

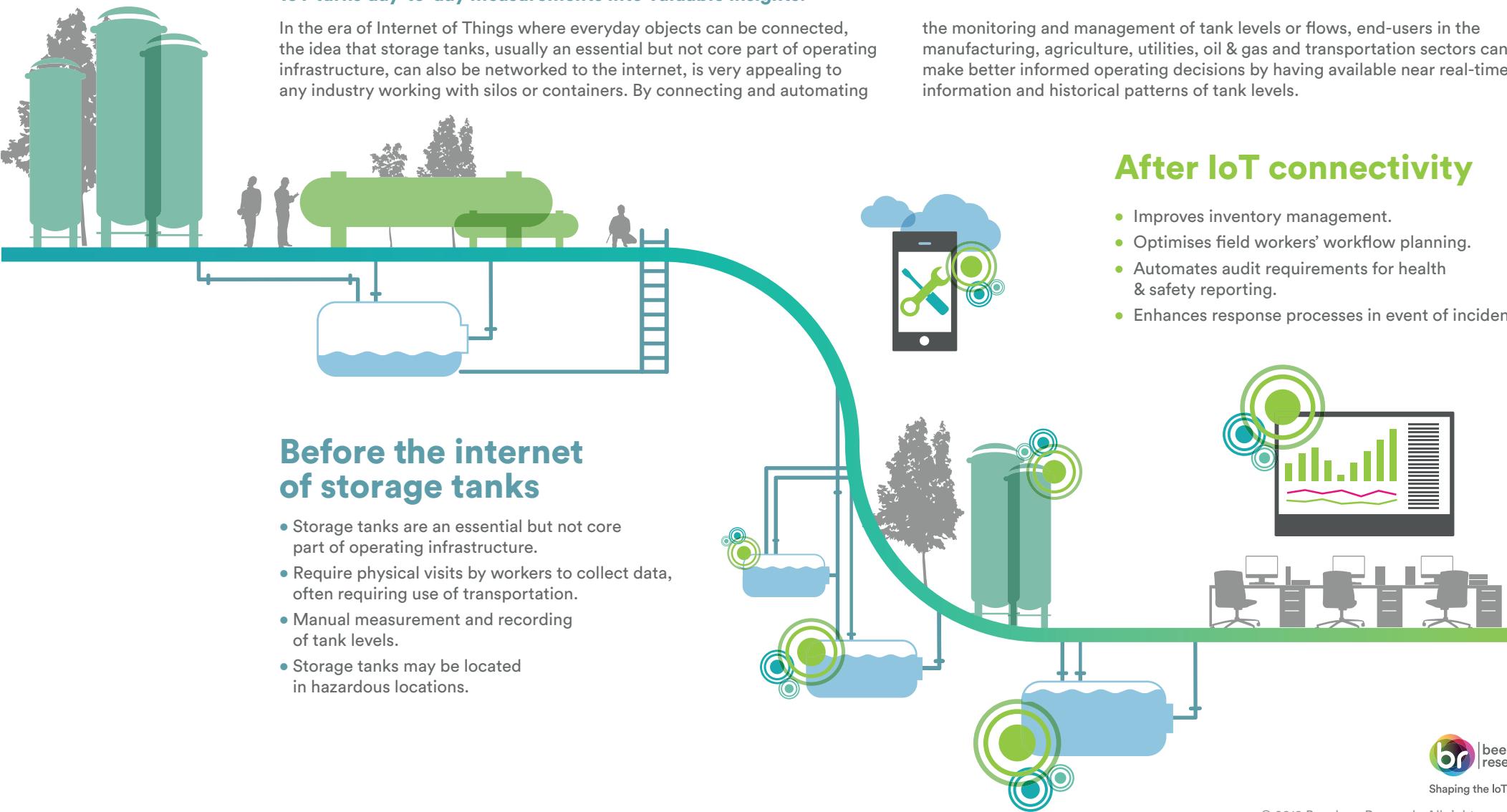
Building the Internet of Storage Tanks

This educational guide introduces the benefits of enabling connectivity as a feature to your tank monitoring products and solutions. It recommends the special considerations to account for when selecting a connectivity choice out of a range of options. Finally, it provides a check list of questions to help you make your final connectivity selection.

IoT turns day-to-day measurements into valuable insights.

In the era of Internet of Things where everyday objects can be connected, the idea that storage tanks, usually an essential but not core part of operating infrastructure, can also be networked to the internet, is very appealing to any industry working with silos or containers. By connecting and automating

the monitoring and management of tank levels or flows, end-users in the manufacturing, agriculture, utilities, oil & gas and transportation sectors can make better informed operating decisions by having available near real-time information and historical patterns of tank levels.



Adding connectivity as a feature creates revenue opportunities for the value chain.

The tank monitoring value chain, from tank manufacturers to solutions providers to applications service providers, can facilitate these end-user benefits by making connectivity a default feature in their products and solutions. As illustrated in **Figure 2**, once connectivity is enabled, everyone on the value chain can move closer to the end customer. Through resultant data about tank conditions, each value chain participant including application service providers can offer aftermarket services such as maintenance, upgrades, support and consultancy bundles.

Enabling IoT connectivity benefits everyone on the value chain.

Sensor manufacturers differentiate from their peers by simplifying the connectivity decision making for the rest of the value chain in the industry vertical.

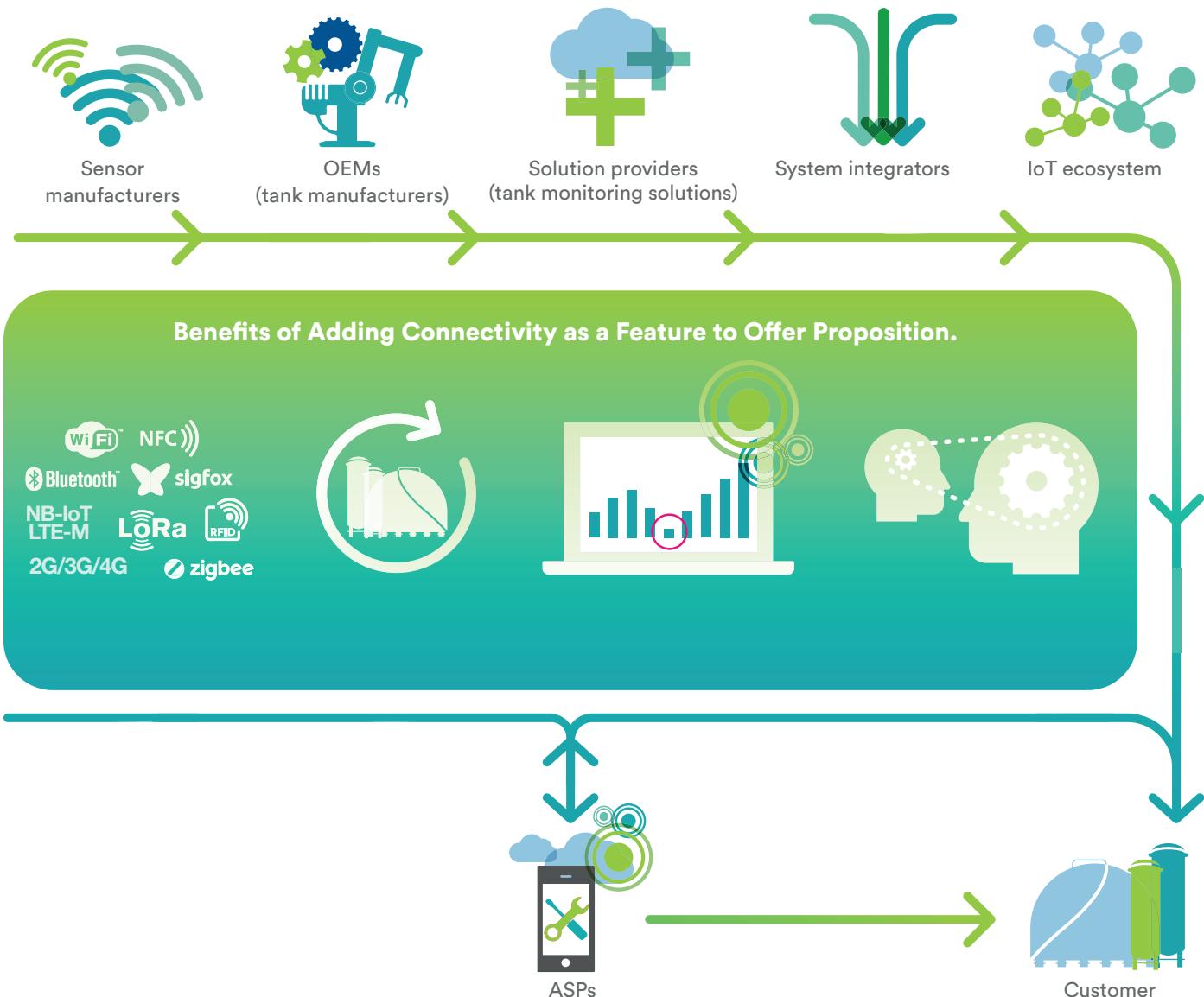
Tank manufacturers (OEMs) differentiate from others by being able to offer a connected tank product from the beginning, simplifying their customers' connectivity decision.

Solution providers (tank monitoring solutions) expand their service portfolio by taking on their customers' non-core data centric functions. Once connectivity is enabled, solution providers can help their customers turn tank data into insights.

System integrators (consultancies and IT services) in their capacity of running digital transformation project have the potential to expand their consultancy to drive new applications derived from having tank monitoring data.

Application service providers (ASPs) develop new applications for end customers in the industrial vertical through access to aggregated tank data.

Figure 2. Tank Monitoring Value Chain

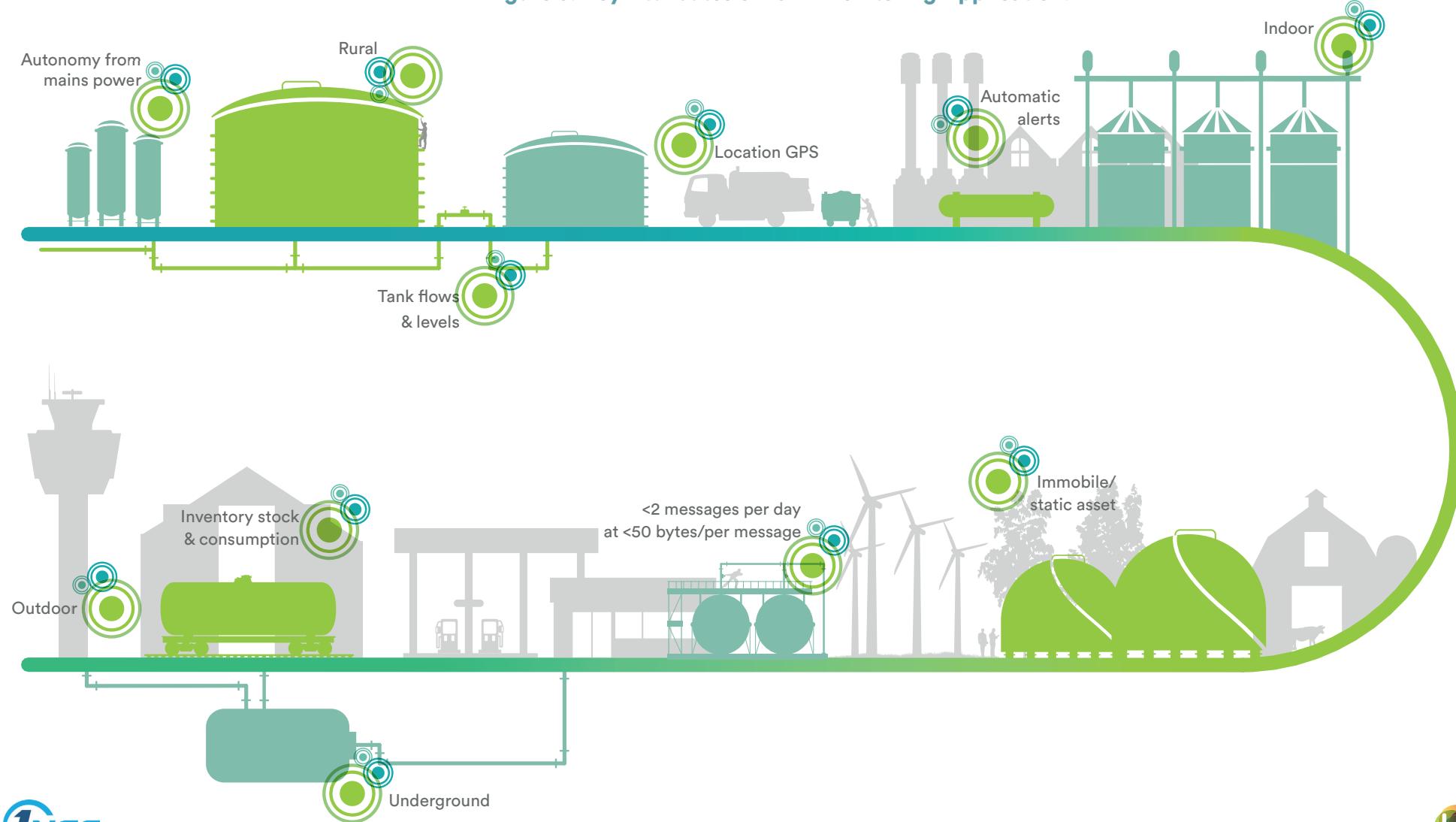


Understanding the connectivity needs of tank monitoring.

The choice of connectivity for both customers in industry vertical and tank monitoring value chain becomes a critical business decision dependent on the specific cost, performance and benefit of tank monitoring.

Figure 3 illustrates the diversity of connectivity requirements across different types of tank monitoring deployment in different environments.

Figure 3. Key Attributes of Tank Monitoring Application.

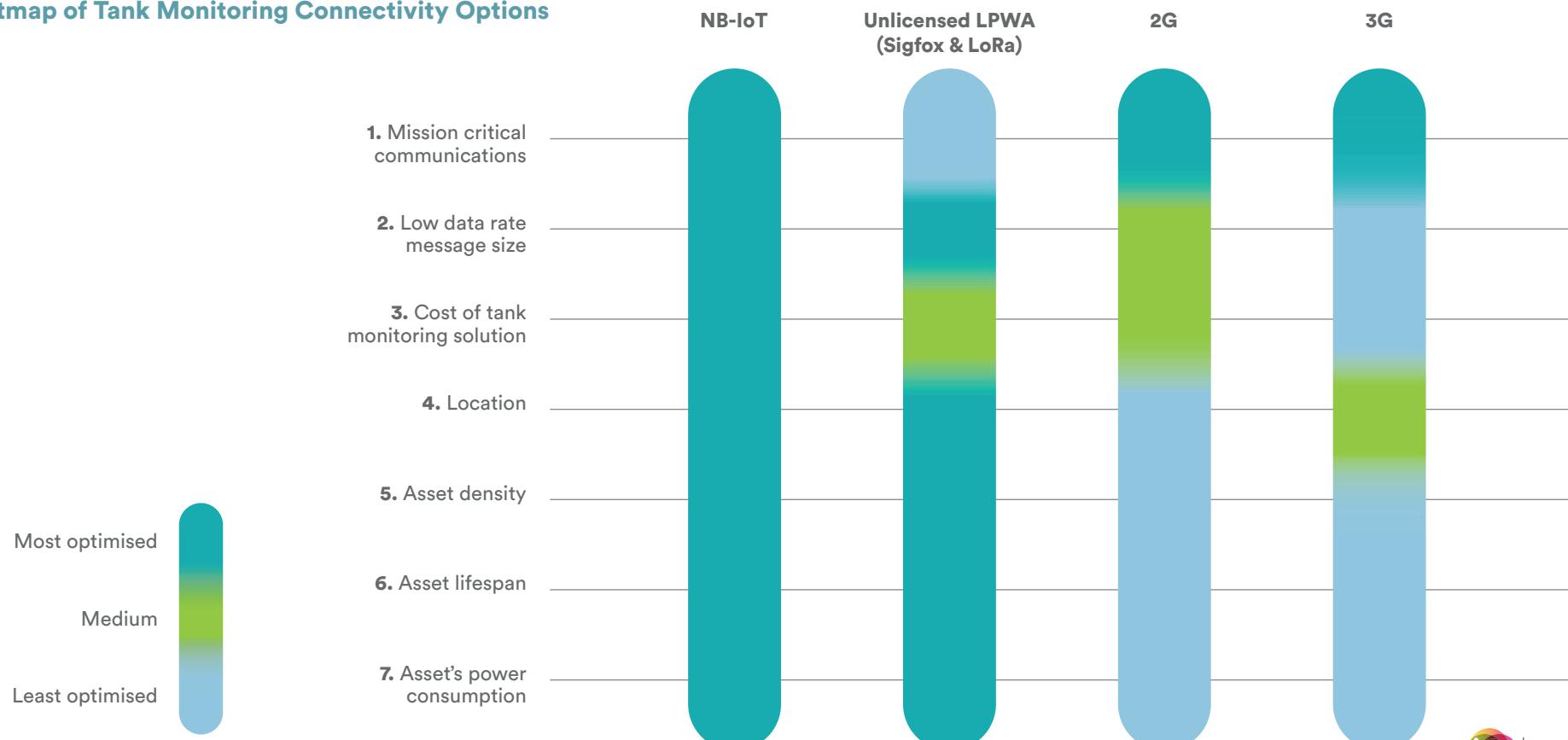


Tank Monitoring requires low data rate connectivity access.

Transformation opportunities for both end customers in the industry vertical and tank monitoring applications stem from connecting tanks. The choice of which connectivity must therefore be made with a view on cost, performance and benefit. There are a variety of connectivity options, from traditional cellular technologies such as 2G/3G and recent ones such as Low Power Wide Area (LPWA). There are two groups of LPWA technologies. Those that use unlicensed spectrum such as Sigfox and LoRa and those that use licensed spectrum that is cellular-based such as NB-IoT and LTE-M. The last are part of the 5G roadmap according to the GSM Association, which as a licensed and standardised technology, offer carrier grade connectivity reassurances. **Figure 4** below applies the 7 characteristics of tank monitoring to 4 types of common

connectivity options and illustrates that tank monitoring is best served by NB-IoT in terms of cost, performance and expected benefit. Reading the heatmap vertically, NB-IoT fulfils tank monitoring requirements that the connectivity is suited to handle mission critical communications, the actual data transmitted, in relative cost of tank monitoring solution, be used both indoors vs. outdoors and over and underground, communicate over long distances, to last more than 10 years, and to low power consumption. The heatmap can also be read horizontally. For example, tank monitoring, despite not being a core operational process, has mission critical requirements in certain industry vertical. As such, NB-IoT, 2G and 3G fulfil this requirement by virtue of being offered on a licensed spectrum.

Figure 4: Heatmap of Tank Monitoring Connectivity Options



1NCE offers simplicity to the value chain.

1NCE is the first dedicated Tier 1 MVNO providing fast, secure and reliable IoT network connectivity for low data B2B applications. As a native IoT company, 1NCE offers a “connect and forget” connectivity service that is well suited for tank monitoring solution. This convenience gives sensor manufacturers, OEMs, solution providers, system integrators and application service providers an easy addition to their solutions to quickly build the needed revenue stream from their customers. 1NCE offers a predictable cost of connectivity to the value chain via its 1NCE Lifetime fee that covers all relevant costs that occur within the lifespan of the solution; costs such as SIM card, data volume, monthly fees, activation

fees, roaming charges and licence fees for using the connectivity management platform to manage and control IoT devices.

Most importantly, 1NCE offers simplicity in terms of making the optimal connectivity decision. It is positioned as expert in narrowband connectivity for IoT, with a simple and compelling commercial offer that applies not only to NB-IoT but also to 2G and 3G technologies, and which assists in the transition from these older technologies to NB-IoT as required.

Check list for making connectivity decision.

Tank monitoring has its unique characteristics that make the selection of connectivity skewed towards LPWA networks. NB-IoT is optimal in terms of function, cost and benefit, especially as it is optimised to connect stationary or slow moving things on reliable and secure licensed networks. 1NCE recommends making these 7 connectivity characteristics as a check list to guide you in making the right connectivity decision.

Figure 5: Checklist for Choosing Connectivity Access



Learn more about 1NCE Connectivity Solutions.
Get in touch! info@1nce.com