

A petri dish containing a dense culture of small, translucent, rod-shaped bacteria, likely E. coli, used as a visual metaphor for growth and innovation.

Tools, Systems, and Innovation for Sustainability

[MEASURING SUSTAINABILITY]

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EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

- Berlin Declaration 2021 on ESD
- Integration of ESD in curriculum and textbooks
- **Tools, Systems, and Innovation for Sustainability [Measuring Sustainability]**
- How do we measure sustainability?

AGENDA

INTRODUCTION

TOOLS

INNOVATIONS

SUMMARY



INTRODUCTION

- Tools for sustainability encompass various instruments, and methodologies, utilized to assess, monitor, and enhance sustainable practices.
- These tools play a crucial role in helping organizations, governments, and individuals measure, manage, and improve their sustainability efforts.



TOOL KIT AT A GLANCE



SUSTAINABILITY TOOLS



TYPES OF SUSTAINABILITY TOOLS

- Sustainable Manufacturing Tools
- Life Cycle Assessment Tools
- Energy Efficiency Tools
- Carbon Footprint Tools
- Toxic Chemicals and Pollution Prevention Tools
- Community Development Tools
- Worker Safety Tools
- Workforce Development Tools



SUSTAINABLE MANUFACTURING TOOLS



- **Sustainable Manufacturing Curriculum**

- Environmental Sustainability
- Lean Manufacturing and Pollution Prevention
- Energy and Carbon.

- **The OECD Sustainable Manufacturing Toolkit** <https://www.oecd.org/>

- Collaborate with countries to develop policy standards to promote sustainable economic growth.
- The Organization for Economic Cooperation and Development (OECD)

- **Lean Manufacturing and the Environment**

- These tools show how manufacturers can use lean and green methods to reduce environmental wastes

- **Global Environmental Management Initiative (GEMI)**

- **Water Sustainability Tool**

This tool helps individual companies build a business water strategy that tracks water use

SUSTAINABLE ENERGY EFFICIENCY TOOLS



International Institute for
Sustainable Laboratories

- **ENERGY STAR Treasure Hunt Guide**

- An Energy Treasure Hunt is a two- to three-day event that engages employees in identifying low-cost energy savings opportunities

- **ENERGY STAR Guidelines for Energy Management**

- This tool, based on the practices of ENERGY STAR partners, is designed to assist organizations in improving energy and financial performance.

- **ENERGY STAR Industrial Benchmarking Tools**

- These tools provide manufacturers with a simple means to track energy use, set baselines, establish energy and emissions reduction goals, and evaluate progress toward goals.

- **I2SL Laboratory Energy Benchmarking Initiative**

This Web-based database tool contains energy use information from more than 200 laboratory facilities and allows users to benchmark energy performance

Website: <https://www.i2sl.org/>

CARBON FOOTPRINT TOOLS

- **Waste Reduction Model (WARM)**
 - This model helps solid waste planners and organizations track and voluntarily report greenhouse gas (GHG) emissions
- **Simplified Greenhouse Gas (GHG) Emissions Calculator**
 - These tools are designed to help small businesses to track progress towards reaching an emissions reduction goal.
- **Small Business Carbon Footprint Calculator**
 - This tool enables small business owners or managers in the U.S. to calculate the carbon footprint of their business



“A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions.”

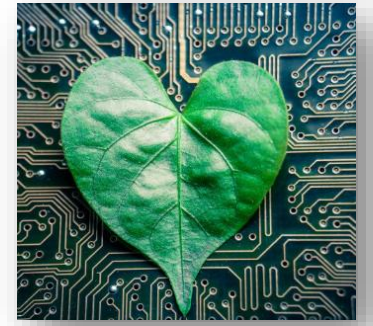
TOXIC CHEMICALS AND POLLUTION PREVENTION TOOLS

- **Chemical Screening Tool for Exposures & Environmental Releases (ChemSTEER)**
 - This tool estimates occupational inhalation and dermal exposure to a chemical during the industrial process
- **Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)**
 - This tool examines the potential impacts associated with raw material usage and chemical releases
- **ChemView**
 - Use this database to get information on chemical health and safety data
 - <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/introduction-chemview>



Reference: <https://www.epa.gov/e3/e3-sustainability-tools>

DIGITAL SUSTAINABILITY



- Digital sustainability is the use of digital technology to impact society and the environment in the long term.
- This includes considering energy efficiency, sustainability in producing and disposing of electronic devices and minimizing digital waste.
- It also encompasses the ethical and responsible use of data and technology to protect privacy and promote a fair digital economy.





INNOVATIONS

WHAT IS INNOVATION?

 **Innovation is** 

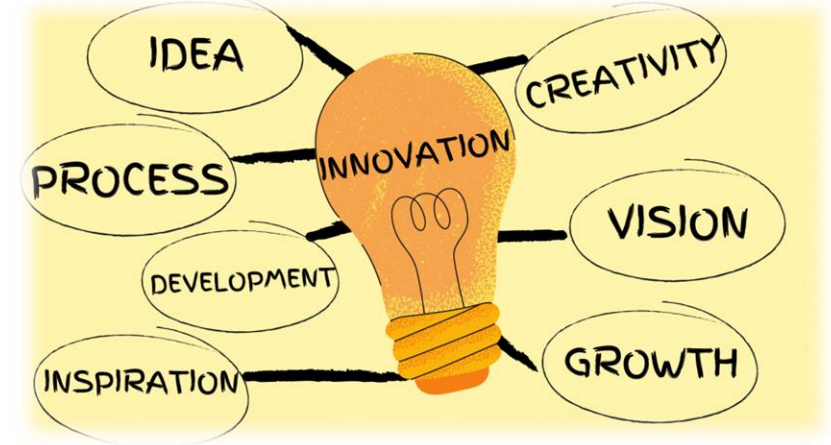
a creative process which introduces

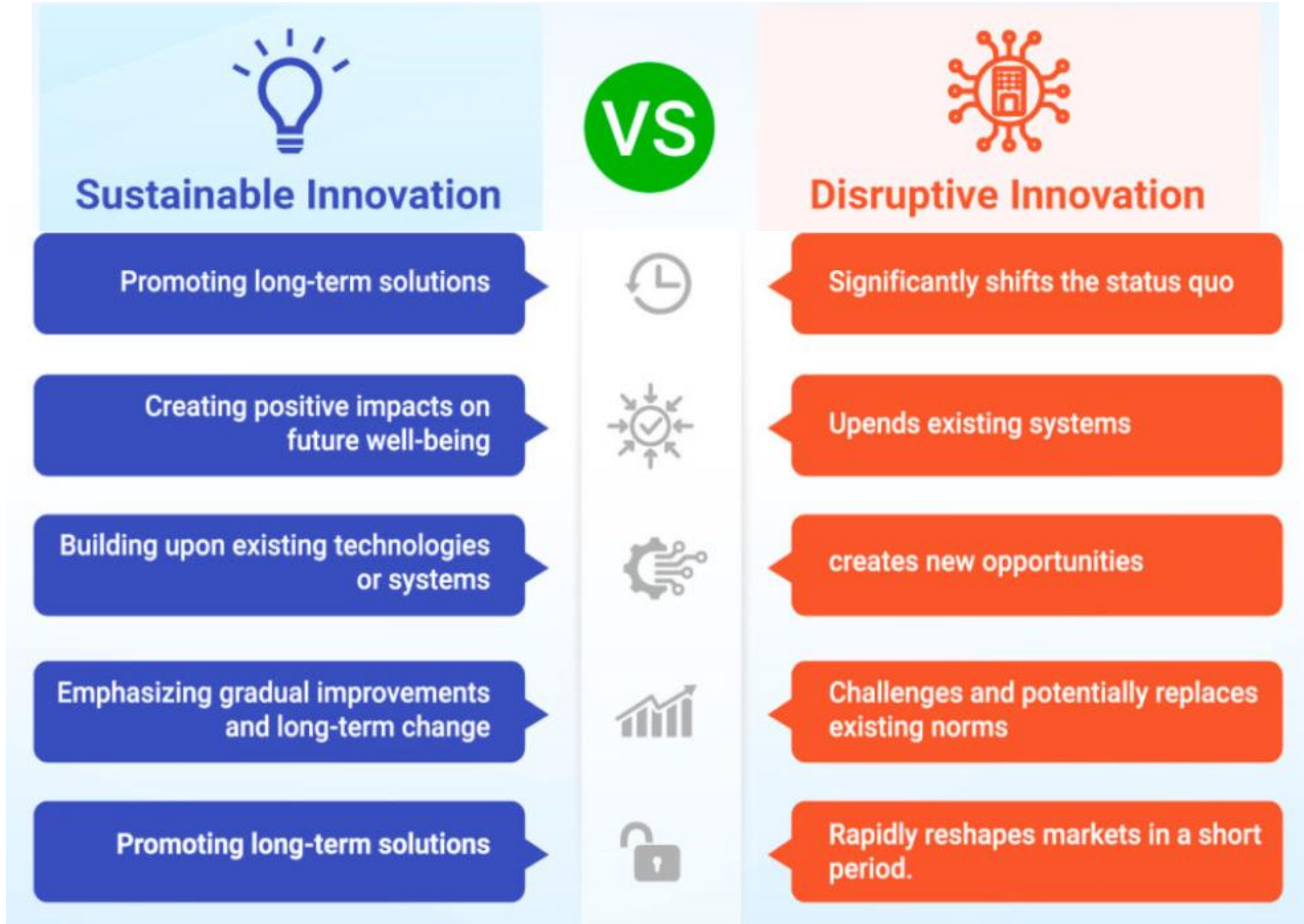
a new solution to the world by

enhancing entrepreneurship. 

WHAT IS SUSTAINABLE INNOVATION?

- Innovation stands as a driving force in the pursuit of sustainability, introducing **novel technologies, that reshape how we interact with the environment and society.**
- These innovations are
 - renewable energy breakthroughs,
 - revolutionary materials,
 - advanced data-driven solutions.





EXAMPLES OF SUSTAINABLE INNOVATION

- **Carbon Capture and Utilization (CCU):** Advancements in using captured carbon dioxide to create **fuels, chemicals, and construction materials**, reducing emissions while creating valuable products.

EXAMPLES OF SUSTAINABLE INNOVATION

- **Vertical Farming:** High-tech indoor farming methods that **maximize space and resources while minimizing water** usage and transportation needs, allowing year-round crop production in urban areas.
- **Biodegradable Plastics:** Development of bioplastics derived from renewable sources or designed to **biodegrade rapidly, reducing plastic pollution** and environmental impact.

EXAMPLES OF SUSTAINABLE INNOVATION?

- **Electric and Autonomous Vehicles:** Ongoing advancements in **electric vehicles (EVs) and self-driving technology** aim to reduce emissions and enhance transportation efficiency.
- **Renewable Energy Storage:** **Innovative battery technologies** and energy storage solutions to enhance the efficiency and reliability of renewable energy sources like **solar and wind**.

EXAMPLES OF SUSTAINABLE INNOVATION?

- **Eco-friendly Biofuel**

Through sustainable innovation, companies can invent and offer novel products or services that directly contribute to achieving sustainability. For example, **Bio-bean, a British startup, developed an eco-friendly biofuel made from coffee waste to help power London's double-decker buses.**

EXAMPLES OF SUSTAINABLE INNOVATION?

- **Fairly-sourced Smartphones**
- They use recycled and responsibly mined materials. Because approximately 80% of the emissions of a smartphone come from its production. They have a modular design which makes repairs and upgrades easier, thereby significantly **reducing e-waste.**

EXAMPLES OF SUSTAINABLE INNOVATION?

- **Smog Vacuum Cleaner**

Daan Roosegaarde is the mastermind behind the world's first smog vacuum cleaner. The Smog Free Tower measures almost 23 feet high (7 meters) and **sucks in polluted air.**

Solar Glass. Solar glass could change the way we create homes and commercial buildings. Researchers at the University of Michigan are developing solar glass, **solar glass would be able to capture and store solar energy.**

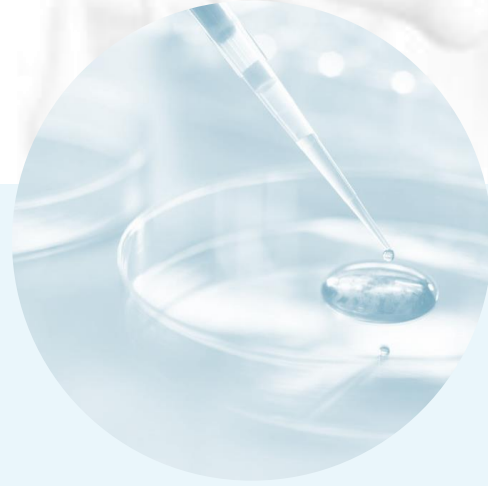
SUMMARY

Tools and innovations are pivotal in driving sustainability across various fronts.

These advancements encompass a wide array of technological, strategic, and systemic solutions aimed at mitigating environmental impact, promoting social responsibility, and ensuring economic viability.

Innovations such as renewable energy technologies—solar, wind, hydroelectricity—provide clean energy alternatives, reducing reliance on fossil fuels.





THANK YOU



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