Lifelong Learning in the Electrical Energy Transition with Wireless Power Transfer

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THUAS, Delft, The Netherlands

November 10-12, 2025

Contents

Introduction: Why WPT?

- Wireless Power Transfer (WPT)
- Enables efficient energy transfer
- Without physical connectors
- Applications: toothbrush to vehicles
- Lifelong Learning (LLL) essential

Share knowledge

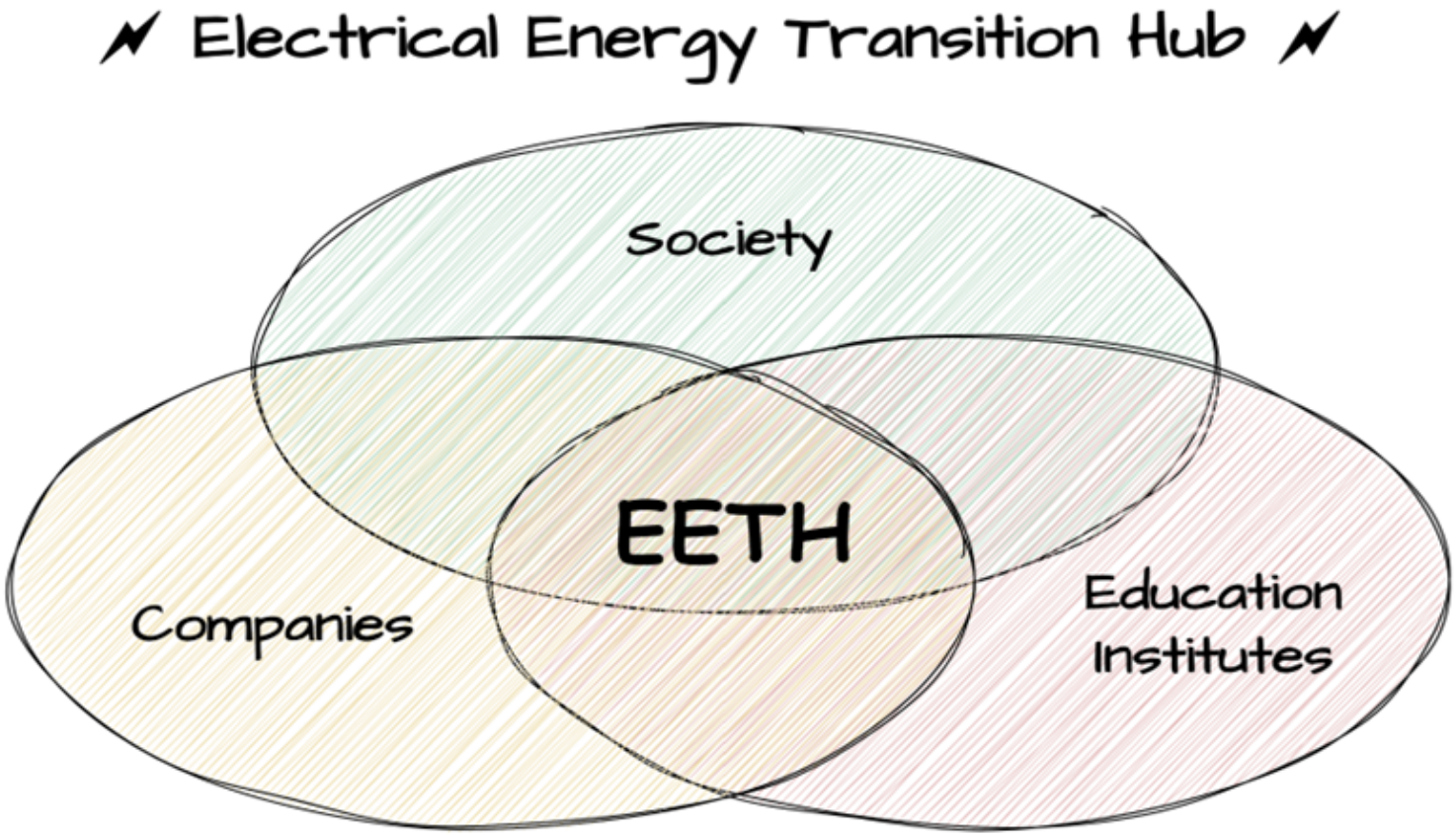

Figure: Share knowledge in EETH

Overview


Society
Public Engagement
Create short, engaging videos or infographics that break down the energy transition into "bite-sized" concepts (e.g., "What is a smart grid?").
Organize community events or online discussions where both young and older generations can participate and share their views, making it more conversational.
Objective: Educate society on the importance and benefits of new techniques (like the shift from AC to DC and smart grids), even if these require higher initial costs or new ways of thinking.
Integration: By making these concepts understandable for everyone-from children to senior citizens-you help foster acceptance of new energy technologies and policies. This societal buy-in is crucial for the successful implementation of energy transition solutions.
Companies
Business Oriented
Develop workshops or webinars featuring the latest technologies and market trends, explaining how businesses can implement them.
Include brainstorming sessions to encourage innovative solutions and networking opportunities between students and companies to foster fresh perspectives.
Objective: Ensure companies understand and adopt these new techniques, with a focus on knowledge transfer between experienced employees and the new generation of skilled students. Companies need to stay updated on the latest solutions rather than relying on outdated methods.
Integration: Businesses engage with students, ensuring that they are hiring individuals who are well-versed in current and emerging technologies. At the same time, businesses may need to upskill their current employees to align with the knowledge these students bring.
Education
Student Targeted
Create interactive simulations or hands-on projects that demonstrate key concepts like renewable energy systems (solar, wind, batteries) or smart grids.
Use case studies of real-world applications to make it relatable and tie these lessons to problem-solving activities.
Objective: Equip students with practical knowledge and techniques (like the difference between AC and DC) to solve real-world energy problems.
Integration: These students become the future workforce, directly applying their learning to address critical issues such as grid congestion, offering innovative solutions like using smart technologies instead of traditional infrastructure.
Integration
Beginner Level (Society-Focused)
Target Audience: General public (young, old, non-technical individuals)
Objective: Raise awareness and understanding of the energy transition using relatable, everyday examples.
Course Content:
Knowledge Clips: Short, animated videos explaining energy transition concepts (like smart grids, renewable energy, AC vs. DC) using simple analogies. For example, compare the energy grid to a smartphone's battery management to explain grid congestion solutions.
Expert Stories: Real-life examples from experts explaining how energy transition impacts their daily lives (e.g., how solar panels or energy storage systems have made their homes more efficient).
Interactive Scenarios: Small quizzes or "choose your own adventure" scenarios where participants can see how different energy choices affect their homes or communities.
Discussion Topics: Simple prompts to encourage family or community conversations about the future of energy, framing it as an everyday, relatable issue.
Intermediate Level (Business-Focused)
Target Audience: Professionals in the energy sector, businesses, and companies facing energy-related challenges.
Objective: Dive deeper into the technical aspects, providing solutions that businesses can adopt.
Course Content:
Case Studies: Real-world examples of companies that successfully implemented solutions to energy challenges (e.g., using smart grids to solve congestion issues).
Simulations: Simple simulations demonstrating how smart grid solutions work and how they can alleviate problems like congestion, energy distribution, and efficiency.
Demonstrations: Practical demonstrations or walkthroughs of how certain technologies (e.g., battery storage systems, grid management software) can be integrated into existing infrastructure.
Knowledge Clips: More detailed explanations of technical solutions, incorporating interviews with industry leaders who share insights on how to adapt to new energy challenges.
Interviews: Conversations with businesses that have already transitioned to smart energy solutions, offering insights into their strategies, challenges, and successes.
Advanced Level (Student-Focused)
Target Audience: Engineering students or trainees in the energy sector.
Objective: Provide in-depth technical knowledge and hands-on experience with energy transition solutions.
Course Content:
Technical Modules: Detailed lessons on the engineering principles behind AC and DC systems, grid management, solar and battery integration, and smart grids.
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Demonstrators: Practical sessions where students can build, measure, and test circuits or algorithms related to energy management, observing real-time effects on grid stability or efficiency.
Project-Based Learning: Group projects or assignments where students design a small-scale solution to a real-world energy problem, testing their theoretical knowledge in practice.

Target audience

Society

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Beginner Level

- Society-focused
- Public engagement
- Short engaging videos
- Simple graphics
- Raise general awareness

Focus: Society

Figure: Kickstand charging, society focus

Intermediate Level: Industry

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Intermediate Level

- Companies-oriented
- Business workshops
- Explore industry trends
- Include hands-on sessions
- Perspective on opportunities

Focus Industry

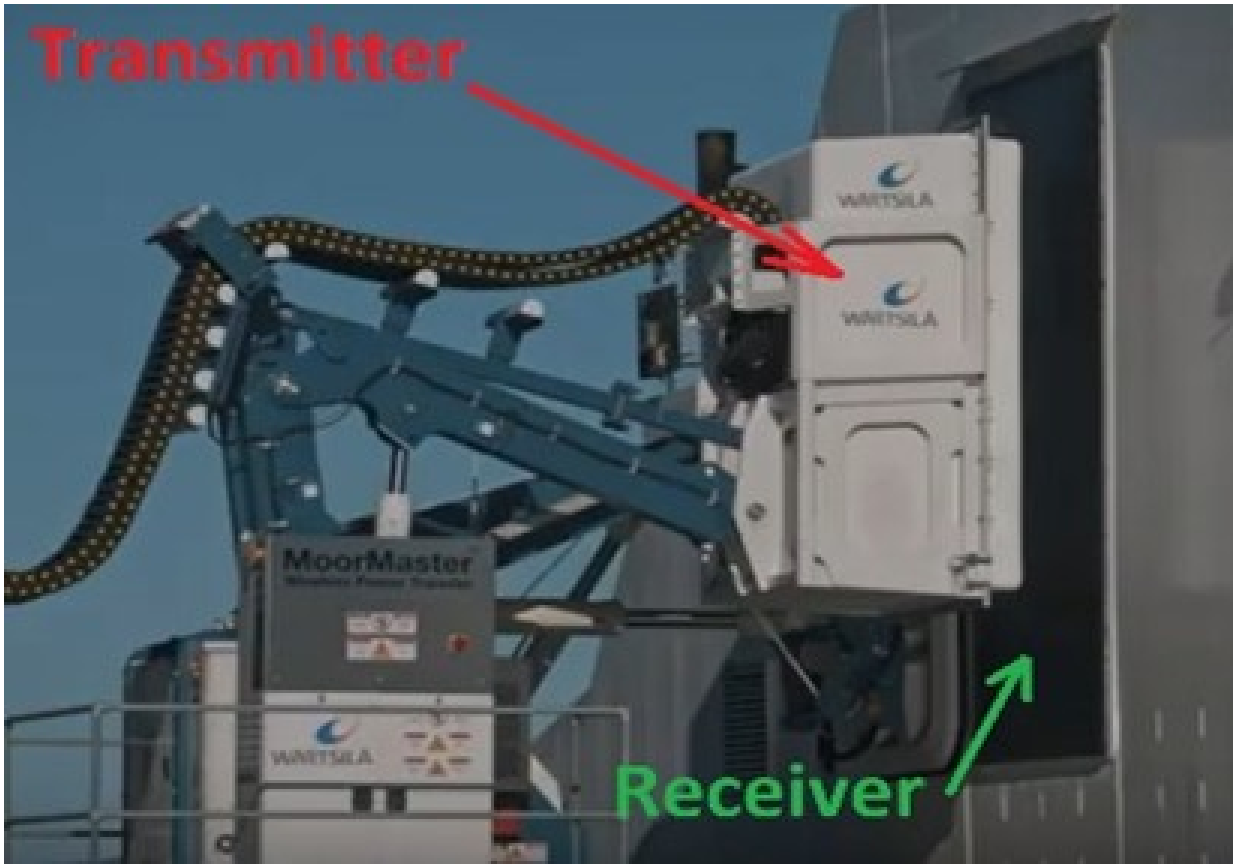

Figure: Ferry charging, industry focus

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Advanced Level

- Education-targeted
- Student interactive simulations
- Key concepts like renewable
- Practical knowledge and techniques
- Solve real-world problems

Focus: Education

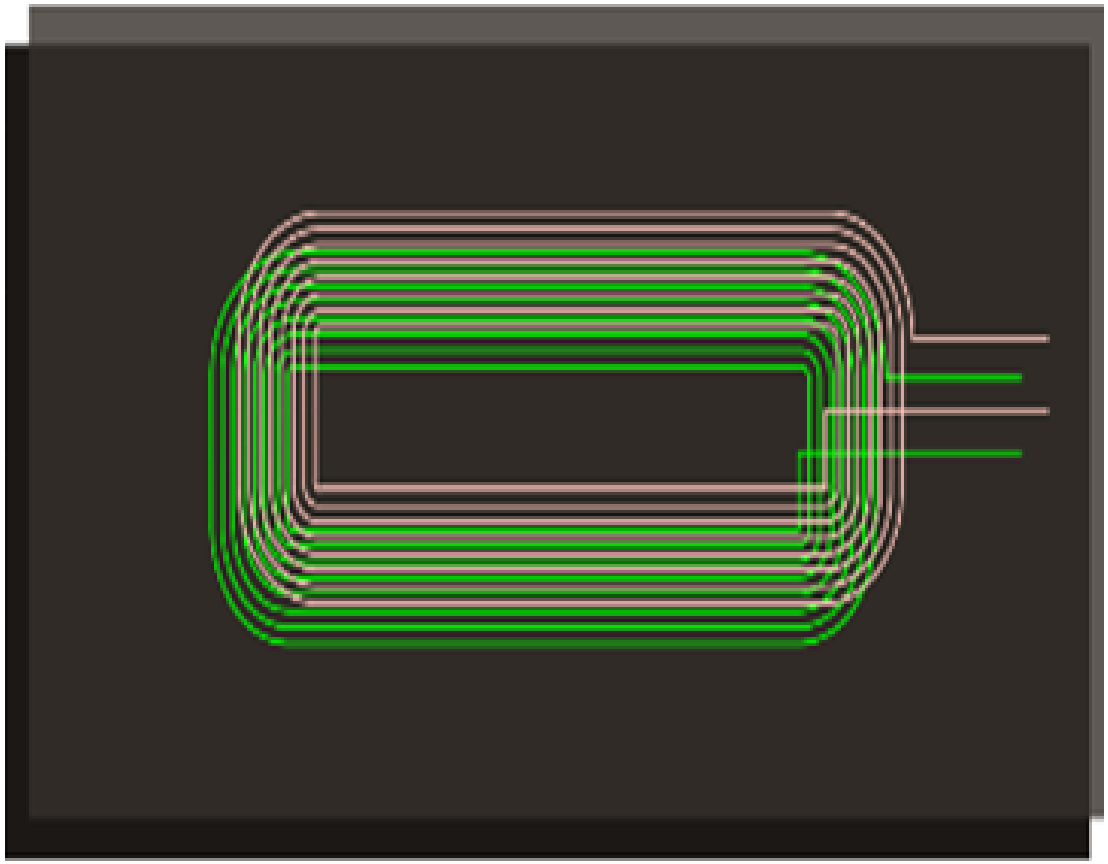

Figure: Wireless coupling, education focus

Educational Set-up

- Demonstrations: repeat assignments
- Adjust distance, alignment
- Control frequency, load
- Observe effectiveness

Hardware trainer

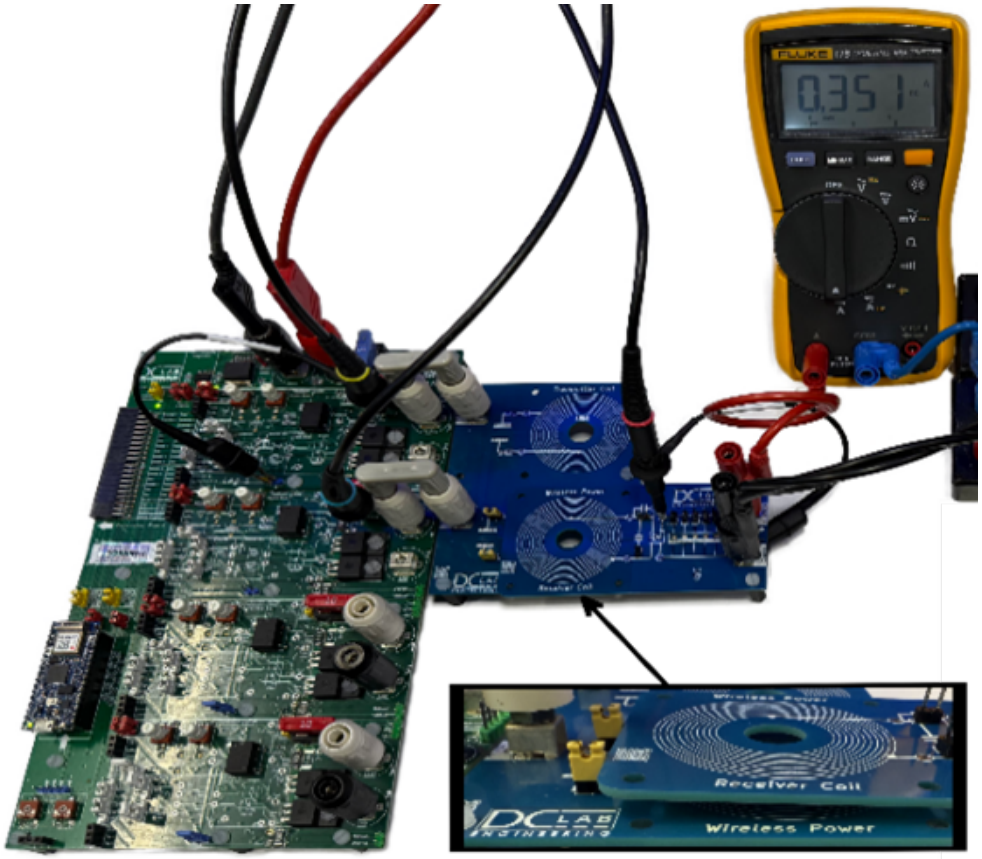

Figure: Hardware trainer setup

Hardware trainer losses

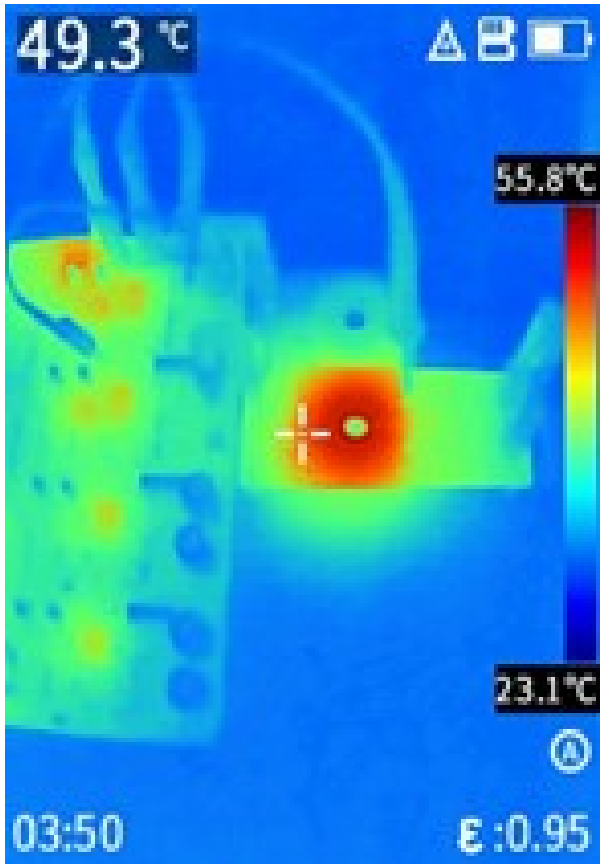

Figure: Thermal image, see losses

Component design

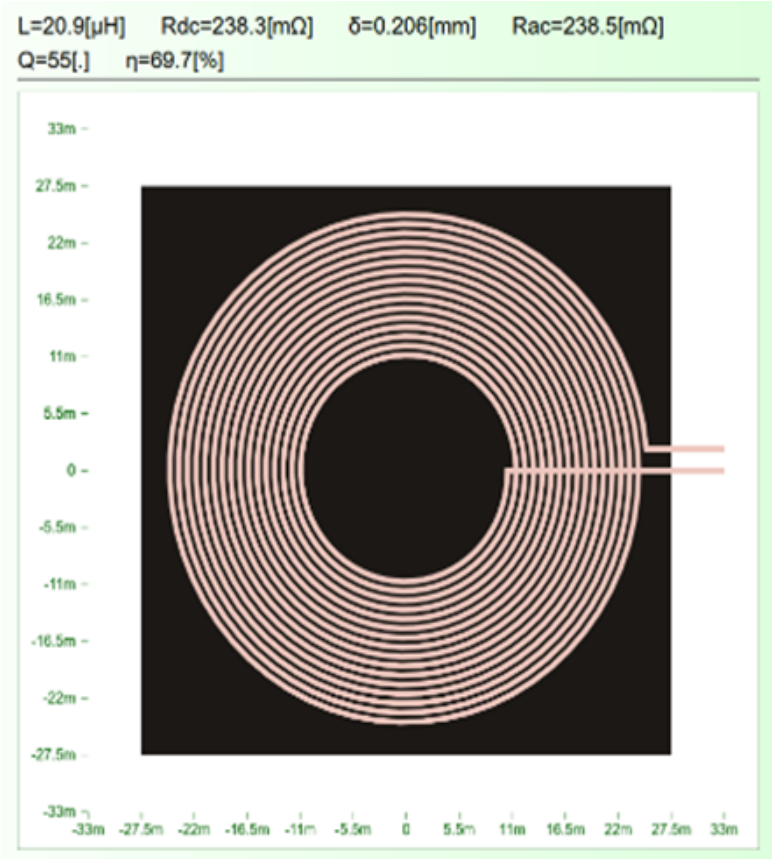

Figure: Coil design in Caspoc

Typical Educational theoretical assignment

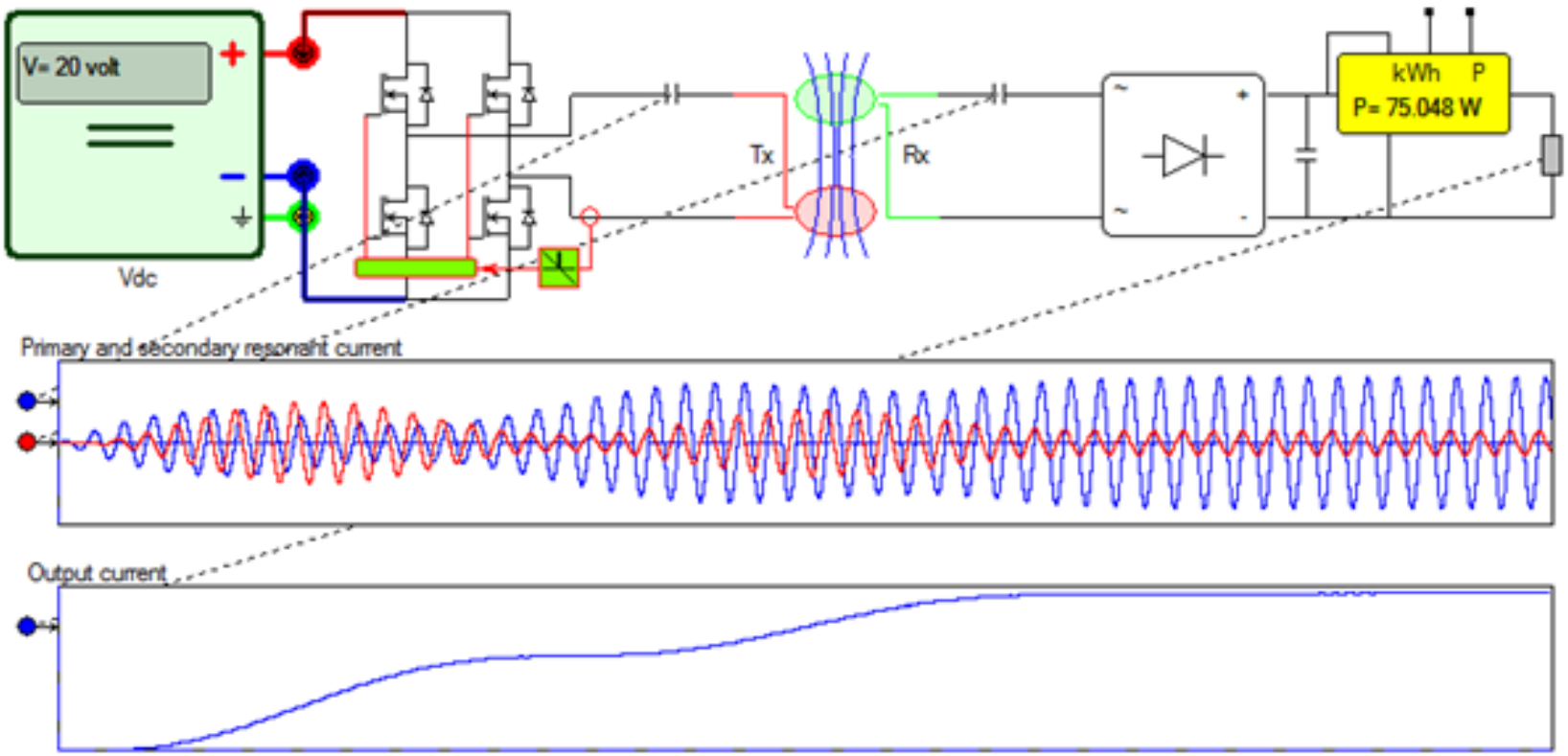

Figure: Simulation 75 Watt transfer

What do you learn: Society

- Introductory lessons
- Familiar: phone charging, Toothbrush wireless charger
- Resonant coupling for transfer
- Demonstrate with setup
- Advantages over plug
- Convenience, contactless

What do you learn: Industry

- Gain insight into possibilities
- Align with LLL
- Kitchen appliances developing
- Electric vehicle charging
- Industrial floor: automated systems
- Recharge carts wirelessly
- Wet environments suitable
- Electric ships charging
- Ferries, tour boats
- Short docking times

What do you learn: Education

- Simulations analyze system
- Interaction of components
- Measure performance
- Compare calculations, measurements
- Develop problem-solving skills

Conclusion

- Lifelong learning for three different groups
- Low level to detailed technical level
- Design and Simulation Tools
- Practical measurements

Thank you! www.dc-lab.org

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