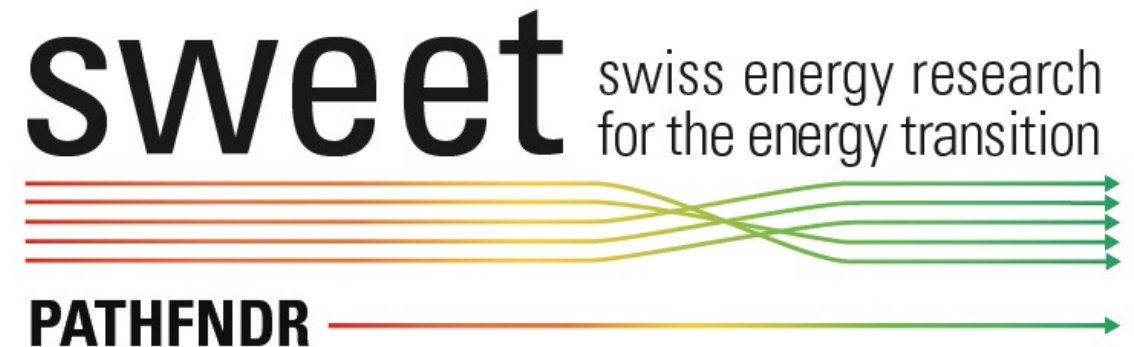


# Electrification, flexibility or both? Emerging trends in recent Swiss and European policy

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# Today's PATHFNDR lunch talk: policy review



## Energy Policy

Volume 206, November 2025, 114725



## Electrification, flexibility or both? Emerging trends in European energy policy

Adrien Mellot <sup>a</sup> ✉, Christian Moretti <sup>a b</sup>, Alejandro Nuñez-Jimenez <sup>c</sup>, Jan Linder <sup>a</sup>,  
Niccolò Moro <sup>a c</sup>, Siobhan Powell <sup>c</sup>, Jochen Markard <sup>c e</sup>, Christian Winzer <sup>d</sup>, Anthony Patt <sup>a</sup>

+ an emphasis on  
Switzerland  
specifically



Motivation

# Higher (demand-side) flexibility needs

## Evolving electricity supply

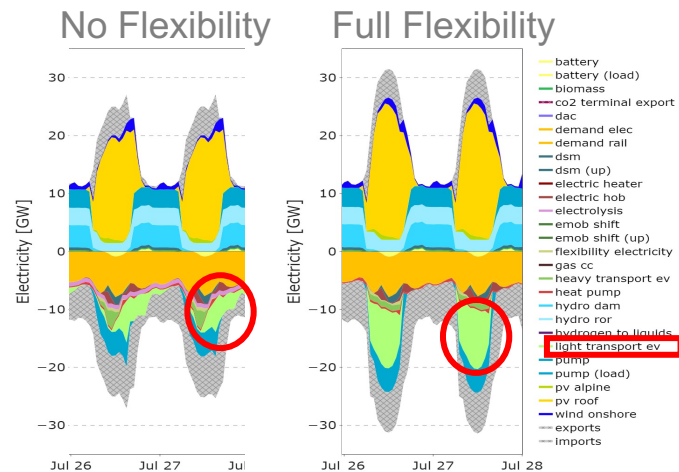
- Intermittent renewables
- Decentralised production
- Smaller share of dispatchable and thermal plants

## Evolving electricity demand

### Sector coupling :

- EVs
- Heat Pumps
- Electrolysis
- etc.

European flexibility needs will **double** by 2030  
(ACER 2023)



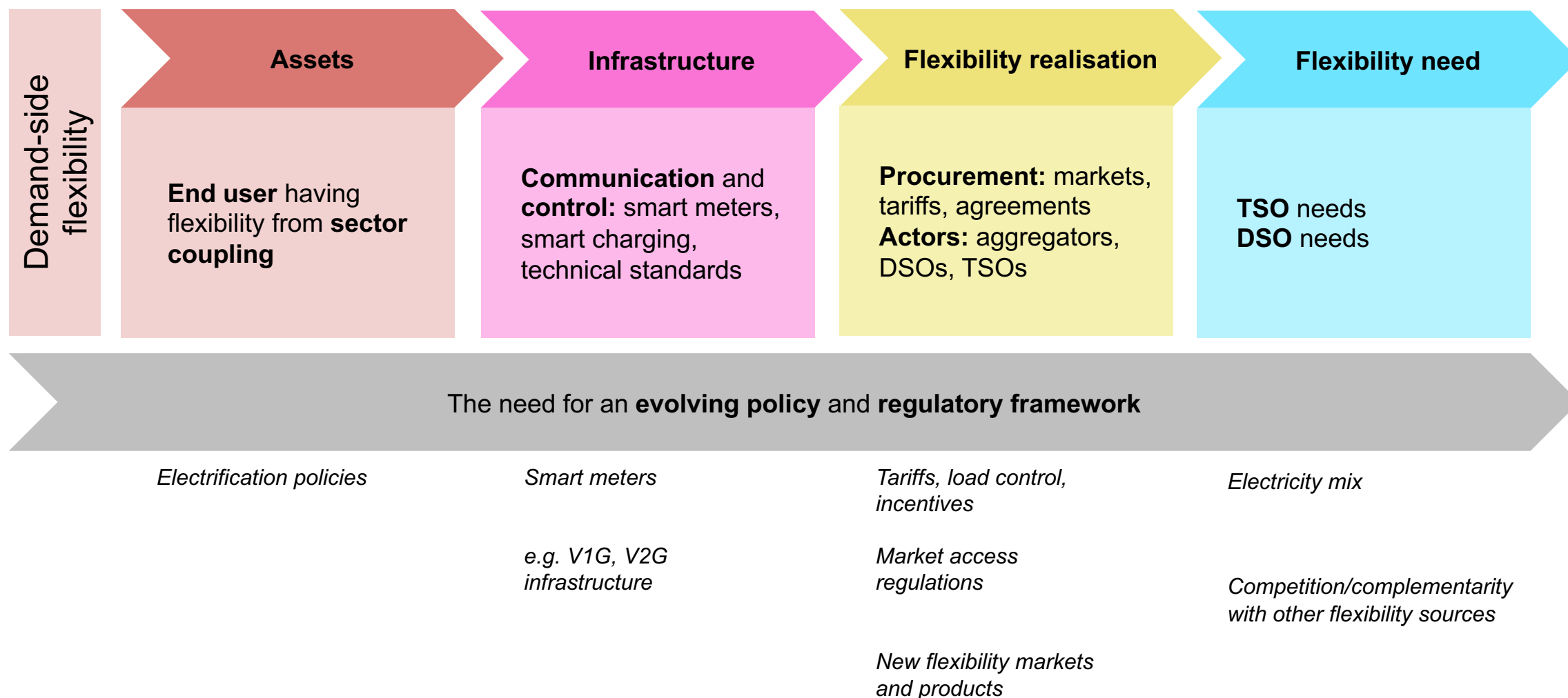
Figures from SR II: Sanvito, F., Garrison, J. (2024). The role of flexibility and sector coupling in the Swiss energy system. SWEET PATHFINDER.

**Sector-coupling** is part of the challenge but also the solution

- New loads can shift in time

→ New sources of flexibility, instead of being only a problem

# Problem: in practice, it's not that simple



# Problem: in practice, it's not that simple

The need for an **evolving policy** and **regulatory framework**

## Modelling flexibility from heat pumps: a bottom-up approach for Swiss buildings

Curtis Meister (HSLU)

**sweet** swiss energy research  
for the energy transition  
PATHFNDR  
LUNCH TALK SERIES V:  
Flexibility provision from  
buildings and electromobility

- Standards
- Smart control

## End-user flexibilities for electrical distribution grid planning

Yaman Evrenosoglu (ETH Zurich)

**sweet** swiss energy research  
for the energy transition  
PATHFNDR  
LUNCH TALK SERIES V:  
Flexibility provision from  
buildings and electromobility

- Incentives
- Tariffs
- Flexibility-aware planning

## Modelling flexibility from electric vehicles: where, when, why, and how

Siobhan Powell & Maria Parajeles (ETH Zurich)

**sweet** swiss energy research  
for the energy transition  
PATHFNDR  
LUNCH TALK SERIES V:  
Flexibility provision from  
buildings and electromobility

- Automation
- Infrastructure
- Tariffs
- Aggregation
- Incentives

## Impacts of electric vehicles and heat pumps flexibility: European and Swiss perspectives

Jared Garrison (Swissgrid, formerly ETH Zurich)  
Patricia Mayer (ETH Zurich)  
Francesco Sanvito (TU Delft)

**sweet** swiss energy research  
for the energy transition  
PATHFNDR  
LUNCH TALK SERIES V:  
Flexibility provision from  
buildings and electromobility

- Access to flexibility
- Incentives
- Coordination across actors

# Our policy review



## Review of policies and regulations for sector coupling and demand-side flexibility

- ① What are policymakers currently doing about this?
- ② Compare Switzerland to its neighbours and the EU
- ③ Identify potential policies for Switzerland
- ④ Understand whether a shift was happening: from electrification to towards also considering flexibility



# Methods

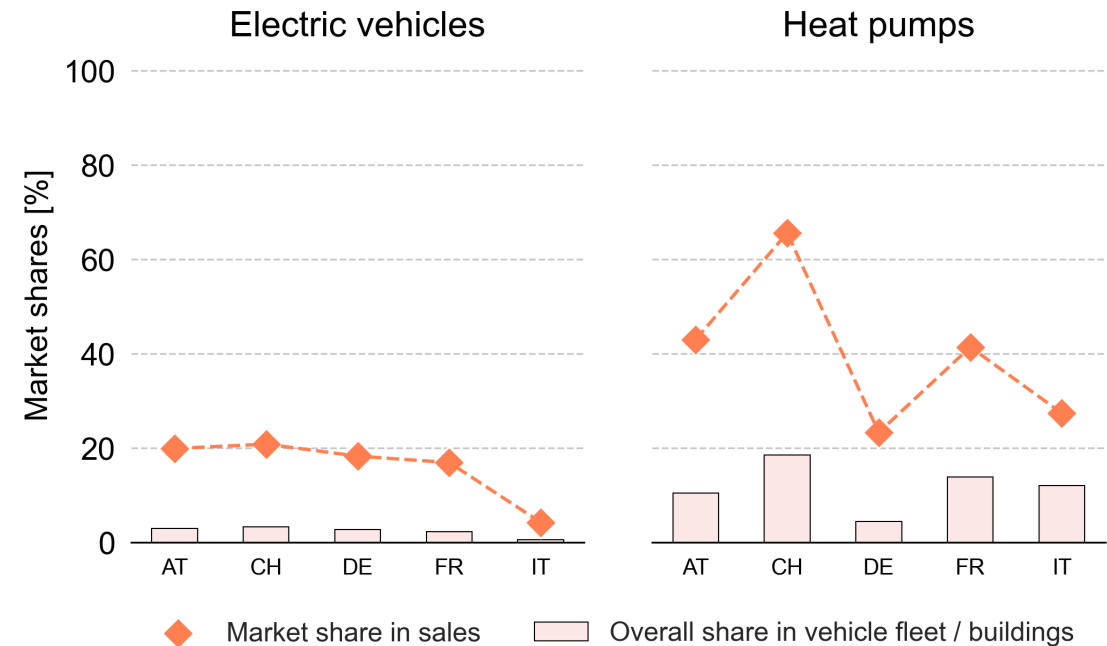
# Scope of our review

## Technologies which are...

- ✓ New
- ✓ Sector coupling
- ✓ Flexible
- ✓ Growing fast
- ✓ Growing big

1. Electric vehicles
2. Heat pumps (buildings)
3. Electrolysers
4. New industrial loads

No PV + batteries, No data centres



# Scope of our review

## Technologies which are...

- ✓ New
- ✓ Sector coupling
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No PV + batteries, No data centres

## Jurisdictions

- ✓ Switzerland
- ✓ its neighbours
- ✓ the EU



### Neighbours with:

- different flexibility needs
- different decarbonisation strategies
- different legislations

# Analysis framework



1. Directed data collection



2. Data classification



3. Synthesis and comparison



Swiss federal authorities



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Fedlex  
The publication platform for federal law



Bundesministerium  
der Justiz und  
für Verbraucherschutz

Bundesamt  
für Justiz

Startseite

Gesetz über die Elektrizitäts- und Gasversorgung

Policy Objective

Diffusion

Flexibility

Policy Instrument

Framework policy

Economic

Regulatory

Comparison:

- Across countries
- Across technologies
- Over time

# Data is available in the paper



## 1. Directed data collection



## 2. Data classification



## 3. Synthesis and comparison

#	Policy	Country	Year implemented	Year end	Targeted technologies	Policy objective	Policy instrument type	Policy target	Policy instrument design	Additional note	URL	Link date last	Data source
1	Code de l'énergie (Article D251-4)	FR	2018	N/A	ELECTRIC VEHICLE	DIFFUSION	ECONOMIC – Fiscal/Financial incentives	N/A	"Prime à l'autoconsommation": In 2024, a <b>subsidy of 27% of the electric vehicle's price</b> in the limit of 6000 EUR. Additional 5000 EUR for poorer households.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
2	Code de l'énergie (Article D251-5)	FR	2018	N/A	ELECTRIC VEHICLE	DIFFUSION	ECONOMIC – Fiscal/Financial incentives	N/A	"Valeur Autonomie": A new tax based on the <b>number of electric vehicles</b> . Increased since 2020 (initially applicable only above 15000km, rising from 200–4000 EUR) to 40000 EUR above.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
3	Code de l'énergie (Article D251-6)	FR	2018	N/A	ELECTRIC VEHICLE	DIFFUSION	ECONOMIC – Fiscal/Financial incentives	N/A	The French energy tariff system is split in two: market offers (the price is decided by the supplier and tariffs can vary), and regulated tariffs (TRV). Tarifs Réglementés de Vente, where a fixed price is decided by the CRE every year (this TRV is the TRVE). Tarifs Réglementés de Vente, where a fixed price is decided by the CRE every year (this TRV is the TRVE).	Only applies to small load customers (< 36 kW)	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
4	Arrêté du 26 juillet 2013 relatif aux	FR	2013	N/A	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	The TRVE applies to the French grid. The new tariff system (TRVE) is introduced with new flexibility considerations: in particular, a part of the price principle of the TRVE is now paid customer responsibility (TRVE). As such, the TRVE is now paid customer responsibility (TRVE).	Only applies to small load customers (< 36 kW)	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
5	Délibération n° 2021-135 du 16	FR	2022	N/A	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	Following the AEL 1 Directive (2021/24/UE), a fourth dynamic price tariff design for all "small load" customers (> 36 kW) is allowed in France. The CRE defines <b>dynamic tariffs</b> as offers where prices are indexed, for at least 15%, on wholesale.	Only applies to small load customers (< 36 kW)	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	French Energy
6	Délibération n° 2022-215 du 16	FR	2026	N/A	ANY	FLEXIBILITY	REGULATORY – Mandates	N/A	Starting 2026, all electricity utilities serving more than 200,000 sites must offer the <b>dynamic tariff</b> supported in DSR (Directive n° 2021-135) of the CRE. This standard was initially supposed to come into force in 2023.	Only applies to small load customers (< 36 kW)	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	French Energy
7	Arrêté du 15 juillet 2018 relatif aux	FR	2018	2020	ELECTRIC VEHICLE	FLEXIBILITY	ECONOMIC – Fiscal/Financial incentives	N/A	<b>Subsidy for EV charging stations</b> , with an additional amount of 1500 EUR for smart charging stations, for individual residential charges, up to 1000 EUR. 40% of total cost without smart charging for residential collective charges, up to 1000 EUR.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
8	Code général des Impôts (Article 170)	FR	2021	2025	ELECTRIC VEHICLE	DIFFUSION	ECONOMIC – Fiscal/Financial incentives	N/A	Credit d'impôt pour l'acquisition et la pose d'un système de charge pour véhicule électrique (CDEVE). The credit for EV charging stations of individual residential locations. Value of 75% of spendings, up to 800 EUR.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
9	Code général des Impôts (Article 170)	FR	2021	2025	ELECTRIC VEHICLE	FLEXIBILITY	ECONOMIC – Fiscal/Financial incentives	N/A	Credit d'impôt pour l'acquisition et la pose d'un système de charge pour véhicule électrique (CDEVE). The credit for EV charging stations of individual residential locations. Value of 75% of spendings, up to 800 EUR.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
10	Code de l'énergie (Article D251-4)	FR	2018	N/A	ELECTRIC VEHICLE	DIFFUSION	ECONOMIC – Fiscal/Financial incentives	N/A	WAF for EV charging stations, installation and maintenance is reduced to 5% (normally to 20% normally).		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
11	Code de la construction et de	FR	2021	N/A	ELECTRIC VEHICLE	DIFFUSION	REGULATORY – Codes and standards	N/A	Regulations setting the requirements of EV Charging station accessibility.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
12	Arrêté du 15 juillet 2018 relatif aux	FR	2018	N/A	ELECTRIC VEHICLE	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Public charging stations</b> must be equipped such that the <b>SDC can temporarily modulate the load</b> . No V2G conditions are mandatory at this time.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
13	Code de la construction et de	FR	2020	N/A	ELECTRIC VEHICLE	REGULATORY	REGULATORY – Codes and standards	N/A	<b>Right to charge</b> : Following the loi d'orientation des mobilités (LOM, 2019) any EV user can make a demand to install, at their own expense, a EV charging station at the parking spot that they occupy in their residence. Previously, only apartment.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
14	Code de l'énergie (Article D251-4)	FR	2021	N/A	ELECTRIC VEHICLE	DIFFUSION	REGULATORY – Codes and standards	N/A	<b>Right to charge</b> : Following the loi d'orientation des mobilités (LOM, 2019) any EV user can make a demand to install, at their own expense, a EV charging station at the parking spot that they occupy in their residence. Previously, only apartment.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
15	Code de l'énergie (Article D251-4)	FR	2021	N/A	ELECTRIC VEHICLE	DIFFUSION	REGULATORY – Codes and standards	N/A	<b>Right to charge</b> : Following the loi d'orientation des mobilités (LOM, 2019) any EV user can make a demand to install, at their own expense, a EV charging station at the parking spot that they occupy in their residence. Previously, only apartment.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
16	Code de l'énergie (Article D251-4)	FR	2021	N/A	ELECTRIC VEHICLE	DIFFUSION	REGULATORY – Codes and standards	N/A	<b>Right to charge</b> : Following the loi d'orientation des mobilités (LOM, 2019) any EV user can make a demand to install, at their own expense, a EV charging station at the parking spot that they occupy in their residence. Previously, only apartment.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
17	Code de l'énergie (Article D251-4)	FR	2021	N/A	ELECTRIC VEHICLE	DIFFUSION	REGULATORY – Codes and standards	N/A	<b>Right to charge</b> : Following the loi d'orientation des mobilités (LOM, 2019) any EV user can make a demand to install, at their own expense, a EV charging station at the parking spot that they occupy in their residence. Previously, only apartment.		<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
18	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
19	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
20	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
21	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
22	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
23	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
24	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
25	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
26	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
27	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
28	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
29	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
30	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
31	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
32	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
33	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
34	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
35	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
36	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
37	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
38	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
39	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
40	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
41	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
42	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
43	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Effacement de consommation") either through tariffs (through electricity supply directly), or through the intermediation of an "demand response operator" (i.e. aggregator) which participates in the TRVE.	Targets were changed for 2023 in the second	<a href="https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD">https://www.lafrance.gouv.fr/codes/section_lc/ESETX1000023383208/LEGISCTAGD</a>	14.05.2024	N/A
44	Décret n° 2021-1444 du 21 octobre	FR	2021	2025	ANY	FLEXIBILITY	REGULATORY – Codes and standards	N/A	<b>Definition of electricity demand response</b> ("Eff				

# Results

# R1: Electrification policy support is at different stages across technologies, but things are happening

← Instruments → ← Countries →

Technology diffusion policies by technology and country. Only policies in effect in June 2024 are shown. For targets, we only include technology-specific explicit targets set out in strategies, NECPs or in law.

Technology	Policy instrument type	Policy instrument sub-type	Instrument details	AT	FR	DE	IT	CH
Electric vehicles	Framework policy	Roadmap	Transport decarbonisation strategy 2035 effective ban of thermal engine cars	✓	✓	✓	✓	✓
		Targets	Targets of EV numbers Targets of EV chargers	✓	✓	✓	✓	✓
		Economic	Fiscal/Financial	✓	✓	✓	✓	✓ <sup>b</sup>
	Economic	Fiscal/Financial	EV Purchase subsidy	✓	✓	✓	✓	✓ <sup>b</sup>
			EV Tax credit, reduction or exemption	✓	✓	✓	✓	✓ <sup>b</sup>
			Extra purchase tax on polluting cars	✓	✓	✓	✓	✓ <sup>b</sup>
	Market-based	Fiscal/Financial	Social leasing programme	✓	✓	✓	✓	✓ <sup>b</sup>
			EV Charger subsidies	✓	✓	✓	✓	✓ <sup>b</sup>
			EV Charger tax credit, reduction or exemption	✓	✓	✓	✓	✓ <sup>b</sup>
			Company EV benefits	✓	✓	✓	✓	✓ <sup>b</sup>
Heat pumps	Framework policy	Roadmap	Heating decarbonisation strategy	✓	✓	✓	✓	✓
		Targets	Targets of HP installations	✓	✓	✓	✓	✓
		Economic	Fiscal/Financial	✓	✓	✓	✓	✓
	Economic	Fiscal/Financial	Heat pump purchase subsidy	✓	✓	✓	✓	✓
			Heat pump tax credit, reduction or exemption	✓	✓	✓	✓	✓
			Energy economy loan programmes for households	✓	✓	✓	✓	✓
	Market-based	Fiscal/Financial	Energy economy loan programmes for companies	✓	✓	✓	✓	✓ <sup>b</sup>
			Heating consulting subsidy	✓	✓	✓	✓	✓ <sup>b</sup>
			Reduced grid fees for smart meter-connected heat pumps	✓	✓	✓	✓	✓ <sup>b</sup>
	Regulatory	Codes & Standards	Energy economy certificates	✓	✓	✓	✓	✓
Electrolyser	Framework policy	Roadmap	Hydrogen strategy	✓	✓	✓	✓	✓
		Targets	National hydrogen infrastructure plans	✓	✓	✓	✓	✓
		Economic	Fiscal/Financial	✓	✓	✓	✓	✓
	Economic	Fiscal/Financial	Targets of electrolyser capacity/production	✓	✓	✓	✓	✓
			Targets of H <sub>2</sub> pipeline infrastructure	✓	✓	✓	✓	✓
			Support for hydrogen fuel cell vehicles	✓	✓	✓	✓	✓
	Market-based	Fiscal/Financial	Support for hydrogen-based heating	✓	✓	✓	✓	✓
			Support for hydrogen-based electricity production and storage	✓	✓	✓	✓	✓
			Reduced grid fees for electrolyzers	✓	✓	✓	✓	✓
	Regulatory	Codes & Standards	Emissions trading system (ETS)	✓	✓ <sup>d</sup>	✓ <sup>d</sup>	✓ <sup>d</sup>	✓
Industrial loads	Framework policy	Roadmap	Govt. support for H <sub>2</sub> production	✓	✓	✓	✓	✓
		Targets	Govt. support for H <sub>2</sub> infrastructure	✓	✓	✓	✓	✓
		Economic	Fiscal/Financial	✓ <sup>d</sup>	✓ <sup>d</sup>	✓ <sup>d</sup>	✓ <sup>d</sup>	✓ <sup>d</sup>
	Economic	Fiscal/Financial	Hydrogen taxonomy in law	✓	✓	✓	✓	✓
			Regulatory framework for hydrogen markets and networks	✓	✓	✓	✓	✓
			Subsidy programme for industrial heat pumps	✓	✓	✓	✓	✓
	Market-based	Fiscal/Financial	Energy economy loan programmes for companies	✓	✓	✓	✓	✓
			Carbon Contracts for Differences (CCfD)	✓	✓	✓	✓	✓
			Emissions trading system (ETS)	✓	✓ <sup>d</sup>	✓ <sup>d</sup>	✓ <sup>d</sup>	✓
	Regulatory	Codes & Standards	CO <sub>2</sub> tax on industrial fuels	✓	✓	✓	✓	✓
Electrolyser	Framework policy	Roadmap	Energy economy certificates	✓	✓	✓	✓	✓
		Targets	Govt. support for ind. electrification projects	✓	✓	✓	✓	✓
		Economic	Fiscal/Financial	✓	✓	✓	✓	✓
	Economic	Fiscal/Financial	Subsidy programme for industrial heat pumps	✓	✓	✓	✓	✓
			Energy economy loan programmes for companies	✓	✓	✓	✓	✓
			Carbon Contracts for Differences (CCfD)	✓	✓	✓	✓	✓
	Market-based	Fiscal/Financial	Emissions trading system (ETS)	✓	✓ <sup>d</sup>	✓ <sup>d</sup>	✓ <sup>d</sup>	✓
			CO <sub>2</sub> tax on industrial fuels	✓	✓	✓	✓	✓
			Energy economy certificates	✓	✓	✓	✓	✓
	Regulatory	Codes & Standards	Govt. support for ind. electrification projects	✓	✓	✓	✓	✓

## EVs and Heat Pumps:

- End-user adoption policies
- Targets, strategies are in place

→ Ready to phase out fossil technologies

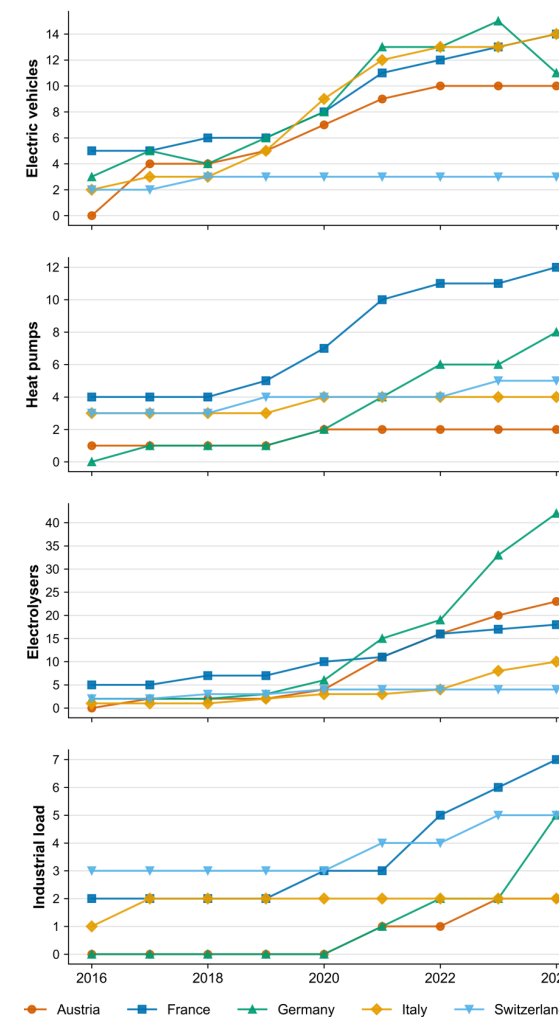
## Hydrogen:

- Strategies are mostly there but changing
- Some support, mostly by direct government funding

## Industrial electrification:

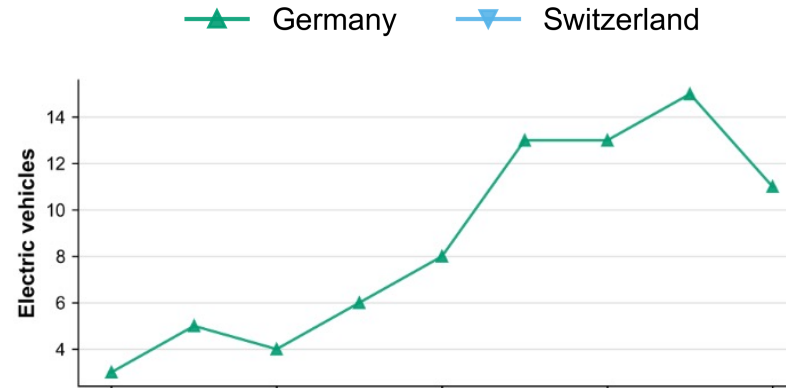
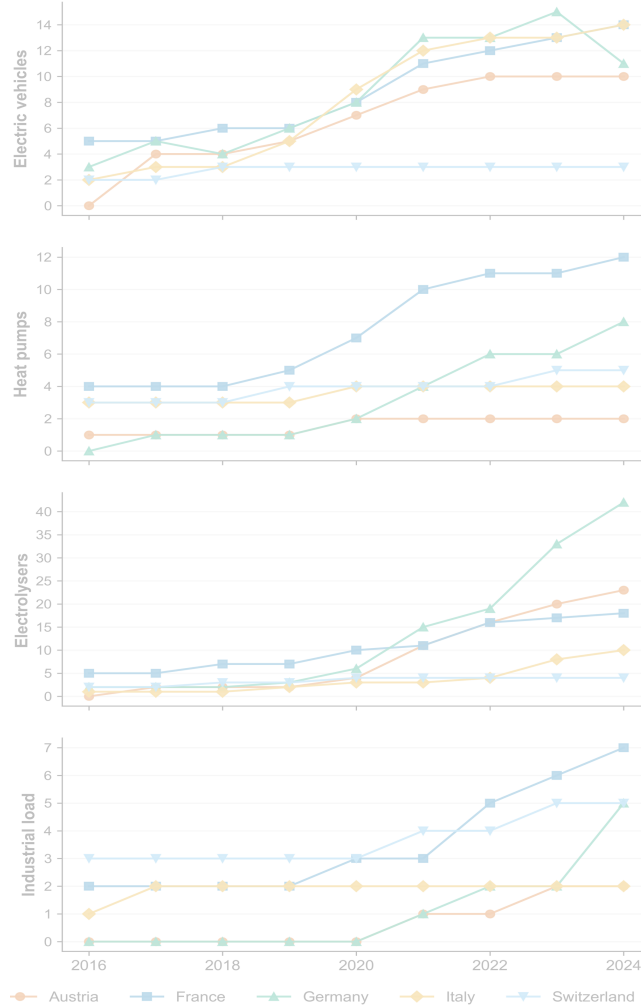
- Lack of policies, beyond EU ETS

Number of policy items



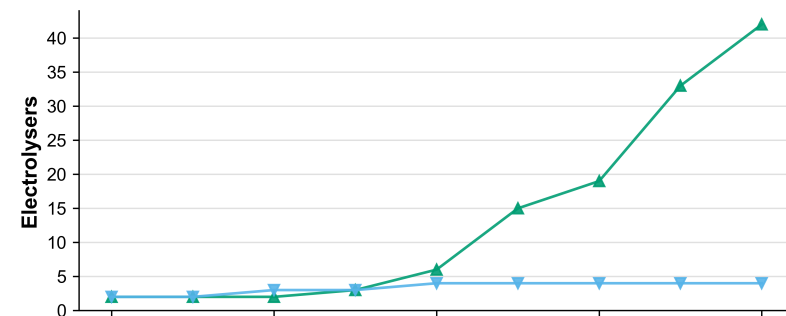
## R2: All countries are doing something, some do it differently



Number of policy items



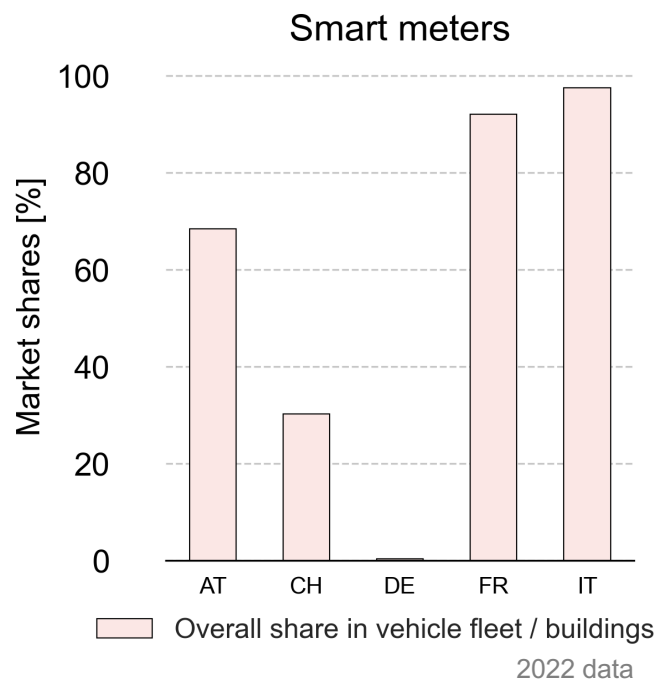
EV support in  is going down

- Removed support for EVs
- Removed support for chargers



 pushing hard for H<sub>2</sub>,  
 is not

# R3: Infrastructure policies & readiness are very different across countries



Instrument details	AT	FR	DE	IT	CH	EU
Target of smart meter installation	✓	✓	✓	✓	✓	✓ <sup>a</sup>
Financial penalty for households without smart meters		✓				
Reduced grid fees for appliances if smart meter is installed			✓			
DSOs mandated to install smart meters	✓	✓ <sup>b</sup>	✓	✓ <sup>b</sup>	✓	✓ <sup>a</sup>

- 🇫🇷, 🇮🇹 are far ahead
- 🇩🇪 far behind
- 🇨🇭 share is growing but still low





- 🇫🇷 getting last households on board with financial penalties
- 🇩🇪 trying financial incentives
- All have mandates: 🇨🇭 has 80% target by 2027

# R3: Infrastructure policies & readiness are very different across countries



Technology	Policy instrument type	Instrument details	AT	FR	DE	IT	CH	EU
EV V1G/V2G chargers	Framework policy	Target of V1G public chargers					✓	
	Economic	Subsidy or tax credit for V1G chargers	✓	✓			✓ <sup>c</sup>	
		Subsidy or tax credit for V2G chargers					✓ <sup>c</sup>	
		No double taxation of electricity for V2G chargers			✓	✓		✓
	Regulatory	Public chargers must be technically controllable by DSOs		✓				✓
		Local charging network must be co-designed with DSOs		✓				
		All new EV chargers must be technically controllable by DSOs	✓		✓		✓	✓
		DSOs must be notified of all new EV chargers			✓			
		Requirement to assess the role of infrastructure for EV flexibility every 3 years						✓

## In general:

- Lots of **regulation** with standards & mandates
-   are lagging on economic support for V1G (smart charging)
-   are ahead

## Switzerland :

- **Uneven support across cantons:**
  - e.g, Bern subsidises V2G at 3000 CHF, some others barely support V1G
- Some standards & requirements set, but no mandates or right-to-charge



# R4: Demand-side flexibility support is increasing


## Different countries → different ways

← Instruments →



← Countries →

Procurement mechanism		Supporting policy instrument	AT	FR	DE	IT	CH	EU
Tariffs	Grid tariffs	Framework for experimental grid tariffs	✓			✓		
		Allowing dynamic grid tariffs	✓	✓			✓	✓
	Electricity tariffs	Free choice of electricity supplier <sup>d</sup>	✓	✓	✓	✓	✓ <sup>a</sup>	✓
		Allowing TOU electricity tariffs	✓	✓	✓	✓	✓	✓
		Allowing CPP electricity tariffs		✓				✓
		Allowing RTP electricity tariffs	✓	✓ <sup>b</sup>	✓	✓	✓	✓
		Mandating suppliers to offer RTP electricity tariffs		✓	✓			✓
Direct Load Control	Through regulations	DSOs may use DLC in general, in exchange for reduced grid fees	✓		✓ <sup>b</sup>			
		DSOs may use DLC in grid emergencies		✓ <sup>b</sup>			✓	
		TSOs may use DLC in grid emergencies		✓				
	Through contracts	DLC contracts are allowed at DSO level	✓ <sup>a,c</sup>	✓			✓	✓
		DLC contracts are allowed at TSO level	✓ <sup>a,c</sup>	✓				✓
Local flexibility markets		Regulatory sandbox enabling pilot projects		✓		✓		
		Undertaking of pilot projects for local flexibility markets		✓	✓	✓	✓ <sup>b</sup>	
		Established local flexibility market		✓				
		DSOs shall procure flexibility through markets only			✓			✓
Wholesale markets	Day-ahead and intraday markets	DSF may participate in wholesale markets	✓	✓	✓	✓	✓	✓
		Facilitating access conditions for DSF		✓				✓
TSO markets	Ancillary markets	DSF can participate in ancillary markets	✓	✓	✓	✓	✓	✓
		Platform facilitating conditions for market access	✓			✓	✓	
	Interruptibility schemes	DSF can participate in TSO interruptibility schemes	n.a	✓	n.a	✓ <sup>a</sup>	n.a	✓
		Facilitating DSF access by reducing bid size	n.a	✓	n.a		n.a	
	Strategic grid reserves	DSF must be considered when establishing strategic grid reserve needs	✓	n.a	n.a	n.a		
		DSF can participate in strategic grid reserve auctions	✓	n.a	n.a	n.a	✓ <sup>a</sup>	
	Capacity mechanisms	DSF can participate in capacity mechanisms	n.a	✓	✓ <sup>a</sup>	✓	n.a	✓
		Facilitating conditions for market participation	n.a	✓		✓	n.a	
Government economic support for DSF participation		n.a	✓			n.a	✓	


### Tariffs

- Dynamic tariffs are now allowed. Mandates haven't kicked in
-  stands out as a non-liberalised market

### Direct load control

- Different types: regulated | emergencies | contracts
- Quite common in contracts in , , 



### Local energy / flexibility markets

- : established market
- Others: mostly pilot projects, rarely with a follow-up

### Wholesale markets

- Pooling & access conditions are improving

### TSO-level markets

- access is improving
-  is focusing on capacity
-  doesn't really involve demand-side flexibility

# R5: Flexibility policies arrived late, but are catching up



- Flexibility policies are showing up, fast in many countries

- 2019: EU's new electricity packages
- > 2022: Ukraine – Russia energy crisis

- EVs, heat pumps: low penetration coincided with low renewables and flexibility needs initially

- Future policy needs to include flexibility *with* electrification

2023: France stops subsidizing conventional chargers  
+ increases subsidies for V1G chargers

+ as did Austria & some Swiss cantons

Key takeaways, recommendations

# Key takeaways (for Switzerland)

1. **Electrification is unevenly supported across technologies:**
  - EVs & heat pumps well supported
  - Hydrogen & industry lack support and strategies
2. **Switzerland's flexibility infrastructure is catching up**
  - Smart meters appearing (federal policy mandate)
  - EV infrastructure lacks federal guidelines
3. **Demand-side flexibility is on the agenda of policymakers, but barriers remain**
  - Dynamic tariffs are allowed, Direct Load Control contracts often utilised
  - No free choice of supplier for households
  - Some efforts to allow market access for small loads are being made (pooling, reduced bid sizes)
4. **Policy timing was consistent with the system's needs**
  - Initially: support for electrification without considering flexibility as much
  - Now: policies increasingly consider flexibility, as electrification & intermittent renewables penetrate



# Recommendations

## 1. Consider flexibility & electrification together

- Policies to support new loads  $\Leftrightarrow$  Policies to operate them flexibly
  - Example: EV charger support  $\Leftrightarrow$  Smart chargers, not conventional
  - Data centres ?

## 2. Support industry's electrification

- Whether it's direct electrification or through hydrogen, it lacks support
- Untapped decarbonisation potential

## 3. Address small loads' participation in flexibility

- Continue improving market access
- Address non-liberalisation's barriers: if your supplier doesn't offer flexibility incentives, you're very limited in flexibility utilisation



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