

Optimization-based design of decentralized energy and resource systems using data from a **Citizen Science** approach

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Area 2.3 Microgrids and Smart Energy Communities



 Federal Ministry
Innovation, Mobility
and Infrastructure
Republic of Austria

 Federal Ministry
Economy, Energy
and Tourism
Republic of Austria



 For the
City of Vienna



Introduction

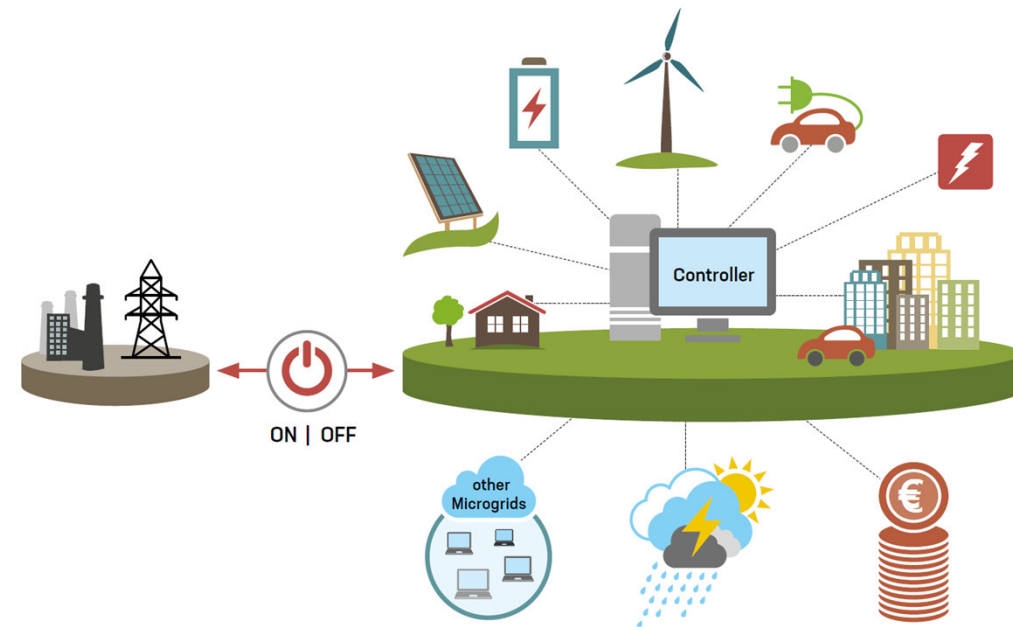
Decentralized energy and resource systems

- Bring generation and consumption together

Advantages

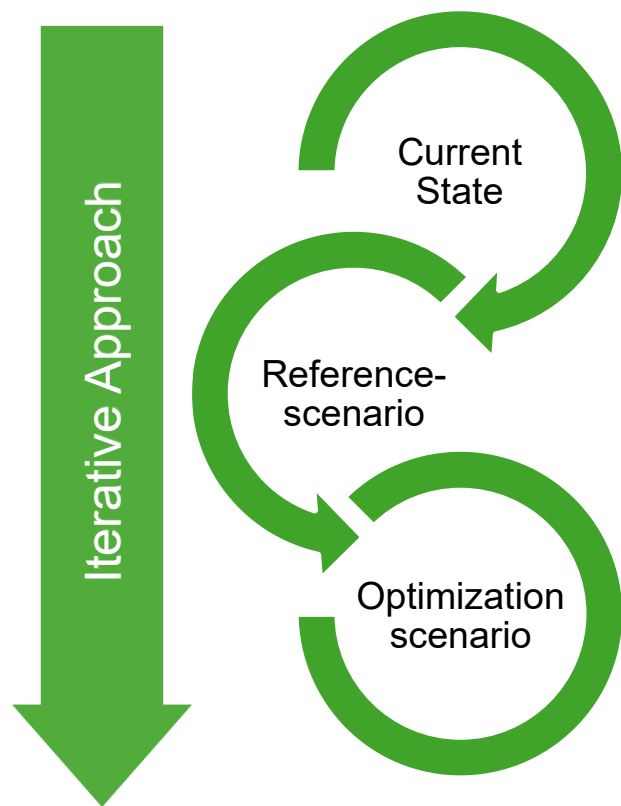
- High efficiency, since generation and demand are closely aligned
- Excellent integration of volatile renewable energy sources, since demand and generation can be managed effectively
- Less need for intensive “energy transit”
- Increased reliability
- Local value creation
- Reduced CO₂ emissions...

- **Optimized planning** (sector coupled) of technology, flexibilities and storage systems is needed
- To react on volatile generation, demands and loads



Optimization Process

Procedure and general approach

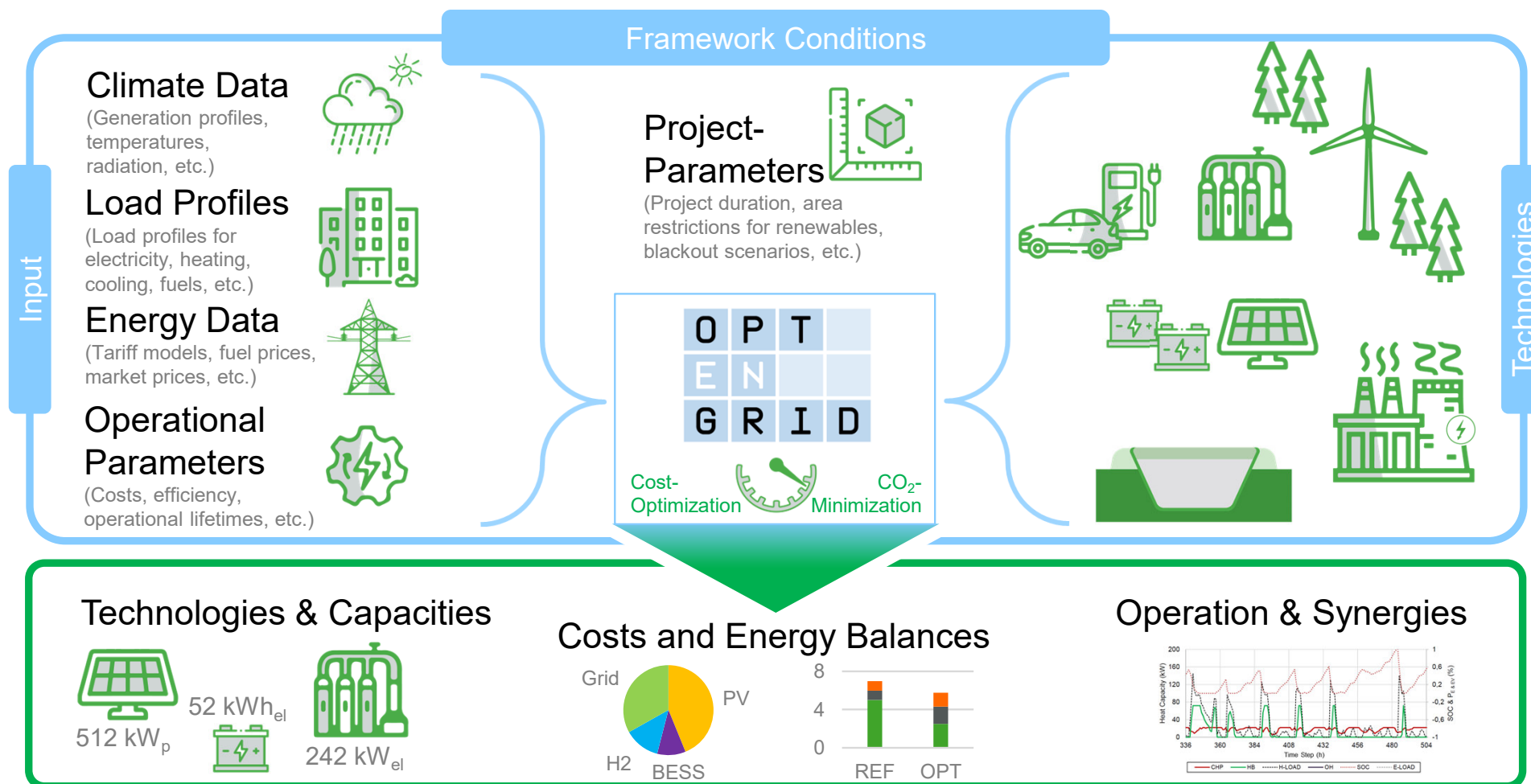


- Current state:
Data collection of real-life situation
- Reference scenario:
Either current situation or future baseline scenario for improved comparison (e.g. consideration of CO₂ tax)
- Optimization scenario: comparison to reference scenario with simultaneous investment in technologies

→ Calculations with **OptEnGrid**

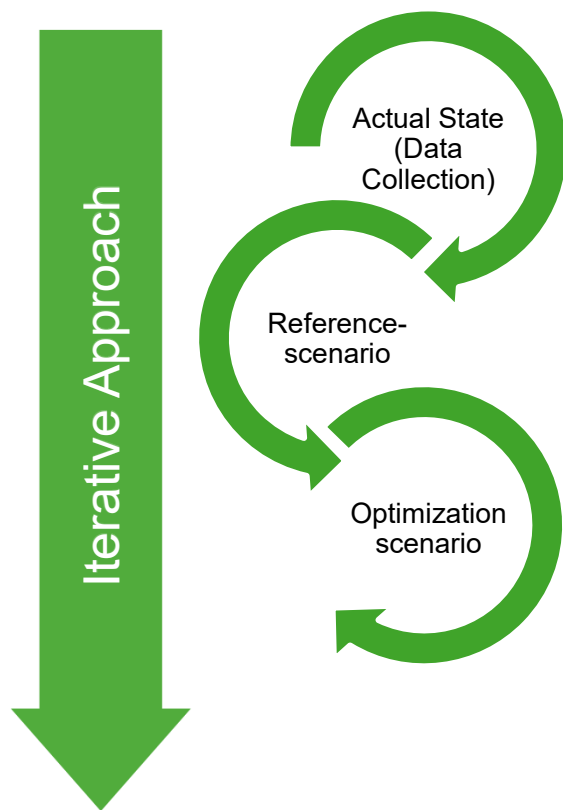
O	P	T	
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OptEnGrid – Workflow



Optimisation Process

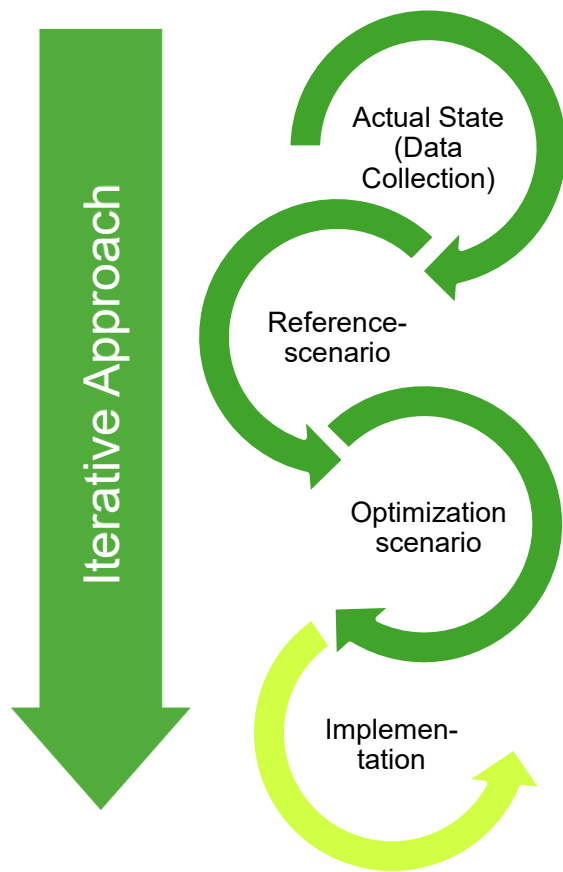
Procedure and general approach



- Current state calculation:
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Optimisation Process

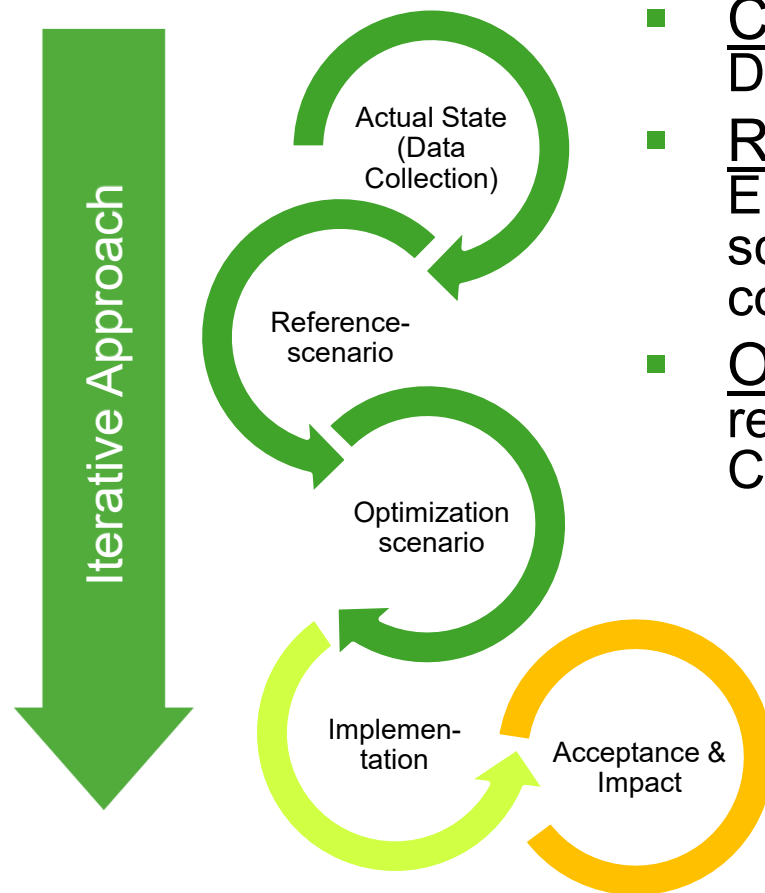
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Decision makers, investment in technologies and energy system changes

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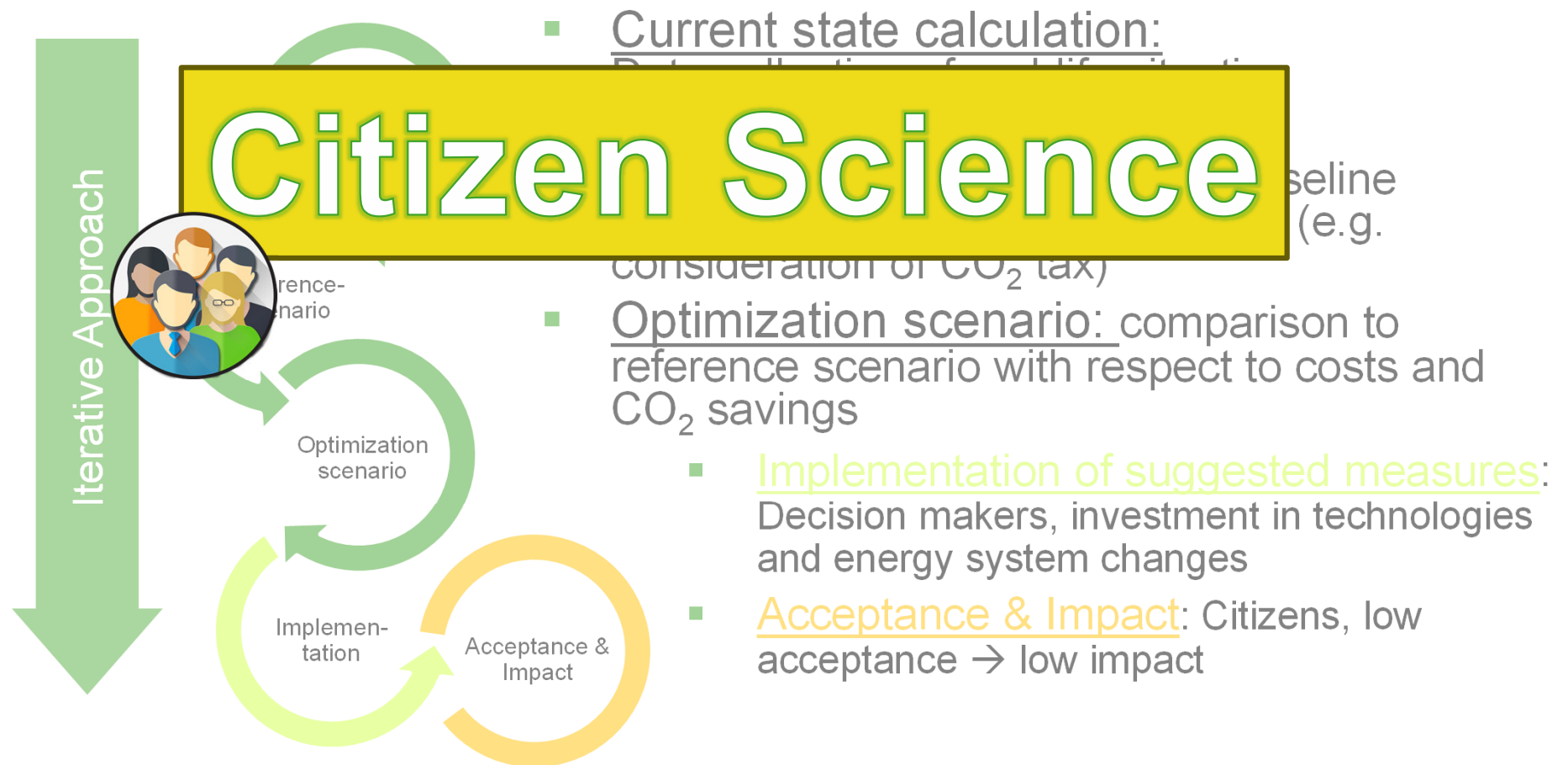
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 - Acceptance & Impact: Citizens, low acceptance → low impact

Optimisation Process

Procedure and general approach



Citizen Science

Citizen science is any **activity that involves the public in scientific research** and thus has the potential to bring together science, policy makers, and society as a whole in an impactful way. Through citizen science, all **people can participate in many stages of the scientific process, from the design of the research question, to data collection and volunteer mapping, data interpretation and analysis, and to publication and dissemination of results**. Citizen science is also an approach of scientific work that may be used as a part of a broader scientific activity.
 (European Citizen Science Platform)



Citizen Science Platforms

- **ECS Platform** (European Citizen Science Platform)
- **Österreich forscht** platform
 - Quality criteria
 - Summary of (Austrian) projects (ongoing and finished)
 - E.g. IMPETUS by BEST



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Citizen Science Project IMPETUS – Identifying Mobility Aspects of Daily Traffic Using Citizen Science in Lower Austria

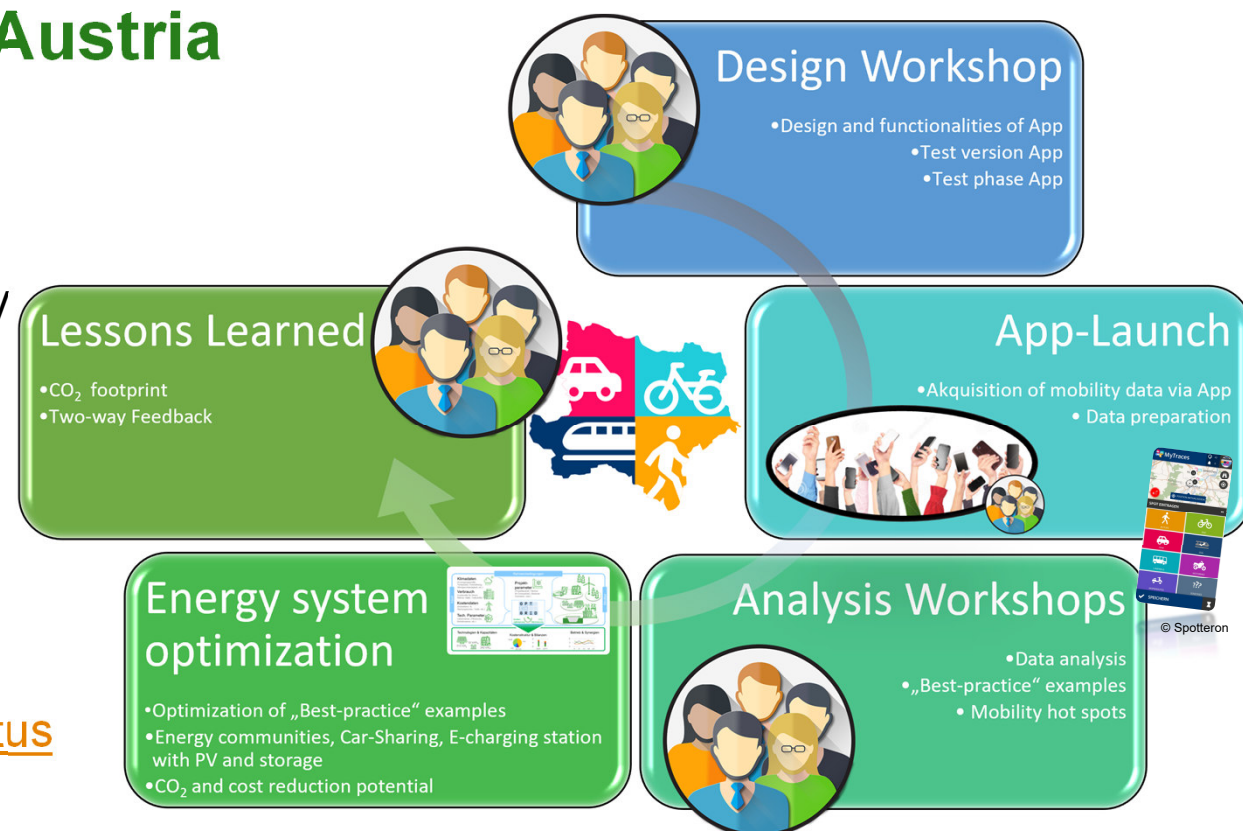
Goals:

- Accelerating the mobility transition
- Climate-friendly and efficient mobility
- Reduce CO₂ emissions of private transport sector
- Increase public awareness, acceptance and support

www.mytraces.at

www.citizen-science.at/en/projects/impetus

zenodo.org/records/21914279



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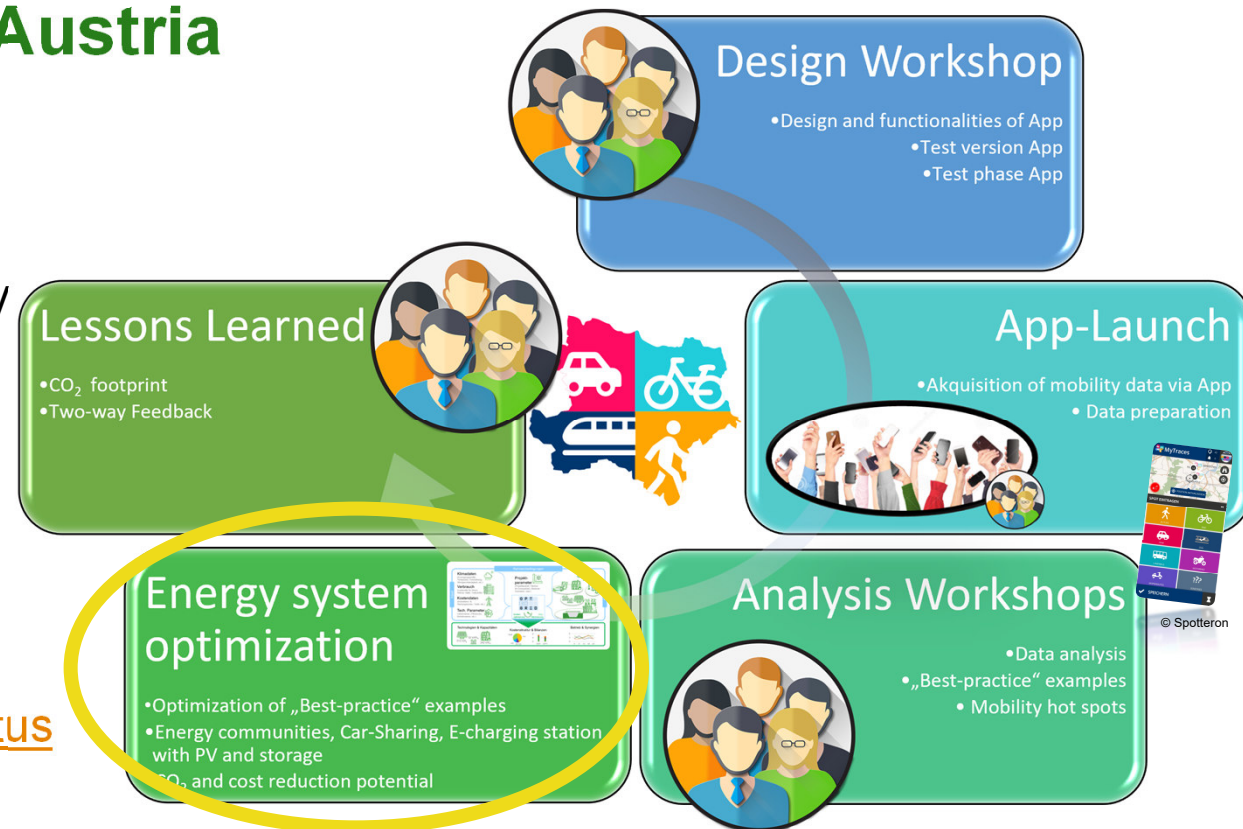
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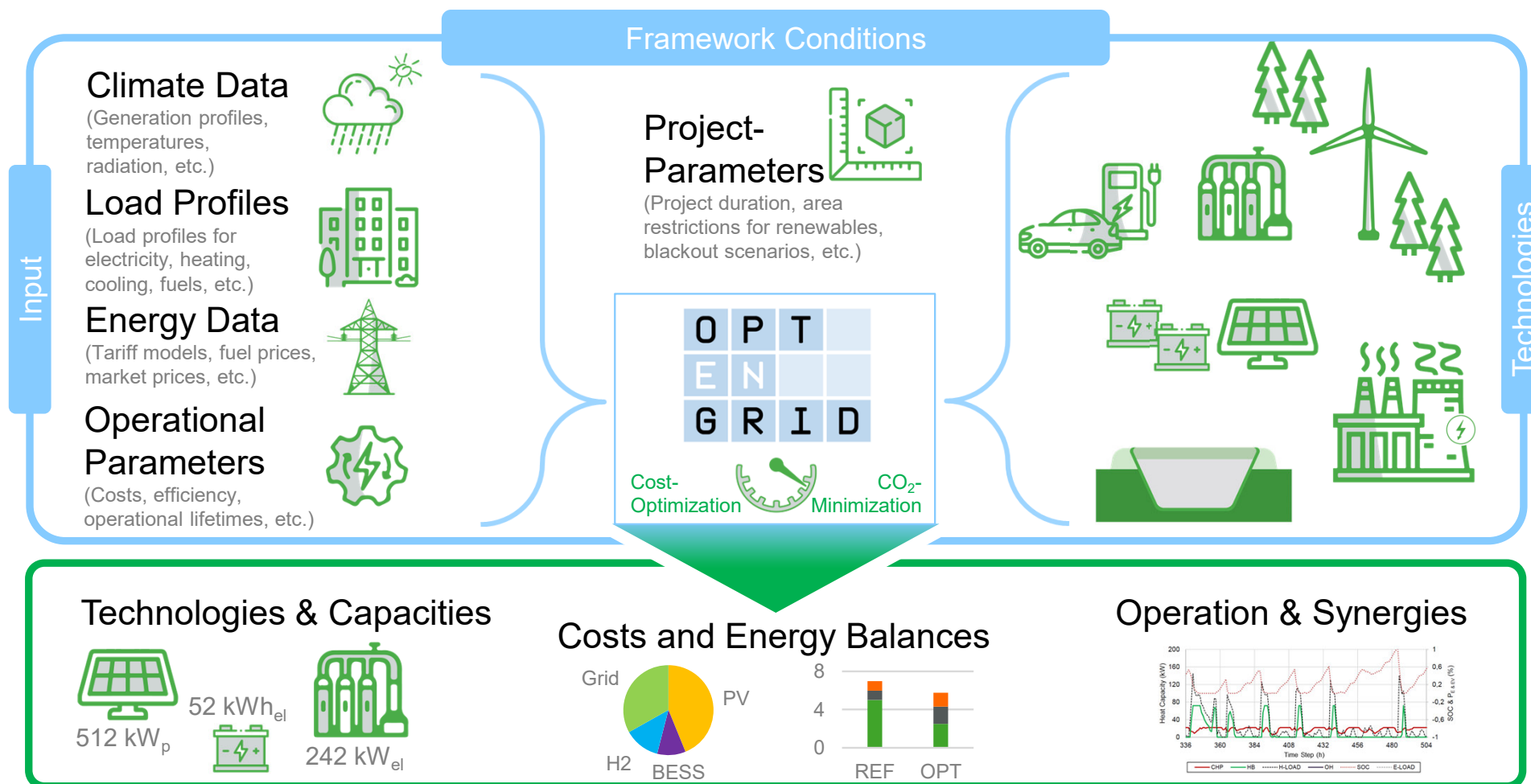
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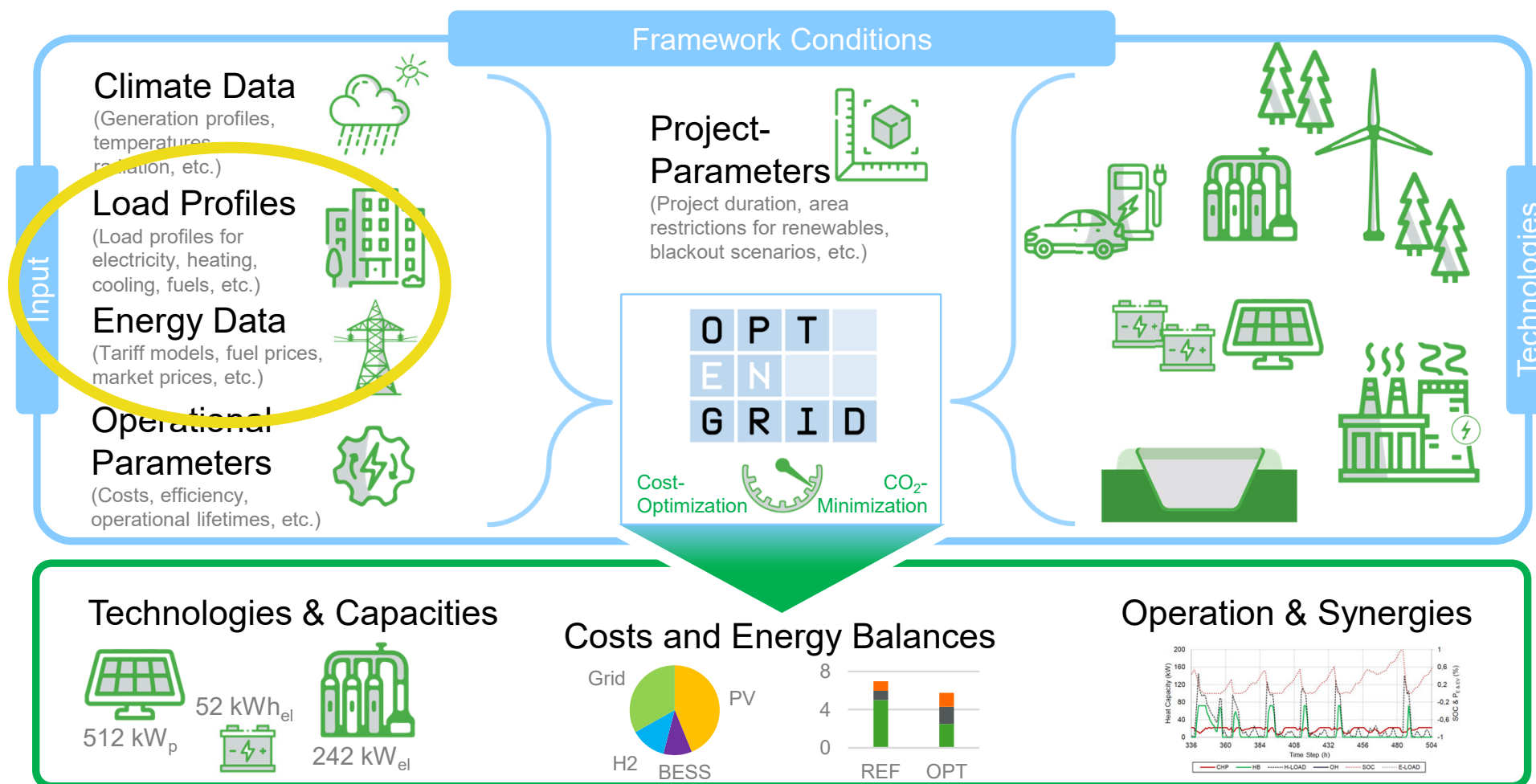
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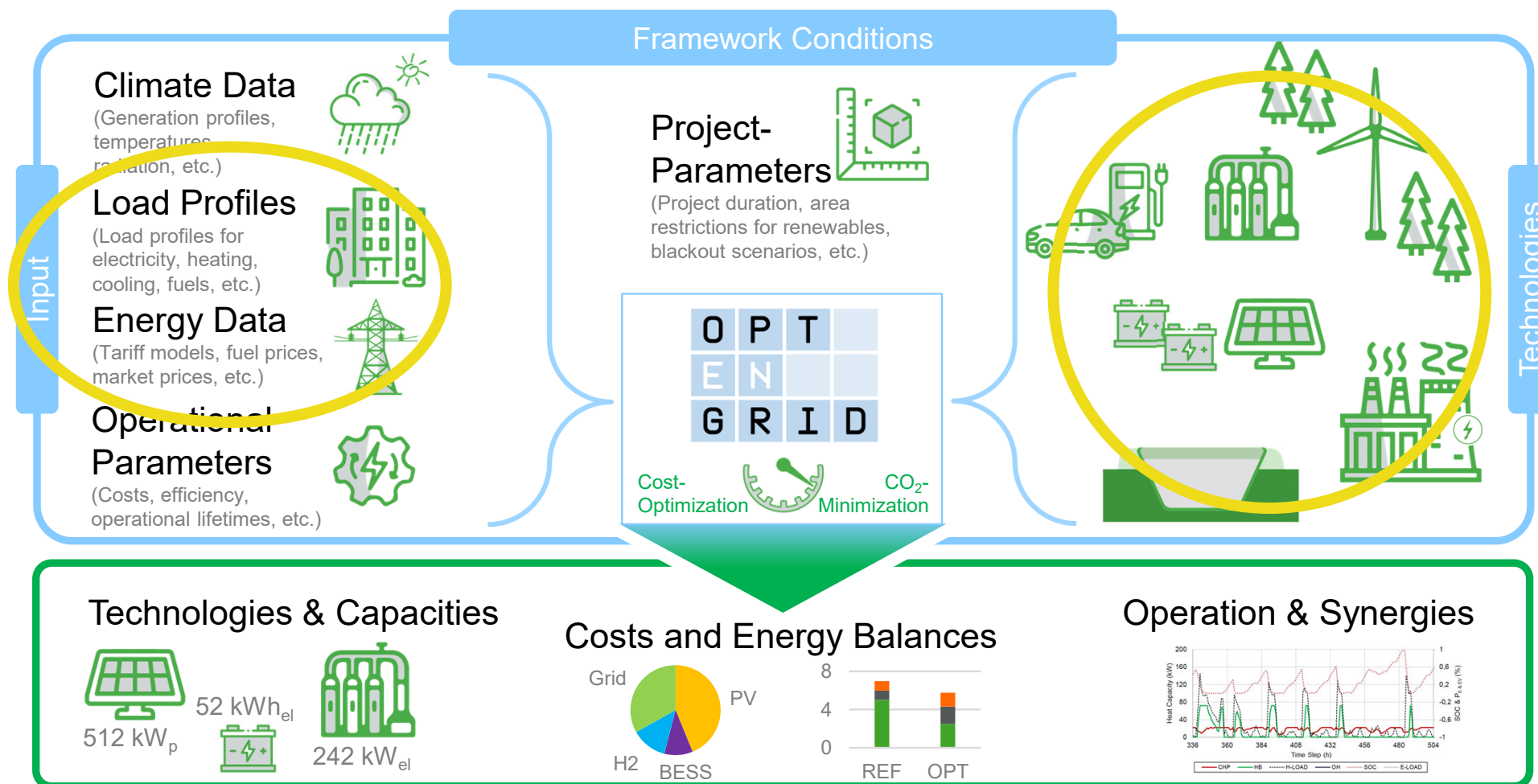
Big Picture - Workflow



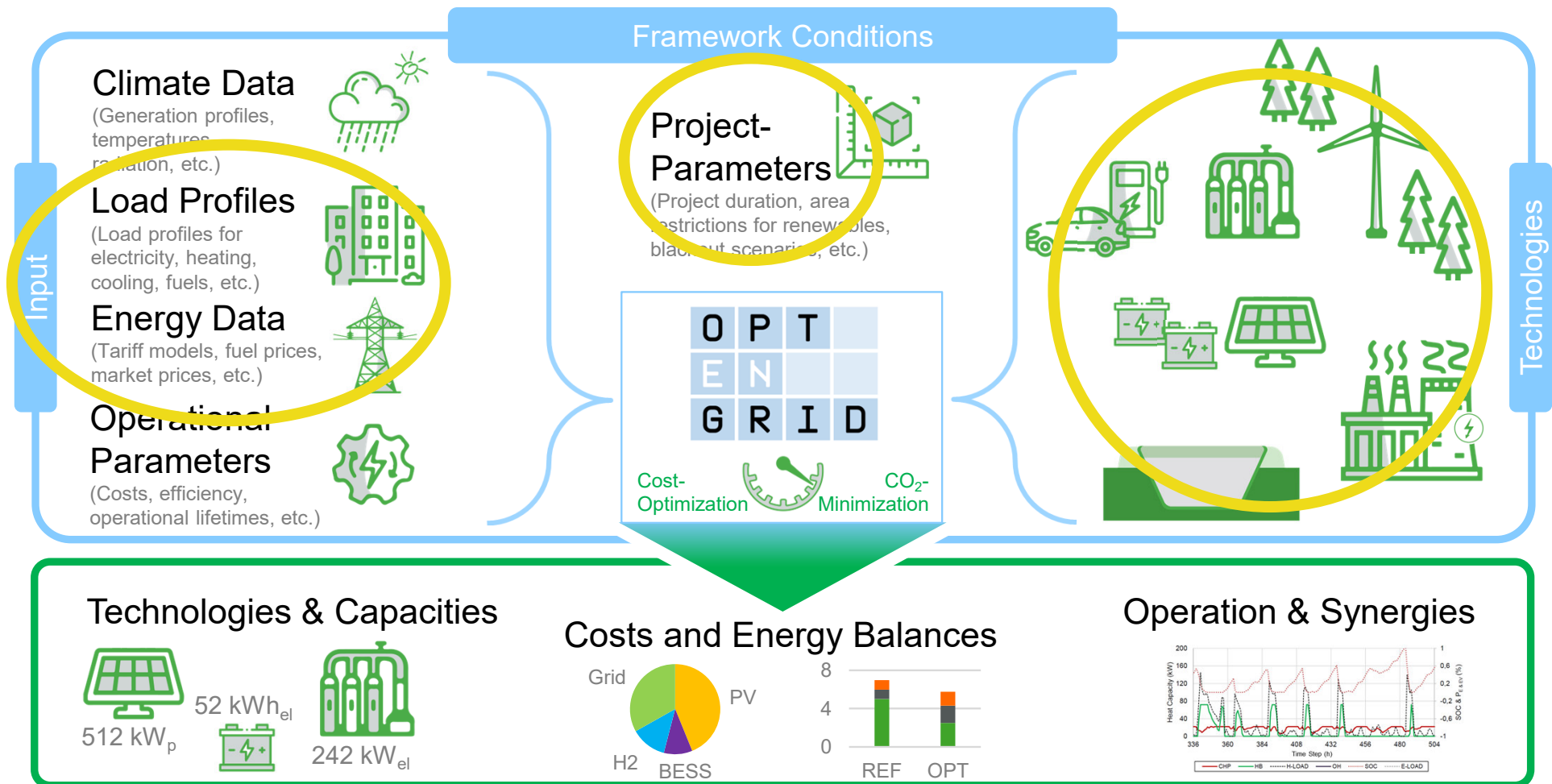
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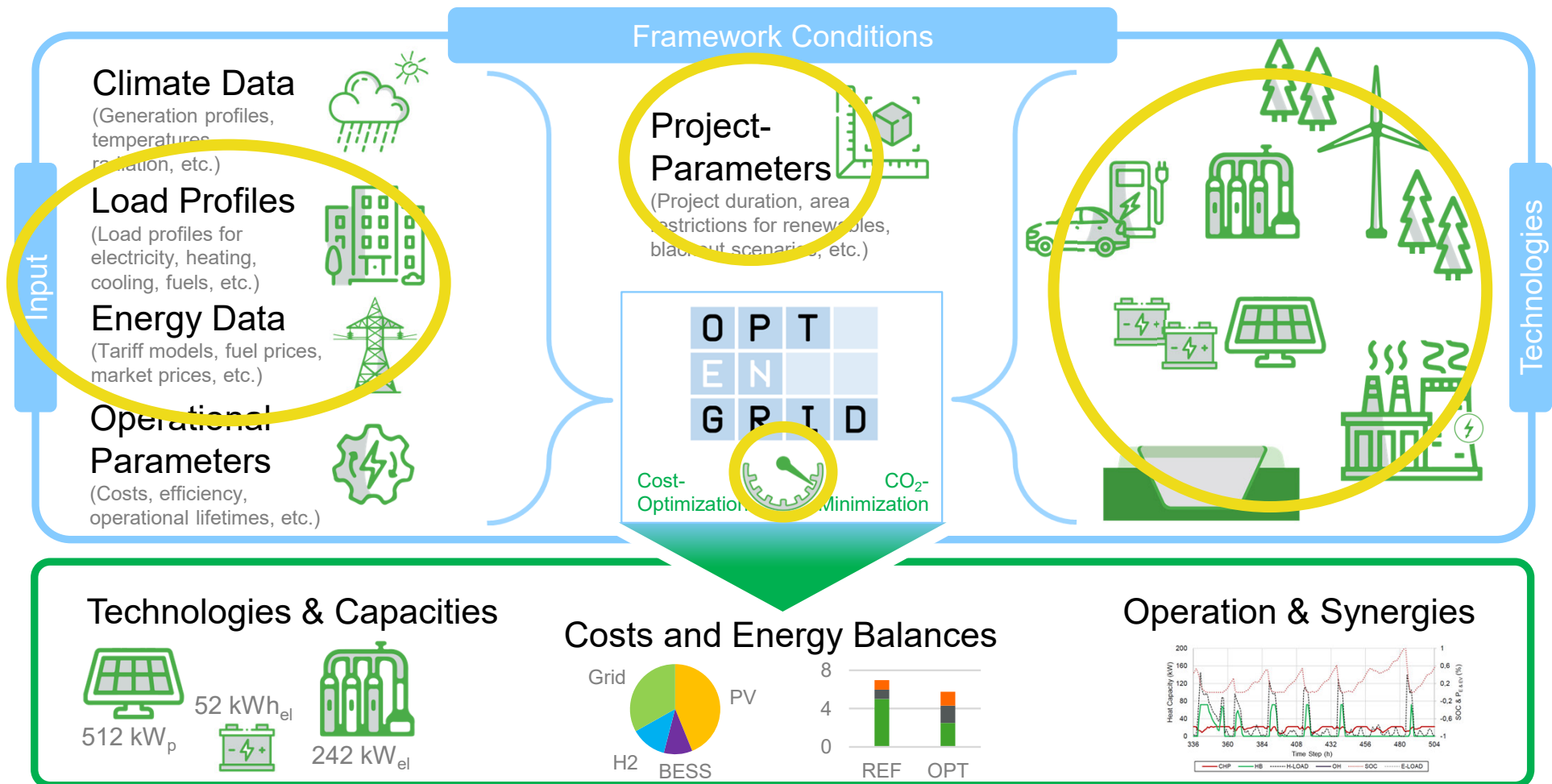
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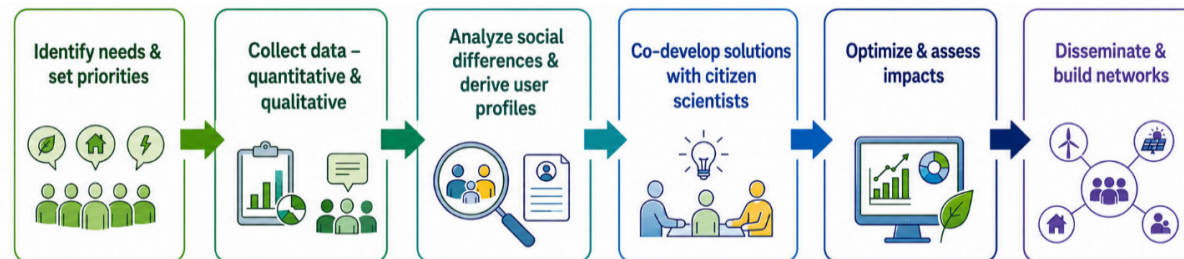


Outlook

- IMPETUS: **MyTraces**-App launch at **October 2026**
- **CoPower-CS**: Co-Creation of inclusive Power Systems with Citizens
 - Increasing the use of renewable energy, reduce CO₂ emissions, improve energy efficiency → accelerating the energy transition
 - GFF NÖ: Citizen Science Call 2026



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- **ERSTA** : Erneuerbare **St**romversorgung mit Systemlösungen für **Alt**städte – Denkmalschutz, Technik & soziale Teilhabe für resiliente Energieversorgung
 - Citizen participation (not Citizen Science)
 - FFG: Mission: Climate-Neutral City – Technologies and Innovations for the Climate-Neutral City

Conclusions

- Expansion of **technical** solutions regarding **social** issues
 - Acceptance of technical solutions
 - Early adopters
 - Participation from the beginning
→ Increasing impact
 - Real-life data
- Awareness raising for scientific processes



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Thank You!

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