Hello from Greene 4.0!

Welcome to the first edition of our LinkedIn newsletter, where you'll find the latest insights on green transformation and updates on Greene 4.0 - a project dedicated to supporting manufacturing companies in piloting new value chains and co-designing innovative products and services through open innovation approaches. Each month, we aim to provide you with valuable knowledge and news tailored for business owners, green and digital transformation specialists, and anyone interested in the green revolution.

Greene 4.0 Transnational Conference Co-organized on the 2nd day of the TBMCE 2024

We are excited to announce a comprehensive event that will bring together companies, research institutions, and educational organizations to discuss the circular economy, as well as green and digital practices. As part of this larger event, **Greene 4.0** will be hosting the **Transnational Conference** on the second day, **September 5th, 2024**.

The Greene 4.0 project has partnered with the University of Maribor to deliver an engaging event that meets the needs of companies by offering a diverse programme with a range of speakers and topics relevant to their green and digital transition.

The event will be held at Grand Hotel Bernardin in Portorož and is expected to attract approximately 150 participants from businesses, research institutions, and educational organizations. Several renowned speakers will address topics related to science and development, focusing on the current challenges of technological advancement and society's responsibility in transitioning from fossil fuels to renewable energy sources, and from a linear to a circular economy. Greene 4.0 will showcase one of its key results – the User Acceptance Model for facilitating a smooth green transition for small and medium-sized companies – and will promote the B2GreenHub to all green-oriented stakeholders in Slovenia.

All Greene 4.0 project partners will be attending the Transnational Conference, and we are pleased to invite interested stakeholders to join us. Greene 4.0 has reserved seats for all stakeholders who wish to participate in the Transnational Conference. In case of interest, please contact us at **info@p-tech.si** and register by **August 30th, 2024**.

The event will provide a unique opportunity to connect with industry leaders, researchers, and peers, fostering collaboration and innovation. By exploring current trends, sharing ideas, and learning best practices, stakeholders can gain valuable insights into emerging technologies, effective business models, and successful projects that are crucial for staying competitive.

Please find the Greene 4.0 Transnational Conference agenda HERE.

For general information about the umbrella 3-day event TBMCE 2024 , please visit the TBMCE website. **For those interested in joining the Greene 4.0 Transnational Conference, please ensure to register via Pomurje Technology Park for participation at info@p-tech.si.**

Registration deadline: August 30th, 2024.

User Acceptance Model

The Greene 4.0 User Acceptance Model (UAM) is a critical initiative aimed at understanding what motivates or hinders manufacturing SMEs in adopting digital and sustainable practices. Through extensive research, including surveys of 422 companies and in-depth interviews with 50 more, we have mapped out the key barriers and enablers in the green and digital transition. These findings are being used to develop practical tools, such as customized transition plans and training modules, which will help SMEs integrate new technologies more effectively into their business processes.

The UAM will also support the creation of a matchmaking platform that connects solution providers with businesses seeking to enhance their sustainability efforts. By identifying the specific needs and challenges of SMEs, the UAM offers tailored strategies that address their unique circumstances, ultimately facilitating a smoother transition to more sustainable practices.

B2GreenHub

B2GreenHub is an initiative that complements our efforts by helping businesses navigate the complexities of the EU's Corporate Sustainability Reporting Directive (CSRD). This initiative provides valuable resources, including **technological solutions**, **expert guidance**, and **personalized roadmaps**, all designed to help companies turn regulatory challenges into growth opportunities. With the support of over 100 EU institutions and a team of specialists, **B2GreenHub is a comprehensive program aimed at bolstering the green and digital transformation of manufacturing companies**.

Manufacturers in sectors such as Electronics, Food & Beverage, and Machinery & Equipment can greatly benefit from joining B2GreenHub. The program offers access to state-of-the-art testing facilities and over 200 technological solutions, ensuring that participating companies are well-equipped to meet both regulatory demands and market expectations.

You can apply here: https://lnkd.in/dAmdreJz Early application is recommended to secure a spot in pilot activities that offer firsthand experience in implementing these solutions.

Final deadline for applications: June 30, 2025.

Green and Digital Innovations – Where to Start?

During the research conducted as part of the Greene 4.0 4.0 project across seven European countries (Italy, Austria, Germany, Czech Republic, Slovenia, Poland, and Hungary), a total of 422 entrepreneurs were asked to rate their agreement with several statements on a scale from 1 to 7, where 1 means "strongly disagree" and 7 means "strongly agree":

- 4.3 – The cost of transitioning to sustainable production is too high
- 3.8 – The effort required for green transformation is too substantial
- 4.0 – Implementing digital technologies would be too complicated for our employees

Managers tend to view green transformation as a challenging and complex process. When asked about specific obstacles to adopting green and digital innovations, they pointed to a lack of funding, unclear regulations, and insufficient time to focus on new projects. These factors can indeed significantly limit - or even entirely halt - a company's ability to adopt new technologies.

However, beyond these external factors - money, time, and regulations - an equally fundamental element is awareness of one's own needs. Company leaders often aren't sure which areas of their business need change. It may sound like a cliché, but change really must start from within.

So, where should they begin? Start at the beginning, which means:

1. **Analysis: Build a Clear Picture of Your Company's Current State** Start by gathering as much data as possible to get a comprehensive view of your company's situation. Go beyond just numbers – consider employee feedback, stakeholder expectations, and customer insights. What are the recurring problems? How does your energy consumption compare to industry standards? The goal is to create a thorough snapshot of the present state, as it will serve as a foundation for future decisions.
2. **Definition: Transform Problems into Opportunities.** With detailed data in hand, you can identify and define key challenges. Move from general observations, like "high energy costs,"

to more specific issues, such as “outdated machinery consuming too much energy.” This helps narrow down intervention areas and set a clear direction for change.

3. **Solution Exploration: Find What Works for Your Company.** Not every innovation will be suitable for your organization, and that’s okay. Evaluate different options considering your company’s size, resources, and industry context. If your goal is to optimize energy usage, explore energy management systems designed for industrial settings or tools for tracking and reducing CO2 emissions. It’s also worth looking at solutions from startups and smaller enterprises, as they often provide niche, highly effective technologies. Look for information in public sources—technology parks and other organizations frequently publish reports and directories of innovative companies.
4. **Prototyping and Pilot Testing: Bring Ideas to Life.** Start with a prototype, whether it’s a new process, software, or a small-scale pilot project. Collect feedback, refine the solution, and repeat. This hands-on approach helps identify potential barriers early and prepares the ground for broader implementation.

Greene 4.0 facilitators can be invaluable in helping companies clearly define their needs and explore innovative solutions. Experts from both the digital and green sectors can offer fresh perspectives, while study visits provide the opportunity to see best practices and technologies in action, which might otherwise seem abstract. The emerging B2GreenHub platform will also be an invaluable source of tools, resources, and frameworks.

Strategic guidance and structured methodologies can help businesses make this transition successfully.

Circular economy: a key to a sustainable future

The circular economy isn't just a trend; it's a strategic approach for sustainable growth through responsible resource management. Moving beyond the conventional "take-make-dispose" model, which strains resources and generates waste, the circular model emphasizes continuous reuse, taking cues from nature's cycles, where every resource finds a purpose.

Why focus on the circular economy?

Circular economy practices meet urgent environmental and economic needs by making systems more efficient, adaptable, and less reliant on new resources. Here's how it benefits both businesses and consumers:

1. **Economic resilience** – Circular practices stabilize operations by reducing reliance on unpredictable raw materials. By emphasizing recycling and reuse, companies can gain greater control over resources, avoiding supply chain risks and lowering costs. This approach helps businesses adapt more easily to regulations on resource use.
2. **Building customer loyalty** – Today's consumers value brands committed to environmental responsibility. By offering options like repair services, recycling programs, or take-backs, companies resonate with consumer values, reducing waste while strengthening customer relationships. Embracing circular principles can become a key differentiator, building loyalty in a market that values sustainability.
3. **Lowering environmental impact** – Circular models significantly reduce waste and emissions by transforming resources into a continuous cycle. Rather than discarding byproducts, companies can repurpose them, aligning operations with environmental goals. Practices like composting, recycling, and repurposing minimize waste, helping create a healthier planet.
4. **Encouraging new business models** – Circular principles open doors to resource-efficient business models, like leasing, sharing, and repair services. These models allow companies to provide products without consuming new resources, appealing to eco-conscious consumers

and reducing costs. For instance, leasing durable products that can be refurbished extends product lifecycles and cuts down on frequent replacements.

5. **Taking inspiration from nature** – At its core, the circular economy treats materials as assets, reintegrating them into production cycles. This mirrors natural ecosystems, where waste serves as a resource for new growth. By adopting this approach, companies support a low-waste economy that eases environmental strain and preserves resources for future generations.

Beware of greenwashing

As sustainable practices grow in importance, transparency is essential. Companies must back environmental claims with genuine action, avoiding greenwashing—the practice of promoting eco-responsibility without concrete steps. Transparency in circular practices not only builds trust but also assures consumers of a company's authentic commitment to environmental goals.

Circular audits for small and medium enterprises

The circular economy benefits not only large corporations but also small and medium enterprises (SMEs). Circular audits help SMEs find ways to reuse materials, optimize waste management, and reduce their reliance on new resources. These audits reveal opportunities to improve efficiency, reduce costs, and build resilience. For example, a small electronics repair business might refurbish parts instead of discarding them, cutting waste and expenses while contributing to the circular economy.

EU support for circular economy

In Europe, regulatory frameworks are being established to support sustainable production practices from design to end-use. In March 2020, the European Commission adopted the Circular Economy Action Plan (CEAP), aimed at introducing eco-design requirements to make products more durable, easier to repair, and suited for reuse. It also promotes the use of recycled materials in industry and encourages a 'repair rather than discard' philosophy. By implementing circularity at every stage of the product lifecycle, the EU is building a sustainable economy that encourages businesses to innovate in resource-efficient practices.

The role of innovation in strengthening resilience

In an era defined by rapid change and complex crises, innovation stands out as a cornerstone of corporate resilience. Recent research conducted by GREENE 4.0 project partners FH Kufstein Tirol, led by researchers Mario Situm and Matthias Möllers, highlights that organizations prioritizing innovation not only enhance their adaptability but also strengthen their ability to thrive amidst uncertainty. This alignment of resilience and innovation provides valuable insights for companies pursuing green and digital transformation.

Innovation: the catalyst for resilience

Innovation, as defined by leading studies, involves creating or improving products, processes, or business models to meet unmet needs and adapt to emerging challenges. Whether through product innovation or business model transformation, innovation bolsters a company's position by fostering differentiation, efficiency, and market agility. For example:

- product innovation enables companies to diversify their offerings, reducing dependency on single markets
- process innovation improves operational efficiency and cost-effectiveness, enhancing agility
- business model and distribution innovations extend market reach and mitigate localized risks

These strategies empower businesses to "bounce back" from disruptions, ensuring their long-term viability and competitiveness.

Beyond survival: a holistic view of resilience

The study underscores that resilience is more than financial stability; it encompasses sustainability, employee engagement, and social responsibility. Resilient companies exhibit:

- adaptability through flexible structures and proactive planning
- employee commitment, which is critical for collectively navigating challenges

- sustainable practices, which build trust and long-term stakeholder relationships

This comprehensive perspective aligns seamlessly with GREENE 4.0's objectives, emphasizing a green and innovative approach to resilience.

Lessons for digital and green transformation:

1. invest in innovation: foster a culture that values continuous improvement and experimentation. For GREENE 4.0, this involves supporting technologies and strategies that drive both environmental and operational sustainability.
2. focus on diversification: reduce dependence on specific markets or resources. GREENE 4.0 encourages businesses to explore alternative pathways for growth.
3. promote employee engagement: resilient organizations prioritize their workforce. GREENE 4.0 highlights human-centric innovation strategies.
4. leverage sustainability: align innovation with environmental goals to enhance both resilience and market credibility.

A path forward

Innovation and resilience are inseparable on the journey toward long-term stability and growth. GREENE 4.0 provides a unique platform to amplify these findings, enabling companies to not only weather crises but emerge stronger. By integrating these principles into its initiatives, GREENE 4.0 sets a benchmark for sustainable, resilient innovation across industries.

This synergy between innovation and resilience not only protects businesses against uncertainty but also propels them toward a future of sustainable excellence.

Full article (in German): Link to the article

The text was prepared by Selina-Maria Schiller.

Empowering SMEs for the digital and green transition with User Acceptance Model

In today's rapidly evolving industrial landscape, small and medium-sized enterprises (SMEs) are at a crossroads: adapt to digitalization and sustainability, or risk falling behind. The User Acceptance Model (UAM), developed under the GREENE 4.0 initiative, is a transformative tool designed to empower SMEs to thrive in this new era of opportunity.

What is the User Acceptance Model

UAM is a comprehensive framework that helps manufacturing SMEs evaluate their current readiness, pinpoint areas for improvement, and craft actionable strategies for success. By blending cutting-edge digital tools with sustainable practices, UAM ensures that businesses not only keep up but lead the way.

Key features of the UAM include:

- self-assessment: a straightforward, guided process to benchmark your company's current state.
- results analysis: a clear picture of your strengths and areas that need attention.
- action plan development: tailored, practical steps to bridge gaps and seize opportunities.
- support and monitoring: Long-term guidance to keep your business on track.

Key insights from UAM testing and analysis

What did real-world testing of UAM reveal? Here are the standout findings:

1. assessment of readiness: companies vary widely in their digital and green maturity, with advanced technologies like IoT and AI often underutilized.
2. sustainability practices: while many firms recognize the value of eco-friendly methods, inconsistent adoption underscores the need for targeted support.

3. challenges and enablers: cultural resistance, regulatory complexities, and resource constraints remain hurdles—but financial incentives and clear goals are game-changers.

Why UAM matters

In a world where consumers demand transparency and governments tighten regulations, staying competitive means staying ahead. Here's how UAM can make a difference:

- boost competitiveness: stand out with efficient, sustainable operations.
- unlock opportunities: identify untapped areas for innovation and growth.
- stay aligned: meet the demands of evolving markets and legislation.
- focus strategically: direct resources to initiatives that deliver the biggest impact.

Industries potentially benefiting from UAM

The potential of UAM spans a variety of industries:

- metal fabrication
- food and beverages
- electronics
- machinery and equipment
- pharmaceutical and chemical
- plastics and rubber
- building materials and furniture

Whether you're looking to modernize your operations or pioneer green solutions, UAM offers the tools to transform your industry.

The role of human factors

Transformation isn't just about technology – it's about people. UAM addresses the human element, helping businesses overcome employee resistance, foster a culture of innovation, and align organizational values with sustainability goals. It's not just a transition; it's a mindset shift.

Take the lead in your transformation

The future is green and digital. The User Acceptance Model is a chance to turn challenges into opportunities.

You can join the B2GreenHub ecosystem by filling out the form at https://lnkd.in/dAmdreJz. For more details, reach out at info@b2greenhub.eu.

A video tutorial about the User Acceptance Model is available: https://youtu.be/8R1yPO-PQUI. Let's build a sustainable tomorrow, together!

Sustainable innovations transforming industry

As industries worldwide focus on sustainability, several initiatives are demonstrating how circular economy practices can be effectively integrated into business operations. From packaging and food production to industrial efficiency, these approaches illustrate the shift toward more resource-conscious models.

PL 🍝 One example comes from **Swapp!**, a Polish startup working on retail packaging waste management. Through its **Refill and Pasta Stations**, the company has partnered with major retailers to introduce reusable packaging systems that help reduce single-use plastic waste. By allowing consumers to refill their own containers with dry goods and other food products, Swapp! has eliminated thousands of plastic packages within just a year. With ongoing expansion plans, this model could influence packaging practices in the retail sector.

AT 📦 Meanwhile, in **Austria**, WOLF NUDELN GmbH has adopted fully recyclable paper-based packaging for its pasta products. Developed in collaboration with Bosch and BillerudKorsnäs, this alternative to plastic packaging contributes to reducing waste. Additionally, Wolf Nudeln uses eggs from its own farms and biogas for energy, incorporating more sustainable practices into its production.

HU 🚽 🫧 In **Hungary**, Respray is addressing the issue of single-use aerosol cans in the cosmetics industry. By introducing **refillable deodorant stations** in Rossmann stores, the company offers customers the option to refill their deodorant bottles rather than purchasing new ones. This reduces the number of metal cans entering the waste stream and provides an example of how consumer goods can transition toward circular business models.

CZ 🌡️ The industrial sector is also exploring ways to optimize resources. In **Czechia**, **AGRO Kadaň** has implemented a system that repurposes **waste heat from a power plant** to warm greenhouses where fresh produce is grown. This integration of energy and agriculture helps lower carbon emissions while supporting local food production. Additionally, the company employs hydroponic farming techniques, reducing water consumption.

SI ♻️ In **Slovenia**, CIRCI project has developed a digital platform that connects businesses looking to repurpose industrial waste. By creating a database of post-production materials available for reuse, CIRCI facilitates partnerships between manufacturers, reducing waste and lowering material costs. This initiative promotes the reintegration of materials into production processes rather than their disposal.

IT 🧱 Finally, in **Italy**, a bio-based materials initiative is reshaping the construction industry. A collaboration between research institutions and manufacturers has led to the development of **hemp-based concrete**, an alternative building material that not only reduces carbon emissions but also improves insulation and durability. By utilizing agricultural waste and renewable resources, this initiative showcases how sustainable materials can replace conventional construction components while enhancing energy efficiency in buildings.

These examples show how businesses across different industries are implementing circular economy solutions. As companies continue to refine their strategies, such initiatives demonstrate the potential for more sustainable resource use and waste reduction.

This text is based on the brochure *SMART-CIRCUIT Circular Success Stories*, available at https://tiny.pl/kxnt238k, prepared by SMART CIRCUIT. We present just a few of the 120 success stories featured in this publication.

CSRD: a challenge or a competitive advantage?

The **Corporate Sustainability Reporting Directive (CSRD)** is changing how companies report their impact on the environment, society, and governance (ESG). While it may seem like just another reporting requirement, it can actually help businesses **streamline operations, improve transparency, and gain a competitive edge**.

Let's break down **who needs to comply, how CSRD can benefit businesses, and what changes the EU is considering**.

What is CSRD, and who needs to comply?

CSRD replaces the **Non-Financial Reporting Directive (NFRD)** and introduces stricter **ESG reporting requirements**. Reports must follow the **European Sustainability Reporting Standards (ESRS)** and will be **verified by external auditors**.

Who needs to report and when?

2025 (for the year 2024):

- **large listed companies** with **500+ employees** and exceeding either: **€50M in revenue €25M in total assets**

2026 (for the year 2025):

- **large listed and non-listed companies** meeting **two out of three criteria**: **250+ employees €50M+ revenue €25M+ total assets**

2027 (for the year 2026):

- **listed SMEs** meeting **two out of three criteria**: **10+ employees €900K+ revenue €450K+ total assets**

Exemptions:

- **non-listed SMEs** are generally exempt unless they are **part of a large corporate group** or **operate in the supply chain of a reporting company**.

CSRD as a business opportunity

While CSRD requires companies to **collect and structure ESG data**, it also provides valuable benefits:

- data-driven improvements – tracking energy use, emissions, and supply chain impact helps identify inefficiencies and savings
- stronger corporate reputation – transparent ESG reporting builds trust with investors, customers, and regulators
- competitive advantage – many procurement processes favor companies with strong ESG credentials
- better access to capital – banks and investors prioritize ESG-compliant companies
- risk management – ESG data helps companies prepare for future regulatory and market changes

While compliance may seem complex, businesses can **use ESG data to optimize operations and gain market advantages**.

Proposed changes: making CSRD easier

To reduce reporting burdens, the **European Commission is considering changes**:

higher reporting thresholds – CSRD may apply only to firms with **1,000+ employees, €25M+ assets or €50M+ revenue** - this could **exempt up to 80% of previously included companies**

- **delayed deadlines** – Some companies **may start reporting in 2027 instead of 2025**.
- **Voluntary ESG reporting for SMEs** – A **simplified framework** may allow smaller firms to disclose ESG data **without excessive complexity**
- **less complex ESG data requirements** – The EU is working on **simplifying the ESRS framework**

These changes aim to **balance transparency with business feasibility**. Companies should **stay updated** on final decisions.

What should companies do now?

- **start tracking ESG data** now to avoid last-minute complications
- **use ESG management tools** to automate reporting
- **engage all relevant departments** - ESG reporting involves **finance, HR, supply chain, and operations**
- **follow regulatory updates** to adjust reporting strategies as needed

CSRD is more than a legal requirement—it is an **opportunity to improve business processes, strengthen market position, and prepare for the future**.

Smart manufacturing for SMEs: digital twins and practical alternatives

Why digital transformation matters

Digital transformation is no longer a luxury—it's becoming essential, even for small and medium-sized manufacturers. Faced with growing pressure to **increase efficiency, cut waste, and lower operating costs**, many SMEs are turning to emerging technologies to stay competitive. Among these, **digital twins** are often viewed as one of the most powerful tools available.

What is a digital twin?

A **digital twin** is a dynamic virtual model of a physical machine, process, or production line. By connecting real-time data from IoT sensors with AI-based analytics, it allows companies to **simulate changes, detect problems early, and optimize performance** without interrupting ongoing operations. For SMEs, this means the potential to **reduce material waste, save energy, and minimize downtime** while improving decision-making on the production floor.

The challenges of implementation

However, the path to implementing digital twins is rarely straightforward. Many SMEs struggle with **high initial investment costs**, especially when considering the infrastructure required to install sensors, connect systems, and manage cloud-based analytics platforms. The **technical complexity of integration**, **data security risks**, and **limited in-house expertise** often pose additional barriers.

More accessible starting points

Fortunately, embracing digital innovation **doesn't have to begin with a full-scale digital twin**. There are **more accessible alternatives** that can still deliver meaningful improvements in productivity and sustainability.

- **Cloud-based platforms** offer flexible tools for data management and process optimization without large upfront investments. These services are **easy to scale** and often include **built-in security features** and **automatic updates**, reducing the technical burden for smaller teams.

However, companies must consider **dependence on internet connectivity** and **data privacy concerns** when using third-party providers.

- **Modular automation systems is** another practical approach. These allow manufacturers to **upgrade operations gradually** by adding functional units as needed. This flexibility makes it easier to **adapt to changing production needs** without major disruptions. While this path still requires some investment and technical integration, it often provides a **more manageable entry point** for SMEs looking to modernize step by step.

Choose the path that fits

Digital twins remain a compelling vision of the future—but they are not the only option. By exploring more practical solutions like cloud tools or modular automation, SMEs can move toward **smarter, more sustainable manufacturing** in ways that match their **resources, capabilities, and long-term goals**.