Luas

This article is about the modern light rail system in Dublin. For the city's historic tram system, see Dublin tramways.

Luas (Irish pronunciation: [ˈl̪ˠuəsˠ]; Irish for *"speed"*), also promoted in the development stage as the **Dublin Light Rail System**, is a tram or light rail system serving Dublin, the first such system in the decades since the closure of the last of the Dublin tramways. In 2013, the system carried 30.5 million passengers, up 3.7% from 29.4 million passengers in 2012.[1]

There are currently two Luas *main* lines. The Green Line commenced operations on 30 June 2004, while the Red Line opened on 26 September 2004. Since the initial opening both lines have been extended and "split" into different branches. As of January 2014, the system has 54 stations and 36.5 kilometres (22.7 mi) of service track.[1]

The Luas is operated by Transdev, under tender from the Railway Procurement Agency (RPA). It is a major part of the Dublin Transportation Office's strategy (2000–2016).[2] Three extensions to the existing Luas lines have been completed. Construction of a 6 km extension to the Green line to the north city centre and Broombridge (called Luas Cross City during construction), which will link both Green and Red lines, began in June 2013.

1 History

The idea for a new tram or light rail system for the city of Dublin was first suggested in 1994, by a Dublin Transportation Initiative (DTI) report,[3] which referenced the original Dublin tramways, once running over 60 kilometres (37 mi)and reaching most parts of the city. Following this report Córas Iompair Éireann (CIÉ), the state-owned public transport operator in Ireland, was asked to study the different options. They recommended two phases for the construction of a tram system:

- Phase 1: Tallaght to Dundrum/Balally via the City Centre

- Phase 2: Ballymun to the City Centre and Dundrum/Balally to Sandyford

The Transport Act, 1996 created a legal framework for CIÉ to build a tram system and in May 1997 the company applied for a Light Railway Order to construct the first phase, as well as the Dundrum/Balally to Sandyford part of phase 2.

An inquiry started in July 1997, but was put on hold to investigate the possibility of underground sections in the city centre. In May 1998 the government decided to build two lines, amending the plans. The first was to run from Tallaght to Connolly Station, while the second would run from Sandyford Industrial Estate to Dublin Airport, through the city centre and Ballymun. Part of the second was to be underground through the city centre.

The responsibility for developing the Luas was transferred from CIÉ to the Railway Procurement Agency (RPA), a separate government agency created in 2001.[3]

Construction work began in March 2001 on the Tallaght to Connolly line, as well as the Sandyford to St. Stephen's Green section of the second line, with Ansaldo of Italy and MVM of Australia getting the contract to build the system.[4] The St. Stephen's Green to Dublin Airport section was dropped before construction began, as it was decided to serve the area by a metro instead. The contract to maintain operate the system was awarded to Veolia Transport Ireland (formerly known as Connex).[5]

The development of the Luas Red Line was facilitated by EU funding of €82.5 million under the European Regional Development Fund (ERDF),[5] and part of the cost of some proposed line extensions (e.g. over 50% of Line B1 to Cherrywood) is being raised though levies on development in areas close to the projected route.[6]

1.1 Launch

Sign welcoming the Luas to South Dublin in 2004

The original launch date for the Luas was to be 2003, but delays in construction saw this date pushed back by a year. An advertising campaign took place to inform the

public of the development of the system, while construction was taking place. Construction finished in February 2004 and a period of testing and driver training began. 30 June 2004 was decided on as the official launch date of the Green Line. The first tram went into service for the general public at 3 p.m. Several days of free travel and a family fun weekend took place to launch the system. The Red Line opened on 26 September 2004, with six days of free travel for the general public.[3]

1.2   2004 to present

By November 2006, over 50 million journeys had been made on the system.[7] Around 90,000 Luas trips are made each day. 28.4 million journeys were made in 2007.[8] 27.4 million journeys were made in 2008.[9] 25.4 million journeys were made in 2009.[10] To date, the busiest day on the Luas system was Friday, 21 December 2007 when 145,000 passenger journeys were recorded.[8]

Luas operates without a state subvention. The service recorded a surplus of €985,000 (€680,000 in 2004) - an achievement well ahead of an anticipated deficit of €2.5 million.[11]

On the 8 December 2009 the Red Line C1 Connolly to Docklands extension opened.[12] There are 4 stops: George's Dock, Mayor Square, Spencer Dock (serving the new Docklands railway station, approximately 500m away) and terminating in Point Village, opposite the The O₂-this extension however bypasses Connolly. Construction started at the beginning of June 2007.[13] Test runs began on the line in September 2009 before the opening.[14]

The Railway Procurement Agency noted in their annual report that passenger numbers fell for the first time in 2009. The Luas had 25.4m passengers in 2009.[15]

On Saturday 16 October 2010 the Luas B1 extension from Sandyford to Cherrywood opened.

In June 2010, plans to join the two Luas tracks were finalised.[16] On 20 May 2011 the Dublin City Council made submissions to An Bord Pleanála's Oral Hearing into Line BXD stating that the Planning Authority had a serious area of concern with the overhead conductor system in the historical city centre asking for a wire free zone.[17][18]

2   Infrastructure

2.1   Stations and lines

The network currently comprises two lines:

1. **Red Line (Line A,A1,C,C1)** - The Point resp. Connolly station to Saggart or Tallaght (each link end to end approx 20.7 kilometres (12.9 mi) but the

total track length is longer due to the part Belgard-Tallaght and Belgard-Sagart are separate parts of the Red Line)

2. **Green Line (Line B,B1,Bx,D)** - St Stephen's Green via Sandyford to Bride's Glen, 17.5 kilometres (10.9 mi)

The Red Line (Line A,A1,C,C1) runs in an east-west direction through Dublin's Northside, then crosses the River Liffey and travels southwest to the heavily populated suburb of Tallaght, and then on through the Citywest campus and then terminating at Saggart.

The Nine Arches Bridge on the Green Line at Milltown

The Green Line (Line B) is currently entirely in the south side of Dublin city. It mostly follows the route of the old Harcourt Street railway line, which was reserved for possible re-use when it closed in 1958. The Red Line and Green Line are not yet connected to each other, with a 15-minute walk between the two closest points. There are a total of 32 stops on the Red Line and 22 (plus two further unopened stations) on the Green Line.

A third line to Lucan (Line F) is planned. The line is planned to start in the city center and travel north west to Lucan.

2.2   Track and rolling stock

The system operates on a 750 V DC overhead power supply. The international standard rail gauge of 1,435 mm (4 ft 8 ½ in) is used, rather than the Irish 1,600 mm (5 ft 3 in).[19]

The silver Citadis trams, manufactured in La Rochelle by French multinational Alstom, reach a top speed of 70 km/h on off-street sections between Red Cow and Kylemore etc., but travel at a slower speed on-street where conflicts with other vehicles or pedestrians can occur. The 26 initial Red Line '3000' class trams were 30-m long Citadis 301 configurations with a capacity of 256. The 14 Green Line '4000 class' trams, each 40 m Citadis 401 configurations, have a capacity of 358 including two

wheelchairs.[19] Starting in 2007, all the Red line trams were upgraded to 40 m by inserting two more articulated sections, with the last one converted by June 2008.[8] Both configurations of tramcars are fully compatible with both the Red and the Green Lines.

26 new 43m Citadis 402 trams, numbered as the '5000 class', were ordered for delivery in early 2009. These are 100% low-floor configuration and currently work solely on the Green Line but are capable of working on Red if required. Due to this, the 4000 class units have been cascaded to operate on the Red Line.

10 further trams will be procured for use on the new Cross City - Broombridge line.[20]

In other aspects, the two lines are identical except that the interaxis width between the tracks on the Green Line is slightly wider than on the Red Line. This does not relate to the track gauge of 1,435 mm (4 ft 8 $\frac{1}{2}$ in), which is identical on both lines. This will allow wider metro trains be run on the same tracks if a proposed upgrade to full metro service is implemented.[21] This is possible because the route uses an old railway line and as such has few interactions with vehicular or pedestrian traffic. The Railway Procurement Agency has stated (November 2006) that "We still envisage conversion of almost all Luas lines to light metro standard in the long-term."[6]

The main engineering structures on the Green Line at present are Milltown Viaduct, also known as The Nine Arches, a large stone viaduct dating from 1854, and the William Dargan Bridge, a large new cable-stayed suspension bridge at Taney Cross, near Dundrum town centre.

3   Travel on the Luas

3.1   Ticketing
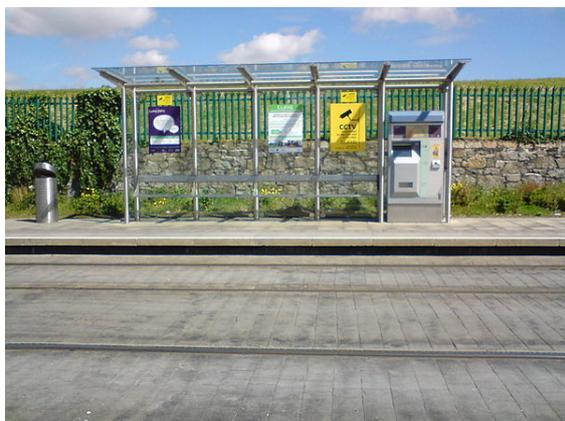
Stillorgan Luas stop with the ticket machine and CCTV warning

Luas tickets are purple in colour and credit card sized. They bear a magnetic stripe on the back although this is not used on Luas. Uniquely among Dublin's public trans-port, tickets are not checked upon boarding trams and an honour system, combined with random inspections, is used.

Ticket machines operate at every Luas stop and these are the only source of single-journey and return tickets. They also sell 1-day, 7-day and 30-day tickets, valid in either some or all the fare zones, for adults, children and students. It is also possible to purchase 'Combi' tickets valid on Dublin Bus and Luas. DART and Luas 'Combi' tickets have been produced since Luas opened but despite this being a major ticket option these LUAS-DART Combis are not available at either ticket newsagents or online from either Irish Rail or Luas, nor are they available in Luas vending machines. The situation has become so farcical that most passengers, indeed even most persons working in Irish Rail ticket offices, do not know these tickets exist. They are available only from Irish Rail ticket offices. Transport user lobby groups like 'Rail Users Ireland / Platform 11' have written to both Luas and Irish Rail asking for an explanation for this and none has been forthcoming. While it is also possible to purchase Luas-DART-Dublin Bus triple combi tickets (from Irish Rail booking offices) from monthly ramblers upward, these are often more expensive than simply topping up a LEAP card to its weekly cap rate (currently €40 for Adults). Certain ticket combinations are not possible (for example a one-day student ticket), and tickets can only be valid from the stop at which they are purchased and must commence their validity within 90 minutes, valid until a specific time shown on the card. Certain tickets require the user to hold an ID card and write the number on the ticket, to prevent the ticket from being transferred to another person. Ticket machines accept card payments (by American Express, Laser, MasterCard, or Visa for transactions from €5 upwards and a weekly limit of €150 (upper limit changed from €50 per transaction to €150 per week in January 2012 after upgrading all POS terminals to have a PIN keypad).[22] Like other Irish transport operators, Luas has taken to requiring students to purchase a special Student Travelcard, not recognizing their student cards as enough to get a discount. These have recently been merged with the LEAP Cards to form a personalized blue LEAP card with new benefits such as lower daily caps.

Luas tickets are sold at newsagents and other shops, mostly in the vicinity of Luas stops. Joint Luas and Dublin Bus tickets can be purchased from Luas vending machines for immediate use, as well as from Dublin Bus ticket agents. Tickets bought at Dublin Bus agents must be validated on a bus before being valid for a tram (since Luas does not use ticket validation systems upon boarding the tram). Certain tickets are cheaper in shops than at ticket machines. Tickets cannot be purchased on board the trams.

Both lines are divided into 5 zones, the central zone being shared. Fares are calculated based on how many zones a journey is taken through. There is a stop on the bor-

der of each zone, which is considered to be in whichever zone is more beneficial to the traveller. The two lines do not connect, but it is possible to purchase tickets that are valid for a journey using both lines. It is necessary to walk or take other transport between the two lines, most commonly between St. Stephen's Green (on the green line) and Abbey Street (on the red line). Alternatives include buses (the number 145[23] links St. Stephen's Green to Heuston and the number 18 links Ranelagh to Kylemore, although these are not included on the ticket) and taxis.

3.2   Smartcard

In March 2005 the Luas smartcard was launched. the smartcard is being phased out following launch of the integrated Leap card which is further detailed below. The Luas smartcard allows travellers to pay for travel on the Luas network. Credit is pre-loaded onto the smartcard at ticket machines by cash, debit card or credit card, with a minimum top-up of €5 and a maximum credit on the card of €100, and the customer must validate the card using readers on the platform before boarding the tram and then again after exiting the tram. This is referred to as 'tag-on' and 'tag-off'.

A smartcard can be purchased at a Luas ticket agent or online.[24] The card costs €10, which includes a €3 non-refundable charge for the card, €3 of credit and €4 for a fully refundable 'reserve fund' which allows travel even if there is insufficient credit on the card for the journey. The card must then be topped up before another journey can be taken.

Smartcard fares are slightly cheaper than standard single and return fares from ticket machines. For example, a journey within a single zone costs €1.25 with the card, compared to €1.50 (€1.60 during peak time) single with a paper ticket, or €2.80 return. Daily, 7-day and 30-day tickets generally work out cheaper, unless used only rarely. Luas smartcards are unable to store multiple-journey tickets and these tickets are issued on paper only.

Until January 2012 there were three different smartcard systems in Dublin: The above Luas smart-card, the Dublin Bus prepaid Smartcard system for day-cards or longer[25] and the smart-card for commuter trains and the DART which is -as the Luas card- a per journey tag on/off card but not compatible with Luas cards.[26]

Over the past years the Railway Procurement Agency has been working on the design of an integrated ticketing system [27] and was many years behind schedule and is estimated to have costed €30m to complete.[28] This new card, marketed under the name LEAP card has been fully operational since January 2012 and allows you to buy single journey tickets for the Luas, DART, Commuter and Dublin bus lines. The card carries a credit, which can be topped up, which is then used to pay for your fare. On Dublin bus you present your card to the ticketing machine of the bus driver and ask for the ticket you want. On

the Luas you "tag-on" before entering the tram and "tag off" at your destination and the correct fare is deducted. And the same applies to DART and Commuter-trains, but there the tagging will normally be done when passing the electronic entry/exit gates. (For stations without these gates you can tag-on/off using terminals at the platform).

The "Leap" smartcard has functionality that will cap the daily and weekly spend to ensure Leap card holders do not pay more than they would have had they bought day, weekly, or monthly tickets. This functionality had been enabled on the Luas system and DART services. The number of Leap cardusers was reported by the National Transport Authority to be 384,689 as of December 2013.[29]

3.3   Hours of operation and frequency

Trams operate from 05:30 to 00:30 Monday to Friday. On Saturday the Green Line begins operating at 06:15, while the Red Line begins at 06:30. Both lines close at 00:30 on Saturday nights. On Sundays the Green Line runs from 06:45 to 23:30, while the Red Line runs from 07:00 to 23:30. Bank holidays are the same as Sundays, except trams run until 00:30. Services run at regular intervals, from every 4–5 minutes during peak times to every 15 minutes late at night.

During the Christmas season (from early December to New Year's), a night service runs on the Luas during Friday and Saturday nights (as well as on New Year's), with the last trams departing the city centre at 03:30.

3.4   Accessibility

Luas tram crossing the Liffey (a yellow stripe around the trams has since been added to improve visibility)

The low floors and wide spaces of the Citadis trams mean that wheelchair users can easily board. All stations have also been designed with ramps, to allow easy access. Several have lifts, such as Kilmacud and Dundrum on the Green Line, while Connolly Station has escalators that

connect the Luas station to the main station building. The Luas website also has an accessibility newsletter.

3.5 Safety

Sign warning of Luas track ahead

Before the Luas was launched a Safety Awareness Day was held in Dublin City Centre. Also thousands of reflective armbands were distributed to pedestrians and cyclists, in order to ensure their visibility for tram drivers. This policy seems to have worked as the Luas has been described as being "one of the safest transport systems in the world".[30] Both trams and stops are monitored using CCTV 24 hours a day from the central control room, located in the Red Cow Depot.[31]

Before the Luas' launch, it was feared that the tram system would lead to a high number of fatal accidents. So far, however, there have been only four fatalities. There have been many occurrences of cars striking trams, mainly caused by motorists breaking red lights. On 16 September 2009, a Luas collided with a Dublin Bus on the O'Connell Street-Abbey Street Junction. 22 people were injured in the collision, 3 seriously, including the tram driver. Early investigations have suggested that the bus had the green light to move, and that the Luas must have had technical problems.[32] The Luas driver was later charged with dangerous driving causing harm and operating a tram in a manner which posed risk to others. He was subsequently acquitted of dangerous conduct by the Dublin Circuit Criminal Court.[33]

3.6 Security

In February 2009 Veolia Transport, the company responsible for the management of the Luas system, terminated its contract with Federal Security, an Ireland-based private security firm. The contract to provide security services in and around the Luas system was won by STT Rail Security, an Ireland-based company specialising in rail/transit security.

This change was due to the increase in violence, criminal damage, breaches of by-laws and anti-social behaviour on board the trams.

4 Issues

The cost of building the original Red and Green Lines was €728m. It was envisaged in the original plans that the Green Line would meet the Red Line at O'Connell Street. However two separate unconnected lines were built, leaving a 15-minute walk - through O'Connell Street, Westmoreland Street, College Green and Grafton Street - between the two lines. Plans to link the lines were announced with the proposed building of the BX Line under Transport 21; this is now under construction as of 2014.

Park and ride charges have also attracted criticism. The cost of parking for a full day is €4. It was described by former government TD and head of the Dáil transport Committee Eoin Ryan as "unacceptable for Luas to charge passengers for parking at their Park and Ride facilities on top of ticket fares".[34]

5 Notable incidents

There have been several incidents involving the Luas, often leading to its temporary closure.

5.1 2009 double-decker Dublin Bus/Luas collision

At 3 pm on 16 September 2009 a red line Luas tram and a double-decker number 16 Dublin Bus collided at the crossroads of Abbey Street and O'Connell Street in Dublin city centre.[35] The front section of the tram was derailed in the incident and the driver's cabin was crushed flat against the left hand side of the bus.[36] At least 21 people were injured and three were seriously hurt, including the driver of the tram who had to be cut out from the wreckage.[37]

6 Fatal incidents

6.1 2008

At 7:40 PM on 23 February 2008, 59-year-old Anthony Creed was struck by a red-line tram at Cookstown Way

in Tallaght, and sustained serious head injuries. He died in hospital the following day.[38][39]

6.2 2011

At 16:20 on 11 October 2011, a 35-year-old man, who was a Polish national, was struck and killed by a red-line tram on Steeven's Lane near Heuston Station.[40] The Luas was stopped between the Heuston and The Point stops for 3 hours, trams between Tallaght and Blackhorse remained running throughout this period. Trams began running between Heuston and The Point again at 19:20.

6.3 2012

On 28 June 2012, 32-year-old Ann Marie McQuillan was struck by a Luas tram in Inchicore, after falling onto the tracks at Blackhorse platform as a tram pulled in. She was caught between the platform and tram, and suffered severe head and body trauma. Emergency services managed to free her from under the tram, and the area was cordoned off for a forensic examination. McQuillan was rushed to hospital, and died of her injuries on 6 July 2012.[41]

6.4 2014

On 7 April 2014, a car collided with a Luas tram at the junction of Jervis Street and Abbey Street, which caused the car to fatally strike the pedestrian Yao Webster, a 35-year-old from Dublin, who was pronounced dead at the scene.[42]

7 Planned extensions and lines

7.1 Luas Cross City

The Luas Cross city project is an extension of the Green Line will link it with the Red Line, and continue northwards to Broombridge in North Dublin (interchange with Irish Rail station). The extension will begin at the existing St.Stephen's Green Green Line stop. Construction started in June 2013 with services expected to begin in 2017.[43]

- **Line BX (includes Line D to Broombridge)** – City Centre link for Red and Green Lines. The RPA started public consultation on the route in December 2005. In March 2007 the preferred route was announced.[44] The planned route runs from St. Stephens Green to College Green where the line changes from a double track to single track. From here it runs north through Westmoreland St., over O'Connell Bridge and along the west side of

O'Connell St. to Cathal Brugha St. It then turns east into Cathal Brugha St. and turns south to run along Marlborough St., across the River Liffey on a new bridge, continues along Hawkins St. and College St. and joins up with the double track section of the line at College Green. 2012 was the original completion date given in the Transport 21 plans, but construction has only started in 2013. The completion date is 2015–2016 with passenger services to commence in 2017. The RPA applied for a Railway Order application to An Bord Pleanála for a combined Line D / Line BX Luas Line that is planned to run from St. Stephen's Green to Broombridge via the city centre and Broadstone / Grangegorman.[45]

- **Line D** – City Centre to Liffey Junction. This is expected to serve Grangegorman, the site of the proposed new DIT campus. This line will linked with the Maynooth line.

On 10 November 2011, the government announced in its 2012–16 Infrastructure and Capital Investment plan that the project to link the Red and Green lines, known as **BXD**, was to proceed. No other new lines or extensions are being funded.[46][47] Construction work for the bridge across the River Liffey (connecting Marlborough St and Hawkins St) began in April 2012, which the southbound Luas BXD track will be laid on.[48] A Railway Order was granted by ABP for the Luas BXD line on 3 August 2012. The construction project has since been branded **Luas Cross City**.[49]

7.2 Proposed planned future extensions

- **Line B2** – Cherrywood to Bray environs extension (Green Line). Was a proposed extension of 6.8 km (4.2 mi). On 6 June 2007, the route of this Luas extension was announced. It was proposed to run from Cherrywood to Fassaroe and Bray (adjacent to Daly station), and would run very close to the M11 motorway, eventually crossing it near the Wilford interchange.

7.3 Proposed Lines

- **Line F1/2** – City Centre to Lucan. On 27 September 2007, Noel Dempsey (Minister for Transport) launched the public consultation process for the planned Luas line to Lucan. Two main route options where identified, with a number of sub-options also identified. It was expected that would link with the proposed Metro West. The preferred route was announced in November 2008 and the RPA where planning the precise alignment and station and depot locations. The planning for the two lines was split in two. Line F1 was to be the line from Lucan to where it will connect with the existing red line at

Blackhorse and Line F2 will be where the line was to leave the existing red line at James and continue on to College Green.

- **Line E** – In May 2008, the feasibility study for a possible Luas line E, to run from Dundrum to the City Centre via Rathfarnham, Terenure and Harold's Cross, was completed.[50] The line was found to be feasible and it was submitted to the Minister for Transport but was rejected on being found uneconomic to operate.

7.4 Other Projects

With the success of the Luas system in Dublin, there is very strong support for bringing tram to other Irish cities. During the 2007 election campaign, Fianna Fáil and the Green Party both announced plans for tram systems in Cork, Limerick, Galway, Waterford and Bray. The 2007 Programme for Government between these two parties and the Progressive Democrats included a section which ensured feasibility studies would be carried out on these projects within the first two years of the government.[51] Cork and Limerick were expected to complete their studies by "mid 2009".[52] As a result of the financial crisis beginning in 2008, a moratorium was placed on future capital projects; as such, no feasibility studies have been completed as of 2014.

8 On-board announcements

Since 2010 all on-board Luas announcements have been voiced by Doireann Ní Bhriain, to coincide with the opening of the new Point and Bride's Glen extension.

9 See also

- Transport in Ireland
- List of Irish companies
- Public Transport Operators in Dublin
- Dublin United Transport Company (leading pre-1950 operator of Dublin's original tram system)
- DART
- Trams in Europe

10 References

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11   External links

- Luas website

- Luas Smartcard

- Luas Cross City project

- Photos of Luas Green line(Harcourt Street)

- Rail Users Ireland Ireland's National Rail Users Group

- Hidden Dublin Photos of Luas construction

- Railway Procurement Agency

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