How does the big picture in the energy sector look like for Austria?

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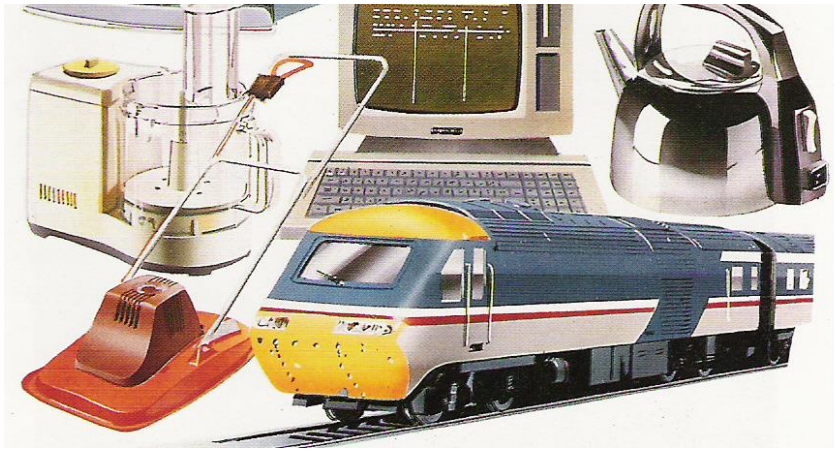
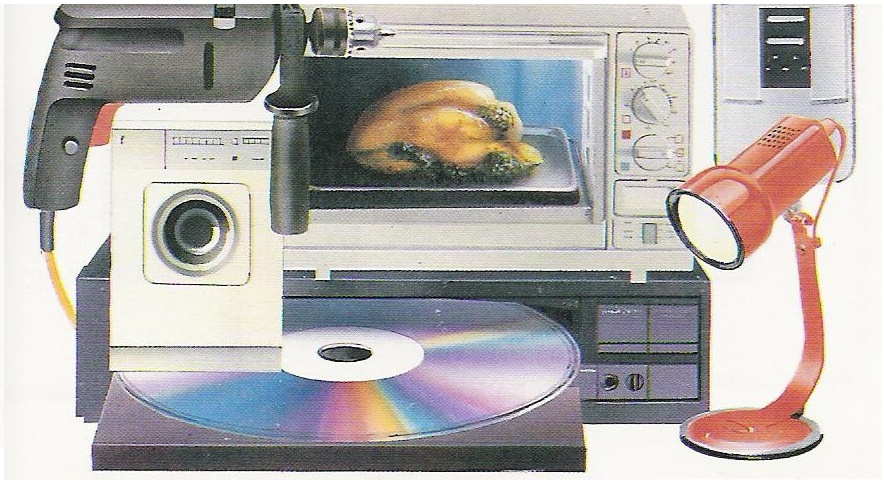
1. INTRODUCTION / MOTIVATION

Why are we here today?

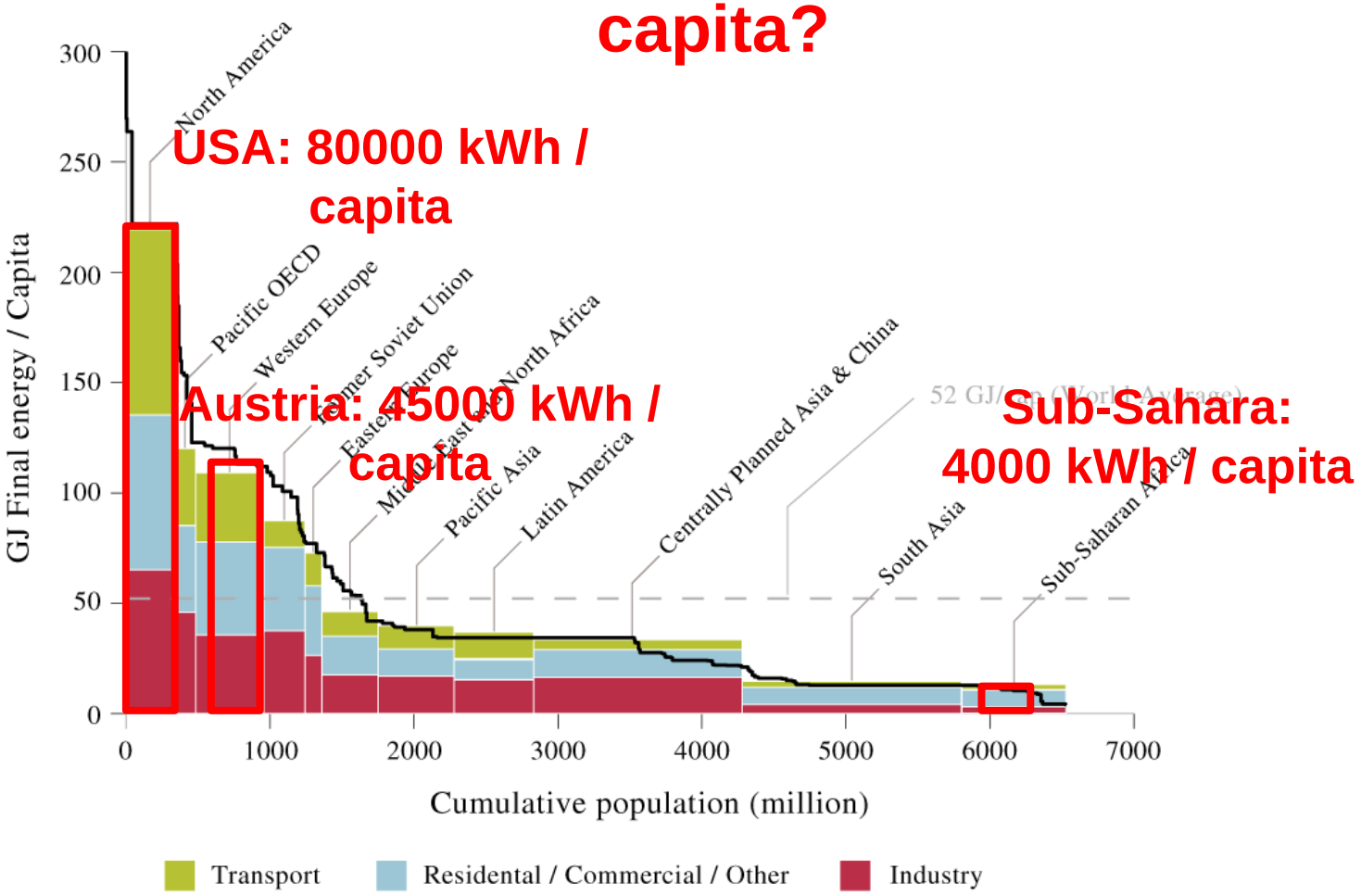
- Energy is the fundament of our standard of life today
- Every second of our life – even in deep sleep – we „consume“ energy

- Dramatic increase in energy consumption in recent years!
- Dramatic increase in energy consumption in the next decades expected → from which sources?

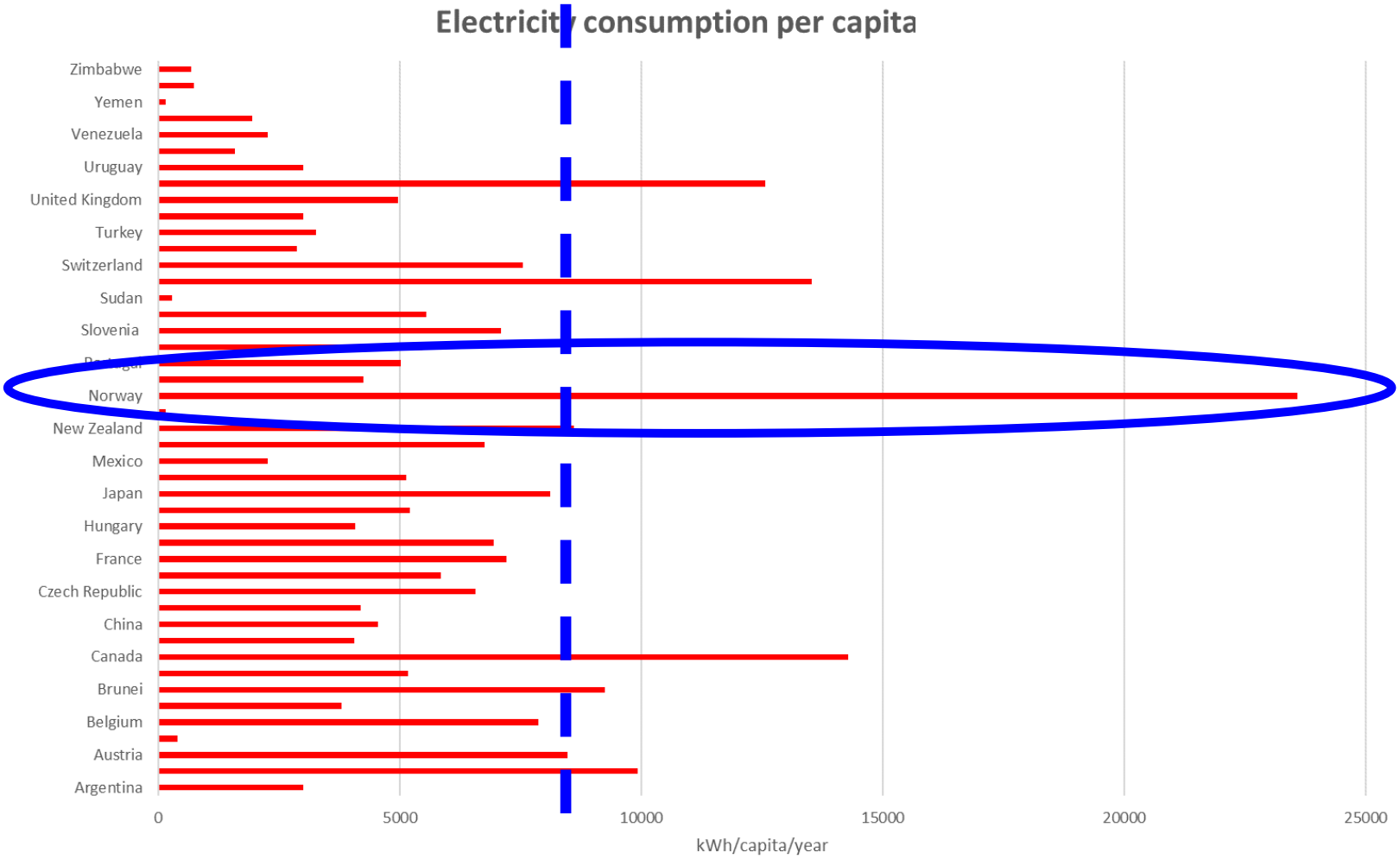




How much energy do we need per capita?



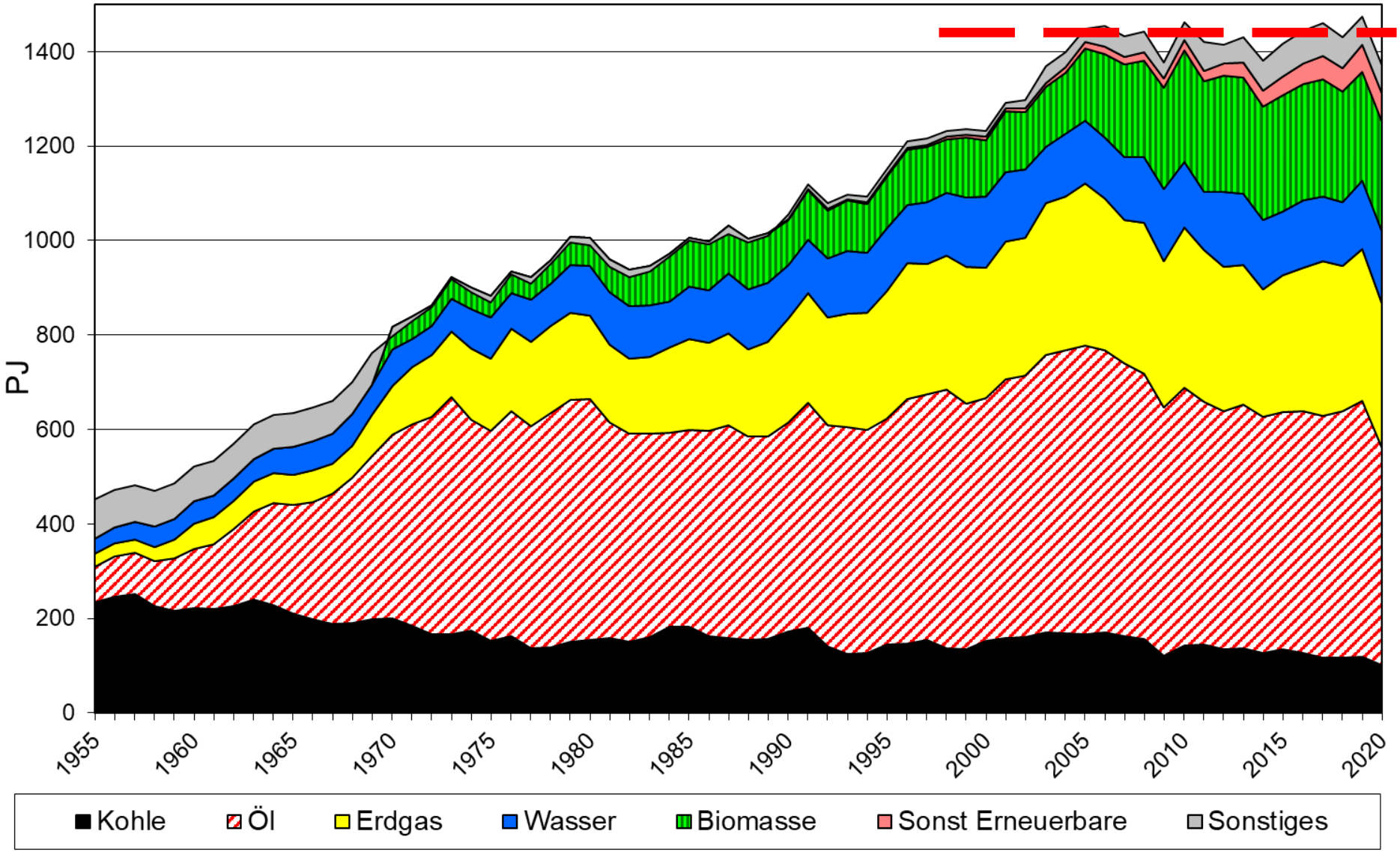
ELECTRICITY PER CAPITA



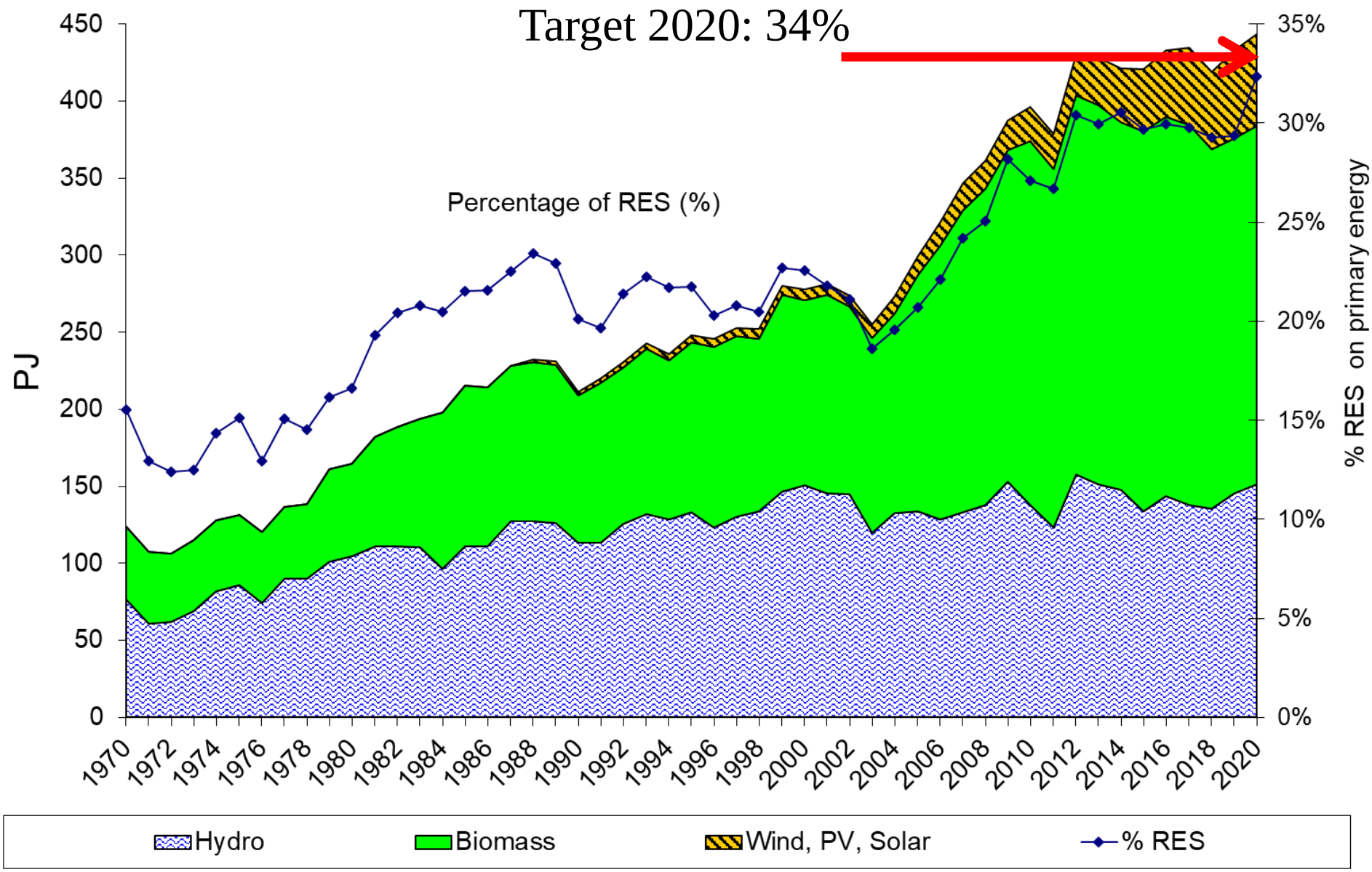
Austria

2. ENERGY IN AUSTRIA

PRIMARY ENERGY AT



Renewable Energy in AT

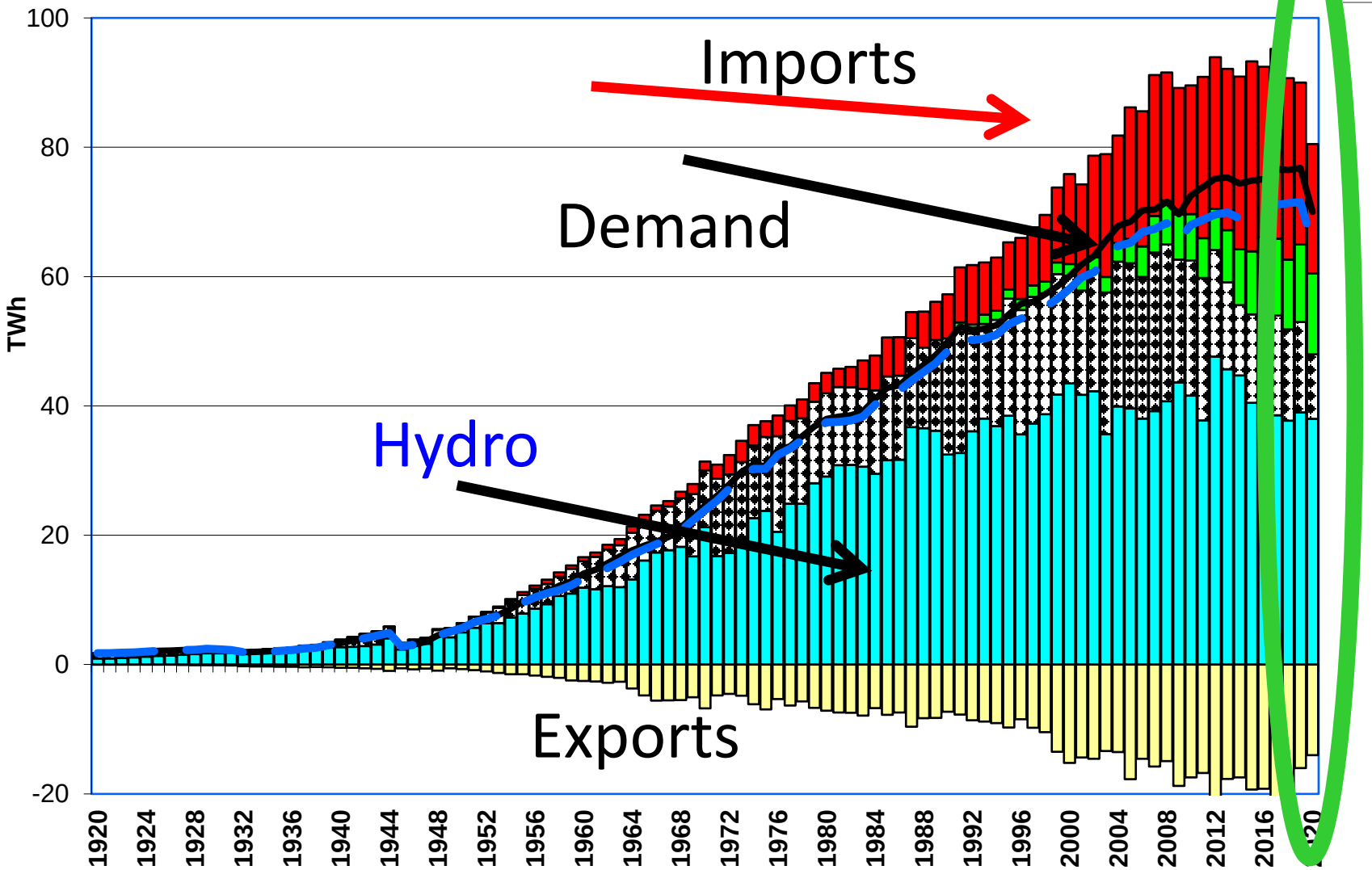


3. ELECTRICITY IN AUSTRIA

ENERGIEWENDE ÖSTERREICH: 5.11.1978? 50,5 % GEGEN DIE ATOMKRAFT!

Electricity generation Austria 1918-2020

2020: Corona?

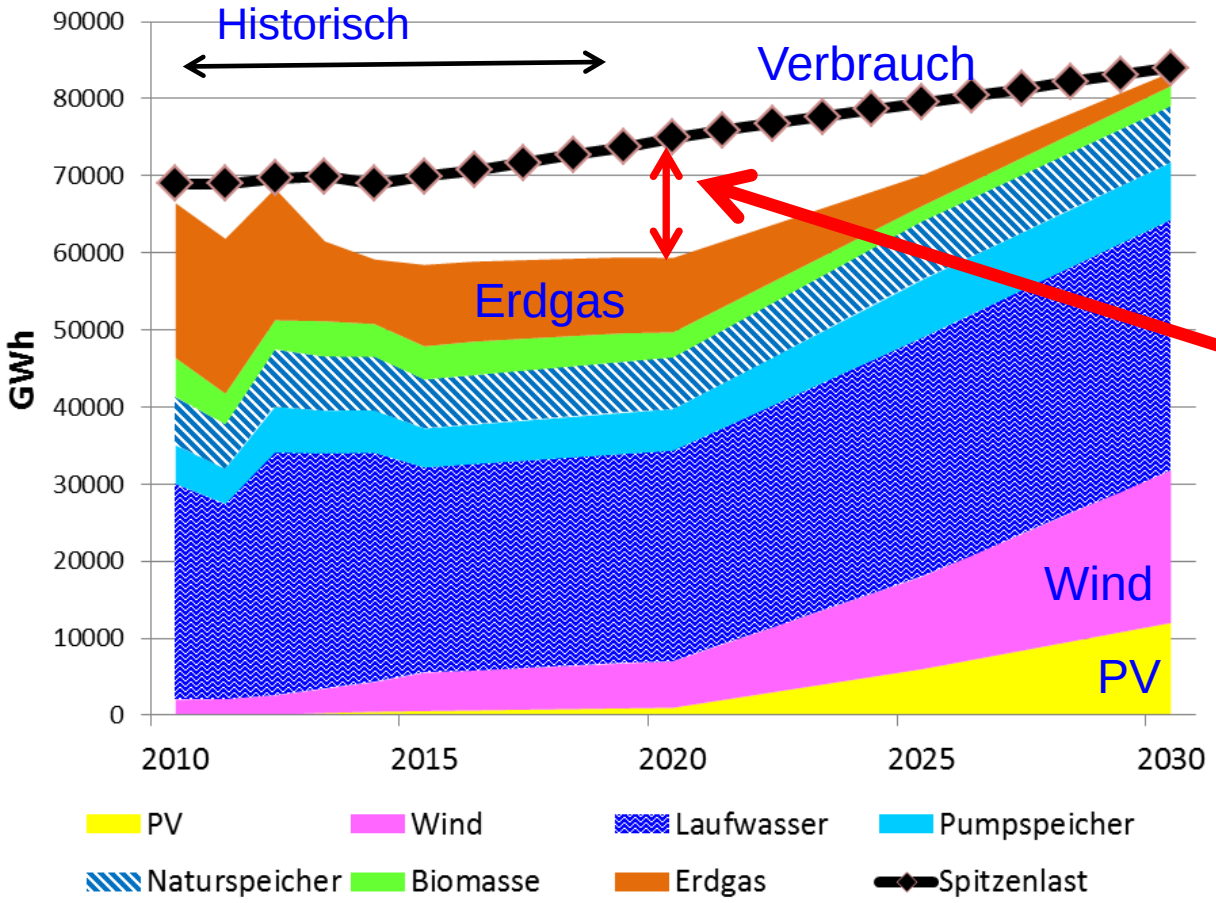


On the margin today:

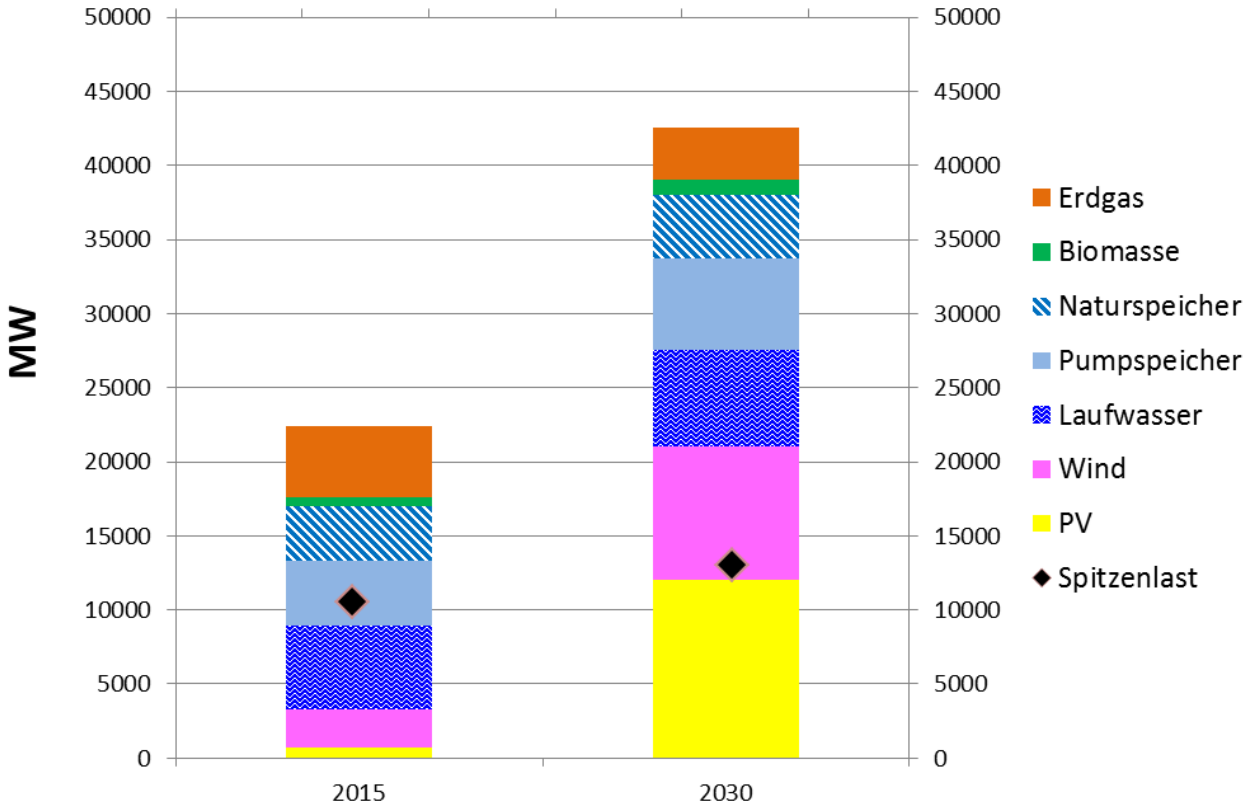
In most hours of the year: every additional kWh of electricity is generated from fossil fuels

Today no excess electricity from Renewables exist except …

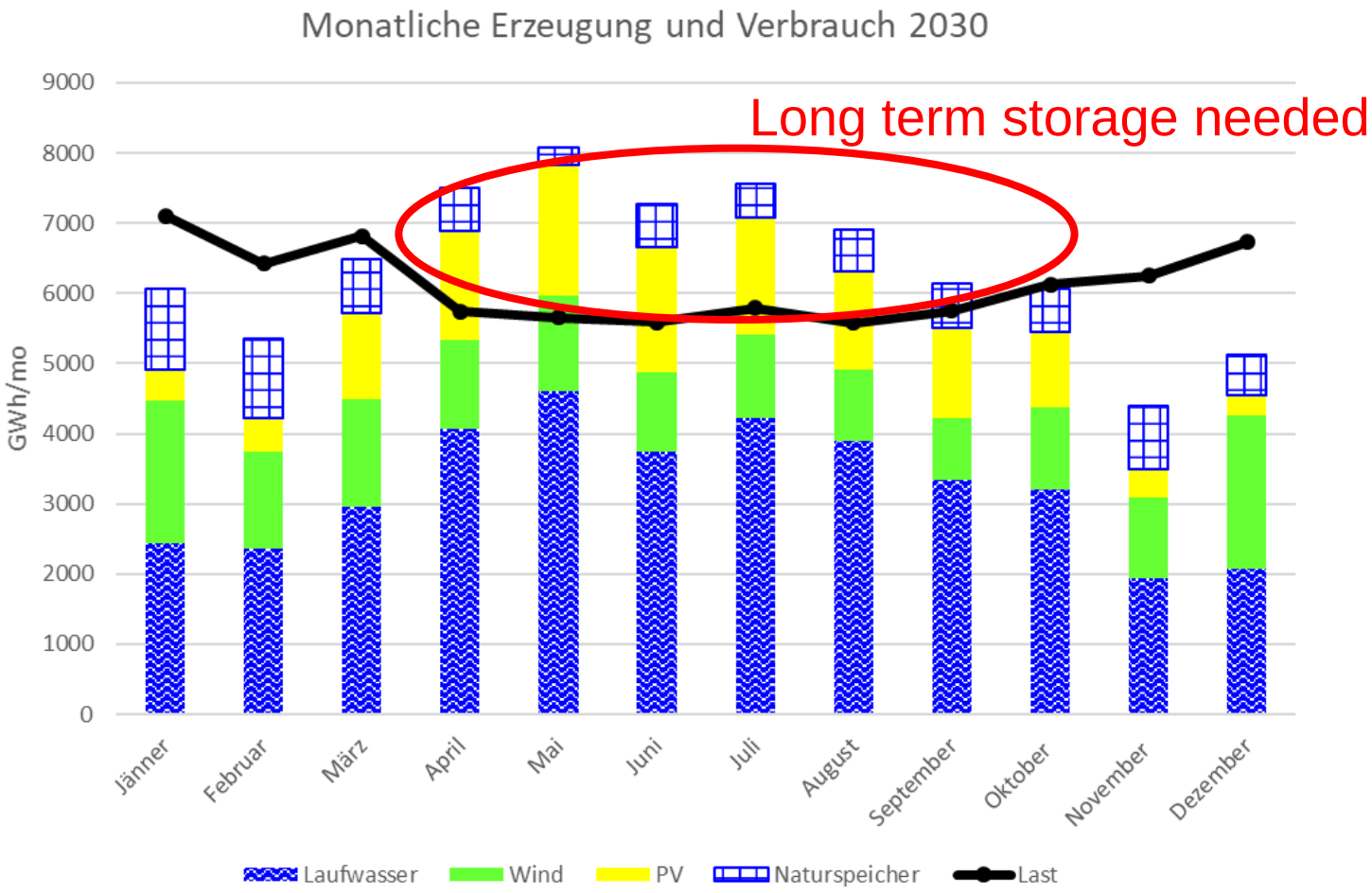
Stromerzeugung Referenzszenario
100% Variable EET 2030



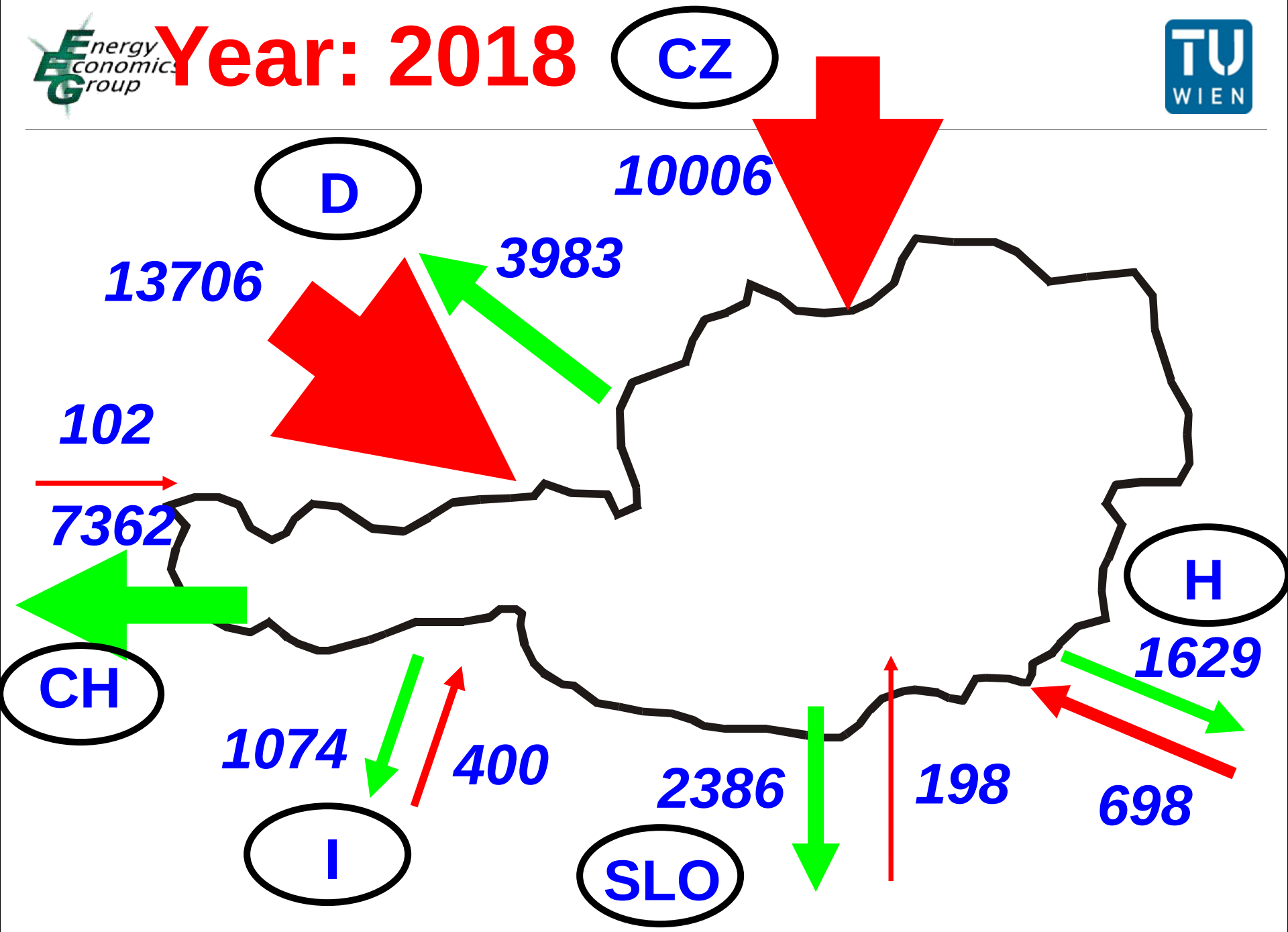
Installierte Leistung Referenzszenario Variable EET 2030



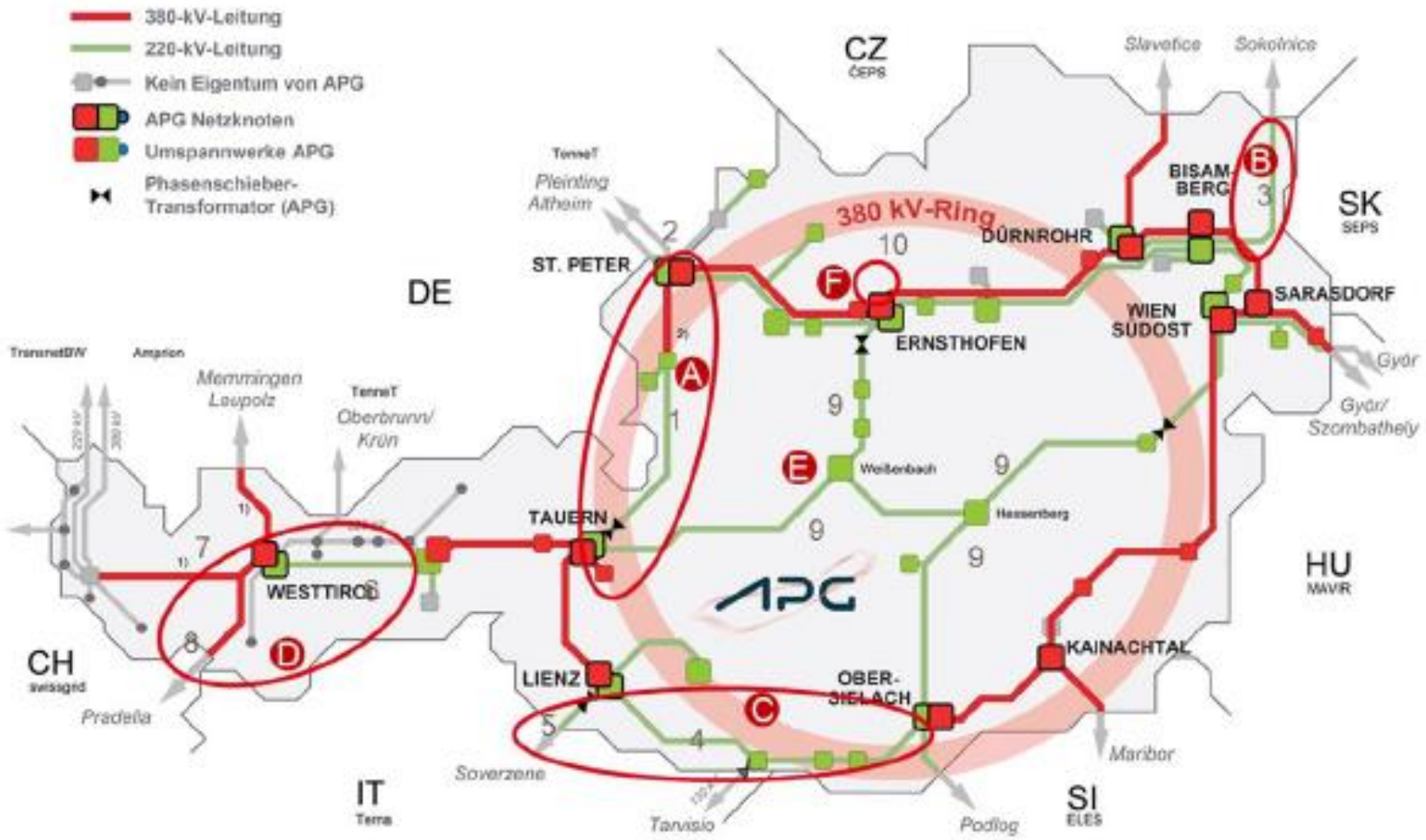
Electricity generation and demand 2030



Year: 2018

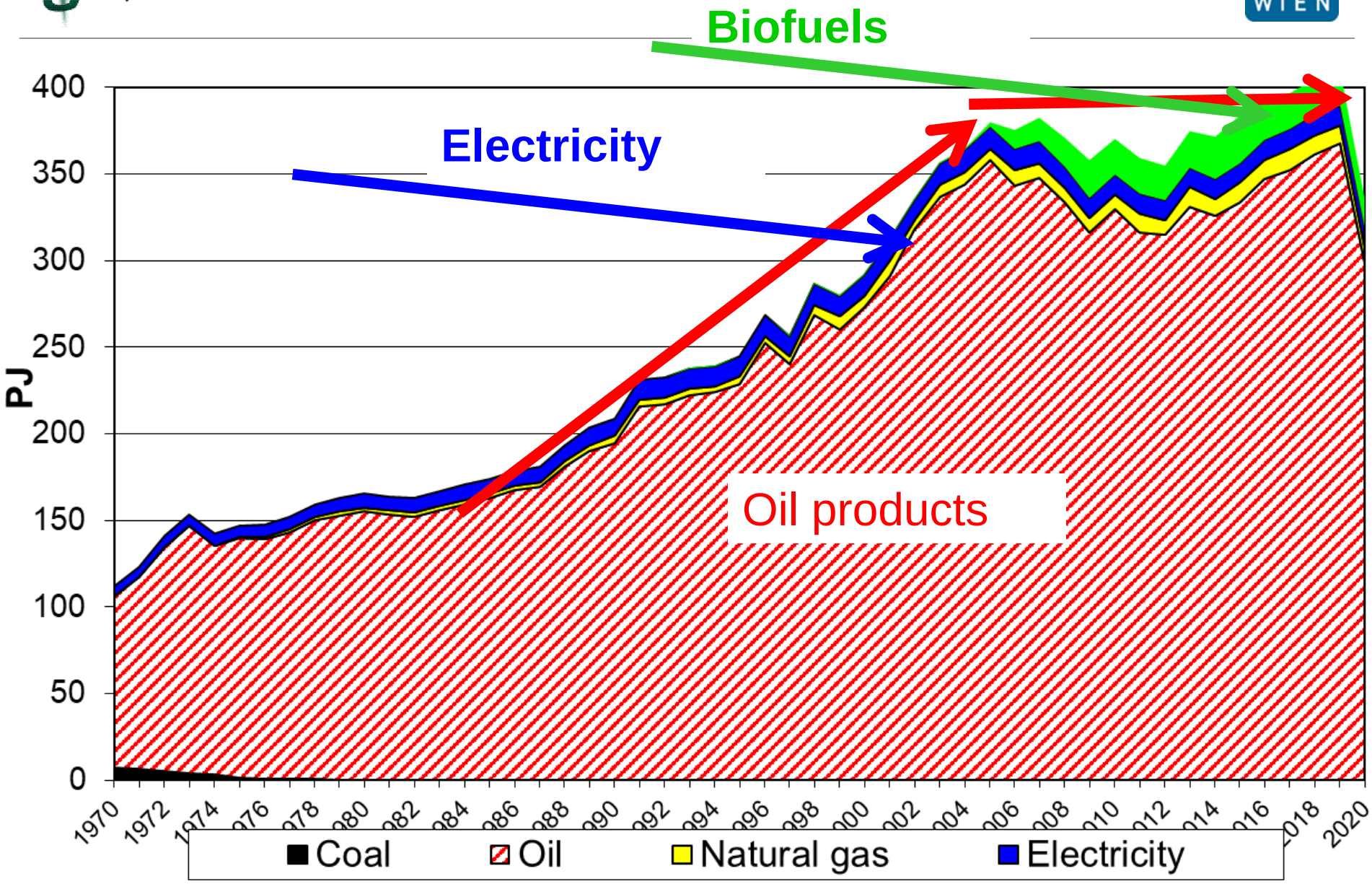

CZ
10006
D
13706
3983
102
7362
CH
H
1629
1074
400
I
2386
198
SLO
698

Die TOP-10-Netzausbauprojekte (Leitungen) der APG

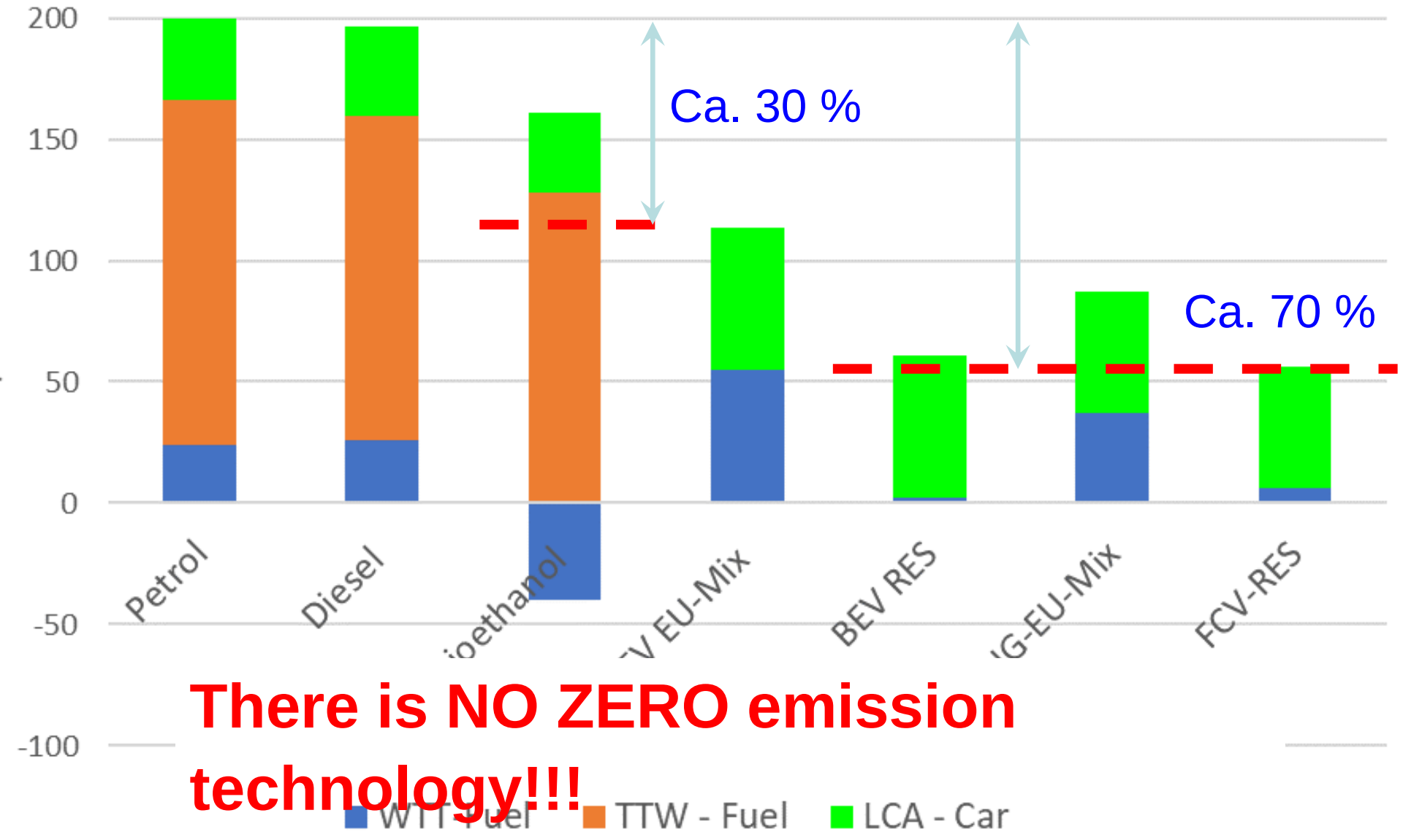


Quelle: APG (2020)

4. MOBILITY / TRANSPORT

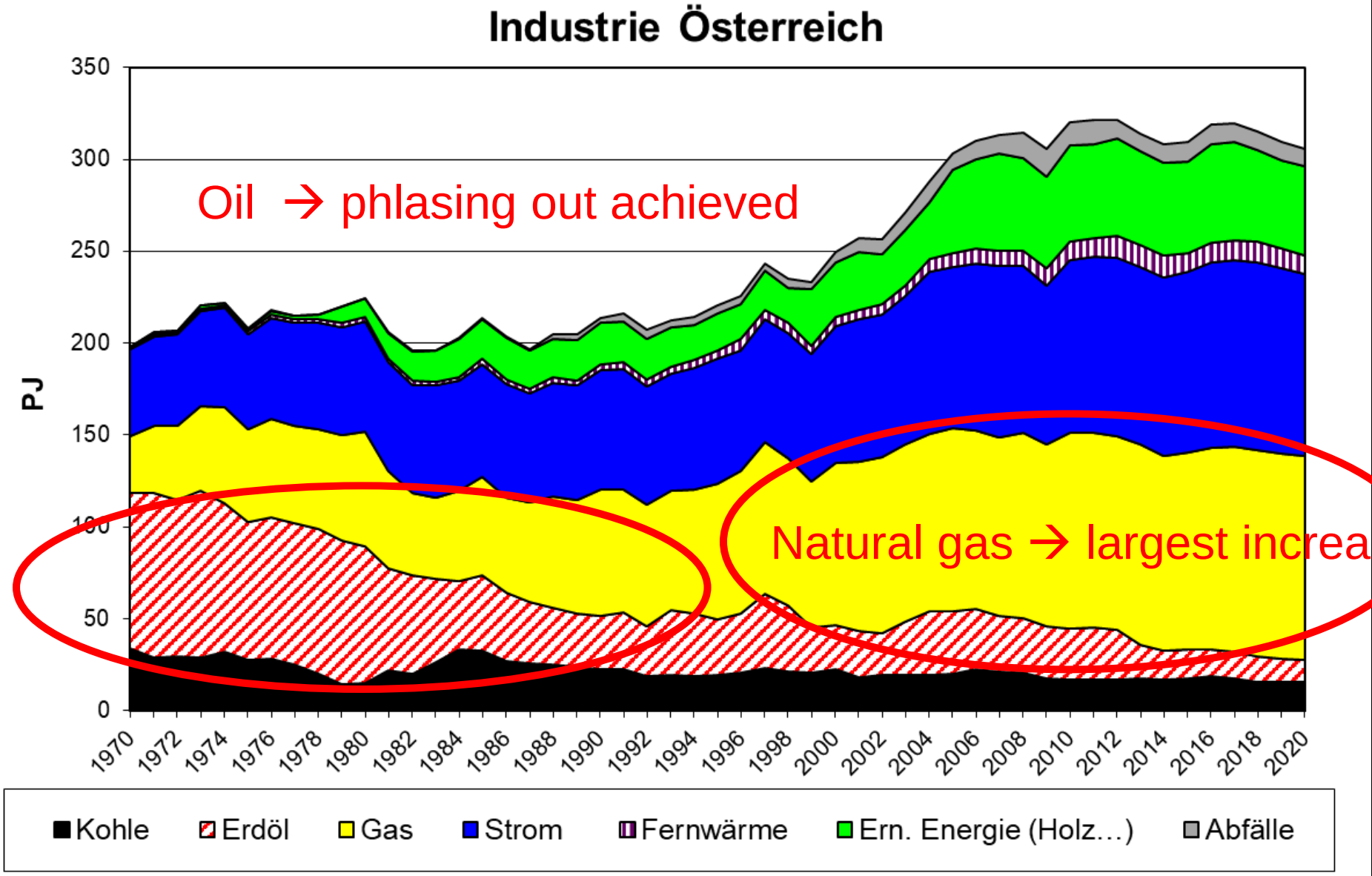


TOTAL EMISSIONS OF CARS



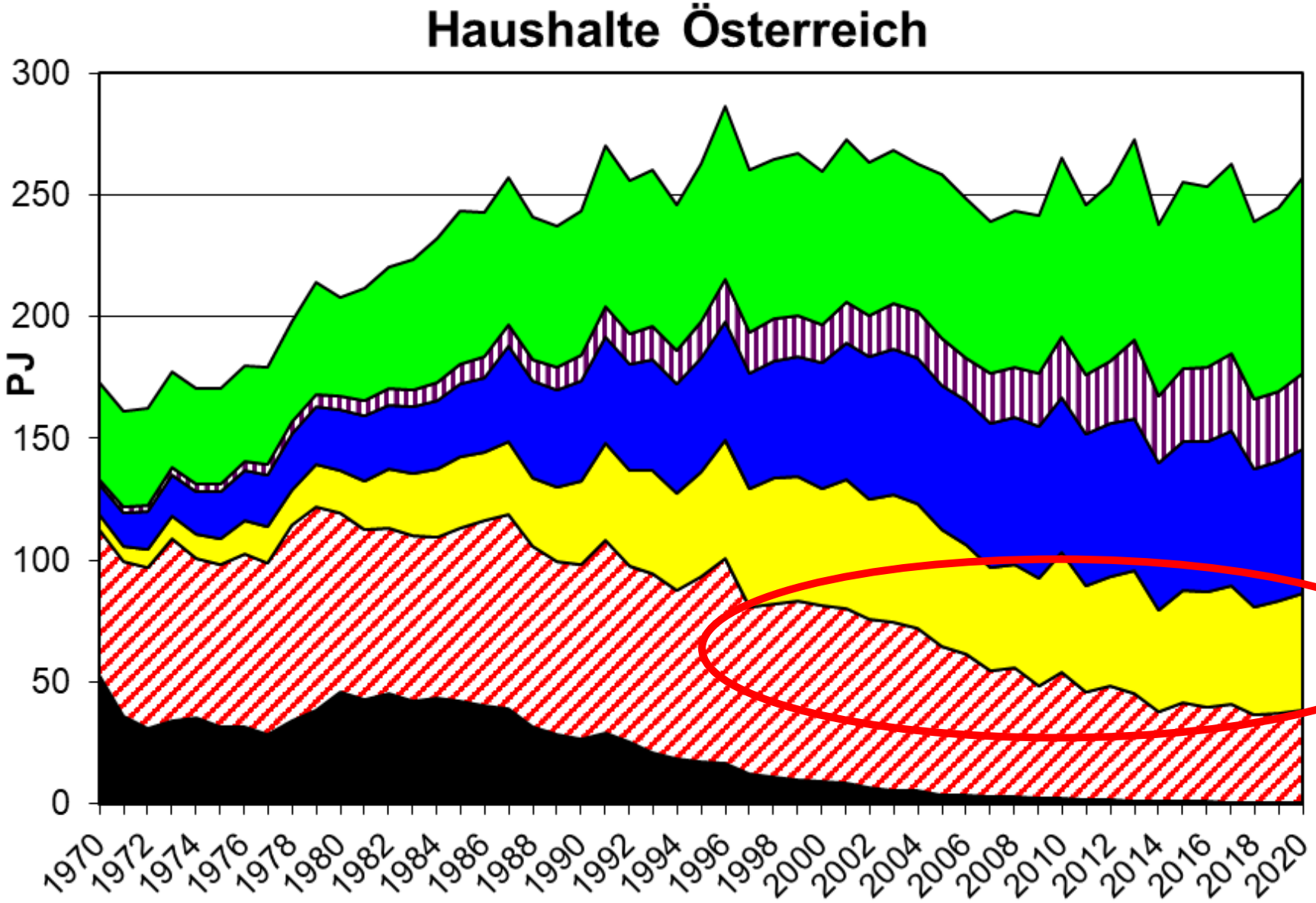
There is NO ZERO emission technology!!!

5. INDUSTRY

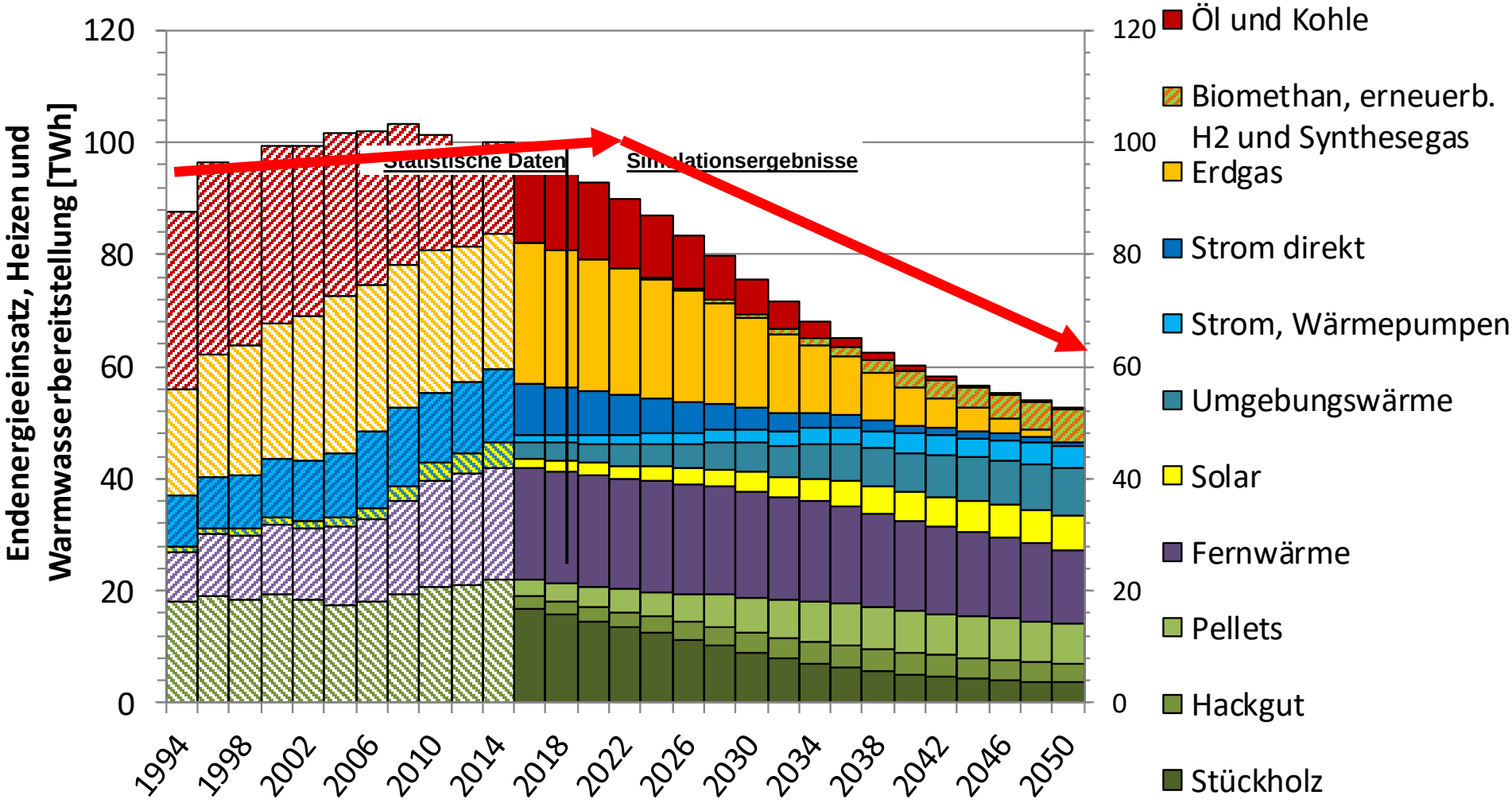

Industrie Österreich
PJ
350
300
250
200
150
100
50
0
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Oil → phlasing out achieved
Natural gas → largest increa
Kohle
Erdöl
Gas
Strom
Fernwärme
Ern. Energie (Holz…)
Abfälle

6. BULDINGS

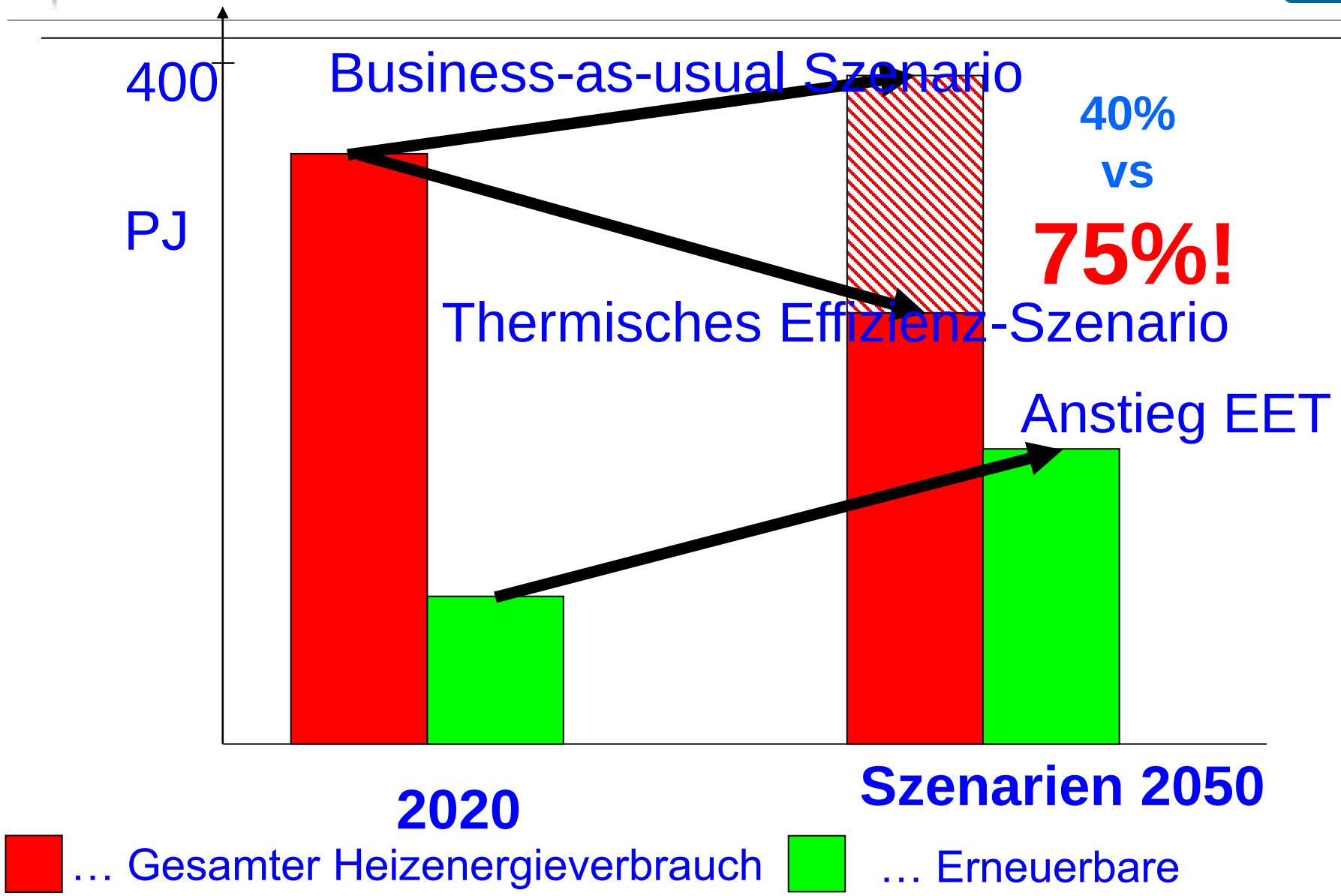
Natural gas → modest



„Wärmewende 2050“



Szenarien 2050:



7. DECARB OF THE ENERGY SYSTEM – HOW ?

We start with the basic relationship:

$$S = E * \eta$$

S … service demand
E … energy
η … efficiency

$$CO2 = f_{CO2} * E$$

Change f_{CO2} – switch to Renew

Reduce S – Change in structu behaviour, sufficie

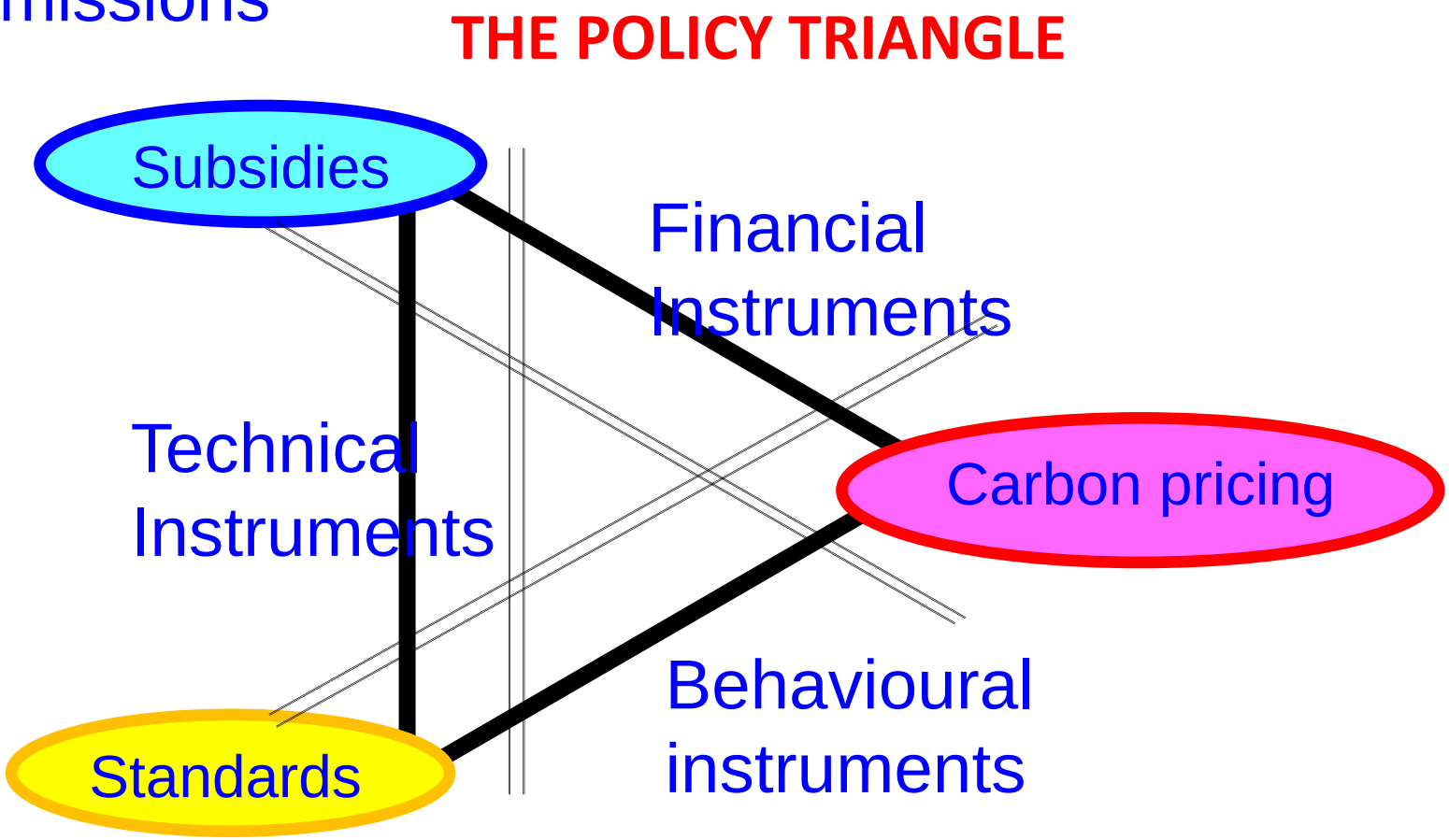
$$CO2 = f_{CO2} * S / \eta$$

+ WTT Embedded !

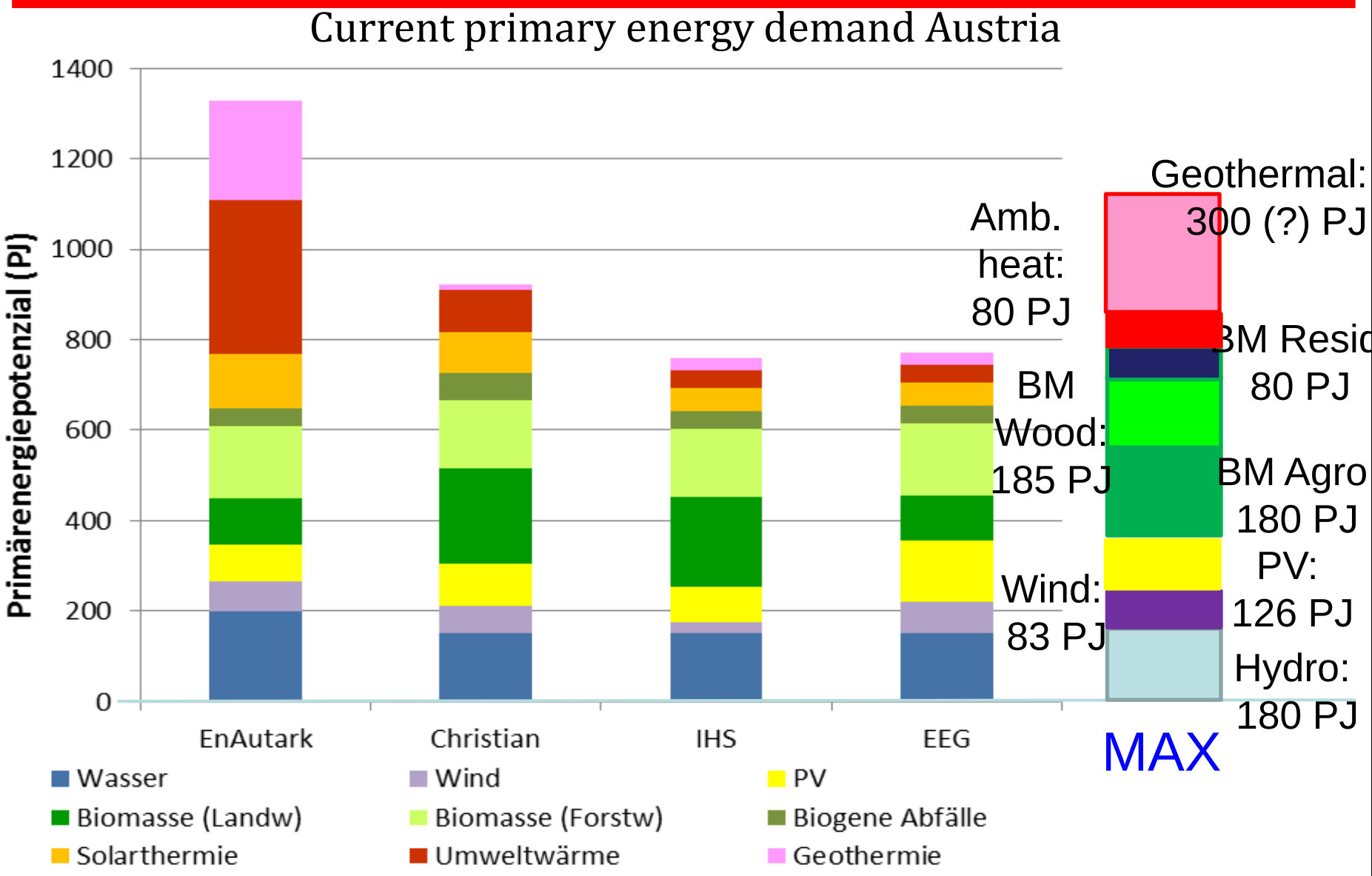
Improve Efficiency η

7. ENERGY AND DECARB POLICIES

- Policies for reducing energy demand and carbon emissions



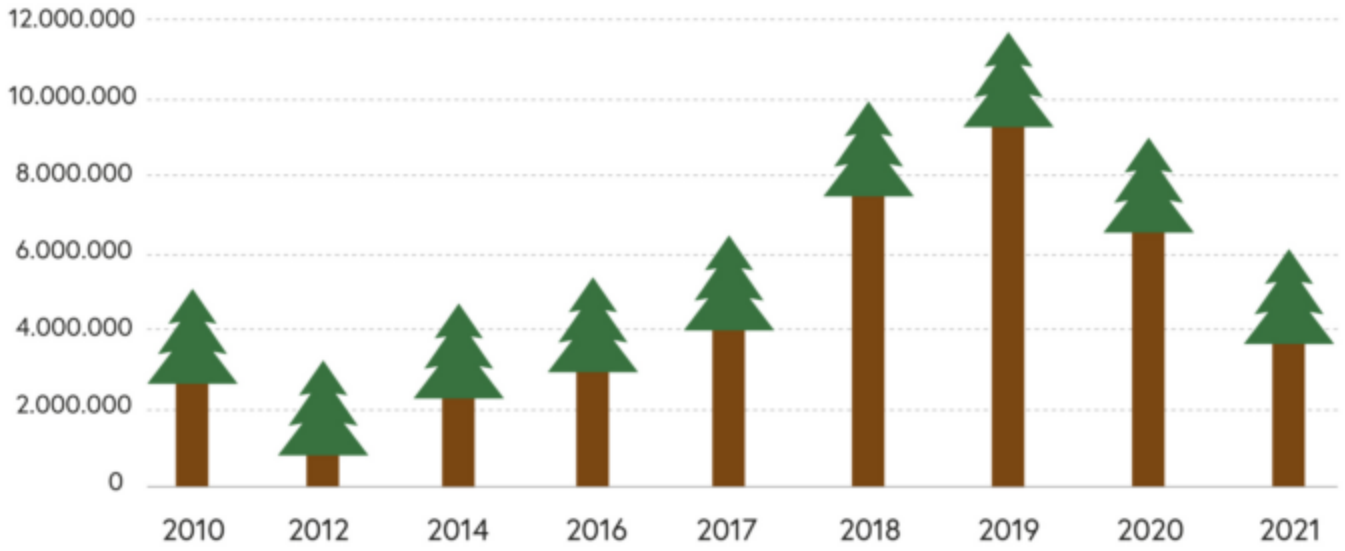
8. THE POTENTIAL OF RENEWABLE ENERGY IN AUSTRIA



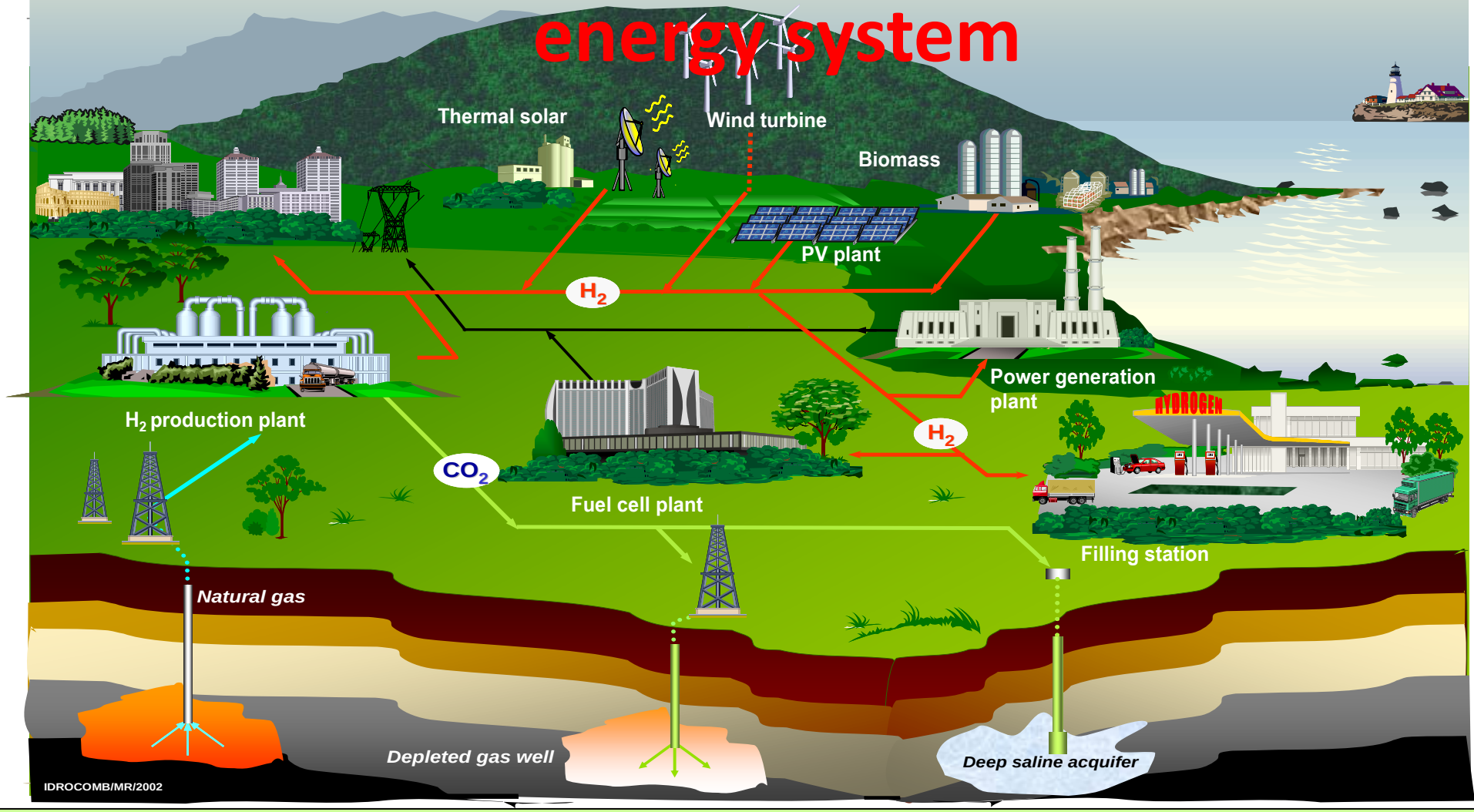
Bundesministerium
Landwirtschaft, Regionen
und Tourismus

Schadholzmengen 2010–2021

(in Erntefestmetern ohne Rinde)



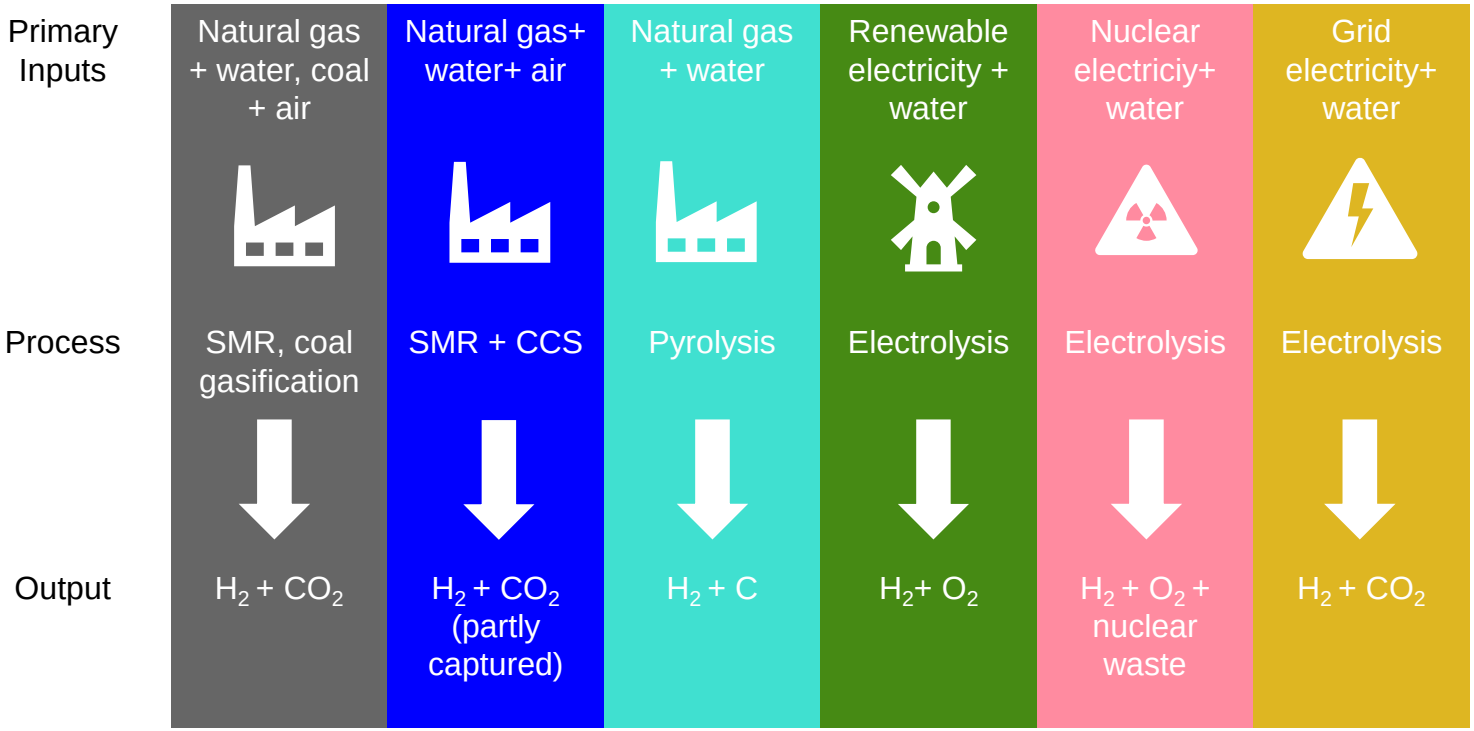
9. The vision of a hydrogen–based energy system



This is how an integrated energy system of the future might look – combining large and small fuel cells for domestic and decentralised heat and electrical power generation. Local hydrogen networks could also be used to fuel conventional or fuel cell vehicles.

Source: EU, 2003

Main colors of hydrogen



9. OPTIONS FOR GREEN HYDROGEN

0. There is NO zero emission technology

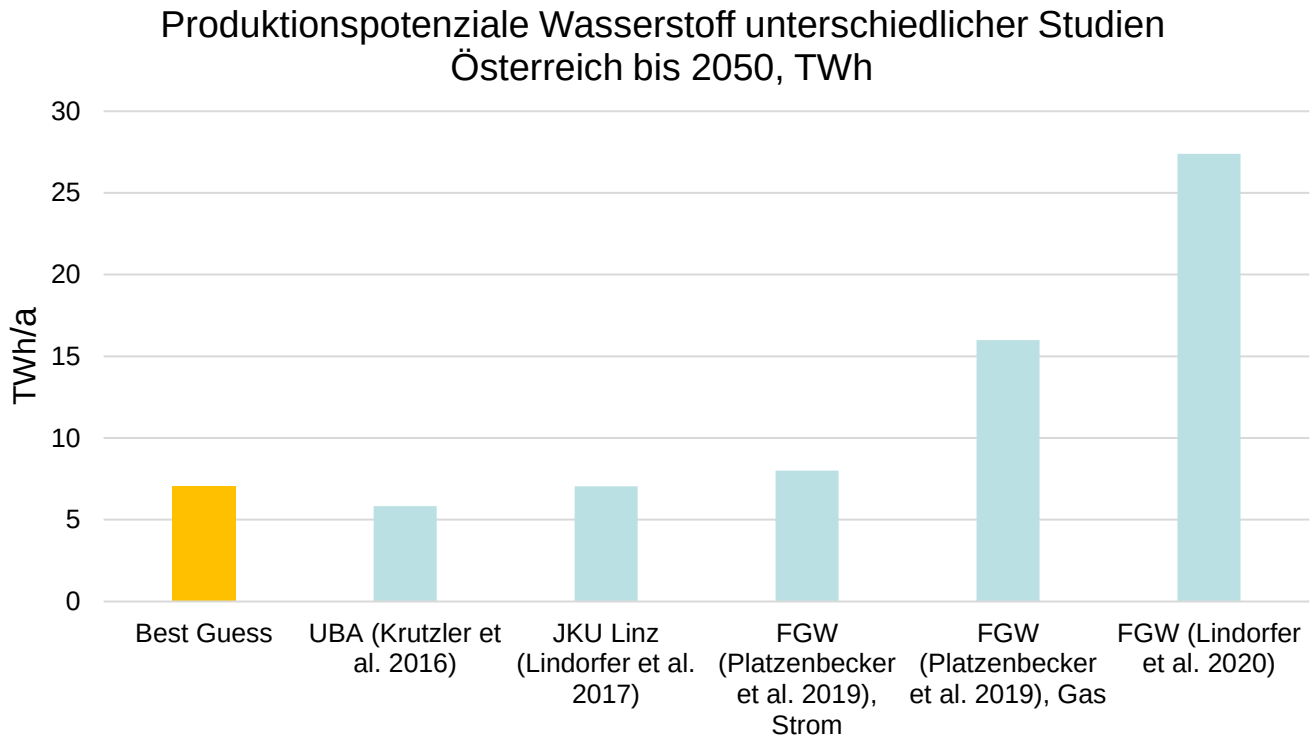
1. Modest efficiency in the chains

2. GREEN H2 (low FLHs) or GREY H2 (cheaper)?

3. Import of green H2 or use green electricty in the host country?

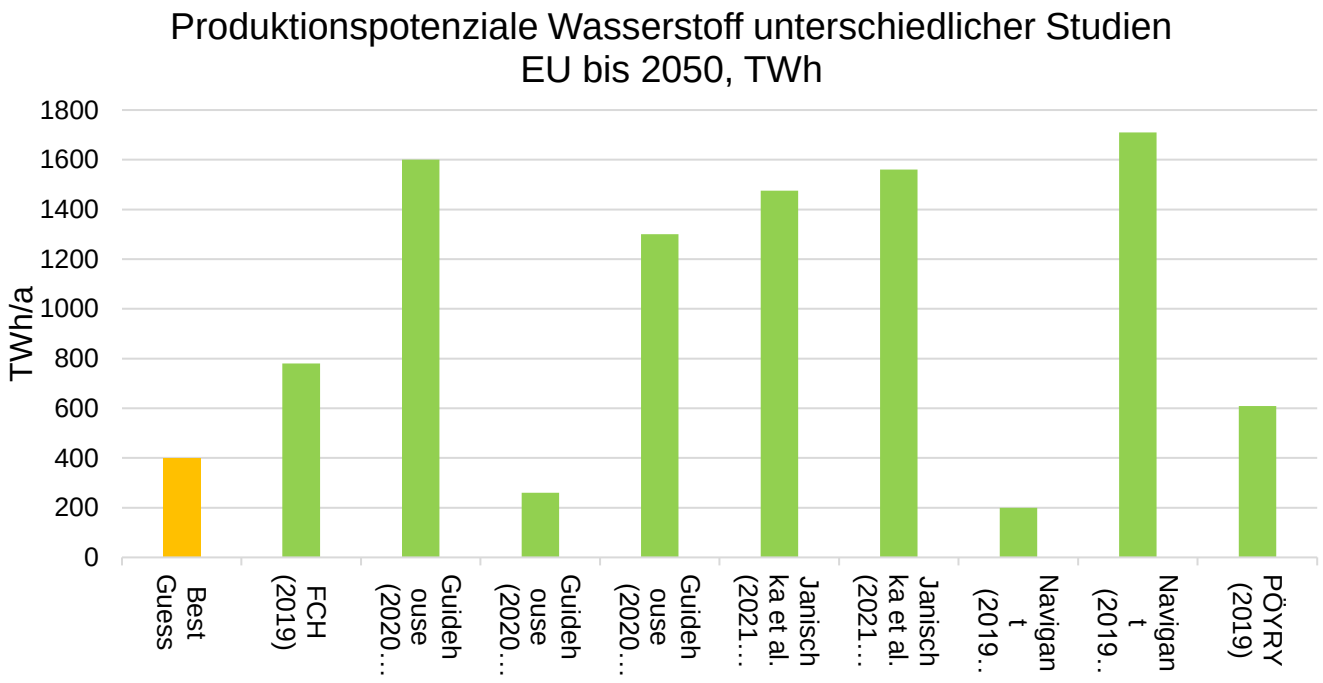
Übersicht analysierte Studien Österreich 2050

Erneuerbarer Wasserstoff: entweder nur Überschussstrom oder nachfragegetriebene Analysen



Übersicht analysierte Studien EU 2050

Rein grüner Wasserstoff aus Elektrolyse



Anmerkungen zu Szenarien: EU = aktueller EU Trend; Global=Globale Klimaschutzmaßnahmen; Dekarb=beschleunigter Dekarbonisierungspfad; Autarkie=Teilautarkie

10. CONCLUSIONS

0. There is NO ZERO emission technology

1. To reduce carbon emissions – not easy, no one size fits-all approach → Flexibility needed!

2. Biomass Green gases : Untapped potential but need for investment support

3. The Potential of Renewables (in AT) is limited

4. How to get Money for investments in new green energy infrastructure?

5. BANANA:

Build absolutely Nothing Anywhere Near Anybody

6. Education … ACE … TU Wien