



Voluntary emission trading potential of Turkey

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HIGHLIGHTS

- Turkey has 1,071 million tons GHG emission reduction in three sectors for 2013–2020.
- Turkey can only use voluntary emission trading for reduction of GHGs.
- Total revenue estimation could be between 19,775 and 33,386 million US Dollars.
- Turkey's economy and emissions have been rapidly growing.
- Turkey can more easily reduce its emission by using voluntary emission trading.

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ABSTRACT

Climate change is likely to cause serious market failures, and carbon trading as a market instrument can help correct its negative impacts. The global carbon markets established to combat climate change include regulatory and voluntary markets. Turkey cannot utilise regulatory carbon markets under the Kyoto Protocol. As a result of her unique position in the UNFCCC, some offsetting projects in Turkey have benefitted only voluntary emission trading for the reduction of GHG emissions. Due to on-going climate change negotiation under the UNFCCC, it seems that Turkey will not use the current regulatory carbon markets. Thus, Turkey should promote the use of and participation in voluntary carbon markets. In this article, emission reduction potential via energy efficiency, renewable energy and solid waste management, and corresponding offsetting of credits with their estimated prices is investigated for the period between 2013 and 2020. The emission reduction potential for energy efficiency, renewable energy and solid waste management projects are estimated at 403, 312 and 356 million tons of CO₂ equivalent emissions respectively, totalling 1,071 million tons of CO₂ equivalent. The total revenue of the carbon certificates are estimated in the range of 19,775–33,386 million US Dollars for the same period.

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1. Introduction and background

Carbon trading, which is a market-based instrument aimed at mitigating climate change through trading greenhouse gases (GHG) emissions, has been established for the purpose of preventing market failure due to climate change (Perdan and Azapagic, 2011). The 'carbon market' refers to the buying and selling of GHG emissions reduction amounts and allowances

credits (Bayon et al., 2009). This is because emission reductions should take place in the lowest level for minimising the overall cost of combating climate change. Emission trading enables actors to find minimum cost reductions via carbon markets (Perdan and Azapagic, 2011). In addition to ensuring the most cost-effective emission reduction, carbon markets provide the facility to transition to low carbon economies and technologies, to develop innovative new solutions to encourage emissions reduction (Bayon et al., 2009). In these markets, there is a punishment and reward system which ensures parties reduce emissions through the adoption of low carbon technologies, or pay more if they remain using more carbon-intensive systems (Bayon et al., 2009). Further, emission trading and carbon markets can contribute to sustainable development outcomes (Benessaiah, 2012), such as the eradication of poverty, job creation, and the mobilisation of finance. The volume and value of global carbon markets has increased to 10,289 million tons of CO₂ eqv., and 176,027 million US Dollars respectively in 2011 (Peters-Stanley and Hamilton, 2012). The regulated carbon markets accounted for more than 99% of the total (Peters-Stanley and Hamilton, 2012).

Abbreviations: GDP, gross domestic products; GHG, greenhouse gas; GW h, giga watt hour; IPCC, intergovernmental panel on climate change; KP, Kyoto Protocol; MENR, ministry of energy and natural resources; MOEF, ministry of environment and forestry; MW, mega watt; MWG, municipal waste gas; MW h, mega watt hour; TETC, Turkish electricity transmission corporation; UNFCCC, United Nations framework conventions on climate change; VER, Verified (or voluntary) emission reductions

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Global carbon markets can be divided into two groups: regulatory and voluntary markets (Bayon et al., 2009). Regulatory markets operate under emission caps and authority, but voluntary markets are outside of any legally binding emission reduction and compliance framework (Bayon et al., 2009). Instead, voluntary markets are driven by companies and individuals who take responsibility for off-setting their own emissions (Peters-Stanley et al., 2011). Offsetting refers to issued carbon credits are gained by projects through reducing emissions via low carbon technologies, carbon sequestration, and reforestation (Mathews, 2008). Offset credits are called Verified (or Voluntary) Emission Reductions (VERs) (Bayon et al., 2009). Generally, in these markets, there are two types of buyers: consumers and middlemen (Bayon et al., 2009). The demand side (buyer) of VER certificate generally uses this certificate for the purpose of social and corporate responsibility, public relations/branding, investment, climate-influenced business model, competition and product sales (Bayon et al., 2009; Hamilton et al., 2009). The VER buyers purchase credits for offsetting emission related to its actions, event or products, the latter trades these credits (Bayon et al., 2009). For instance, thousands of private companies use the wording 'carbon neutral' in their products, events and activities by buying carbon credits to offset their associated emissions (Bayon et al., 2009).

The majority of buyers and sellers of voluntary carbon markets trade through Over-the-Counter (OTC) transactions, where buying and selling is conducted directly, rather than through a formal trading platform (Bayon et al., 2009; Peters-Stanley and Yin, 2013). Due to buyers and sellers trading directly, it is often difficult to know the price of VER in the OTC (Bayon et al., 2009). Besides OTC, between 2004 and 2010, some of the voluntary offset credits were traded on the Chicago Climate Exchange (CCX), which is based on exchanges completed in 2010 (Peters-Stanley and Yin, 2013).

There are some pros and cons to voluntary carbon markets. The advantages of these markets are lower transaction costs, less a bureaucratic procedure, creativity and innovation for projects – particularly small sized ones – and the flexibility to enable the support specific types of projects (Bayon et al., 2009; Benessaiah, 2012). In voluntary carbon markets, there is no need for start-up capital to prepare the offsetting project, and this is a significant advantage over the regulated carbon market (Bayon et al., 2009). The disadvantages of these markets are fragmentation, insufficient information due to lack of regulation and monitoring mechanisms, and non-uniform certification, verification and registration procedures (Bayon et al., 2009). These have led to the development of different standards for validation of VER credits in the markets

(Bayon et al., 2009). Having weighed up these advantages and disadvantages, many market players and stakeholders think that as a fast evolving market, the voluntary carbon has important advantages over the regulated carbon markets. For example, they are a fast way to fight climate change, are a key tool for awareness-raising, and they prefer not to deal with bureaucracy (Bayon et al., 2009). Importantly, however, it should be understood that both markets are not alternatives to each other (Bayon et al., 2009).

Table 1 shows global carbon markets' volume and value between 2008 and 2012. The rate growth of carbon markets declined due to the global economic crises and uncertainty in the post-Kyoto agreement period (Benessaiah, 2012). Due to the worldwide recession starting in the second half of 2008, industrial production, energy demand and demand for carbon credits have fallen (Nazifi, 2013; Perdan and Azapagic, 2011). This crisis negatively affected the demand and supply sides of the carbon market (Perdan and Azapagic, 2011). Mobilisation of financial resources to developing countries through offsetting projects decreased during this period, so many project developers cancelled these projects (Kossov and Ambrosi, 2010). In particular, the primary CDM markets were negatively affected, and as a result many carbon contracts were cancelled (Nazifi, 2013). Although the total volume and value of global carbon markets increased between 2008 and 2009, and these markets showed some resilience to global crisis, this cannot be assumed to have mitigated the net effect of this crisis (Perdan and Azapagic, 2011).

Even though the exact volume and value of size of the global voluntary carbon market is difficult to know (Bayon et al., 2009), according to the responses to surveys from market players in the voluntary carbon markets, global voluntary carbon markets are smaller than 1 per-cent of the total global carbon markets (Peters-Stanley and Hamilton, 2012). The volume and value of voluntary carbon markets reached their maximum in 2008. After the global financial crisis, volume, value and VER prices reduced in 2009, with the value and volume of voluntary carbon markets fluctuating between 2009 and 2012. In 2012, volume and value were 100 million tons of CO₂ eqv. and 524 \$ million (Hamilton et al., 2008; Hamilton et al., 2009; Peters-Stanley et al., 2011; Peters-Stanley and Yin, 2013) (Fig. 1).

One of the major sources of off-setting credits, in fact the 7th largest globally, is Turkey (Peters-Stanley and Yin, 2013). In Turkey, there has been considerable progress on the climate change issue during the past decade. Turkey is an Annex-I country that is party to the UNFCCC, and did not receive any legally binding emission targets in the Kyoto Protocol, so its name is not listed in Annex B

Table 1
Overview of carbon markets.

Markets	Volume (Mt CO ₂ eqv.)				Value (\$ million)			
	2008	2009	2010	2011	2008	2009	2010	2011
OTC	65	51	128	93	479	326	422	572
CCX	69	41	2	0	308	50	0,2	0
Others	0	2	2	2	2	12	11	4
Total VCM	132	94	132	95	789	388	433	576
EUA	3,093	6,326	6,789	7,853	100,526	118,474	133,598	147,848
Pri. CDM	404	211	265	291	6,511	2,678	3,206	3,320
Sec. CDM	1,072	1,055	1,275	1,822	26,277	17,543	20,637	23,250
AAU	23	155	62	47	276	2,003	626	318
RGGI	62	813	210	120	241	2,667	458	249
RMU	25	26	0	4	367	354	0	12
NZU	31	34	7	27	183	117	101	351
CCA			0	4			0	63
Others	65	818	94	26	275	2,728	151	40
Total reg. markets	4,775	9,483	8,702	10,194	134,656	146,564	158,777	175,451
Total	4,909	9,577	8,834	10,289	135,445	146,952	159,210	176,027

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