Greenhouse gas emissions

Our carbon footprint in tonnes of equivalent carbon dioxide (CO_2e):

	2021		2020		2019		2018		2017 (current baseline)	
Scope 1	**Consumption**	**tCO_2e**	Consumption	tCO_2e	Consumption	tCO_2e	Consumption	tCO_2e	Consumption	tCO_2e
Gas buses (kWh)	**6,363,349**	**1,166**	5,640,483	1,037	6,015,533	1,106	6,075,632	1,118	3,721,896	685
Gas premises (Bus) (kWh)	**28,954,884**	**5,303**	25,327,060	4,657	23,811,076	4,381	22,081,195	4,062	19,100,488	3,518
Gas premises (Rail) (kWh)	**23,238,039**	**4,256**	23,026,795	4,234	24,922,178	4,582	31,305,147	5,759	34,172,777	6,293
Bus diesel (10% biodiesel blend)(ltrs)	**132,291,707**	**332,360**	136,608,713	347,810	142,617,090	369,964	137,374,506	360,875	138,863,052	361,066
Gas oil (Rail) (ltrs)	**3,862,768**	**10,656**	4,325,028	11,927	5,381,957	14,845	11,698,766	34,751	18,475,417	54,567
Total scope 1 (tCO_2e)		**366,372**		383,082		394,878		406,564		426,130
Scope 2										
Traction electricity (kWh)	**1,386,760,708**	**295,863**	1,477,645,807	346,306	1,356,323,985	346,676	1,389,289,129	393,266	1,371,415,035	482,135
Mains electricity premises (Bus) (including Singapore and Ireland) (kWh)	**19,861,682**	**5,010**	19,264,512	5,179	18,789,409	3,953	18,374,050	5,387	17,722,995	6,231
Mains electricity premises (Rail) (kWh)	**71,293,912**	**15,165**	71,999,941	16,814	74,410,676	19,019	82,862,076	23,456	90,511,067	31,820
Mains electricity premises (Head office) (kWh)	**115,257**	**24**	122,954	29	183,629	47	162,890	46	95,683	34
Mains electricity electric bus (kWh)	**9,181,299**	**2,036**	4,729,277	1,110	2,352,029	601	1,726,965	489	822,497	289
Solar electricity generated and consumed in premises (Bus) (kWh)	**222,800**	**0**	211,301	0	175,415	0	102,836	0	114,661	0
Solar electricity generated and consumed in premises (Rail) (kWh)	**857,865**	**0**	734,430	0	431,706	0	0	0	0	0
Solar electricity generated and consumed in premises (Total) (kWh)	**1,080,665**	**0**	945,731	0	607,121	0	102,836	0	114,661	0
Total scope 2 – location (tCO_2e)		**318,099**		369,439		370,297		422,644		520,508
Total scope 2 – market (tCO_2e)		**43,242**		67,279		61,971		63,306		61,037
Scope 3										
Electricity – transmission and distribution										
Total (tCO_2e)		**27,945**		31,554		31,510		36,012		48,666

Breakdown by division										
Scope 1, 2 and 3	**Location**	**Market**	Location	Market	Location	Market	Location	Market	Location	Market
Bus (tCO_2e)	**354,396**	**349,260**	368,761	364,115	381,314	382,413	372,677	373,666	372,611	372,057
Rail (tCO_2e)	**357,993**	**88,297**	415,283	117,798	416,169	105,084	492,755	132,155	622,869	163,728
Group (tCO_2e)	**27**	**2**	31	2	51	63	50	60	37	33
Total (tCO_2e)	**712,415**	**437,559**	784,075	481,916	797,534	487,559	865,482	505,881	995,516	535,819
Scopes 1-3 by country	**Location**	**Market**	Location	Market	Location	Market	Location	Market	Location	Market
UK (tCO_2e)	**625,865**	**333,678**	703,158	389,243	742,915	432,914	819,851	460,018	958,216	498,310
Singapore (tCO_2e)	**46,594**	**46,594**	47,010	47,010	48,283	48,283	45,630	45,863	37,300	37,509
Ireland (tCO_2e)	**13,715**	**13,762**	11,964	12,010	6,336	6,364	0	0	0	0
Norway (tCO_2e)	**1,044**	**768**	1,025	736	0	0	0	0	0	0
Germany (tCO_2e)	**25,197**	**42,758**	20,919	32,915	0	0	0	0	0	0
Total (tCO_2e)	**712,415**	**437,559**	784,075	481,916	797,534	487,561	865,482	505,881	995,516	535,819
Out of scopes										
Biogenic content of biodiesel (tCO_2e)	**20,144**		15,188		12,436		7,858		9,373	

Scope 1, 2 and 3 and Out of scopes	**Location**	**Market**	Location	Market	Location	Market	Location	Market	Location	Market
Total (tCO_2e)	**732,559**	**457,703**	799,263	497,104	809,121	500,795	873,078	513,740	1,004,677	545,207
YoY % change	**-8.35%**	**-7.93%**	-1.22%	-0.74%	-7.33%	-2.52%	-13.10%	-5.77%	n/a	
% change on 2017 baseline	**-27.10%**	**-16.05%**	-20.45%	-8.82%	-19.46%	-8.15%	n/a	n/a	n/a	
Total vehicle miles operated	**749,034,991**		733,702,870		706,393,581		683,223,210		684,511,871	
Total bus and rail mileage										
All scopes kg CO_2e/vehicle mile	**0.9780**	**0.6111**	1.0894	0.6775	1.1454	0.7089	1.2779	0.7519	1.4677	0.7965
YoY % change	**-10.22%**	**-9.81%**	-4.90%	-4.43%	-10.37%	-5.72%	-12.93%	-5.59%	n/a	n/a
% change on 2017 baseline	**-33.37%**	**-23.28%**	-25.78%	-14.94%	-21.96%	-10.99%	-12.93%	-5.59%	n/a	n/a
Total global energy consumption (kWh)	**2,917,925,461**		3,032,726,257		2,983,369,795		3,042,437,920		3,207,016,101	

Annual emissions figures for prior years have been restated to reflect the collation of subsequent changes in consumption data and the correction of emissions.

Greenhouse gas emissions continued

Methodology, scope and exclusions

We report on greenhouse gas (GHG) emissions in accordance with the GHG Protocol Corporate Accounting and Reporting Standard, and the UK Government's Environmental Reporting Guidance methodologies.

In line with the GHG Protocol and guidance, we have reported all Scope 1 and 2 emissions, and CO_2 relating to fugitive emissions from air-conditioning equipment in our premises and fleet, the consumption of ad blue (used in exhaust abatement technology installed on some of our latest diesel buses to reduce NoX emissions) and CO_2 emissions relating to fuel consumption by some ancillary vehicles that was not previously accounted for. These additional sources of CO_2 emissions were quantified as part of work in setting a Science Based Target (SBT) for reducing our CO_2 emissions. The baseline year for our SBT is 2020, and therefore the figures for 2020 have been restated to account for these additional CO_2 emissions. Historical data prior to 2020 has not been restated. These additional CO_2 emissions account for less than 2 per cent of our total scope 1 and 2 CO_2 emissions and not accounting for them prior to 2020 is well within our 5 per cent materiality threshold.

We do not currently report on our scope 3 emissions other than those arising from losses within the electricity transmission and distribution systems. A scope 3 screening exercise was carried out in 2021 to quantify our scope 3 emissions as part of the work in setting a SBT. This screening exercise established that our scope 3 emissions are under the 40 per cent threshold specified by the Science Based Target Initiative, (SBTi). Therefore, we did not have to set reduction targets for our scope 3 emissions, but plan to do so later this year as well as incorporating scope 3 emissions into future GHG reporting. We also report our 'out of scopes' CO_2e emissions which relate to the bio-genic content of the bio-diesel that is used in our diesel bus fleet.

All scope 1 emissions are calculated by using the appropriate CO_2e conversion factor for each energy source. We report our scope 2 emissions on both a 'location' and a 'market' basis. This dual reporting applies to CO_2e emissions arising from our electricity consumption only. The location-based method uses the national average carbon emission factors for mains electricity that take the whole mix of fuels used to generate electricity in each country we operate in into account. The correct location based CO_2e conversion factors for 2021 were used for all electricity consumed. The market-based method uses supplier or product-specific carbon factors, (where available), that reflects supply contract specifications agreed between supplier and customer. In some instances, particularly for traction electricity where we do not contract directly with the supplier, supplier or product-specific market-based CO_2 conversion factors are not available. Where this occurs, we follow the hierarchy of market-based factors as specified in the GHG Reporting Protocol and have used the most recent national mix residual factors that are available instead.

All the above emissions sources fall within the businesses included in our consolidated financial statements. We define our organisational reporting boundary by applying the financial control approach with a materiality threshold set at 5 per cent.

Emissions are expressed in terms of equivalent carbon dioxide (CO_2e). Our relative performance metric is kilogrammes of CO_2e per vehicle mile operated. This metric ensures there is a direct correlation between our performance and the purchase of increasing numbers of ultra-low carbon vehicles as well as the measures we are taking to improve our energy efficiency. For 2020, the mileage figures provided by our German and Norwegian rail operations (1.1 per cent of total mileage) were for fleet mileage rather than for vehicle mileage. Therefore, the total vehicle mileage figure for 2020 was slightly understated. As our performance metric is CO_2e per vehicle mile, understating the mileage has a negative impact on performance, so performance has also been slightly understated. Correct vehicle mileage figures for 2021 have been obtained and reported.

To maintain transparency and enable stakeholders to see our performance trends over time, we provide historical data for both our absolute CO_2e emissions and for our relative performance metric. We restate figures for historical CO_2e emissions and our relative performance when there has been a subsequent change in energy consumption data or if methodologies change or if accounting errors were made.

Context

Performance over time must be seen in the context of the changes in the composition of the Go-Ahead Group since our 2017 baseline year. The loss of the London Midland rail franchise in December 2017 resulted in a significant absolute reduction in our energy consumption and scope 1 and 2 CO_2 emissions (107,955 tCO_2 for 2017 - the last full reporting year), from that date onwards. However, that reduction has been offset by the additional energy consumption and CO_2 emissions caused by the acquisition or start-up of Go-Ahead Singapore (September 2016), East Yorkshire Motor Services (June 2018), Go-Ahead Ireland (September 2018) and Go North West (June 2019), plus the start of rail services we operate in Germany and Norway in 2020. Additionally, the significant expansion of Govia Thameslink Railway operations between 2018 and 2019 increased in traction electricity consumption. Similarly, Go South West's operations and CO_2 emissions increased by 40 per cent year on year in 2021 following the start of the contract to operate bus services throughout Cornwall. The aggregate total of scope 1 and 2 CO_2 emissions by the companies acquired since the start of our 2017 baseline year in 2021 was 110,532 tCO_2e, so the net effect of these changes in the Group since 2017 is that the additional CO_2 from additional operations/acquisitions is marginally higher than the reduction that resulted from the loss of the London Midland rail franchise. Lower CO_2e conversion factors for grid electricity since 2017 have also contributed to our performance.

Performance

Overall, in absolute terms, on a location-basis, our equivalent carbon dioxide (CO_2e) emissions in 2021 were 8.35% lower year on year and are 27.1% lower than in our baseline year 2017.

We set ourselves a target to achieve a 25 per cent reduction on CO_2e per vehicle mile by 2021 from our 2017 baseline performance. This target was supported by secondary targets over the same timescale to improve bus fuel efficiency (fleet average miles per gallon) by 5 per cent and to improve traction electricity energy efficiency (fleet average vehicle miles/kWh) at GTR by 15 per cent, (therefore not including Southeastern as this franchise was originally due to end in April 2020).

In 2021, we achieved a 10.22 per cent year on year reduction in CO_2 emissions per vehicle mile and a reduction of 33.38 per cent against our 2017 baseline, thus our headline CO_2 reduction target has been achieved. CO_2 reduction performance has largely been driven by improved fleet energy efficiency. Bus fuel efficiency has improved by 4.98 per cent year on year and by 12.25 per cent since 2017. And, although GTR's traction electricity efficiency fell by 0.9 per cent year on year in 2021, it has improved by 21.4 per cent since 2017. Subsequently, both of the secondary efficiency improvement targets have also been achieved.

Actions that were implemented during 2021 to reduce energy consumption and improve energy efficiency to drive down our CO_2 emissions

- The financial impact of COVID-19, due to loss of revenue for passengers, combined with the structural change of our UK rail contracts and the imminent end of those contracts, has meant that the number and/or scale of energy reduction/efficiency improvement measures that we have been able to implement in 2021 was reduced. The clearest demonstration of this is investment in new buses. New buses are a significant driver of improved fuel efficiency and were only purchased to service confirmed new contract work and will remain this way for 2022.
- Conversely, both diesel and electric bus fleet efficiency has improved significantly since the start of the pandemic. The improvement in fleet efficiency pre-dates the pandemic but it has undoubtedly accelerated the rate of improvement. Lockdowns and other related restrictions significantly reduced the amount of road traffic and congestion and buses were therefore able to operate more efficiently. We are not able to quantify exactly how much of the improvement in efficiency that we have seen is attributable to COVID-19, but it did make some contribution to our improved efficiency rates in 2021.
- Though investment in our bus fleet in 2021 was significantly lower than normal due to the financial impact of COVID-19, 130 new diesel buses were purchased in 2021, all of which were certified as Low Emission Buses (LEBs), LEBs are, by definition, the most fuel-efficient and cleanest diesel buses available to us to purchase. These new diesel buses would have contributed to the 4.98 per cent year on year improvement seen in diesel fleet average MPG across the whole of the Group in 2021. On the same basis, diesel fleet fuel efficiency has improved by 12.3 per cent since 2017. As noted above, some of this improvement is also likely to be attributable to the impact of COVID-19.
- Notwithstanding the above, we also purchased 71 electric buses in 2021, taking the total number of electric buses operated by the Group to nearly 300 and making Go-Ahead by far the largest operator of electric buses in the UK. Most of these new electric buses were purchased to service route contract wins in London, but Go North East also began operating its first electric bus route, purchasing nine new electric buses in 2021. The increase in the size of our electric bus fleet and in the number of services operated on them, accounts for the 149 per cent year on year increase in electric bus mileage operated and the 94 per cent year on year increase in electricity consumption by electric buses in 2020. Nearly all of this additional mileage would previously have been operated by diesel buses, so the increase in electric bus mileage and consumption is the beginning of the transition from diesel to low carbon bus fleets. Across all Go-Ahead's electric bus operations, CO_2 per mile operated was 78.3 per cent lower than CO_2 per mile operated by all of Go-Ahead's diesel bus operations, demonstrating the positive impact that this transition will have on our CO_2 emissions. The partial transition achieved so far has contributed to reducing our CO_2 emissions per mile operated by over 33 per cent since 2017, well ahead of our 25 per cent reduction target.
- We recognise that electric buses are not the only option to replace diesel buses and that there is a significant role for hydrogen buses, particularly when operating long-distance routes where constraints of battery technology mean that electric buses are not a feasible option. Go-Ahead regional bus company Brighton and Hove recently won external funding for 20 hydrogen buses. Delivery of these buses is expected at the end of 2022.
- The purchase of these hydrogen buses, as well as the operation of the largest fleet of electric buses in the UK and LEB-certified diesel buses previously, such as the extended range electric/diesel hybrids with 'geo-fencing', clearly demonstrates the Group's innovative and sector leading approach to adopting low carbon vehicle technologies that also contribute to reducing air pollution.
- The results of the trial of solar panels installed on the roofs of 18 buses at Go South Coast were promising but inconclusive, partly because of the impact of COVID-19 on bus fuel efficiency, but the trial has been extended to include buses operated by Go-Ahead London and Go-Ahead Singapore. The electricity generated by the panels will reduce the load on the vehicles' alternators/drivetrain, and will contribute to a marginal improvement in fuel efficiency. Go South Coast also has a number of fitted with a roof mounted filter, designed to remove particulates from the air and so contribute to improving air quality.
- New rolling stock that is significantly more energy efficient than the rolling stock that it replaced has been the main driver of improved fleet energy efficiency (vehicle miles per kWh) within our rail division. Very little new rolling stock was introduced in 2021, which, combined with significant changes in timetabling and services operated because of COVID-19, impacted on our efficiency performance in 2021. Understated train mileage figures were reported for German and Norwegian rail operations in 2020. In addition to this, the 2020 figures for Norwegian rail only accounted for part of the year as operations started in December 2019. German Rail operations have also grown significantly since 2020. Taking all these factors into consideration means that year on year comparison of traction electricity efficiency for the whole of the rail division is not possible. For UK rail operations, traction electricity efficiency

Greenhouse gas emissions continued

Actions that were implemented during 2021 to reduce energy consumption and improve energy efficiency to drive down our CO_2 emissions continued

deteriorated by 1.7 per cent year on year in 2021, with both GTR and Southeastern's performance worsening slightly. As noted above, GTR's electric fleet efficiency in 2021 was 21.4 per cent better than it was in 2017, so the target of improving electric fleet efficiency by 15 per cent over the same period was still achieved.

- Solar PV has been installed at four Southeastern railway depots, Go-Ahead Germany's Essingen depot and four bus depots in the UK. We plan to install solar PV at two more bus depots in 2022 and are presently carrying out a feasibility study to identify further potential sites for solar PV across all UK bus premises so that we can increase the amount of self-generated, zero carbon electricity that we consume. Additionally, we have continued to replace existing lighting with LED lighting to reduce electricity consumption within our premises.
- From 1 July 2019, all electricity supplied to Group premises within our central Group electricity supply contract has been generated from fully renewable sources (wind, solar, hydro, etc.) and is zero rated for CO_2e under a market-based reporting approach. Southeastern Railway operates train services on the High Speed 1 (HS1) rail network. HS1, rather than Southeastern, is responsible for procuring and supplying electricity to the HS1 network and the procurement specifications for this electricity did not specify that it should be generated from renewables and be zero rated for CO_2. Southeastern is one of the main users of this electricity and worked in partnership with HS1 so that electricity generated from renewables was specified, starting from April 2020.
- Go-Ahead's bus division achieved ISO 50001 certification in October 2018. The scope of the certification was extended during 2020 to include East Yorkshire Motor Services and Go North West and extended again in 2021 to include Go-Ahead Ireland. With the existing certifications already held by the Group's two UK train operating companies, all of Go-Ahead's UK and Ireland operations are now covered by ISO 50001 certification, recognised as best practice for energy management. Our bus division's ISO 50001 certification expires in October 2021 and we are currently working towards achieving re-certification.
- The main focus of our activities to reduce future energy consumption and CO_2 emissions in 2021 was the development of our new climate change strategy which incorporates a Science Based Target, validated by the Science Based Target Initiative, to reduce our scope 1 and 2 CO_2 emissions by 75 per cent by 2035 relative to our 2020 baseline performance and our commitment to achieve net zero for scope 1 and 2 CO_2 emissions by 2045. Further information about our climate change strategy and how we will achieve it and our net zero by 2045 commitment can be found at: https://www.go-ahead. com/sustainability/climate-change.