



INTELLIGENCE AT THE PUMP: HOW AI IS REDEFINING FUEL FORECOURT OPERATIONS

FROM REACTIVE MAINTENANCE TO
AGENTIC INTELLIGENCE

Executive Summary

The fuel forecourt is in the middle of a disruption it didn't see coming. Electric vehicles have stretched customer dwell times from two minutes to twenty. Fraud actors are running generative AI to manufacture counterfeit fleet card applications at industrial scale. And across the globe, downstream operators are sitting on vast estates of equipment telemetry that nobody is reading in real time, while dispensers go down, trucks roll unnecessarily, and customers drive away frustrated.

AI is no longer speculative in this sector. Leading convenience and fuel retailers have deployed always-on monitoring across their forecourt estates, generating documented savings of \$1,500 to \$3,500 per site each year through remote fault resolution alone. The technology works. The returns are real. The only open question is why the rest of the industry is moving so slowly.

This paper sets out the case for oil majors and downstream retailers to build a structured AI programme across four value layers: equipment intelligence, fraud prevention, revenue personalisation, and customer retention. We walk through the opportunity, the architecture, the sequencing, and the organisational realities that determine whether these programmes succeed or stall.

\$1.5k–\$3.5k
savings per site/year
(documented deployments)

15,000+
sites now on always-on
AI monitoring

1. The Burning Platform

Three forces have collided to make AI a practical necessity for downstream fuel operators, not a digital-transformation aspiration for the next planning cycle.

1.1 The EV dwell-time shift

The traditional forecourt was built around a two-minute transaction: pull in, pay, leave. Every investment decision on that site, from staffing ratios to retail layout to signage, was calibrated to that rhythm. EV charging breaks it completely. Even fast chargers take 15 to 45 minutes. Rapid chargers are faster, but the volume of vehicles needing slower overnight or en-route charging will dominate most networks well into the 2030s.

That shift turns the forecourt from a fuel point into a destination. Product placement matters now. So do customer service, personalised promotions, dynamic staffing, and chargepoint congestion. None of those things were operationally material when the average visit lasted 90 seconds. AI isn't an optional enhancement to this new model; it's the only practical way to run it.

1.2 The generative AI fraud escalation

Fuel card fraud has always been a cost of doing business in this sector. What's changed in the past 24 months is the industrialisation of the attack. Fraudsters now use generative AI to fabricate card applications that look entirely legitimate, drawing on stolen identity data from illicit marketplaces. The resulting synthetic accounts get approved, then exploited over extended periods without tripping threshold-based detection systems that were never designed for this kind of fraud.

The asymmetry is stark. Criminals are running current-generation AI on the offensive side. Most operators are defending with rule sets that predate the technology entirely. Closing that gap takes more than a model refresh cycle.

1.3 The data dividend left unclaimed

Modern dispensers, point-of-sale systems, and fleet card platforms generate enormous volumes of operational and transactional telemetry. At most major operators, that data flows into siloed systems and gets reviewed after something has already gone wrong. The architecture to use it in real time exists. The operational case for doing so is proven. The barrier is organisational: someone has to decide to move from reactive to proactive and invest accordingly in the data infrastructure that makes it work.

C-suite imperative

The question is not whether AI will transform fuel forecourt operations. It already is, and documented deployments at scale prove the case. The question for boards and executive teams is whether they act from a position of strategic choice or are forced to catch up later at far greater cost.

2. The Four AI Value Layers

A well-structured AI programme for a downstream fuel operator needs four distinct but connected value layers. Each one has a different time-to-value, a different data dependency, and a different organisational home. Getting the sequencing right is what separates programmes that build momentum from ones that stall after the first pilot.

Layer 1: Equipment intelligence and remote resolution

The foundational layer, and the fastest to generate measurable ROI, is continuous AI monitoring of forecourt equipment: dispensers, payment terminals, EV chargers, and the rest. The traditional maintenance model is reactive by design. A fault gets reported by a frustrated customer, escalated by a store manager, and eventually resolved by a field technician who might be several hours away. Every hour the dispenser is down, revenue walks out. Every unnecessary truck roll burns cost. Neither outcome is acceptable when the alternative exists.

AI monitoring changes this in two concrete ways. It surfaces faults before customers encounter them, by catching anomalies in equipment performance data early. And it resolves a meaningful share of those faults remotely, without dispatching anyone. Configuration errors, communication failures, firmware issues: fixed in minutes, not hours.

Deployments at scale within the convenience and fuel retail sector have documented annual savings of \$1,500 to \$3,500 per site, across reduced truck rolls, lower downtime, and IT support overhead. Run that across 1,000 sites and you're looking at \$1.5M to \$3.5M annually from a single use case. That's not a projection; that's a published figure from live operations.

Layer 2: Agentic fraud detection and autonomous response

The second layer addresses the fraud problem head-on. Rule-based fraud systems were built for a different era. Agentic AI does three things those systems can't: it reads sequential transaction data to catch behavioural patterns that point-in-time rules miss entirely; it decides autonomously whether to flag, block, or re-verify without a human in the loop at each step; and it adapts to new fraud patterns continuously, not on a quarterly update schedule.

For fleet card operators, the financial stakes are immediate: fraud losses, investigation costs, and the reputational hit when a corporate customer gets caught in the crossfire. For forecourt operators with on-site payment infrastructure, there's a second dimension: phishing attacks on staff, now dramatically amplified by AI-generated fraudulent communications that are nearly indistinguishable from the real thing.

Deploying agentic fraud AI requires integration with transaction systems, card management platforms, and identity data. It's not a trivial integration. But the data assets are almost always already present within large operators. The barrier is prioritisation, not infrastructure.

Layer 3: Telematics-driven personalisation and demand generation

The third layer is where the revenue opportunity sits, and it's the most strategically differentiated of the four. By connecting vehicle telematics with fuel card platforms and site management systems, AI can work out where a driver is heading, estimate their remaining fuel or charge level, and push a relevant offer to route them to a specific site before they've even thought about where to stop.

That's a fundamental shift in how forecourt operators think about acquisition. Instead of hoping a driver notices a sign as they pass the site, the platform finds them at the moment of decision, with an offer built around their behaviour and current journey. For fleet operators running thousands of vehicles, the ability to shape fuelling patterns in real time has cost and efficiency implications that go well beyond the margin on any single transaction.

Layer 4: Churn prediction and retention automation

The fourth layer is about protecting customer lifetime value, and it matters most to fuel card operators and loyalty programme managers. AI models built on card-level fuelling data (fill frequency, average volume, product mix, site preferences, spend trends) can spot the early signals of churn weeks or months before a customer actually leaves.

Once identified, automated retention logic can trigger the right response: a tailored discount, an account review call, a pricing tier upgrade. The detection requires AI. The intervention can run through existing CRM and card management platforms. The closed loop of detect, respond, and measure is well within reach for any operator with a reasonably mature card platform.

The numbers are material. A 1% improvement in retention across a portfolio of 500,000 active cards, each with annual fuel spend of £5,000, protects £25 million in revenue. That's not a rounding error in most P&L conversations.



3. Use Case Prioritisation Matrix

The table below maps each use case to its primary value driver and the best available ROI evidence, whether documented from live deployments or modelled from comparable operator data.

Use case	Value driver	Documented ROI
Equipment intelligence	Reduce maintenance cost, maximise uptime	\$1,500–\$3,500/site/year (industry deployments, 2024–25)
Remote dispenser resolution	Eliminate unnecessary truck rolls	Included in above; 40–60% of fault volume resolvable remotely
Agentic fraud detection	Reduce fraud losses, protect card revenue	Earlier identification vs. rule-based; continuous adaptation
AI phishing defence	Protect staff and financial controls	Reduces successful social engineering attacks on forecourt staff
Telematics-driven offers	Drive incremental site visits and volume	Uplift in fuelling frequency; measurable via A/B at pilot sites
EV congestion management	Optimise chargepoint utilisation, reduce customer churn	Prevents loss of EV customers to competing charge networks
Churn prediction	Protect fleet card portfolio LTV	£25M+ protected revenue per 500k cards at 1% retention improvement
Personalised retention offers	Sustain B2B fleet card relationships	Reduced acquisition cost vs. winning back lapsed accounts

4. Implementation Architecture and Sequencing

The most common failure mode in AI programmes is trying to do everything at once. Organisational bandwidth gets exhausted, early wins don't materialise, and the investment case starts to look shakier than it should. A phased approach avoids that trap. We structure ours around three horizons.

Horizon 1 (0–12 months): Operational foundation

Horizon 1 is about getting the foundational use cases live and generating returns that justify the next round of investment. Equipment intelligence at scale, the data infrastructure it needs, and agentic fraud detection on the card platform. The fraud case is urgent and the data prerequisites are already in place at most operators, so there's no reason to defer it.

- Deploy AI-powered equipment monitoring across priority tier of network (high-volume sites, recently upgraded dispensers)
- Integrate fraud detection AI with transaction processing and card management systems
- Establish a centralised AI operations centre with clear escalation protocols for issues requiring human resolution
- Define KPI baselines: truck roll frequency, mean time to resolution, fraud loss rate, dispenser uptime

Horizon 2 (12–24 months): Revenue and retention

With the operational and fraud foundation running, Horizon 2 pushes into customer-facing applications. The data integration work from Horizon 1 needs to stretch further: telematics feeds, loyalty programme data, CRM systems. More complexity, but by this point the organisation has the muscle memory and the internal credibility to manage it.

- Pilot telematics-integrated personalised offer engine with a fleet partner or loyalty segment
- Deploy churn prediction models on card portfolio; integrate with retention campaign automation
- Extend equipment monitoring to EV chargepoint estate
- Establish data governance framework for customer-level AI decision-making

Horizon 3 (24–36 months): Intelligent forecourt ecosystem

Horizon 3 is the mature state: a fully integrated forecourt ecosystem where equipment intelligence, fraud prevention, personalisation, and operational management work as a coherent whole, continuously learning from data across the entire network. It sounds ambitious, but every component has been proven in isolation across Horizons 1 and 2. Integration is the work of Horizon 3, not invention.

- Unified AI platform integrating equipment, payment, customer, and telematics data streams
- Dynamic forecourt management: real-time staffing, product placement, and offer optimisation driven by site traffic and customer profiles
- Network-level predictive maintenance: AI models trained on failure data across the entire estate to predict equipment failures before they occur
- Continuous fraud model adaptation with minimal human intervention

Critical success factor

The single biggest determinant of AI programme success isn't the quality of the technology. It's the quality of the data. Operators who invest in data infrastructure, governance, and integration in Horizon 1 will find Horizons 2 and 3 materially faster and cheaper. Operators who defer that work will hit the same wall at every subsequent horizon and wonder why their AI programme keeps stalling.

5. Risks and Mitigations

No AI programme is without risk. The following are the most material risks specific to this sector and these use cases.



Data quality and fragmentation

Most large fuel operators have accumulated telemetry, transaction data, and customer data across multiple partially integrated systems built up over decades. Data quality, meaning completeness, consistency, and timeliness, is frequently the practical rate-limiter for AI deployment. This is especially true for the personalisation and churn use cases, which need clean, longitudinal data at the individual card level. The mitigation is straightforward: treat data infrastructure as a first-order workstream, not something to sort out after the AI is already running.



Organisational change resistance

AI monitoring and remote resolution change real jobs: field service technicians, operations managers, helpdesk teams. If that change isn't managed proactively, the AI programme will encounter resistance that slows deployment far more than any technical problem. The mitigation is a genuine reframing, not a communications exercise. Fewer wasted journeys. Faster resolution. Better tools. That's the honest case for the people whose roles are changing.



Vendor concentration and build/buy decisions

The market for AI-powered forecourt management platforms is consolidating fast. Operators who commit deeply to a single vendor risk significant dependency if that vendor gets acquired, pivots, or falls behind the technology curve. The mitigation is architectural: API-first design, clean data portability, and an honest evaluation of the build/buy/partner spectrum before committing to any platform.



Regulatory and data governance requirements

Customer-level AI decision-making, particularly in fraud detection and personalised offers, sits inside evolving data protection and financial conduct regulation across every major market. Blocking a card or declining a transaction based on an automated decision requires a transparent, auditable model. The mitigation is to design compliance into the platform architecture from day one. Retrofitting governance onto a live system that's already making thousands of decisions a day is painful, expensive, and often inadequate.



Conclusion:

The fuel forecourt is one of the most data-rich, most operationally complex, and (until recently) one of the least AI-enabled environments in the downstream energy sector. That's changing. Deployments already in production across the convenience and fuel retail sector show that always-on AI monitoring isn't a pilot or a proof of concept anymore. It's a mature capability delivering real returns at real scale.

The window of competitive differentiation is closing. Operators who deploy AI equipment intelligence in the next 12 to 18 months will accumulate three to five years of operational learning and cost advantage before it becomes standard practice. Those who wait won't just pay more to catch up; they'll be doing it while their competitors have already moved on to the revenue and retention layers.

The path is straightforward enough: build the data foundation, get the operational use cases live first, generate the returns that fund the next layer, and treat the EV transition as the forcing function it is. The forecourt model isn't dying. It's changing faster than most operators have planned for, and AI is how you keep up.

About this paper

This point of view draws on published deployments, industry research, and primary sector knowledge in fuel retailing, downstream operations, fleet payments, and AI-powered maintenance systems. It is intended for C-suite and senior leadership audiences in integrated oil majors, fuel retailers, and fleet card operators.



Authors



Nandkishor Wankhede

Principal Consultant, Infosys Consulting — Mobility & Convenience

Nandkishor has spent 13+ years working across strategy, finance, operations and product in the energy and mobility space. He worked in fuel retail. EV operations, trading and downstream.



Vikram Chandrashekar

Associate Partner, SURE — Infosys Consulting

Vikram has 25+ years in Energy consulting. He worked with supermajors, NOCs and new-energy companies across upstream, midstream and downstream.

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For more information, contact consulting@infosys.com



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