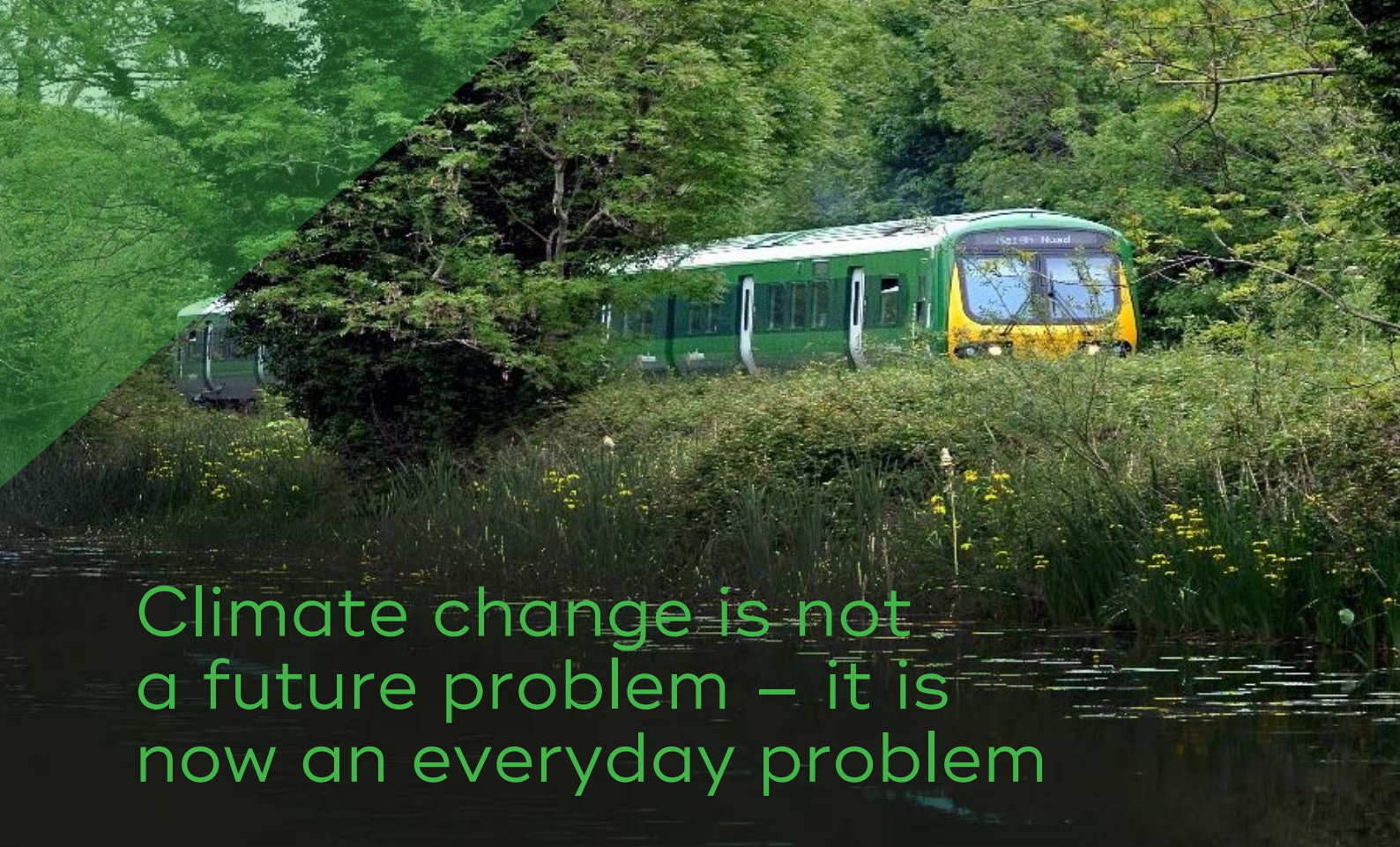




CLIMATE
ADAPTATION
STRATEGY
2024



Climate change is not a future problem – it is now an everyday problem

Iarnród Éireann services are at the heart of Ireland's transport system and our railway network is part of the national critical infrastructure. As custodians of the railway, we know from our history and what we see today that our climate is changing.

Climate change has the potential to adversely impact on railway infrastructure, resulting in greater level of service disruption to our customers.

The climate change outlook for Ireland is more frequent and intense extreme weather events, with rising sea levels, coastal storm surges, stronger winds and temperature increases meaning wetter winters and drier summers. Delivering high quality railway services, during extreme weather-related events, is a constant and evolving challenge for Iarnród Éireann due to the variability and uncertainty about such events.

Our Climate Adaptation Mission

Our mission is to safeguard the railway network of which we are custodians for future generations from the effects of climate change.

Objective

Our objective is to embed climate adaptation into how we maintain our fleet and railway infrastructure, into our train operations and procedures ensuring a safe and resilience network capable of delivering a sustainable public transport service to our customers.



Climate Impacts to our Services

Extreme weather events and climate change pose significant risks to infrastructure, affecting both our services and the people and businesses that depend on them, increasing the requirement for maintenance to ensure the railway is safe.

Depending on their severity, weather events can lead to minor service disruptions or more widespread networkwide problems, especially if a railway line is seriously damaged, requiring costly repairs.



Intense Rainfall and Flooding



- Trains must slow down when water levels rise above the rail causing delays
- Heavy, persistent rainfall can impact earthworks causing landslips meaning service cancellations
- Flooding can dislodge the ballast which supports the railway track blocking drainage systems.
- Intense rainfall accelerates erosion, which can cause damage to bridges and culverts.



Severe Winds and Storm Surges



- Causes risks to our heritage buildings, structures, and DART overhead line equipment
- High winds can lead to tree falls and obstructions on railway lines
- Increased storm frequency and severity, combined with potential changes in leaf fall timing, contribute to low rail adhesion (LRA), a major cause of network delays.



Sea Level Rise



- Impact on coastal environment in areas where the railway line is exposed to or close to the sea
- Coastal and cliff face erosion can damage track infrastructure.
- Severe wave formations overtopping sea defence walls flooding rail lines.



Extreme Temperatures



- Thermal expansion due to prolonged high temperatures causes warping of the railway track, known as rail buckling, raising safety concerns and disruption to train services.
- Overhead Line Equipment (OHLE) can sag in extreme heat causing disruption to electrical power supply.
- Service disruptions due to cold weather events.



Drought Events



- A reduction in soil moisture due to drought can cause soil shrinkage and subsidence, especially in clay soil.
- Track geometry misalignment may occur in areas with pronounced seasonal shrink-swell of organic rich soils, such as bogs.


Challenges

Vegetation has a key role to play in both causing and mitigating against weather related impacts and as climate change evolves, shorter winters are expected resulting in longer growing periods for many plant species. This in turn will increase the requirement for management of vegetation across our network.

High intensity rainfall events can overwhelm drainage capacity along the railway corridor and in urban areas. Drainage of the railway has a significant interdependency with local authorities, third party landowners and other organisations and neighbours.

The Strategic Flood Risk Assessment which was undertaken to support the All-Ireland Strategic Rail Review identified several locations throughout the current rail network that is susceptible to river or coastal flooding, based on publicly available information including historical records and flood hazard maps. The risk associated with flooding are currently addressed by Iarnród Éireann through projects such as ECRIPP (see next page) and will continue to be considered as part of climate change adaptation interventions.

Our heritage rich railway infrastructure and assets date back to the 19th century in some areas. This along with the structural boundaries and environmental conditions mean that interventions and adaptations can be difficult, disruptive, expensive and may also be subject to planning and other developmental restrictions. However, failure to address our vulnerability to weather events will cause service disruptions and could lead to risks including significant financial costs and disruptions to society, the economy, and the environment.



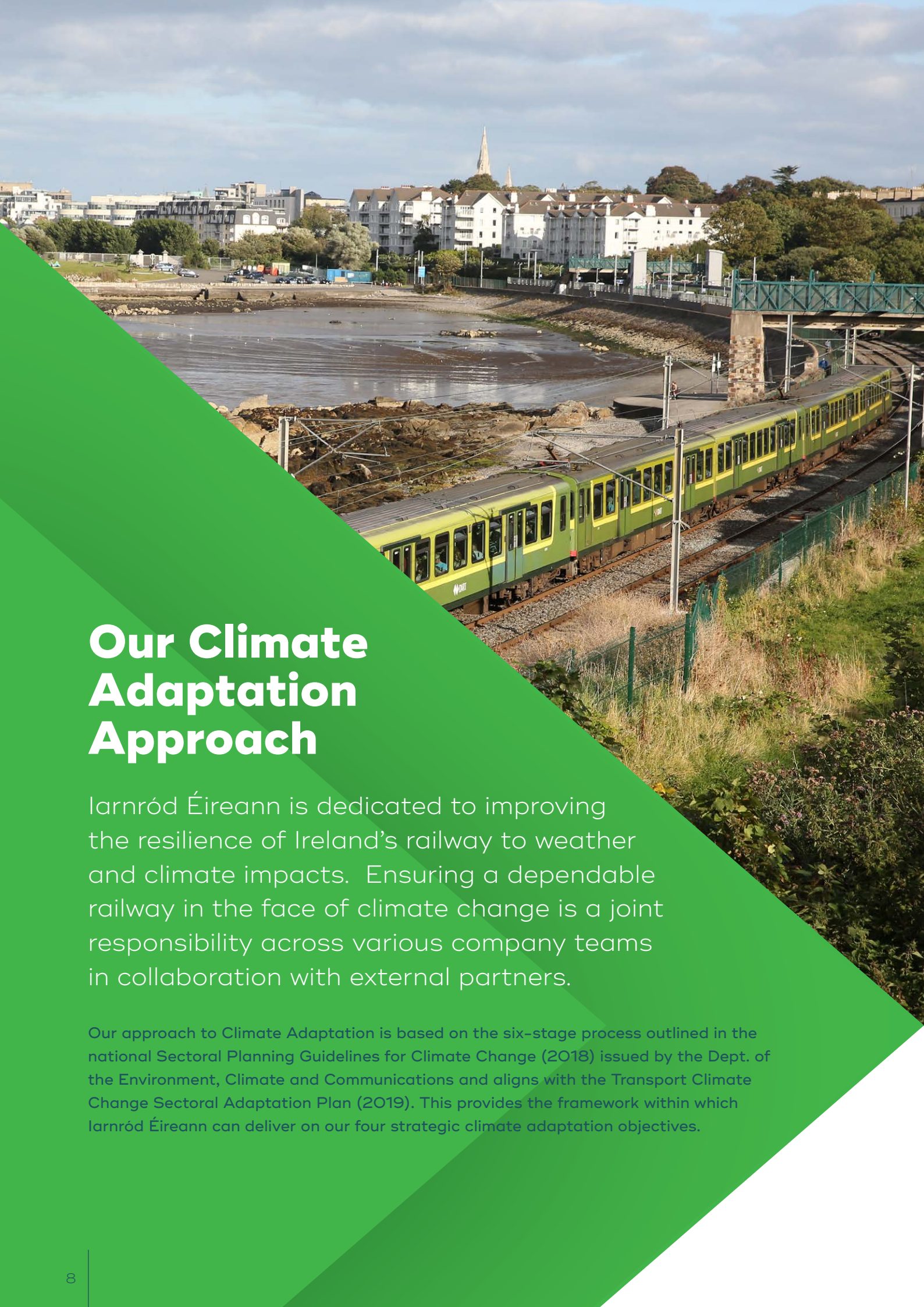
Adapting the Iarnród Éireann rail network to climate change will require changes in how we operate, and significant investment. Improving our resilience will enhance safety, operational and financial performance and deliver a better customer experience further strengthening Iarnród Éireann's status as one of the safest railways in Europe.

CASE STUDY

East Coast Railway Infrastructure Protection Projects (ECRIPP)

The East Coast Railway Infrastructure Protection Projects (ECRIPP) were established to mitigate against sea level rise, coastal erosion, extreme weather, and coastal flooding that is increasingly occurring along key sections of the coastal railway line south of Dublin to Wicklow. The interventions provided by ECRIPP will ensure that the rail infrastructure is protected, and connectivity is maintained against the effects of climate change such as sea level rise and storm surges on the east coast railway corridor thus securing the railway line for future generations. The ECRIPP interventions will be achieved by a variety of engineering measures on or near the shoreline.



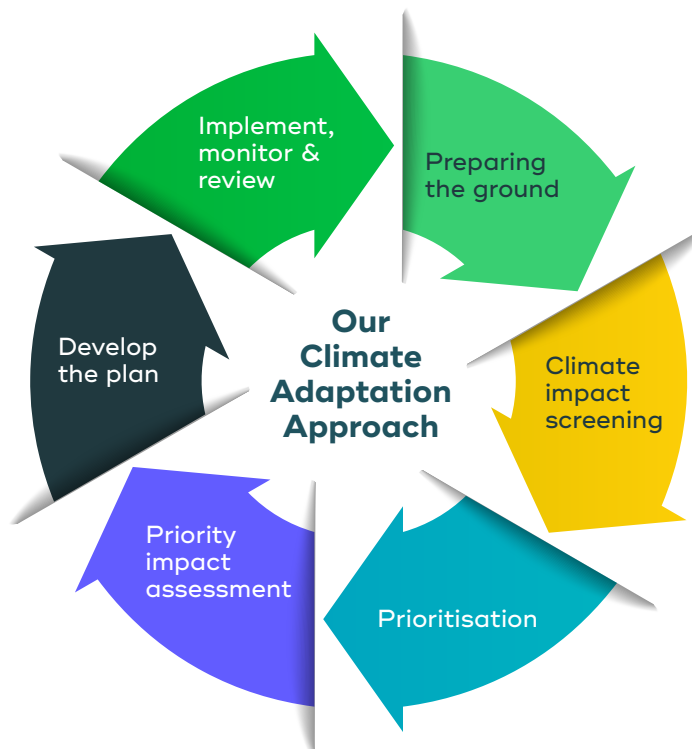


Our Climate Adaptation Approach

Iarnród Éireann is dedicated to improving the resilience of Ireland's railway to weather and climate impacts. Ensuring a dependable railway in the face of climate change is a joint responsibility across various company teams in collaboration with external partners.

Our approach to Climate Adaptation is based on the six-stage process outlined in the national Sectoral Planning Guidelines for Climate Change (2018) issued by the Dept. of the Environment, Climate and Communications and aligns with the Transport Climate Change Sectoral Adaptation Plan (2019). This provides the framework within which Iarnród Éireann can deliver on our four strategic climate adaptation objectives.

The 6 Stage Approach to Climate Adaptation



Stage 1: Preparing the Ground

- Develop an understanding of the key climate risks for Iarnród Éireann railway infrastructure through learnings from past experiences and then identifying the gaps in our approach.

Stage 2: Climate Impact Screening

- Extreme weather event risk assessments are completed to establish the possible impacts on our railway assets.

Stage 3: Prioritisation

- The risk assessment allows for ranking of each asset by risk and vulnerability to climate change along with the scale of the intervention required.
- If impacts are likely to cause disruption to customer services, this will be a priority

Stage 4: Priority Impact Assessment

- A detailed analysis of climate change predictions linked to site specific characteristics and constraints is completed to develop climate change interventions that are suitable for each site and technically feasible for implementation.

Stage 5: Develop the Plan

- With options assessment complete and suitable designs developed we identify the climate adaptation intervention that Iarnród Éireann consider necessary to protect the rail network from climate change risks.
- A timeframe for implementation of the measures is programmed and funding requirements are identified.

A wide variation in the scale and urgency of interventions across the different asset types, operational activities, and potential hazards is certain.

Stage 6: Implementation, Monitoring and Review

- The five year Infrastructure Manager multi annual contract (IMMAC) is the key funding source for the maintenance and renewal of our railway infrastructure
- With funding secured the plan can be implemented, once complete the plan is subject to regular evaluation, reviews, and updates.

Our understanding of climate change, its impacts and how best to deal with events is continuously evolving and as such the work required is ever changing. We are embracing this challenge.

Climate Adaptation Action Plans

Climate Adaptation Plan



Embedding resilience into the way we design, build, operate and maintain our trains and railway infrastructure is critical to meeting the climate change challenges. Our proactive approach is being delivered by teams across the business through four strategic mitigation and adaptation objectives.

- 1 Improved Operational Resilience**
Embed climate adaptation into train operations, policies, and procedures to ensure a safe and resilient rail network that prioritises a quality customer service.
- 2 Improved Asset Resilience**
Ensure the reduction in instances of climate related service disruptions throughout the network across the lifetime of the asset.
- 3 Enhanced Service Levels**
Reduce recovery time and service disruption following climate related events.
- 4 Mitigation low carbon approach**
Achieve our carbon reduction targets as laid out in our Climate Action Plan 2023.

CASE STUDY

Reducing our Fleet Climate Impacts

Iarnród Éireann has a large fleet of mainly diesel-powered trains which are typically at the mid-point of a 35-year asset life. Improvements have been sought in the environmental footprint of these existing fleets while at the same time phasing out for modern electrically powered trains where possible. In 2024 we will take delivery of the first two of an order of thirty-one new battery electric DART trains, each made up of five carriages, as well as six 5-car electric trains. These will expand the DART network and allow for the replacement of diesel-powered trains in the Greater Dublin Area.

Trials have been completed for a fuel-efficient transmission for our diesel trains which reduces fuel consumption and CO₂ by 20%. Subject to funding this transmission will be fitted to all existing Intercity diesel railcars in the near future.

Newly introduced Intercity rail vehicles being introduced to service in 2024 are all fitted with the very latest EU emission compliant Stage V engines and use AdBlue technology to reduce harmful emissions. We are trialling a retrofitted Hydrogen powered locomotive during 2024 to establish proof of concept for future freight haulage. If successful, this could then be deployed on all our freight locomotives to give freight a much-improved environmental footprint. The use of HVO is being considered as an alternative to diesel on our non-electric passenger trains and the civil engineering yellow plant. Finally, we continue the use of combustion additives in our diesel fuel to improve emission properties.



Funding, Corporate Governance & Transparency

Our Climate Adaptation Strategy infrastructure works will be funded through the Infrastructure Manager Multi Annual Contract (IMMAC) which is the main source of funding for the maintenance and renewal of railway infrastructure. Iarnród Éireann has undertaken a detailed asset condition assessment to determine the steady state funding requirement 2024 – 2033 and an added provision for climate adaptation works will be included in the next five-year IMMAC covering the period 2025 – 2029.

The resilience of the fleet across the different seasons and the recovery of services post incidents is addressed through the fleet maintenance programme which is funded through the public service obligation (PSO) contract with the NTA.

Performance will be reported on and monitored on a quarterly basis in line with the reporting requirements of the Public Service Obligation (PSO) and the Infrastructure Manager Multi Annual Contract (IMMAC).

Iarnród Éireann will prepare governance reporting on all climate adaptation intervention projects. Our approach to managing climate change is broadly aligned with the international standard for adaptation (ISO14090).

Governance structures internally include:

- Reporting to the Iarnród Éireann Board on the delivery of the sustainability strategy, including Climate Adaptation
- Senior Executive Team appraised of sustainability and environmental developments on a four-week period basis
- An Environmental Sustainability Committee, chaired by the Chief Sustainability Officer monthly, with quarterly meetings chaired by a Board member and with senior management representation

Our Climate Adaptation Strategy is aligned with the Department of Transport ‘Transport Climate Change Sectoral Adaptation Plan’ (July 2019) prepared under the National Adaptation Framework.

Our Climate Adaptation Strategy is also aligned with the UN Sustainable Development Goals 11 and 13.





Storm Ali, Tullamore, 2018



Clonsilla, Dublin, March 2018



DART line coastal flooding, March 2018



Storm Kathleen, April 2023



Storm Babet, Waterford Station, 2023



Kiltartan level crossing, Glaway, 2009



Flooding on the Northern Line, 2023

