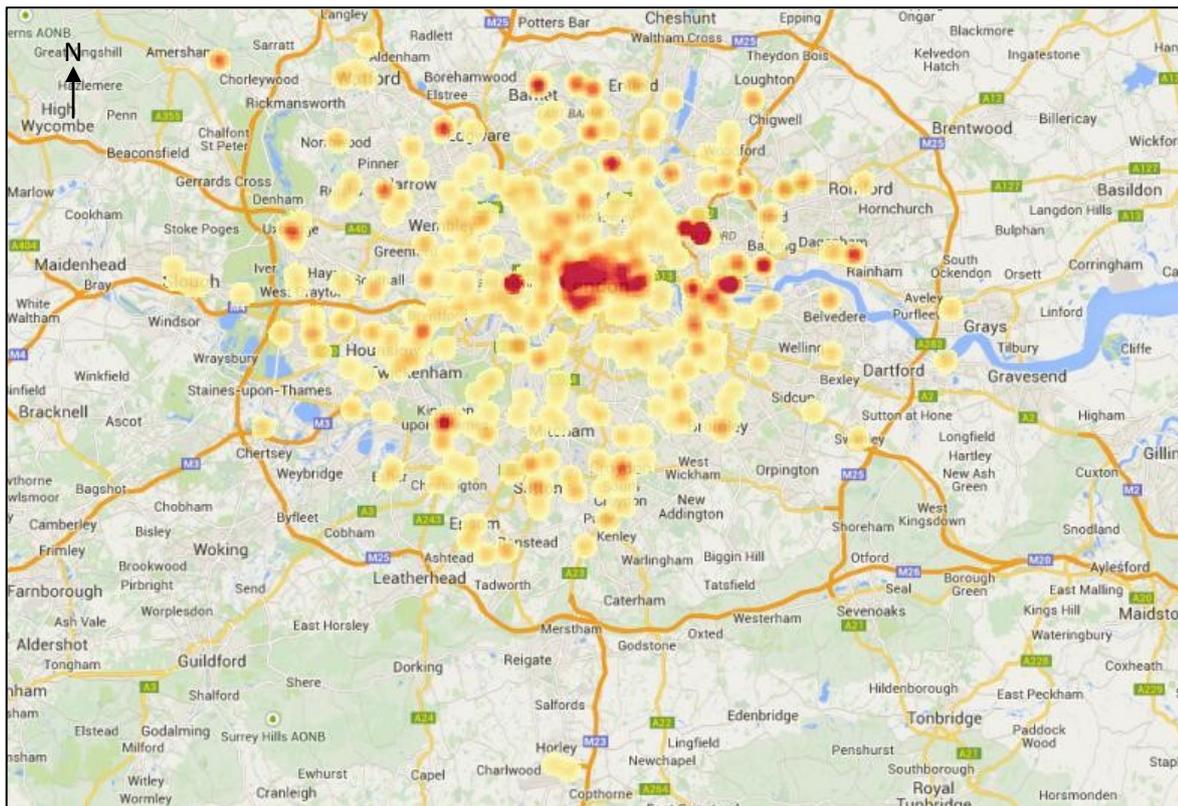

Figure 2: Heat map of all charging units - June 2014

Figure 3: Number of charging sessions by start time for June 2013 and June 2013, Source London

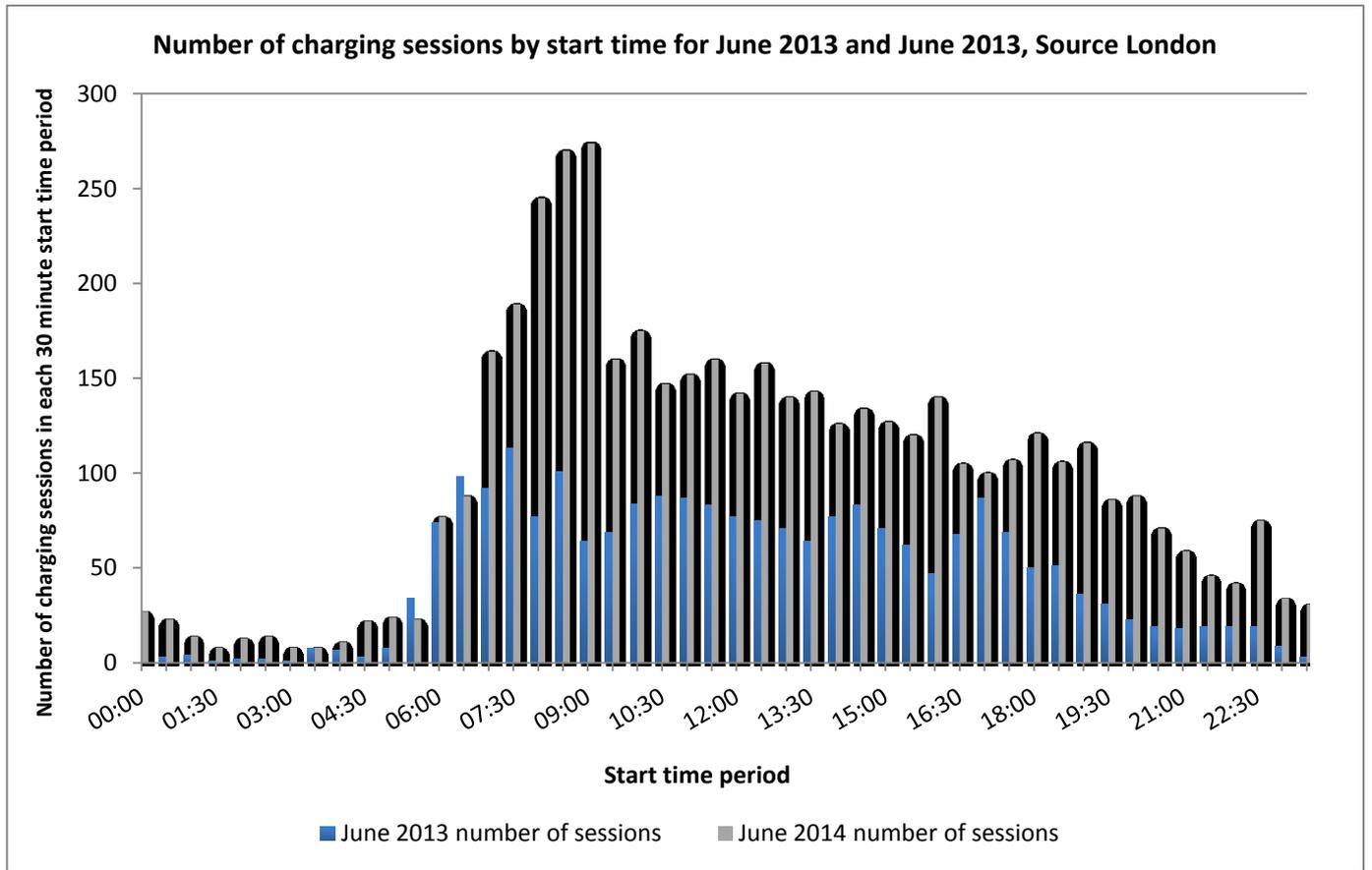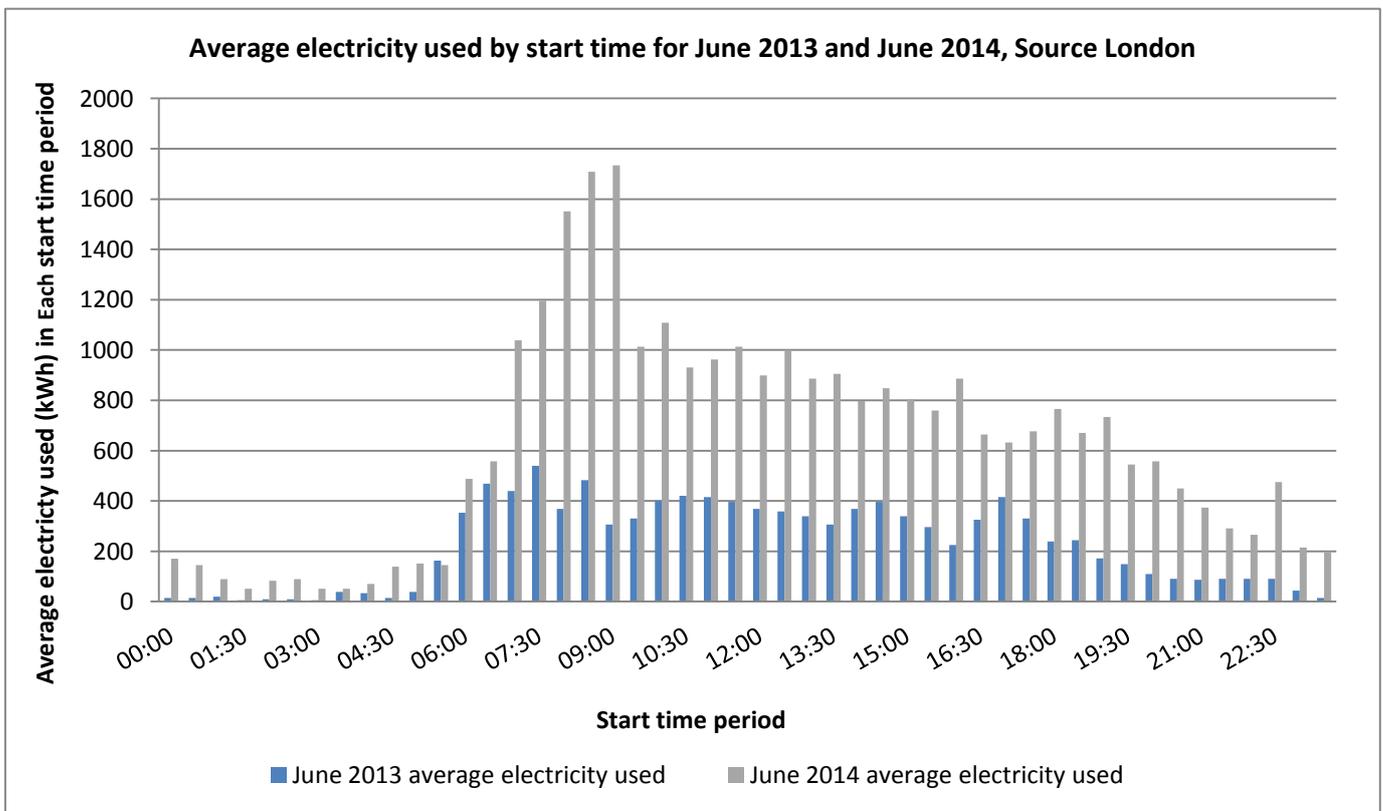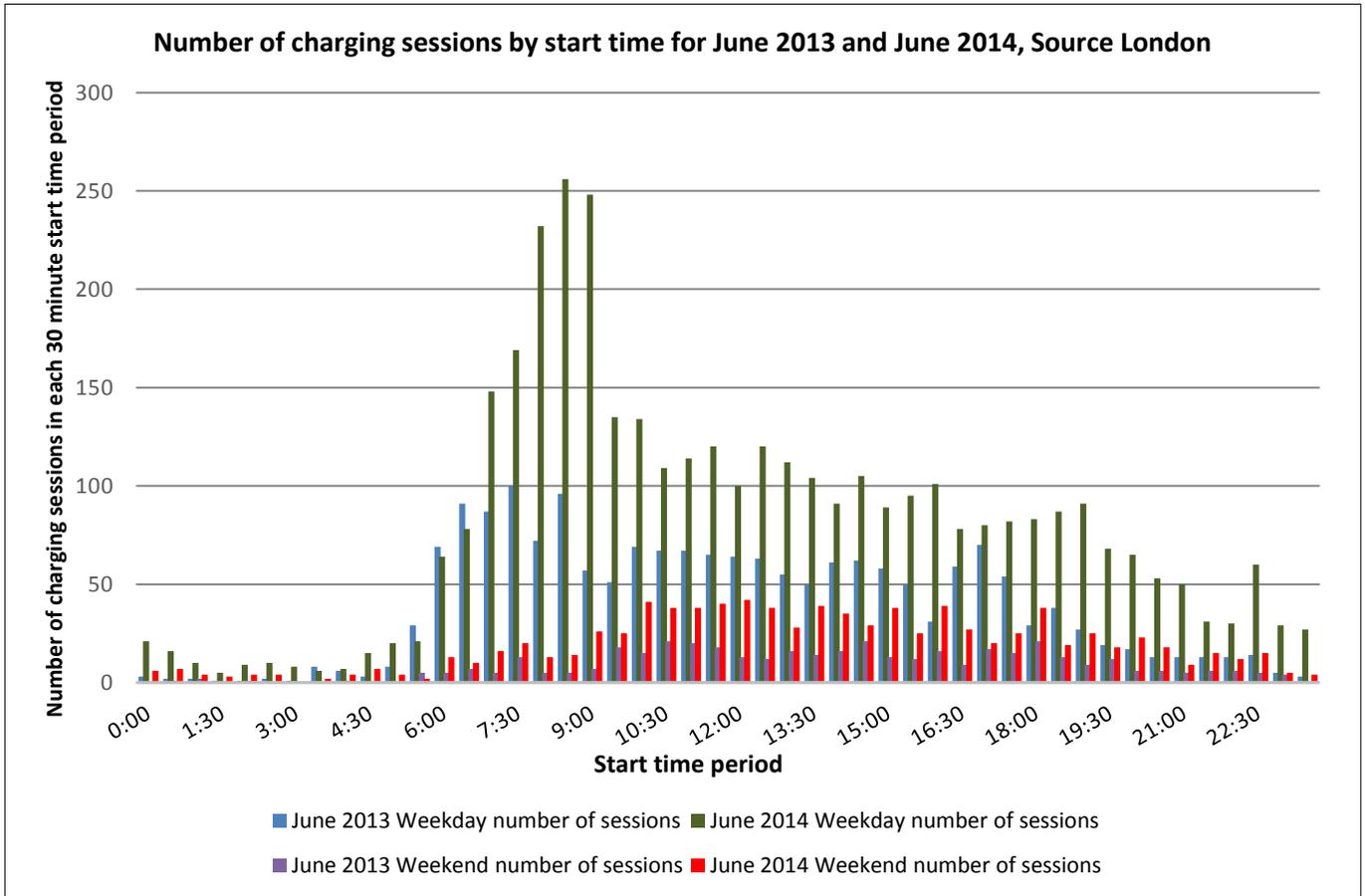Figure 4: Average electricity used by start time for June 2013 and June 2014, Source London

Figure 5: Number of charging sessions by start time for June 2013 and June 2013, Source London
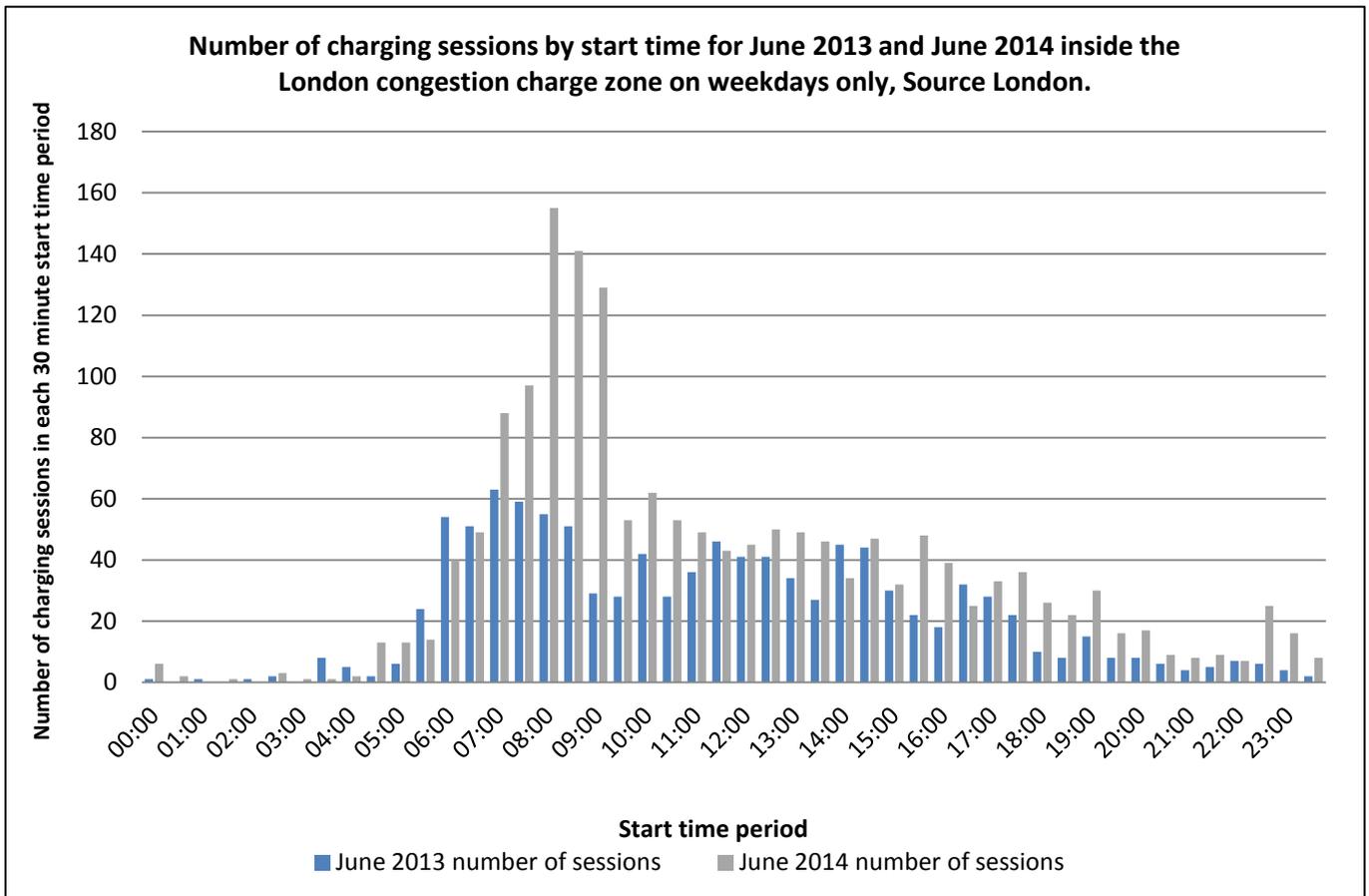

Figure 6: Number of charging session by start time for June 2013 and June 2014 for inside the London congestion charge zone on weekdays only, Source London.

In the charts above the number of charging sessions in a half an hour period is shown. These charts take the start time of each charging session during that month and plots the number of charging sessions in the 30 minutes period after that start time. For example, a charging session which began at 09:13 would be plotted in the time period between 09:00 and 09:30. In the graph above this is represented by the start time period of 09:00.

The number of sessions follow a similar pattern to the use of transport in London, there is large peak in the morning rush hour period followed by a decline in use, in this case a fall in users plugging-in their plug-in vehicle throughout the day. Then there is a further, less pronounced, peak in the evening rush hour (after 16:30) with low volumes of charging sessions starting during the late night and very early morning hours.

Figures 3-6 seem to indicate that there has been a stronger trend for users to start their charging session in the morning in June 2014 than in June 2013. The proportion of charging sessions which began between 06:00 and 09:30 increased from 27% to 31% of all charging sessions between June 2013 and June 2014. Figure 5 shows the contrast between the use of charging units between weekdays and the weekend. There is a very strong trend for charging sessions to begin between 06:00 and 09:30 for weekdays with approximately 34% of all charging session on weekdays beginning within this time period. Conversely, weekend charging units are used far more throughout the day time with approximately 65% of all charging sessions beginning between 10:00 and 18:30. Furthermore, Figure 6 shows a sharp increase for charging session to begin between 07:00 and 10:00 within the London congestion charge zone for weekdays with the proportion of all charging sessions rising from 28% to 39%. However, for the remaining time periods, the pattern of use is very similar between June 2013 and June 2014 with the number of charging sessions slowly decreasing throughout the day.

Top ten tables:

Table 3: Top ten charging units by number of charging sessions:

	June 2013				June 2014		
Charge Unit name	Postcode	Number of Sessions	Total electricity used (kWh)	Charge Unit name	Postcode	Number of Sessions	Total electricity used (kWh)
Crouch Hall Road Car Park	N8 8HJ	79	268.9	Victoria Station	SW1W 9SJ	302	748.5
Hinde Street	W1U 3BJ	64	353.6	Hinde Street	W1U 3BJ	114	676.6
Hinde Street	W1U 3BJ	59	233.4	Hinde Street	W1U 3BJ	113	768.8
Store Street	WC1E 7PL	52	148.6	Eaton Square	SW1W 9BQ	110	529.8
Rosslyn Hill	NW3 1PH	51	110.6	Crouch Hall Road Car Park	N8 8HJ	68	378.4
Charlotte Street	W1J 6EG	47	132.8	Church Row	NW3 6UR	67	184.1
Warren Street	W1T 5NG	47	172.3	King John Court	EC2A 3HB	67	632.4
Berkeley Square	W1T 2NH	47	232.0	Exeter Street	WC2E 7DU	66	258.2
Berkeley Square	W1J 6EF	45	213.2	Berkeley Square	W1J 6EG	63	440.8
South End Road	NW3 2RL	43	160.4	Albemarle Street	W1S 4BS	62	376.9

Caution must be taken when looking at longest time period. The data for average charging time and longest charging time is potentially misleading. The way that the charging units are designed means that a charging session is not ended until the charging socket has been fully closed. Source London users sometimes fail to close the socket properly which would lead to the charging duration to continue to register until a new users or the maintainer of the charging socket closes it properly. It may well be the case that the user was plugged in for an extremely long period of time. For example, in August 2013 a user was plugged in for 94 hours at Heathrow Terminal 1. Upon closer inspection it can be seen that this user had most likely gone on Holiday over the August bank holiday weekend and left their vehicle charging for 4 days. However, this may also be a failure to close the socket properly.

Table 4: Top ten locations by longest charging session:

June 2013			June 2014		
Charge unit name	Postcode	Longest charge session (hhh:mm:ss)	Charge unit name	Postcode	Longest charge session (hhh:mm:ss)
Magdalen Street	EC2A 3ER	632:53:30	NCP Great Eastern Street	EC2A 3ER	691:53:48
Union Street	WC2H 7PR	632:10:56	Q-Park Chinatown	WC2H 7PR	401:34:57
Q-Park - Trafalgar Car Park	W1G 0PN	546:12:27	Q-Park - Oxford Street	W1G 0PN	295:45:39
Q-Park - Harley Street Car Park	TW6 1RU	538:58:57	Heathrow Airport Terminal 1	TW6 1RU	231:33:00
Q-Park - Harley Street Car Park	W1K 7TY	535:37:44	Q-Park - Park Lane / Marble Arch	W1K 7TY	181:28:31
NCP Aldersgate Street - Level 1	W8 5EH	527:29:10	NCP Young Street	W8 5EH	177:49:05
Q-Park - Harley Street Car Park	NW6 4SS	513:58:26	West End Lane	NW6 4SS	177:43:27
Q-Park - Harley Street Car Park	SW1A 2TS	512:25:11	Q-Park - Trafalgar Car Park	SW1A 2TS	154:37:06
Q-Park - Harley Street Car Park	W1G 0PN	509:29:18	Q-Park - Oxford Street	W1G 0PN	120:06:03
Southampton Street	W9 1JB	505:09:49	Biddulph Road	W9 1JB	118:12:37

In June 2013 there are 74 instances of charging sessions being longer than 200 hours (8 days, 7 hours) compared to only 5 instances of charging sessions being longer than 200 hours in June 2014. It could be the case that a vehicle was left charging for over 26 days in Magdalen Street (London Bridge) and for near 29 days in NCP Great Eastern Street (Shoreditch) but it is impossible to know for certain. However, it can be said for certain that there were no other charging sessions using these particular charging units over this period of time. The fall in the number of charging sessions over 200 hours could also be due to a better understanding of the need to properly close the charging socket after it is used.

Table 5: Top ten charging units by electricity used:

June 2013				June 2014			
Charge unit name	Postcode	Number of charging session	Electricity used (kWh)	Charge unit name	Postcode	Number of charging session	Electricity used (kWh)
Hinde Street	W1U 3BJ	64	353.6	Hinde Street	W1U 3BJ	113	768.8
Harrow Civic Centre Car Park	HA1 2XY	22	293.2	Victoria Station	SW1W 9SJ	302	748.5
Crouch Hall Road Car Park	N8 8HJ	79	268.9	Hinde Street	W1U 3BJ	114	676.6
Hinde Street	W1U 3BJ	59	233.4	King John Court	EC2A 3HB	67	632.4
Berkeley Square	W1J 6EG	47	232.0	Q-Park - Soho Car Park	W1F 7NQ	39	541.4
Albemarle Street	W1S 4BS	32	224.4	Eaton Square	SW1W 9BQ	110	529.8
Berkeley Square	W1J 6EF	45	213.2	Canary Wharf	E14 5EW	25	476.1
Clifton Villas	W9 2PH	24	196.7	Berkeley Square	W1J 6EF	60	463.2
Clifton Villas	W9 2PH	20	192.7	Asda Park Royal	NW107LW	33	445.4
Horselydown Lane	SE1 2UP	36	187.9	Berkeley Square	W1J 6EG	63	440.8

Table 6: Top ten London LA by number of charging sessions

JUNE 2013- TOP TEN LA BY NUMBER OF CHARGING SESSIONS

London Local Authority	Number of charging sessions	Number of sockets	Number of sockets per square mile	Electricity used (kWh)	Average electricity used per session (kWh)	The number of miles a 2014 Nissan Leaf would be capable of from the average electricity used in a session.*	Longest charging Session (hh:mm:ss)	Average charging session (hh:mm:ss)
City of Westminster	1,008	246	30	5,482.45	5.44	22.7	546:12:27	36:15:25
Camden	481	64	8	1,597.78	3.32	13.8	246:51:12	4:56:17
Haringey	99	24	2	310.90	3.14	13.1	16:47:02	1:42:17
Southwark	84	48	4	487.81	5.81	24.2	632:53:30	37:16:03
Hackney	56	51	7	341.71	6.10	25.4	21:36:25	5:05:31
Kingston upon Thames	52	45	3	218.08	4.19	17.5	632:10:56	65:38:21
Hammersmith and Fulham	44	34	5	297.30	6.76	28.2	177:57:37	17:43:25
Hounslow	35	41	2	165.95	4.74	19.8	12:38:26	2:53:44
Lambeth	35	6	1	154.37	4.41	18.4	8:31:07	2:43:29
Greenwich	27	31	2	95.04	3.52	14.7	13:35:56	2:11:27

JUNE 2014- TOP TEN LA BY NUMBER OF CHARGING SESSIONS

London Local Authority	Number of charging sessions	Number of sockets	Number of sockets per square mile	Electricity used (kWh)	Average electricity used per session (kWh)	The number of miles a 2014 Nissan Leaf would be capable of from the average electricity used in a session.*	Longest charging Session (hh:mm:ss)	Average charging session (hh:mm:ss)
City of Westminster	2,485	254	31	15,700.80	6.32 (+16%)	26.3	401:34:57	6:36:40
Camden	474	64	8	1,920.53	4.05 (+22%)	16.9	177:43:27	3:07:20
Hackney	174	53	5	1,500.61	8.62 (+41%)	35.9	691:53:48	11:54:24
Southwark	122	48	4	750.06	6.15 (+6%)	25.6	45:20:15	3:29:42
Kingston upon Thames	120	45	6	726.97	6.06 (+45%)	25.2	13:49:49	2:24:11
Hammersmith and Fulham	107	34	2	846.18	7.91 (+17%)	33.0	23:24:22	3:59:44
Tower Hamlets	99	23	4	1295.08	13.08 (+25%)	54.5	19:43:41	7:57:19
Kensington and Chelsea	79	14	1	488.86	6.19 (+48%)	25.8	177:49:05	7:37:11
Croydon	75	42	4	466.60	6.22 (+7%)	25.9	5:29:47	0:58:18
Hounslow	75	35	2	396.33	5.28 (11%)	22.0	10:48:15	2:01:24

*A 2014 Nissan Leaf has an energy consumption of 0.24 kWh/mile and a maximum range of 124 miles from a full charge (NEDC).

Charging by Inner and Outer London region

Table 7: Charging statistics of Inner and Outer London regions

	June 2013		June 2014	
	Inner London	The rest of the network	Inner London	The rest of the network
Total number of charging sockets	637	749	649	761
Total number of charging sessions	1,848	395	3,764	914
- Percentage of total sessions	82%	18%	80%	20%
Total Amount of Electricity used (kWh)	8,978.24	1,738.47	23,478.64	6,154.17
Average electricity used per session (kWh)	4.86	4.40	6.24	6.73
The number of miles a 2014 Nissan Leaf would be capable of from the average electricity used in a session.	20.2	18.3	26.0	28.0
Longest Charging session (hh:mm:ss)	632:53:30	632:10:56	691:53:48	231:33:00
Average charging session (hh:mm:ss)	26:03:48	17:34:28	6:07:46	3:21:53

Charging in the London Congestion Charge

Table 8: Charging statistics of the London congestion charge zone (CCZ) and the regions outside the CCZ

	June 2013		June 2014	
	Inside the CCZ	Outside the CCZ	Inside the CCZ	Outside the CCZ
Total number of charging sockets	234	1,152	240	1,170
Total number of charging sessions	1217	1026	1954	2724
- Percentage of total sessions	54%	46%	42%	58%
Total Amount of Electricity used (kWh)	5,834.17	4,882.54	12,888.15	16,744.66
Average electricity used per session (kWh)	4.79	4.76	6.60	6.15
The number of miles a 2014 Nissan Leaf would be capable of from the average electricity used in a session.	20.0	19.8	27.5	25.6
Longest Charging session (hh:mm:ss)	632:53:30	632:10:56	401:34:57	691:53:48
Average charging session (hh:mm:ss)	30:27:25	17:35:02	6:48:45	4:42:44

Table 9: Network Usage:

	Jun-13			Jun-14		
	Number of charging units	% used	Number of unused units	Count of Number of units	% used	Number of unused units
Inner London						
Camden	44	43%	25	44	52%	21
City of London	27	11%	24	27	19%	22
City of Westminster	141	47%	75	145	61%	56
Greenwich	26	38%	16	27	48%	14
Hackney	33	18%	27	34	35%	22
Hammersmith and Fulham	31	39%	19	31	58%	13
Islington	10	40%	6	10	50%	5
Kensington and Chelsea	8	50%	4	8	50%	4
Lambeth	5	60%	2	5	80%	1
Lewisham	14	36%	9	14	43%	8
Southwark	27	22%	21	27	41%	16
Tower Hamlets	14	36%	9	14	57%	6
Wandsworth	15	27%	11	15	60%	6
Subtotal	**395**	**37%**	**248**	**401**	**52%**	**194**
Outer London						
Barking and Dagenham	4	0%	4	4	25%	3
Barnet	24	17%	20	24	25%	18
Bexley	7	14%	6	7	14%	6
Brent	16	19%	13	17	18%	14
Bromley	13	23%	10	13	38%	8
Croydon	27	7%	25	26	12%	23
Ealing	19	11%	17	19	21%	15
Enfield	35	9%	32	34	21%	27
Haringey	20	25%	15	20	15%	17
Harrow	20	15%	17	20	35%	13
Havering	10	0%	10	10	0%	10
Hillingdon	33	30%	23	33	30%	23
Hounslow	29	17%	24	26	35%	17
Kingston upon Thames	27	33%	18	27	44%	15
Merton	4	0%	4	5	0%	5
Redbridge	25	4%	24	25	24%	19
Richmond upon Thames	7	43%	4	7	43%	4
Sutton	20	15%	17	20	30%	14
Subtotal	**340**	**17%**	**283**	**337**	**26%**	**251**

Outside London						
Chiltern District	6	0%	6	6	17%	5
Crawley District(B)	2	100%	0	2	50%	1
Dartford District(B)	2	0%	2	1	100%	0
Elmbridge District(B)	3	33%	2	3	100%	0
Epping Forest District	4	25%	3	4	25%	3
Epsom and Ewell District(B)	6	0%	6	6	17%	5
Newham	107	4%	103	110	11%	98
Reigate and Banstead District (B)	3	0%	3	3	0%	3
Runnymede District (B)	2	0%	2	2	0%	2
Sevenoaks District	2	0%	2	2	100%	0
Slough(B)	-	-	-	5	40%	3
Spelthorne District	2	0%	2	2	0%	2
Thurrock(B)	2	50%	1	2	50%	1
Waltham Forest	10	10%	9	11	27%	8
Watford District(B)	6	33%	4	8	38%	5
Subtotal	**157**	**8%**	**145**	**167**	**19%**	**136**
Total	**892**	**24%**	**676**	**905**	**36%**	**581**

Table 6 shows the top ten LA by the number of charging sessions for June 2013 and June 2014. The City of Westminster contributes a significant proportion of the total number of charging sessions for each month. Despite having only 17% of all charging units in the Source London network, 44% and 53% of all charging sessions took place within the City of Westminster for June 2013 and June 2014 respectively. The City of Westminster has a significantly higher number of charging sockets per square mile with more than three times as many charging sockets per square mile than the next highest local authority. It can be clearly seen that both the intensity of use and the rate of use of the Source London charging network has increased between June 2013 and June 2014. The local authorities which performed well in June 2013 continued to do so and, almost all, increased the number of charging sessions within their local authority.

Table 7 indicates that there is a fairly even distribution of charging sockets between Inner London regions and outer London regions. However, charging sessions within Inner London are significantly higher with 81% of all charging sessions for both June 2013 and June 2013 being located in Inner London local authorities. There has been a rise in the usage in addition to a rise in average electricity use between June 2013 and June 2014. Interestingly, charging sessions in outer London regions for June 2014 had the highest average electricity use which would seem to indicate a larger amount of charging (in terms of energy) taking place in the outer London regions despite the fact that the majority of charging sessions took place in inner London. Table 8 further shows that the location of charging sessions were strongly concentrated within the congestion charge zone. In June 2013, 54% of all charging sessions in the Source London network took place within the CCZ this decreased to 42% of all charging sessions in June 2014. Whilst this does seem to indicate more that more charging sessions take place outside the CCZ figure 7 quite clearly shows that the sessions are highly likely to still be within Inner London. Table 9 shows the Network usage pattern of charging units for each Local authority. Whilst there has been an increase in the usage in almost all local authorities, there was still less than 50% of the network used even for Inner city regions this was only 52% in June 2014. There is still a vast amount of underuse.

Summary:

There has been a significant increase in the use of the Source London charging network between June 2013 and June 2014. The number of charging sessions have more than doubled (2,243 to 4,678 sessions) whilst there has only been a small rise in the number of charging sockets within the network (1,386 to 1,410 sockets). Both the average number of charging sessions across every used charging unit (10 to 14 sessions) and the mean average electricity used per charging session has increased (4.78 kWh to 6.33 kWh). Furthermore, the proportion of used charging units has increased from 24.3% to 35.8%. This suggests that the Source London charging network is more widely and more intensively used in June 2014 than in June 2013.

The time of use of the Source London network follows a similar patter to other public transport networks. Approximately 30% of all charging sessions began between 06:00 and 09:30 for both months with a smaller peak in usage in the evening rush hour. This morning peak is further accentuated when only looking at weekdays within the CCZ.

Caution must be taken when looking at longest time period. The data for average charging time a longest charging time is potentially misleading as improper closure of the charging socket will continue to register as use until it is closed properly. However, we can see from the top ten lists by number of charging sessions and by electricity used that certain charging units are particularly popular for users (Hinde Street, Berkeley Square and Crouch Hall Road).

However, overall the Source London network is still underutilised and clustered in nature. Approximately 80% of all charging sessions took place within Inner London. Even more significantly, the approximately half of all charging sessions took place within the CCZ zone. For both June 2013 and June 2014 combined there were only 5 instances of where a charging unit was used each day and the percentage of network used remains under 50% with 845 charging sockets not being used at all in June 2014. In addition, the number of charging sessions has doubled from a relatively small number. Despite the rapid growth and uptake of electric vehicles and the use of electric charging units the proportion of electric vehicles still remains small. Furthermore, it is also difficult to determine how the fact that electric vehicle users are able to charge their electric vehicles at home will affect the demand for public charging units.