Australian Standfirst

The *Internet of Waste* – A Technological Revolution in Waste Management:
Transforming Cities and Industries Through Smart Technologies & Data-Driven Solutions

Sustainability

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The post-World War II era saw Allied nations, particularly the United States, prioritise technological and scientific advancements to outpace Communist rivals. This focus led to the widespread adoption of materials and chemicals like asbestos, DDT, and lead, as well as atomic energy, with little regard for environmental consequences and the concept of environmental protection was largely overshadowed by Cold War tensions and industrial progress. A pivotal shift occurred on August 29, 1962, when President Kennedy publicly acknowledged Rachel Carson's "***Silent Spring***" book during a press conference. This recognition, coupled with a heralded 1963 CBS Report documentary, thrust environmental concerns into the political spotlight for the first time, challenging the indiscriminate use of DDT and other pesticides in America and Marshall Plan-aided countries. These events marked a crucial turning point, introducing environmental protection as a significant political and social consideration and a paradigm shift for industry alike.

Just as Carson's book catalysed the environmental movement in the 1960's, the **Internet of Waste, or IoW**, concept has equally seismic opportunity to trigger a paradigm shift in how societies perceive and manage waste. This emerging industry, whilst still in its nascent stages of public consciousness, carries the potential to be as transformative as environmentalism was following the 1962 awakening.

Cite:- When ESG Execution Misses The Point, 21 May 2019

The IoW represents a convergence of advanced technologies applied to waste management, encompassing a network of smart bins, sensors, data analytics platforms and AI-driven optimisation algorithms. Companies at the forefront of this revolution, such as Compology, are deploying AI-powered cameras in waste containers to analyse fill levels and contamination in real-time. Their system has demonstrated up to forty percent reduction in collection costs and a twenty percent improvement in recycling rates for early adopters. Similarly, Finnish firm Enevo has developed predictive analytics software that optimises waste collection routes, reducing truck traffic by up to fifty percent in pilot cities.

These technological advancements are reshaping the waste management landscape in ways that parallel how Carson's work exposed the hidden environmental costs of pesticide use. Just as Silent Spring revealed the interconnectedness of ecosystems and human activities, IoW is unveiling the intricate web of waste generation, collection and disposal within urban environments. This newfound visibility is compelling communities to confront the inefficiencies and environmental impacts of traditional waste management practices, which we are all well aware are grossly inefficient and uneconomic (for their communities and the environment at-large).

The transformative potential of IoW extends beyond operational efficiencies: It is fostering a new ethos of resource conservation and circular economy principles, for instance, the implementation of RFID-enabled *pay-as-you-throw* systems in cities like Seoul, South Korea, has led to a thirty percent reduction in waste generation and a fifteen percent increase in recycling rates. This approach not only reduces landfill usage but also encourages people to rethink their consumption patterns – technology avoiding the new for a punitive carbon tax.

From an economic perspective, the IoW industry is projected to reshape various sectors – the global smart waste management market, valued at US$3.52 billion in 2024, is expected to reach US$9.01 billion by 2033, growing at a CAGR of eleven percent. This growth is driven by increasing urbanisation not only in emerging economies but also existing developed economies, stringent waste management regulations and the need for cost-effective solutions. The sector is attracting significant venture capital investment, with startups like Rubicon [RBT:US] and AMP Robotics raising hundreds of millions of dollars to develop AI-powered waste sorting and analytics platforms.

The environmental impact of IoW technologies is particularly noteworthy in the context of global warming: by optimising collection routes and improving recycling rates, IoW systems can significantly reduce greenhouse gas emissions associated with waste management, evidenced by a study by the Ellen MacArthur Foundation suggests that smart waste management systems could contribute to a ten to fifteen percent reduction in waste sector emissions by 2030. This is crucial given that the waste sector currently accounts for approximately five percent of global greenhouse gas emissions, making it the third most polluting emission behind concrete and energy production.

Cite:- Concrete, 29 September 2019

Cite:- Fusion Power, Thorium & The Near Future Of Energy Capex, 20 March 2022

Cite:- Responsible Deep-Sea Mining: Resourcing The 2030's, Polymetallic Nodules & The Genesis Of The Automation Era, 18 January 2024

For global investors, the IoW sector presents a unique opportunity to participate in an industry that combines technological innovation with environmental stewardship. Investment opportunities span across hardware manufacturers producing IoT sensors and smart bins, software companies developing waste analytics platforms and service providers offering *end-to-end* waste management solutions. Established waste management companies like Waste Management (WM:US) and Republic Services (RSG:US) are also investing heavily in IoW technologies, offering exposure to this trend through public markets.

Looking towards the 2030's, the IoW concept is expected to become deeply integrated into smart city initiatives and circular economy strategies. Advanced IoW systems will enable precise tracking of materials throughout their lifecycle, facilitating higher rates of reuse and recycling. This will not only contribute to resource conservation but also create new business models centred around material recovery and upcycling.

Moreover, the data generated by IoW systems will likely become a valuable asset in itself, informing urban planning decisions, product design and consumer behaviour interventions. This data-driven approach to waste management and resource utilisation could lead to more sustainable production and consumption patterns across industries.

Cite:- Quantum Supremacy: Complicated Technologies Define Realpolitik, Hegemony & Wealth, 22 October 2020

Cite:- Relative Magnetism Of Rare Earths For Real-Money Investors: Green Capex, The Great Pacific War & Digital Revolution, 14 October 2021

The Internet of Waste movement represents a rare confluence of technological innovation, environmental stewardship and economic opportunity. Unlike the environmental awakening of the 1960's – which initially posed challenges to industrial progress – IoW demonstrates how sustainability and profitability can be mutually reinforcing. The sector offers tangible investment opportunities across both public and private markets, from established waste management companies implementing **IoT solutions** to emerging startups developing AI-powered sorting technologies. With a projected CAGR of eleven percent through 2033 and demonstrated cost reductions of up to forty percent in early deployments, IoW exemplifies how data-driven sustainability initiatives can generate substantial returns while addressing critical environmental challenges. For investors, municipalities and corporations alike, IoW technology represents not merely an environmental imperative but a compelling economic proposition that will reshape waste management practices and urban infrastructure throughout the coming decades.

As Carson concluded in *The Sea Around Us*, "*To dispose first and investigate later is an invitation to disaster, for once elements have been deposited at sea they are irretrievable. The mistakes that are made now are made for all time*". ■