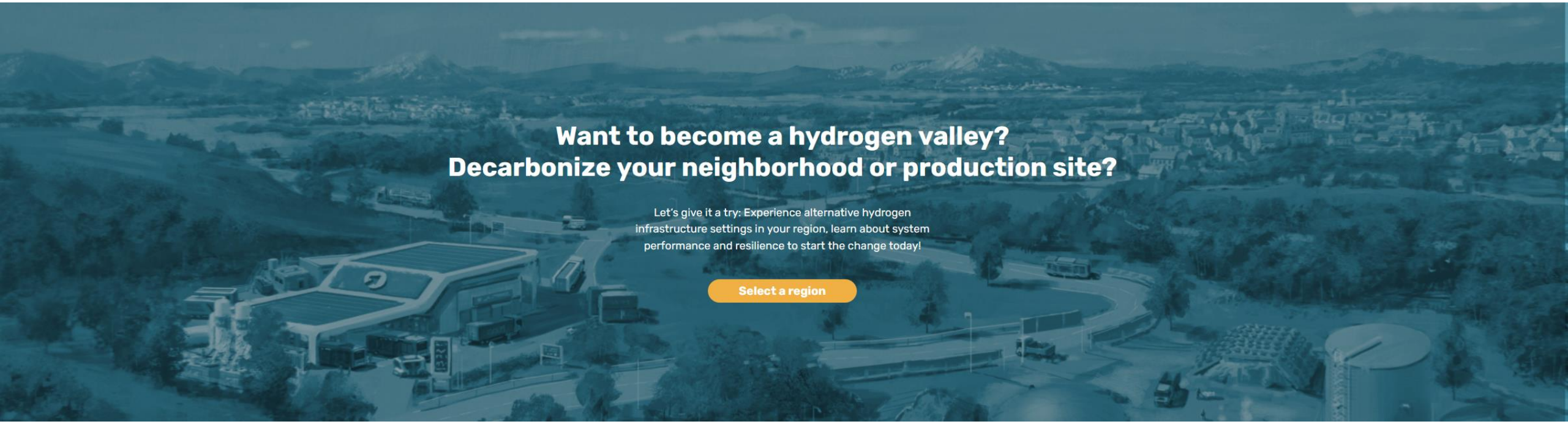


H2SCOUT FOR REGIONS

Berlin, 06.07.2023

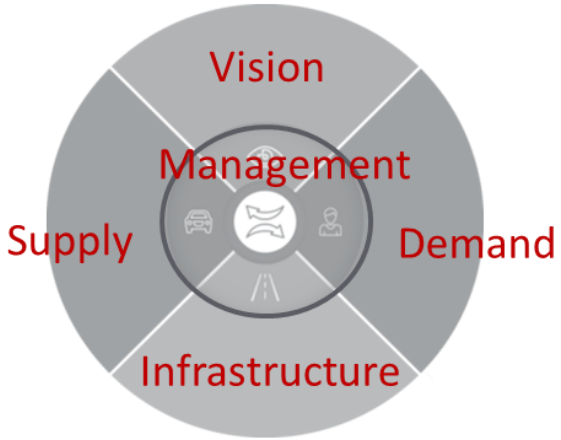
Andy Fuchs Toyota Mobility Foundation

TOYOTA MOBILITY FOUNDATION

To enable more people to go more places

by collaborating with Toyota worldwide, sharing know-how with external partners, and using our innovative spirit

Harmony in Mobility



Prerequisite

- Safe
- Sustainable
- Affordable
- Convenient & Reliable

Personal Mobility

- Accessible Vehicles (easy to ride)
- Transport Services
- Assistive Devices

What we do

- Social Implementation
- Open Innovation
- Research · Proposal Leading Practices & Technologies
- Networking with Partners (Non-profits, Research Institutes)

TOYOTA MOBILITY FOUNDATION

Key Focus Areas

Based on its mission, Toyota Mobility Foundation is working to solve various mobility issues around the world, such as traffic congestion and safety, maintaining local transportation options, assisting basic hydrogen research, supporting those with mobility difficulties, farming village assistance in Africa, and pursuing initiatives that bring fun and joy to mobility.

- Traffic Safety
- Measures to mitigate traffic congestion
- Support for people with mobility challenges
- Hydrogen/Energy
- Mobility support for local communities
- Contests/Open calls

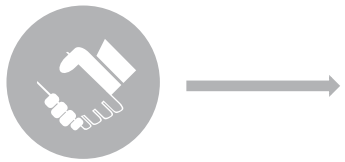
SUSTAINABLE CITIES CHALLENGE

sustainablecitieschallenge.org

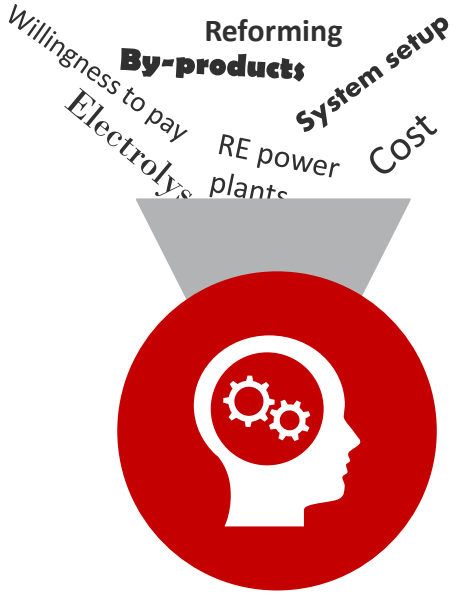
CONTENT

WHY A SCENARIO CALCULATOR?

INITIAL SITUATION AND AIMS OF THE PROJECT



Decision to have hydrogen play a role in the regional energy transition



- How is the setup of the system that we need to implement?

=> security of supply, regional eneryg ressources, regional energy demand, political context

- What if system framework changes?

=> during the lifetimeof the installed technology system (20 years)

- How to influence economic viability?

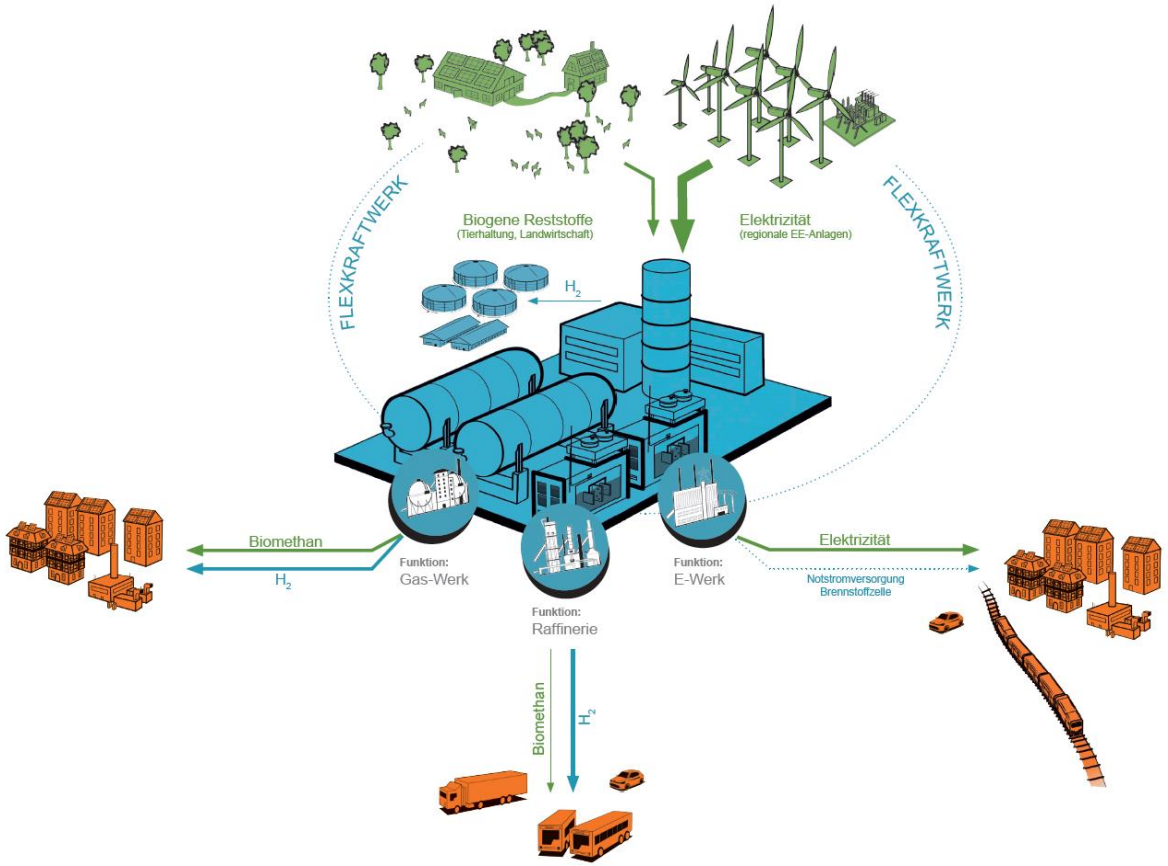
=> Parameters‘ target values to reach break-even / a defined profit

DECISION SUPPORT UNDERSTANDING OF SYSTEM SETUP AND PERFORMANCE

SUPPORT OF COMMUNICATION PROCESSES TRANSPARENCY

WHY A SCENARIO CALCULATOR?

A SHIFT OF PERSPECTIVE



(1) Focus on **security of energy supply** instead of disposal of electricity into the grid in times of high elecricity production times (resulting in price dumping at the stock exchange)

(2) Use and **combine all regional ressources** to produce hydrogen (circular economy)

(3) No focus on hydrogen production only, integration of **by-product revenues** to increase viability

WHY A SCENARIO CALCULATOR?

SUPPORTING PEOPLE AND DISCUSSIONS

New stakeholders → **with regional competences:** → **empowerment** → **and motivation**

- Renewable energies and hydrogen technologies enable regions to become players in the energy market
- Access to land, networks and local customers, influence to regional (political) decision making
- Need to make decisions under uncertainty and hedge investment and operational risks
- Being responsible for ensuring acceptance of the energy system transformation and accelerating processes

SZENARIO CALCULATOR

Technical feasibility | Energy efficiency | Economic viability

Time

- **Time to restructure** infrastructures and market models of energy production, distribution / storage and use
- **Time for learnings** (missing blueprints)

Resilience

- **Security of energy supply:** Resilience of energy supply systems to failures, sabotage, fluctuations in supply and demand
- **Cost stability:** Resilience towards developments in resource policy or economic policy

Motivation

- **Motivation of investors** to leave established paths and to forego short-term returns (business models)
- **Motivation of energy consumers** to change their behaviour and to engage in "new" pricing models (acceptance)
- **Motivation of politicians** to set regulatory framework conditions and secure political support

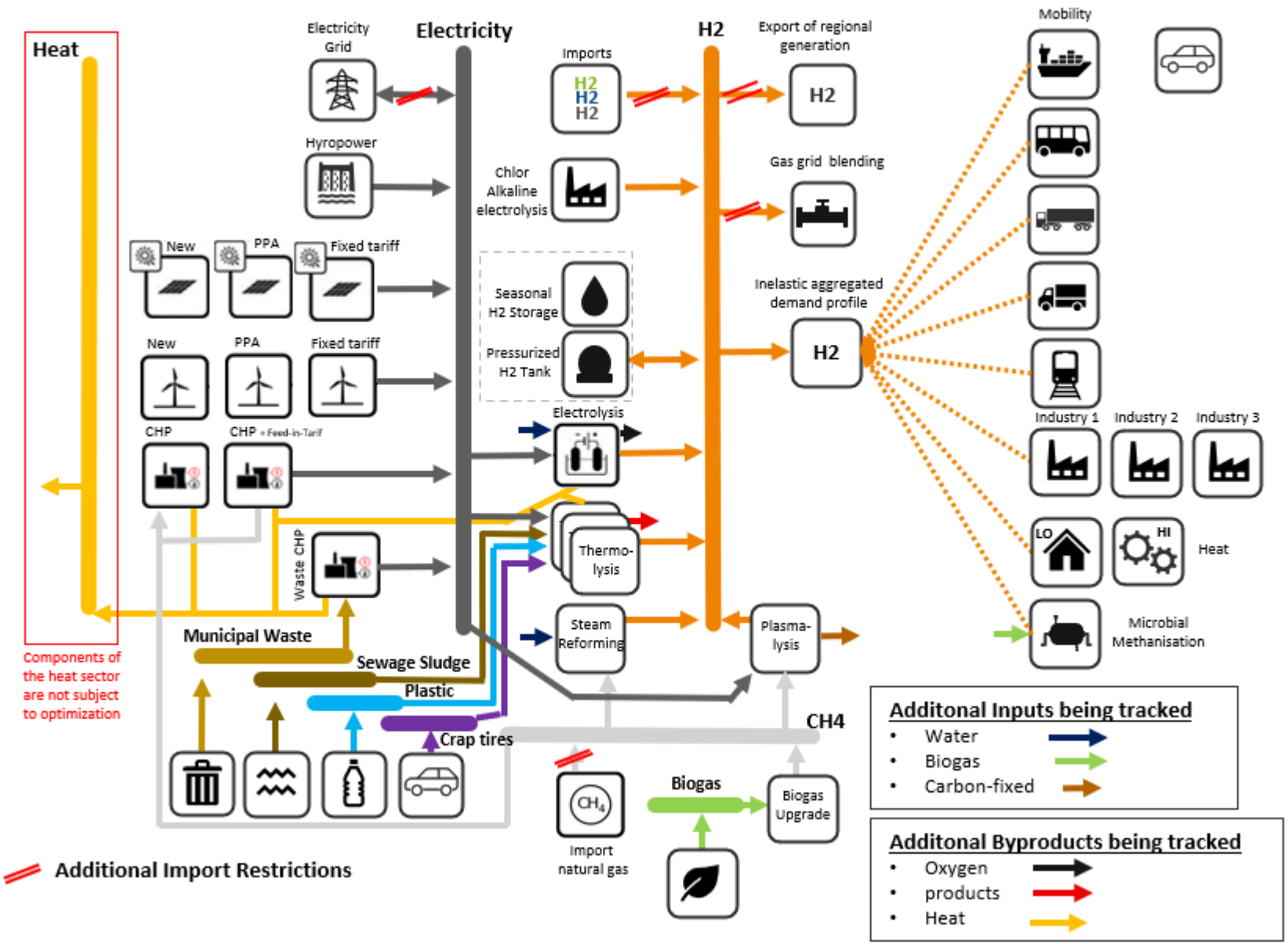
✓ Identification of a **cost-optimized target system for Flexkraftwerke** that guarantees regional supply security if the set targets and framework conditions are met

✓ Understanding of **system resilience and risks** of changing conditions

✓ Understanding and communication of **options for action and scope for design**

CONTENT

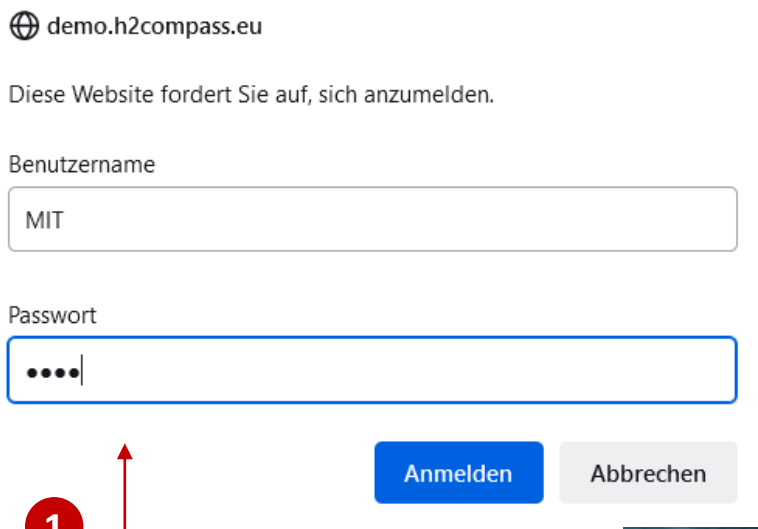
Energy system model

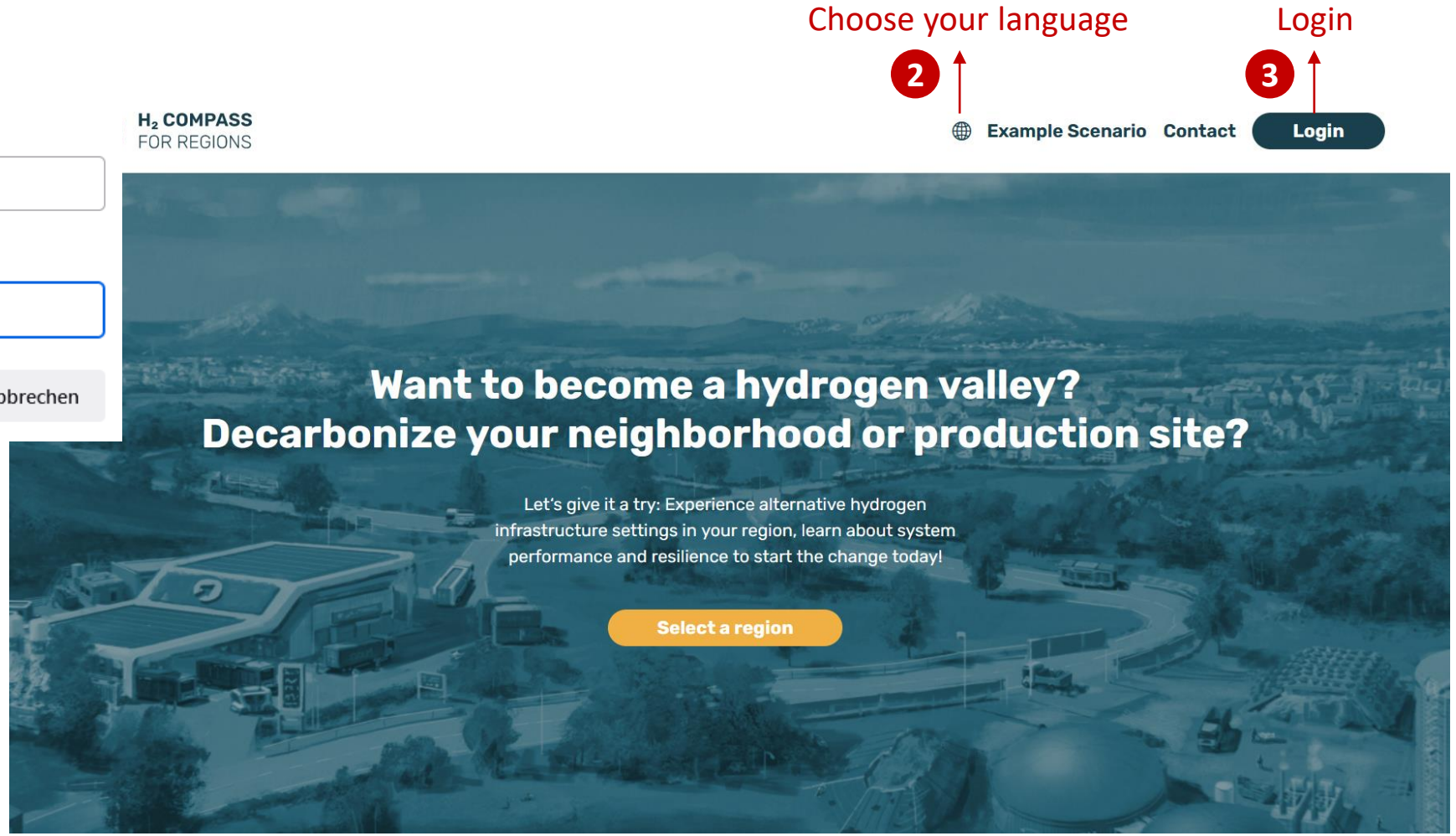


CONTENT

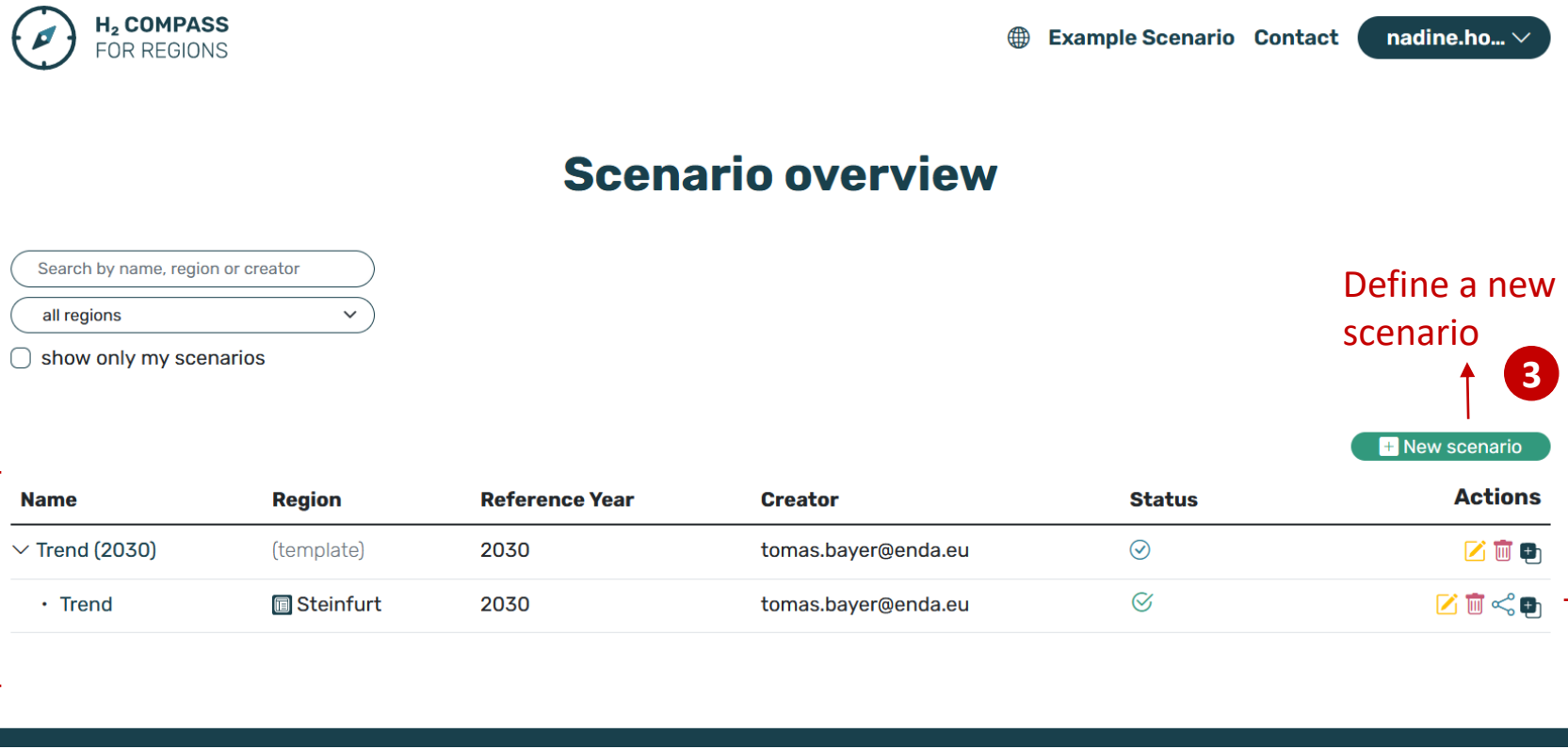
FIRST STEPS - LOGIN

HTTPS://DEMO.H2COMPASS.EU/





FIRST STEPS – ACCESS OR DEFINE NEW SCENARIOS



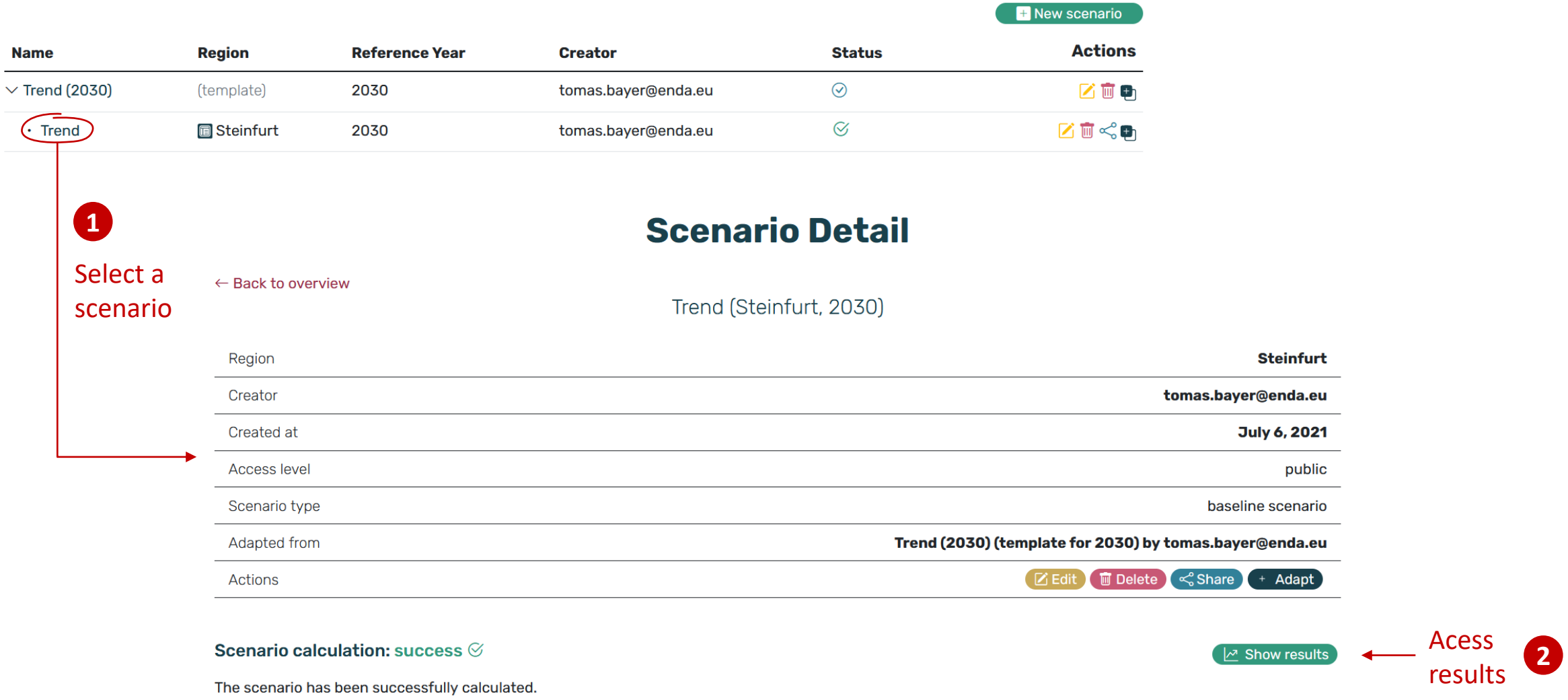
Filter available regions (optional) 2

All scenarios you are allowed to access (public, shared, own) 1

Define a new scenario 3

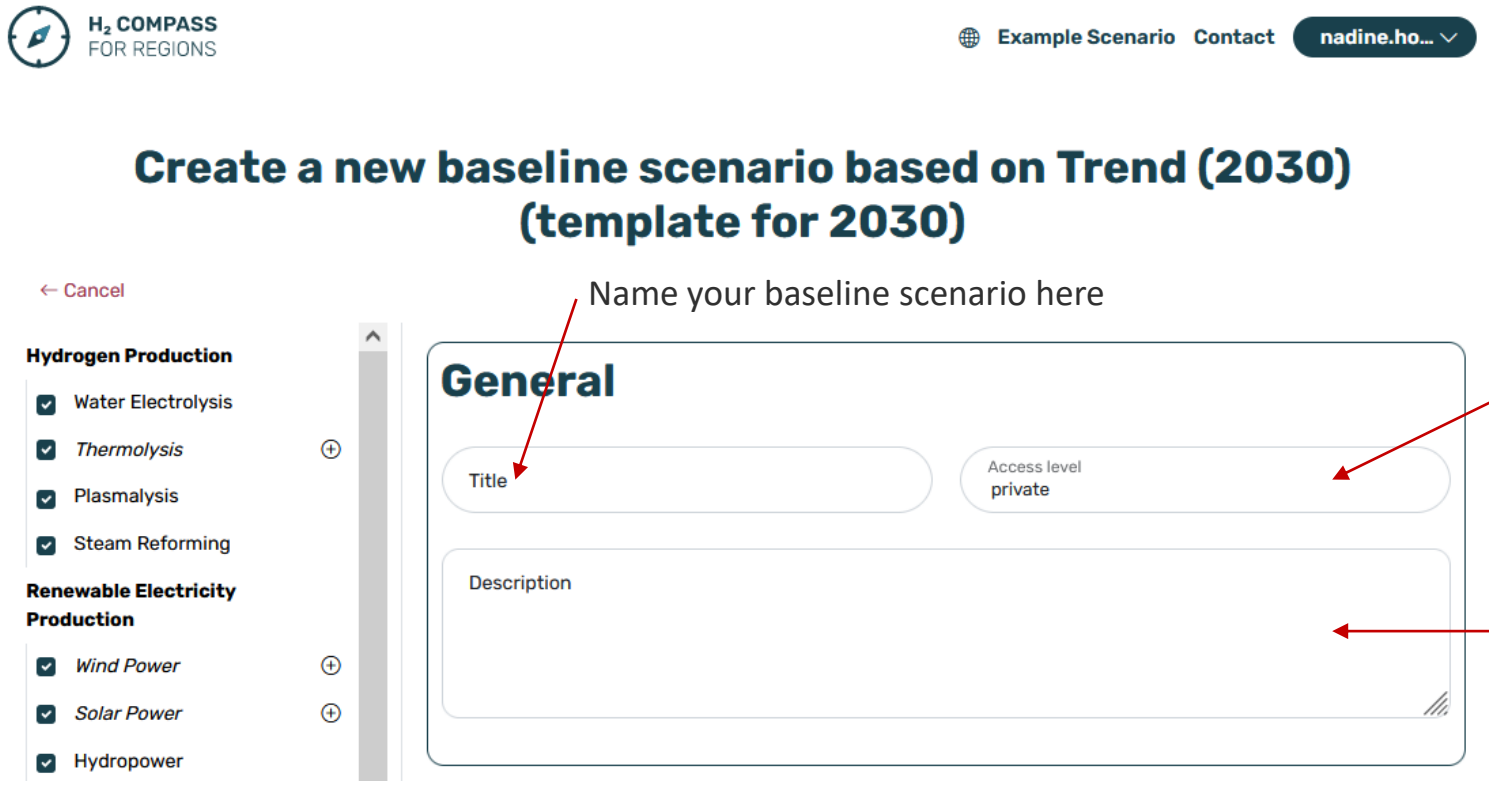
Adapt an existing scenario 4

FIRST STEPS - ACCESS RESULTS OF AN EXISTING SCENARIO



DEFINE A NEW BASELINE SCENARIO

PLEASE USE THE „MIT DEMO REGION“ TO DEFINE A NEW BASELINE SCENARIO



All available technologies and ressources are activated as default. Please check and deactivate if not available in your region

Name your baseline scenario here

Choose the right access level

Describe the main characteristics of your scenario

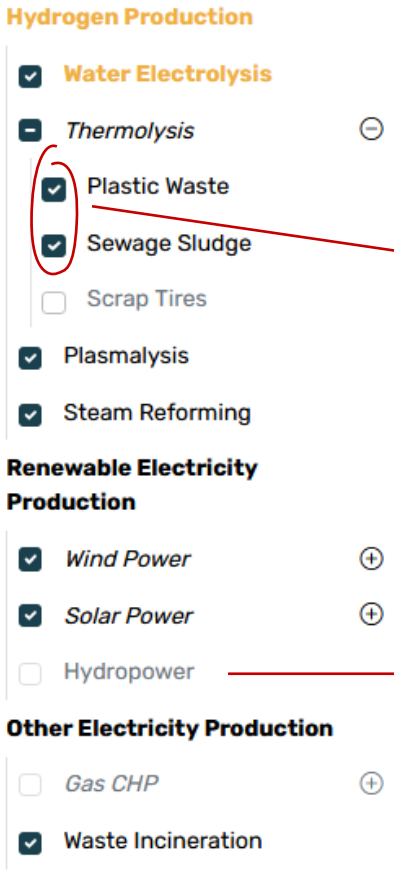
+ define max. capacities /potential per technology and ressources
+ upload time series[1]

(1) if you want to se an example for time series data, please see the Steinfurt baseline scenario

CUSTOMIZE A SCENARIO

VARIATION OF A REGIONAL BASELINE SCENARIO

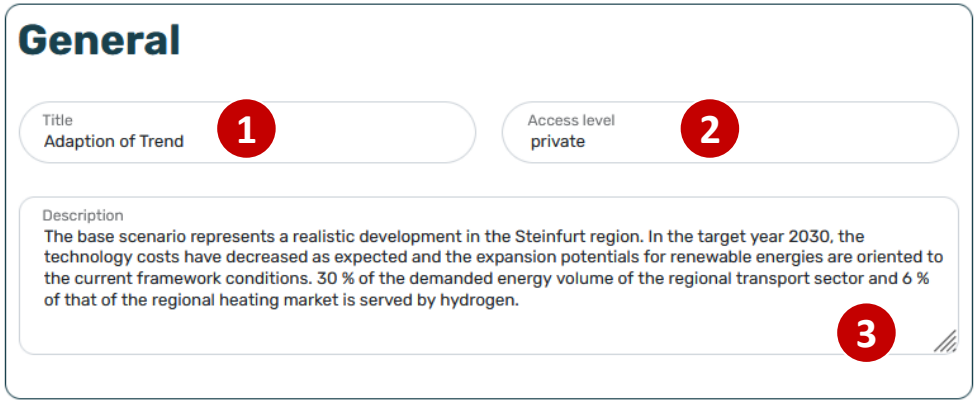
Step 1: Change of available technologies and ressources



Deactivate technologies and / or ressources by click

Grayed out fonts indicate that this option is not available for the region (needs to be changed in the underlying baseline scenario)

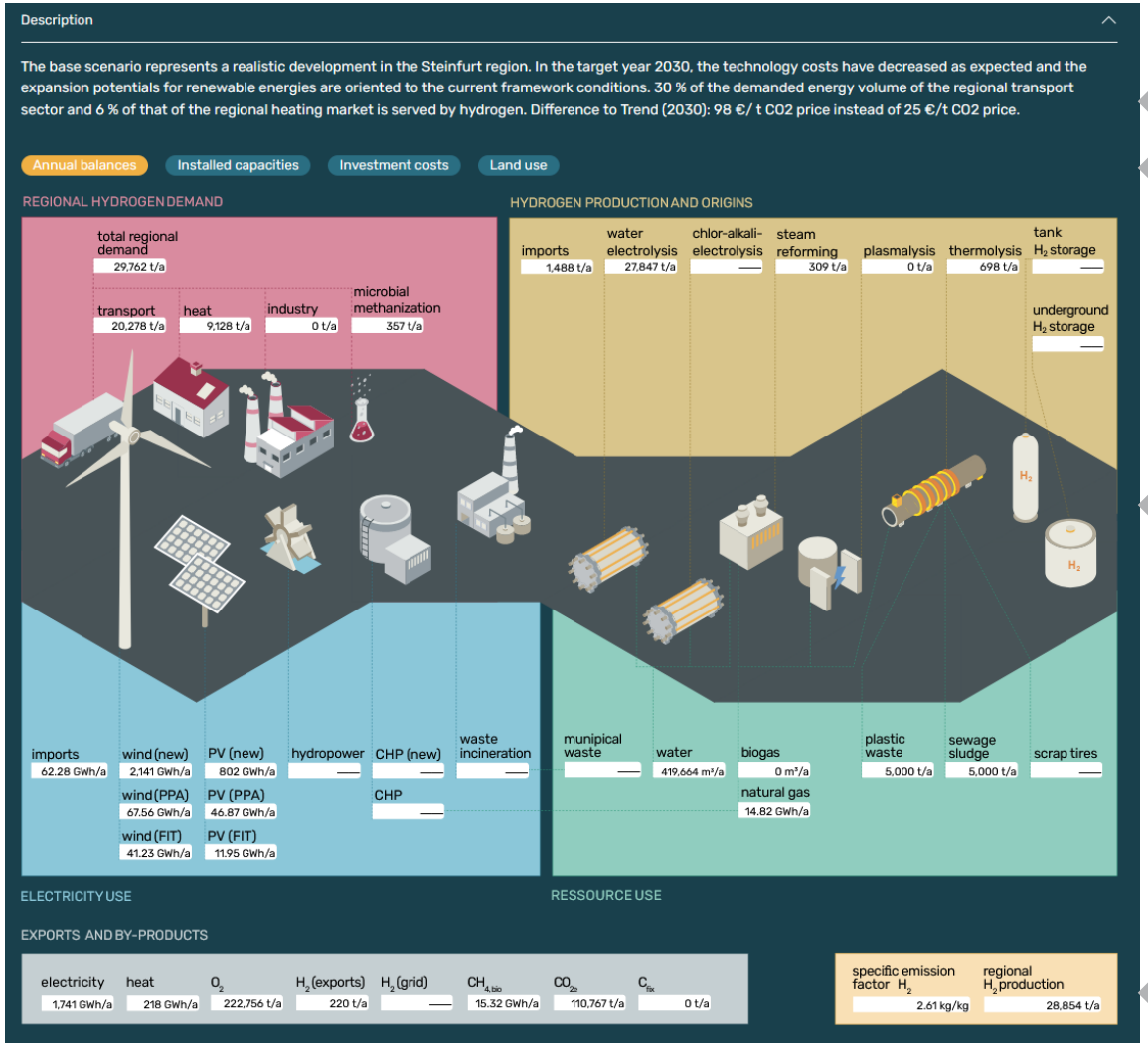
Step 2: Adapt name, access, description and parameters



- Limit plant capacities, energy ex- and imports
- Define role for hydrogen
- Adapt willigness to pay (positive values indicate higher WTP)
- Define carbon price
- Define external cost of CO2 and NOx

CONTENT

RESULT LEVEL 1: COST-OPTIMIZED INFRASTRUCTURE SETUP



Description of the scenario

Menue to switch between balances, capacities, cost and land use

Cost-optimized infrastructure setup (categories)

Exports and by-products

Possibility to switch units to ease understanding of some parameters

RESULT LEVEL 2: INFRASTRUCTURE SYSTEM PERFORMANCE

OVERVIEW OF KEY PERFORMANCE INDICATORS ATTACHED TO THE INFRATSRUCTURE SETUP AND THE DEFINED CONTEXT

System key figures: KPIs

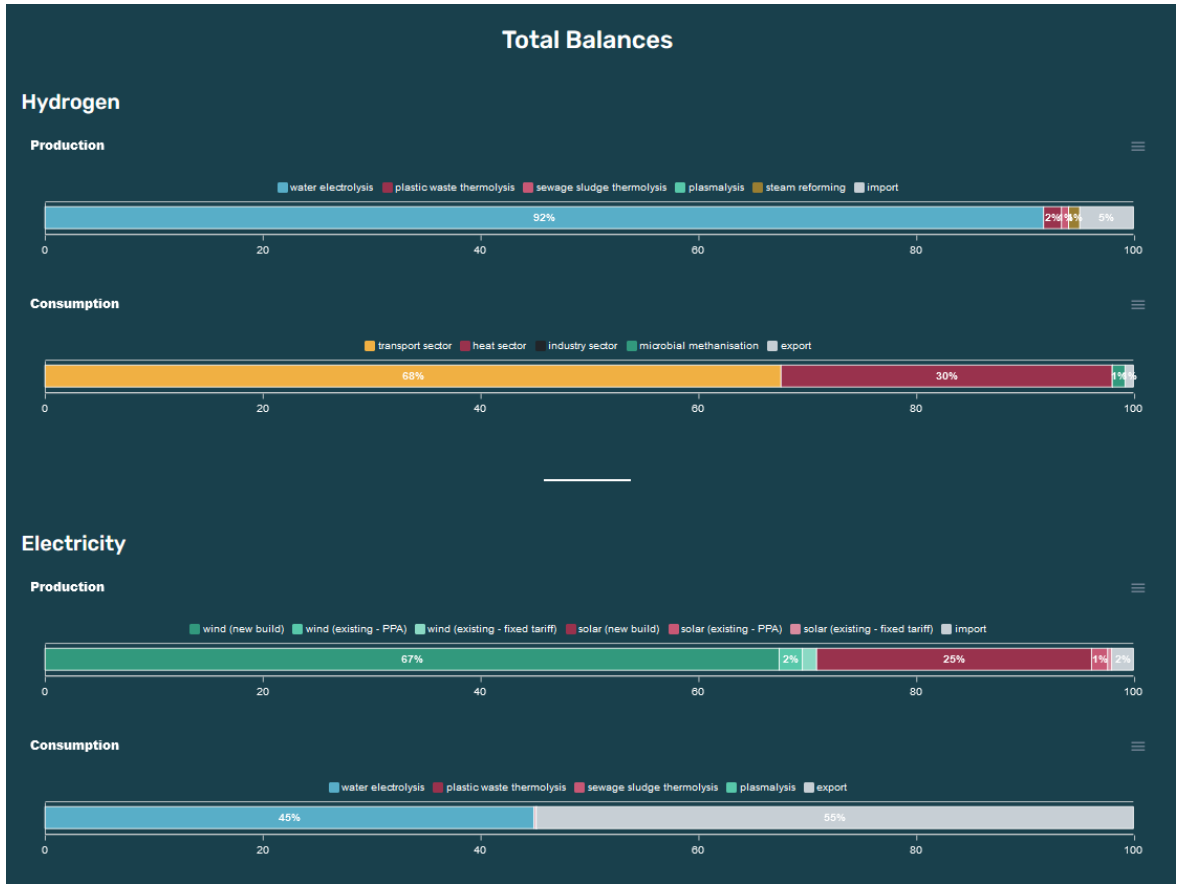
28,473 t/a hydrogen demand	**2.13** €/kg hydrogen supply costs	**187,701,066** €/a earnings before taxes	**338,171** t/a avoided CO_2 emissions	**72,989,313** €/a avoided external costs
89.2 % degree of self-sufficiency	**8.58** €/kg willingness to pay for hydrogen	**18.8** % return on investment	**-428.84** €/t CO_2 abatement costs	**234,831,066** €/a direct regional added value

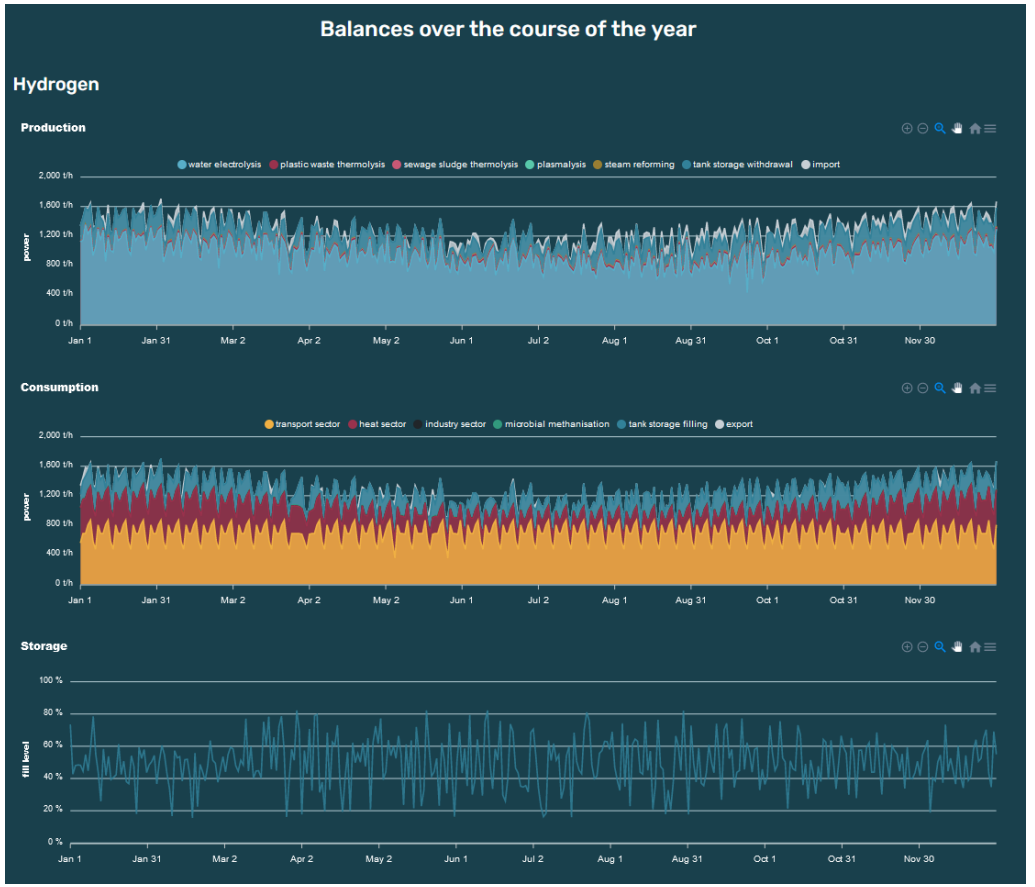
Set of 10 key performance indicators (overview)

Access to detailed results

RESULT LEVEL 2: INFRASTRUCTURE SYSTEM PERFORMANCE

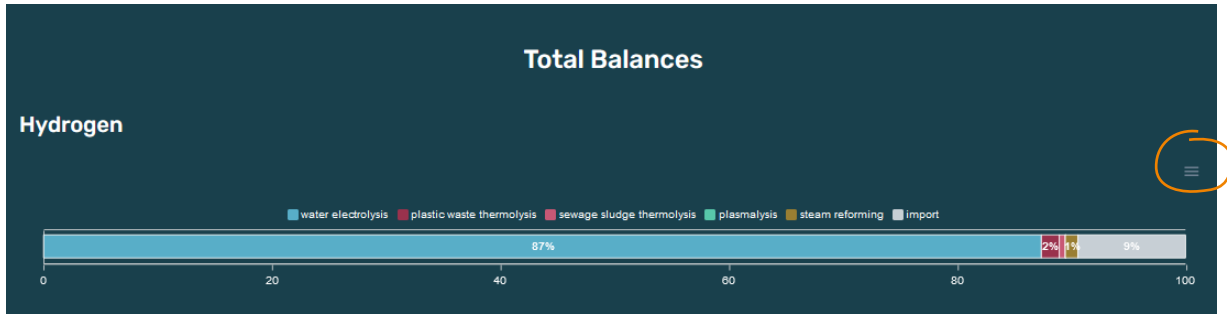
DETAILED INFORMATION ON ENERGY AND MASS BALANCES

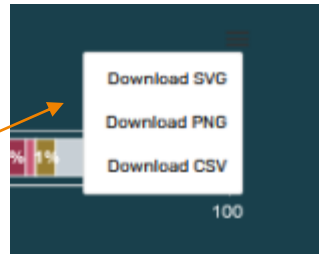




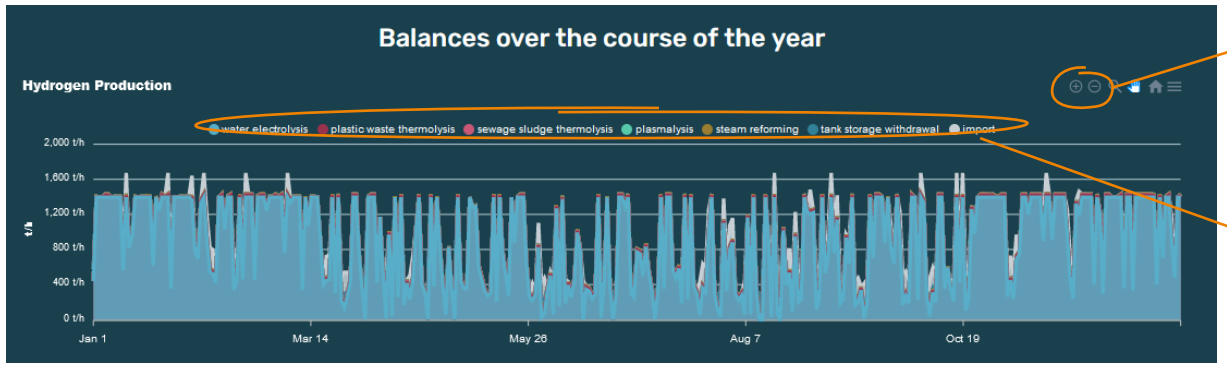
RESULT LEVEL 2: FEATURES FOR FURTHER ANALYSES

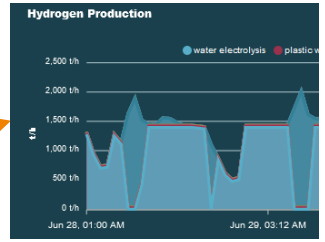
APPLIES TO ALL DETAILED ANALYSES



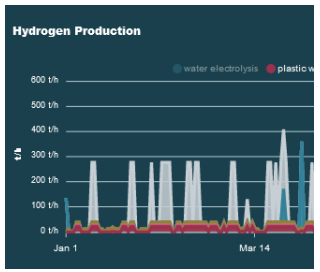


Possibility to download results





Possibility to change time period



Possibility to activate / deactivate technologies

ADDITIONAL OFFER – IF INTERESTED?

Technical workshop with live demonstration:

Date: Wednesday, 26th of July
Time: 13:00 – 15:00 CET

Please reply by mail to:
andy.fuchs@toyota-europe.com
to get dial in details.

THANK YOU FOR YOUR ATTENTION!