AI Investment for Climate Sustainability in Emerging Asia

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Abstract

The application of artificial intelligence (AI) to business and technological activities is fairly recent, and its scope, so far, has been limited.

However, the emergence of generative AI, exemplified by ChatGPT, highlights AI's growing significance as a mainstream technology in the 21st century. Amidst the critical global challenge of reducing greenhouse gas emissions and mitigating climate change impacts, AI technologies offer promising solutions through enhanced energy management, waste reduction, and resource optimization.

This paper focuses on emerging Asia, which we define as high-growth economies such as Southeast Asia, the Middle East, and India. These regions and countries are characterized by robust economic growth, large populations, urbanization, and technological advancement, thus creating fertile ground for pioneering technologies such as AI.

On the other hand, the region faces significant climate change threats, with a high risk of extreme weather events. Moreover, social and economic conditions in these nations make them more vulnerable to climate impacts compared to developed countries. This paper delves into case studies from Singapore, Hong Kong, and Israel to serve as representative examples of the emerging Asian context.

Drawing insights from Earth Venture Capital (Earth VC), a venture capital firm dedicated to climate tech investment, this study reviews recent AI advancements and their applications in various sectors including energy management, mobility, agricultural precision, and waste collection.

It also explores the challenges and limitations of AI adoption for climate sustainability in emerging Asia, such as concerns about data privacy. Furthermore, the paper outlines expectations and potential outcomes for each approach and concludes that investing in AI for climate sustainability holds significant promise for achieving climate targets and fostering economic opportunities.

In light of these findings, the paper recommends that policymakers encourage climate investment by incentivizing investors to increase funding for AI research and development, reinforcing collaboration among stakeholders, and establishing ethical guidelines to ensure responsible Artificial Intelligence deployment.

1 Introduction

In recent years, the convergence of artificial intelligence (AI) and climate sustainability has emerged as a potent force for positive change.

This intersection presents a unique opportunity in emerging Asia, which is a region characterized by diverse ecosystems and pressing climate challenges, making it the ideal ground for AI-driven solutions to flourish.

The first section of this paper explores the potential of, and challenges to, AI adoption in the Asian market. The rapid expansion of digital infrastructure in the region, backed by growing government support for AI development and a burgeoning tech-based start-up scene, underscores the strategic importance of AI in addressing climate concerns. However, it is crucial to acknowledge and navigate the hurdles that accompany AI deployment, such as data gaps, the digital divide, evolving policies, skills gaps, and funding constraints.

Moving forward, we delve into the work done by Earth Venture Capital (Earth VC) through a case study, which illustrates its process for investing in AI-based climate tech. in emerging Asia. Its '3 fits' framework rigorously evaluates product market fit, founder/industry fit, and fund fit for all potential investments. The paper highlights four of Earth VC's portfolio companies, demonstrating how AI can be utilized effectively to address region-specific concerns in smart buildings, smart city solutions, waste management, and agriculture and deliver substantial value to the region and its communities.

In the final section, we discuss the pivotal role played by venture capital (VC) in developing the start-up ecosystem and driving sustainable progress. Fields such as AI and climate tech present unique complexities, including challenges associated with long-term returns on investment (ROI) and ethical concerns raised by AI integration.

Nonetheless, venture capitalists (VCs) act as financial catalysts by offering capital, expertise, mentorship, and invaluable networks to start-ups. Government and philanthropic organizations complement their role by funding early-stage research, nurturing innovation infrastructure, and supporting start-ups dedicated to societal and environmental challenges.

This study advocates for proactive measures across all sectors of the quadruple helix model and recommends that policymakers incentivize climate-focused investments, educational institutions foster AI talent, and the private sector provide networks and resources to bridge gaps for the effective implementation of AI technologies. Such a collaborative effort is essential to address climate challenges and realize the full potential of AI in emerging Asia, and beyond.

2

Asia's Emerging AI Landscape

The dynamics of emerging Asia have engendered a multifaceted landscape that presents opportunities as well as challenges for the implementation of AI for forging climate sustainability.

This region boasts a rich tapestry of ecosystems, from lush rainforests to vital coral reefs and sprawling mangroves, which serve as a vast repository of data for AI systems to gather insights and conduct analyses.

More recently, this region has been found to be highly vulnerable to climate change, as it faces rising sea levels and intensified extreme weather events. According to the Global Climate Risk Index 2020,[1] among the ten nations most affected by climate risk, seven are Asian (Myanmar, the Philippines, Pakistan, Vietnam, Bangladesh, Thailand, and Nepal). A 2019 survey[2] also reports that climate change is ranked as the most significant concern to national security in Southeast Asia. Thus, the potential benefits of deploying AI for bolstering climate resilience are substantial.

Moreover, digital infrastructure has rapidly expanded in the country in recent years, which could facilitate the advancement of AI technologies. Many governments have recognized the strategic importance of AI and have deployed policies and investments to support AI research and development. For example, in 2022, the Singaporean government introduced the world's first AI governance testing framework and toolkit, AI Verify, to provide a standardized method to verify AI systems' performance while ensuring compliance with ethical principles.

The burgeoning start-up scene in emerging Asia has a strong foundation in technology, including AI, and a growing commitment to sustainability. Regional cooperation, exemplified by organizations such as the Association of Southeast Asian Nations (ASEAN), enhances the potential for sharing AI technologies and knowledge.

Nevertheless, there are challenges to navigate in this regard. Data gaps, particularly in remote or under-resourced areas, may impede the effective training of AI systems. The digital divide within and between countries presents a stark contrast: some regions are tech-savvy and interconnected while others lack basic internet access, which limits the reach and efficacy of AI tools.

1   Eckstein, D., Künzel, V., Schäfer, L., & Winges, M. (2019). *Global Climate Risk Index 2020* [Briefing paper]. Germanwatch. www.germanwatch.org
2   Poushter, J., Fagan, M., & Gubbala, S. (2022, August 31). *Climate change remains top global threat across 19-country survey*. Pew Research Center. www.pewresearch.org

Furthermore, policy and regulatory frameworks surrounding AI are still in the developmental stages in many emerging Asian nations as of 2023. This may slow down the adoption of AI and create complexities for businesses and researchers alike.

Additionally, a significant gap in AI skill capabilities persists in the region, which necessitates capacity-building efforts that can ensure that local communities and businesses can harness AI effectively. Finally, despite growing interest, securing consistent funding for AI initiatives aimed at climate change remains a challenging endeavour.

In essence, the emerging Asian region stands at the crossroads of leveraging AI for climate sustainability: in its current state, its diverse ecosystems, urgent need for climate adaptation, expanding digital infrastructure, and collaborative potential offer a promising foundation.

However, overcoming data limitations, addressing the digital divide, establishing robust policies, closing the skills gap, and ensuring sustainable funding are essential steps on this transformative journey.

3

Earth Venture Capital's Approach to AI Investment in Climate Tech

Introduction

The adoption of AI to address climate change challenges is a relatively recent development. Committing resources to invest in such AI applications requires considerable effort, exploration, and risk assessments.

Earth VC aligns itself closely with the pioneering spirit of venture firms in this field. As emerging Asia is now being recognized as a hub for innovative start-ups that are leveraging AI for climate sustainability, Earth VC has actively invested in and contributed to the growth of over seven start-ups in the region.

This section dives into Earth VC's methodology of identifying and validating investment opportunities, progress monitoring, and measuring impact. This is followed by an in-depth examination of four start-ups in its portfolio. These start-ups are at the forefront of utilizing AI in various domains including smart buildings, smart city solutions, waste management, and agriculture.

Investment Selection Framework

At the heart of Earth VC's investment approach lies a strategic due diligence framework known as the "3 Fits".[3]

This framework represents a holistic and rigor-ous evaluation process that ensures alignment between its investments and the demands of the climate tech landscape. Earth VC's unique approach scrutinizes three key aspects: product—market fit, founder—industry fit, and fund fit.

3   Venture Capital Strategy. (n.d.). *VC razor framework*. www.vcrazor.com

Investment Selection Framework
Product–Market fit

This is a stage in a start-up's development wherein its product or service aligns perfectly with the needs and preferences of its target market. In simpler terms, it is when a start-up has developed a solution that customers truly want and are willing to pay for. Achieving product–market fit indicates that the start-up has identified a viable market, developed a valuable prod-uct, and demonstrated that customers are enthusiastic about it.

Key questions VCs seek to answer to assess product–market fit:

Value proposition

How effectively does the product or service solve customers' pain points or challenges?

Market size

What is the potential size of the market being addressed, and how much market share can be captured?

Traction

Can the demand for the product or service be substantiated through concrete evidence?

Investment Selection
Framework
Founder-industry fit

This refers to the degree to which the founders of a start-up have the knowledge, domain expertise, and affinity for the industry or market they are operating within. It suggests that founders who are deeply connected to and knowledgeable about the industry are better equipped to identify market opportunities, address challenges, and make informed decisions.

This alignment between founders and the industry can be a critical factor in a start-up's ability to navigate complexities and compete effectively.

Key questions VCs seek to answer to assess founder–industry fit:

Team

Does the founding team possess the right blend of skills, experiences, and expertise needed to excel in the industry?

Secret sauce

What sets the start-up apart from potential competitors, and how can it protect its unique position?

Business model

How quickly can the start-up grow, and can it do so profitably within the industry?

Investment Selection Framework
Fund fit

This refers to the compatibility between the unique strengths, industry knowledge, networks, and investment strategies that the VC funds bring to the table and the requirements and growth prospects of a start-up seeking funding. It suggests that successful VC investments go beyond financial backing: they involve a strategic partnership where the VC fund can actively contribute to the start-up's success.

Key questions VCs seek to answer to assess fund fit:

Growth milestones

What is the start-up's proposed path to achieving growth, and how can the VC fund support this journey?

Exit strategy

When and how will the start-up exit the investment, and what are the potential exit scenarios?

Return analysis

Can the VC fund generate a favourable Return on Investment (ROI) based on the start-up's potential?

Overall, Earth VC looks for a synergy among these three fits before making an investment in climate tech utilizing AI, that is, the most optimum arrangement whereby the start-up's product resonates with the climate tech market, the founders possess a deep-rooted passion and expertise, and the VC fund contributes not just capital but also a strategic vision for a sustainable future.

The proof of concept is a critical step in the due diligence process. It helps the fund evaluate start-ups' technical viability, market potential, and execution capability. Most of Earth VC's portfolio companies have generated revenue and have established a pool of paying customers, which helps reduce various forms of risk associated with early-stage investment in technological start-ups.

Case Study 1

Ampotech, Singapore

Case Study 1

Climate Challenges

With 4.5 billion people, the Asia-Pacific (APAC) region is home to 60% of the world's population and is responsible for almost half of the global Gross Domestic Product (GDP).[4]

According to the International Energy Agency (IEA),[5] in 2018, buildings were responsible for a substantial share of energy consumption, constituting 27% of the total final energy consumption in ASEAN, China, and India.

Additionally, they contributed significantly to process- and energy-related CO_2 emissions, totalling 3.2 gigatonnes of CO_2 ($GtCO_2$).[6] When considering the production of construction materials, which accounts for roughly 11% of global emissions, the buildings and construction sector emerges as a focal point in the battle against climate change. (see Figure 1.)

Solution

Ampotech is an energy technology company based in Singapore.

The company develops Internet of Things (IoT) hardware and AI-enabled software for energy management in residential, commercial, and industrial buildings, with a focus on Southeast Asia and India. Having launched its products in the Singaporean market in 2018, Ampotech has since thrived on a business-to-business (B2B) model, serving energy and property enterprises across eight different countries.

Ampotech's products and software help businesses collect, analyse, and integrate electricity usage data into smart building solutions. Use cases include reporting, benchmarking, detecting and reducing energy waste, and fault detection. An artificial intelligence (AI) algorithm is used for real-time energy monitoring and suggests required actions to optimize the situation.

Impact

In a notable case study involving one of Ampotech's clients, the company implemented its solution across 14 petrol stations located in Singapore. This deployment was integrated into a cloud-based building management system (BMS) for an oil and gas company that was responsible for the ownership and operation of these sites. The figures below are taken from the central monitoring dashboard of the mentioned company. (see Figure 2,3,4.)
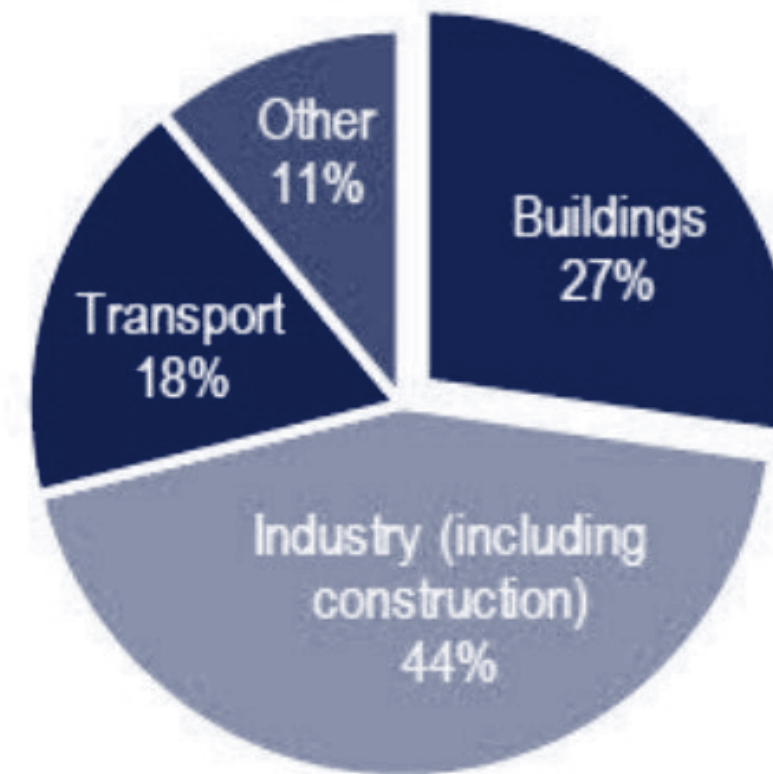
Ampotech presents a scalable solution poised to enhance energy efficiency across various building types, spanning homes, offices, and manufacturing facilities. Given the rising demand for sustainable building practices, increasingly stringent reporting and compliance standards, and the drive to lower operational expenses, Ampotech is strategically positioned to cater to the needs of the APAC region and beyond.

4   United Nations Population Fund Asia and the Pacific. (n.d.). *What we do.* https://asiapacific.unfpa.org
5   International Energy Agency and the United Nations Environment Programme. (2018). *2018 global status report: Towards a zero-emission, efficient and resilient buildings and construction sector.* Global Alliance for Buildings and Construction. www.iea.org
6   International Energy Agency (IEA). (2023). *CO2 emissions in 2022.* IEA Publications. www.iea.org

Buildings' share of total final energy consumption in ASEAN, PRC and India, 2018

Other 11%
Buildings 27%
Transport 18%
Industry (including construction) 44%

Buildings' share of total CO_2 emissions in ASEAN, PRC and India, 2018

Transport 13%
Other 8%
Buildings direct 6%
Buildings indirect 18%
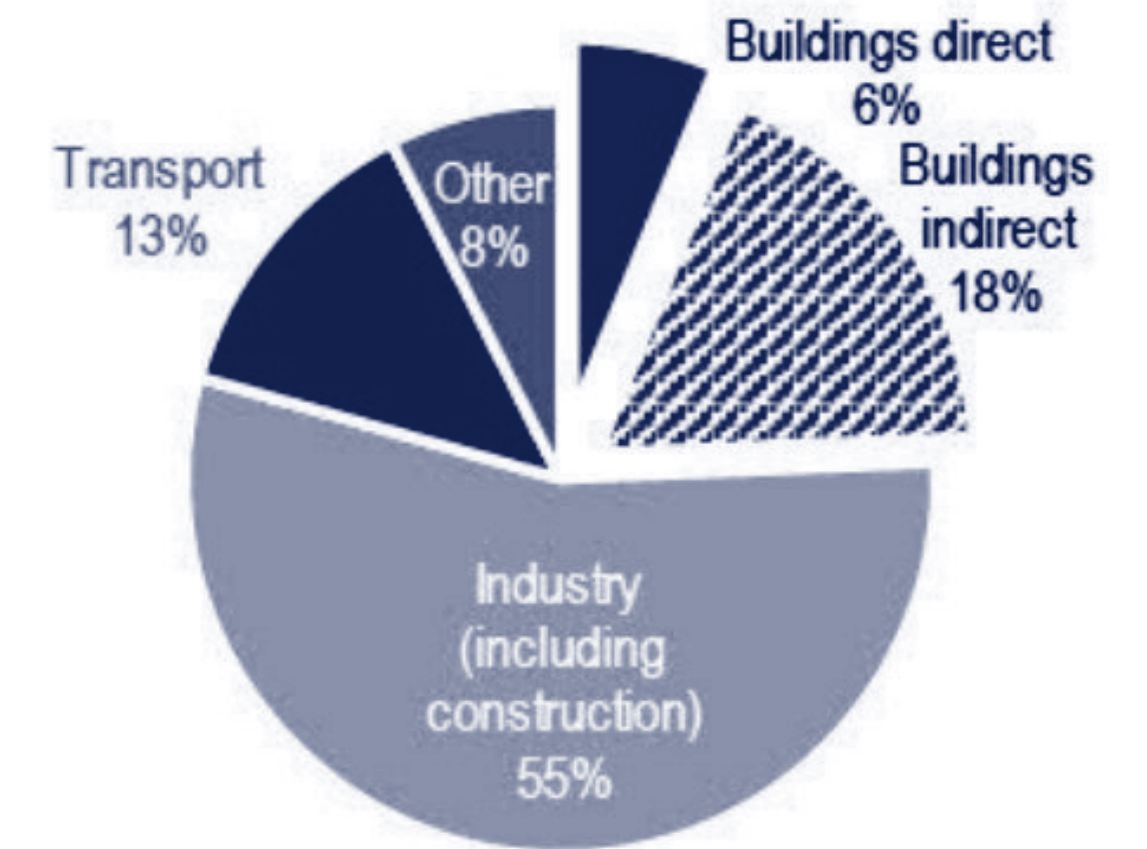Industry (including construction) 55%

Figure 1
Share of Buildings' Final Energy and Emissions in ASEAN, China, and India in 2018

Figure 2

An Incident of Power Loss Was Detected in a Refrigeration Unit in an Asset Located in the East Coast Area of Singapore.

Source: Image by Ampotech, provided by Earth Venture Capital.

Figure 3

Anomaly: Forecourt Lighting Turned on from 1:30 p.m. to 4 p.m., thereby Wasting Energy.

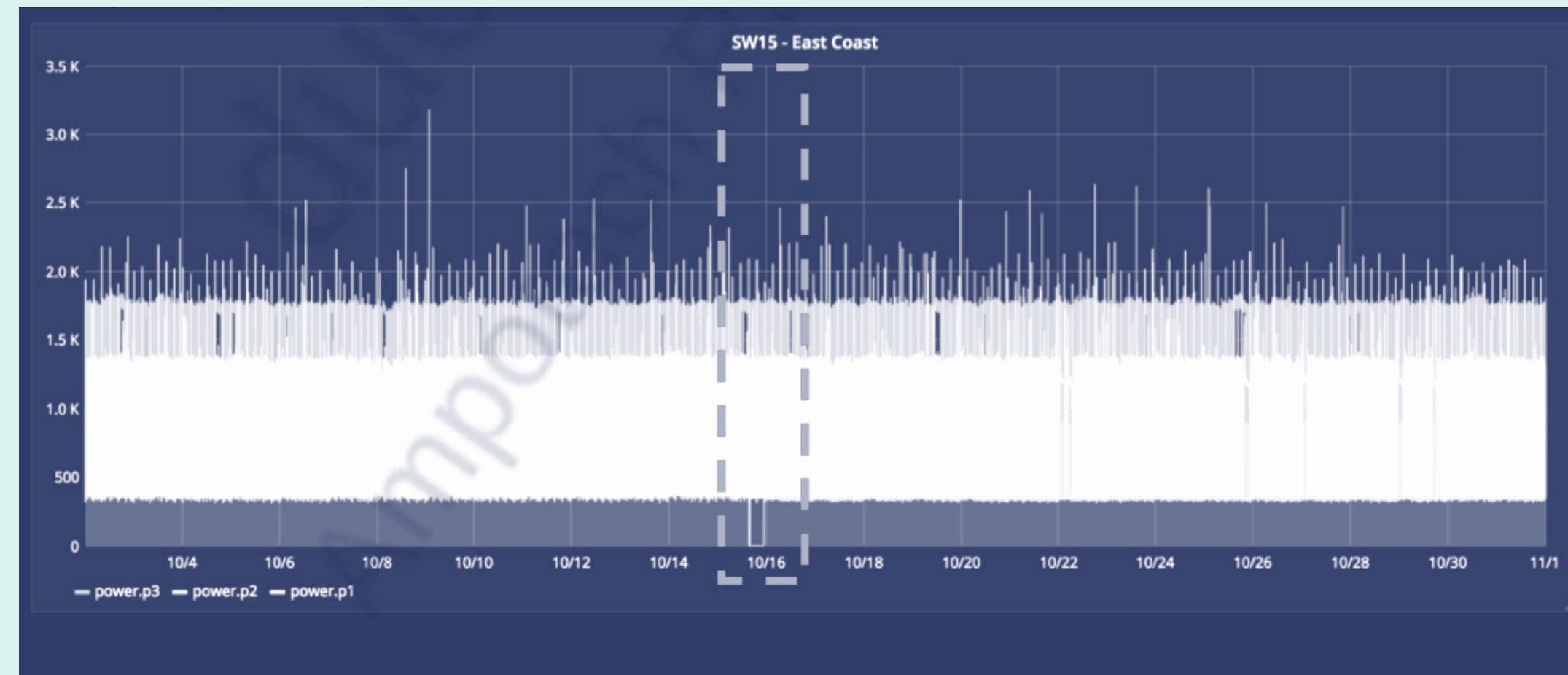*Source: Image by Ampotech, provided by Earth Venture Capital.*

Figure 4

Anomaly: Equipment off Overnight on May 23rd and May 29th. This Indicates that Energy May Be Wasted on Other Nights.

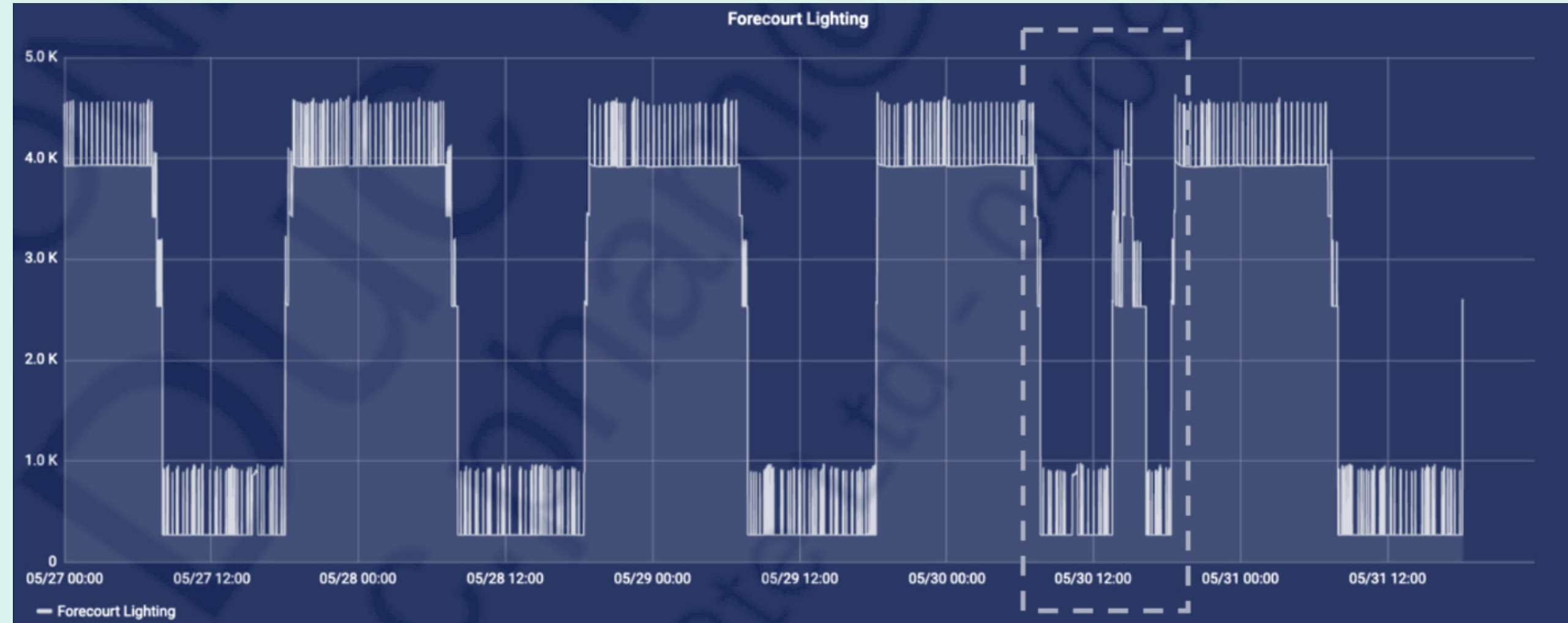*Source: Image by Ampotech, provided by Earth Venture Capital.*
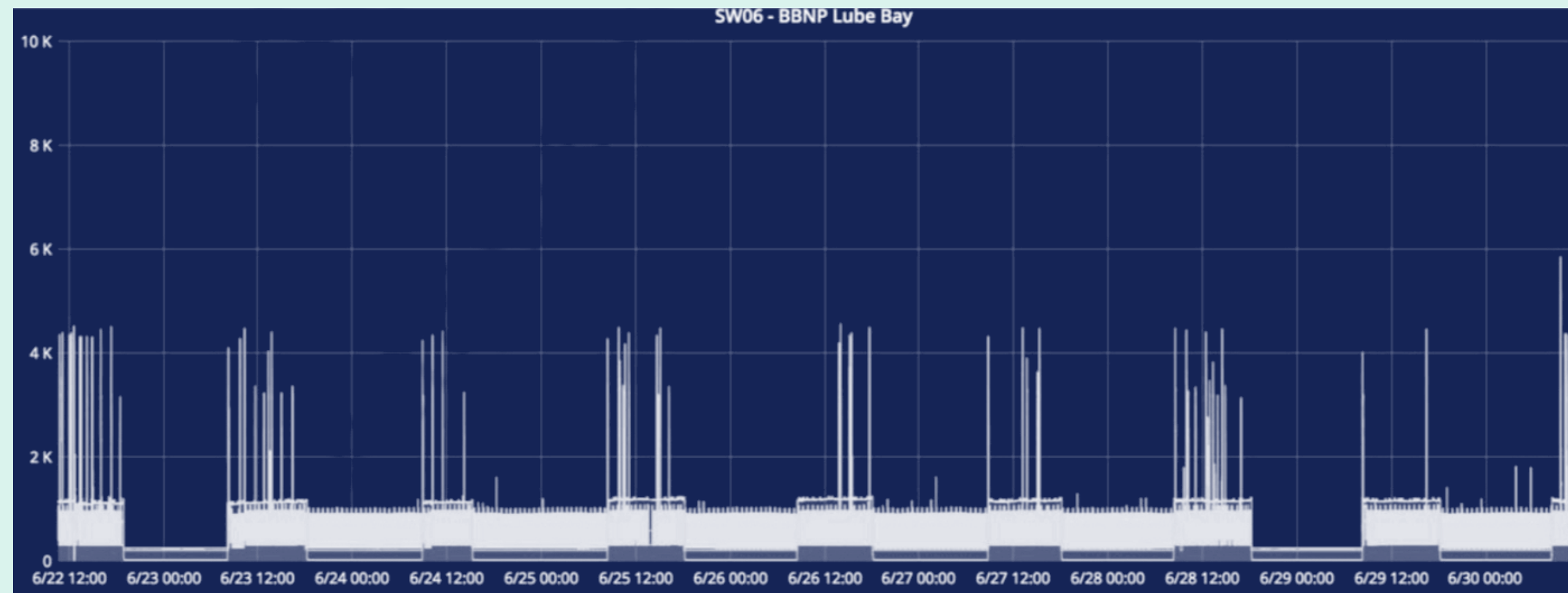
Figure 5

A Series of Required Actions Is Then Sent to the Management Team via Emails and On-platform Notifications, Saving up to 20% of Electricity Usage.

Source: Image by Ampotech, provided by Earth Venture Capital.

Case Study 2

Intelligent Traffic Control, Israel

Case Study 2

Climate Challenge

Inefficient traffic control and traffic congestion have far-reaching consequences: they increase emissions, worsen air pollution, and cause fuel wastage and energy inefficiency within transportation systems.

CNBC reported that Asia is home to 99 out of the top 100 cities facing the biggest environmental risks.[7]

About 44 million people are being added to Asia's urban population every year, which is equivalent to 120,000 people a day. It is estimated that 80% of Asia's new economic growth through 2050 will be generated in cities, where most jobs and employment opportunities are located. These trends are placing an enormous strain on transport and mobility in these areas.[8] (see Figure 6.)

In addition to being one of the leading contributors to global greenhouse gas emissions, the adverse impacts of flawed transportation systems on air quality, particularly in urban areas, where idling vehicles and stop-and-go traffic elevate levels of harmful pollutants such as nitrogen oxides (NOx) and particulate matter (PM), posing threats to air quality as well as public health.

Inefficient traffic control systems and congestion not only result in fuel wastage due to prolonged travel times and frequent stops, but they also contribute to energy inefficiencies. This trend was steadily escalating until 2019, when it peaked at nearly 3.5 billion gallons of excess fuel consumption. Notably, heavy trucks accounted for approximately 20% of this excessive fuel usage.[9]

Furthermore, poor traffic control necessitates increased energy inputs to navigate longer travel times and stop-and-go traffic patterns, which significantly diminish overall fuel efficiency while simultaneously increasing energy consumption.

7   Choudhury, S. R. (2021, May 13). *Asia accounts for 99 out of 100 top cities facing the biggest environmental risks*. CNBC. www.cnbc.com

8   Leather, J. (2022, March 25). *Asia's cities need quality public transport*. Asian Development Blog. https://blogs.adb.org

9   Schrank, D., Albert, L., Eisele, B., & Lomax T. (2021). *Urban mobility report*. Texas A&M Transportation Institute.

Figure 6

Global Greenhouse Gas Emissions by the
Transport Sector

*Source: Intergovernmental Panel on Climate
Change. (2014) Summary for Policymakers.
In Climate change 2014: Mitigation of climate
change. Contribution of Working Group
III to the Fifth Assessment Report of the
Intergovernmental Panel on Climate Change.
Cambridge University Press.*
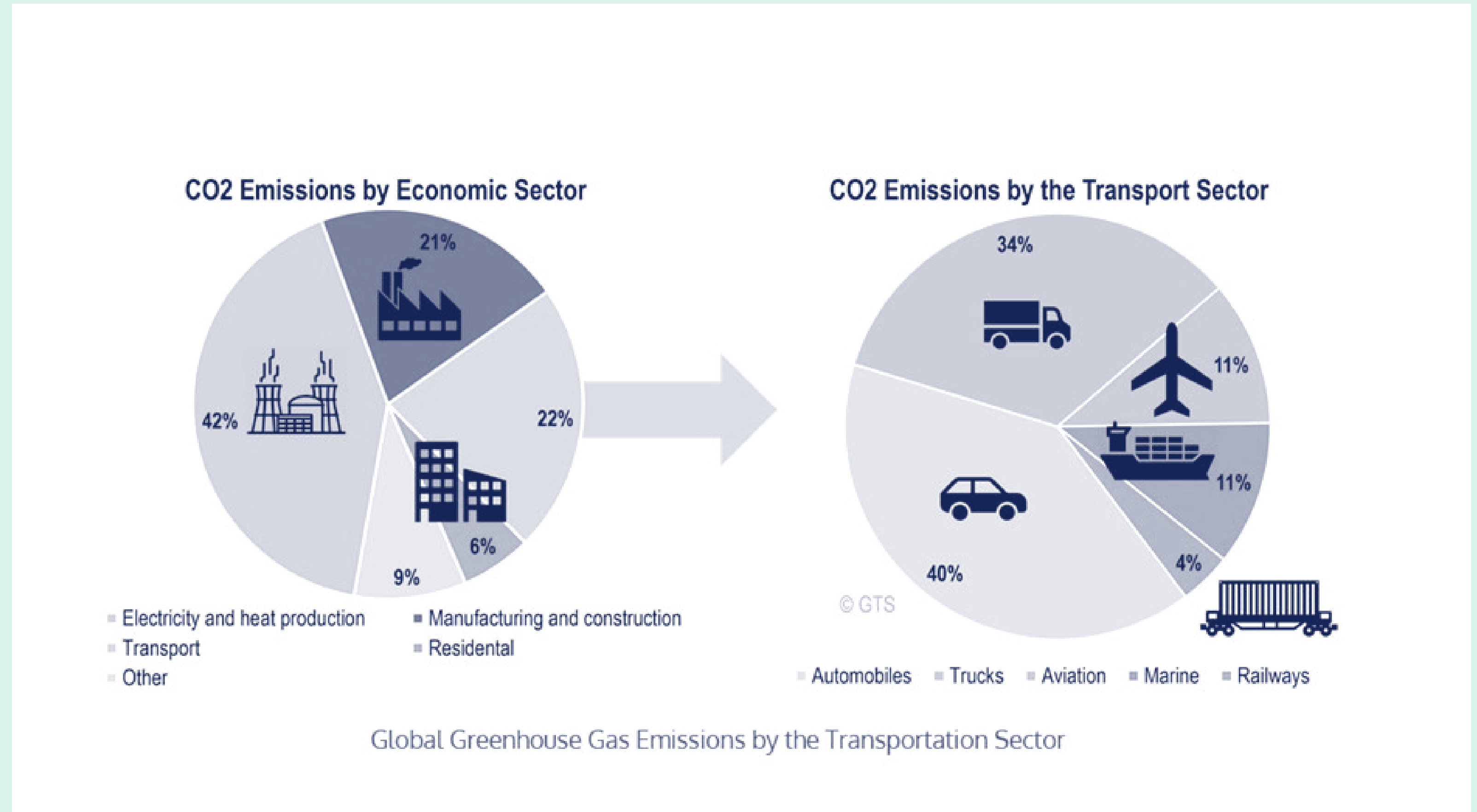
Case Study 2

Solution

To effectively address the climate challenges associated with traffic control, the adoption of intelligent transportation systems and the implementation of robust traffic control measures are critical. Israeli start-up, Intelligent Traffic Control (ITC), specializes in 5G-based traffic management software solutions that predict traffic patterns to help alleviate traffic congestion.

ITC's software harnesses the power of machine learning and computer vision algorithms to anticipate traffic patterns and enforce municipal traffic policies, including prioritization of public transport, bicycles, and pedestrians. This proactive approach enables traffic control systems to minimize wait times and address potential traffic jams pre-emptively. ITC tailors its solutions to the cybersecurity standards of individual cities, offering options based on edge computing, cloud services, and local cloud infrastructure. AI algorithms form the heart of the system.

These algorithms are trained using a diverse dataset comprising historical traffic congestion data, traffic counts, and pedestrian waiting times. Thereafter, they predict potential traffic jams and simulate scenarios to inform traffic management decisions.

Data privacy emerges as a critical concern given the substantial volume of data processed by the ITC system: classified and unclassified videos, traffic counts, and traffic programmes, especially vehicle license plate numbers.

To safeguard privacy, ITC deploys AI algorithms equipped with General Data Protection Regulation (GDPR) features. These features encrypt license plate numbers into unique codes, ensuring the protection of sensitive information while enabling effective traffic management.

Impact

ITC's computer vision algorithm uses off-the-shelf cameras, which have already been installed in numerous intersections, to obtain live traffic data. The algorithms are sensitive enough to correctly identify 99% of vehicles, buses, ambulances, bikers, and pedestrians, and detect a range of parameters about these objects' behaviours.

By altering traffic light programming, the traffic flow through intersections can be adjusted to mitigate congestion, thus preventing jams and gridlocks and ensuring safe and fast travel for all road users.

Currently, ITC's technology is being trialled in Israel, but the innovative traffic management system holds immense promise for Asia's bustling metropolises. Besides alleviating traffic jams, it can play an important role in addressing climate-related problems by curbing emissions and enhancing urban sustainability.
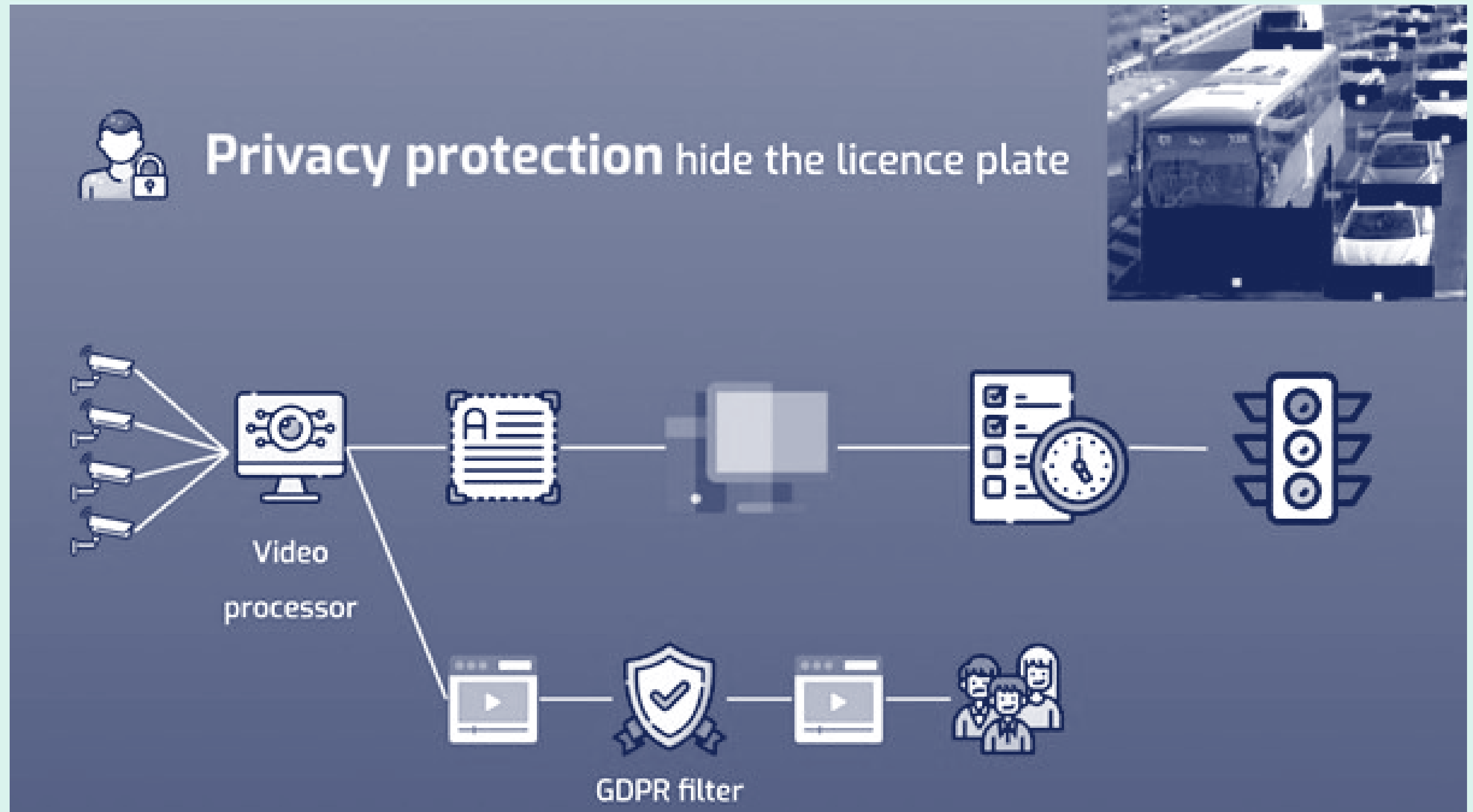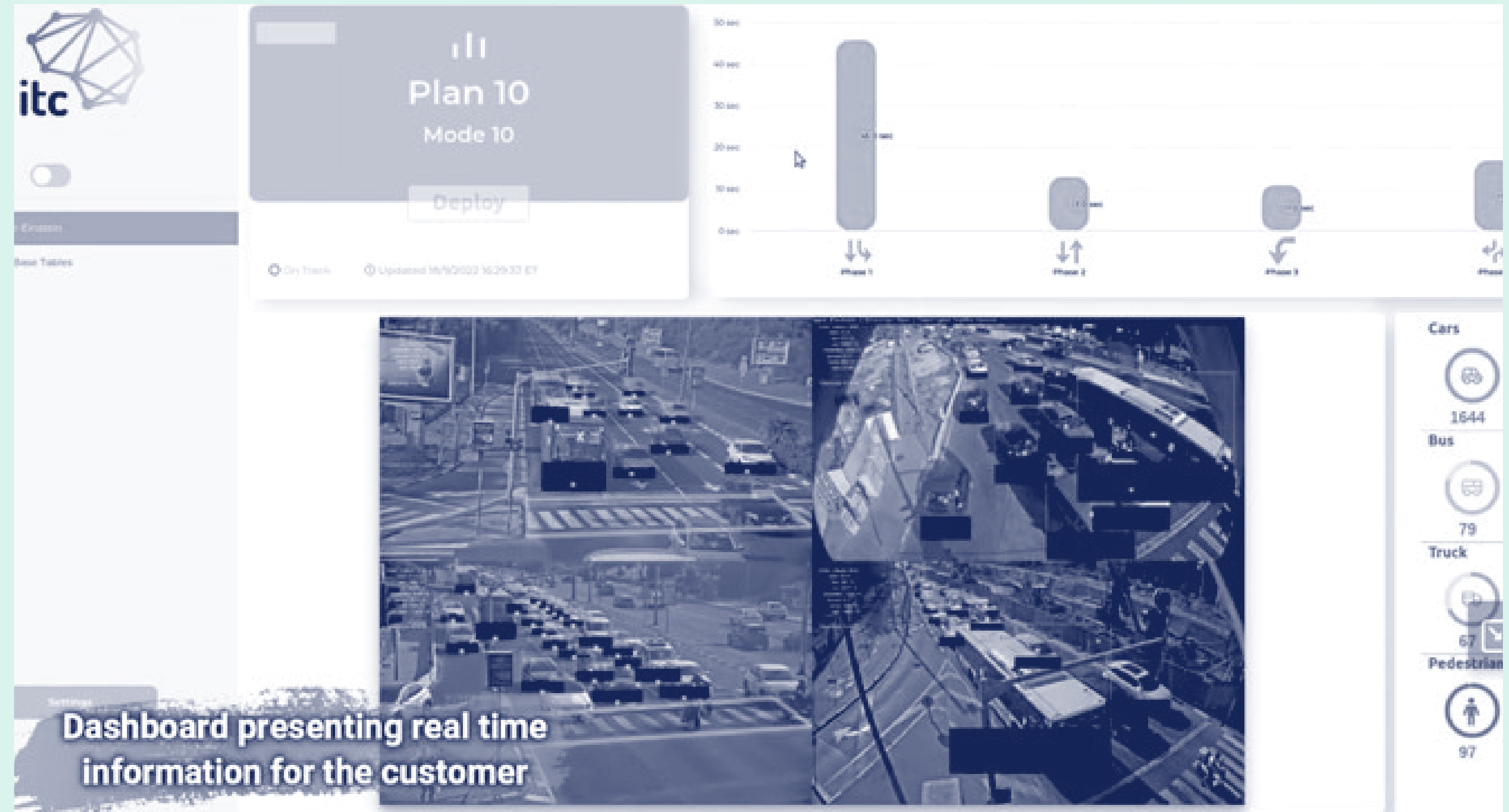
Figure 7
Features of ITC's Software
Source: Image by ITC. Provided by Earth Venture Capital.

Figures 8 and 9

The ITC Dashboard

Source: Images by ITC. Provided by Earth Venture Capital

Figures 8 and 9

The ITC Dashboard

Source: Images by ITC. Provided by Earth Venture Capital

Case Study 3

Treetoscope, Israel

Case Study 3

Climate Challenge

Water scarcity has become an increasingly urgent global concern as projected by UNICEF,[10] which estimates that as early as 2025, half of the world's population will face this issue.

Escalating environmental adversities, compounded by the effects of climate change, have begun to jeopardize the long-term viability of agriculture in Asia. Irrigation plays an indispensable role in agricultural practice. However, it also impacts the climate and environment negatively.

Firstly, water consumption associated with irrigation is a substantial contributor to global freshwater usage. The Food and Agriculture Organization (FAO) reports that approximately 70% of the world's freshwater resources are consumed by agricultural irrigation.[11]

Excessive or inefficient irrigation practices can result in the over-extraction of groundwater, depleting precious aquifers and reducing water availability for ecosystems and future generations.

Secondly, many irrigation systems require energy for water pumping and distribution. The energy consumption associated with such tasks can lead to greenhouse gas emissions, albeit the exact figures can vary depending on factors such as the energy source and irrigation system efficiency.

Thirdly, improper irrigation techniques, such as excessive watering or inadequate drainage, can lead to soil erosion and salinization. Soil erosion affects agricultural productivity and can result in sediment runoff, which can harm water quality and aquatic ecosystems.

10   UNICEF. (n.d.). *Water scarcity.*
      www.unicef.org
11   Food and Agriculture Organization (FAO).
      (2020). *World food and agriculture: Statistical
      yearbook 2020*. FAO. www.fao.org

Solution

Treetoscope (T2S), founded in 2020, is an innovative Israeli start-up specializing in precision irrigation management. It has developed ground-breaking technology for direct plant monitoring, which provides invaluable insight into the specific water requirements of essential crops.

By arming growers with this knowledge, T2S empowers them to use precise amounts of water at the most optimized times. This in turn helps growers maximize their crop yields while conserving water resources.

What sets T2S's business apart is its software-as-a-service (SaaS) irrigation management platform, which combines accuracy in assessing crops' actual water requirements with an AI-driven engine. This integration also encompasses soil analysis, satellite data, and real-time weather information.

The resulting solution delivers a comprehensive array of irrigation insights, including stress level management, historical weather data, forecasts, plot-specific recommendations, and round-the-clock alerts and notifications. In essence, T2S's innovative platform equips growers with a sophisticated toolset that enables them to make informed decisions and respond effectively to the complex challenges posed by modern agriculture and an ever-changing climate.

Impact

T2S's innovative technology has been applied in fields growing various crops, including citrus fruits, avocados, and wine grapes. It has the potential to reduce irrigation water usage by up to 20% and lower fertiliser costs by as much as 30% through efficient fertigation techniques.

Furthermore, the T2S sensor has a distinct advantage over traditional soil sensors in promptly identifying stress events. This capability empowers growers to take swift and informed actions to address crop stress, thus enhancing overall crop management.

Figure 10

The T2S Solution

Source: Image by T2S. Provided by Earth Venture Capital.

Figure 11
Features of T2S's SaaS Platform
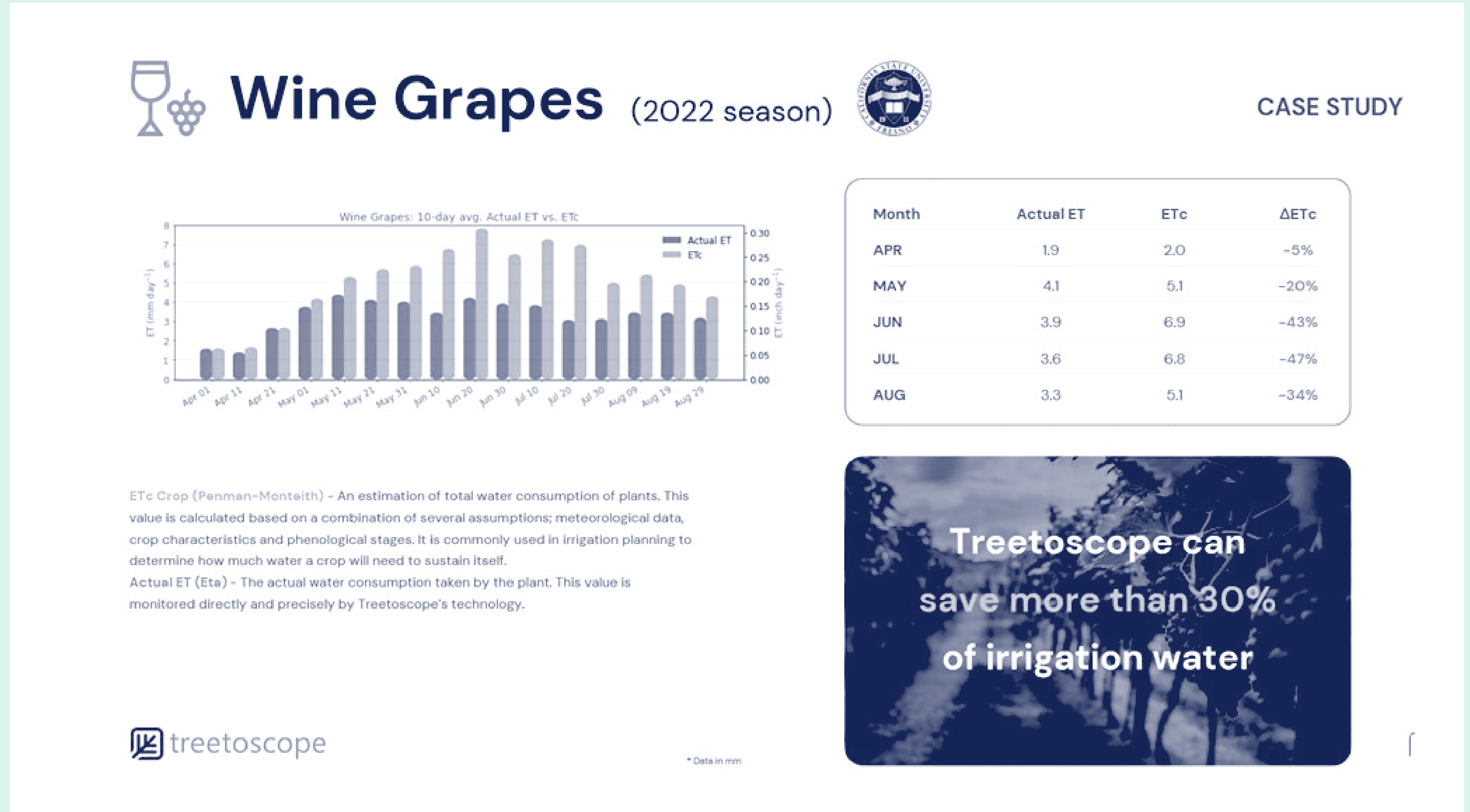*Source: Image by T2S. Provided by Earth Venture Capital.*

Figure 12
Findings from a Study on the Application
of T2S's Technology on Wine Grapes, 2022
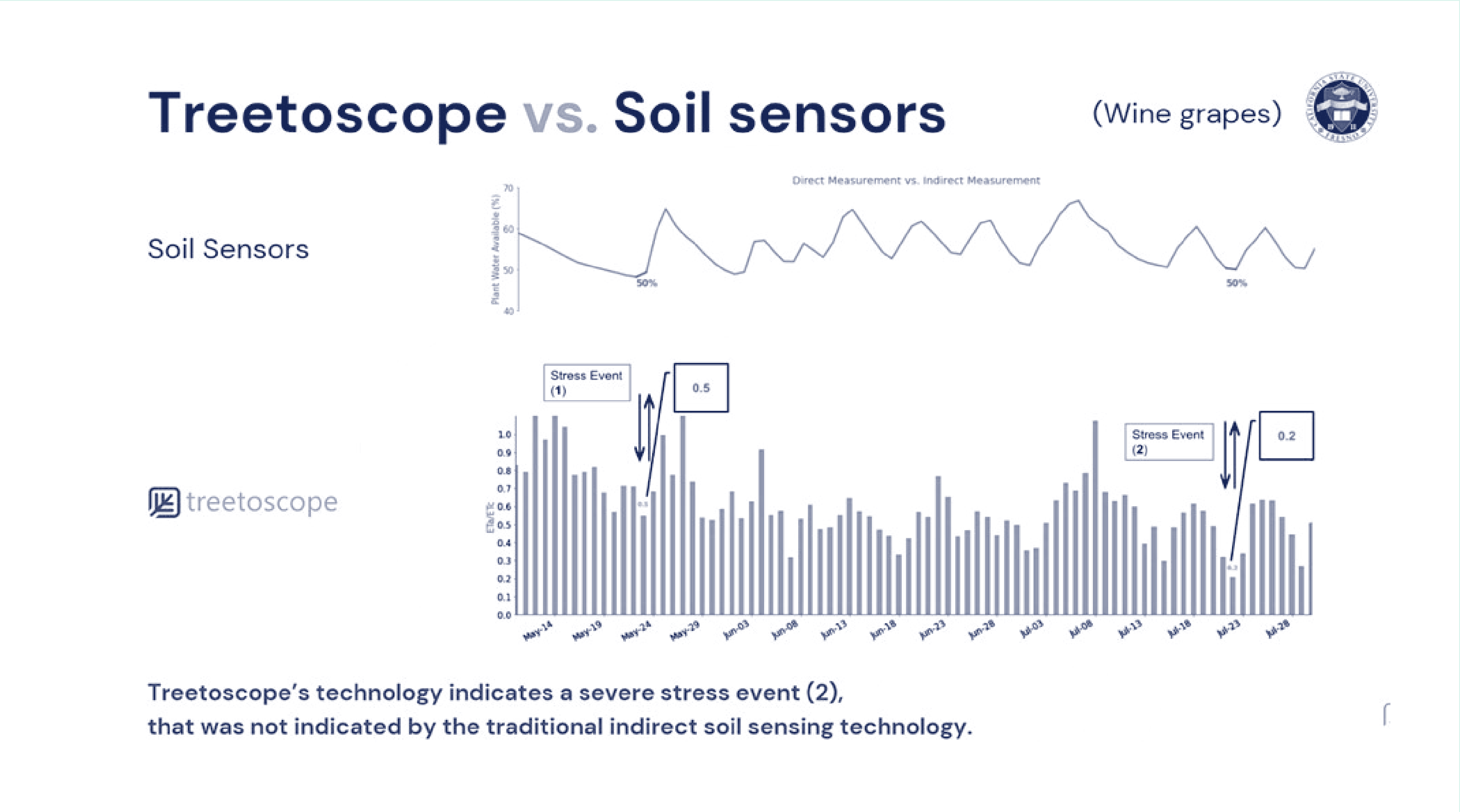*Case study by T2S.*

Figure 13
T2S Versus Other Soil Sensors
in the Market
*Source: Image by T2S. Provided by
Earth Venture Capital.*

Case study 4

Clearbot, Hong Kong

Case Study 4

Climate Challenges

Plastic pollution is a significant environmental challenge globally.

According to UNESCO,[12] around 8 million metric tonnes of plastic enter the oceans each year. Around 50–75 trillion pieces of plastic pollutants are estimated to be found in the world's oceans, approximately 80% of which comes from Asia.[13] ASEAN member states are among the world's biggest sources of plastic pollution.

This plastic waste either degrades into microscopic particles, known as microplastics, over time or floats around on the ocean surface, eventually accumulating in massive garbage patches formed by circulating ocean currents. This type of pollution has adverse effects on marine ecosystems, wildlife, and human health. Plastic pollution degrades the quality of water bodies, affecting water quality, biodiversity, and ecosystem health. It also contributes to the destruction of habitats, disrupting the ecological balance.

Solution

Clearbot offers a comprehensive set of solutions to combat plastic pollution in water bodies. Its primary approach involves deploying autonomous robots designed for efficient plastic waste collection. These robots operate autonomously, leveraging AI technology for navigation, object detection, classification, and decision-making.

Real-time monitoring capabilities provide data on the quantity, location, and types of plastic waste collected, aiding in pollution assessment and future clean-up planning. By harnessing AI, Clearbot aims to enhance the efficiency and effectiveness of its robots in managing plastic pollution, reducing the need for constant human intervention, and optimizing plastic waste collection processes. Its data and insights can also empower local governments to craft well-informed climate action strategies.

Impact

Clearbot's latest technological endeavour is aimed at transforming the polluted Umiam Lake in Meghalaya, India. While most fisherfolk in the area rely on this lake to feed their families, the lake is highly polluted, and fish have been reported to be filled with plastic. Clearbot is committed to collaborating with the Smart Village Movement (SVM) and revitalizing the lake's natural beauty while empowering the local community.

In just three hours post-deployment, Clearbot collected an impressive 250 kilograms of trash. The local fishermen were able to learn to use the technology in less than five minutes, indicating its user-friendliness.

The gathered trash undergoes a detailed analysis to identify its composition, which helps refine future clean-up efforts and informs policymakers on effective strategies to combat pollution.

12   Fava, M. (2022, May 9). *Ocean plastic pollution an overview: Data and statistics*. Ocean Literacy Portal. https://oceanliteracy.unesco.org
13   Our World in Data. (2021). *Share of global plastics emitted to the ocean.* https://ourworldindata.org

Share of global plastic waste emitted to the ocean, 2019

Annual estimate of plastic emissions. A country's total does not include waste that is exported overseas, and may be at higher risk of entering the ocean.

Our World in Data

Asia — 81%
Africa — 8%
South America — 5.5%
North America — 4.5%
Europe — 0.6%
Oceania — 0.4%
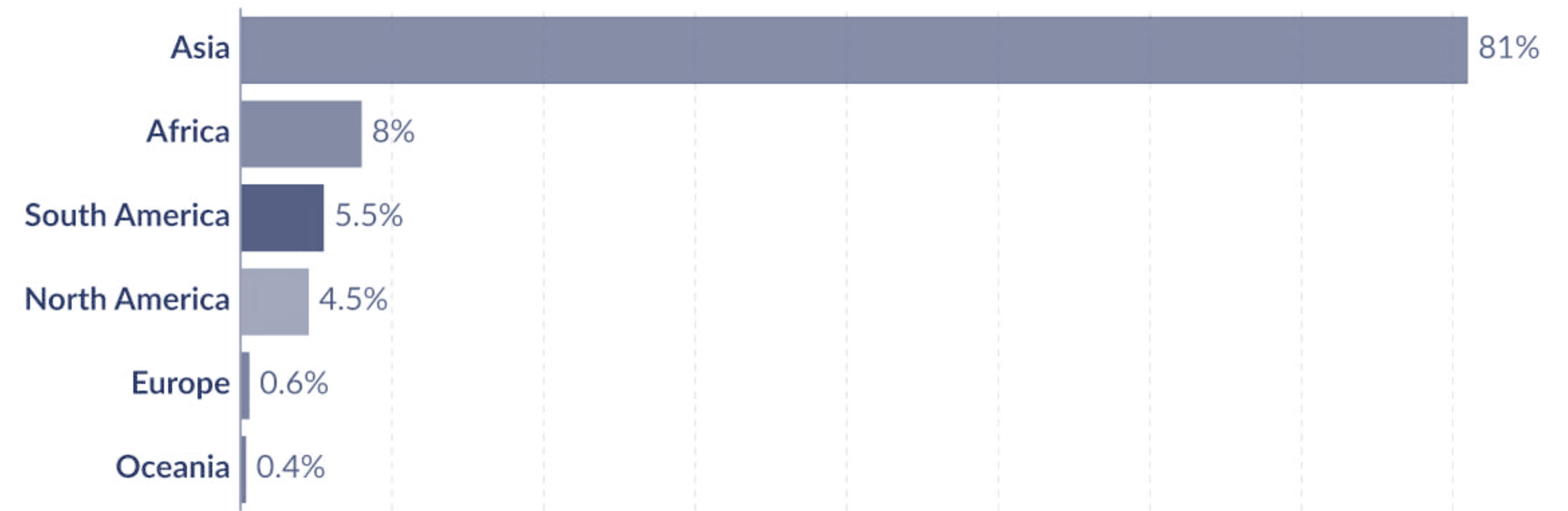
Data source: Meijer et al. (2021)

OurWorldInData.org/plastic-pollution | CC BY

Figure 14
Share of Global Plastics Emitted to the Ocean in 2019
Source: Our World in Data (2021)

Figure 15
Umiam Lake, Meghalaya, Before the Clean-up
Source: Image by Clearbot. Provided by Earth Venture Capital.

Figure 16
Umiam Lake After the Clean-up
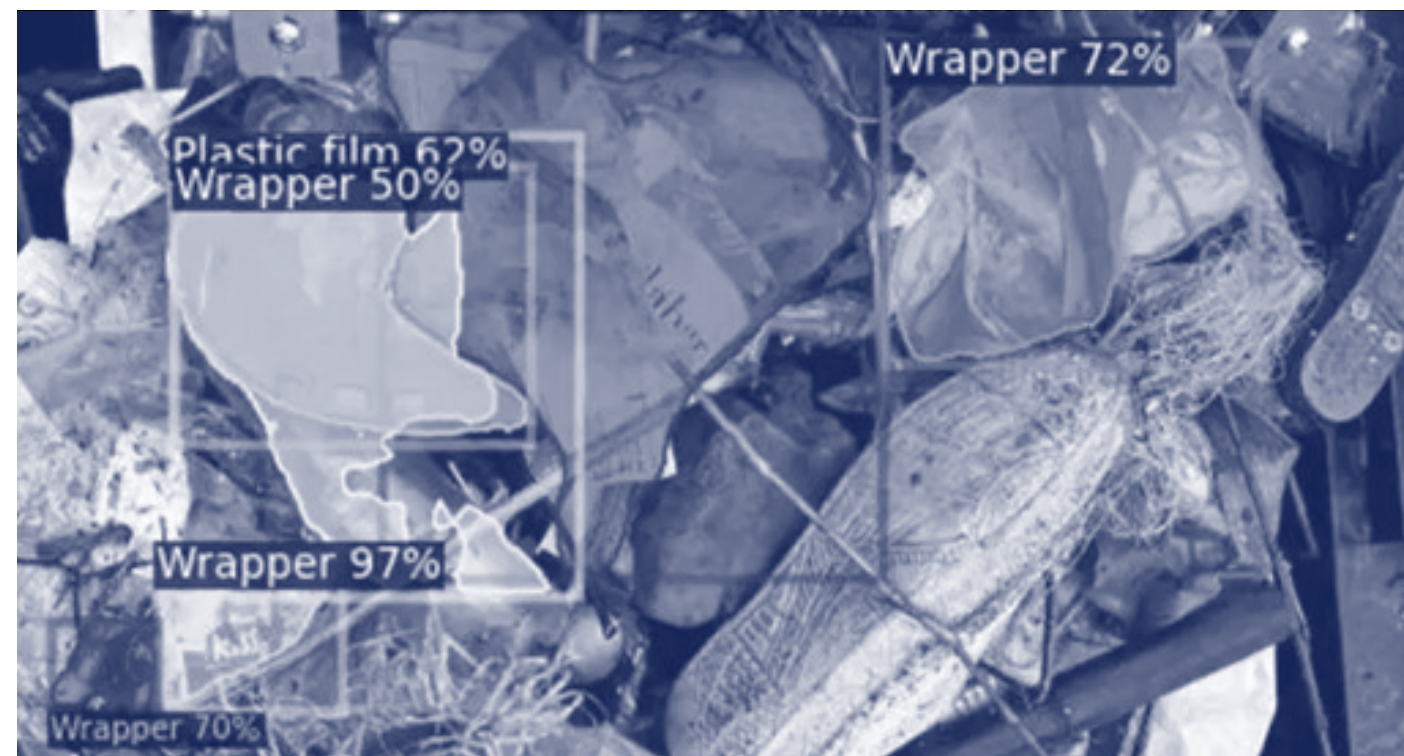*Source: Image by Clearbot. Provided by Earth Venture Capital*

Figure 17
Data From the Collection are Analysed
Source: Image by Clearbot. Provided by Earth Venture Capital.

Figure 18
An Example of Clearbot's AI-generated Dashboard
Source: Image by Clearbot. Provided by Earth Venture Capital.

4

Earth Venture Capital
A VC-view of the Start-up Ecosystem

Challenges to Increasing Finance and Investment in AI and Climate Tech

VC investment in climate tech and AI technology is a vital avenue for tackling environmental challenges and driving sustainable progress.

However, this sector presents various challenges that can make it difficult for start-ups to attract investors. In the case of climate tech, the prospect of long-term ROI often discourages investors from seeking rapid financial gains.

Moreover, the ever-evolving, and sometimes inconsistent, regulatory landscape surrounding climate change and clean energy exacerbates uncertainty for business ventures. The inherent technological risks, including the use of unproven technologies prone to technical failures, and the need for large-scale climate tech solutions, which often require significant upfront capital, act as barriers to entry.

Successfully scaling climate tech solutions from initial pilot projects to full-scale implementation is also a risky endeavour as there can be numerous setbacks at every stage.

On the other hand, AI integration in climate tech has its own set of complexities. Concerns surrounding data privacy and ethical considerations arise due to extensive data collection. Biases inherited by AI algorithms from training data can potentially lead to biased decision-making in climate-related applications.

The scarcity of AI talent exacerbates the situation, hindering the development and implementation of AI-driven climate solutions. Integrating AI into existing climate tech infrastructure presents vast challenges, and the opaque nature of certain AI models impedes transparency and the ability to justify AI-driven climate recommendations.

Assessing the State of Maturity of the Asian Start-up Ecosystem

To evaluate the maturity of the start-up ecosystem in Asia, we can utilize the quadruple helix model for innovation, which offers a more comprehensive and inclusive perspective on the innovation process. (see Figure 19)

The Quadruple Helix Innovation Model is a framework for understanding and promoting innovation through collaboration between four key stakeholders: government, academia, industry, and civil society.

An imbalance in any of these four elements can hinder tech-nological progress in a specific area. For example, the lack of a clear and consistent regulatory framework for some climate technologies can hinder investment and development, given their capital-intensive nature and long investment horizon.

This model is particularly relevant to the Asian start-up ecosystem because it provides a comprehensive lens to identify opportunities and address the key challenges that the region is facing in developing its innovative landscape.

So far, we have seen positive developments across all four aspects of the Quadruple Helix Innovation Model in the region:

Government

Many Asian governments have recognized the need to support start-ups, as they are drivers of innovation, economic growth, and job creation. Various policies and initiatives have been implemented to promote a conducive environment for start-ups.

For example, countries such as Singapore, South Korea, and India have launched start-up-friendly policies, tax incentives, and regulatory reforms to attract entrepreneurs and investors.

Industry

Established industries and corporations in Asia are increasingly engaging with start-ups. This collaboration takes various forms, including corporate venture capital (CVC) investments, partnerships, and accelerator programmes.

Industries such as fintech, e-commerce, healthcare, and logistics are witnessing a surge in start-up activity and corporate involvement.

Academia

Universities and research institutions in Asia continue to play a significant role in innovation and entrepreneurship. They provide a large talent pool, research collaborations, and technology transfer opportunities for start-ups. Asian universities, especially those in China, Japan, and South Korea, are actively promoting entrepreneurship programmes and fostering a culture of innovation.

Civil society (public)

Civil society and the public are becoming increasingly involved in the Asian start-up ecosystem. Crowdsourcing and crowdfunding platforms are becoming popular ways for start-ups to raise funds and gain public support. Moreover, start-ups in Asia often focus on solving pressing societal challenges, such as healthcare access, sustainability, and education, which align with public interests.
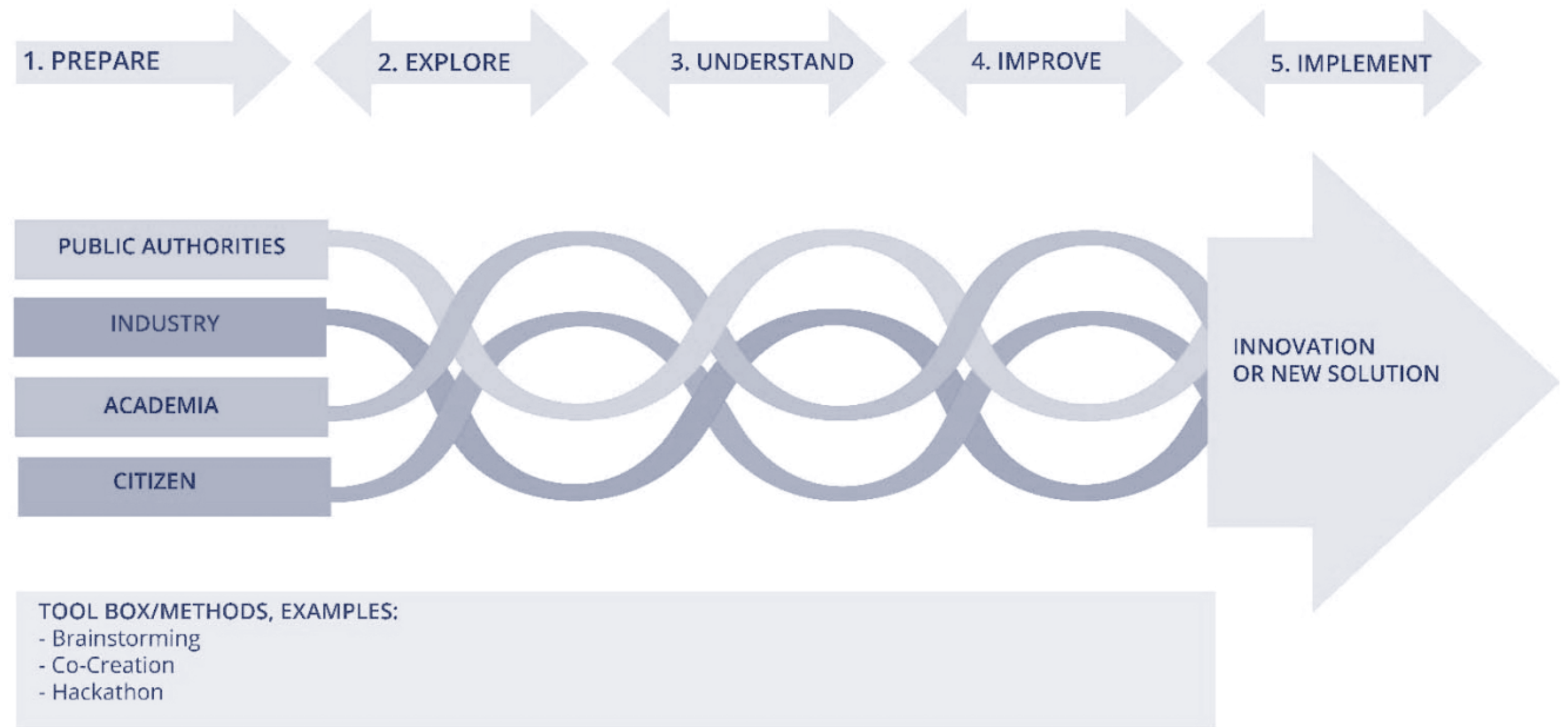
Figure 19
The Quadruple Helix Innovation Model
Source: A Quadruple Helix Guide for Innovations. In For Care: Informal care and voluntary assistance: Innovation in service delivery in the North Sea Region

Venture Capital's Vital Role in Start-up Development

At the heart of VCs' involvement in the quadruple helix model is their role as financial catalysts. Start-ups often grapple with limited resources, and VCs step in to bridge this funding gap. This financial support is essential for early-stage experimentation and the subsequent scaling of operations. By providing risk capital, VCs empower start-ups to take calculated risks that can lead to ground-breaking innovations.

However, VCs offer more than just capital. Their engagement with start-ups extends to the provision of invaluable expertise and mentorship. VCs draw from their extensive experience and industry knowledge and serve as trusted advisors, guiding founders through the complexities of building a successful business.

Start-ups benefit from the wealth of insights that VCs bring to the table, across strategy development, product refinement, market access, and business growth. This mentorship not only accelerates growth but also ensures start-ups navigate potential pitfalls with confidence.

VCs are known for their expansive networks within the business world. They facilitate connections between start-ups and potential customers, partners, and other sources of funding. This network access is invaluable, allowing start-ups to expand their reach and gain market traction more rapidly than they would have on their own.

The involvement of VCs goes beyond funding and mentorship; they also play a pivotal role in due diligence and validation. VCs conduct rigorous assessments before investing in start-ups, scrutinizing factors such as market potential, competitive advantages, and growth prospects.

Their investments serve as external validation of a start-up's potential, which can, in turn, attract other stakeholders including government agencies, philanthropic organizations, and corporate partners. This validation bolsters a start-up's credibility and attractiveness to a broader range of supporters.

As start-ups mature, VCs continue to be instrumental in their growth journey. They excel in helping start-ups scale their operations by providing them support for strategic planning, access to growth capital, and guidance on entering new markets. VCs help start-ups scale, ensuring that they seize expansion opportunities and compete effectively in evolving markets.

The Complementary Roles of Government and Philanthropy

While VCs are essential components of the quadruple helix model, government and philanthropic organizations have equally vital roles to play.

Government agencies often fund basic research and provide grants for early-stage innovation projects that are too high-risk for VCs. This support can lead to the creation of intellectual property and foundational technologies that later attract VC investments.

Moreover, governments are responsible for building the innovation infrastructure, fostering a supportive regulatory environment, and promoting education and skill development.

Philanthropic organizations play a critical role in supporting start-ups that address social and environmental challenges. They provide grants, impact investments, and patient capital to ventures focused on societal impact rather than immediate profitability.

5 Conclusion

In conclusion, harnessing sustainability as a strategic tool holds immense promise in not only realizing climate targets but also unlocking robust economic opportunities. To fully tap into the potential of AI for combatting climate change in emerging Asia, we must confront the associated challenges while capitalizing on the unique strengths inherent to this region. This endeavour demands a multi-faceted approach, encompassing local capacity-building, targeted investments, and collaborative efforts at the regional level.

Given the early stage of investment activities in this high-potential region, we strongly advocate for proactive measures. Policymakers should actively incentivize   climate-focused investments and urge investors to amplify their support for AI research and development.

Simultaneously, stakeholders should foster stronger collaboration and establish ethical guidelines to ensure responsible AI deployment.

To climate tech investors in emerging Asia, we underscore the importance of recognizing that investing in AI to combat climate change is a long-term commitment. It necessitates not only knowledge, skills, and experience but also steadfast belief and unwavering patience.

This collective effort can drive transformative change, aligning economic growth with sustainable environmental outcomes.

About the
Project

About DFL

Digital Futures Lab is an interdisciplinary research collective that interrogates the complex interaction between technology and society in the global South. Through evidence-based research, public engagement and participatory foresight, we seek to realise pathways toward equitable, safe and just digital futures.

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About the Project

Commissioned in early 2023 by The Rockefeller Foundation, this project explores the intersection of Artificial Intelligence and Climate Action in Asia. It examines opportunities, challenges and risks across three domains – agriculture and food systems, energy transitions, and disaster response in nine countries - Bangladesh, China, India, Indonesia, Malaysia, Singapore, Thailand, The Philippines and Vietnam.

We assembled a network of regional experts to help guide our investigation and provide context specific insights.

Aaditeshwar Seth (India)
ChengHe Guan (China)
Cindy Lin (Indonesia)
Elenita Daño (The Philippines)
Elina Noor (Malaysia)
Gaurav Sharma (India)
Md. Golam Rabbani (Bangladesh)
Pyrou Chung (Thailand)
Tien Nguyen (Vietnam)
Veerappan Swaminathan (Singapore)

For additional reports and outputs from this project visit – climateai.asia

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