Notes on the Design of the Turkish Emission Trading System

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Highlights

- Including only installations having emissions more than 100 ktCO2e/year under the Turkish ETS would led to the exclusion of installations producing plaster, glass, mineral wool and iron. However, when compared with the EU ETS coverage, there seems to be room for including more installations under the Turkish MRV.
- The adoption of the EU ETS installation categorization criteria can help to determine installations more accurately. Using single emission-based criterion may lead to biased installation selection.
- Turkish climate authorities announced that the cap will change along with the projected emissions under the announced NDC in April 2023, in which Türkiye pledged to limit emissions to 695 MtCO2e in 2030, and to 805 MtCO2e in 2038 (peak year).
- Historical emissions, however, reveal a different path. If the historical trend continues in the future, Turkish emissions would only reach to 653 MtCO2e in 2030, and to 751 MtCO2e in 2038, both well below the levels reflected in the NDC.
- That means, employing NDC projected emissions rather than emissions reflecting historical trend would cause a 17 million oversupply of allowances in 2027 (when transition phase ends). Hence, there is a risk for the Turkish ETS to face with extremely low carbon prices, if not zero.
- Existence of fossil-fuel subsidies, tax breaks and special treatment offered to some industries in Türkiye are another factors that can decrease the effectiveness of ETS in Türkiye.

Introduction

Türkiye announced that the Turkish Emission Trading System (ETS) will begin in 2025. The first step in establishing an ETS in Türkiye started with the establishment of a Monitoring-Reporting-Verification (MRV) system in 2017. According to the regulation, installations emitting above a threshold level of GHGs (> 100 ktCO2e) are covered in electricity, refinery, non-metallic minerals, basic metals, paper and chemicals sectors. As of 2020, 476 installations under the Turkish MRV system emitted 251 MtCO2e of GHGs, which corresponds to 48.2% of 520 MtCO2e total emissions.

This policy brief aims to highlight possible shortcomings in the Turkish ETS by reviewing the experiences of existing ETS practices globally, specifically of the EU ETS which shares many common elements with that of Türkiye.

Key Features of the Implemented ETS Initiatives Worldwide

According to the World Bank's Carbon Pricing Dashboard dataset, as of end 2023, there are 36 (regional and subnational) ETS initiatives implemented, 3 scheduled and 22 under consideration (see Table 1).

Table 1. Key Statistics for 2023 on ETS Initiatives

Status	Number	GHGs Emissions Scope (GtCO2e)	Share (% of Global Emissions)

Implemented	36	8.91	17.7
Scheduled	3	N/A	N/A
Under Consideration	22	N/A	N/A

Source: Carbon Pricing Dashboard, The World Bank

Table 2 presents the key statistics on implemented ETS initiatives.

These 36 ETS initiatives covered 8.91 GTCO2e which accounts for 17.7% of global emissions.

In terms of 2023 share in global emissions, the biggest initiative is the Chinese National ETS, which became operational in 2021, that covers 4.5 GtCO2e (8.9% of global emissions). It is followed by the EU ETS with 1.4 GtCO2e that accounts for 2.7% of global emissions.

The price of allowances ranges between 96 (EU ETS) and 1 US$ (Saitama ETS-Japan), with an average price of 2 US$ in 2023. Initiatives, overall, generate 65.6 billion US$ revenues with the EU ETS tops the list with 42.2 billion US$.

Table 2. Key Statistics for 2023 on Implemented ETS Initiatives

Name-Country	Year	Price (US$/ton CO2e)	Revenue (billion US$)	Sectoral Scope	GHG Emission Scope (Mt CO2e)	2023 Share (% Global Emissions)	2023 Share (% Jurisdiction Emissions)
China national ETS	2021	8	0	Electricity	4500	8.92	31
EU ETS	2005	96	42.152	Manufacturing, Electricity, Aviation	1354	2.69	38
Korea ETS	2015	11	0.243	Manufacturing, Electricity, Buildings, Aviation, Public, Waste	507	1.01	74
Germany ETS	2021	33	6.963	Buildings, Road Transport	305	0.6	40
Indonesia ETS	2023	N/A	0	Electricity	300	0.6	26
California CaT-USA	2012	30	4.027	Manufacturing, Electricity, Transport, Buildings	279	0.55	74
Guangdong pilot ETS-China	2013	12	0.119	Manufacturing, Aviation	278	0.55	40
Alberta TIER-Canada	2007	48	0.44	all installations with >100 kt CO2e/year	148	0.29	58
Kazakhstan ETS	2013	1	0	Electricity, Manufacturing	136	0.27	46
Mexico pilot ETS	2020	0	0	Manufacturing, Electricity	280	0.27	40
Fujian pilot ETS-China	2016	5	0.0002	Manufacturing, Aviation	125	0.25	51
Hubei pilot ETS-China	2014	7	0.013	Manufacturing	125	0.25	27
Shanghai pilot ETS-China	2013	9	0.02	Manufacturing, Electricity, Buildings, Transport	107	0.21	36
RGGI-USA	2009	15	1.194	Electricity	83	0.17	14

Tianjin pilot ETS-China	2013	5	0.012	Manufacturing, Buildings	75	0.15	35
Chongqing pilot ETS-China	2014	5	0.012	Manufacturing	73	0.14	51
Quebec CaT-Canada	2013	30	1.338	Manufacturing, Electricity, Transport, Buildings	59	0.12	77
Washington CCA-USA	2023	22	0	Manufacturing, Electricity, Transport, Buildings, Waste	57	0.11	70
New Zealand ETS	2008	34	1.274	Manufacturing, Electricity, Buildings, Aviation, Road Transport, Waste, Forestry	38	0.08	49
Beijing pilot ETS-China	2013	13	0.016	Manufacturing, Electricity, Transport, Buildings	35	0.07	24
Ontario EPS-Canada	2022	48	0	all installations with >50 kt CO2e/year	38	0.07	25
Austria ETS-China	2022	35	0	Transport, Buildings, Agriculture, Electricity, Manufacturing	32	0.06	40
Shenzhen pilot ETS-China	2013	9	0.004	Manufacturing, Electricity, Buildings, Transport	25	0.05	30
Oregon ETS-USA	2021	0	0	Liquid fuels, Prophane, Natural Gas utilities	21	0.04	43
Nova Scotia CaT-Canada	2019	21	0.038	Manufacturing, Electricity, Transport, Heating	13	0.03	87
UK ETS	2021	88	7.592	Manufacturing, Electricity, Aviation	113	0.03	28
Saskatchewan OBPS-Canada	2019	48	0	all installations with >25 kt CO2e/year	9	0.02	13
Tokyo CaT-Japan	2010	5	0	Manufacturing, Electricity, Buildings, Transport	12	0.02	20
Canada federal OBPS	2019	48	0.086	all installations with >50 kt CO2e/year	7	0.01	1
New Brunswick ETS-Canada	2021	48	0	all installations with >50 kt CO2e/year	6	0.01	50

Newfoundland and Labrador PSS-Canada	2019	48	0.0001	all installations with >25 kt CO2e/year	4	0.01	43
Saitama ETS-Japan	2011	1	0	Manufacturing, Electricity, Buildings	7	0.01	17
Switzerland ETS	2008	94	0.047	Manufacturing, Electricity, Aviation	5	0.01	11
BC GGIRCA-Canada	2016	18	0	LNG facilities	0	0	0
Massachusetts ETS-USA	2018	12	0.054	Electricity	5	0	8
Montenegro ETS	2022	N/A	0	Manufacturing, Electricity	N/A	N/A	N/A
Total			**65.6**		**9160.9**	**17.7**	**-**

Source: Carbon Pricing Dashboard, The World Bank

As can be observed from Table 2, sectoral coverage varies significantly across initiatives. EU, Korea and New Zealand ETSs top the list in terms of sector coverage.

An Analysis of the Turkish Emission Trading System

Türkiye took the first step on establishing a domestic ETS by instituting a MRV system in 2017. According to the regulation, installations above determined sizes in electricity, iron-steel, aluminum, cement, glass, ceramics, lime, mineral wool, paper, refinery products and chemicals sectors are required to report their emissions to the Turkish Ministry of Environment, Urbanization and Climate Change. In terms of sectoral and product coverages, Turkish MRV matches almost one-to-one with the EU ETS, except aviation.

According to the officials, the pilot phase of the Turkish ETS will start on 15 October 2024 with the announcement of the national allowance allocations. Following a 2-year transition period, the first implementation phase will start on 15 October 2026.

Note that Turkish MRV categorizes installations under three groups: Category A includes installations with emissions lower than 50 ktCO2e; Category B installations with emissions between 50 and 500 ktCO2e; and Category C installations with emissions higher than 500 ktCO2e.

Table 3 presents key statistics of the Turkish MRV system.

Table 3. Key Statistics on Turkish MRV System in 2020

	Category A		**Category B**		**Category C**		**Total**	
Activity	**Emissions (tCO2e)**	**Number**	**Emissions (tCO2e)**	**Number**	**Emissions (tCO2e)**	**Number**	**Emissions (tCO2e)**	**Number**
Non-Ferrous Metals	0	0	664855	9	241756	1	**906611**	**10**
Plaster	211787	9	0	0	0	0	**211787**	**9**
Aluminum	118073	5	98154	2	637567	1	**853794**	**8**
Glass	211955	7	2146532	12	0	0	**2358487**	**19**
Cement	0	0	1294851	4	66278981	53	**67573832**	**57**
Lime	44099	3	2186179	22	541259	1	**2771537**	**26**
Ceramics	541917	27	1712381	17	253776	1	**2508074**	**45**
Bricks	617014	86	141942	3	282441	1	**1041397**	**90**
Mineral Wool	101401	6	126507	3	0	0	**227908**	**9**

Iron	312068	18	2063901	21	0	0	**2375969**	**39**
Pig Iron-Steel	55732	7	2292978	11	29951784	6	**32300494**	**24**
Electricity	56694	5	1595537	14	116341452	49	**1.18E+08**	**68**
Paper	575614	30	1473825	14	741143	2	2790582	46
Chemicals	190996	11	882155	3	7907469	7	8980620	21
Refinery Products	0	0	54368	1	7560373	4	7614741	5
Total	**3037350**	**214**	**16734165**	**136**	**230738001**	**126**	**2.51E+08**	**476**
% of MRV Emissions	*1.2*		*6.7*		*92.1*		*100*	
% of Total Emissions	*0.6*		*3.2*		*44.4*		*48.2*	

Source: Turkish Ministry of Environment, Urbanization and Climate Change

By 2020, the Turkish MRV covered 476 installations, of which 214 belonged to Category A, 136 belonged to Category B, and 126 belonged to Category C.

In 2020, Türkiye emits 520 MtCO2e, and the Turkish MRV covered 48.2% of it (251 MtCO2e). Category A, Category B and Category C installations emit 1.2%, 6.7% and 92.1% of emissions covered under the Turkish MRV, respectively.

It is announced that the Turkish ETS will cover only Category C installations during the pilot phase. While Category C installations made up for the majority of emissions, note that, if only Category C installations would be covered, then GHGs emissions of installations producing Plaster, Glass, Mineral wool, and Iron would not be accounted for (as of 2020)[1].

Table 4 presents the average emissions of installations covered under the Turkish MRV and the EU ETS.

Table 4. Average GHGs Emissions under the Turkish MRV and the EU ETS (tCO2e)

	Turkish MRV			**EU**
Activity	**Category A**	**Category B**	**Category C**	**EU ETS Av**
Non-Ferrous Metals	none	73873	241756	87068
Plaster	23532	none	none	29844
Aluminum	23615	49077	637567	145198
Glass	30279	178878	none	53651
Cement	none	323713	1250547	475303
Lime	14700	99372	541259	121886
Ceramics, Bricks	10256	92716	268109	19438
Mineral Wool	16900	42169	none	43368
Iron	17337	98281	none	77756
Pig Iron-Steel	7962	208453	4991964	495881
Electricity	11339	113967	2374315	153955
Paper	19187	105273	370572	33682
Chemicals	17363	294052	1129638	139005
Refinery Products	none	54368	1890093	1044465

Source: Turkish Ministry of Environment, Urbanization and Climate Change; EU ETS data viewer

[1] Note that, figures reflect the situation as of 2020 (the latest year for which data is available) and that installation coverage would be different when ETS starts in 2025.

As can be seen from Table 4, the Turkish MRV categorization (which considers to cover Category C installations only) led to the exclusion of installations producing plaster, glass, mineral wool and iron. However, when compared with the EU ETS coverage, there seems to be room for including more installations under the Turkish MRV. For example, average installation emission in plaster production under the EU ETS is 29.8 ktCO2e, which is very close to 23.5ktCO2e of Category A installations under the Turkish MRV. This is also the case for glass and iron productions. EU ETS glass and iron installation average is 53.7 and 77.8 ktCO2e, respectively, which are even well below the average emissions of installations under Category B in the Turkish MRV.

Installation coverage under the Turkish MRV and eventually the Turkish ETS can be considered to be extended by revising the rules employed in installation categorization. And in that regard, the EU ETS installation categorization rules may help. Table 5 below presents conditions employed in installation selection under the EU ETS.

Table 5. Categories of Activities to which ETS Directive Applies

Activity	**Category C-Turkish MRV**	**EU ETS**
Non-Ferrous Metals	emissions >100 ktCO2e/year	combustion units with a total rated thermal input > 20 MW
Plaster	emissions >100 ktCO2e/year	combustion units with a total rated thermal input > 20 MW
Aluminum	emissions >100 ktCO2e/year	combustion units with a total rated thermal input > 20 MW
Glass	emissions >100 ktCO2e/year	melting capacity >20 tons/day
Cement	emissions >100 ktCO2e/year	rotary kilns >500 tons/day; other furnaces >50 tons/day
Lime	emissions >100 ktCO2e/year	rotary kilns or other furnaces >50 tons/day
Ceramics, Bricks	emissions >100 ktCO2e/year	production capacity >75 tons/day
Mineral Wool	emissions >100 ktCO2e/year	melting capacity >20 tons/day
Iron	emissions >100 ktCO2e/year	combustion units with a total rated thermal input > 20 MW
Pig Iron-Steel	emissions >100 ktCO2e/year	capacity > 2.5 tons/hour
Electricity	emissions >100 ktCO2e/year	combustion units with a total rated thermal input > 20 MW
Paper	emissions >100 ktCO2e/year	capacity > 20 tons/day
Chemicals	emissions >100 ktCO2e/year	carbon black combustion units with a total rated thermal input > 20 MW; etc.
Refinery Products	emissions >100 ktCO2e/year	combustion units with a total rated thermal input > 20 MW

Source: Turkish Ministry of Environment, Urbanization and Climate Change, EU ETS Regulatory Guidance for Installations (https://climate.ec.europa.eu/system/files/2016-11/guidance_interpretation_en.pdf)

Turkish MRV is announced to employ a single criterion to determine the scope of installations, that is, installations emitting more than 100 ktCO2e will be covered under the Turkish ETS. However, EU ETS have long employed a more detailed set of criteria specifically designed for each activity as shown in Table 5. Using single emission-based criterion may lead to biased installation selection.

How is Turkish ETS expected to function?

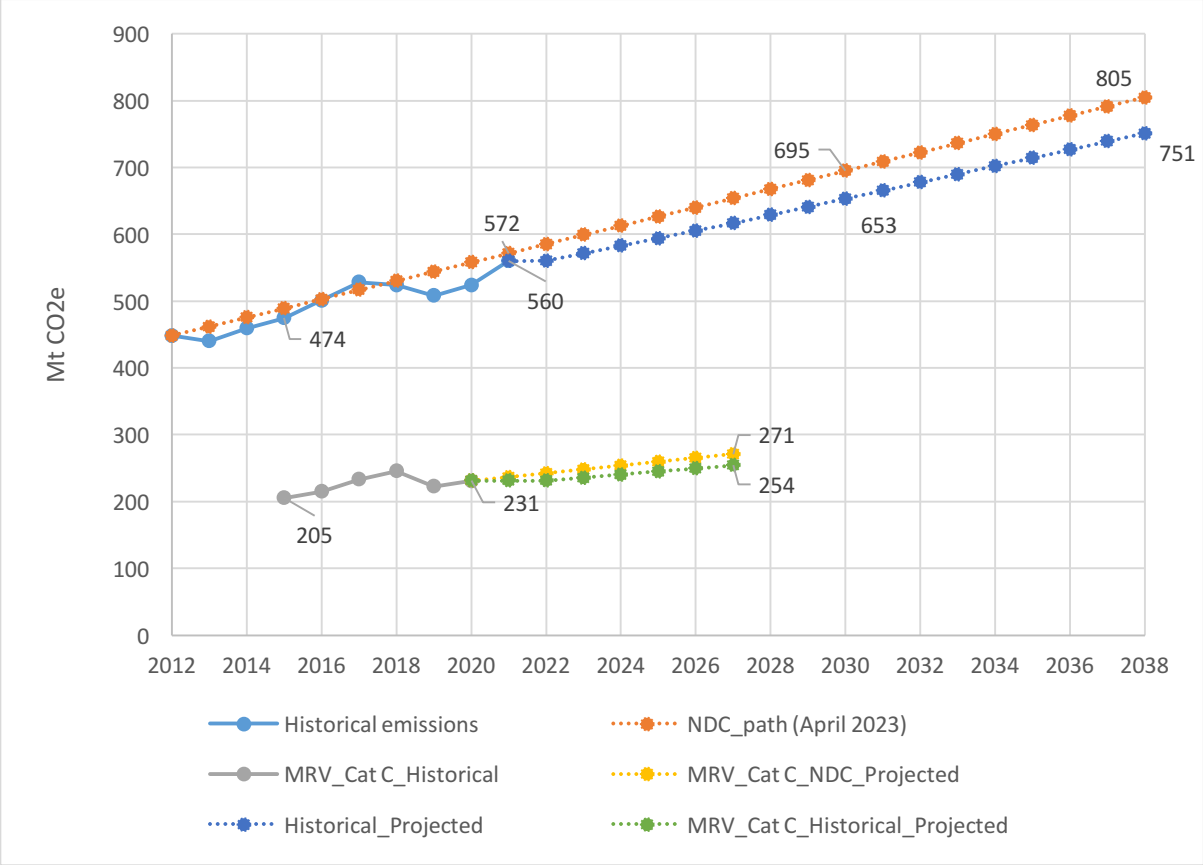
One of the most important element of ETS is the determination of the cap. The cap sets the upper boundary for permissible greenhouse gas (GHG) emissions within a scheme, essentially determining

the total number of allowances (emissions budget) allocated to covered entities. An absolute cap ensures that emissions remain below a specified limit, guaranteeing a predetermined environmental outcome.

The pricing of allowances is influenced by factors like the quantity of available allowances under the cap, the ease of emissions reduction for installations, and variables such as consumption patterns and economic growth drivers. These elements must be considered when formulating a cap. While the carbon price is affected by these factors as well, a generous emissions budget tends to result in a surplus market and a lower allowance price, diminishing incentives for emission reduction. Conversely, a relatively stringent emissions budget, or a 'tight cap,' implies a restricted supply of allowances, creating a market shortfall, leading to a higher allowance price, and providing a stronger fiscal motivation for emission reduction. Hence, determining the cap trajectory accurately is important for an effective functioning of ETS.

Turkish authorities announced that the cap will increase (not decrease) along with the projected emissions under the announced NDC[2] in April 2023.

Figure 1. Historical and Projected GHGs Emissions in Türkiye (MtCO2e)



Source: Climate Action Tracker; Turkish Ministry of Environment, Urbanization and Climate Change; author's calculation

According to the Turkish NDC;

[2] https://unfccc.int/sites/default/files/NDC/2023-04/T%C3%9CRK%C4%B0YE_UPDATED%201st%20NDC_EN.pdf

Turkish emissions would reach to 1178 Mt CO2e by 2030 under Business-as-Usual (BaU) scenario (not shown in Figure 1). As can be seen from Figure 1, Turkish authorities pledged to limit emissions to 695 MtCO2e in 2030, which corresponds to a 41% decrease from BaU.

Moreover, NDC-path is expected to reach 805 Mt CO2e in 2038, the year which the emissions will announced to peak.

Historical emissions, however, reveal a different path. Between 1990 and 2021, Turkish emissions grew, on average, by 11.2 MtCO2e annually. If this historical trend continues in the future, Turkish emissions would reach to 653 MtCO2e in 2030, and to 751 MtCO2e in 2038, both well below the levels reflected in the NDC.

Turkish MRV started operation in 2015. Category C installations emitted, on average, 44.2% of total emissions. In 2020, Turkish emissions reached to 524 MtCO2e, and 231 Mt of them were covered under the MRV Category C which is expected to apply under Turkish ETS.

If the cap will increase along with the NDC path (as announced officially), the cap is expected to reach to 271 MtCO2e in 2027 (the year the transition period of the Turkish ETS will end).

However, if the cap would have increased along with the historical path, it is expected to reach to 254 MtCO2e (see the evolution of *MRV_CatC_Historical_Projected* in Figure 1). That means, by 2027, when the transition phase of Turkish ETS ends, there is a risk that "actual" MRV-Cat C emissions would be 17 Mt (271-254) lower than the would-be allocated allowances.

Note that, the existence of surplus of allowances under the EU ETS's first phase had driven down the allowance prices near to zero in 2008[3].

Hence, there is a risk for the Turkish ETS to face with extremely low carbon prices, if not zero, when free allocation partly expires in 2027.

To avoid this outcome, Turkish NDC must be revised to reflect actual and expected trends in GHGs emissions.

What should be the evolution of cap under the Turkish ETS?

According to the Climate Action Tracker[4], an independent scientific project that tracks government climate action, a 1.5 degree compatible and fair emission level of Türkiye is 433.9 Mt CO2e in 2030 (as opposed to 695 Mt CO2e announced in the NDC).

Assuming that the MRV Category C installations, those are expected to be covered under the Turkish ETS, would continue to emit on average 44.2% of total emissions, one can find the "1.5 Degree Compatible Cap" for Türkiye as presented in Figure 2.

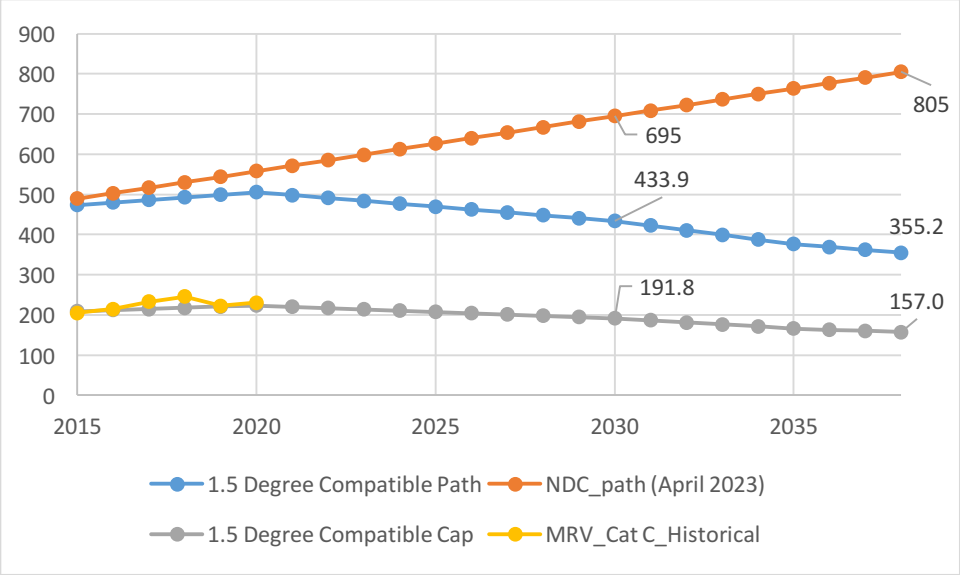
According to the calculation, the cap will be reduced to 191.8 Mt, and to 157 MtCO2e in 2030 and 2038, respectively.

The absolute reduction in cap would ensure a positive carbon price in the Turkish ETS market.

Figure 2. NDC and 1.5-Degree Compatible Paths

[3] https://www.frontier-economics.com/uk/en/news-and-articles/articles/article-i20084-eu-emissions-has-the-ets-been-a-success/

[4] https://climateactiontracker.org/countries/turkey/



Source: Climate Action Tracker; Turkish Ministry of Environment, Urbanization and Climate Change; author's calculation

Concluding Remarks

ETS gaining ground in limiting GHGs. As of 2023, there are 36 implemented, 22 under consideration and 3 scheduled ETS initiatives worldwide.

Türkiye is one of the countries considering a domestic ETS to be effective in 2025. Türkiye's effort in establishing an ETS started in 2017 by instituting a MRV system that covered installations in electricity, refinery products, non-metallic minerals, iron-steel, aluminum, paper and chemicals, almost the same coverage as the EU ETS, except aviation.

Installations scope is rather limited due to the criterion announced to be employed. According to officials, only Category C installations emitting more than 100 ktCO2/year will be included under the Turkish ETS. Historical MRV data reveals that if this is the case then no installations producing plaster, glass, mineral wool and iron would be covered. Applying the EU ETS installation selection criteria, those are specifically designed for each activity, may solve this problem.

Another important issue is the size of the cap. The EU ETS experience revealed that effective carbon prices are formed only when allowances are scarce. In other words, oversupply of allowances would drive down carbon prices to zero, and renders ETS ineffective.

Türkiye has not determined officially the cap yet but rather announced that it will be determined along with the emissions under the NDC submitted in April 2023. However, the Turkish NDC is criticized for being unsatisfactory. First of all, actual emissions since 2012 have been systematically lower than the projected emissions under the NDC, except 2017. Secondly, according to the Climate Action Tracker methodology, it is neither aligned with 1.5 nor 2-degree path.

Contrary to growing emission path under the Turkish NDC, Climate Action Tracker's "fair" and "1.5-degree compatible" path requires an absolute reduction in emissions to 433.9 MtCO2e (as opposed to 695 MtCO2e) in 2030. If MRV Category C installations continue to emit 44.2% of total emissions in the future, this indicates that the cap should be reduced to 191.8 MtCO2e in 2030 from 231 MtCO2e in 2020. Otherwise, our calculations show that, using NDC path would lead to at least 17 million oversupply of allowances in 2027, which would drive down carbon prices in Türkiye to zero.

It should be acknowledged that ETS is not the only tool to decarbonize economies. Also note that, existing and new companion policies can help improve the effectiveness of carbon markets

(complementary policies), duplicate incentives provided by carbon markets (overlapping policies), or in some cases, counteract incentives in carbon markets (countervailing policies)[5]. Fossil-fuel subsidies, and tax breaks and special treatment offered to some industries in Türkiye can be viewed as countervailing policies risking to limit the effectiveness of ETS in Türkiye.

[5] https://icapcarbonaction.com/system/files/document/ets-handbook-2020_finalweb.pdf