How Etihad Rail Uses Modern AI Technology for the Long-Awaited Passenger Train Service in the UAE

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In brief

Launched on June 30, 2026, Etihad Rail's passenger service connects Abu Dhabi and Fujairah using a sophisticated AI-driven infrastructure to ensure safety, efficiency, and sustainability across harsh desert terrains. The network leverages a comprehensive ecosystem of artificial intelligence for real-time track monitoring, automated maintenance, and a seamless digital passenger experience.

On June 30, 2026, the UAE opened a new chapter in its transport story. Etihad Rail's passenger train service officially began running, connecting Abu Dhabi's Mohamed bin Zayed City Station to Fujairah's Al Hilal City Station in just 105 minutes, at speeds up to 200 km/h. The demand was immediate - over 10,000 tickets were sold, and the first services sold out within 48 hours.

But what makes this railway genuinely interesting isn't just the trains themselves. It's what's running quietly in the background: a deep network of artificial intelligence that keeps the trains safe, on time, and running smoothly across some of the harshest terrain in the world. Here's a breakdown of how AI actually powers this railway, from the tracks to your phone.

A Quick Look at the Launch

The first phase of the service uses 13 passenger trains, each able to carry around 400 people, running through a mix of desert and mountain landscapes. To encourage early ridership, Etihad Rail launched with a 50% introductory discount - Comfort Class tickets dropped to AED 55 (from AED 109), and Premium Class to AED 120 (from AED 239).

This is just the beginning. Etihad Rail is aiming to carry 36 million passengers a year by 2030, and the entire network is being built with AI at its core, not added on as an afterthought.

The AI Foundation: Built on the UAE's National AI Network

Etihad Rail isn't building its AI systems in isolation. It's plugged into the UAE's broader national AI push, working closely with Presight AI, part of the G42 group of companies. This partnership focuses on using big data and generative AI for things like planning, operations, and network analytics.

G42 itself is building a massive AI infrastructure capable of processing huge volumes of data every day. For the railway, this means the systems aren't just reacting to problems after they happen - they're increasingly able to predict issues, adjust schedules, and manage logistics automatically.

Etihad Rail has also partnered with several major technology and engineering companies to bring different pieces of this puzzle together:

- Hitachi Rail - signaling systems, cybersecurity, and the mobile app experience
- L&T Technology Services (LTTS) - AI-powered track inspection technology

- Thales - advanced train control and smart station systems
- SBS Transit (Singapore) - multimodal transport expertise

Together, these partnerships mean the railway operates as one connected system, rather than several separate technologies stitched together.

AI Eyes on Every Kilometre of Track

One of the biggest challenges for any railway in the UAE is the heat. Track surfaces can exceed 50℃, which speeds up wear and tear. Traditionally, railways deal with this through manual inspections and scheduled maintenance - a slow, labor-heavy process.

Etihad Rail has taken a different approach with a system called TrackEi, developed with LTTS. It’s essentially a set of AI-powered cameras and sensors mounted directly onto trains. So instead of sending out separate inspection crews, every regular train journey doubles as a track inspection.

The system uses high-resolution cameras, lasers, and GPS to scan the tracks as the train moves - at speeds up to 100 km/h - and processes everything instantly using onboard computing hardware (rather than sending data back to a distant server, which would be too slow). During early trials, TrackEi inspected around 147 km of track and analyzed nearly 400,000 images.

It’s trained to spot things like:

- Cracks or surface damage on the rails
- Tracks that have shifted out of alignment
- Missing or damaged fastening parts
- Sand buildup or plant growth near the tracks

The goal is simple: catch small problems before they become big, dangerous ones - and fix things on a "just in time" basis instead of a fixed schedule.

Turning Alerts Into Action: Smart Maintenance Scheduling

Spotting a problem is only half the job - someone still needs to fix it. To manage this, Etihad Rail digitized its entire maintenance process using a system called SAP Enterprise Asset Management (EAM). In plain terms, this means every piece of track and equipment has a digital record, and the whole maintenance process - from work orders to repair confirmations - happens electronically, without paperwork.

When TrackEi flags an issue, it automatically becomes a task in this system. Field technicians get the details on tablets, and a scheduling tool then figures out the best time to send a repair crew - usually during off-peak hours - so it causes as little disruption as possible to train schedules.

Fighting the Desert: How AI Helps Stop Sand From Burying the Tracks

The UAE’s shifting sand dunes - some as tall as 150 metres - are a real threat to any railway. Sand can build up on tracks, damage the ballast underneath, and even cause derailments if left unchecked.

Rather than guessing at solutions, Etihad Rail’s engineers used wind and sand simulation software to study exactly how sand moves across the desert near the tracks. Through this research, they designed something called a "Ditch-Berm" system - essentially a shaped ditch and mound combination that redirects wind and traps sand before it ever reaches the rails.

The results were tested and measured carefully. These structures cut wind speed near the tracks by up to 87%, and reduced the amount of sand reaching the rail line by around 74%. TrackEi's cameras now continuously monitor these sand barriers too, alerting crews only when sand genuinely needs clearing - instead of sending teams out on a routine that may not be necessary.

Smarter Signals: Letting Trains Run Closer Together, Safely

As more freight and passenger trains share the same tracks, keeping everything running safely and efficiently becomes harder. Etihad Rail is addressing this with a modern signaling standard called the European Train Control System (ETCS).

The freight network already uses ETCS Level 2, which sends train movement instructions digitally straight to the driver's cabin, removing the need for old-style trackside signals. For the passenger network, Etihad Rail is working with Thales toward ETCS Level 3 - a more advanced version that uses real-time location data (rather than fixed track sections) to calculate a safe "bubble" around each moving train. In simple terms, this lets trains safely travel closer together without slowing things down, because the system is constantly recalculating safe braking distances based on speed, weight, and track conditions.

One App, One Journey: Making Travel Effortless

For a train service to actually replace car journeys, it needs to be genuinely convenient - not just for the train ride itself, but for the entire trip, door to door. This is where Etihad Rail's app and digital ticketing system come in, built with Hitachi Rail as the lead technology partner.

The app lets passengers plan a full journey in one go - for example, taking the Dubai Metro to a connecting bus, then the high-speed train, and finally a taxi at the destination - all mapped out and priced in a single booking. It also handles real-time train tracking, digital tickets, delay notifications, and baggage information.

Ticketing is designed with flexibility in mind:

- Saver - lowest cost, no changes or refunds
- Value - free date/time changes up to 72 hours before travel
- Flex - full flexibility for last-minute plans

Children aged 0-17 get 50% off, infants under two travel free, and passengers over 60 automatically receive a discounted fare. Each passenger can bring one cabin bag (up to 55cm x 40cm x 23cm) - and interestingly, this same size allowance also covers approved pet carriers for dogs and falcons, a nice nod to local travel habits.

Etihad Rail has also partnered with Dubai's RTA to support the Nol Card - already used by over five million people - for simple tap-and-go station access. Looking ahead, the plan is to introduce facial recognition boarding as well, similar to the "smart tunnels" already used at Dubai International Airport, allowing registered travelers to walk straight through gates without showing a ticket or card at all.

Smart Stations and AI-Powered Customer Support

Stations themselves are being built as "smart" environments. Cameras equipped with AI-based video analysis can detect overcrowding or unsafe activity near platforms and alert staff immediately, allowing quicker responses during busy periods.

On the customer service side, Etihad Rail uses AI chatbots that work across WhatsApp, the mobile app, and SMS, in multiple languages. These handle everyday requests like ticket refunds, cancellations, delay updates, and lost-and-found queries - reducing the need to wait on hold with a call centre.

AI for a Cleaner Railway

Shifting people and freight from roads to rail is a major part of the UAE's plan to cut carbon emissions. Every train journey is estimated to take the equivalent of 300 trucks off the road, and the network is expected to help eliminate around 8.2 million tonnes of CO2 each year.

AI plays a role here too - particularly at the Ghuweifat freight terminal, where a solar power system paired with a battery storage unit is managed by smart algorithms that balance solar generation with real-time power needs, covering up to 85% of the terminal's electricity use.

During construction, AI-based environmental modeling was also used to track wildlife movement and adjust the rail route to avoid sensitive habitats like the Al Wathba Wetland Reserve. As a result, the project includes 95 wildlife crossings and relocated hundreds of animals, including geckos and vipers, to safer areas - alongside 1,300 replanted native trees.

What's Coming Next

The June 2026 launch is just the first phase of a rollout that continues over the next year:

- Phase 2 (September 2026): Expansion to Dubai and Al Dhaid, with deeper integration into the Dubai Metro and Nol Card system.
- Phase 3 (December 2026): Extension into the Al Dhafra region, including Al Sila, Al Mirfa, Madinat Zayed, and Liwa - deep desert routes where the sand-mitigation and track-monitoring AI systems will be especially important.
- Phase 4 (March 2027): Full network completion, linking 11 cities across the UAE.

Beyond this, there are early discussions about a future high-speed link between Abu Dhabi and Dubai that could cut travel time between the two cities to around 30 minutes.

The Bottom Line

Etihad Rail's passenger service is a major infrastructure achievement on its own, but the real story is how much of it depends on artificial intelligence working quietly behind the scenes - inspecting tracks, predicting maintenance needs, managing sand in the desert, coordinating train schedules, and making the booking and travel experience genuinely simple for passengers.

As the network expands over the next year, this AI backbone is what will allow Etihad Rail to scale up safely, stay efficient in a tough climate, and eventually move millions of passengers a year - all while keeping the experience as smooth as possible for the people actually riding the trains.