



Accelerating Clean Tech for Energy and Agriculture in SIDS: Enabling action for a Just Transition

November 11, 2024

4:45 – 6:15 PM GMT+4 (local time) / 1:45 – 3:15 PM CEST



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Working Group on
Climate Change



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Community Advisory Board

Climate Change

IEEE: Enabling Innovation and Technology Solutions

IEEE Climate Change Technology for Climate Resilience

UNFCCC COP29, Baku, Azerbaijan, 11 Nov 2024

Professor Saifur Rahman

2023 IEEE President and CEO

Joseph Loring Professor and Director, Advanced Research Institute, Virginia Tech, USA

climate-change.ieee.org



All Encompassing Aspects of Climate Change



- A topic that encompasses various aspects of science, engineering, technology, policy and societal impact and brings to the forefront many issues:
 - Greenhouse gas emissions, temperature rise, renewable energy, land use
 - Ocean acidification, ocean warming, and extreme weather events
 - Mitigation, adaptation, and resilience
 - Social and economic impacts
 - Technological innovations, and more

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IEEE

*Advancing Technology
for Humanity*

What Can We Do to Serve Humanity?

**Promote Clean-tech Solutions for
Climate Sustainability**

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IEEE Engagement in Addressing Climate Change



Mission-based Challenge

- Pragmatic and accessible technical solutions are urgently needed to address climate change
- We, as engineers and technologists, are well and uniquely placed to provide technical solutions and offer a neutral space for discussion and action

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What IEEE Brings to the Challenge

- Commitment to the constant pursuit of innovation and excellence for the benefit of humanity
- The technical expertise of IEEE members and volunteers from across IEEE OUs
- The power of IEEE's collaborative platforms to enable innovation with purpose
- Longer-term IEEE engagement in creating and promoting technical solutions and applications for addressing climate change



Deploying Resources to Address Climate Change

There is growing interest and activities across IEEE in helping to combat and mitigate the effects of climate change through:

- Information sharing and thought leadership
- Providing spaces for discussion, ideation and action
- The development of pragmatic and accessible technical solutions

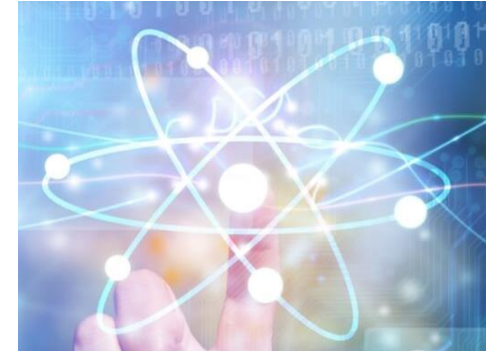
Resulting in a burgeoning IEEE climate change program and the opportunity to amplify the collective IEEE footprint.

Engaging and mobilizing the 460,000+ members throughout the world and locally around climate change issues and solutions.

Bringing to bear the expertise of the communities of IEEE and their respective outputs.

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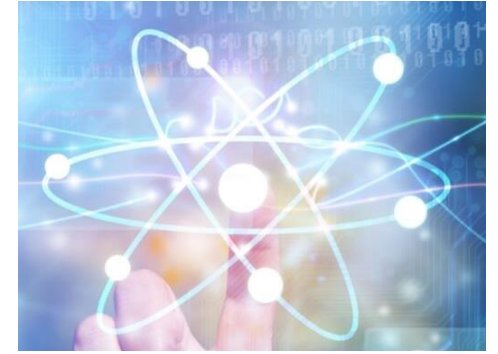
External Outreach to Address Climate Change

IEEE engages in various fora on the topic and is sought after for its technical content, thought leadership, and expert communities, including in such global stage events as:

- United Nations Framework Convention on Climate Change Conference of the Parties (COP)
- The International Renewable Energy Agency (IRENA)
- European Green Coalition and Sustainability Energy Week

Working to engage and coordinate with cross-disciplinary engineering communities (civil, mechanical, chemical, mining, etc.) on a global scale.

IEEE has many publications and conferences addressing and incorporating climate change and sustainability.



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IEEE Climate Change Program

<https://climate-change.ieee.org>



[Resources from IEEE](#) [Climate Change in the News](#) [Contact](#) 



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Ecosystem for IEEE's Climate Sustainability Work

IEEE Spectrum: Climate Change News Feed; Podcasts; Features; Archives; Journal Watch Posts (Xplore); The Institute (Engineers of Climate Change); Coverage of Conferences and Standards

IEEE Discusses 6 Simple Solutions to Climate Change at COP27 > They include switching to LEDs and making coal plants more efficient

BY KATRY PRETZ | 26 JAN 2023 | 4 MIN READ

Simple, effective solutions that can help lessen the impact of climate change already exist. Some of them still need to be implemented, though, while others need to be improved.

Social Media



Sponsored Content From Industry

Evolution of In-Vehicle Networks to Zonal Architecture

In this webinar, you will learn more about:

- Evolution of In-Vehicle Network architecture
- Automotive Ethernet characteristics
- Compliance testing of Ethernet
- Practical demonstration

Xplore: Engineers to Follow; Journal Watch Articles (free); Climate Change Articles

IEEE Xplore Advancing Technology for Humanity

SEARCH 2,866,681 ITEMS

IEEE CLIMATE CHANGE SOLUTION

Wenbin N. Ye, David S. Sumanuzzi, and Fei (Fred) Wang

Climate Change Resources from IEEE | Climate Change in the News | Contact | IEEE

MAKING A DIFFERENCE

TECHNICAL Solutions | BUILDING Technical Community | CLIMATE CHANGE Mitigation

IEEE's mission is to advance technology for the benefit of humanity. Today the world faces its largest modern-day threat—climate change. We recognize this global crisis and are committed to helping combat and mitigate the effects of climate change through pragmatic and accessible technical solutions and providing engineers and technologists with a neutral space for discussion and action.

COORDINATING IEEE'S RESPONSE TO CLIMATE CHANGE DEDICATED COMMITTEE

The 2022 IEEE Ad Hoc Committee to Coordinate IEEE's Response to Climate Change is identifying ongoing efforts across IEEE and collaborating with key external partners for a comprehensive response to climate change.

Jobs From IEEE Job Site

IEEE JOB Site

FEATURED JOBS

- Image Reconstruction Scientist
- Engineering Designer
- Senior Test Systems/Electrical and Instrumentation Engineer
- Manager - Health Plans Engineering
- Global Project Manager - Senior PM - Asia PM
- Supervisor of Computer Science

Conferences



Standards

IEEE SA
STANDARDS ASSOCIATION

Newsletters

IEEE Spectrum (Live group code: #WAI2SPIC for US/CA if you join IEEE)

Tech Alert 2 FEBRUARY 2023

Here's How Apronik is Making Their Humanoid Robot - Is now the right time for useful, affordable, general-purpose humanoids?

AI Goes To K Street: ChatGPT Turns Lobbyist - Automated influence campaigns could spell trouble for society.

IEEE Technology Center for Climate

IEEE TECHNOLOGY CENTER for Climate

The Promise of Electrification

IEEE Technology Center for Climate

IEEE's Technology Center for Climate is a leading organization in the development and implementation of climate change solutions. We are committed to providing the industry with the latest research and technical solutions to help combat and mitigate the effects of climate change.

ITCC Plans

- Technology Roadmap through 2030
- Collaboration and Partnership
- Making Progress through IEEE Technical Activities

IEEE Climate Change newsletter

Information from IEEE to Help Sustain Our Planet

Climate Change IEEE: Building Knowledge and Technology Solutions

August 2022 IEEE Climate Change News

Smart Cities Rely on Smart Infrastructure to Make People's Lives Better

Smart Cities help urban environments to develop and grow by using modern technology, including data-driven solutions, that provide a sustainable, resilient, equitable, and privacy-respecting community for its inhabitants.

[Read More](#)



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IEEE Climate Change Collection (ICCC)

IEEE.org | IEEE Xplore Digital Library | IEEE Standards | IEEE Spectrum | More Sites

Climate Change
IEEE: Enabling Innovation and Technology Solutions

Resources from IEEE | Climate Change in the News | Contact | IEEE

RESOURCES FROM IEEE

As the world's largest organization of technical professionals, IEEE has both the opportunity and the responsibility to assist in organizing the response of engineers, scientists, and technical professionals across the world to address the causes, mitigate the impact, and adapt to climate change.

IEEE's scholarly publications, conference proceedings, technical standards, and other materials help foster the exchange of technical knowledge and information for the critical climate issues that our planet faces today.

[View the IEEE Climate Change Collection in IEEE Xplore®](#)



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Immense Breadth of IEEE Activity in Climate Change

IEEE SA STANDARDS ASSOCIATION

Examples of

Industry Connections Programs

- Green Hydrogen
- Marine Carbon
- Dioxide Removal
- Sustainable Maritime
- Energy and Water Nexus

Webinars from

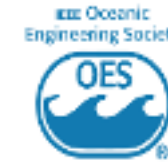
IEEE TECHNOLOGY CENTER for Climate

More than 1300 events

IEEE Resource Center 500+ Resources

IEEE Technical Community for Climate Change

Exploring *Sustainable Technology Challenges & Solutions* to Climate Change



IEEE-ITU SYMPOSIUM on Achieving Climate Resilience

IEEE Technical Community for Climate Change



The IEEE Climate Change Collection

IEEE Xplore

- Conference Papers (23,793)
- Journal Articles (3,276)
- Magazine Articles (555)
- Early Access Articles (82)
- **NEW!!** Climate Change taxonomy
- **NEW!!** IEEE Climate Magazine
- **NEW!!** IEEE PES Sustainability Magazine

Other Activity Examples:

- Tracking inventory of CC-related initiatives, including improvements to collection process
- IEEE Spectrum Influencers
- Much more!

Coming Soon!!
IEEE Experts in Climate Change
 Beta launch in Q4 2024

IEEE DataPort 60+ Resources

Climate Change/Environmental

IEEE Activities in Collaboration with External Partners

Sampling of International Collaborations

IEEE-ITU SYMPOSIUM on Achieving Climate Resilience

HOME PROGRAM SPEAKERS TRAVEL PARTICIPATE

The Symposium will convene on
12-13 December 2024
ITU Headquarters
Rue de Varembe 2, Geneva, Switzerland

Attendance is limited and by invitation

Achieving climate resilience centers on both climate change mitigation and adaptation. Concrete actions are essential, and it is crucial to establish the groundwork for a swift, just, feasible, and equitable transition. This transition must be supported by robust policy, standards, skills, finance, and collaboration.



IEEE youngprofessionals

Member Benefits Volunteer Resources Contact Us

Climate Week NYC | 23 September 2024 | 5 - 7 PM EDT

A Multi-Stakeholder Dialogue on Climate Action:
Young Practitioners and Their Role in the Technology Transformation

Jay Conference, Bryant Park, 2nd Floor, Tokyo Room
109 West 39th Street, New York City, NY, United States of America

The Event Has Concluded

Thank you for seizing this opportunity to contribute to a vital conversation on climate action and sustainability. Your insights and participation were crucial in driving discussion that will shape a sustainable future.



IEEE-ITU SYMPOSIUM *on* Achieving Climate Resilience

The Symposium will convene on

12-13 December 2024

ITU Headquarters

Rue de Varembe 2, Geneva, Switzerland

Attendance is limited and by invitation

Symposium aims to achieve objectives:

- Explore Technology Solutions: *Highlight innovative technologies and standards that support climate resilience and policy integration.*
- Promote Collaboration: *Facilitate cross-sector dialogue among government, industry, academia, and international partners.*
- Support Policy Formulation: *Develop actionable policies and strategies, encouraging clean-tech lending by financial institutions and development agencies.*
- Showcase Best Practices: *Present effective technologies and practices to reduce carbon emissions and support future research and development.*
- Facilitate the Development of a Technology Roadmap: *Outline a collaborative roadmap to enhance global climate resilience, promoting environmental efficiency.*

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An unprecedented level of awareness of climate change and the role of decarbonization in enabling environmental sustainability moving forward

Major focus placed on the carbon produced through electricity generation, as it is responsible for roughly 30% of emissions globally

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- 
- ▶ **Navigating the tension between industrialized nations and emerging economies for global decarbonization efforts requires a diverse portfolio of solutions for low-carbon generation, storage and demand side management with advanced technology focusing on energy efficiency.**
 - ▶ **To more efficiently facilitate the global shift towards renewable energy adoption, the following six areas should be our priority.**

Reduce Carbon Emissions from Electricity Production



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Six Priorities for Decarbonization in Industrialized and Emerging Economies

1. Use less electricity, energy efficiency
2. Use low carbon fossil fuel power plants
3. Use H2 & other storage technologies
4. Promote more renewables
5. Accept some nuclear
6. Promote cross-border power transfer

Our efforts can be the seeds to help combat and mitigate the effects of climate change through pragmatic and accessible technical solutions and by providing engineers and technologists with a neutral space for discussion and action.



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Thank you.

Prof. Saifur Rahman
s.rahman@ieee.org

Innovative Climate-Smart Solutions for Food Security and Sustainability in Small Island Nations – A Perspective from a Resilient Future



By
Aitazaz A. Farooque, PhD, P.Eng, P.Ag
Professor & Associate Dean

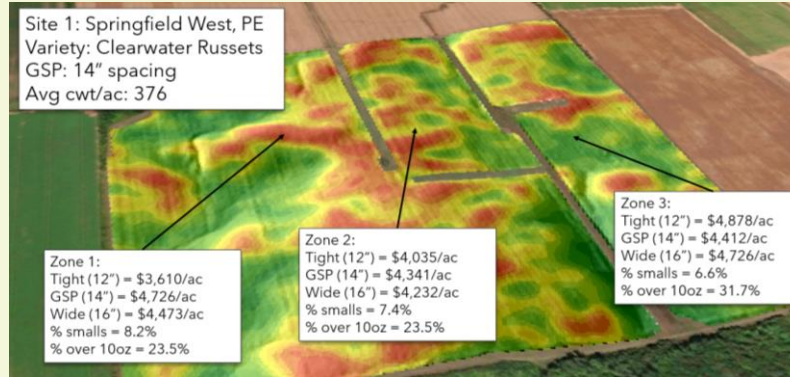
November 11, 2024: Baku, Azerbaijan



Outline

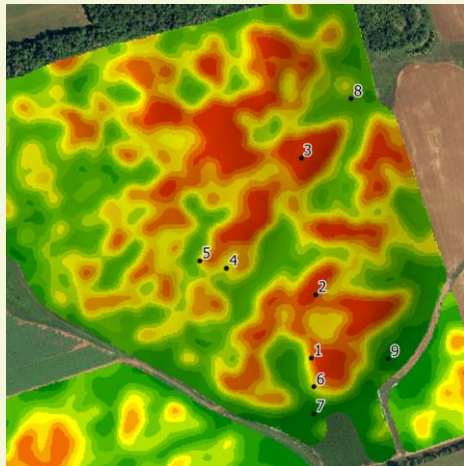
Potato Virus Y Scouting and Variable Rate Technology

Variable Rate Seeding and Nutrient Management

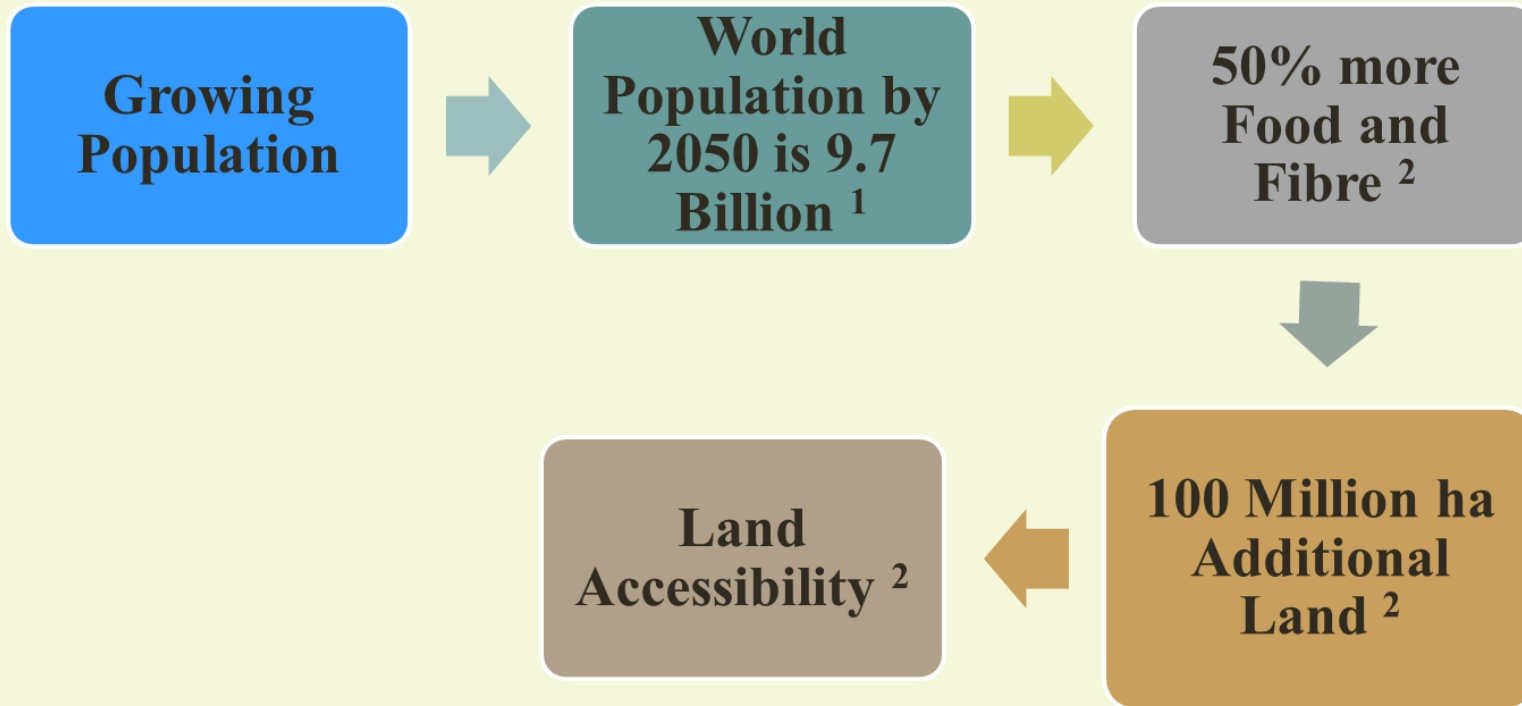


Greenhouse Gas Emissions using Machine Learning

Sustainable Water Management



Why Climate Smart Solutions?



<https://www.teknopalas.com.tr/en/iot-agriculture-solutions/>

In last 50 years GHG emission from agriculture and forestry has been doubled and is estimated to increase by 2050

Source: Tubiello *et al.*, (2014).



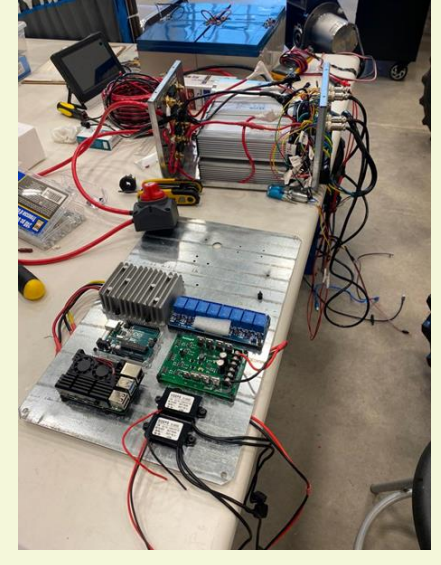
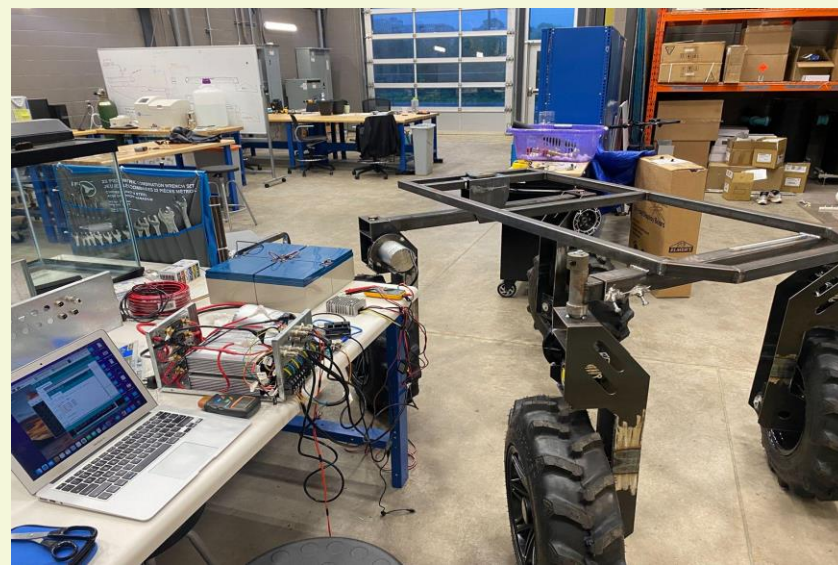
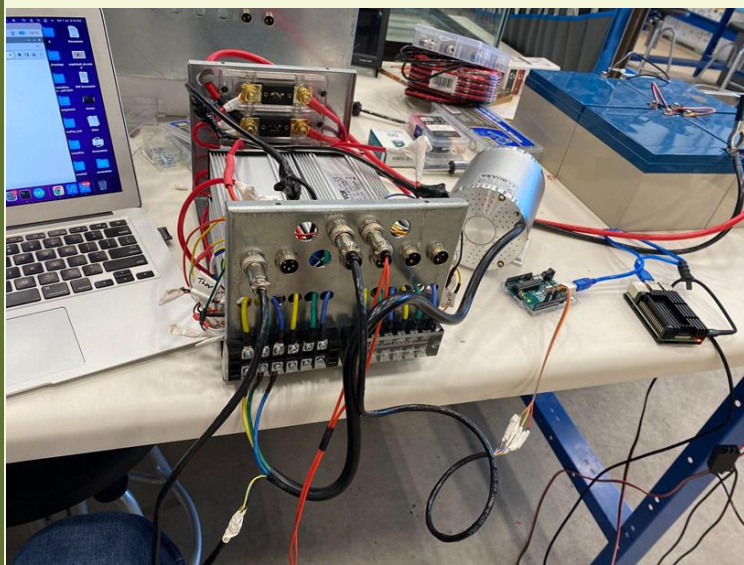
SDG#2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

SDG#9: Build resilient infrastructure, promote sustainable industrialization and foster innovation

A person is operating an AgriScout robot in a large agricultural field. The robot is a small, four-wheeled vehicle with a white top and black frame, equipped with a sensor array and a camera. It is moving along a dirt path between rows of young green plants. The field is vast and flat, with a line of trees and a power line tower in the distance under a bright blue sky with scattered white clouds. A green decorative bar is at the top of the image, and a green semi-transparent box is in the bottom right corner.

AgriScout Robot

AgriScout Robot – Design & Development





Model Evaluation

Greenhouse Data

Data collected under
Controlled environment

85%

Field Data

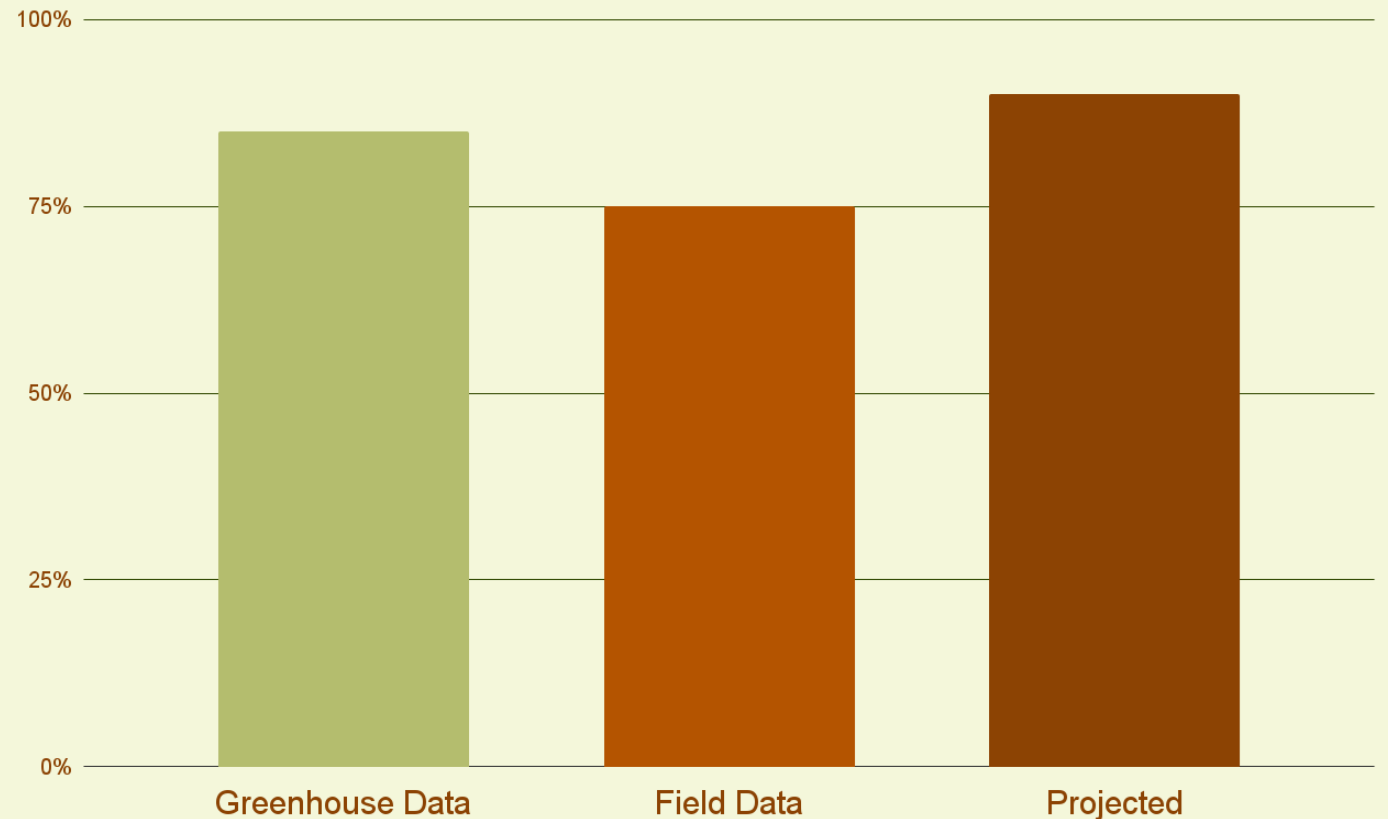
More variation
lighting conditions

75%

Target Accuracy

With more training data we
aim to achieve higher
accuracy

>90%



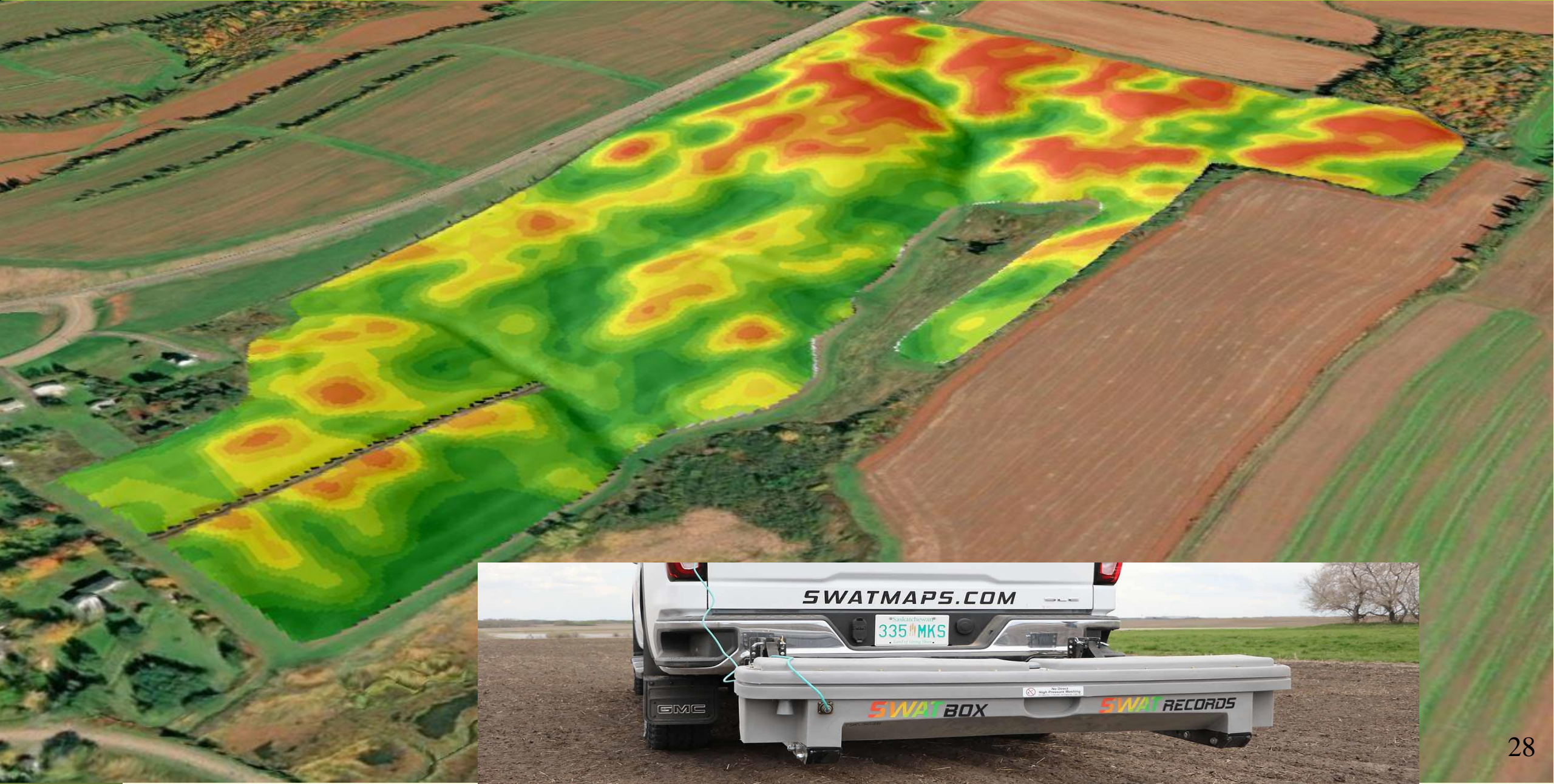
On-going Work

Infected Plants Map

- AgriScout Robot V2 with GPS RTK.
- Geo-location of PVY infected plants.



Variable Rate Seeding & Nutrient Management



Variable Rate Seeding in PEI

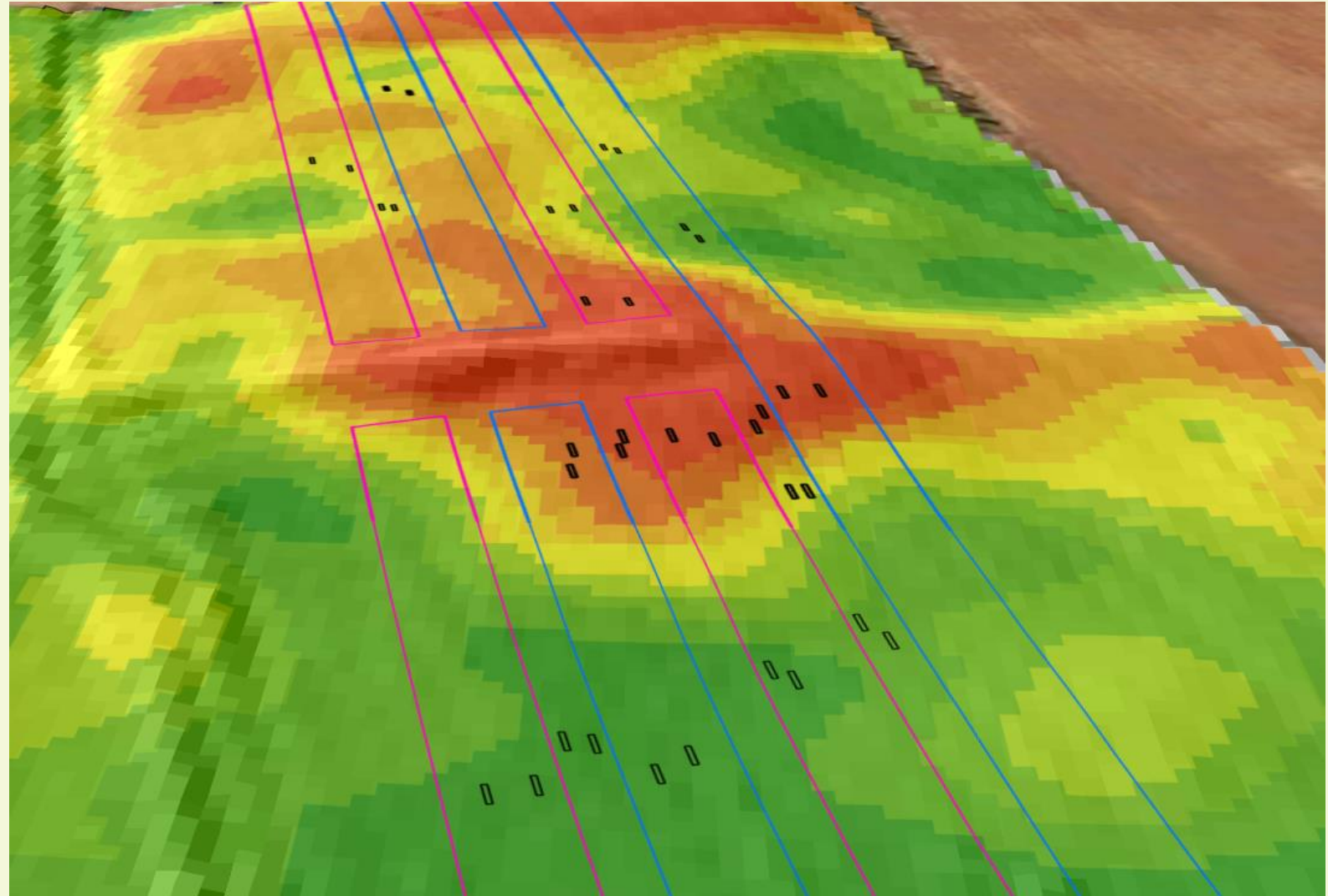
Trials carried out in 10 fields in PEI between 2021 and 2023.

Varied plant spacing approx. 10-15% from grower standard.

Strips harvested according to SWAT Zones.

330 10 ft strips dug and graded

Economic analysis was performed

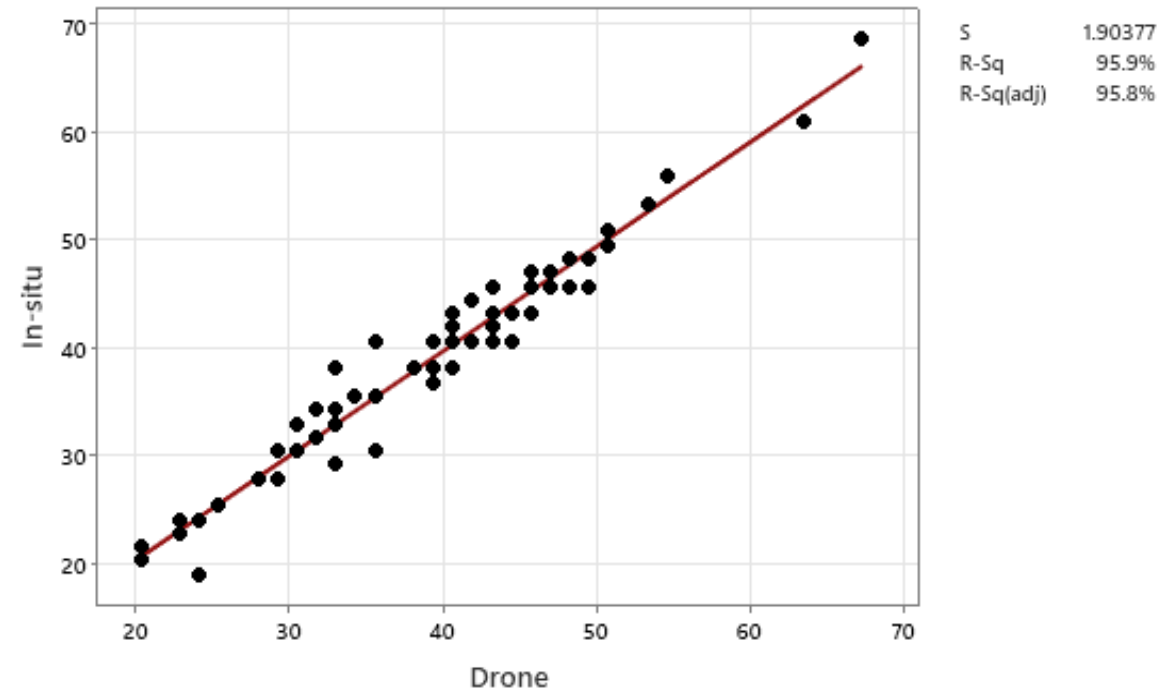


Seeding Spacing – Drone & Machine Learning



Plant Spacing (cm) - In-situ measurement vs Drone based measurement

$$\text{Actual} = 1.020 + 0.9668 \text{ Drone}$$



Wider Spacing – Profitability Comparison

| Zone 1 | Value per ac (\$) | | | | |
|--------------------|-------------------|----------|-----------|------------|--|
| Farm / Year | | GSP | Wide (VR) | Difference | |
| Clearwater2021 | | \$ 4,726 | \$ 4,473 | -\$ 253 | |
| RussetBurbank2021 | | \$ 5,307 | \$ 6,026 | \$ 719 | |
| Waneta2021 | | \$ 6,618 | \$ 6,815 | \$ 197 | |
| Clearwater2022 | | \$ 3,279 | \$ 3,910 | \$ 631 | |
| OCF2022 | | \$ 4,396 | \$ 4,063 | -\$ 333 | |
| MountainGem2022 | | \$ 4,625 | \$ 4,967 | \$ 342 | |
| MountainGem2023 | | \$ 5,921 | \$ 5,782 | -\$ 139 | |
| RussetBurbank22023 | | \$ 6,311 | \$ 5,913 | -\$ 398 | |
| Satina2023 | | \$ 3,509 | \$ 3,549 | \$ 40 | |
| | | | Average | \$ 90 | |

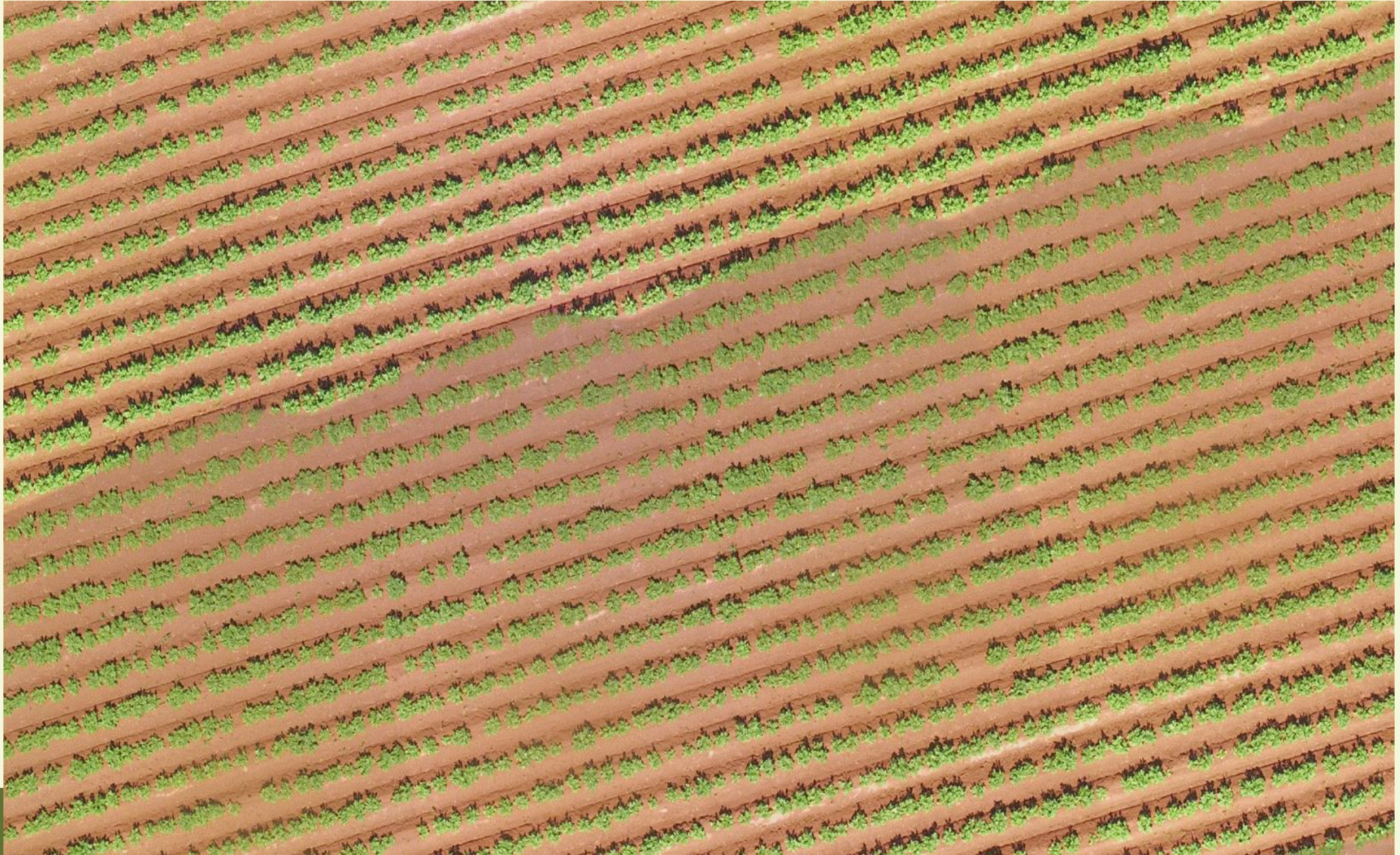
Wide spacing in upper zones (drier) outperformed GSP 5/9 times with an average profitability increase of \$90/ac

Tight Spacing – Profitability Comparison

| Zone 3 | Value per ac (\$) | | | | |
|--------------------|-------------------|----------|---------|--|------------|
| Farm/Year | Tight (VR) | GSP | | | Difference |
| Clearwater2021 | \$ 4,878 | \$ 4,412 | | | \$ 466 |
| RussetBurbank2021 | \$ 5,019 | \$ 4,842 | | | \$ 177 |
| Waneta2021 | \$ 6,695 | \$ 6,713 | | | -\$ 18 |
| Clearwater2022 | \$ 3,943 | \$ 3,991 | | | -\$ 48 |
| OCF2022 | \$ 4,678 | \$ 4,396 | | | \$ 282 |
| MountainGem2022 | \$ 7,131 | \$ 6,183 | | | \$ 948 |
| MountainGem2023 | \$ 6,268 | \$ 5,384 | | | \$ 884 |
| RussetBurbank12023 | \$ 5,124 | \$ 5,628 | | | -\$ 504 |
| RussetBurbank22023 | \$ 5,773 | \$ 5,362 | | | \$ 411 |
| Satina2023 | \$ 4,355 | \$ 3,387 | | | \$ 968 |
| | | | Average | | \$ 357 |

Tight spacing in lower zones (more moisture but well drained) outperformed GSP 7/10 times with an average profitability increase of \$357/ac

Variable Rate Seeding – Drone Mapping

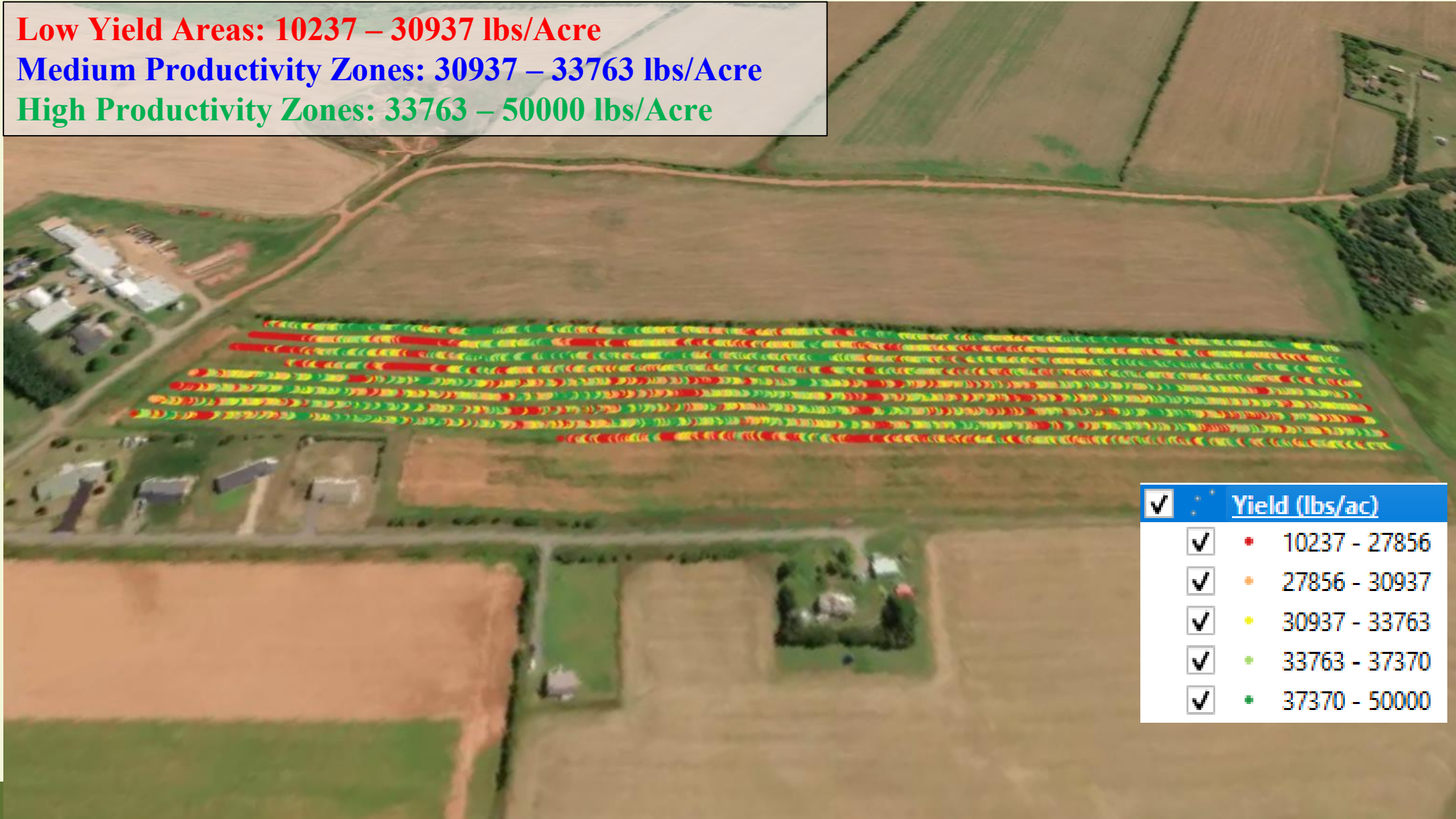


Variable Rate – Nutrient Management

Low Yield Areas: 10237 – 30937 lbs/Acre

Medium Productivity Zones: 30937 – 33763 lbs/Acre

High Productivity Zones: 33763 – 50000 lbs/Acre



| ✓ | Yield (lbs/ac) |
|---|-----------------|
| ✓ | • 10237 - 27856 |
| ✓ | • 27856 - 30937 |
| ✓ | • 30937 - 33763 |
| ✓ | • 33763 - 37370 |
| ✓ | • 37370 - 50000 |

Variable Rate – Nutrient Management

Average Yield per Treatment

Check – 32,373 lbs/ac

VR – 32,682 lbs/ac

Difference = 309 lbs/ac more in VR

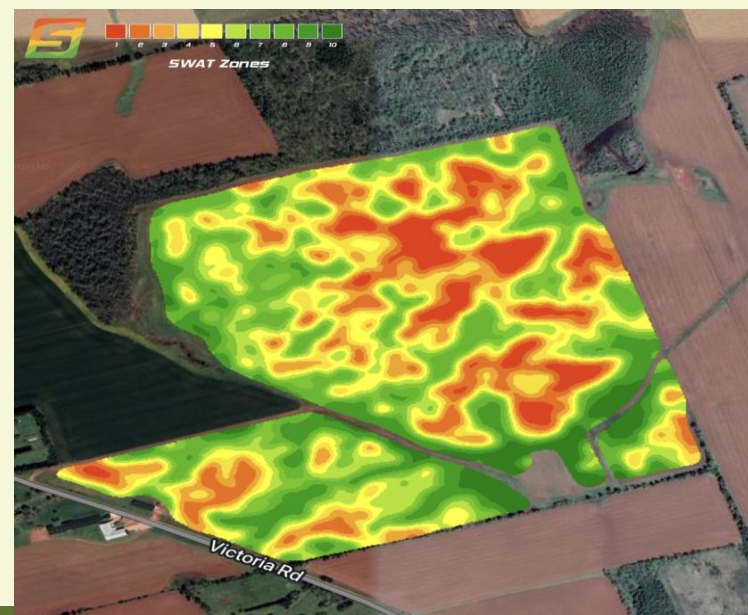
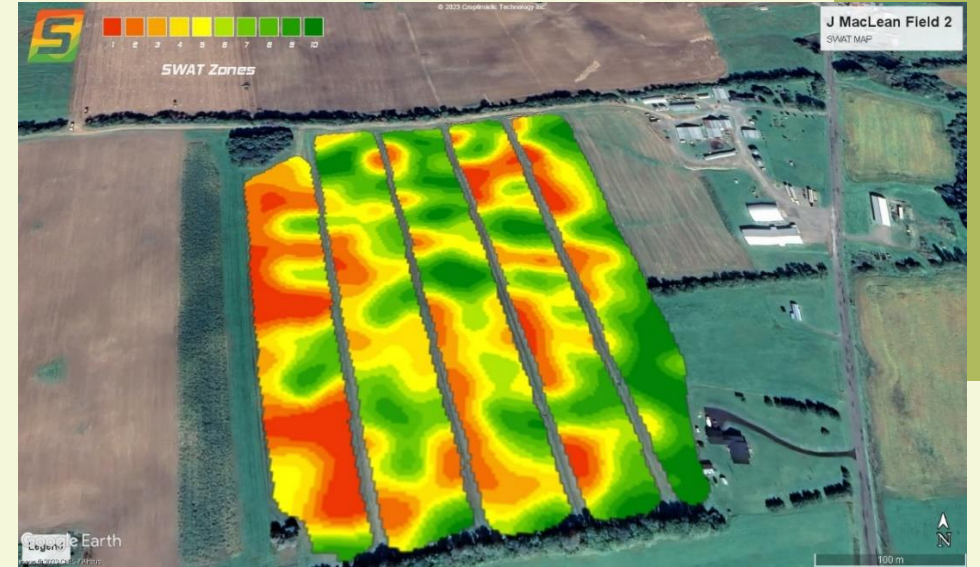
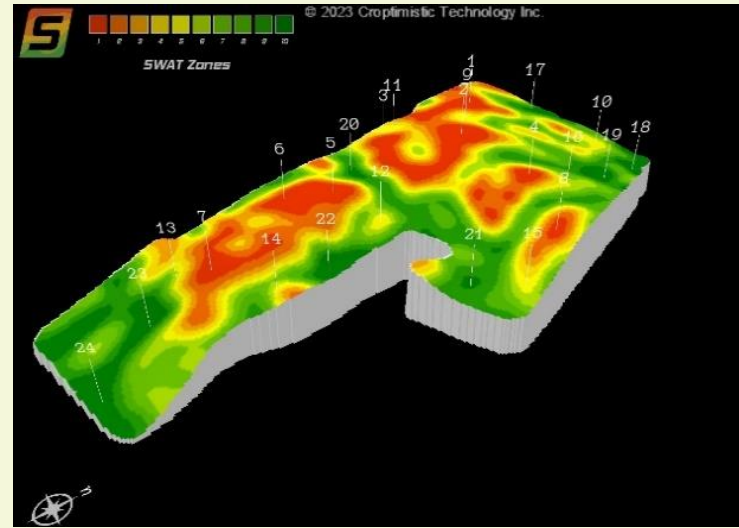
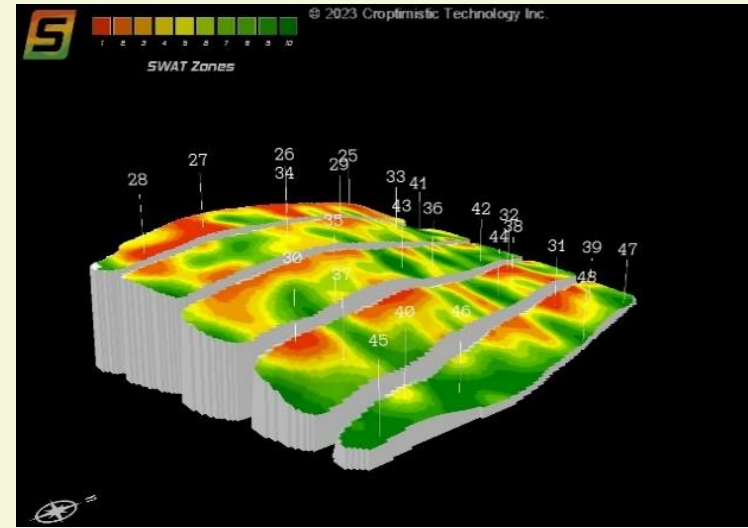
+ \$36/ac using VR with same amount of fertilizer applied

Cost to do VR: (generate zones with EC/Topography, soil sample, and create prescriptions approx. \$15/ac in year 1, \$7/ac going forward)

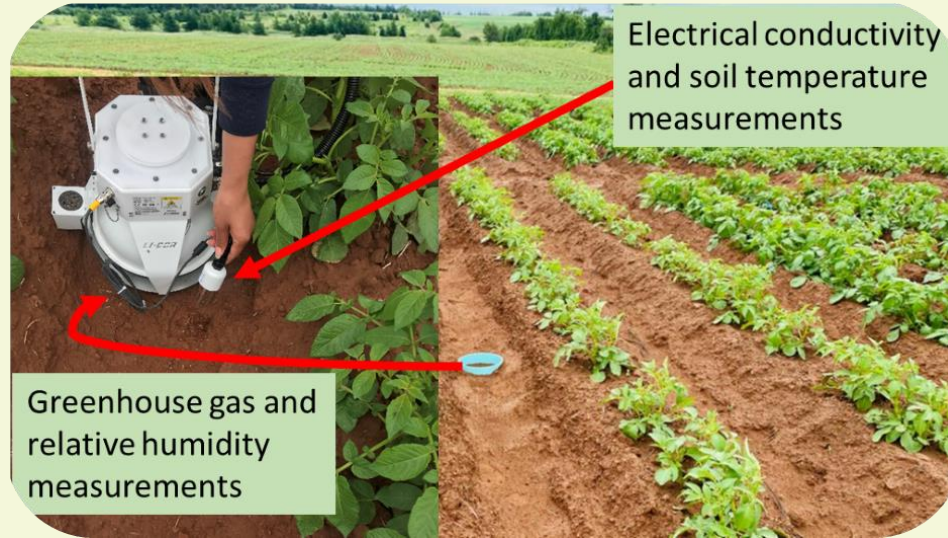
ROI of approx. \$21/ac for Potash

*** Zones can be used for many other applications: VR Lime, N, irrigation, planting and more**

Greenhouse Gas Emissions – Monitoring/Modeling



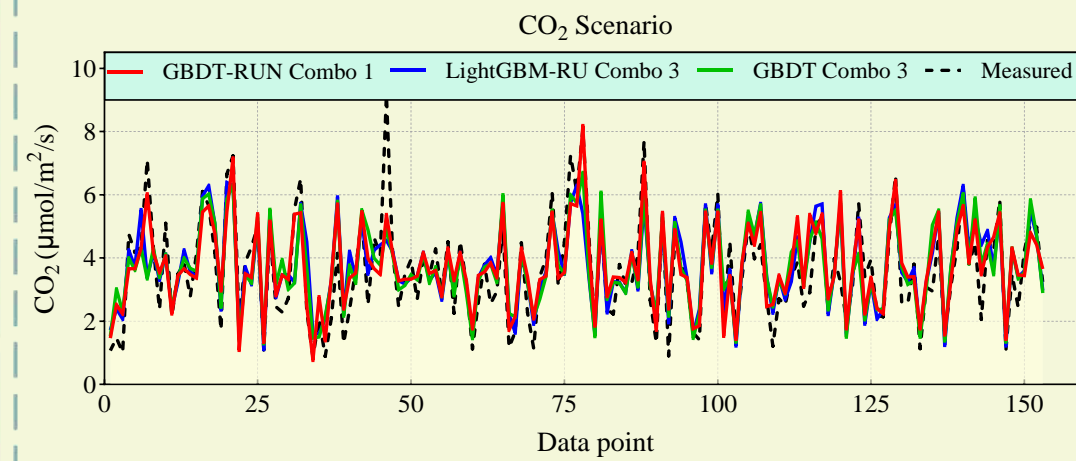
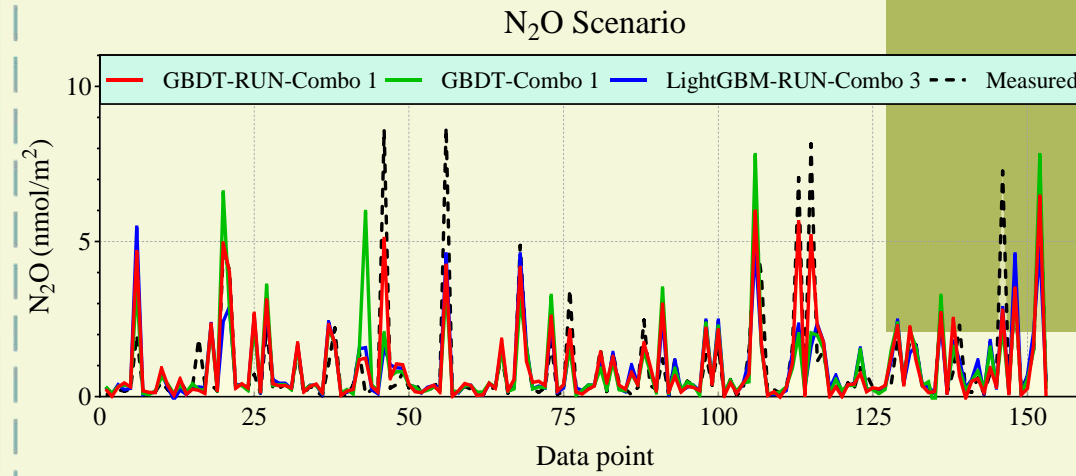
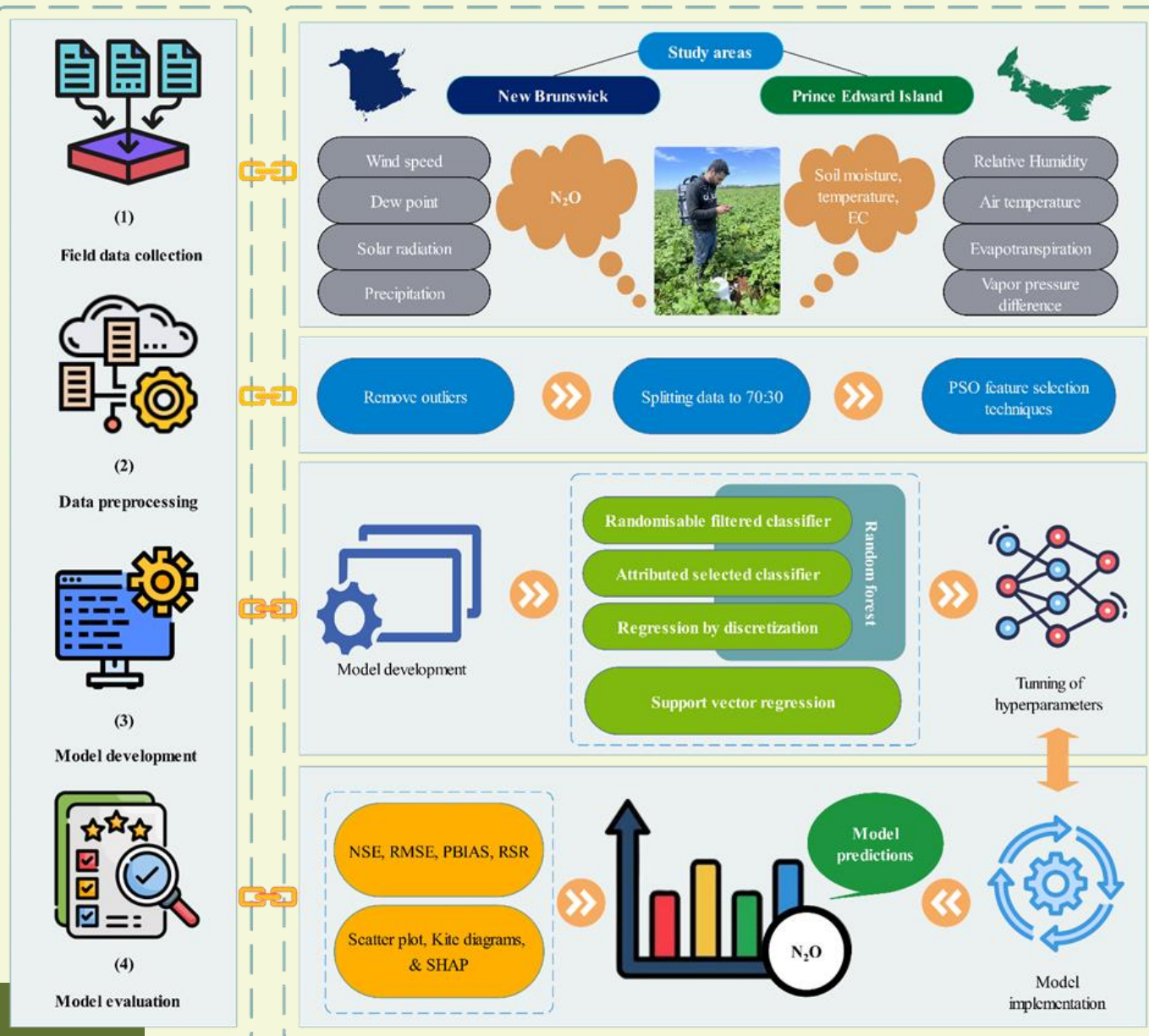
Greenhouse Gas Emissions – Monitoring/Modeling



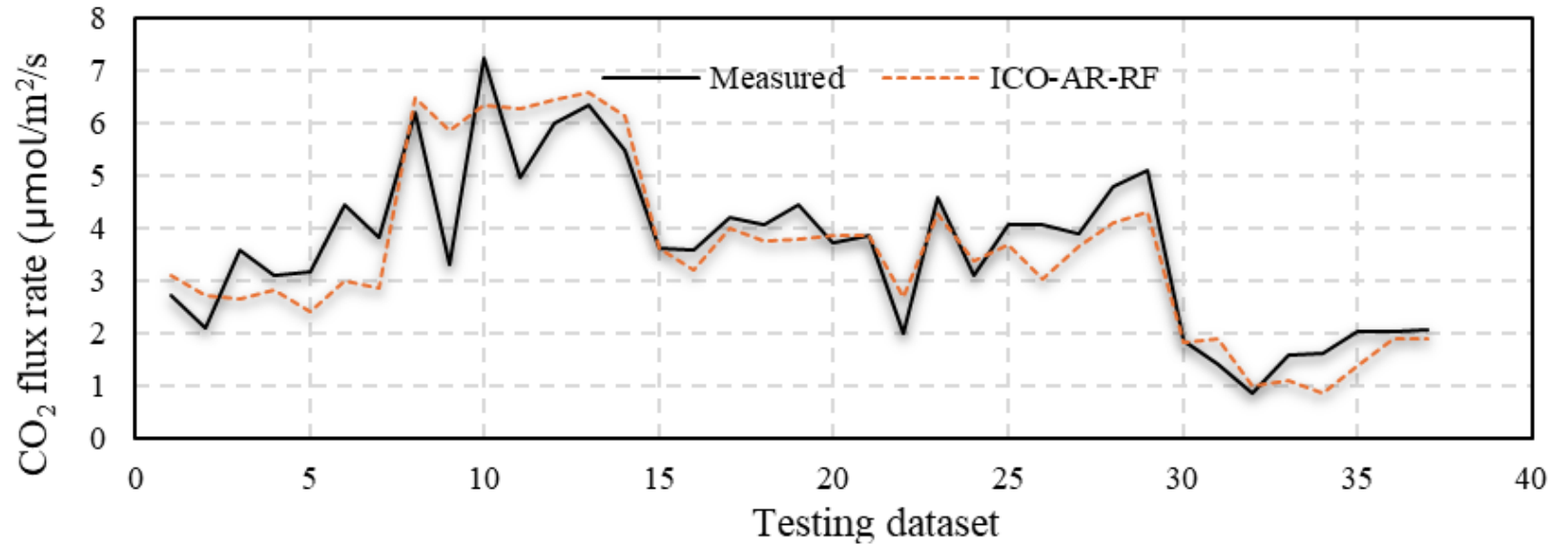
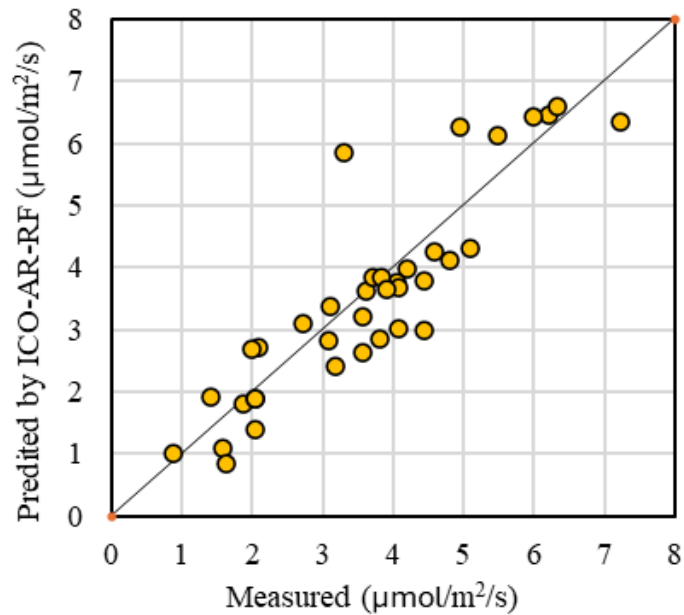
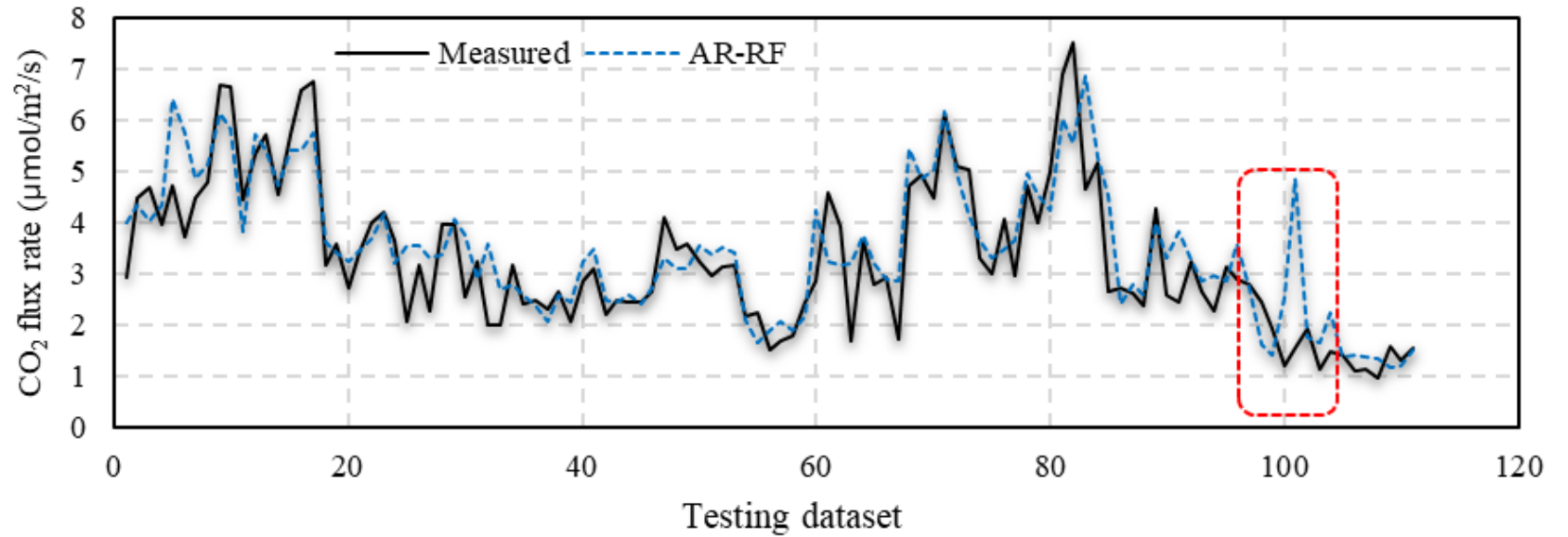
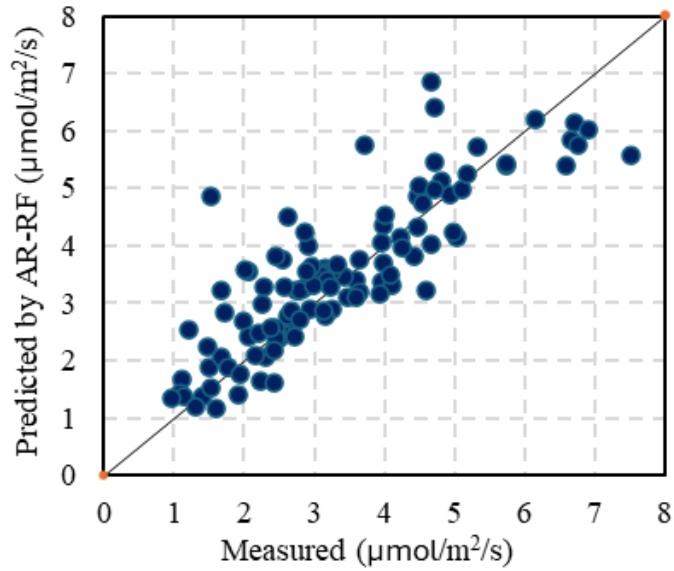
Greenhouse Gas Emissions – Monitoring/Modeling



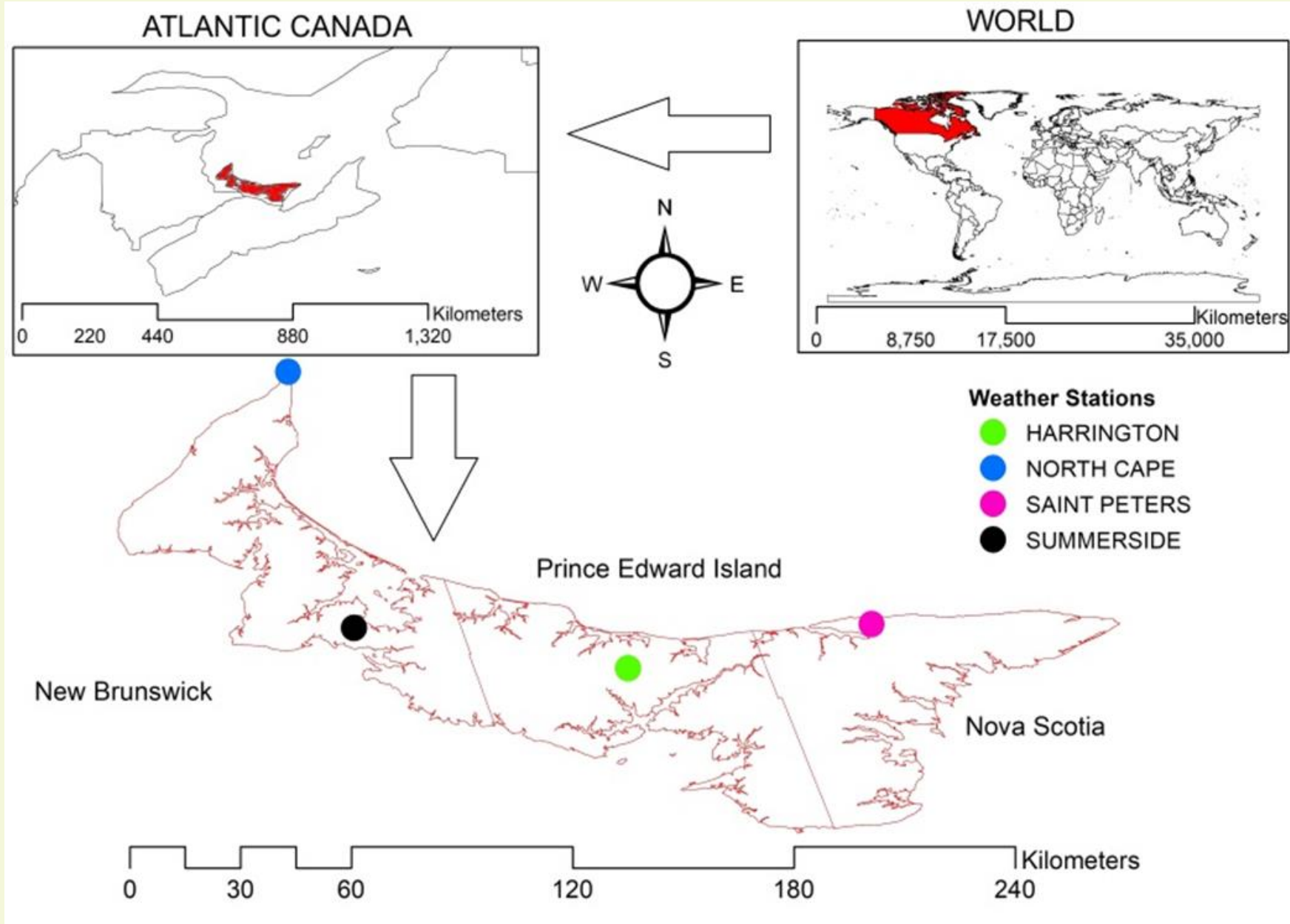
Greenhouse Gas Emissions – Monitoring/Modeling



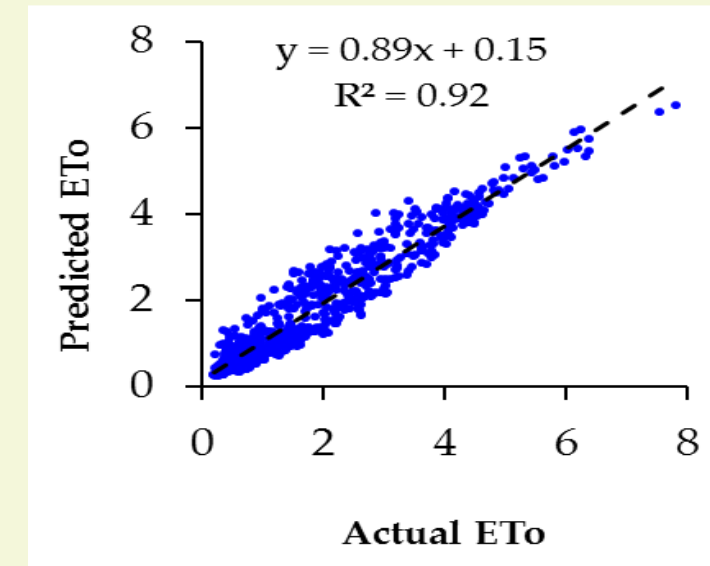
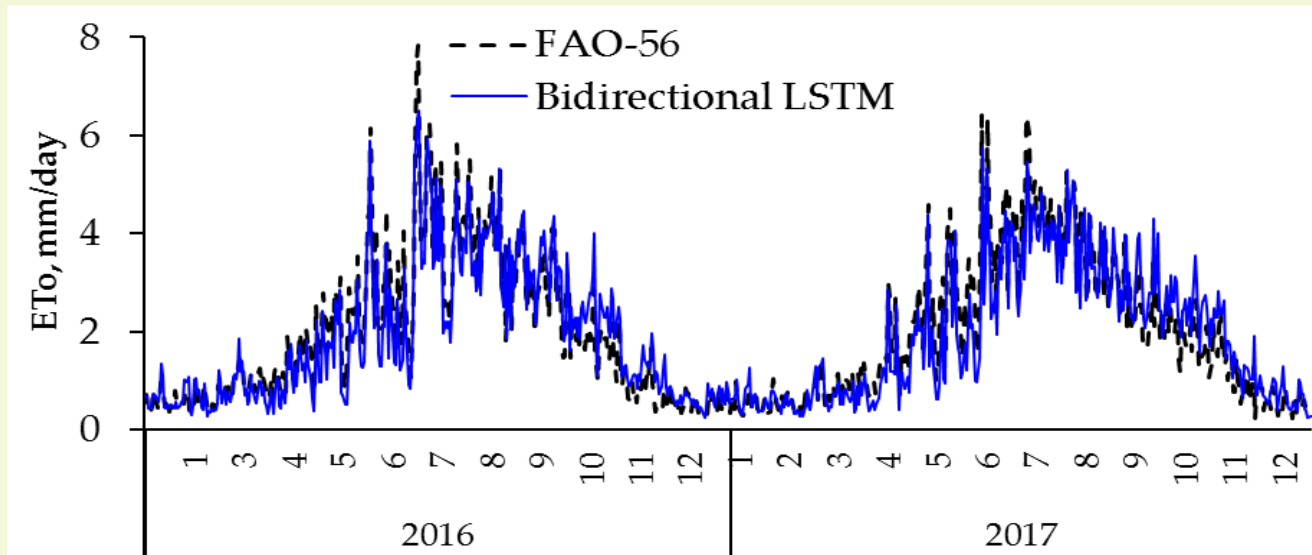
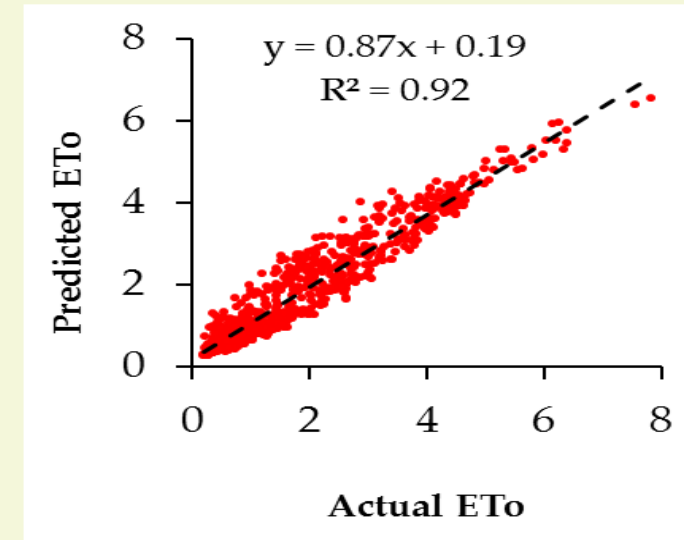
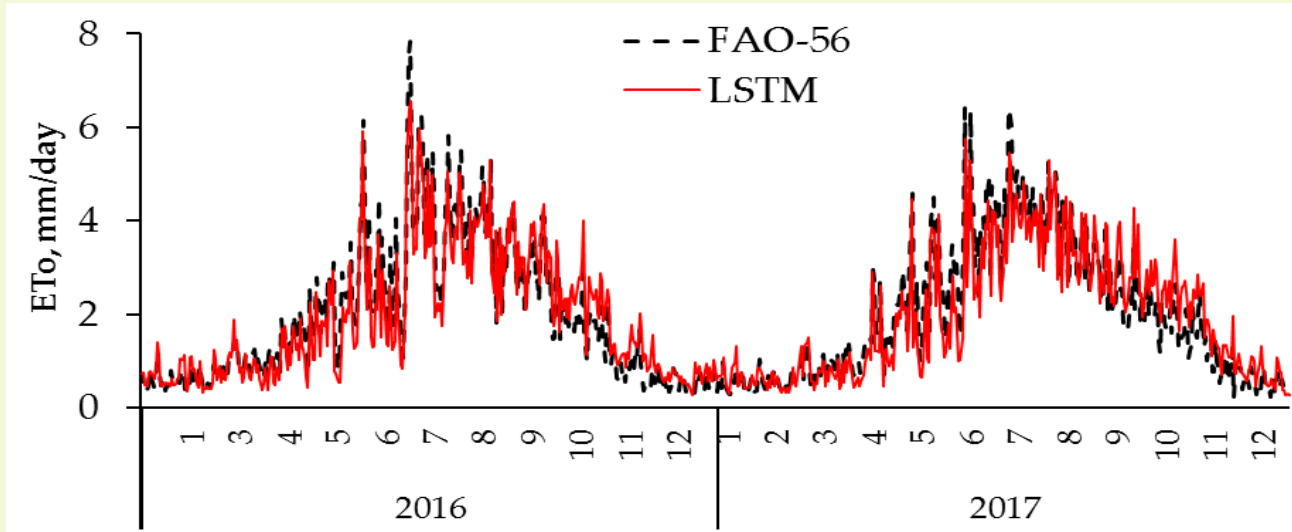
Greenhouse Gas Emissions – Monitoring/Modeling



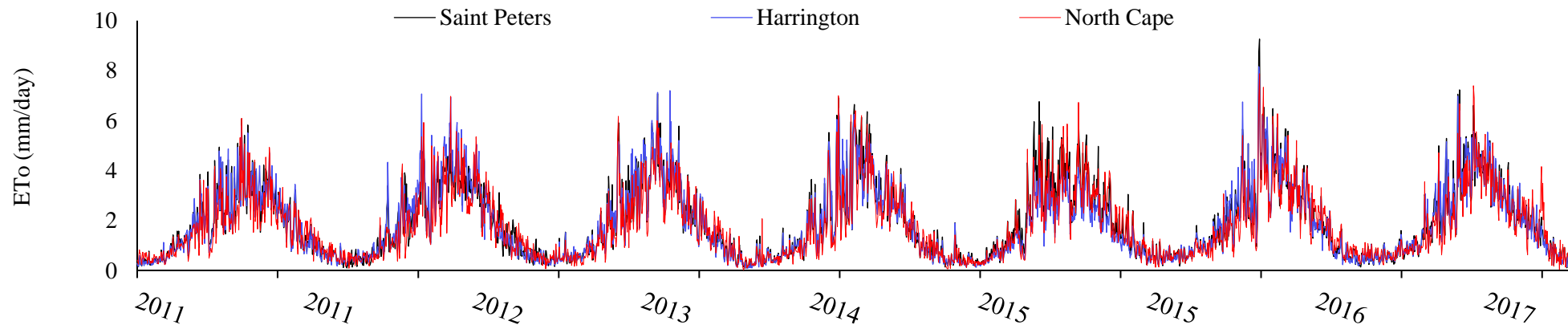
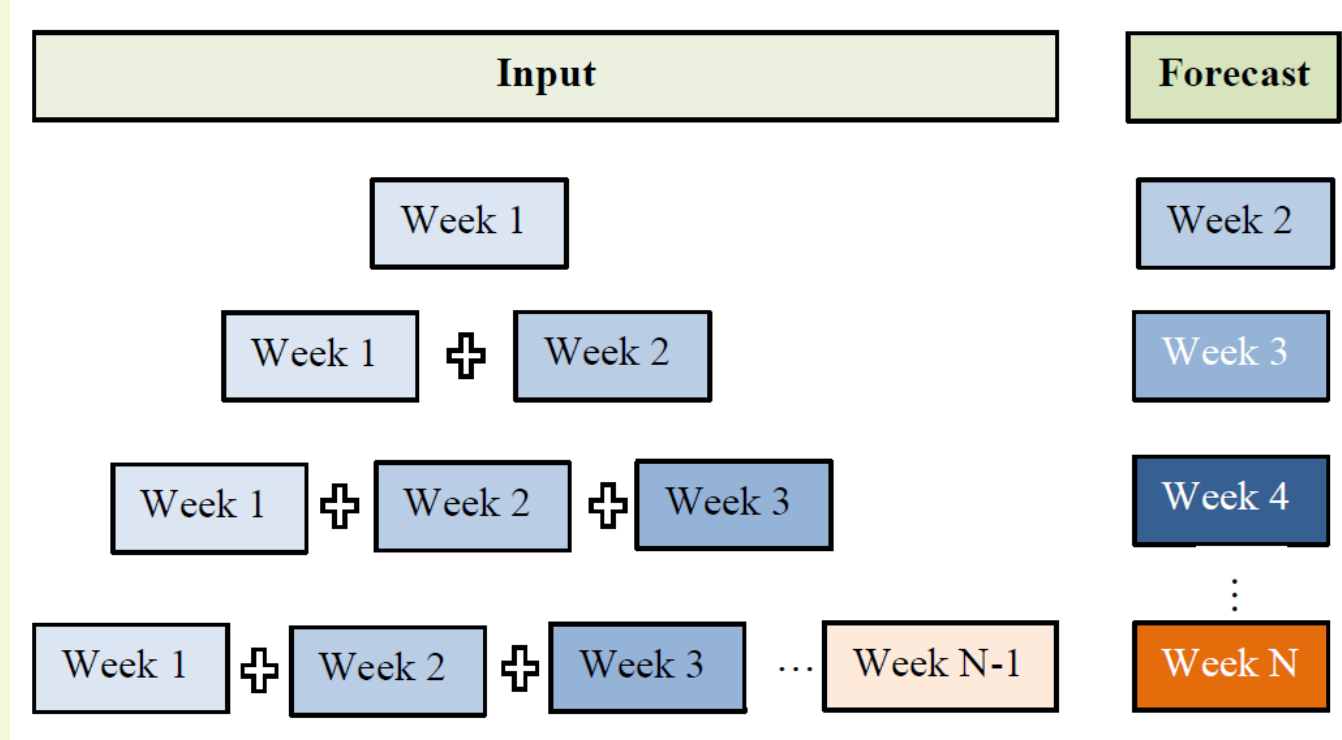
Sustainable Water Management



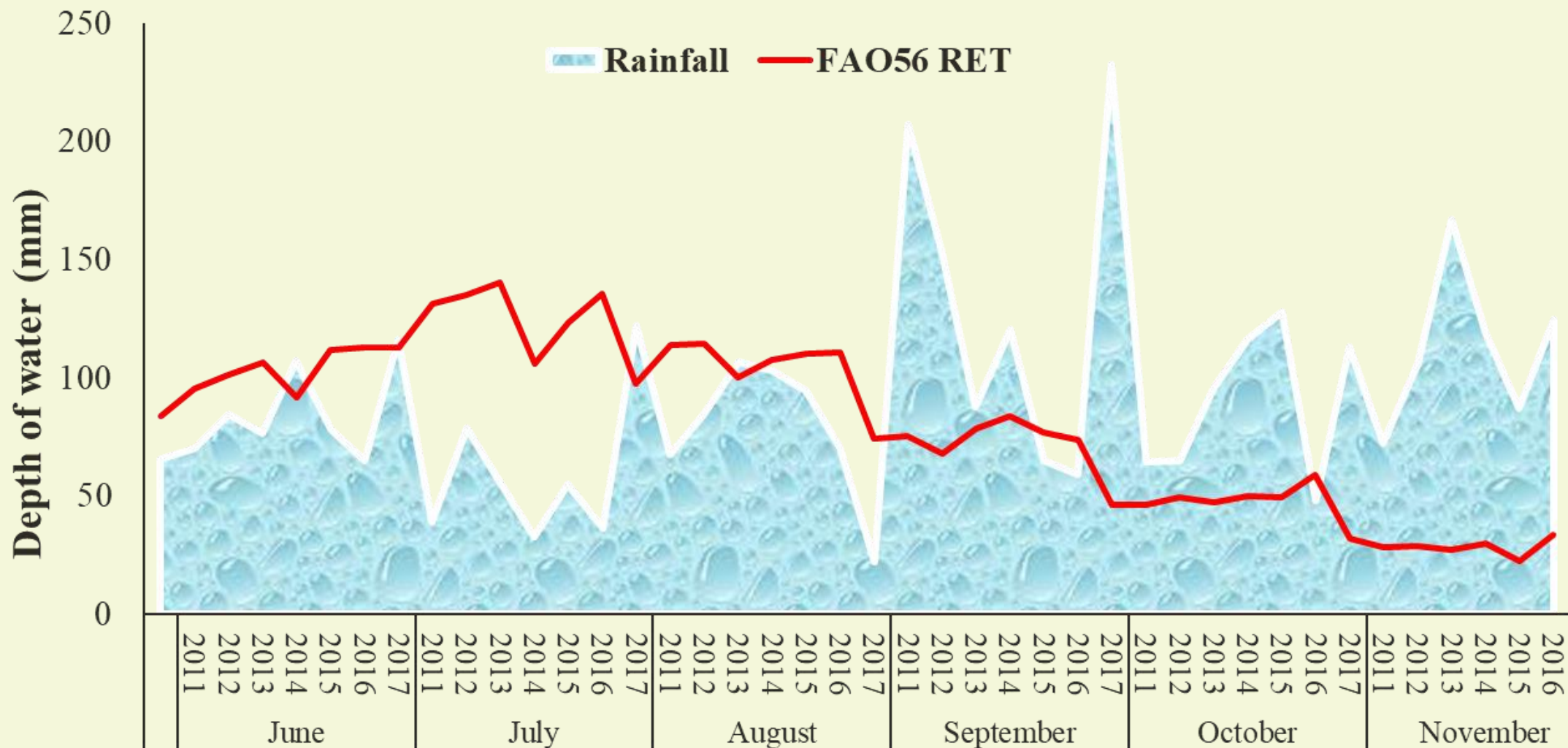
Sustainable Water Management



Sustainable Water Management



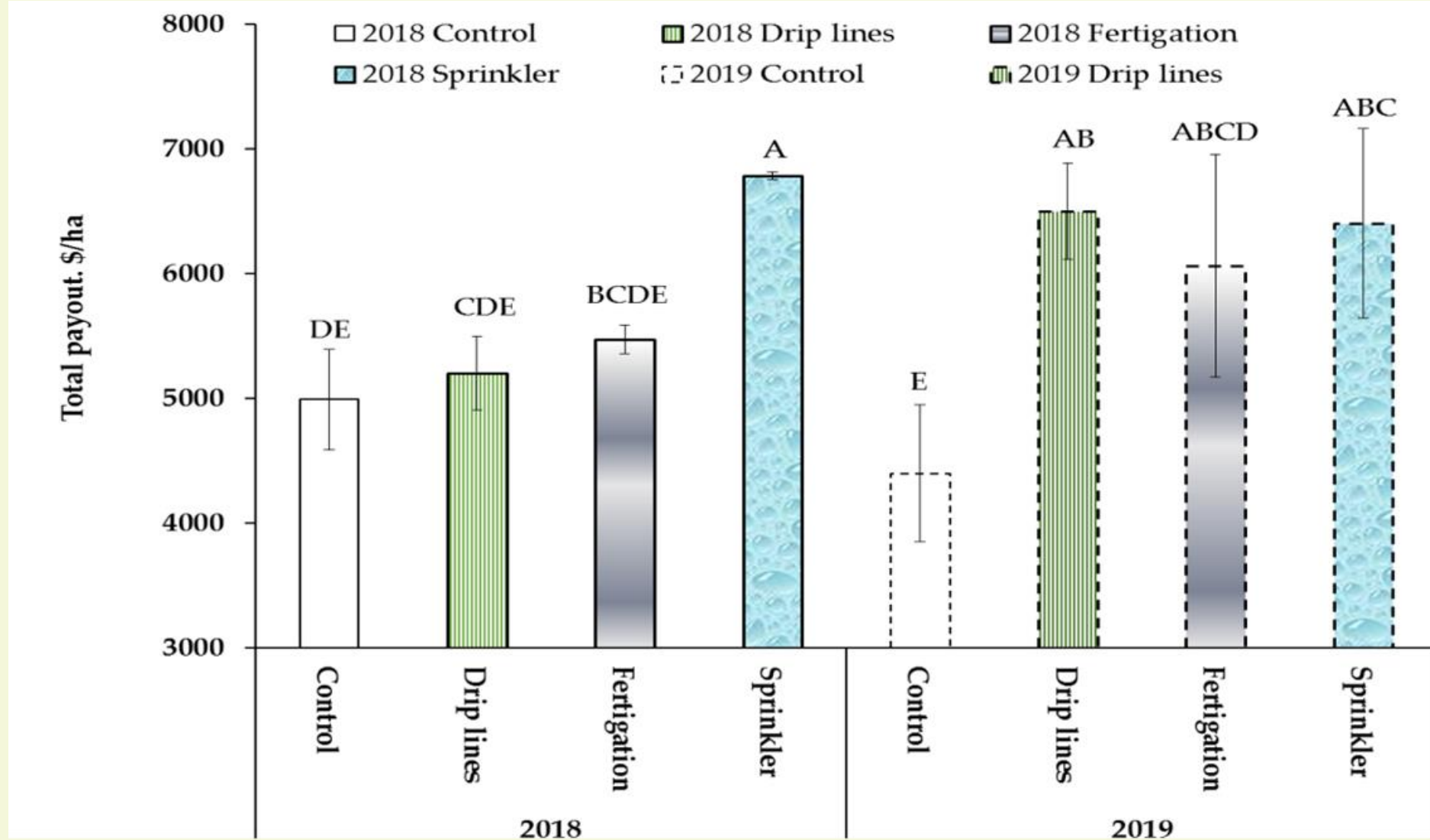
Sustainable Water Management



Sustainable Water Management

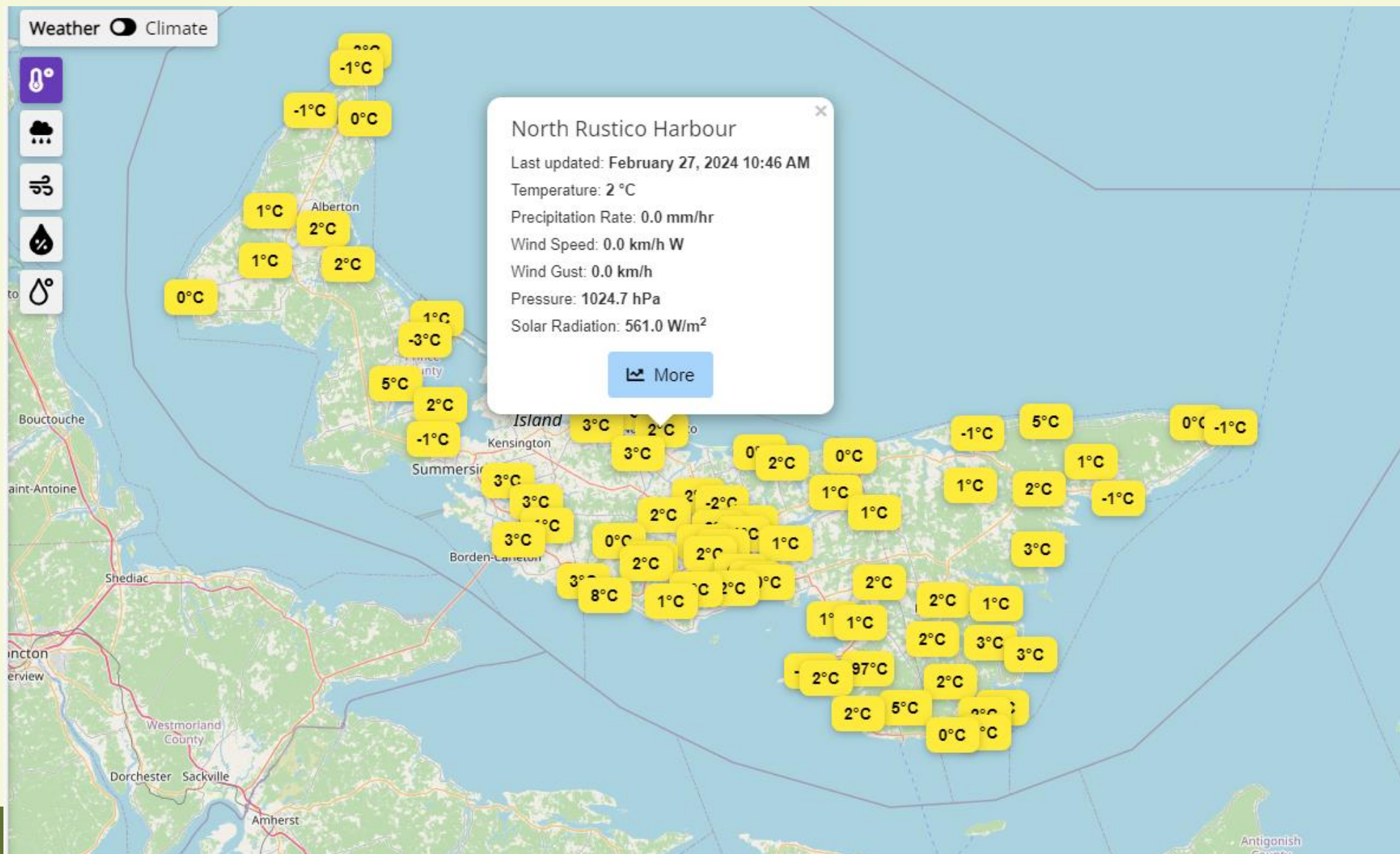


Sustainable Water Management



^{a-e} Different letters in the same columns indicates significant statistical differences ($p < 0.05$, Tukey's test)

Sustainable Water Management



Take Home

- Develop climate-smart and efficient agriculture systems for agriculture industry
- Apply nutrients based on soil and crop needs considering spatial variations.
- Evaluate productivity and environmental benefits of precision agriculture technologies.
- Develop BMPs to improve soil health and mitigate greenhouse gas emissions.
- Evaluate and promote BMPs through effective outreach.
- Develop user friendly protocols for farmers/industry use.
- Train highly qualified personnel and industry personnel to promote sustainable agriculture.



Atlantic Canada Opportunities Agency / Agence de promotion économique du Canada atlantique

Acknowledgements



Canada



NSERC
CRSNG



SWATMAPS

Mitacs



Sustainable Canadian Agricultural Partnership
Competitive. Innovative. Resilient.



UNIVERSITY of Prince Edward ISLAND

Tyler MacKenzie, Mathuresh Singh, Ryan Barrett, Newton Yorinori, MaryKay Sonier, and Khalil

CANADIAN CENTRE for Climate Change and Adaptation



Precision Agriculture Research Group – UPEI



Agromony Initiative for Marketable Yield



Participating Growers



DALHOUSIE UNIVERSITY



Agriculture and Agri-Food Canada



UNIVERSITY OF SASKATCHEWAN



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THANK YOU FOR YOUR ATTENTION

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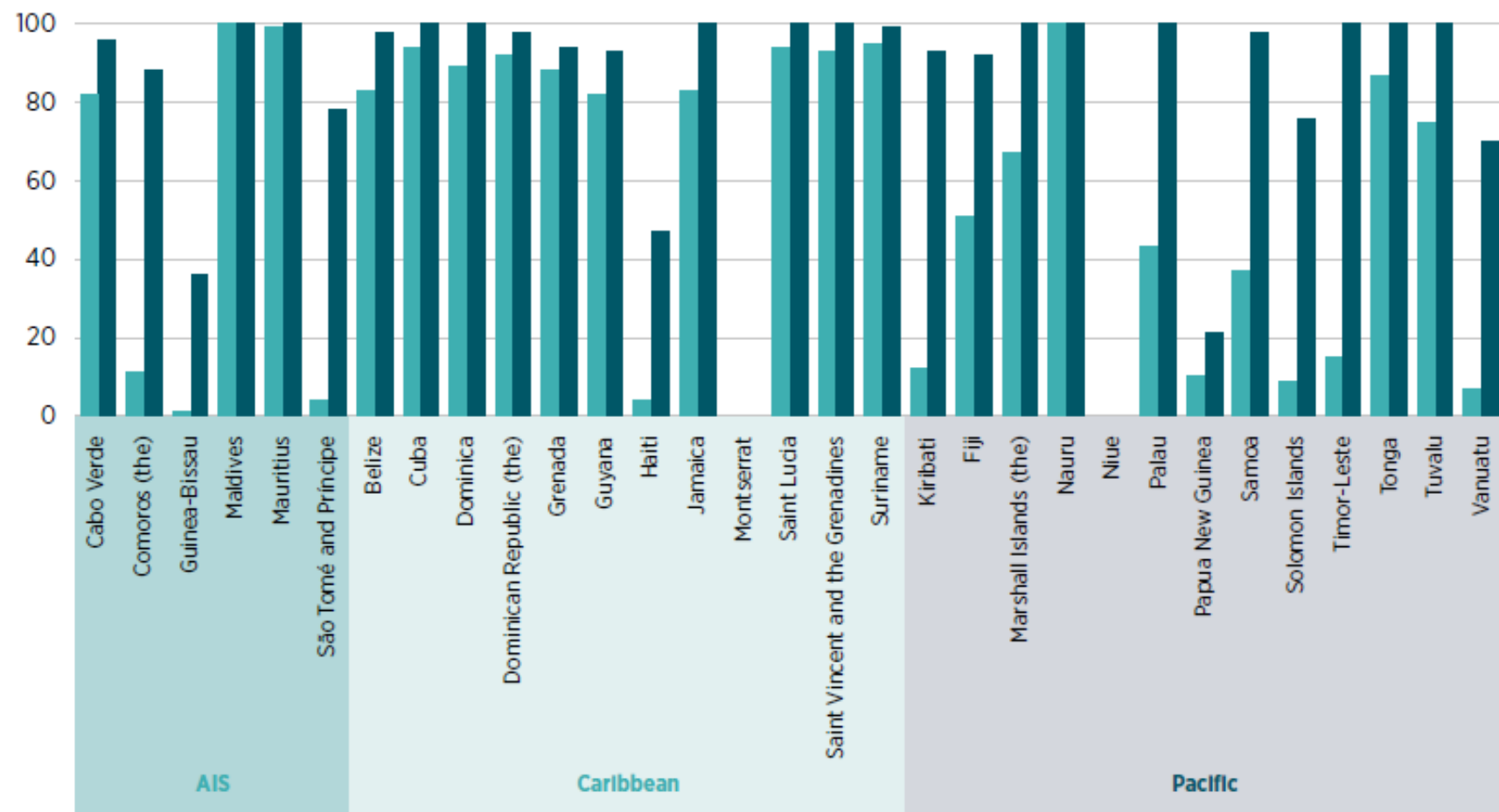
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COP 29 side event

Marie-Line Vaiani, Chair Committee on Energy, WFEO

Small Islands Developing States : very diverse situations in terms to electricity & clean energy access



■ Access to clean fuels and technologies for cooking (% of population)

■ Access to electricity (% of population)

Source: (World Bank, 2024b).

A common challenge : balancing the energy trilemma (energy security, energy equity, environmental sustainability)



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Energy Trilemma Index

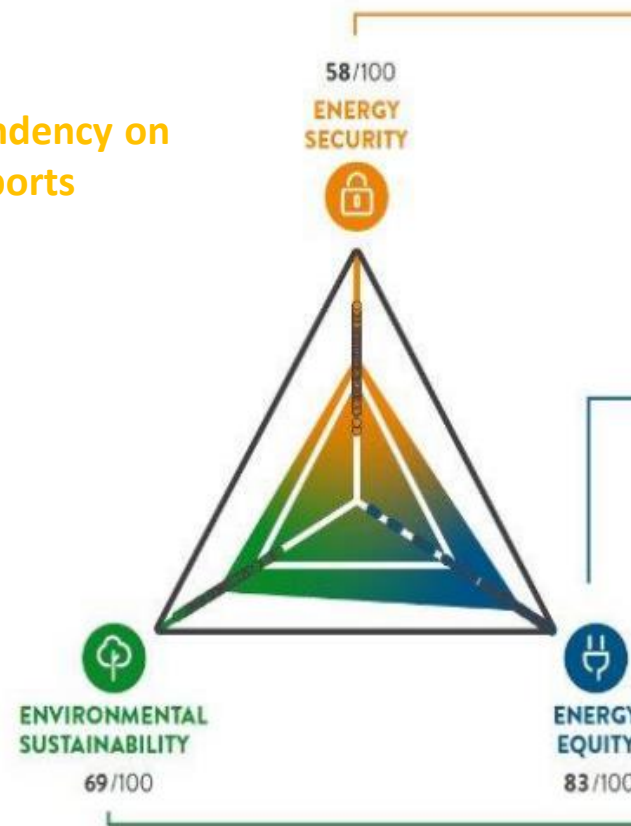
Reflects a nation's capacity to meet current and future energy demand reliably, withstand and bounce back swiftly from system shocks with minimal disruption to supplies.

Assesses a country's ability to provide universal access to affordable, fairly priced and abundant energy for domestic and commercial use.

Represents the transition of a country's energy system towards mitigating and avoiding potential environmental harm and climate change impacts.

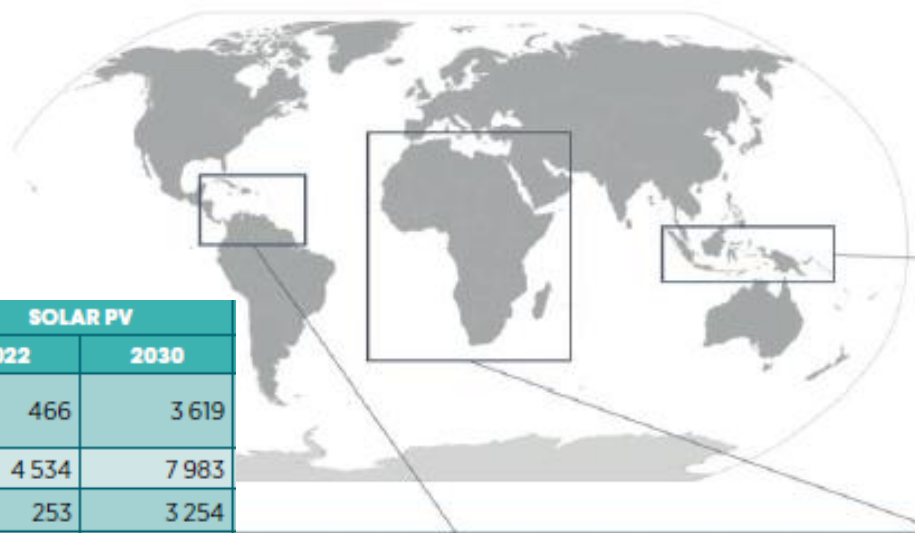
High dependency on energy imports

Heavy reliance on fossil fuels for power generation

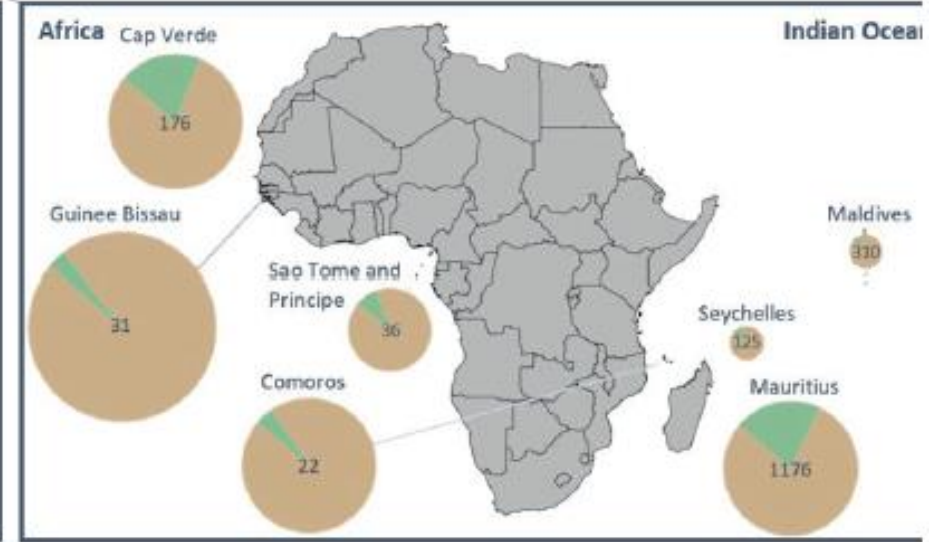
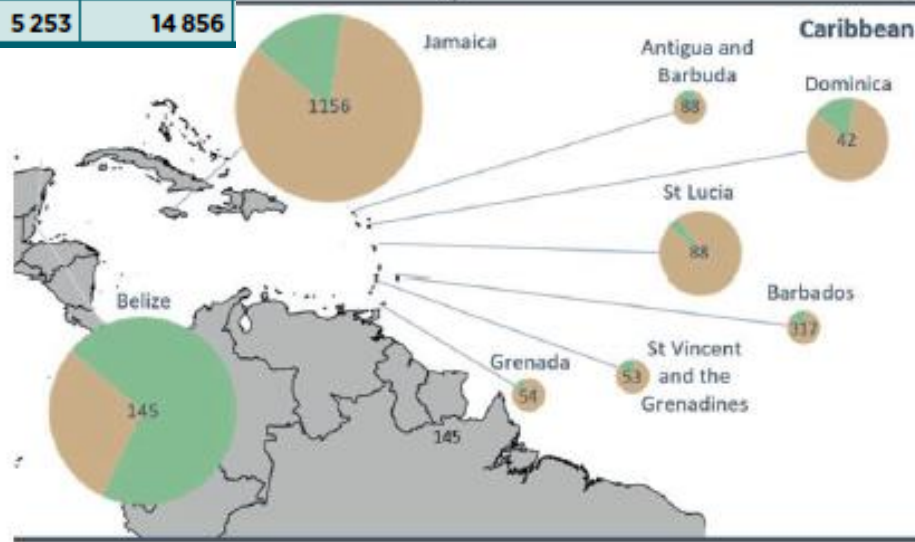
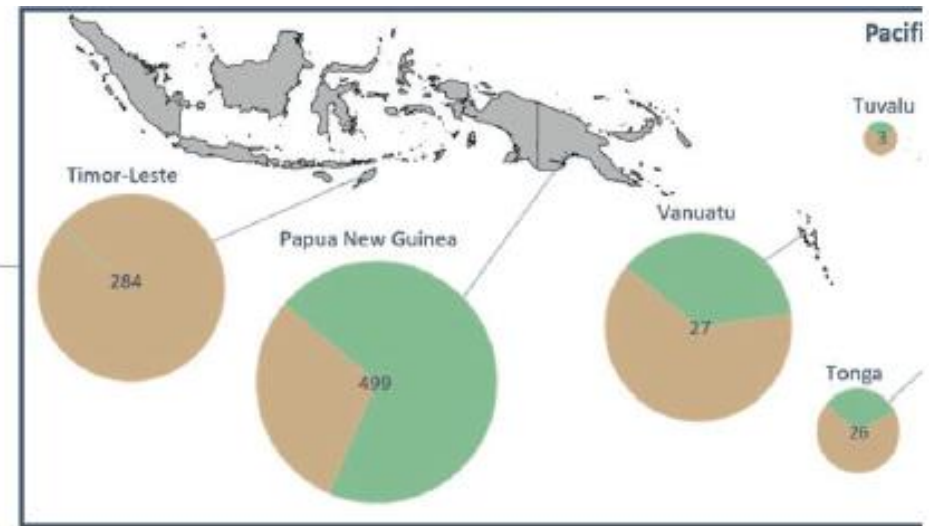


High electricity prices

Decarbonization of the electricity mix : planned in NDCs & potential for renewable



| | ONSHORE WIND | | SOLAR PV | |
|--|--------------|--------------|--------------|---------------|
| | 2022 | 2030 | 2022 | 2030 |
| Atlantic, Indian Ocean and South China Sea | 24 | 192 | 466 | 3 619 |
| Caribbean | 718 | 994 | 4 534 | 7 983 |
| Pacific | 9 | 51 | 253 | 3 254 |
| Total | 751 | 1 237 | 5 253 | 14 856 |



Source : IRENA 2024, World Bank 2024

Energy technologies : options for mitigation and adaptation are already available (IPCC, 6th assessment Report)



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Mitigation and Adaptation Options across Systems

Rapid and far-reaching transitions across all sectors and systems are necessary to achieve deep and sustained emissions reductions and secure a liveable and sustainable future for all. These system transitions involve a significant upscaling of a wide portfolio of mitigation and adaptation options. Feasible, effective, and low-cost options for mitigation and adaptation are already available, with differences across systems and regions. (*high confidence*) {4.1, 4.5, 4.6} (Figure SPM.7)

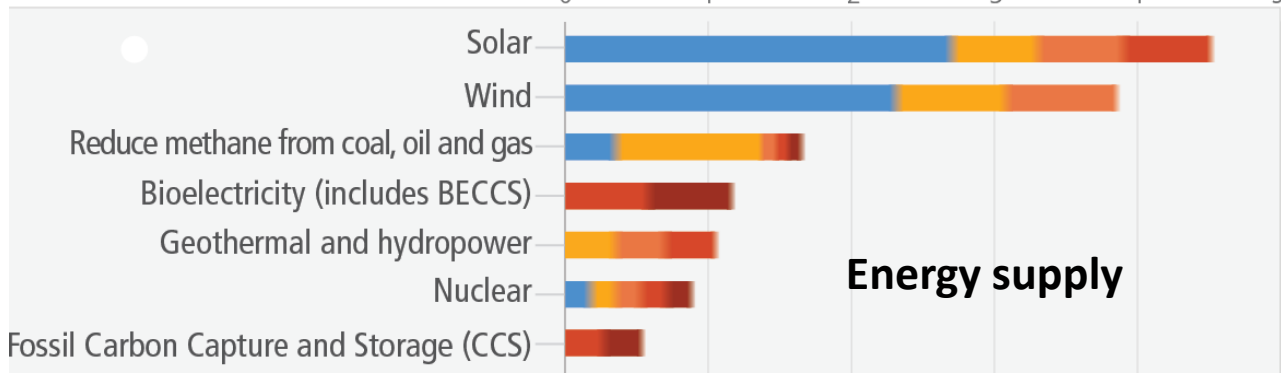
Finance, Technology and International Cooperation

Finance, technology and international cooperation are critical enablers for accelerated climate action. If climate goals are to be achieved, both adaptation and mitigation financing would need to increase many-fold. There is sufficient global capital to close the global investment gaps but there are barriers to redirect capital to climate action. Enhancing technology innovation systems is key to accelerate the widespread adoption of technologies and practices. Enhancing international cooperation is possible through multiple channels. (*high confidence*) {2.3, 4.8}

Energy technologies : options for mitigation and adaptation are already available



Potential contribution to net emission reduction, 2030
GtCO₂-eq/yr



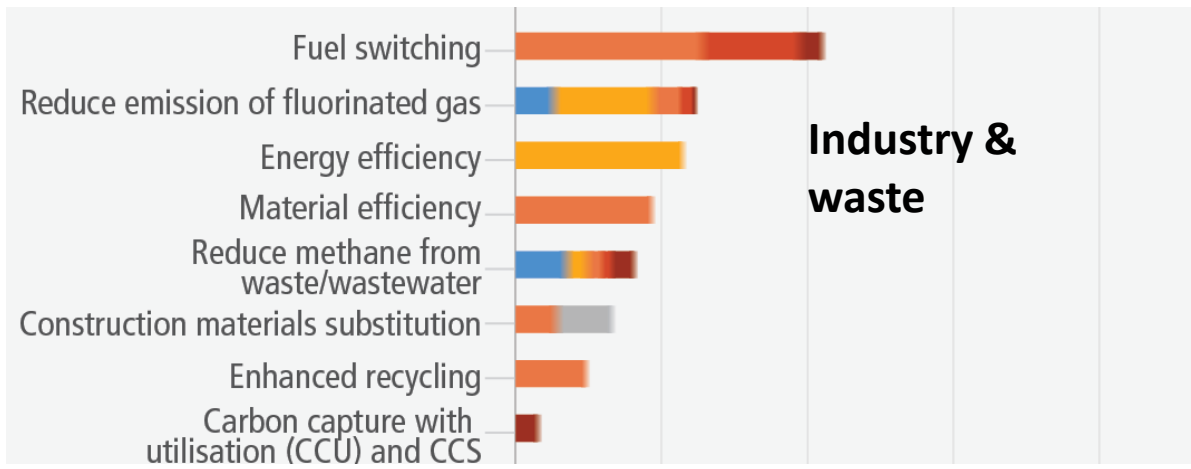
Net lifetime cost of options:



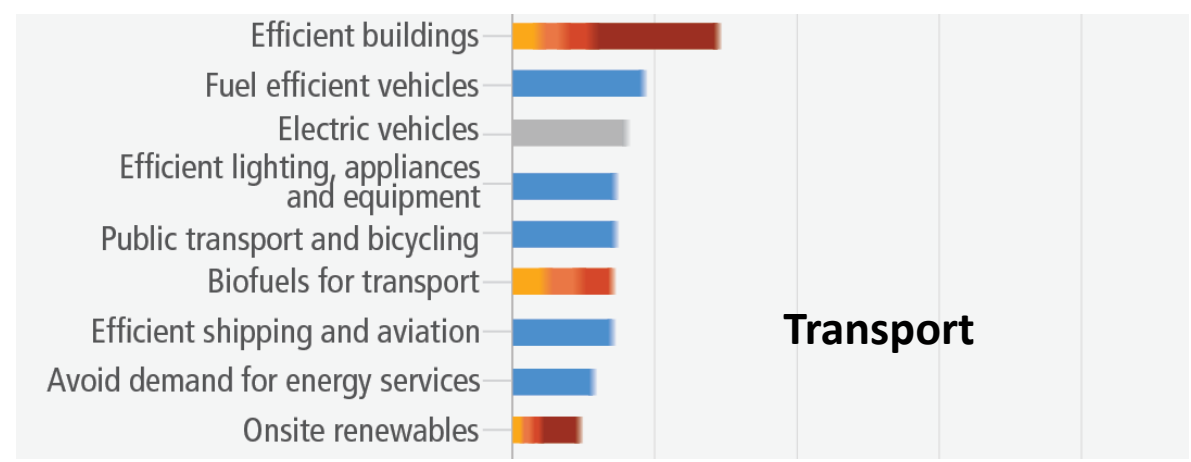
options costing 100 USD tCO₂-eq or less could reduce global emissions by at least half of the 2019 level by 2030

Energy supply

Industry & waste



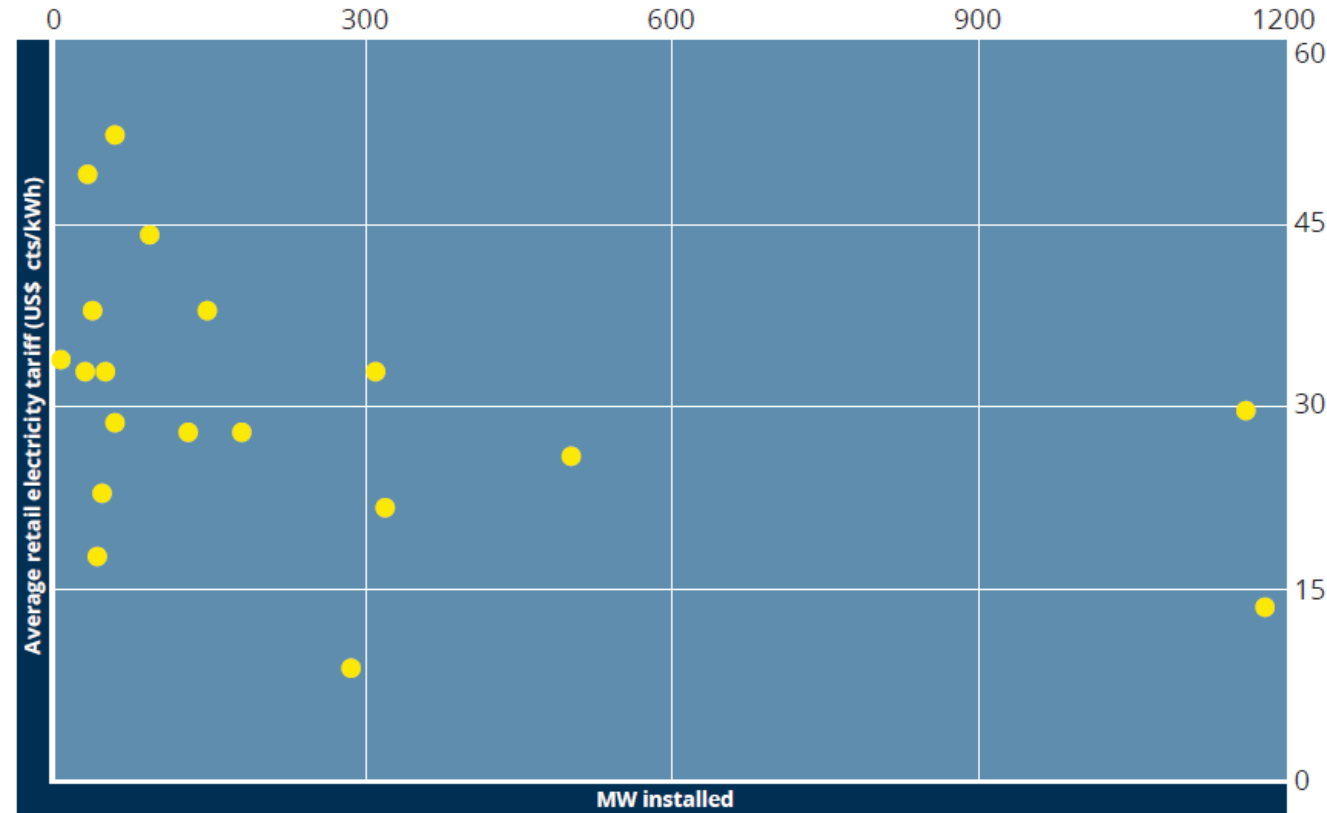
Transport



Specific challenges for clean energy access in SIDS



- **Scale challenge** (very small project sizes) and **the real time balancing challenge of an electrically isolated system** (in particular with growing intermittent renewable)
- **Level of risks for developers** : financial, climate-change (resilience of infrastructure...)
- **Workforce**: for both project phase and maintenance/operations period
- **Easy access to state-of-the-art energy technologies and projects knowledge suited to SIDS**
- **Energy planning**



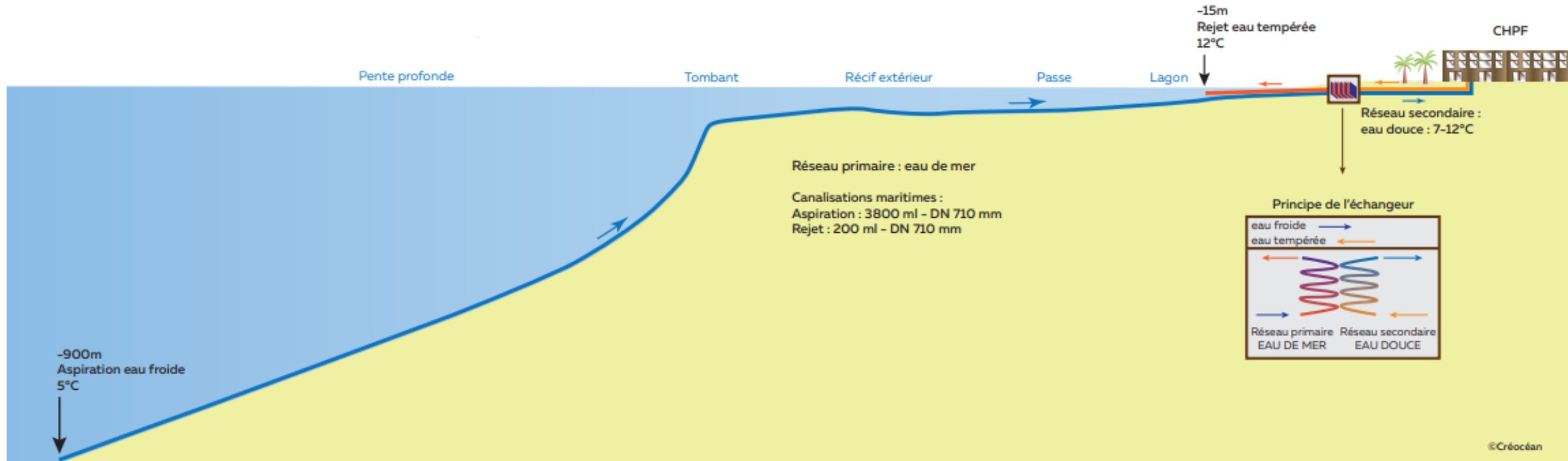
Innovative energy projects for small islands



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Seawater Air Conditioning (SWAC) system for Hospital



Deployed in Tahiti, La Réunion...

Innovative energy projects for small islands



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Agrivoltaics : agricultural solar greenhouse

Solar PV, batteries, agricultural greenhouse and local economic development



Source Bardzour project

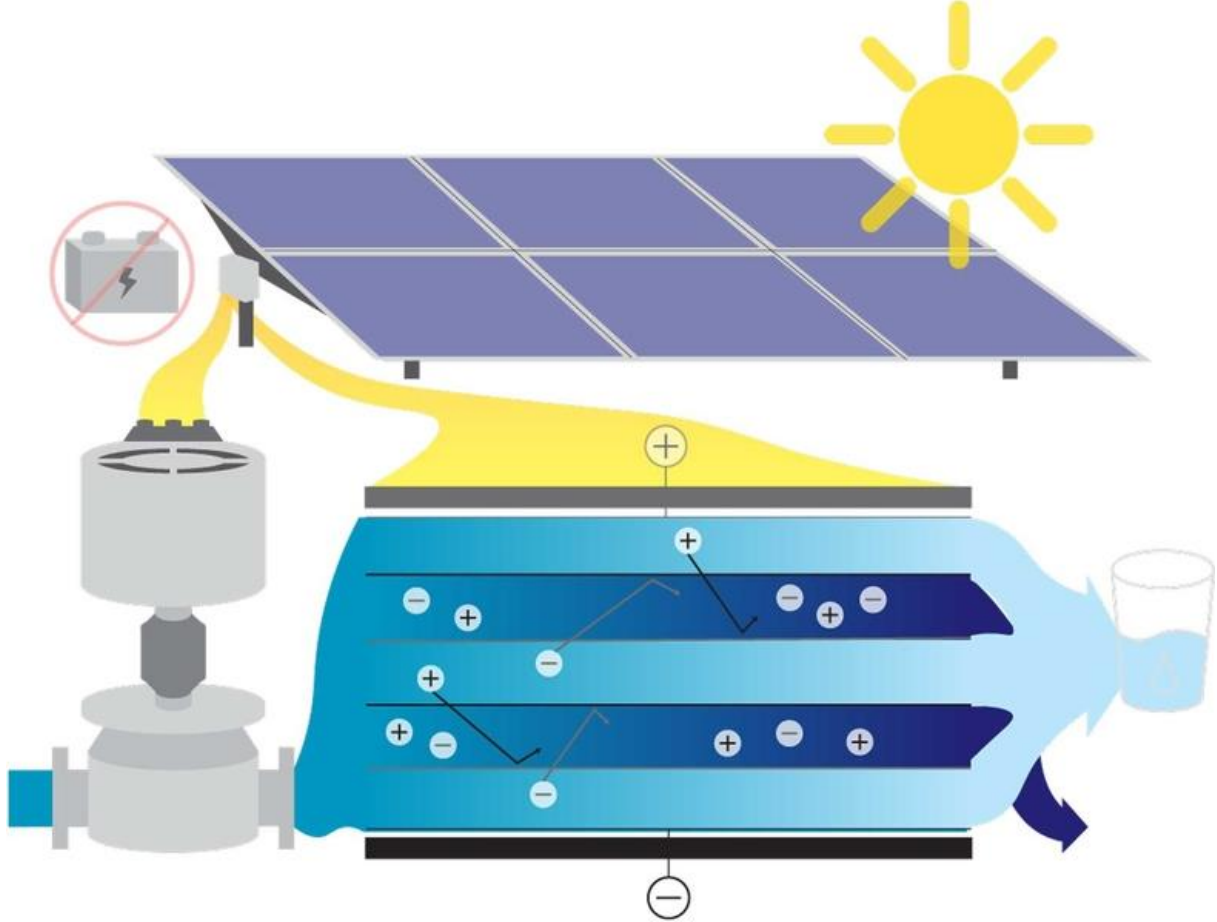
Innovative energy projects for small islands



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Solar-powered desalination system with no extra batteries



Source MIT, Credit Jonathan Bessette

Innovative energy projects for small islands



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Foldable wind turbines for tropical weather resilience



Source Vergnet

Actions for SIDS specific challenges



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- **Access to concrete expertise and technology applicable to energy challenges in SIDS:** sharing best practices and successful projects (Center of Excellence) (South-South, North-South)
- **Skills training (and job creation) :** training programs for local workforce to enable energy projects on-site installation and maintenance
- **Strengthening international technical cooperation focused on SIDS-specific energy challenges**
- **Financing...**

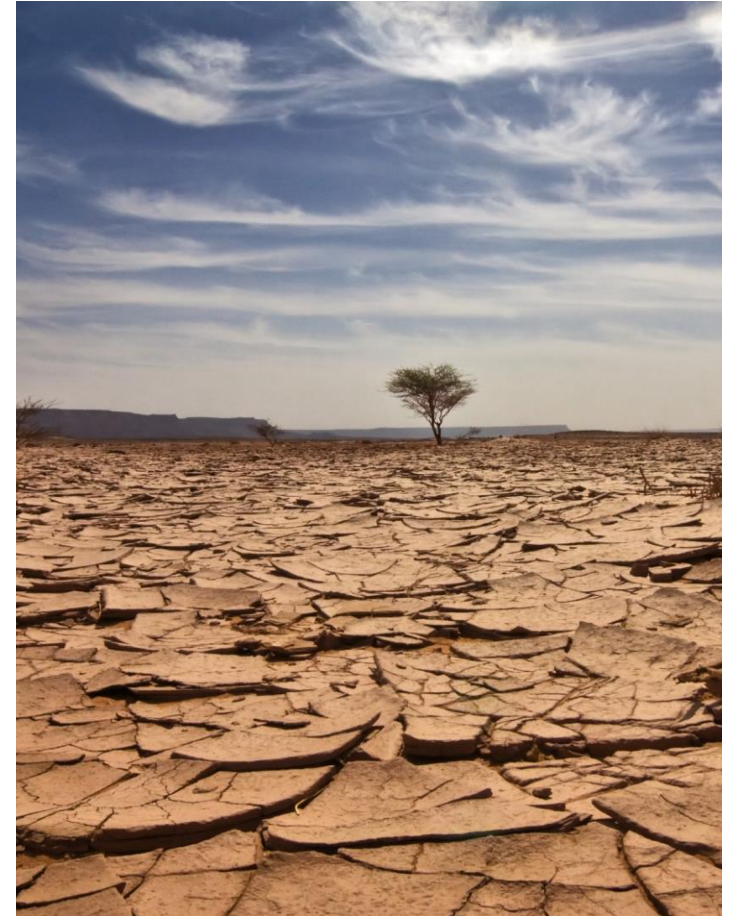


David Smith

Sustainable, Resilient Infrastructure Advisory Board Chair

ice.org.uk

We need Sustainable, Resilient Infrastructure



The Institution of Civil Engineers – who are we?

97,000 members

25% of whom are
outside the UK...

... in 160-plus
countries

Our purpose:

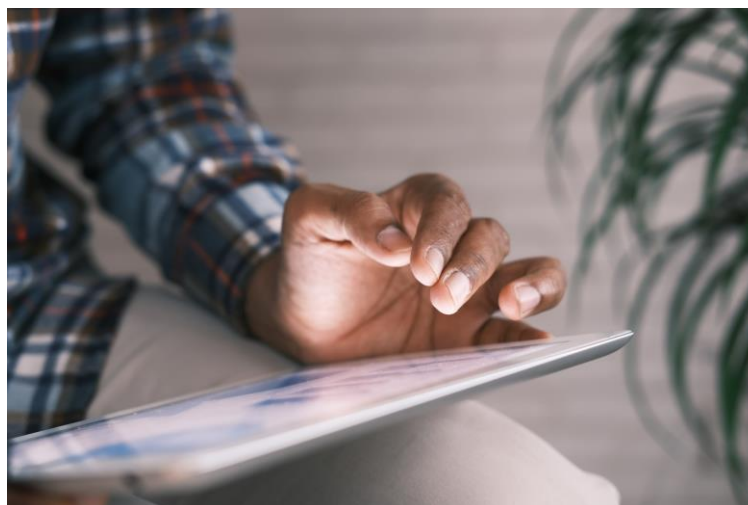
“To improve lives
by ensuring the world
has the engineering capacity
and infrastructure systems
it needs to enable
our planet and our
people to thrive.”

Sustainable, Resilient Infrastructure Advisory Board focus...

Adaptation must be on an equal footing with mitigation for engineers...



Coherent guidance



Equipping engineers



Championing Carbon and Resilience

Enhance Ambition

Make decarbonization and resilience core to the engineering and infrastructure profession:

- **Continuing professional development**
- **Carbon case studies**
- **Resilience case studies**
- **Sustainability, nature, people**

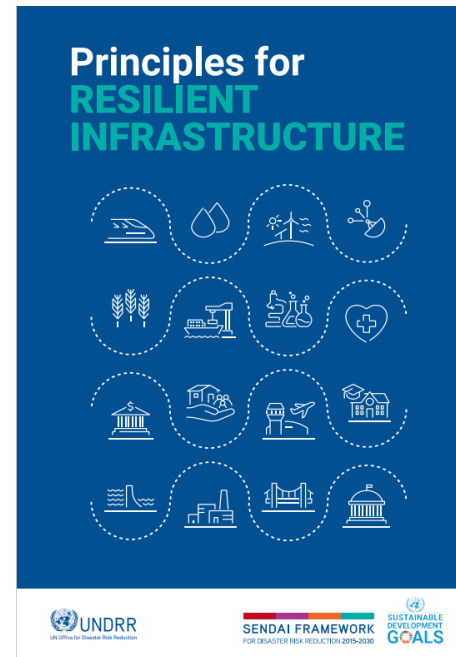
Initiatives:

- **Inspiring systems thinking**
- **Stress testing**
- **Net zero carbon**
- **Resilience net gain**
- **Nature positive**

Enable Action

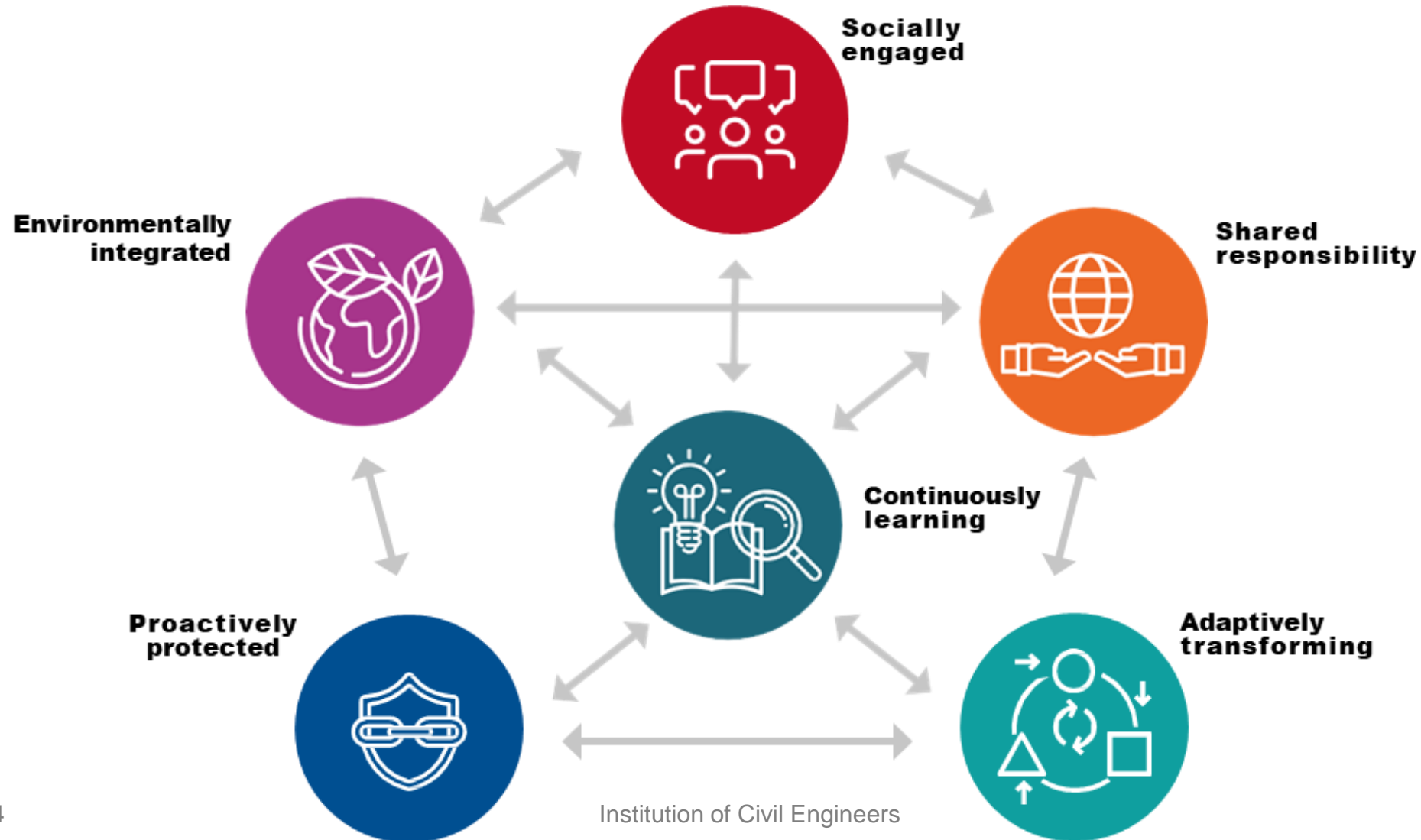
Empowering engineers and infrastructure professionals to act:

- **National Adaptation Plans**
- **Guidance – UNDRR Resilient Infrastructure Principles**
- **Standards – International Standard for Resilient Infrastructure**
- **Standards – PAS 2080: Carbon Management in Infrastructure, PAS on Adaptation Pathways in Infrastructure**



**Handbook for
Implementing the
Principles for Resilient
Infrastructure**

UNDRR Principles for Resilient Infrastructure shape coherent Infrastructure Plans



Sendai Framework

Engineers' viewpoint:

1. The role of DRR and resilience needs to be highlighted in relation to global agendas
2. Develop and implement systemic risk and resilience frameworks and establish resilience-focused agencies and governing bodies
3. Accelerate improvement of data collection, analysis and methodology through technological advances and sustained investment
4. Encourage multi-disciplinary cross-sector collaboration among experts to tackle complex challenges
5. Educate policymakers, practitioners, and the public on DRR and resilience concepts



Empowering engineers and infrastructure professionals to act:

- **National Adaptation Plans**
- **Guidance – UNDRR Resilient Infrastructure Principles**
- **Standards – International Standard for Resilient Infrastructure**
- **Standards – PAS 2080: Carbon Management in Infrastructure, PAS on Adaptation Pathways in Infrastructure**

Initiatives:

- **Evolving with and beyond design codes**
- **Innovation and digital**
- **Collaboration and stakeholder skills**
- **Growing capacity**

Community and 'Solutions in the Round' are key for SIDS and Sustainable Infrastructure



Speaker Q&A



COP29
Baku
Azerbaijan
UN CLIMATE CHANGE CONFERENCE

Panelists

Cheryl Senhouse

Finance Innovation Director, Caribbean Climate Smart Accelerator

Micheala Chan

Young Water Utilities Expert for the Pacific, ADB Member, WFEO Young Engineers/ Future Leaders Working Group



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Panel and Speaker Q&A



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Closing Remarks

Davide Stronati



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