



100% Renewable Energy for Austria's Industry



Alternative Energy Sources and Infrastructure Requirements

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100% Renewable Energy

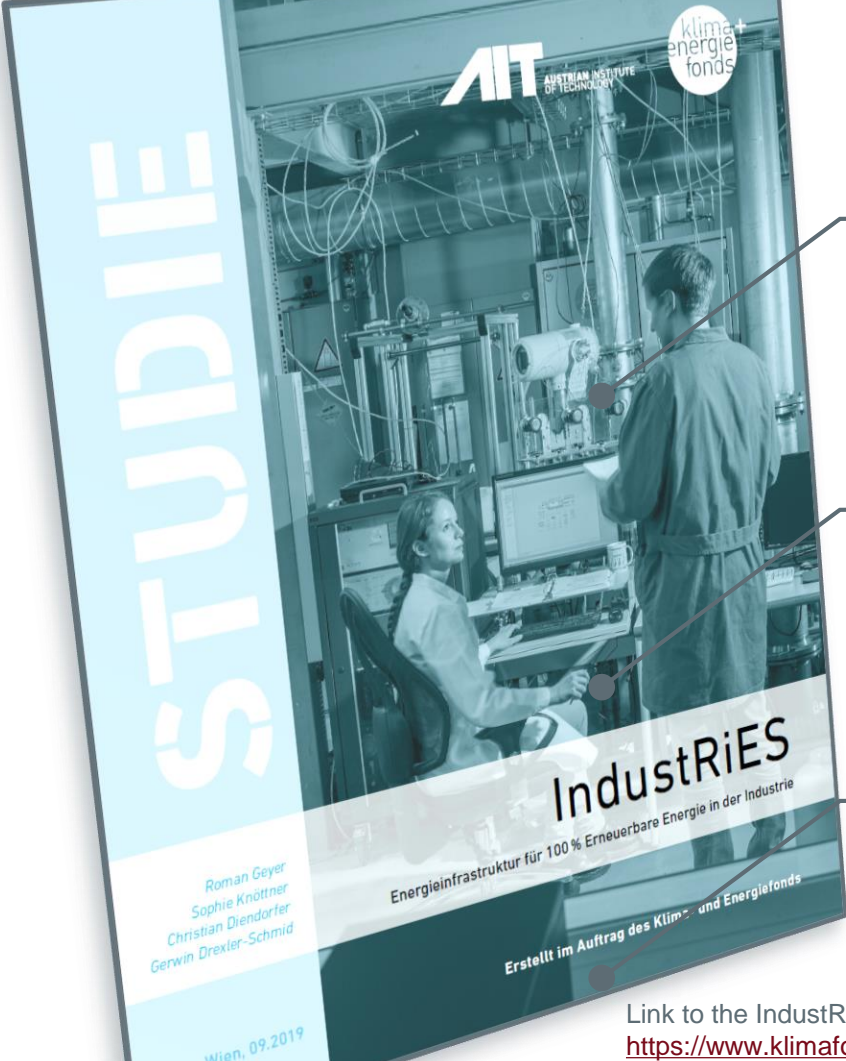
Is a sustainable supply of the Industry possible?



Situation & Potentials

Scenarios

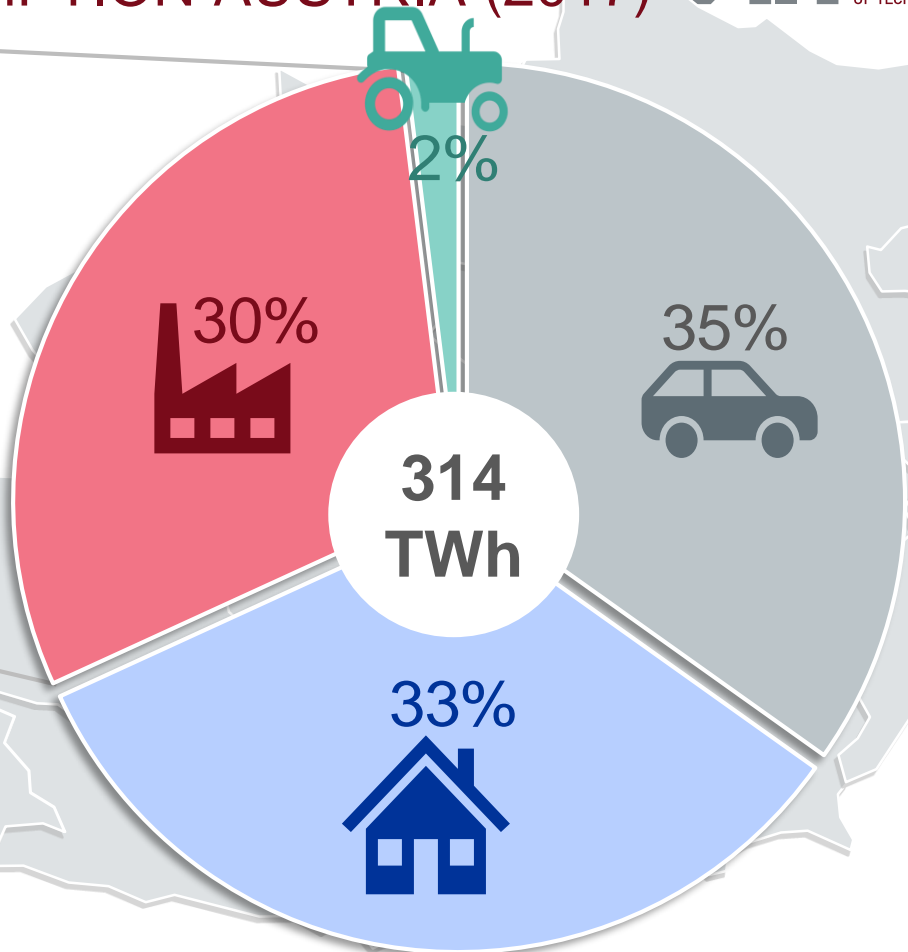
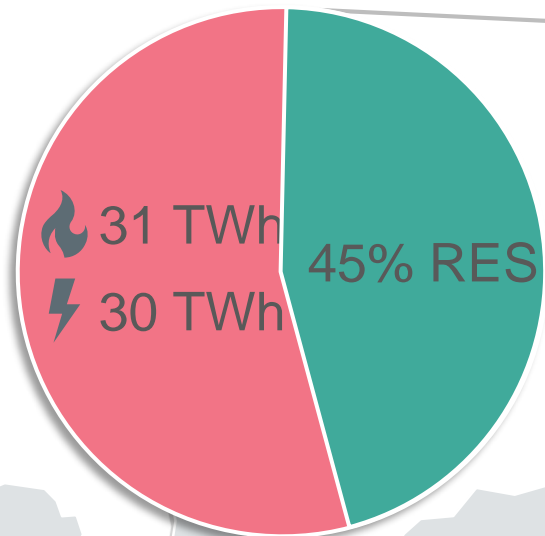
Energy infrastructure requirements



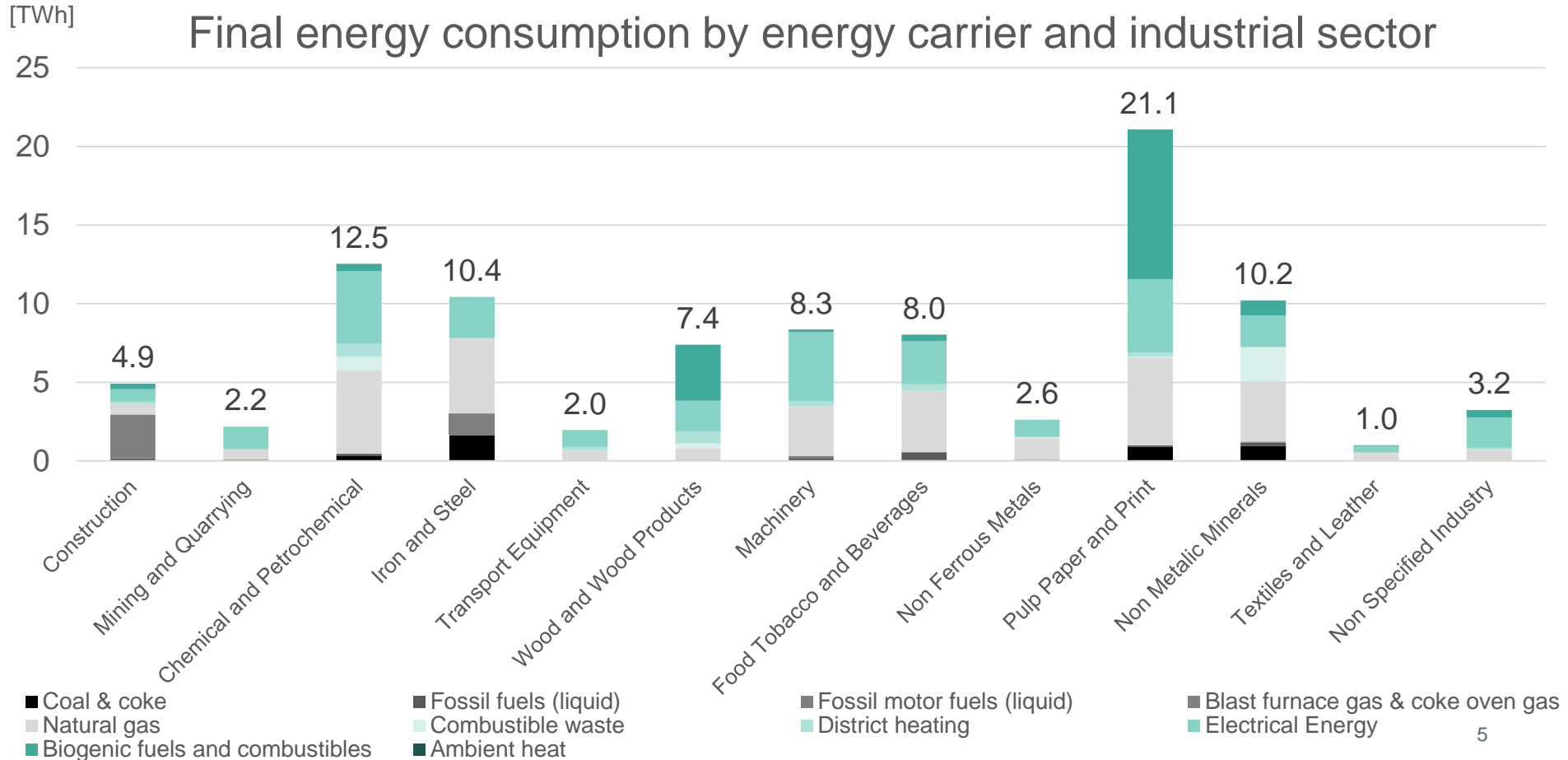
Link to the IndustRiES-Study (German):

https://www.klimafonds.gv.at/wp-content/uploads/sites/6/Studie_IndustRiES-2019_neu-1.pdf

FINAL ENERGY CONSUMPTION AUSTRIA (2017)



Final energy consumption by energy carrier and industrial sector



SCENARIOS

Fuel switch to renewables

Base

Low temperature by heat pumps

Conversion of fossil stationary engines to electrical energy

Coal & coke and blast furnace gas & coke oven gas remain process-related

Starting point: Base scenario

Efficiency

Steam generation & industrial furnaces (especially drying) by heat pumps

Process efficiency at industry level

Coal & coke and blast furnace gas & coke oven gas remain process-related

Starting point: Efficiency scenario

Transition

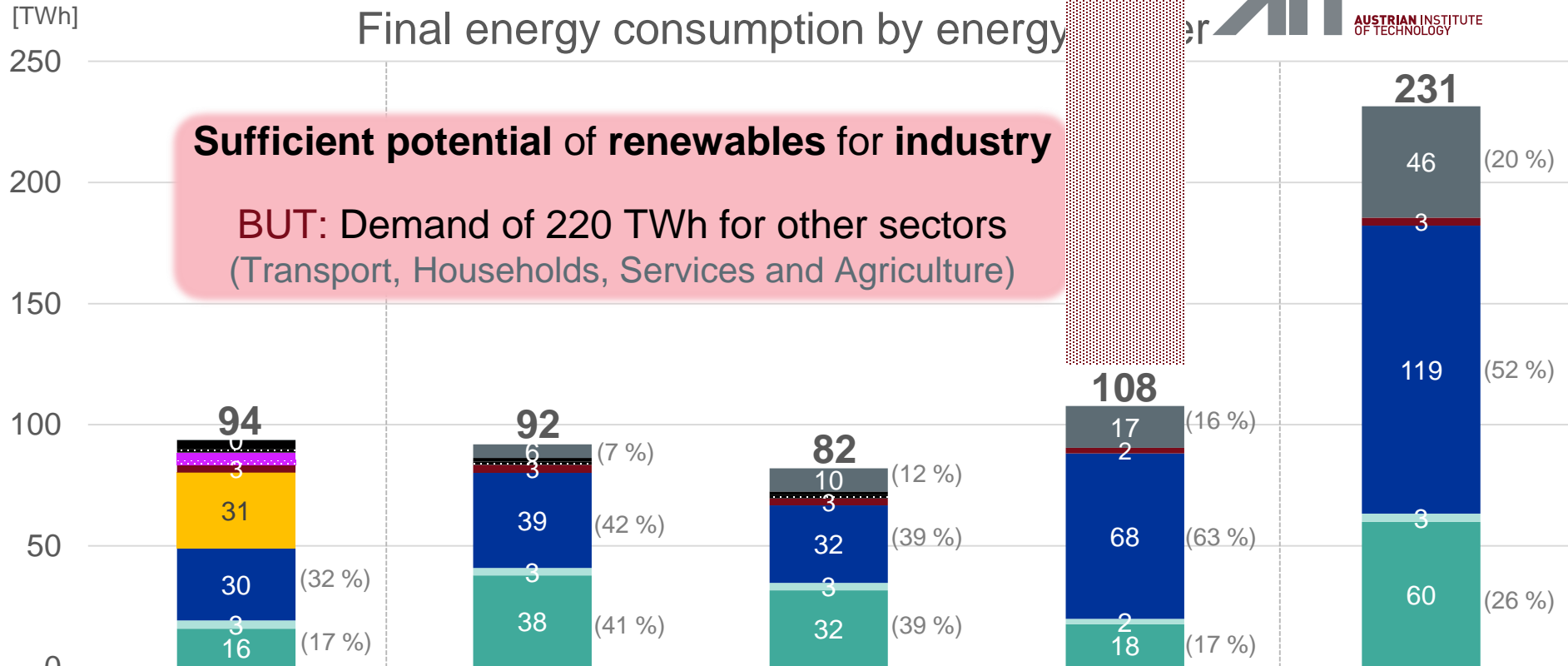
Higher penetration of heat pumps

Biogenic and combustible waste mainly for high temperature applications

Iron and steel production: Direct reduction with hydrogen

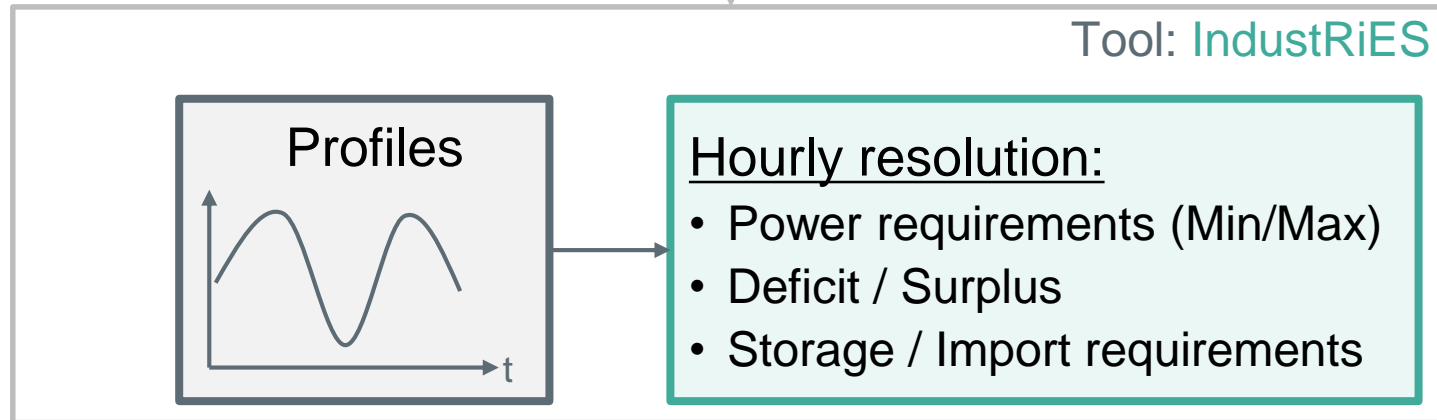
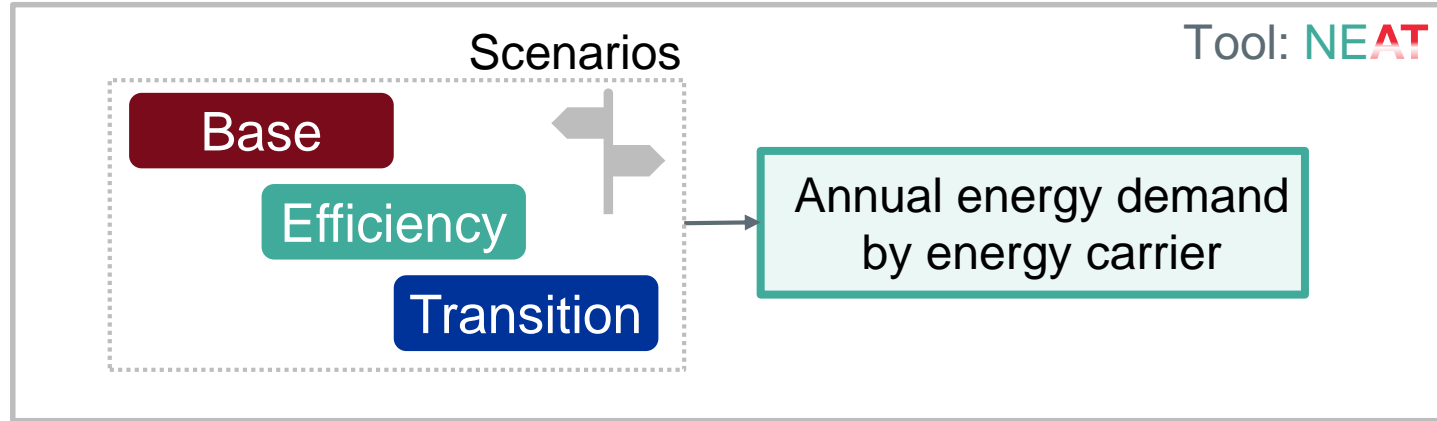
Final energy consumption by energy

Sufficient potential of renewables for industry
BUT: Demand of 220 TWh for other sectors
 (Transport, Households, Services and Agriculture)

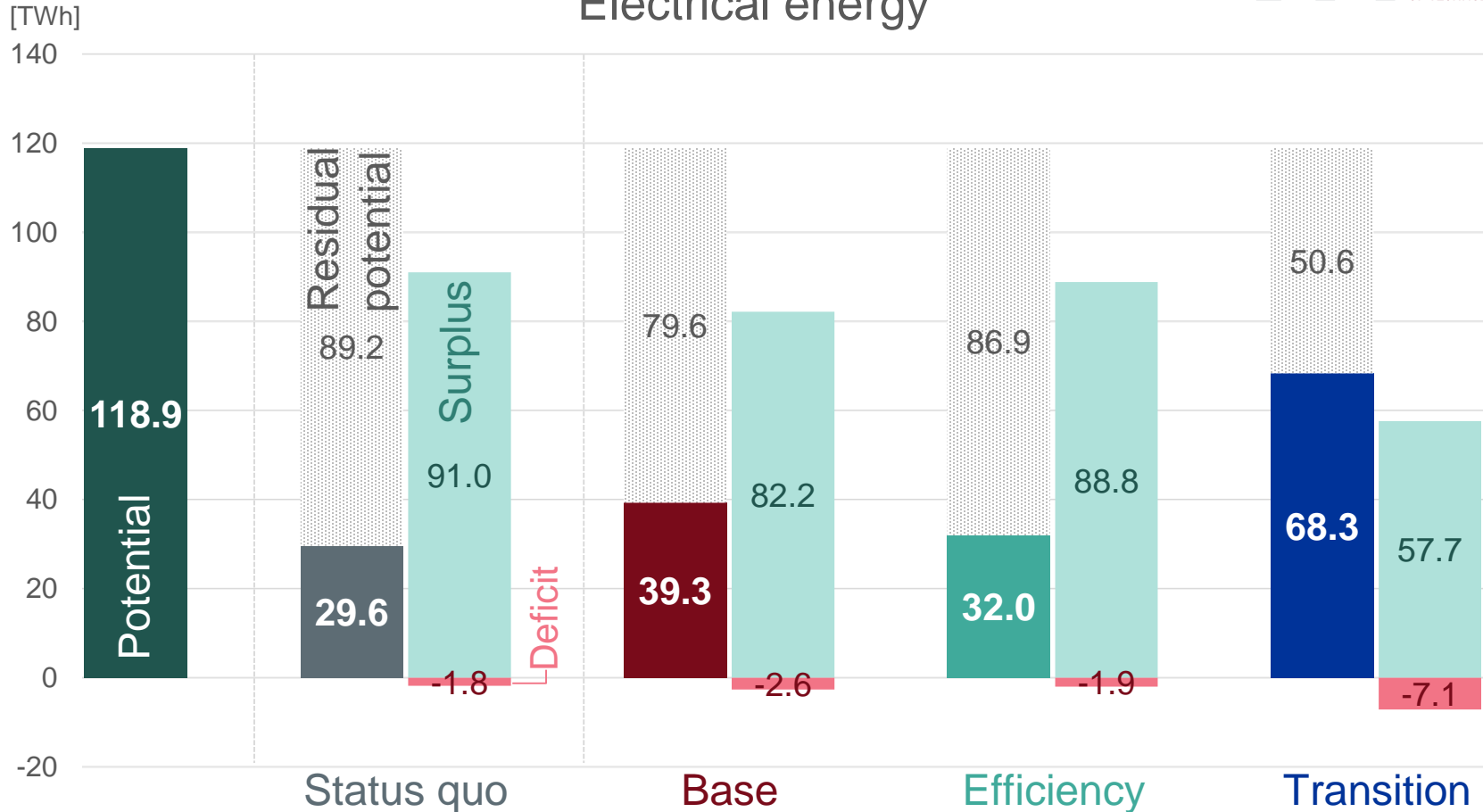


- Biogenic fuels and combustibles
- Combustible waste
- Electrical Energy
- Natural gas
- District heating
- Fossil fuels (liquid)
- Fossil motor fuels (liquid)
- Blast furnace gas & coke oven gas
- Coal & coke
- Ambient heat

ENERGY INFRASTRUCTURE REQUIREMENTS THROUGH HOURLY ANALYSES

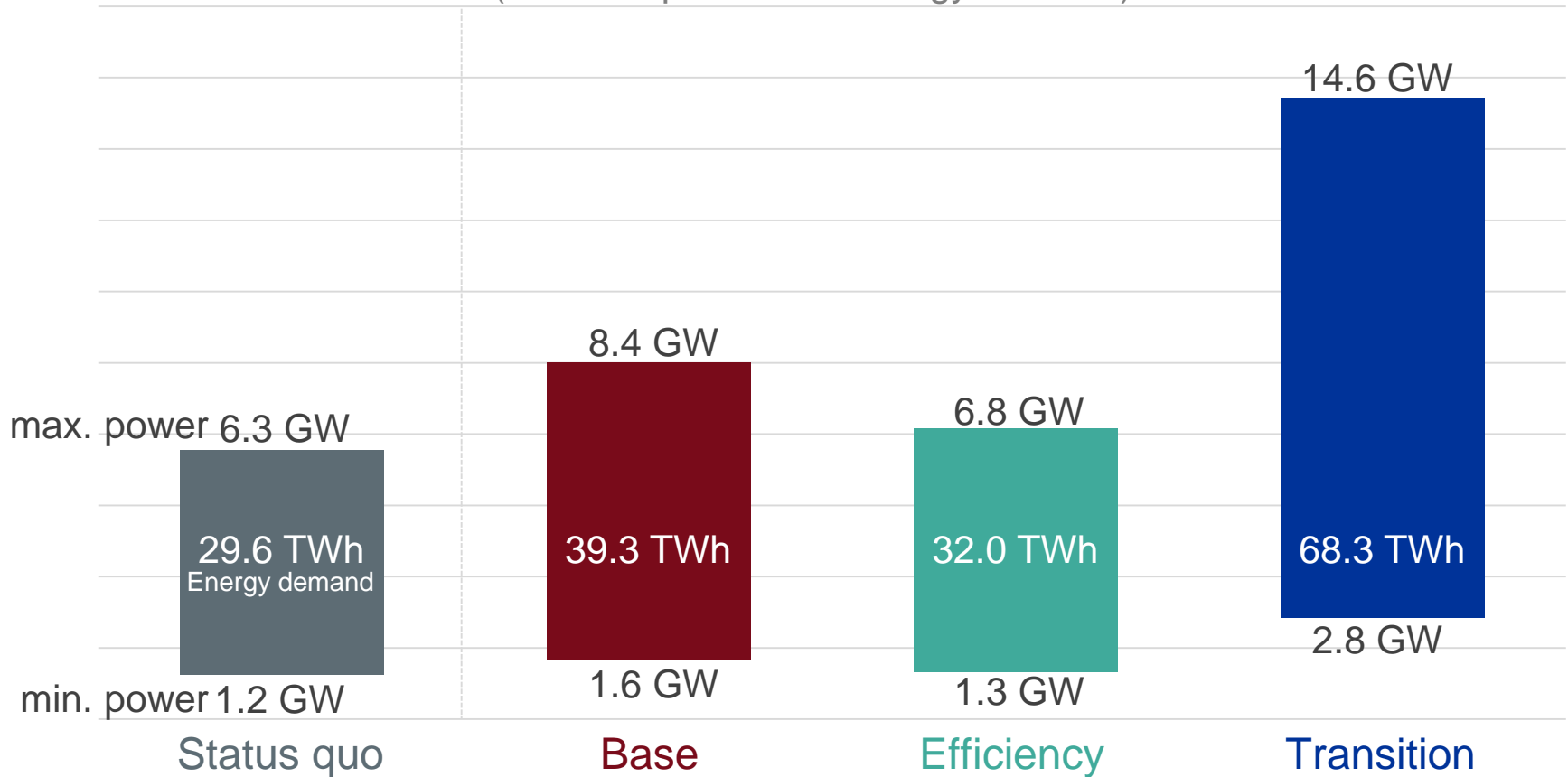


Electrical energy

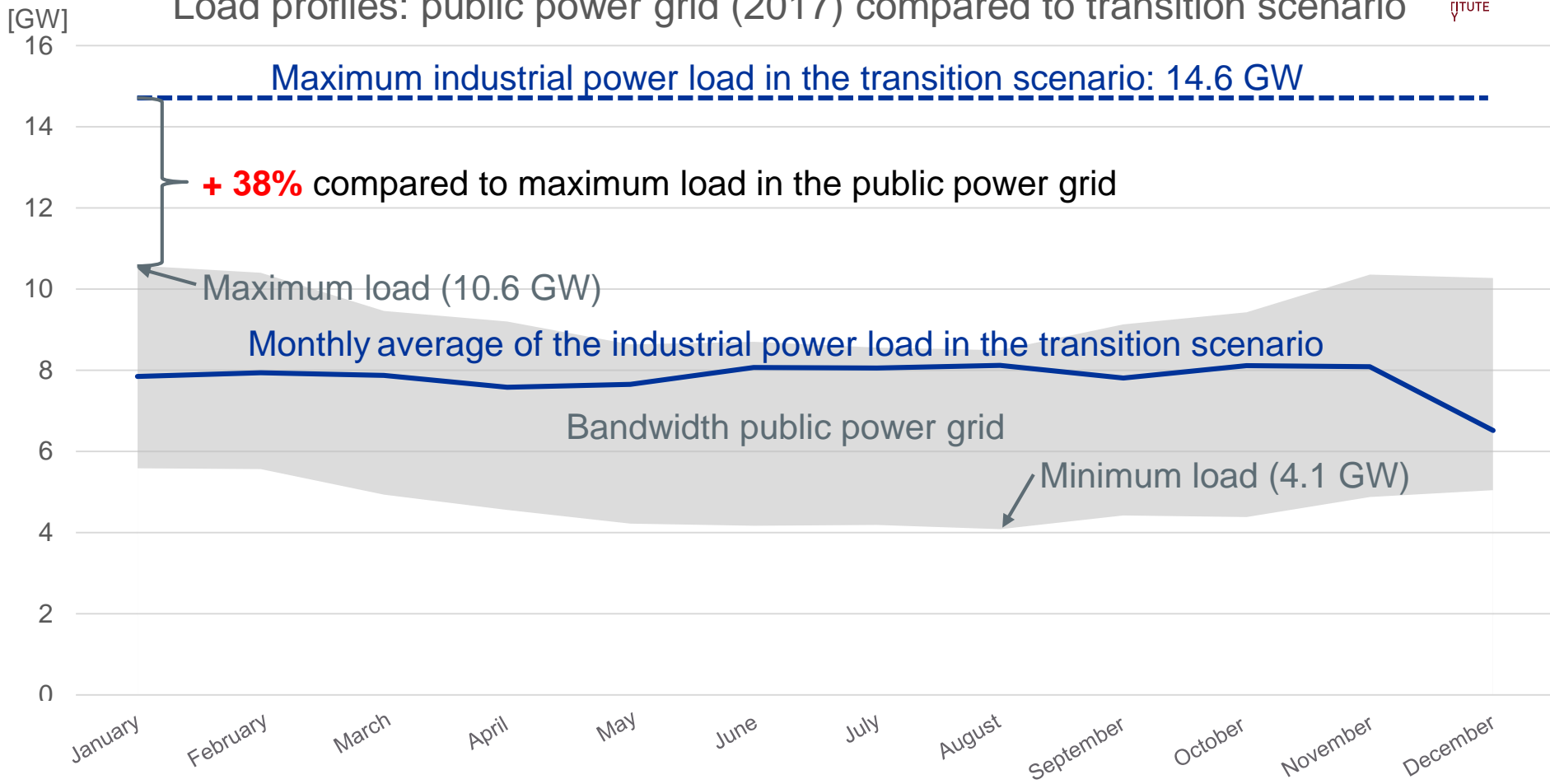


Electrical energy

(min/max power and energy demand)



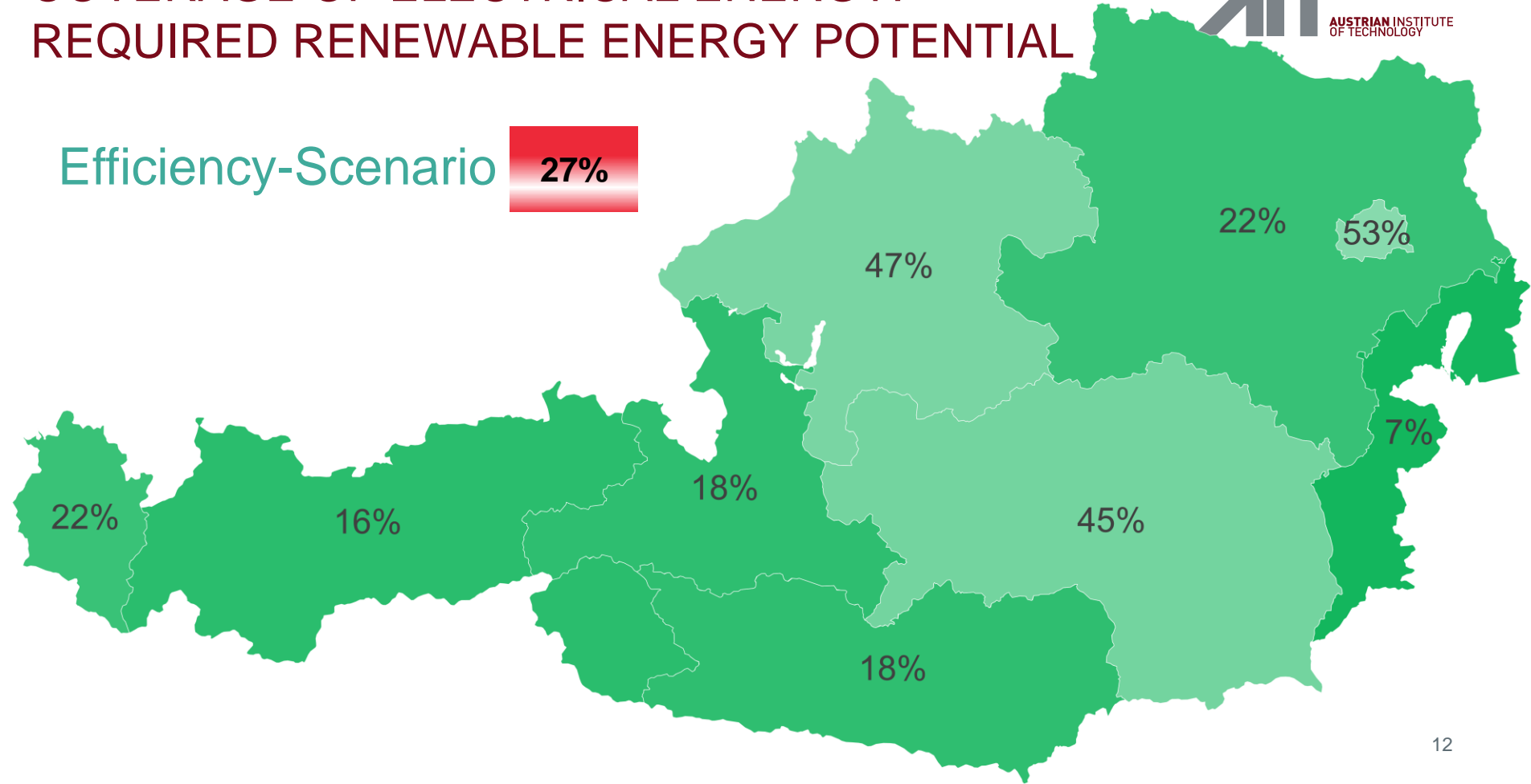
Load profiles: public power grid (2017) compared to transition scenario



COVERAGE OF ELECTRICAL ENERGY: REQUIRED RENEWABLE ENERGY POTENTIAL

Efficiency-Scenario

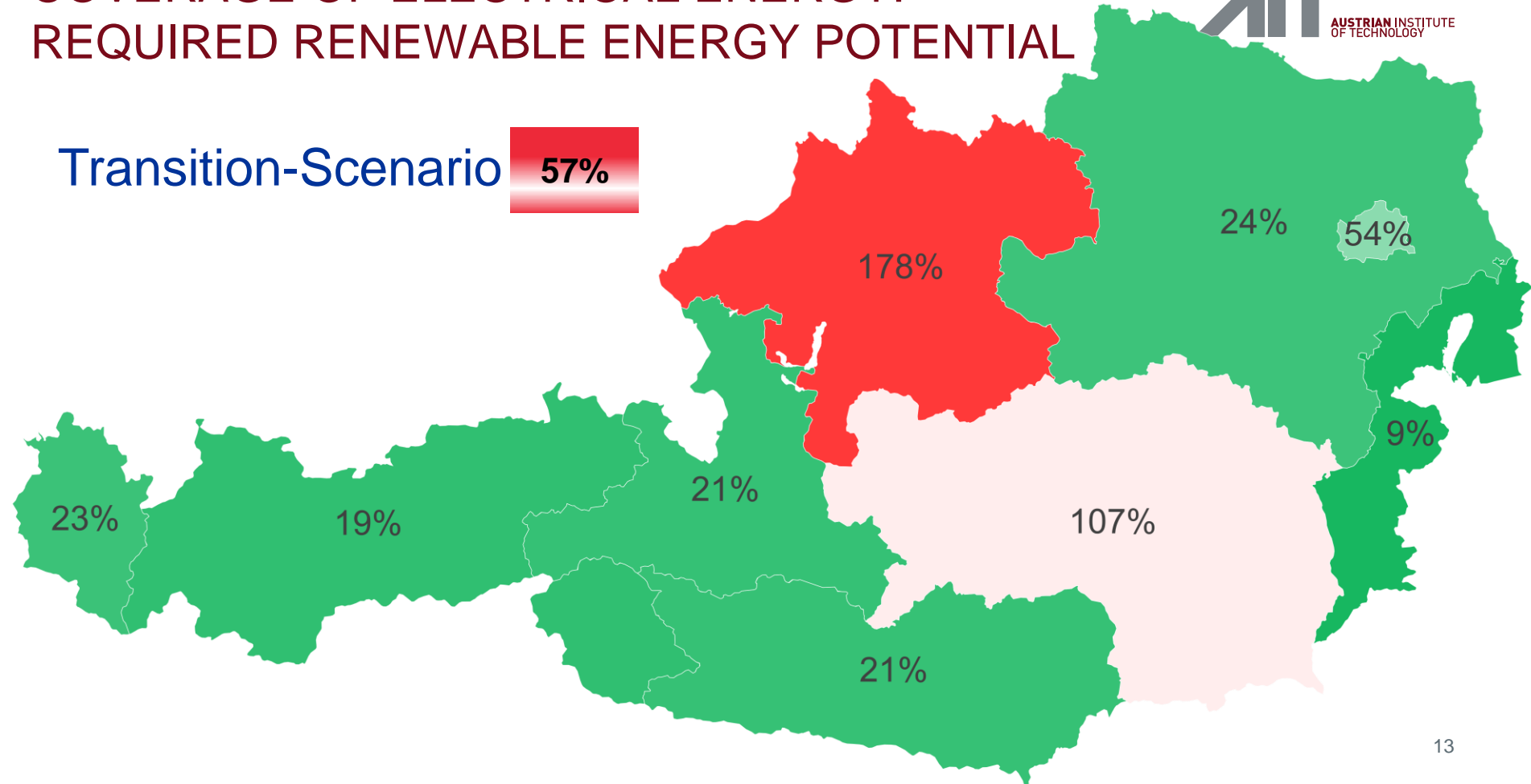
27%



COVERAGE OF ELECTRICAL ENERGY: REQUIRED RENEWABLE ENERGY POTENTIAL

Transition-Scenario

57%



Transition-Scenario

Available renewable potentials not sufficient!

178%

24%

54%

9%

21%

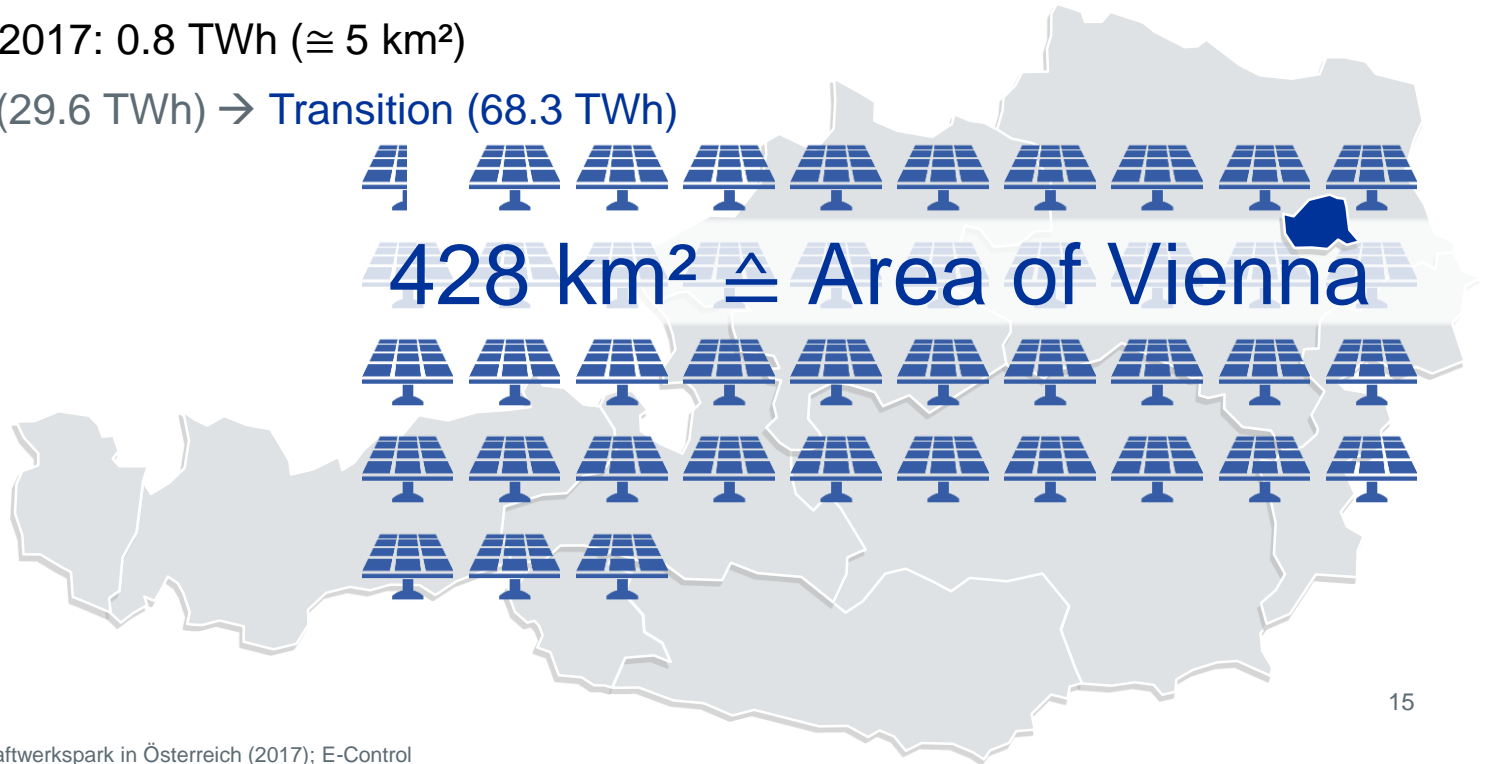
107%

21%

REQUIRED PV-POTENTIAL TO COVER THE INDUSTRIAL ELECTRICAL ENERGY DEMAND

Photovoltaic

- Generation 2017: 0.8 TWh ($\cong 5 \text{ km}^2$)
- Status quo (29.6 TWh) \rightarrow Transition (68.3 TWh)



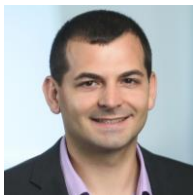
SUMMARY

- Renewable potentials in AT could cover industrial demand (2017); if **all sectors** are considered, the **gap** is **71 - 97 TWh** (depending on the scenario)
- **Deficit of electrical energy coverage** approx. **2 - 7 TWh** → import/storage requirements
- Transition-Scenario: maximum power load in industry **38% higher** than the **maximum load** in the **public power grid** in 2017

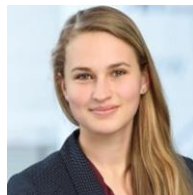
Outlook (further and deeper analysis):  **NEFI**
NEW ENERGY FOR INDUSTRY

- Results of the IndustRiES study builds a robust basis for the NEFI_Lab, where development paths for different decarbonization levels until 2050 will be shown
- This paths will indicate, which sector has to implement which kind of technology in which timeframe to reach a certain decarbonization level

THANK YOU!



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