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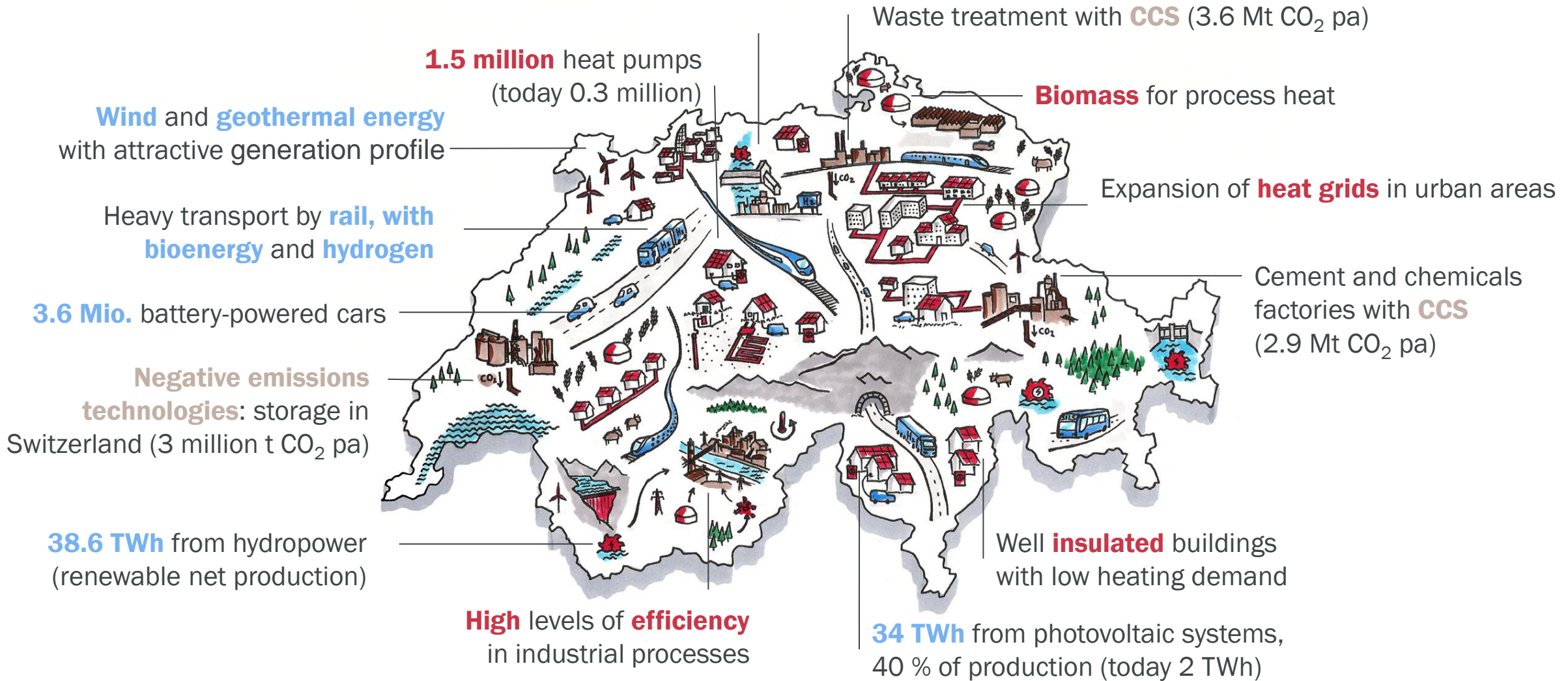
THE SWISS ENERGY STRATEGY 2050

RECENT DEVELOPMENTS



CARBON-NEUTRAL SWITZERLAND IN 2050

Hydrogen production at run-of-river sites (7 PJ)



© Graphic: Dina Tschumi, Prognos AG / TEP Energy GmbH / INFRAS AG 2020



POLITICAL SITUATION IN SWITZERLAND

- **Federal Constitution:** “To ensure a sufficient, diverse, safe, economic and environmentally sustainable energy supply as well as the economic and efficient use of energy.”
- Government decision to **withdraw from nuclear energy use** in 2011 (after Fukushima)
 - **Development of the Energy Strategy 2050** (policy measures)
- **2015 Paris Agreement:** Well below two degrees goal.
- In August 2019, the Federal Council decided **the net zero carbon emissions target.**
 - **Long-term climate strategy to 2050:** sectoral emission goals and reduction path.
 - The **Energy Perspectives 2050+** show technological scenarios for achieving the net zero target (updated in 2022)



ENERGY PERSPECTIVES

Energy scenarios with a specific time horizon to enable informed policy making. They are based on scientific studies of the Federal Administration, the model calculations of experts and a working group comprising specialists from science and energy industry practice.

Energy Perspectives 2035 (issued in 2007)

Energy Perspectives 2050 (issued in 2013)

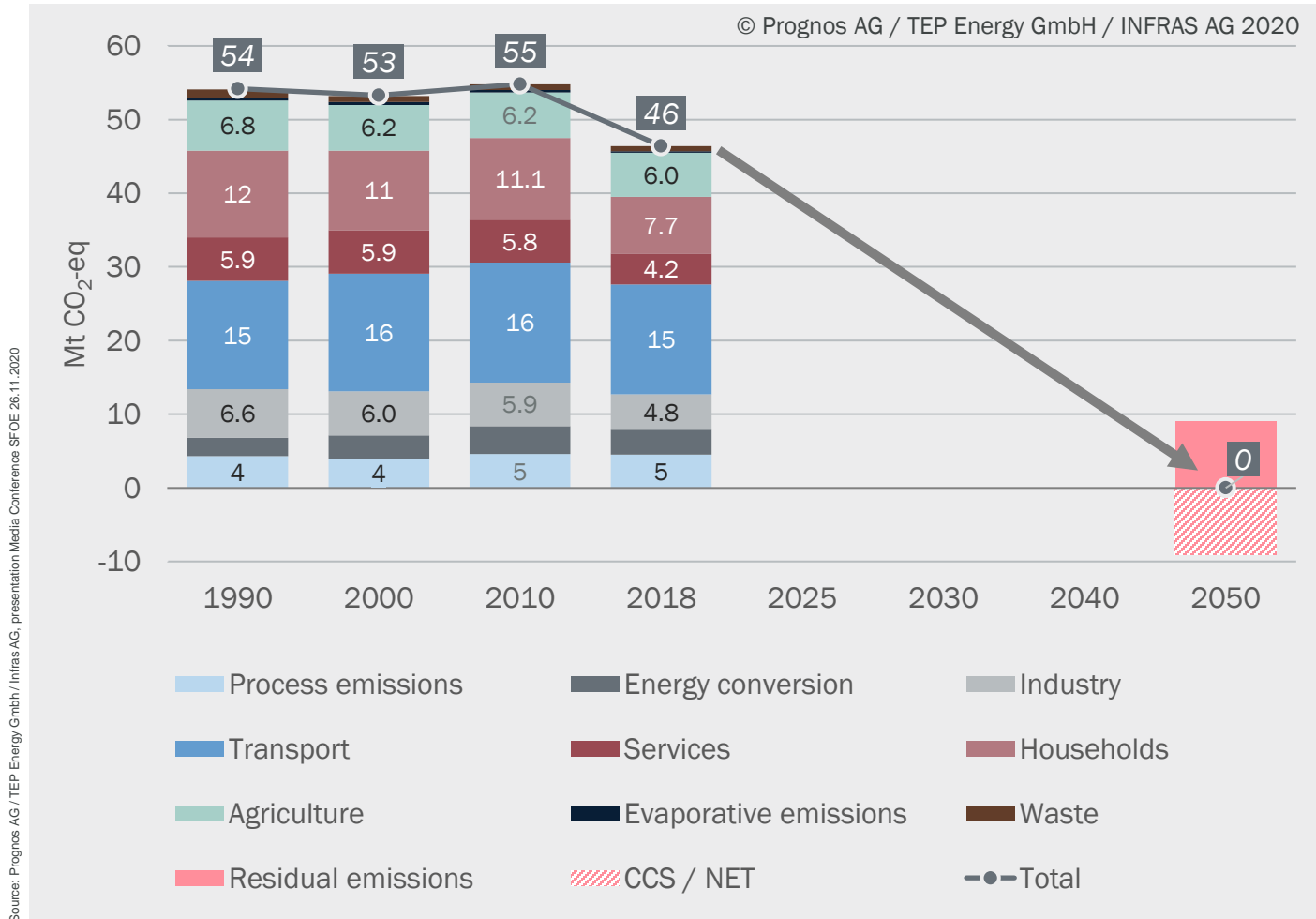
Energy Perspectives 2050+ (issued in 2022)

- The **EP2050+** analyse how to develop an energy system that is compatible with the long-term climate goal of net-zero greenhouse gas emissions by 2050
- ensure a secure energy supply.

Several scenario and variants are considered. They differ in their combination of technologies and the speed of the renewable energy transition in the electricity sector.



ENERGY PERSPECTIVES 2050+ GREENHOUSE GAS EMISSIONS & CCS/NET



Basic assumptions

- Population increases to more than 10 million;
- heated surface area increases by 17%;
- travel distance (passenger transport) also increases by 17%;
- number of full-time employees increases by 8%;
- GDP growth by 38% (2019-2050).

Delimitation

- CO₂, CH₄, N₂O, fluorinated gases
- In addition to the energy system, process emissions plus non-energy-related emissions from agriculture and waste treatment were also considered



SCENARIOS AND VARIANTS

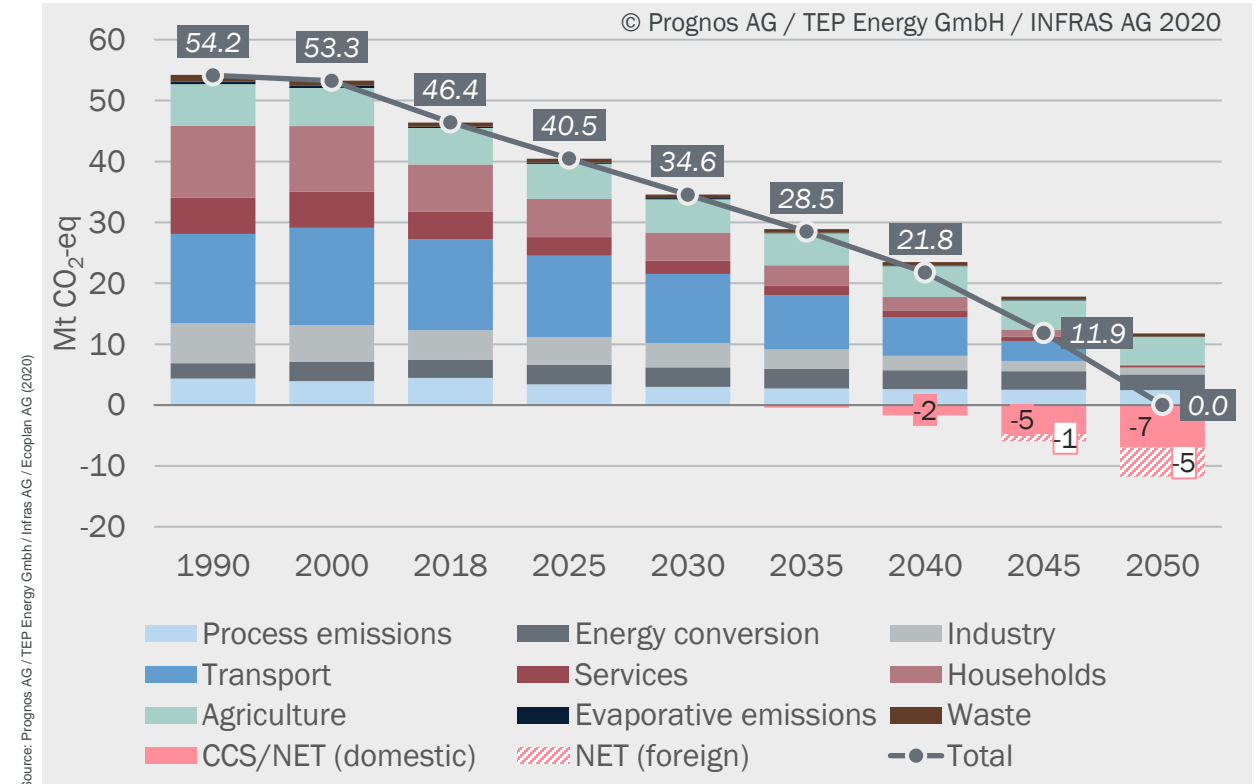
VARIOUS PATHS LEADING TO THE TARGET

Scenario	Variant	Strategic electricity production variants
Net zero scenario (ZERO)	Basis variant (ZERO Basis)	Even annual import-export balance 2050 Guidelines / expansion targets Current framework conditions
	Variant A (ZERO A) <i>extensive electrification</i>	Even annual import-export balance 2050 Guidelines / expansion targets Current framework conditions
	Variant B (ZERO B) <i>stronger focus on gas</i>	Even annual import-export balance 2050 Guidelines / expansion targets Current framework conditions
	Variant C (ZERO C) <i>stronger focus on heat networks and liquid fuels</i>	Even annual import-export balance 2050 Guidelines / expansion targets Current framework conditions
Business as Usual scenario (BAU)	Current energy and climate policy measures	Existing legal and framework conditions

ENERGY PERSPECTIVES 2050+ GREENHOUSE GAS EMISSIONS

- Net zero target is achievable
- In 2050, around 12 million tonnes of unavoidable residual CO₂-equivalent emissions mainly in the following areas:
 - Agriculture
 - Industrial Processes (including cement)
 - Waste treatment (incineration plants)
- Application of CCS/NET necessary so that balanced zero can be achieved

Greenhouse gas emissions & CCS/NET



Scenario ZERO Basis

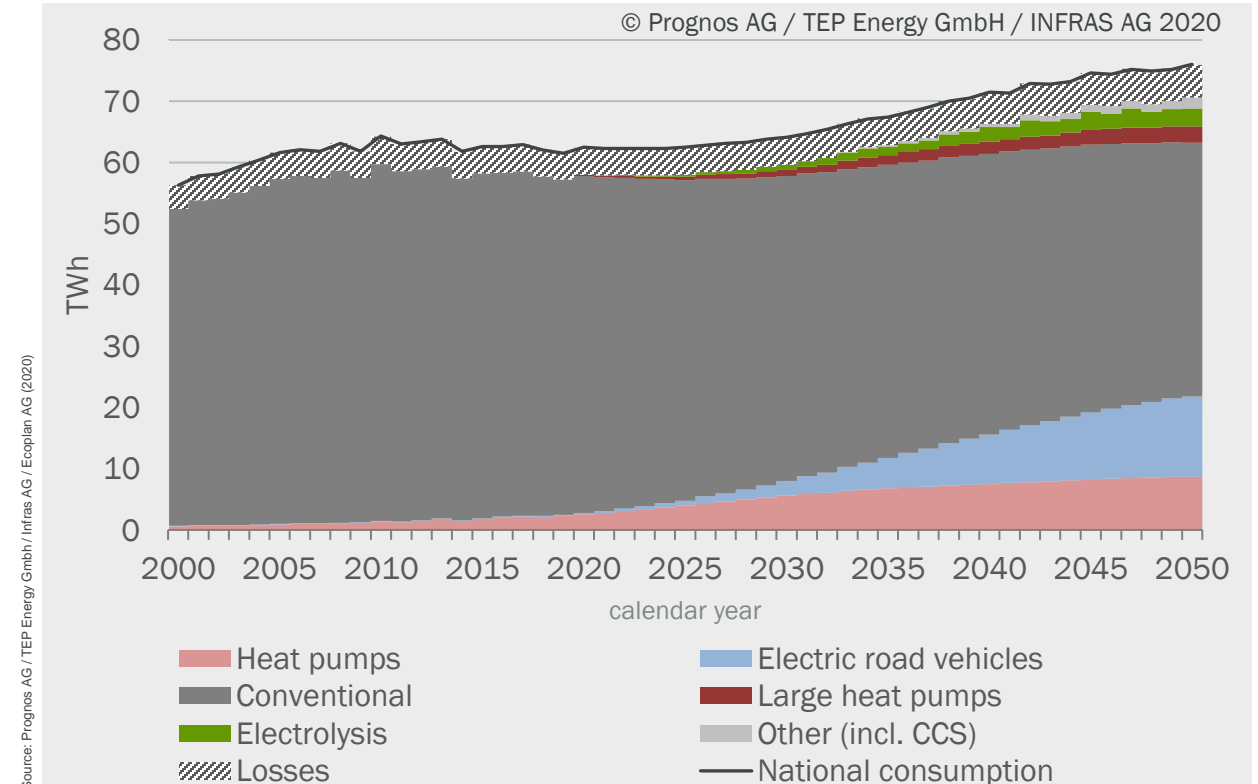
Strategic variant «even annual import-export balance 2050», lifetime NPP 50 years

ENERGY PERSPECTIVES 2050+

ELECTRICITY CONSUMPTION

- Increase in national consumption by around 24 % by 2050
- Main drivers:
 - Electric vehicles (road transport) (13 TWh)
 - Heat pumps (9 TWh)
 - H₂ electrolysis (3 TWh)
 - CCS / NET (2 TWh)
- The increase is damped by efficiency gains in conventional electricity consumption

National consumption by application



Scenario ZERO Basis

Strategic variant «even annual import-export balance 2050», lifetime NPP 50 years

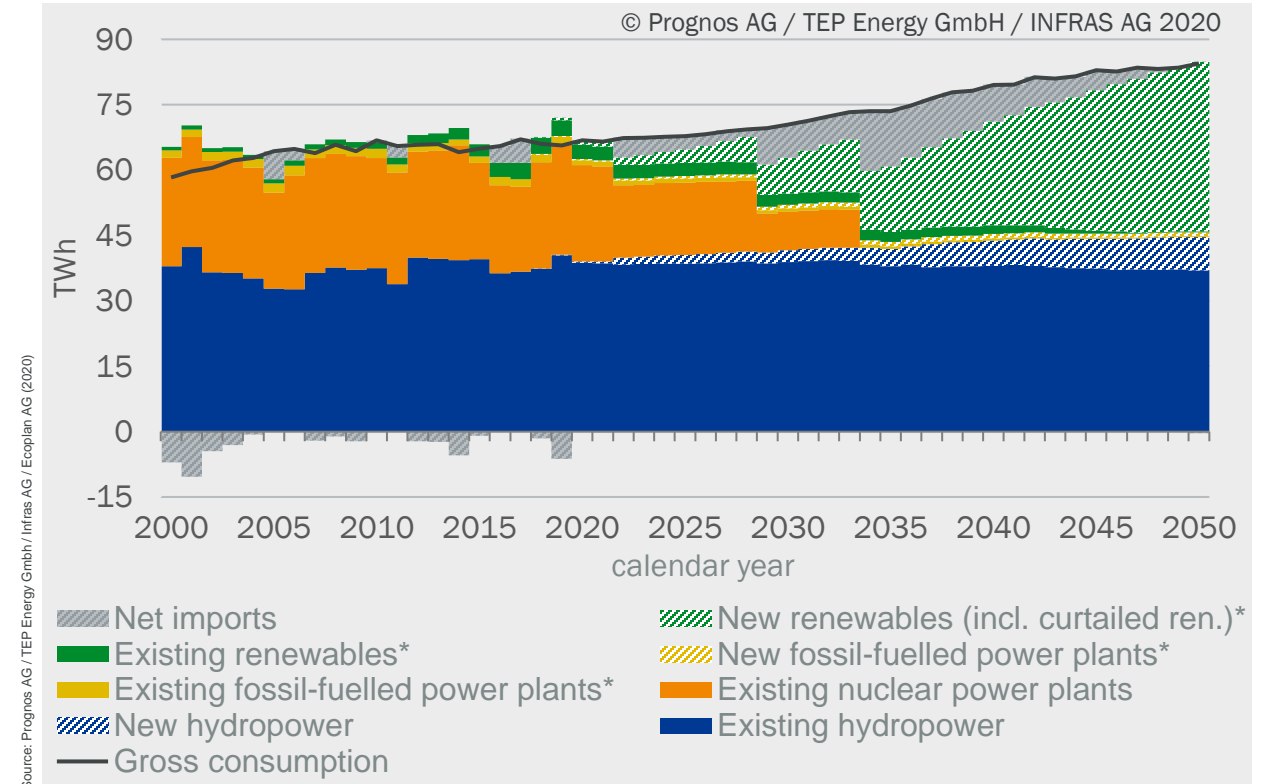
ENERGY PERSPECTIVES 2050+

ELECTRICITY SUPPLY

Up to 2050, Swiss electricity supply will be sourced by hydropower and renewable energy, temporarily supplemented by electricity imports.

- Increase in total consumption (including storage pumps) to 84 TWh in 2050.
- Increase in domestic electricity generation through renewable energy and hydropower.
- Net imports balanced by 2050 after withdrawal from nuclear energy.

Annual electricity generation by technology



Scenario ZERO Basis

Strategic variant «even annual import-export balance 2050», lifetime NPP 50 years

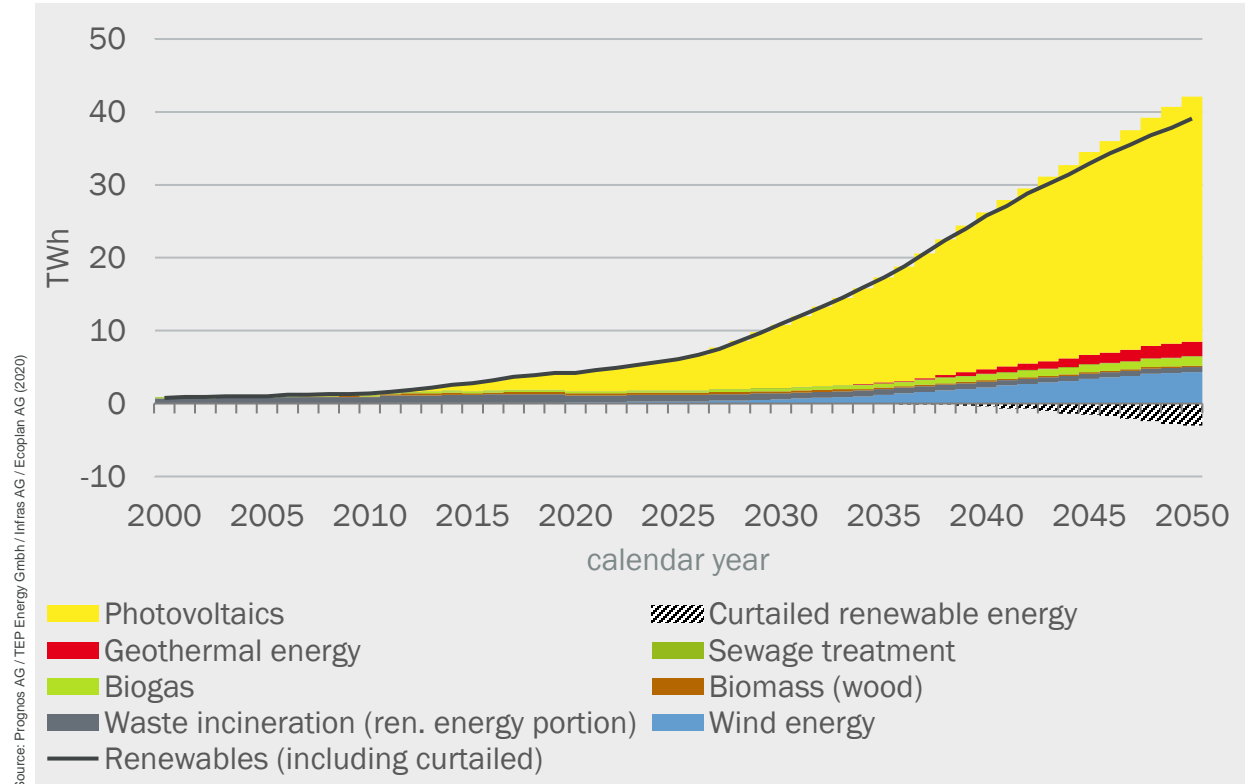
* coupled and uncoupled

ENERGY PERSPECTIVES 2050+ ELECTRICITY SUPPLY

Sharp increase in power generation from renewables by 2050 to 39 TWh (today 4 TWh).

- High share of photovoltaics (falling costs and high potentials): 34 TWh in 2050.
- Wind power with low costs at good locations, but challenges regarding acceptance.
- Biomass and geothermal energy supplement the electricity mix and provide CO₂-free heat.
- Flexibility in generation and consumption is essential for integration.

Annual electricity generation new renewables



Scenario ZERO Basis

Strategic variant «even annual import-export balance 2050», lifetime NPP 50 years

ENERGY PERSPECTIVES 2050+ ELECTRICITY SUPPLY

Considerable differences between winter and summer supply situation:

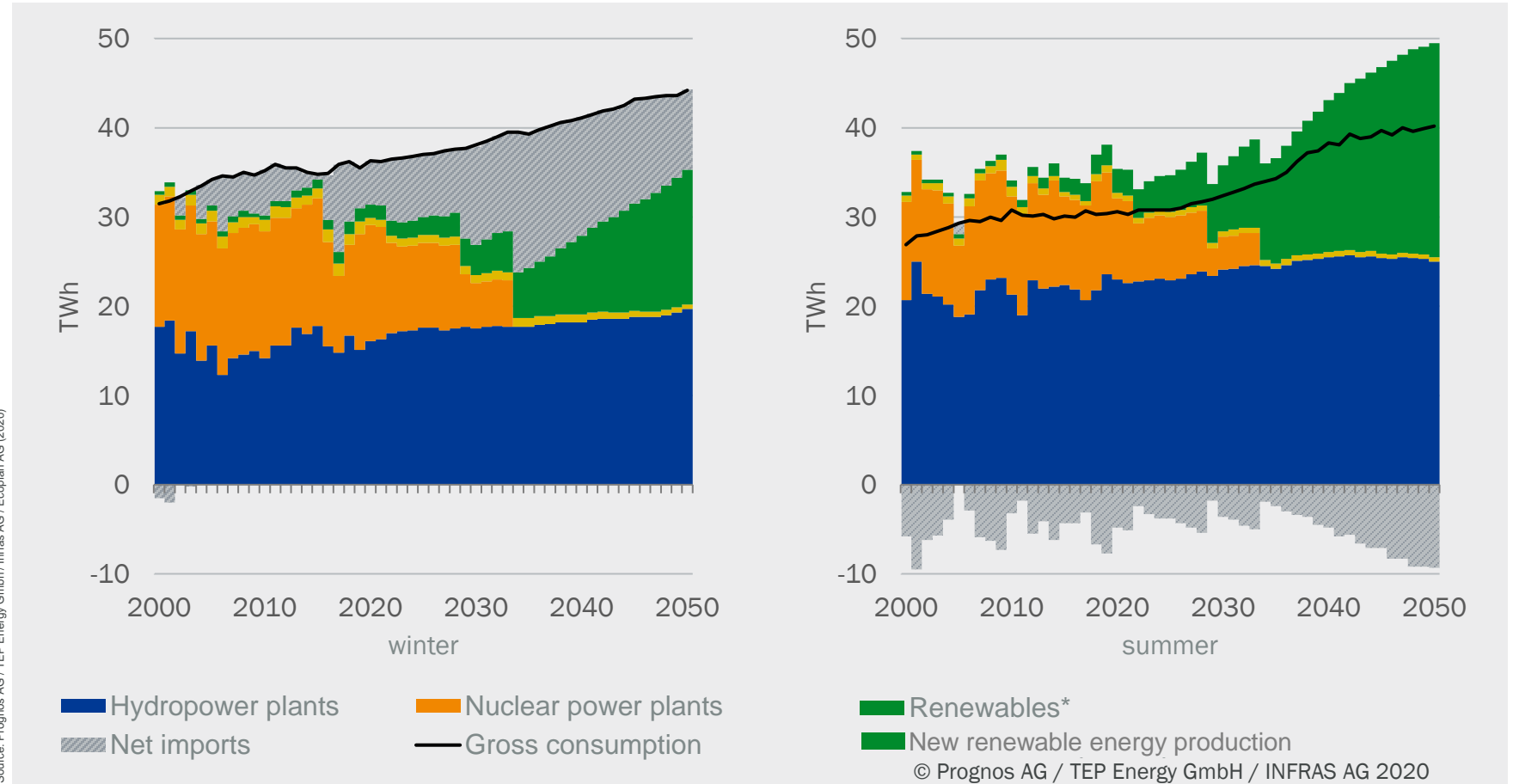
- Increasing share of net imports in winter
- Net exports during summer

Scenario ZERO Basis

Strategic variant «even annual import-export balance 2050», lifetime NPP 50 years

* coupled and uncoupled

Electricity generation in winter and summer





ENERGY STRATEGY 2050

The **ES2050** consist of policy measures to reach an energy system that ensures a sufficient, diverse, safe and sustainable energy supply.

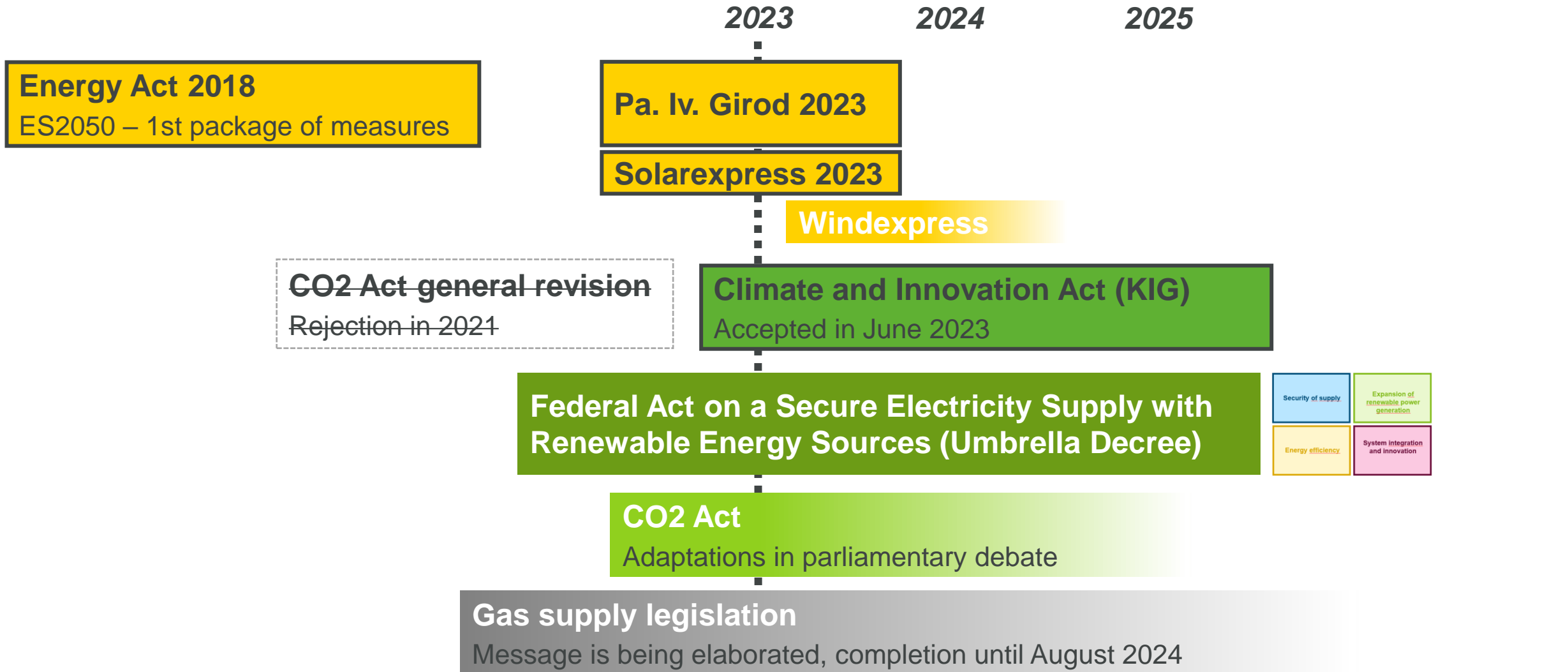
Today Switzerland (still) has a secure and cost-efficient supply of energy. Economic and technological developments as well as political decisions at home and abroad are currently leading to fundamental changes in the energy markets. In order to prepare Switzerland for these, the Federal Council has developed the Energy Strategy 2050.

Aims:

- Enable Switzerland to make advantageous use of the current situation and maintain its high supply standard,
- contribute to reducing Switzerland's energy-related environmental impact.



THE ENERGY STRATEGY 2050 MANY ELEMENTS





CLIMATE PROTECTION AND INNOVATION ACT (KIG)

2023, public vote on **Climate Protection and Innovation Act (KIG)** accepted (59% yes):

- net zero target by 2050, and intermediate targets 2035/40/45
- indicative targets for individual sectors (e.g. buildings: reduction of GHG of 82% by 2040)
- target for the climate-compatible orientation of financial flows
- promotion of novel technologies and processes
- subsidy programmes
- the exemplary role of the Confederation and cantons.



UMBRELLA DECREE (MANTELERLASS)

29 September 2023, the **Federal Act on a Secure Electricity Supply with Renewable Energies** agreed by parliament.

So-called “Umbrella Decree” with revisions to the **Energy Act, Electricity Supply Act, Spatial Planning Act** and **Forest Act**.

Four subject areas of the decree:

- Strengthening the security of electricity supply (winter)
- Aligning the electricity system with the net-zero climate target and thus accelerating and increasing the expansion of renewable energies
- Strengthening energy efficiency
- System integration of decentralised energy sources and strengthening innovation

Security of supply

**Expansion of
renewable power
generation**

Energy efficiency

**System integration
and innovation**



UMBRELLA DECREE

CLEAR ORIENTATION THROUGH LONG-TERM GOALS



Binding expansion and consumption targets instead of previous guideline values

- Binding production targets for 2035 and 2050, more ambitious than EP2050+ → accelerated and increased expansion of renewable energies.
- Ambitious consumption targets despite extensive electrification (= EP2050+) → decarbonisation of transport and buildings.

	2035	2050
Renewable energies without hydropower	35 TWh	45 TWh
Hydropower (net generation)	37.9 TWh	37.2 TWh
Electricity consumption per person and year	- 13% vs 2000	- 5% vs 2000
Energy consumption per person and year	- 43% vs 2000	- 53% vs 2000



RECENT POLITICAL DEVELOPMENTS

- 2017, the **Energy Act** (1st package of measures of the Energy Strategy 2050) was accepted by public vote (58% yes)
- 2021, public vote on **CO2 Act** (2nd package of measures ES2050) → rejected (52% no)
- 2023, public vote on **Climate Protection and Innovation Act** (KIG) accepted (59% yes)
- 2023, **Umbrella decree** was adopted by the Federal Assembly on 29 September with a large majority. Possible referendum in June 2024, entry into force by 1 January 2025
- Ongoing, **revision of the CO2 Act for 2025-30** aims at reducing GHG emissions by 50% by 2030 vs 1990. This is an important step on the way to net zero by 2050.





CONCLUSION / TAKE-AWAY MESSAGE

- Energy Perspectives 2050+ is a well established basis for target setting
- Effective policy instruments in place: ES2050, long term Climate Strategy
- Encouraging recent political developments: KIG, Umbrella Decree
- But: many open questions and definitions left to be answered – tbd today!

→ Let's use the momentum to strengthen our efforts to fight against climate change – it's more urgent than ever!

Thank you for your attention



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