

A Responsible Data Sharing Framework for the Distributed Renewable Energy Sector

The bottom line. In collaboration with Nigeria’s Rural Electrification Agency, the World Bank is piloting a Responsible Data Sharing Framework (RDSF) for the distributed renewable energy sector. The framework was developed over the course of 12 months in 2024, through collaboration with some 25 stakeholders from government and the private sector. It embodies a shared ambition to turn data into better outcomes for the communities served. At its core, an RDSF for the sector sets out how appropriate data about projects can be shared in ways that are efficient and effective.

In 2023, the World Bank approved the Nigeria Distributed Access through Renewable Energy Scale-up (DARES) project. DARES aims to bring new or improved access to clean energy to 17.5 million people and replace more than 280,000 petrol and diesel generators in the process. The RDSF pilot is part of DARES.



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What is at stake?

750 million people worldwide have no access to electricity, more than half of them in Sub-Saharan Africa. Distributed renewable energy offers a practical, scalable way to close a significant part of that gap

Distributed renewable energy (DRE)—including solar mini grids and standalone solar—provides uninterrupted electricity to off-grid and underserved communities. To date, equipment costs, economies of scale, financing modalities, and sectoral experience have combined to limit the DRE ecosystem. Rapid growth and acceleration will be needed to reach the World Bank’s new goal of connecting millions in Africa to electricity by 2030 as part of Mission 300, an ambitious effort to provide electricity access to 300 million

people in partnership with the African Development Bank (World Bank 2024; REA n.d.). About half of this population is expected to be reached through DRE (REA n.d.).

Part of Mission 300 is the Nigeria Distributed Access through Renewable Energy Scale-up (DARES) project. DARES is a national platform to unify structured and unstructured data, boosting the capacity of the Nigerian Rural Electrification Agency (REA) to analyze and use information at scale for planning and oversight.

And part of DARES is a new effort to find secure ways to collect, share, and use data in the DRE sector. The pilot Responsible Data Sharing Framework (RDSF) was developed over the course of 12 months in 2024 by the World Bank's Energy Sector Management Assistance Program and the Nigerian Rural Electrification Agency (REA) with the collaboration of some 25 stakeholders from government and the private sector. Developing a prototype RDSF through the DARES project in Nigeria provides an opportunity to test a practical, scalable model that can be adapted and implemented in other countries and contexts.

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Access to timely, trusted, and accessible data is key to improved coordination and learning in the DRE sector. Data is not in short supply. An abundance is generated, stored, processed, and output across the DRE ecosystem—for example, data associated with electricity generation and consumption, calculations of performance metrics, and data on community impacts. Such data has immense potential to help policy makers, funders, and regulators make informed decisions. It also enables operators and industry to learn from and improve their practices. But to realize that potential, the right data must be shared in standardized, usable ways—particularly as the technologies used to collect and manage it grow more complex, including artificial intelligence.

What entities make up the DARES team?

The DARES RDSF gathers in those responsible for producing, processing, or using data in the DRE sector

Stakeholders in the DARES project include DRE developers and distributors (entities that install, maintain, and manage mini-grids, standalone solar, or other types of DRE); equipment suppliers; services supporting DRE projects with administrative and analytical platforms; analysts; financiers, regulators; interest groups and industry bodies; software providers; and nongovernmental organizations.

In general, an organization should be involved in the framework if it is responsible for any of the following tasks:

- ✓ Handling and safeguarding of customers' data
- ✓ Ensuring that a DRE site has data flows in place to fulfil its operations
- ✓ Providing data services that connect third parties with DRE developments
- ✓ Developing monitoring performance metrics for a DRE project or program
- ✓ Using data to undertake analysis and gather insights.

Within this landscape, REA plays a dual role as a convenor and primary data processor. By pooling real-time data from multiple sources, the agency can monitor sector-wide activity, assess developer performance, and generate insights to strengthen program delivery.

The framework is not designed to be directly used by electricity recipients. However, communities are indirectly served by its safeguards. The RDSF is designed to protect the privacy and security of individuals' data and to ensure respect for their rights. All parties to the framework are expected to identify and mitigate risks related to handling personally identifiable data.

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What are the principles behind the DARES RDSF and other RDSFs?

RDSFs set clear expectations and processes, making it easier for organizations to share data with confidence and use it to inform decisions that can deliver maximum impact

Data in the DRE sector exists in different parts of the ecosystem and is collected and controlled by various parties. That is not a design flaw, but a strength. The key to making this data useful is to build strong data governance practices that manage how data is created, shared, and used.

Effective data governance can ensure that valuable data can be accessed and used, while protecting privacy and respecting commercial sensitivities. Done well, this can drive alignment across the sector, rather than divergence. Some examples of existing RDSFs are described in box 1.

Using a common framework to negotiate data sharing agreements is key to aligning interests, building trust, and sharing data effectively. Consent, coordination, and collaboration are principles that can incentivize DRE stakeholders to share data in ways that meet these goals. The three principles are elaborated below.

Appropriate data sharing requires consent. Data in the DRE sector and ecosystem is controlled and processed by various parties. Because these parties interact across a growing number of touch points, risk can arise—for example, unclear guidelines on confidentiality and commercial sensitivity. To ensure secure and appropriate data sharing, parties can and should align in terms of intended purpose; detail their mutual roles and responsibilities; and communicate this shared understanding.

Efficient data sharing requires coordination. Data in the DRE sector varies in its degree of standardization and harmonization, which means more effort is required to produce, use, and interpret it. To reduce inefficiencies, parties can and should agree on common methodologies to compute and process data; establish and document standards for metrics and indicators; and maintain and review shared understandings.

Embedding coordination in the framework helps to foster cooperation over the standards, benchmarks, and best practice agreements that underpin data sharing. In turn, alignment in practice can lead to more effective use and analysis of data.

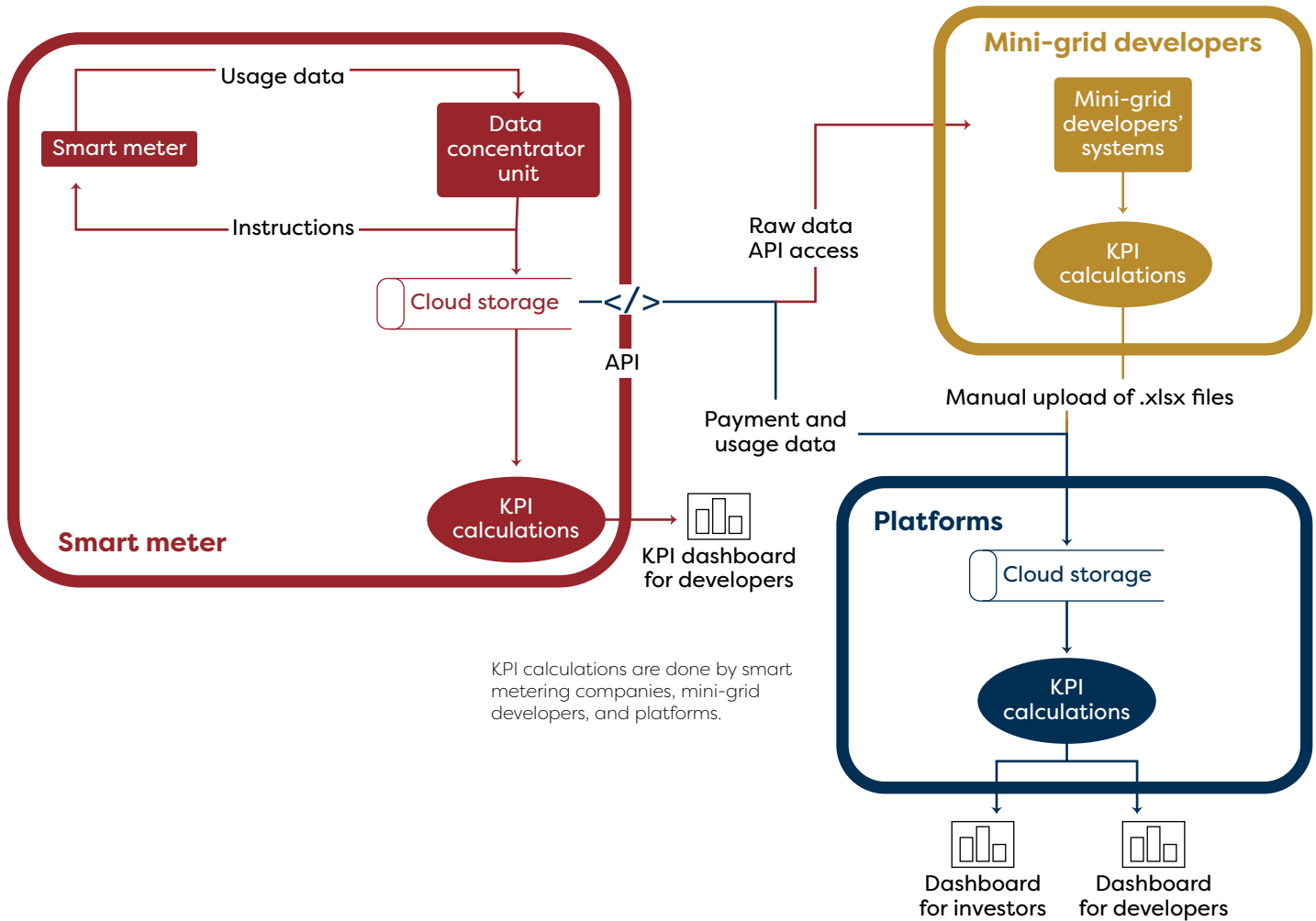
Box 1. Some existing applications of RDSFs

Responsible data sharing frameworks have already been deployed in a number of contexts beyond the distributed renewable energy sector. For example, in 2019, the Global Alliance for Genomics and Health brought together funders, patient groups, regulators, technologists, industry, publishers, and research consortia to develop a framework for responsible sharing of genomic and health-related data (Global Alliance for Genomics and Health n.d.). The framework provides access to data while protecting human rights, complementing regulations, and fostering responsible data sharing.

In 2022, the United Kingdom's Government Digital Service and Central Digital and Data Office launched its Data Sharing Governance Framework to reduce frictions that stop government departments and public bodies from sharing data. The framework was launched as part of the UK's National Data Strategy, which includes a commitment to openness and data sharing (Government of the UK 2022).

In 2023, the Centre for Humanitarian Data, a project managed by the United Nations Office for the Coordination of Humanitarian Affairs, launched "A Principled Framework for Responsible Data Sharing Between Humanitarian Organizations and Donors" (Centre for Humanitarian Data 2023). The framework focuses on building trust and mitigating risk when sharing disaggregated data in humanitarian settings.

Figure 1. Data flow in the mini-grid data ecosystem



API = application programming interface; CRM = customer relationship management; KPI = key performance indicators; NMC = network management card.

Finally, effective data sharing requires collaboration.

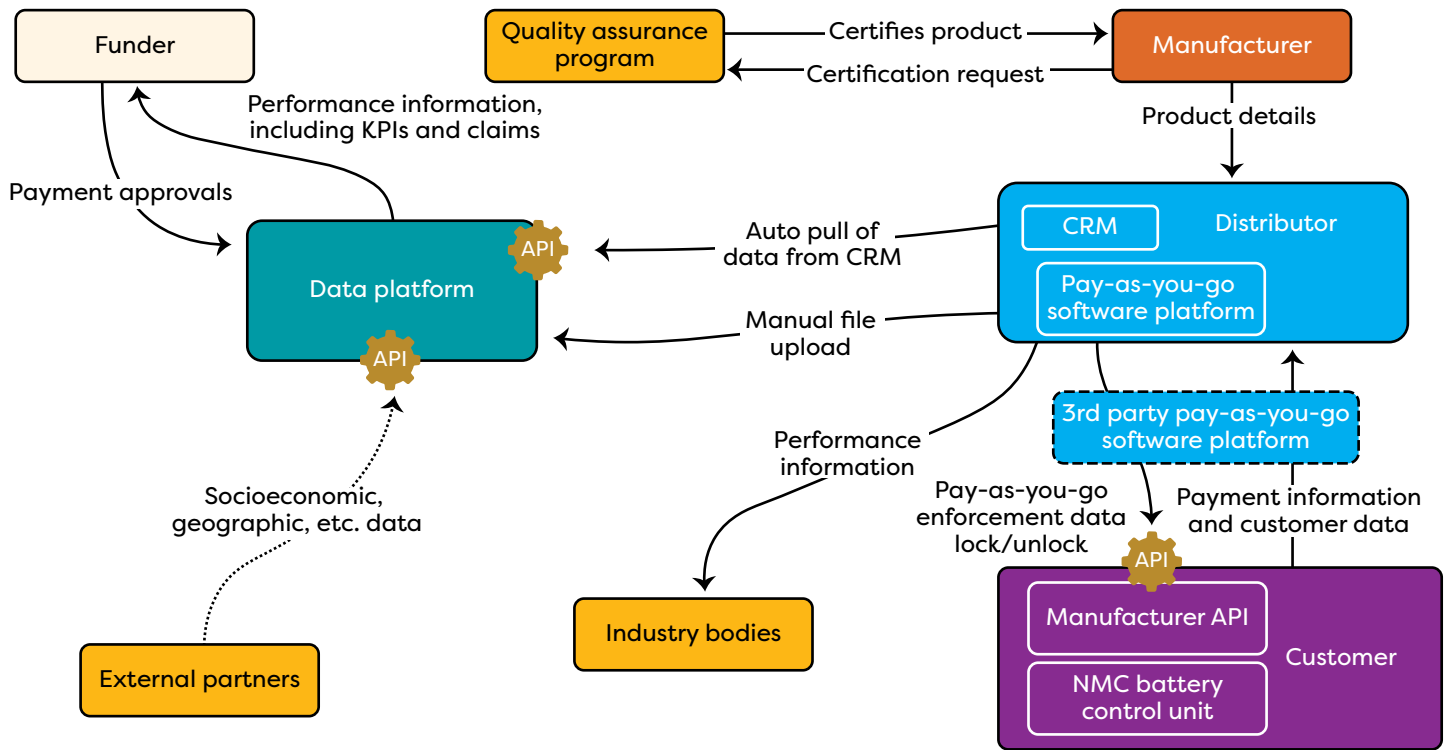
A vision for DRE data is needed to unite stakeholders and catalyze action. Collaboration is required to make the best use of data, the full value of which requires turning data produced and controlled by single organizations into a shared resource. To make this effective, parties should build capacity for all parties to participate; invest in mechanisms to generate insights; and design for longevity.

Figure 1 depicts data flows in the mini-grid ecosystem. The ecosystem has several points of data integration between smart meters, mini-grid developers, and aggregation

platforms. These integration points include manual uploads and application programming interfaces. Across the ecosystem, several formats for dissemination (e.g., dashboards, calculated performance indicators) facilitate responsible data sharing to meet various types of user needs.

Figure 2 depicts data flows in the pay-as-you-go standalone solar ecosystem. Pay-as-you-go distributors manage their services to customers and collect data across their customer base. Distributors can then connect to external platforms to facilitate responsible data sharing with selected audiences.

Figure 2. Data flow in the pay-as-you-go standalone solar ecosystem



API = application programming interface; CRM = customer relationship management; KPI = key performance indicators; NMC = network management card.

The principles of consent, coordination, and collaboration are embodied in three forms: the RDSF; the data sharing agreement; and key performance indicators.

The *Responsible Data Sharing Framework* is a set of principles that inform and guide the sharing of data among participating organizations. These principles ensure that data is shared responsibly, in a spirit of collaboration and coordination, and that trust is built and maintained. The consensus among the organizations is expressed in a formal *data sharing agreement* against which implementation can be monitored. The agreement clarifies who will be sharing data and have access to it, specifies the purpose for which data is being shared, and includes an inventory of the data to which the sharing agreement applies. *Key performance indicators* provide a baseline of information about electrification projects, together with definitions and derivation methods.

These performance indicators can form the basis of a data inventory during the process of specifying the data sharing agreement. The process of building and implementing an RDSF and data sharing agreement is presented in table 1.

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Table 1. Building and implementing an RDSF and data sharing agreement

Milestone	Identify the need for an RDSF	→ Parties commit to an RDSF covering a standard set of KPIs	→ Final design of a DSA to implement the RDSF	→ Sign the DSA	→ Implement the DSA	→ Data sharing begins and compliance is monitored on an ongoing basis
Project timeline	At project inception	→ 6–9 months before data will be shared	→ 3–6 months before data will be shared	→ 1–3 months before data will be shared	→ On signature of DSA (with some preparatory work likely during the design phase)	→ As stipulated in the DSA and dependent on implementation work
Time to completion	1 month	→ 1–3 months	→ 3–6 months	→ 1 month	→ 0–3 months	→ Ongoing

DSA = data sharing agreement; KPIs = key performance indicators; RDSF = Responsible Data Sharing Framework.

What has early implementation of the DARES RDSF taught us?

Early experiences show how different stakeholders in Nigeria are using the DARES RDSF to meet their operational needs, and where refinements are still needed

The perspectives that follow—from the REA and two solar developers—reflect different points in the implementation journey, from building alignment and compliance to adapting in the field and pushing for greater transparency.

For the REA, early implementation has shown the importance of pairing structure with accountability. While the DARES project is still in its early stages, the presence of a formal agreement has already helped to set expectations and promote compliance. Looking ahead, the REA has identified the need for tools or mechanisms to track developer commitments across the project lifecycle to ensure continued alignment. In future iterations of the framework, supporting documentation could be tailored to reflect the different roles and data access levels of stakeholders to support clearer, more effective engagement.

This emphasis on clarity was echoed by Odyssey Energy Solutions, which operates a technology platform that connects solar developers and financiers and provides the data platform for the DARES project. In earlier DRE programs, Odyssey found that data requirements were often unclear or

introduced late in the process of an application—often after developers had already submitted sensitive financial data. With the DARES RDSF, the data sharing agreement is present at the start of the application process, making expectations around data collection and protection explicit from the outset. For Odyssey, the early focus on data governance has helped to build trust among actors, supporting more consistent data flows and improved data quality.

While Odyssey's experience shows the value of early alignment at a system level, implementing the framework in the field presents a different set of challenges. For Prado Power, a solar developer based in Nigeria, applying the RDSF meant translating its requirements into processes that work in communities with limited connectivity and speaking many local dialects. This has involved investment in training and translation, ensuring that field teams can accurately and respectfully collect household level data. Data collection teams have also worked with local leaders to adapt concepts and language in ways that reflect cultural norms and support participation.

Prado Power saw particular value in the framework's requirement for more granular data collection—for example, tracking electrification impacts in women-led households. Their experience highlights that successful implementation requires thorough community engagement and careful adaptation to local circumstances.

By replacing ambiguity with structure and offering a consistent approach to data governance across the DARES program, the framework has helped stakeholders navigate expectations and align on shared practices.

Other stakeholders are looking to see how data sharing can evolve. SunKing, one of the largest solar developers in DARES, believes the RDSF could go further in supporting transparency across the sector. The firm has advocated greater openness in how program data is shared, particularly by making information about deployment locations available in a timely way through the use of public dashboards. From SunKing's perspective, this would improve learning and coordination across the sector while offering the public and policy makers a clearer view of the scale and pace of electrification, thereby strengthening the transparency and accountability of public spending.

These early experiences demonstrate the RDSF's value in strengthening coordination, improving data quality, and embedding responsible data use across a fast-growing sector. By replacing ambiguity with structure and offering a consistent approach to data governance across the DARES program, the framework has helped stakeholders navigate expectations and align on shared practices.

Introducing agreements at the right time, as the REA and Odyssey have emphasized, helps align expectations and strengthen compliance. But delivery also depends on usability in the field, with Prado Power's experience showing how trust and accuracy rely on careful adaptation to local realities. SunKing also noted that encouraging openness, where feasible, could complement the framework's role in supporting coordination and insight. These insights point to where continued refinement can increase the impact of the RDSF.

Effective data sharing frameworks are not simply technical instruments. Instead, they must be built through trust, shaped through collaboration, and tested in real-world settings.

What lessons can we draw from building the DARES Responsible Data Sharing Framework?

The process of designing and implementing the framework offered three key lessons

The development and early implementation of the RDSF through the DARES program has shown that effective data sharing frameworks are not simply technical instruments. Instead, they must be built through trust, shaped through collaboration, and tested in real-world settings.

Establishing trust through sustained engagement

Early consultation revealed a wide range of perspectives, requirements, and concerns from stakeholders about data sharing—from regulatory compliance to commercial sensitivity and different views on data openness. While many participants were already familiar with data governance concepts, the specific terminology and framing of the RDSF were new. Taking the time to explain the purpose of the framework, gather feedback, and co-design the outcome helped build credibility.

Many crucial details, particularly those related to practical realities, were not available from desk research alone. Speaking directly with those in the sector—on the sidelines of conferences and in one-on-one meetings—helped to shape the framework in collaboration with its intended users. Importantly, this engagement ensured that the RDSF was developed *with* the sector, not just *for* it.

However, REA's experience during early implementation adds an important lesson: Trust built during the design of the framework must be matched by trust in delivery. In other words, building confidence in responsible data sharing is a two-step process: establishing trust through inclusive design, then sustaining it with clear oversight.

Designing for flexibility across different contexts

Flexibility was a core principle in the design of the RDSF. The framework needed to support a wide range of DRE programs operating under various technical, regulatory, and geographic conditions. To be effective in practice, it had to enable data sharing agreements that balanced legal

compliance with operational flexibility.¹ In DARES, this took the form of tailored data sharing arrangements for mini-grid and standalone solar projects aligned with the Nigerian Data Protection Act 2023.

Building confidence in responsible data sharing is a two-step process: establishing trust through inclusive design, then sustaining it with clear oversight.

Equally important was recognizing the varied data-management practices in participating organizations. For some, the RDSF reaffirmed the strength of their existing practices, while others used the process to identify opportunities for improvement. This approach reinforced the value of open dialogue, shared learning, and continuous improvement in fostering effective data governance.

This flexibility became particularly important during implementation. For example, Prado Power needed to translate the framework's technical requirements into processes that worked on the ground—including adapting data-collection approaches to local languages. Their experience highlights the need for system design to meet real-world delivery—and the importance of ensuring that data sharing frameworks can meet frontline realities.

REA also emphasized the importance of making the framework more understandable for different stakeholder groups with varying levels of data access. The authority highlighted the value of disaggregating the documentation and producing shorter, more accessible versions to ensure that all parties—from DRE developers to program consultants—can engage with the framework effectively.

Turning frameworks into practice

Once the data sharing arrangement was in place, implementation shifted from principle to practice. We worked with the REA and key data sharing platforms to help stakeholders

understand and apply the data sharing agreement—the formal mechanism through which the RDSF is delivered.

This process involved structured walk-throughs, practical checklists, and targeted learning sessions designed to ensure that all parties knew exactly how to comply with the guidelines. These approaches helped stakeholders assess whether their existing data-management practices met the framework's requirements—and where changes were needed. Our emphasis went beyond compliance to build confidence in the data sharing process.

Odyssey's experience highlights the value of early clarity. By introducing the data sharing agreement at the very start of the project application process, developers could see what data was required, how it would be handled, and what protections were in place. This helped to build trust in data sharing at the start of a key developer's engagement with the DARES program.

The framework also lays the groundwork for more consistent and timely information sharing. Some stakeholders, including SunKing, see an opportunity to share nonsensitive data more widely. With clear roles and safeguards in place, the RDSF provides a way to explore more open access to data that can support transparency and sector wide learning.

Final thoughts?

Designed well, frameworks like the DARES RDSF lay the groundwork for data systems that adapt to new technologies—and to the evolving expectations of users, regulators, and communities

The ultimate goal of data sharing in the DARES program is not data for its own sake, but a more connected, capable sector that delivers stronger outcomes for the people it serves.

As responsible data sharing frameworks become more embedded in the DRE sector, the challenge will be to ensure that the system can keep pace—not only with emerging technologies like AI, but with the demands for transparency, inclusion, and accountability that responsible data use requires.

¹ Not only do RDSFs define how data should be governed and shared, but they also support compliance with legal and ethical standards, while building trust between those who generate data and those who use it.

And as emerging technologies—including AI and advanced analytics—become more embedded in decision-making, the need for responsible, well governed data sharing will only grow. These technologies rely on large, diverse data-sets, often sourced from different organizations and sectors. RDSFs can help ensure that data is shared in ways that are trusted, supporting innovation without losing sight of privacy concerns, ethics, and accountability.

RDSFs are useful in any context where data is created in a distributed way, but they become more valuable when that data is brought together. In many contexts, it is not possible to make this data open—but a clear, agreed framework can help to remove barriers and outline how data can be shared safely and responsibly.

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