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CSRA ANNUAL SAFETY IN PRACTICE REPORT

2025

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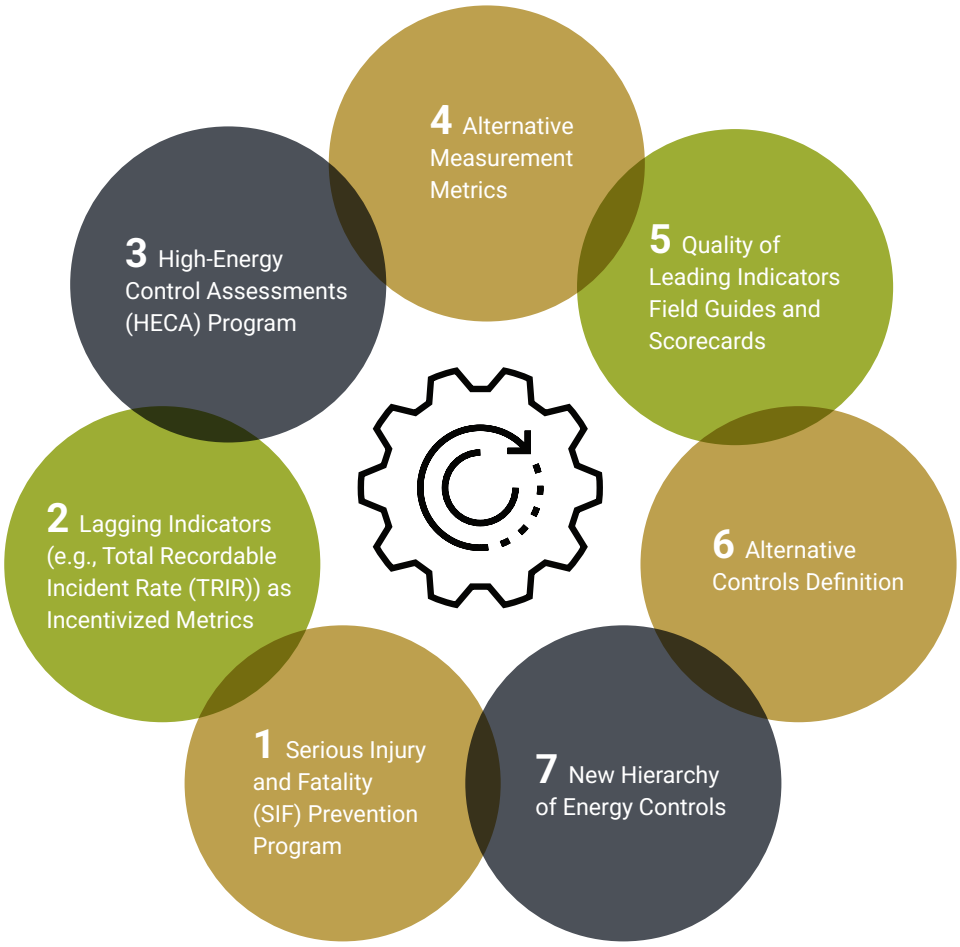
Contents

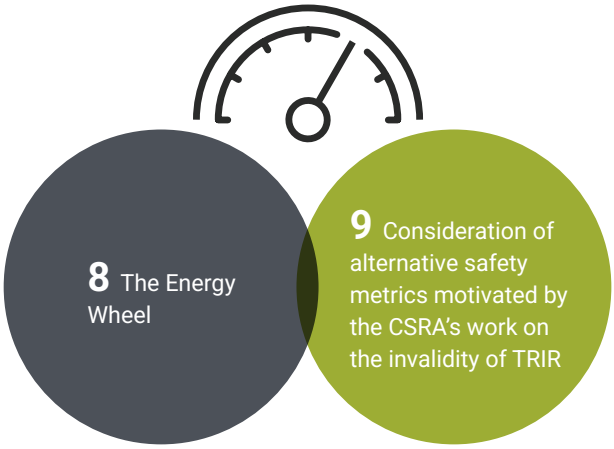
Overview

Section 1 of the **2025 CSRA Annual Safety in Practice Report** presents insights from 72 companies on the implementation of 7 safety concepts from the CSRA's research. These concepts are:



This report provides a structured summary of industry experiences, challenges, and discussion points related to each of the 7 safety concepts in practice. It is designed to help safety professionals understand how their peers are approaching safety implementations, what common factors influence decision-making, and how companies are integrating safety research and other concepts into their operations.

Section 2 of the **2025 CSRA Annual Safety in Practice Report** presents the first statistical impact testing conducted by the CSRA. This section evaluates the impact of two key research concepts:



Using longitudinal recordable injury data and implementation timelines, the researchers examined changes in TRIR before and after adoption, comparing organizations that implemented these interventions with those that did not. The analyses focus on identifying measurable patterns associated with implementation while accounting for baseline trends and natural variability in injury data.

What This Report IS

This report is a learning resource for CSRA members to share and explore implementations of different safety concepts. It provides valuable insights to help companies make informed decisions based on peer experiences within the CSRA. Readers can use this report to:

- Read about others' experiences in applying safety practices and research findings.
- Learn about potential challenges and concerns that arise during implementation.
- Understand key discussion points if still evaluating whether to adopt a concept.
- See how to plan implementation if moving forward with a particular safety initiative.
- Find quotes and insights from industry peers to guide decision-making.
- Review statistical impact analysis of safety programs on injury rates based on ample data from the CSRA community.

By summarizing real-world experiences, this report serves as a tool for discussion, helping safety professionals refine their strategies and anticipate potential barriers.

What This Report IS NOT

This report is not an endorsement of any specific safety activity or best practice.

- Readers should approach this report as a **peer-to-peer knowledge-sharing resource**, rather than a validation or recommendation of any practice.
- All research topics in this report are rigorously researched by the CSRA, and their connection to SIF prevention is tested through empirical, peer-reviewed academic literature.

The goal is to facilitate learning and discussion rather than to endorse any specific approach.

Key Takeaways

- In line with the CSRA's vision, 47 companies (65%) reported having a SIF prevention program already implemented. The remaining number of companies were either in the planning or consideration stage. No companies reported not considering.
- A large majority of companies (63%) do not have compensable safety metrics. All of these companies reported concerns related to leadership overreaction and misplaced focus on low-severity recordable injuries. Among the 24 respondents (33%) who tie incentives for executive to middle leadership to safety performance metrics, the most cited reason is to build organizational commitment to safety.
- HECA adoption is accelerating: from 2024 to 2025 implementation increased from 20% to 26%, planned-to-implement rose from 38% to 44%, and the "still considering" group declined by 14%, signaling a clear shift from exploration to execution.
- Leading indicators dominate alternative safety measurement, with quantity-based leading indicators[1] emerging as the most commonly used alternative metric (47%) in transitioning away from exclusive reliance on lagging metrics.
- Safety climate surveys are widely implemented (55%, 2024 Safety in Practice Survey) but infrequently used as metrics (19%), suggesting they are primarily treated as diagnostic and learning tools rather than formal alternative performance measures.
- Adoption of CSRA Quality of Leading Indicator tools remains limited, with only 13% of companies reporting active use; most organizations reference the tools for guidance and training rather than formal measurement.[2]
- Although newly defined, Alternative Controls are widely viewed as the missing piece in energy-based safety, with 15% of respondents already reporting implementation and 38% planning adoption, signaling clear relevance as a complement to direct controls in managing high-energy exposures.
- The new hierarchy of energy controls represents a foundational realignment of traditional control hierarchies, with the majority of companies planning implementation (36%) followed by 32% still considering and 15% already implemented. By explicitly integrating Direct and Alternative controls, the hierarchy closes the loop in energy control theory and practice, with implementation patterns closely mirroring those observed for Alternative Controls.

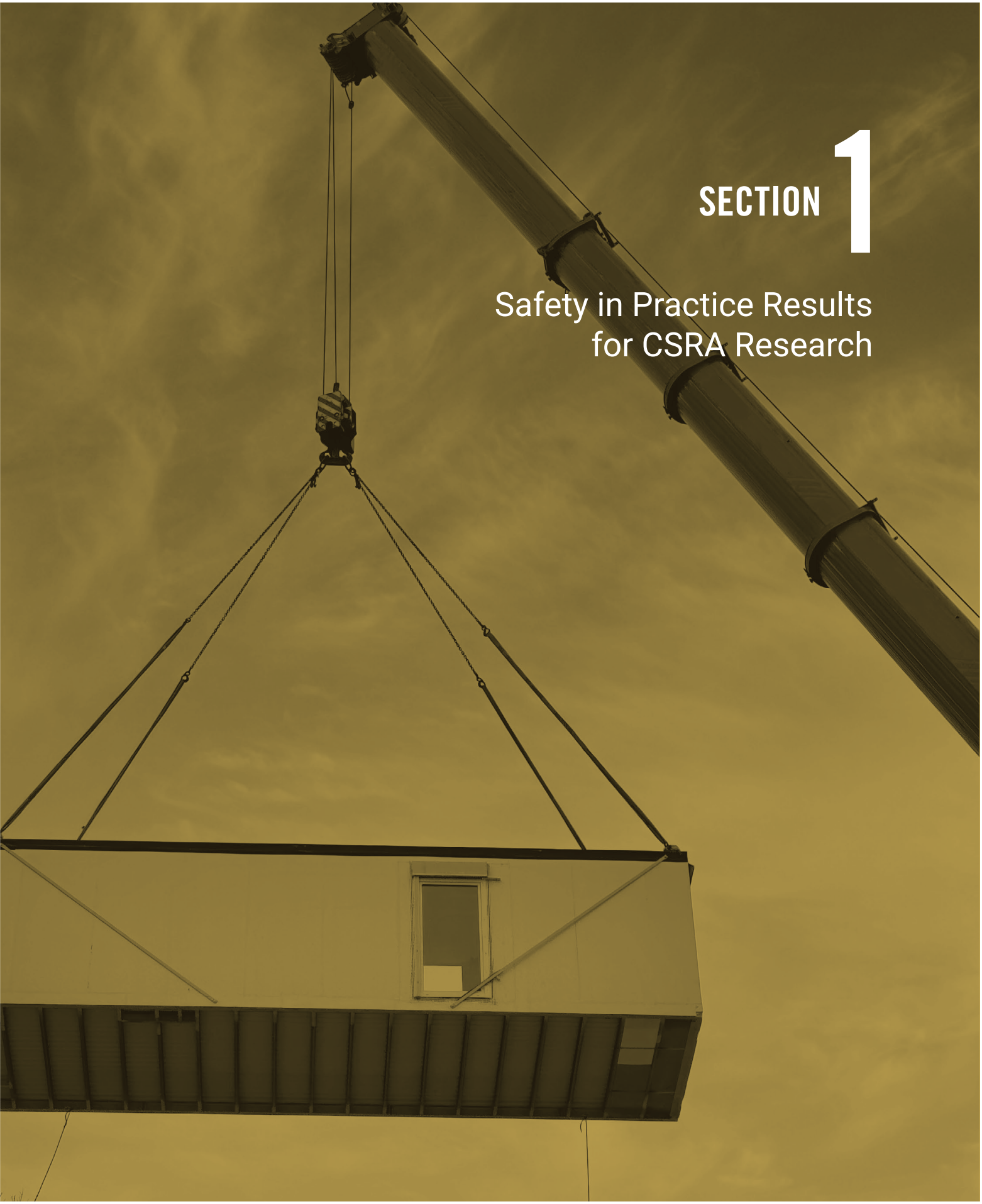
Impact analysis results

Only the following two interventions had sufficient data for analysis, and results reflect single-intervention impacts; future analyses should examine combined effects.

- Companies that recognized the invalidity of TRIR and considered alternative safety metrics experienced an average 0.35 increase in TRIR (≈30% above baseline) following implementation, with effects growing over time. Organizations may be seeing a healthier injury reporting environment by shifting focus towards alternative safety metrics. Further analysis is required to establish causal inference.
- Companies that implemented the Energy Wheel experienced an average 0.43 reduction in TRIR (≈43% below baseline), with larger reductions emerging over time. A sustained decrease in recordable injuries was reported as energy-based hazard recognition became embedded in daily work practices.

[1] A quantity-based leading indicator measures safety performance by counting the number of proactive safety activities completed (e.g., inspections, trainings, observations, or audits).

[2] https://www.csra.colorado.edu/qsli



SECTION 1

Safety in Practice Results for CSRA Research

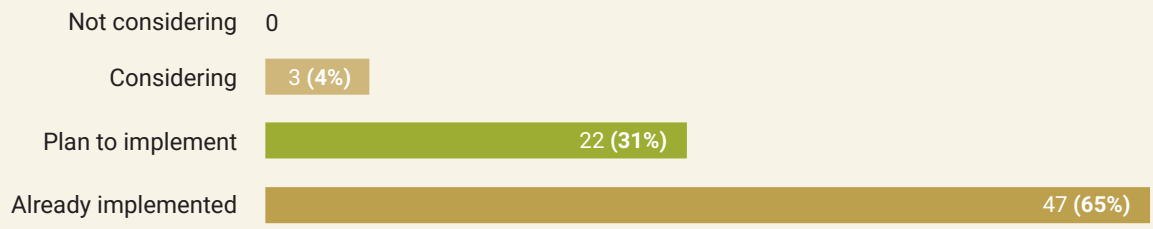
Serious Injury and Fatality (SIF) Prevention Program

Implementation Timeline (for companies who already implemented):

Earliest **2013**

Average **2022**

Latest **2025**



If Implemented: What does it look like?

65% of respondents reported implementing a SIF prevention program. Implementation is characterized by a heightened focus on high-energy hazards and the presence and effectiveness of controls in high-risk work. Core emphasis areas include incident reviews, pre-planning activities, and measurement metrics.

Most organizations began their SIF prevention journey with incident investigations. Standardized definitions of SIF, high-energy hazards, high-energy incidents, and Direct Controls were embedded using the Safety Classification and Learning (SCL) model and the LIFE model. Some companies expanded these definitions to include near-miss and stopped-job reporting. Potential SIFs (PSIFs) were reported as particularly impactful for proactive SIF risk management. Learning teams, regular incident reviews, training activities, and other structured meetings were commonly used to facilitate organizational learning.

65% of respondents reported implementing a SIF prevention program.

Implementation Notes:

SIF prevention programs typically include Energy-Based Safety (EBS), Stuff that Kills You (STKY) and Energy Wheel campaigns along with the embedding of Direct and Alternative Controls. These concepts were incorporated widely into incident learning, corrective actions, work instructions, job safety analyses (JSA), Pre-Job Safety Briefs (PJSBs), and observations through High-Energy Control Assessments (HECA), in coordination with operations.

Implementation typically followed two parallel paths: one focused on culture, leadership, and Human and Organizational Performance (HOP), and the other on SIF strategy through controls, aligned with guidance from research and industry organizations such as Edison Electric Institute (EEI). Companies reported increased success through external benchmarking and research-based standardization.

Successful implementation was described as a multi-year effort, often five to eight years, implemented at the company level, including contractors, and with a continuous improvement mindset. Several companies reported that a zero SIF goal resonated more effectively than traditional zero recordable injury targets. Organizations reported reduced reliance on Total Recordable Injury Rate (TRIR) and Days Away, Restricted, or Transferred Injury Rate (DART). Instead, SIF counts, SIF and HECA rates were used to prioritize SIF.

If Planning to Implement: How do you plan to implement?

SIF Prevention Program:

Organizations reported a slow and deliberate introduction of SIF prevention program elements across the organization, with a focus on building understanding before full-scale rollout. Common elements included:

- **Energy Wheel**
- **High-energy hazards (STKY)**
- **Direct and Alternative controls**
- **Energy-Based Safety (EBS)**
- **Safety Classification and Learning (SCL) model**
- **High-Energy Control Assessments (HECA)**
- **LIFE model for SIF definition**
- **Leading indicators, including Safety observations, Pre-job quality reviews, and Leadership engagements**

Measurement approaches were centered on standardized SIF definitions for SIF and PSIF reporting to establish a baseline to support a meaningful SIF prevention program rollout.

Implementation:

Similar to companies that had already implemented SIF prevention programs, many organizations reported adopting the SCL model for incident classification and rolling out SIF prevention program elements to the field before full adoption. Several organizations reported a full year of preparation prior to implementation.

Implementation planning commonly included:

1. Formalization of the rollout approach with tools, policies, training programs, pre-job brief design, observation programs, performance metrics and leadership support
2. Software integration for injury reporting and observations
3. Alignment with operational guidelines
4. Identification of high-risk tasks, gaps in controls, and control improvement strategies
5. Benchmarking against existing SIF prevention programs
6. Design and implementation of SIF-focused metrics within scorecards to track progress and prioritize SIF risk

If Still Considering: What are the Key Discussion Points?

Only three companies reported they were still considering implementation of a SIF prevention program, citing the discussion points:

SIF Definition and Key Precursors

Progress and Effectiveness Measurement

Alignment with International groups and clients

If Not Considering: Why not?

No respondents indicated that they were not considering implementation of a SIF prevention program.

Lagging Indicators as Incentivized Metrics

Question: Do you have Total Recordable Incident Rate (TRIR), Days Away, Restricted, or Transferred (DART) injury rate or any other injury rate reported across the company?

24 (33%)
Yes, and it is tied to a monetary incentive.

45 (63%)
Yes, but it is not tied to a monetary incentive.

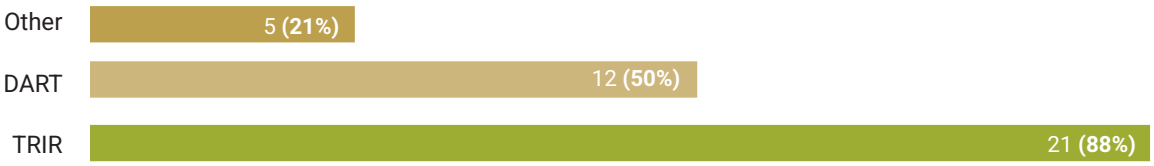
3 (4%)
No.

Most companies track at least one of the TRIR, DART, or other injury rates across the organization. However, the majority (63%) do not use these metrics for compensation, while 33% do. Only three companies reported not tracking any injury metrics at the organizational level.

Yes, and it is tied to a monetary incentive.

Twenty-four (33%) companies reported tying safety performance to monetary incentives. For this subset, the distribution of metrics used shows a strong reliance on traditional lagging indicators. Of these 24 companies:

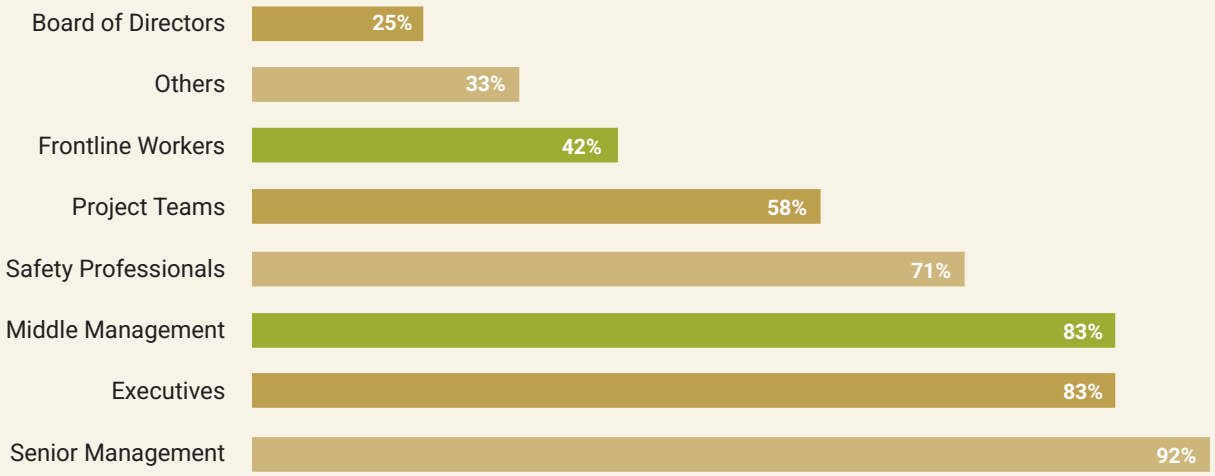
- 88% of companies with monetary incentives included TRIR.
- Of the remaining three companies, two used only DART, and one relied solely on SIF rates.
- Most companies incentivized multiple metrics simultaneously, most commonly TRIR and DART. 50% of companies reported using DART, while only five reported incentivizing other metrics.
- Other metrics cited included HSIF/PSIF counts, SIF rate, Lost Time Injury Frequency (LTIF) rate, leading indicators, and Workers' Compensation Claim rate.



Who Is Incentivized

Safety performance-based compensation was primarily concentrated at the managerial level:

- Senior management, executives, and middle management were the three most frequently compensated groups. This indicates that monetary incentives are commonly used as a management-level safety lever, rather than a workforce-wide mechanism.
- Boards of Directors were the least likely to be compensated for safety performance, with only 4 companies (17%) reporting board-level incentives.
- Only 4 companies (17%) reported company-wide safety incentives, noting that these typically exclude union workers.
- One company noted that TRIR is used for Environmental, Social Governance (ESG) reporting, but carries a relatively low weighting (2.5%) within that framework.
- Other option included non-union employees and shareholders.



Advantages of Compensated Safety Metrics

Companies that reported organization-wide compensated safety metrics identified several perceived advantages below. 5 (21%) of respondents reported no advantage to using compensated safety performance metrics.

Common and Easy: Safety metrics used for compensation are widely accepted across industries, making them easy to measure, track, and report. Their familiarity allows for straightforward internal communication and external reporting.

Benchmarkable: Leadership teams value these metrics because they are easy to monitor over time and support continuous improvement tracking. They also align with external benchmarking expectations, including OSHA Bureau of Labor Statistics benchmarks, and are commonly required by clients as an acceptable industry norm.

Highlights Vision: Leadership teams use compensated safety metrics to signal that injury prevention matters. Incentives are viewed as a way to keep safety visible at the organizational level. One respondent noted, "If anyone is injured, everyone is affected."

Resource Allocation: Incentivized metrics draw increased attention and resources to the areas they reinforce. Several companies reported that when all-severity injury rates are included, significant investments are made in injury prevention initiatives, such as employing athletic trainers to reduce soft-tissue injuries and support employee wellbeing.

Collaboration: Companies reported increased engagement across leadership and the workforce. Financial incentives create a shared stake in safety outcomes, driving higher participation in safety observations, discussions, and injury reporting, along with improved safety awareness, culture, and communications.

Proactive: While two respondents described this approach as proactive, many incentivized measures remain anchored to lagging indicators, which are inherently reactive. Proactiveness may still be argued based on the organizational response they trigger, including earlier intervention and sustained leadership attention. One company noted that incentivizing leading metrics helps keep operational leaders focused on safety performance throughout the year.

Challenges of Compensated Safety Metrics

Companies with organization-wide compensated safety metrics identified several perceived challenges. Two (8%) respondents reported no challenges associated with these incentives.

Overreaction: Respondents described significant pressure in managing leadership reactions to minor incidents. Swift and punitive responses to low-severity events create organizational stress. One respondent characterized this as "sending in the cavalry when medical treatment occurs." Due to this overreaction:

- **Fear and Underreporting:** When leadership compensation is tied to safety outcomes, fear develops at the frontline level. Workers become reluctant to report injuries or near misses, which undermines learning and erodes safety culture. Overreaction was cited as a key driver of underreporting and secrecy.
- **Case Management Over Learning:** Managers may prioritize managing recordability over learning from incidents, including downgrading events to avoid recordable outcomes. This creates an illusion of improved performance. The editor notes this reflects a residual belief from a long-debunked interpretation of Heinrich's Pyramid, that reducing low-severity injuries will causally reduce SIFs, while also incentivizing omission or falsification of injury data.

Focus Misplaced: Both employees and leaders tend to focus on TRIR outcomes rather than prevention programs. This approach does little to support SIF prevention through improved controls. One respondent noted that a company can have a "good" TRIR while having no effective controls over high-risk tasks. Respondents cited the following limitations of TRIR:

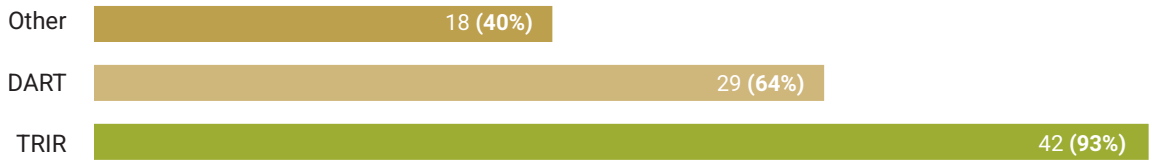
- **Random:** TRIR is highly variable, influenced by chance events, individual worker health conditions, and subjective reporting at low severity levels. For global organizations, this issue is amplified by regional differences. Several respondents questioned the emphasis on decimal-point differences given the documented invalidity of TRIR.
- **Reactive:** A hyperfocus on lagging indicators often comes at the expense of leading indicators. As a result, proactive safety efforts and prevention activities receive less attention. The organization ends up spending all its time trying to fix the past, rather than focusing on the present or the future.
- **Unrealistic:** These metrics create confusion across all organizational levels, including leadership, due to unrealistic expectations around injury counts. Because TRIR is not calibrated for severity, performance targets become misleading, lack context, and distract from the goal of preventing SIFs.

Undermines True Safety Culture: The goal-oriented nature of monetary incentives promotes a narrow "target-must-be-met" mindset rather than openness and learning. Safety risks becoming a check-the-box activity aimed at achieving bonuses, rather than a shared commitment to prevention.

Yes, but it is not tied to a monetary incentive.

Forty-five companies (63%) reported tracking safety performance metrics without tying them to monetary incentives. Similar to incentivized programs, this subset showed a strong reliance on traditional lagging indicators. However, companies in this group reported a much wider variety of metrics in the "Other" category, reflecting greater flexibility in how safety performance is defined and monitored. Of these 45 companies:

- 93% of companies reported TRIR, followed by 64% reporting DART, and 40% reporting other metrics.
- Most companies reported multiple safety metrics. However, 22% reported only TRIR, and 4% reported only DART.
- Other metrics reported included: LTIR, Severity-Based Lagging Indicator (SBLI), SIF rate, SIF actuals, PSIFs, ASTM 292 based metrics, STKY rate, STKY controlled rate, Near-miss reporting rate, (Preventable) vehicle incident rate, First aid reporting and first aid rate, Safety inspections and observations, Experience Modification Rate (EMR)



Use of Non-Incentivized Safety Metrics

While not tied to monetary incentives, companies reported a broad and intentional use of safety performance metrics across multiple organizational functions. Although many organizations still track and report TRIR, there is a clear effort underway to supplement it with a broader suite of leading and monitoring indicators.

Performance tracking and reporting

- Establishing baseline safety performance and monitoring trends over time.
- Routine reporting (weekly, monthly, annual) is linked to improvement plans.
- Use of metrics as KPIs communicated through dashboards and reports to facilitate discussion.
- Evaluating the effectiveness of safety programs and initiatives.
- Metrics are used to establish safety goals even when no financial incentives are attached. Goals are framed to guide continuous improvement and focus attention rather than drive compensation outcomes.

Learning and organizational insight

- Supporting targeted incident reviews and identification of risk factors.
- Shifting the emphasis from injury rates toward learning from events and conditions that contribute to risk.
- Using data to inform leadership conversations and operational decision-making.

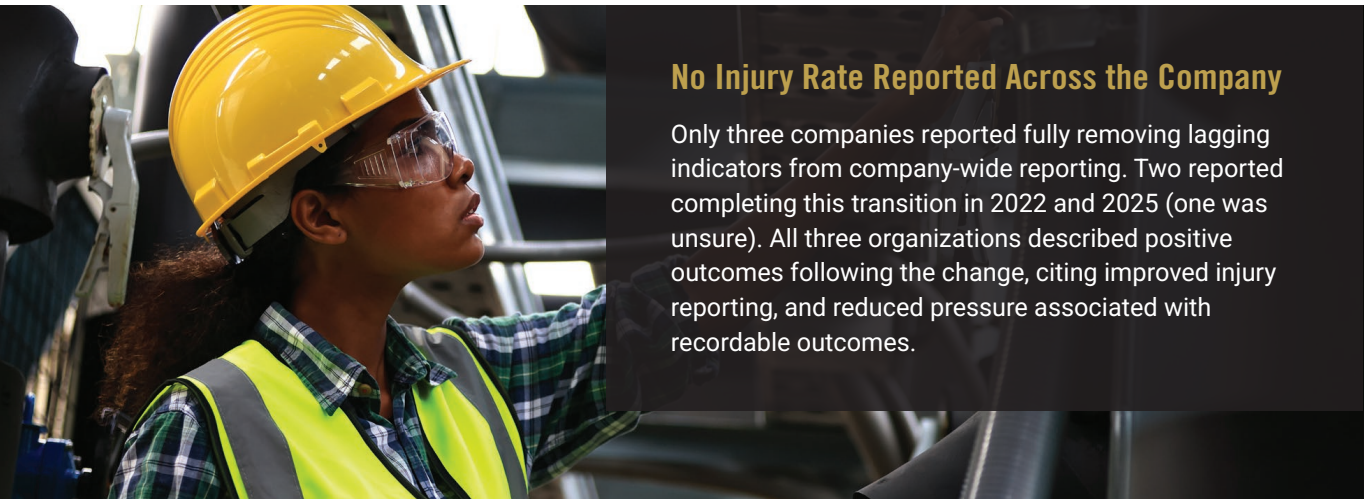
Benchmarking and external reporting

- Internal and external benchmarking across business units and peer organizations.
- Reporting to regulatory bodies (e.g., OSHA) and supporting ESG disclosures.
- Facilitating collaboration and sharing of best practices across companies.

Contractual and commercial applications

- Use of safety metrics in pre-bid approvals, contractor prequalification, proposals, and other bidding processes.

Notably, one company reported a deliberate shift away from TRIR as a compensable metric. This transition initially resulted in a significant increase in reported recordable injuries. This was interpreted as improved reporting, greater transparency, and a strengthening of safety culture. The organization reported improved leadership safety conversations and a clearer refocus on SIF risk rather than recordable injury rates alone.



No Injury Rate Reported Across the Company

Only three companies reported fully removing lagging indicators from company-wide reporting. Two reported completing this transition in 2022 and 2025 (one was unsure). All three organizations described positive outcomes following the change, citing improved injury reporting, and reduced pressure associated with recordable outcomes.

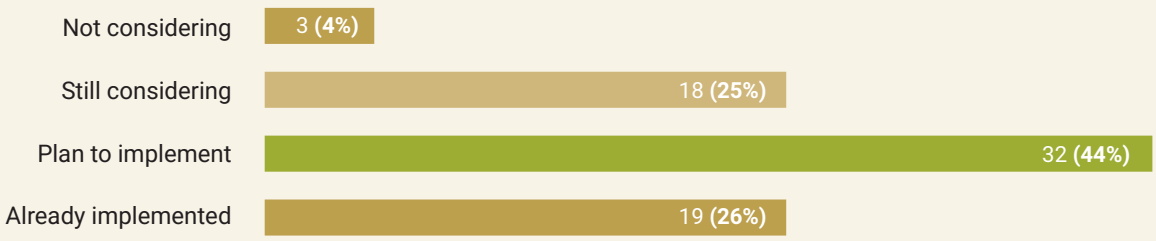
High-Energy Control Assessments (HECA) Program

Implementation:

Earliest **2017**

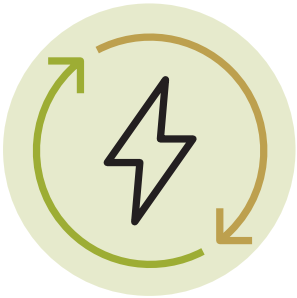
Latest **2025**

Average **2023**



Since last year, the HECA implementation rate improved from 20% to 26% and the *plan to implement* rate improved 38% to 44% while still considering went down by 14%. We observe a trend towards the rapid adoption of HECA.

If Implemented: What does it look like?



The majority of the companies who reported having implemented HECA agreed to share data with the CSRA, creating strong momentum for future learning and community benchmarking.

While the 2024 CSRA Safety in Practice Report documented early implementation patterns, this year's responses reflect greater practical maturity. Organizations now report clearer expectations around what is required to design, operationalize, and sustain a successful HECA program. Key themes from company responses included:

- Deliberate, foundation-first rollout, grounded in shared understanding of the Energy Wheel, high-energy hazards, and Direct Controls, typically established through structured training and workshops.
- Phased implementation via regional rollouts and pilots, with an expectation of a slow maturation curve and continuous recalibration following initial deployment.
- Integration into existing safety practices, including Pre-Job Briefs, safety/STKY walks, investigations, and other routine safety activities.
- Primary data collection by first-line supervisors and safety professionals, often embedded within broader energy-based observation programs.
- Use of HECA data collection rates as a leading indicator, and data collection targets at both project and executive levels.

- Paired or joint HECA observations to promote shared learning, site-level dialogue, and transparency.
- Data capture through internally developed or third-party software, with reporting and analytics supported by dashboards.

If Planning to Implement: How do you plan to implement?

Organizations planning to implement HECA reported:

- Designing metric use and workflows to effectively leverage HECA data for SIF risk profiling and prioritization
- Planning horizons of 2–3 years to support organizational preparedness, typically including pilot efforts
- Initiating rollout through safety teams, followed by a gradual expansion to the operational leaders and broader organization
- Leveraging existing tools such as Pre-Job Briefs, inspections, job safety assessments, and site walks
- Acquiring software or developing in-house solutions to support data collection and use through safety dashboards
- Reviewing work processes, trade-specific needs, Energy Wheel, high-energy hazards, and Direct and Alternative controls to enable consistent data collection
- Conducting calibration and re-calibration training to support data consistency and reliability

If Still Considering: What are the Key Discussion Points?

Overall, companies emphasized the importance of organizational buy-in and a shared understanding of "why", especially as they try to move executives away from overdependence on TRIR. Many reported completing foundational work, centered on the Energy Wheel, high-energy hazard, and Direct Control concepts. Due to concerns about initiative fatigue, companies stressed the need to pace change as part of a broader change-management strategy to avoid negatively impacting the field.

Reported efforts included collecting resources, scheduling pilots, and determining whether HECA could be integrated into existing systems. There were also ongoing discussions about what additional value a scoring system would provide on top of an existing Direct Control focus.

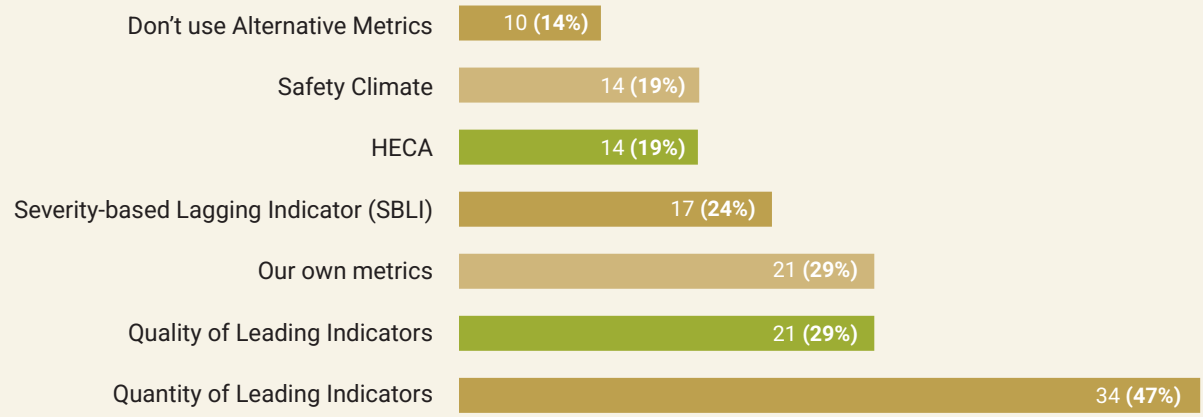
If Not Considering: Why not?

The 3 companies not considering a HECA program cite three primary reasons:

- Client pressure to keep using traditional lagging indicators
- Competing priorities
- Timing issues with other safety management system initiatives

Alternative Measurement Metrics

Implementation:



The Safety in Practice survey examined whether companies use alternative safety metrics and implementation timelines, and how those metrics inform safety decision-making. The quantity of leading indicators emerged as the most commonly used alternative metric (47%), reflecting an initial shift away from traditional lagging indicators. This was followed by quality of leading indicator metrics and company-specific customized metrics. 10 companies out of the 72 reported not using any alternative metrics beyond traditional injury rates.

While 26% of companies reported having a HECA program, only 19% reported using HECA as a metric. This gap is expected, as some organizations intentionally adopt HECA as an observation and learning program without formalizing it as a performance metric, particularly in earlier stages of maturity.

Encouragingly, leading indicator metrics have surpassed Severity-Based Lagging Indicators (SBLI) in reported use, signaling a continued move away from lagging approaches.

In the 2024 CSRA Safety in Practice Report, safety climate surveys were the second most implemented safety concept after the Energy Wheel, with a 55% implementation rate. However, despite their widespread use to assess organizational climate and inform cultural improvements, only 19% of companies reported using safety climate as a metric this year. This suggests that, for most organizations, Safety Climate is treated as a diagnostic or learning tool rather than a formal alternative safety performance measure.

Quantity of Leading Indicators

Practical Use:

- With 47% of respondent companies reporting use, quantity of leading indicators is the primary alternative metric used to set organizational targets and KPIs, typically expressed as activity rates or scoring systems.
- Metrics are tracked regularly, supported by leadership accountability. Two companies reported these as compensable metrics tied to management bonuses.
- Used to identify trends, improve reporting transparency, and develop action plans for continuous improvement.
- Support predictive analytics and proactive planning.
- Promote consistent engagement across crews and the safety function.
- Commonly tracked activities include leadership engagements (most reported), observations, safety oversight, field audits, site visits, training completion, and pre-job quality reviews.
- Only one company indicated that while data are collected, they are not currently used for decision-making.

Earliest
2010

Latest
2025

Average
2020

Quality of Leading Indicators

Practical Use:

- Companies most frequently cited quality of Pre-Job Safety Briefs (PJSBs) as an alternative metric, followed by leadership engagements, field observation quality, knowledge checks, at-risk behavior identification, good catch reporting, incident reviews, audits, and corrective actions.
- These metrics are primarily used to drive continuous improvement, support safety coaching, and support corrective actions programs. While not explicitly stated in company responses, the editor infers that this support occurs through issue identification and resolution tracking.
- A consistent theme was the need to clearly define “what good looks like” to ensure consistent application of best practices.
- Leading indicator data are used to support safety analytics, identify trends, and enable routine reporting (e.g., dashboards). One organization reported using this data in their predictive analytics initiative.
- Companies emphasized setting objective and proactive goals for quality and tracking performance accordingly. Interest in internal and external benchmarking was reported by several respondents.

Earliest
2012

Latest
2026

Average
2022

Company-specific Metrics

Practical Use:

Earliest **2004**

Latest **2025**

Average **2019**

The oldest alternative metrics reported are company-specific measures, with the earliest implementation dating back to 2004, indicating that alternative safety measurement is not new and has been widely practiced across the industry. Most metrics in this category were custom-designed leading indicators, tailored to organizational context. Reported metrics included:

- Observation and auditing tools
- Near-miss reporting (e.g., close calls, loss control incidents, pSIFs, STKY controlled vs. "lucky")
- SIF and High-Energy SIF (HSIF) metrics
- Custom leading indicators (e.g., employee safety engagement rates, timely completion of learning events, leadership engagement indicators, safety conversations)
- High-energy identification rates, and Critical Control Verification
- Custom predictive analytics tools
- Vehicle incident rates

These metrics primarily support internal reporting and benchmarking, trend identification, and performance tracking. Organizations use them to evaluate improvement initiatives, gauge the health of their safety programs, and identify and address emerging risks. One company reported using a compensable metric (Loss Control Incident Frequency, LCIF).

Severity Based Lagging Indicator (SBLI)

Practical Use:

Earliest **2013**

Latest **2025**

Average **2021**

Organizations that use SBLI often do so because it captures injury severity, which TRIR does not, and is therefore viewed as an incremental improvement. **Many companies report SBLI alongside TRIR, to highlight how severity trends differ from overall recordable frequency.** As a result, SBLI has become embedded within existing reporting systems and is commonly used as a reference metric for severity.

While companies acknowledge that SBLI carries limitations similar to TRIR, its ability to differentiate severity makes it a useful, yet often internal, metric. One company reported SBLI as its primary company-wide lagging indicator. By contrast, another company reported using SBLI mainly in prequalification packages.

Beyond reporting, several companies use SBLI to inform decision-making, including prioritizing resource allocation, targeting communication and training efforts, and directing field focus and site visits.

One organization also described using SBLI as part of a tiered response framework, where incident severity determines required actions such as notification levels, investigation type, investigation ownership, and follow-up rigor.

HECA

Practical Use:

HECA is the newest metric reported, with the earliest implementation in 2021. Data are typically collected through daily measurements; however, many companies reported measuring HECA without formally reporting it as an alternative performance metric.

A common theme was an emphasis on improving data quality before using HECA as a dependable metric. Several organizations reported conducting HECAs (collecting high-energy and Direct Control observations) while deliberately avoiding use of the HECA score to prevent target-setting behaviors that could compromise data quality. Respondents noted ongoing tension during adoption over HECA's role as a proactive risk indicator versus a metric focused on operational gaps and errors.

For companies using HECA data as a metric, the information is applied across multiple safety processes, including observation programs, Pre-Job Briefs, leading indicator programs, incident investigations, root cause analyses, leadership walks, and job planning. Common uses include:

- Reviewing the most frequently observed high-energy categories
- Assessing the status of Direct Controls in daily operations to strengthen safeguards against SIFs
- Trending high-energy exposures and Direct Controls to establish baselines and monitor risks over time.

Earliest **2021**

Latest **2026**

Average **2024**

Safety Climate

Practical Use:

This is most commonly done through infrequent safety culture surveys. Two companies reported using survey results as a company-level key performance indicator, while one reported no consistent use across the organization. The primary objective of these surveys is to inform safety program modifications, support the development of targeted training, and improve overall safety culture. Other reported uses of this metric include:

- Identifying areas of high and low performance
- Targeting organizational friction points
- Highlighting improvement opportunities
- Directing leadership engagement
- Serving as a communication tool with field employees

Earliest **2007**

Latest **2025**

Average **2017**

Quality of Leading Indicators Field Guides and Scorecards

Implementation:

The companies were asked if they use the Quality of Leading Indicators Field Guides and Scorecards produced by the CSRA. Responses were overwhelmingly "No" (88%), with only nine companies reporting active use.

Based on the 2024 Safety in Practice survey data, reported use of these guides and scorecards remains limited. As in the prior year, adoption appears inconsistent, with most organizations using the tools primarily as reference documents.

Leading Indicator Resource	Earliest	Latest	Average	2024 implementation (n = 64)	2025 implementation (n=72)
Pre-Job Briefs Field Guide and Scorecard	2023	2025	2024	15 (23%)	7 (10%)
Leadership Engagement Field Guide and Scorecard	2022	2025	2024	13 (20%)	5 (7%)
Safety Observations Field Guide and Scorecard	2022	2025	2024	8 (13%)	7 (10%)

If Implemented: What does it look like?

Pre-Job Briefs (PJB) Field Guide and Scorecard:

The most common reported use of PJB tools is as guidance documents for training, coaching, and on-site assessments. Reported use was split between applying the scorecards for measurement, using the field guides for training, or selectively using elements of both. One company reported systematically measuring Pre-Job Briefs quality, with an average rate of 65%. Identified weaknesses included emergency rescue planning, crew participation, comprehensive hazard identification, discussion of mitigations, and explicit discussion of stop-work authority.

Leadership Engagement Field Guide and Scorecard:

Similar to the findings above, companies reported using leadership engagement tools for leader training and periodic assessments. One company reported that the effort was deprioritized due to multiple concurrent initiatives.

Safety Observations Field Guide and Scorecard:

Respondents reported slightly greater use of safety observation tools, with applications extending beyond training to include incorporation into scoring systems to evaluate observation quality. However, several companies emphasized that greater value was found in fostering meaningful, proactive field engagement rather than focusing on data collection through scorecards alone. As one respondent noted, *"The goal is to create a learning culture where observations lead to real-time feedback, safer behaviors, and continuous improvement across projects."*

Another company reported that, despite rolling out these tools, adoption and integration were not successful. Alternative approaches were described, including tracking participation rates to develop and implement improved observation action plans.

If Not Considering: Why not?

The remaining 63 companies that do not use the quality of leading indicator tools cited the following reasons, ordered by frequency:

1. Existing systems are already in place to collect similar leading indicator field data
2. Competing priorities driven by timing and resource constraints
3. Implementation preparations underway, with organizations working to digest and operationalize the tools
4. Limited familiarity with the field guides and scorecards
5. Need for senior leadership education and approval prior to adoption
6. Increased organizational focus on lagging indicators
7. Insufficient integration with operations, limiting relevance and resonance with field teams

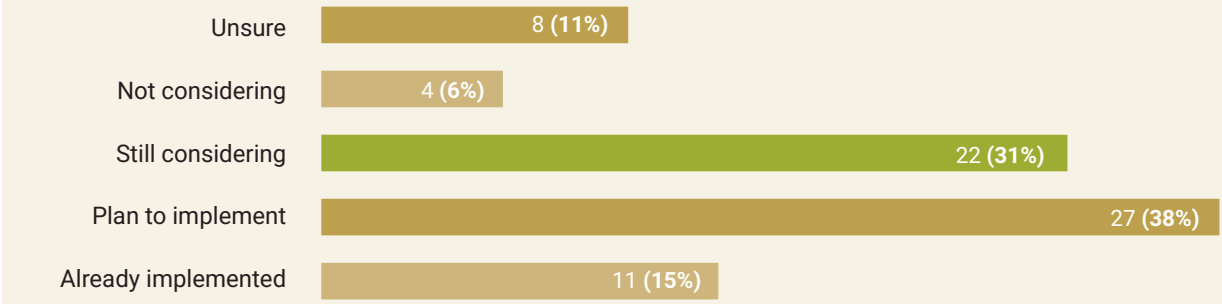
Alternative Controls Definition

Implementation:

Earliest **2023**

Latest **2025**

Average **2024**



If Implemented: What does it look like?

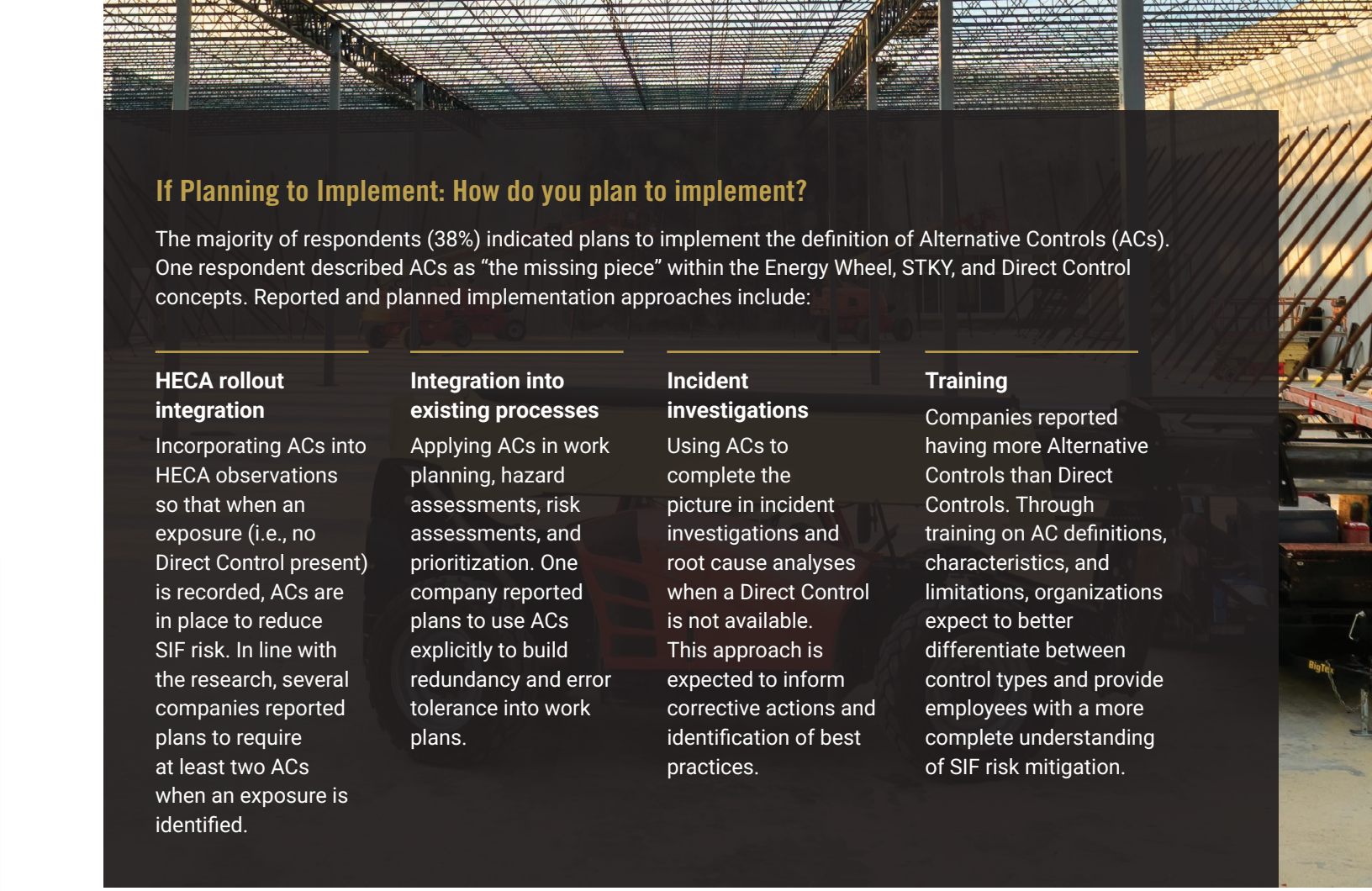
The definition of Alternative Controls (ACs) fills an important gap in practice by complementing the definition of Direct Controls. ACs include physical obstacles, dedicated monitoring, and visual reminders. While the concept itself is newly defined, respondents reported a 15% implementation rate, indicating relevance and practical need. Reported implementation approaches included:

- Use of Alternative Controls in operations planning and field observations.
- Application of ACs to complement existing tools and processes such as HECA, incident investigations, Pre-Job Safety Briefs, and risk registers. In the context of HECA, several organizations noted that when a Direct Control is not present, ACs should intentionally be applied instead.
- A phased maturity approach, where some companies collect data on all forms of Alternative Controls to establish a baseline before narrowing alignment to the CSRA-defined AC categories.

Respondents reported a

15%

implementation rate



If Planning to Implement: How do you plan to implement?

The majority of respondents (38%) indicated plans to implement the definition of Alternative Controls (ACs). One respondent described ACs as "the missing piece" within the Energy Wheel, STKY, and Direct Control concepts. Reported and planned implementation approaches include:

HECA rollout integration

Incorporating ACs into HECA observations so that when an exposure (i.e., no Direct Control present) is recorded, ACs are in place to reduce SIF risk. In line with the research, several companies reported plans to require at least two ACs when an exposure is identified.

Integration into existing processes

Applying ACs in work planning, hazard assessments, risk assessments, and prioritization. One company reported plans to use ACs explicitly to build redundancy and error tolerance into work plans.

Incident investigations

Using ACs to complete the picture in incident investigations and root cause analyses when a Direct Control is not available. This approach is expected to inform corrective actions and identification of best practices.

Training

Companies reported having more Alternative Controls than Direct Controls. Through training on AC definitions, characteristics, and limitations, organizations expect to better differentiate between control types and provide employees with a more complete understanding of SIF risk mitigation.

If Still Considering: What are the Key Discussion Points?

- **Direct control prioritization:** Companies emphasized that direct controls remain the priority. Some expressed concern that introducing ACs could dilute the focus on direct controls and prioritized HECA and direct control maturity first.
- **Change management:** ACs are viewed as a natural extension of energy-based observations so most companies reported the adoption as the next step. Key considerations included timing, resourcing, and training. One company noted the need to better understand and define ACs within their specific work environment before rollout. Initiative fatigue was cited as a concern by multiple companies.
- **Organizational alignment:** As with any company-wide initiative, successful adoption requires alignment from executive leadership through operational teams. For seamless alignment, companies discussed integrating ACs through existing processes such as hazard assessments and pre-job planning.
- **Human error:** Organizations with behavior-based or human-centered safety approaches are already familiar with AC-like controls used to reduce the likelihood of human error. Discussion focused on how ACs align with, differ from, or extend existing concepts in the literature and practice.
- **Internal Vocabulary:** Companies reported using different terms for AC-like concepts within their systems (e.g., critical controls, non-essential controls, indirect controls). There was concern that introducing new terminology could create confusion.

If Not Considering: Why not?

Companies not considering the definition of Alternative Controls cite the following reasons:

- Timing constraints and implementation complexity limiting near-term adoption
- Already implemented a similar process that works well

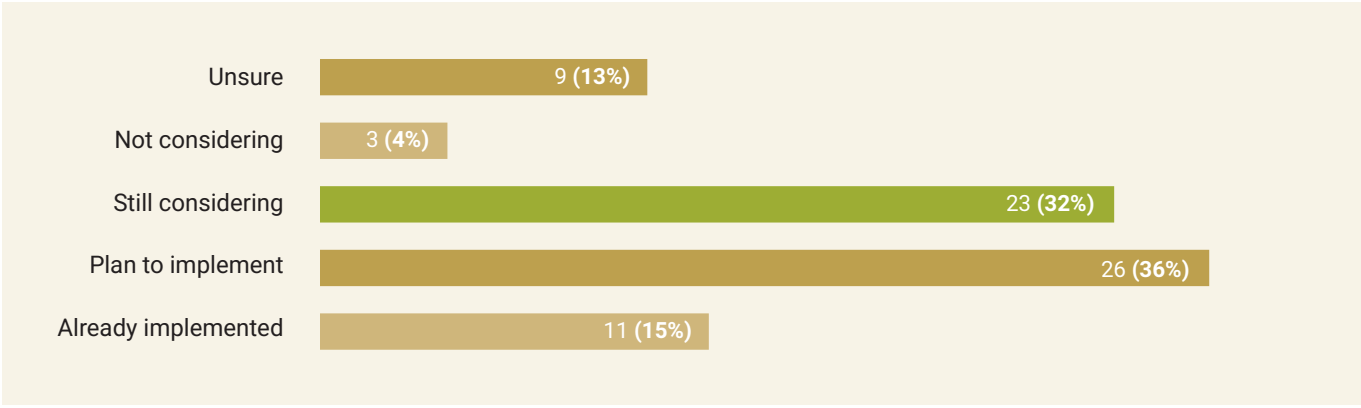
New Hierarchy of Energy Controls

Implementation:

Earliest **2023**

Latest **2025**

Average **2024**



If Implemented: What does it look like?

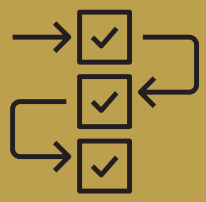
Companies that have already implemented the new hierarchy of energy controls unanimously reported using it to better understand and apply controls in high-energy exposure cases. Direct Controls (energy elimination, reduction, and isolation), together with Alternative Controls, support more consistent evaluation of control sufficiency. The hierarchy is commonly used in safety training to clarify differences among control types and reinforce appropriate application.

Several respondents reported integrating the hierarchy into existing processes such as risk registers, Pre-Job Safety Briefs, and job planning, as well as into new initiatives including HECA and STKY programs. One company reported incorporating the hierarchy tiers into a Safety Action Item Tier Control Metric, designed to capture the level and type of controls associated with risk mitigation efforts.

Companies that have already implemented the new hierarchy of energy controls unanimously reported using it to better understand and apply controls in high-energy exposure cases.

If Planning to Implement: How do you plan to implement?

The majority of companies plan to implement the new hierarchy of energy controls. The hierarchy is expected to be applied in the following areas:



Risk assessments to frame control sufficiency

Control verification practices to consistently verify controls during

Risk registers to prioritize risks and control

SIF prevention and HECA rollout to improve communication of high-energy hazards and corresponding controls

Pre-job planning to address high-energy hazards through informed control selection

Incident investigations to improve incident classifications

High-risk task reviews to consistently identify the controls needed for safe task execution

If Still Considering: What are the Key Discussion Points?

32% of the respondents, close second to those who plan to implement, reported still considering implementation and offered the following discussion points:

Competing priorities: The old hierarchy of controls is already well established, and any deviation would require significant education and resources. Companies discussed whether introducing ACs would meaningfully contribute to risk reduction, with many noting a current focus on high-energy hazards, Direct Controls, and HECA as the primary priorities.

Planning and preparation: Most organizations reported the need to determine appropriate timing, resourcing, and training to support a successful rollout. Opportunities to integrate the new hierarchy into existing processes are being discussed.

Organizational alignment: As with any company-wide initiative, successful adoption requires alignment from executive leadership through operational teams.

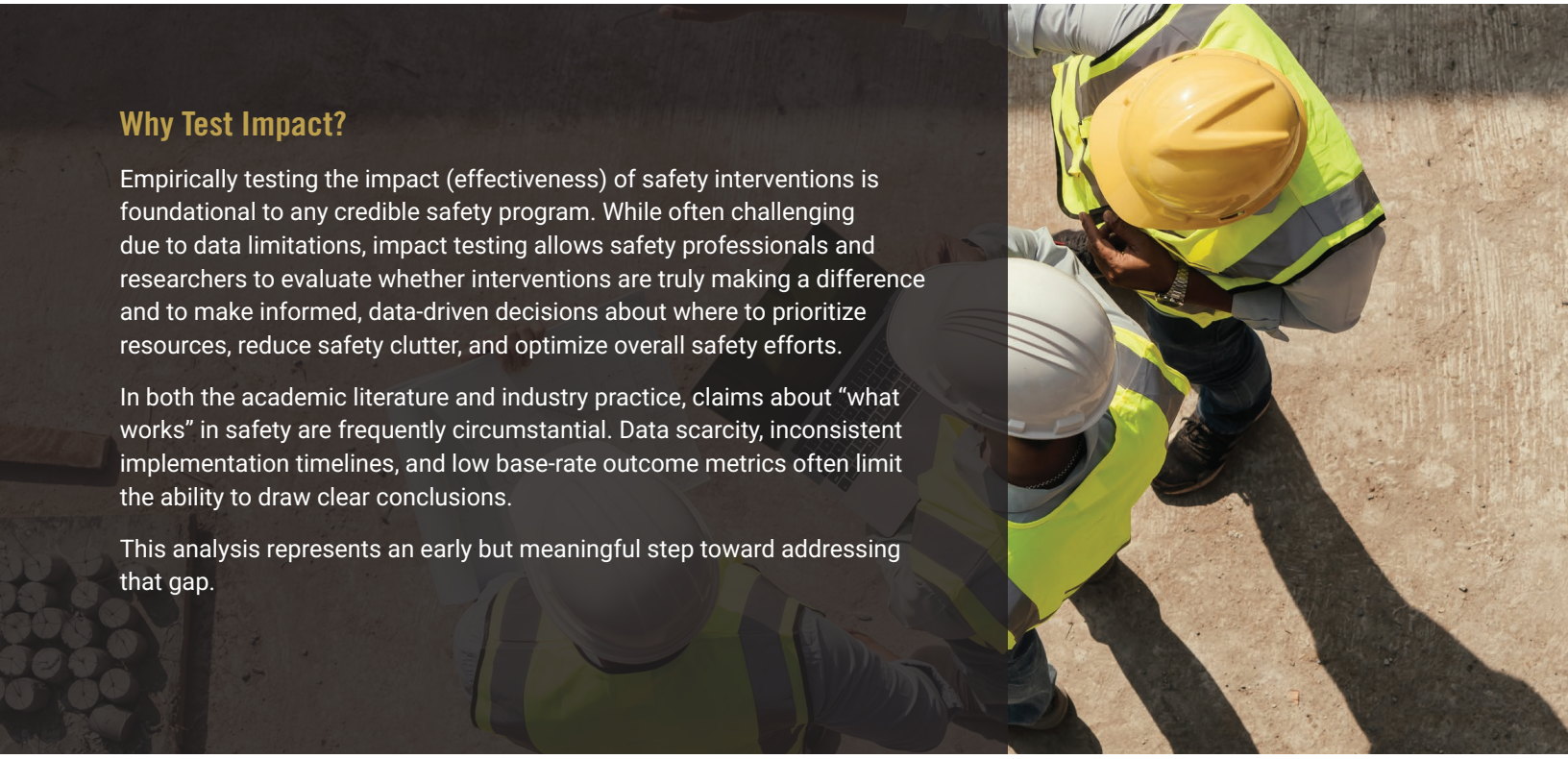
If Not Considering: Why not?

Companies not considering the New Hierarchy of Energy Controls cite the following reasons:

- Timing and resourcing constraints limiting near-term adoption
- Already implemented a similar process that works well

SECTION 2

Impact Testing and Statistical Analysis



Why Test Impact?

Empirically testing the impact (effectiveness) of safety interventions is foundational to any credible safety program. While often challenging due to data limitations, impact testing allows safety professionals and researchers to evaluate whether interventions are truly making a difference and to make informed, data-driven decisions about where to prioritize resources, reduce safety clutter, and optimize overall safety efforts.

In both the academic literature and industry practice, claims about "what works" in safety are frequently circumstantial. Data scarcity, inconsistent implementation timelines, and low base-rate outcome metrics often limit the ability to draw clear conclusions.

This analysis represents an early but meaningful step toward addressing that gap.

Analysis Strategy

Leveraging the CSRA's growing repository of implementation timelines and injury data, including billions of exposure hours, researchers were able to empirically examine the impact of multiple safety interventions on Total Recordable Injury Rates (TRIR).

Rather than relying on anecdotal evidence or single-company case studies, this approach evaluates intervention effects across a large and diverse set of organizations.

Impact Evaluation

To assess changes in TRIR following implementation, the analysis examined:

Average change in TRIR

Provides a clear, high-level comparison between average pre- and post-implementation periods.

Trend-based analysis

Tests whether observed changes reflect sustained shifts in injury patterns rather than short-term fluctuations.

Methodology

A difference-in-differences (DiD) approach is used to estimate intervention impact by comparing changes in injury rates over time between companies that implemented an intervention and those that did not. This is a widely used method in medical, public health, and economic research to evaluate interventions when randomized trials are not feasible.

The intervention date is treated as time zero, and post-implementation trends are evaluated relative to pre-intervention patterns. Staggered adoption enables comparisons both over time and across companies that implemented at different points.

Standard validity checks are applied to account for natural variability in injury data and reduce the influence of random noise.

Limitations

Several limitations should be considered when interpreting these findings.

TRIR variability: Injury metrics such as TRIR can fluctuate substantially in the short term, particularly for organizations with smaller workforces or lower exposure hours. Month-to-month changes may therefore reflect normal variability rather than true shifts in safety performance. To mitigate this, the analysis draws on more than 2 billion worker hours of TRIR data.

Uncontrolled influences: Safety outcomes are affected by many factors beyond a single intervention, including changes in work scope, location, conditions, workforce composition, reporting practices, and concurrent safety initiatives. While the analysis accounts for overall time patterns, it cannot fully isolate the effects of all simultaneous organizational changes or differences in how interventions are implemented in practice.

Generalizability: Findings are based on the companies and the time period included in the study. Although the dataset is large, results may not generalize to all organizations, industries, or contexts and should be interpreted as associations within the study sample rather than definitive evidence of universal impact.

Correlation vs Causation: The DiD analysis in this study evaluates how injury rates changed over time in relation to the timing of safety interventions. This approach identifies statistical relationships, not causation. No causal claims are made, and the results should be interpreted as correlational rather than evidence of direct intervention effects.

Consideration of alternative safety metrics motivated by the CSRA's work on the Invalidity of TRIR

This analysis examines the impact of organizations considering alternative safety metrics following the CSRA's Invalidity of TRIR research. Relevant data was collected through the 2024 CSRA Safety in Practice Survey, as described below.

Number of Companies	Industries Represented	Years of Analysis	Worker-hours Included	Impacted Metric	Reported Metric
29	Construction utilities, oil and gas	2018-2024	2.43 billion	Total Recordable Injury Rate (TRIR) - Monthly	Average change in TRIR

Markers of Implementation

Companies that considered alternative safety metrics and organizationally recognized the invalidity of TRIR reported the following implementation markers:

- **Transition Toward SIF Prevention Programs:** The shift toward SIF prevention represents a meaningful change in how organizations approach safety measurement and the role of TRIR. As limitations of TRIR become more widely recognized, companies have sought alternative lagging indicators. TRIR has not disappeared entirely from safety reporting but has been deemphasized.
- **Management Support:** Middle management buy-in is well established, with senior leadership increasingly aligning around SIF-focused approaches. Partnerships with organizations such as the CSRA, ASSP, NSC, and EEI have supported organizations in shifting away from TRIR toward alternative metrics, managing change, and advancing industry learning.
- **Evolving Metrics Landscape:** As confidence in TRIR declines, organizations are reducing reliance on lagging indicators, in some cases removing them from compensation programs altogether. Leading indicators such as safety conversations, pre-job and pre-construction meetings, field-level risk assessments, critical control verifications, and safety surveys are gaining prominence.

Descriptive Statistics

Of the 29 companies included in the study, 13 reported implementation, resulting in a balanced comparison between implemented and non-implemented groups within the observation period. Implementation occurred between 2018 and 2024, with an average adoption year of 2021, allowing for meaningful comparison of injury outcomes before and after implementation.

Outcome Metric and Baseline Trends

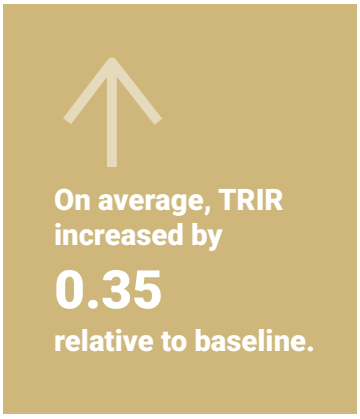
Injury rates were stable before implementation, indicating that changes observed afterward are unlikely to reflect pre-existing trends. Consistent with this stability, companies that later implemented the intervention and those that did not exhibited similar injury patterns prior to adoption.

The absence of meaningful differences prior to implementation serves as a key assumption check, supporting comparisons of outcomes following adoption (*parallel trends assumption*).

Results

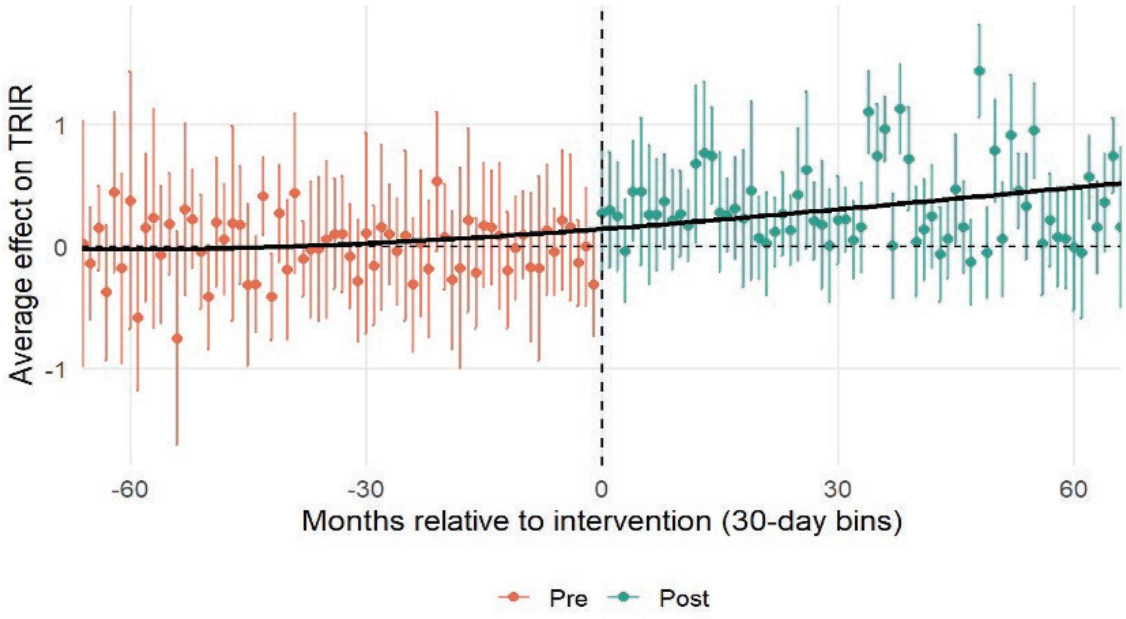
Following implementation, estimated effects show a gradual upward shift in average change in TRIR relative to baseline levels, indicating an increase in TRIR compared to the pre-implementation period. Early post-implementation periods remain close to baseline, while larger effects become more apparent as time since adoption increases. See below graph for reference.

On average, TRIR increased by 0.35 relative to baseline. When scaled to the average pre-intervention TRIR (1.16), this corresponds to an approximate 30.2% increase in TRIR following implementation. The magnitude of the estimated effect grows over time, suggesting a sustained pattern rather than a short-term fluctuation.



Regression Fit of Dynamic Effects

Event-study estimates with 95% confidence intervals



Discussion and Interpretation

The observed increase in TRIR following implementation likely reflects changes in measurement, reporting behavior, and safety management practices, rather than a deterioration in underlying safety performance. As organizations recognize the limitations of TRIR and begin considering alternative safety metrics, reliance on TRIR as a performance or incentive metric is reduced.

With diminished pressure to "manage the number," organizations may report lower-severity injuries more consistently, reflecting improved reporting culture and greater transparency. In this context, rising TRIR may signal the end of the "tyranny of TRIR", where suppressed reporting is replaced by ample data capture and increased attention to severity and leading indicators.

The consistency and direction of the effect suggest that as organizations recognize the limitations of TRIR and adopt alternative metrics, TRIR may increase as injury reporting becomes more complete and less influenced by incentive-driven suppression. **Further investigation is needed to understand how these changes relate to company-specific injury outcomes, and causal relationships still need to be tested.**

The Energy Wheel

This analysis examines the impact of implementing Energy Wheel. Relevant data was collected through the 2024 CSRA Safety in Practice Survey, as described below.

Number of Companies	Industries Represented	Years of Analysis	Worker-hours Included	Impacted Metric	Reported Metric
27	Construction utilities, oil and gas	2018-2024	2.87 billion	Total Recordable Injury Rate (TRIR) - Monthly	Average change in TRIR

Markers of Implementation

Companies that implemented the Energy Wheel reported the following implementation markers:

- **Integration into Day-to-Day Practices:** The Energy Wheel is widely integrated into daily operations as a practical tool for proactive energy-based hazard recognition. Organizations report broad training across safety, operations, and construction roles, reinforced through onboarding and ongoing field communication.
- **Embedding into Existing Safety Systems:** The Energy Wheel is embedded within various safety processes, including job hazard analyses, Pre-Job Briefs, permits, and toolbox talks. It complements existing initiatives such as STKY and Human and Organizational Performance (HOP), with some organizations tailoring it to focus more explicitly on SIF-related energy sources.
- **Energy-Based Reporting:** Organizations increasingly use energy-based data in both leading and lagging indicators, incident and near-miss reviews, and HECA observations. This integration supports more consistent and structured analysis of energy-related risks using established classification and learning frameworks.

Descriptive Statistics

Of the 27 companies included in the study, 14 reported implementation, resulting in a balanced comparison between implemented and non-implemented groups within the observation period. Implementation occurred between 2018 and 2023, with an average adoption year of 2021, allowing for meaningful comparison of injury outcomes before and after implementation.

Outcome Metric and Baseline Trends

Injury rates were stable before implementation, indicating that changes observed afterward are unlikely to reflect pre-existing trends. Consistent with this stability, companies that later implemented the intervention and those that did not exhibited similar injury patterns prior to adoption.

The absence of meaningful differences prior to implementation serves as a key assumption check, supporting comparisons of outcomes following adoption (*parallel trends assumption*).

Results

Following implementation, injury rates show a consistent downward trend, indicating fewer recordable injuries compared to pre-implementation levels for companies who implemented the Energy Wheel. Early post-implementation periods remain close to baseline, while reductions become more pronounced as time since adoption increases. See below graph for reference.

On average, TRIR decreased by 0.43 relative to baseline. Compared to the average pre-intervention TRIR of 1.00, this corresponds to an approximate 43% reduction in recordable injury rates following implementation. The magnitude of the reduction increases over time, suggesting a sustained effect rather than a short-term fluctuation.

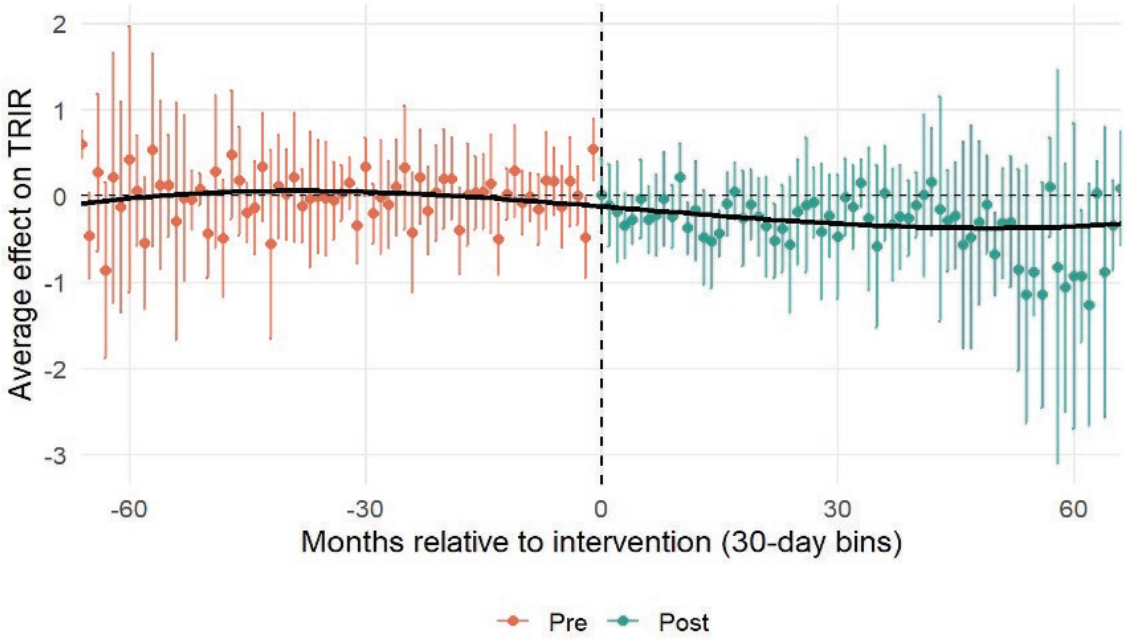
On average, TRIR decreased by

0.43

relative to baseline.

Regression Fit of Dynamic Effects

Event-study estimates with 95% confidence intervals



Discussion and Interpretation

The observed pattern suggests that the Energy Wheel's impact strengthens as organizations continue to use the framework and embed it into routine planning and hazard discussions. As familiarity grows, energy-based hazard recognition becomes more consistent, supporting sustained reductions in injury outcomes.

This finding aligns with hazard-recognition theory, where improved identification and discussion of energy-related risks reduce exposure over time. Because the Energy Wheel does not focus exclusively on high-energy hazards, the observed reductions likely reflect improvements across both higher- and lower-energy incidents. This finding is consistent with the Energy Wheel design and intention as a broad hazard-recognition tool.

Conclusion

In 2025, data was gathered from 72 of the CSRA's 105 research-eligible members, representing a 5% increase in participation compared to 2024. We sincerely appreciate the engagement of participating companies, as their contributions are essential to advancing the CSRA's research and generating meaningful industry insights.

In last year's analysis, a key finding highlighted the need for improved communication of the CSRA research, as unfamiliarity with available resources was frequently cited as a reason for non-implementation or continued consideration. In contrast, this theme appeared less frequently in the 2025 data, signaling progress in the CSRA's research communication and outreach efforts.

A clear pattern emerged around implementation of the CSRA's leading indicator guides and scorecards. While these resources are widely used as references, they were not typically implemented as designed. This suggests that tools intended to refine or improve existing programs face natural resistance, particularly when organizations are hesitant to change practices they perceive as already effective.

In contrast, High-Energy Control Assessments (HECA) have seen much broader adoption. HECA fills a clear gap in present-time risk measurement, offering a systematic solution where none previously existed. This highlights an important lesson for the CSRA's research-to-practice (R2P) efforts: consistent implementation is more likely when research addresses unmet needs rather than providing improvements to established systems.

This report marks the first year the CSRA has conducted a formal implementation impact analysis. Establishing a consistent analytical approach is an important step forward, and its value will grow as more data becomes available. With this foundation in place, continued participation in the CSRA Safety in Practice Surveys will allow our community to collectively test, learn from, and strengthen the impact of safety interventions, moving from shared ideas to shared evidence.

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