

ECOEYE INTERNATIONAL | DECEMBER 2018

IMPACT CARBON

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Korea ETS

Market and Policy Issues

MARKET - 8 November 2018

- New listing of KAU19 and KAU20: After the notification of the Phase 2 quota on the 31st of October, the Korea Exchange has included in the listing the permits for 2019 and 2020. The base price of KRW 23,200 has been applied following the closing price of KAU18 on the listing day.

POLICY - 9 November 2018

- Appointment of the Minister for the Ministry of Environment: The director of the Korea Environment Institute (KEI) has been appointed as the new environment minister. In the ministry's press release, the minister vowed to "pursue responsible policies particularly in clean water and clean air, and to promote environmental preservation as one of the driving forces for economic growth."

MARKET - 14 November 2018

- Disclosure of October OTC Trading Results (Offset Registration System): In October 2018, only KOCs were traded totaling to 208,025 tons. No KAU18 and KCU18 were traded. In 2018, the cumulative OTC trading volume of KAU18 was 10.63 million tons and KOC was 1.65 million tons.

MARKET - 27 November 2018

- KOC issuance through the 23rd Emission Certification Committee (Offset Registration System): A total of 1.59 million tons of KOCs were issued from 12 projects. To date, the cumulative volume of KOC issued has reached 24.07 million tons, of which 15.39 million tons has been converted to KCUs in Phase 1. The remaining amount is expected to be available in Phase 2. [refer to Table 4]

POLICY - 30 November 2018

- **Announcement of Annual Allocation Plan for 2019 (Ministry of Environment):** The 2019 annual allocation plan was announced in accordance with Article 3 of the "Regulation on the allocation of allowances for emission allowances and market stabilization measures". The auction, which will take effect on January 23 of next year, will be held on the second Wednesday of every month. The total permits to be auctioned during Phase 2 is 20.69 million tons, with 7.95 million tons allocated in 2019, divided into 550,000 tons per month. In the second quarter, 1 million tons will be supplied for three months in anticipation of a higher demand. [refer to Table 7]

ECONOMIC - 4 December 2018

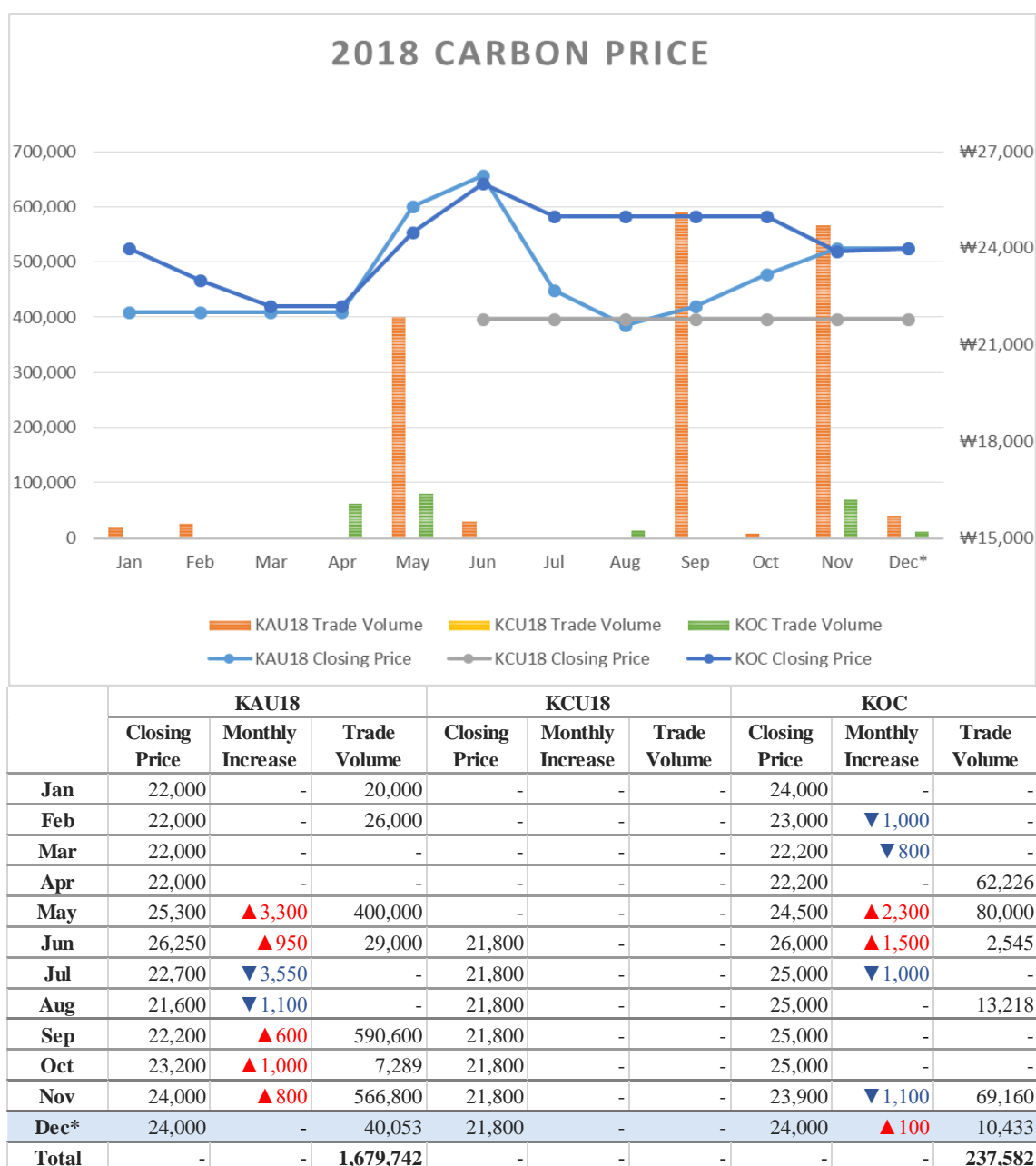
- **Slow Growth in the 2nd Quarter ... "Concerns about the decline in the Economic Sentiment Index" (JTBC):** The Bank of Korea announced that the GDP growth in the third quarter rose by 0.6% compared to the previous quarter following two consecutive quarters of 0% growth. The sluggish domestic demand affected, in particular, capital expenditures and construction investment both of which posted negative growth. In this regard, the Ministry of Strategy and Finance plans to announce measures for the next year's economic policy at the end of this month and provide specific measures.

Korean Market Update

Market Analysis and Outlook

KAU18 prices has shown a price uptrend for three consecutive month since September 2018 while KOC prices has closed in the level of KAUs. The number of buying orders significantly increased from September standing at around 1 million tons in both October and November 2018. It is expected that after the announcement of the 2019 allocation plan, auction participation strategies will be established between companies with shortage and surpluses.

Figure 1. Korea ETS Performance (January 2018 - December* 2018)



*Latest information based on 7th December 2018

At one point in November, the price of KAU18 rose to KRW 24,500 and quickly declined the following day to settle at KRW 24,000 – a rise of 4.4% from the previous month's prices. The price fluctuations occurred in five (5) trading days wherein there were either transactions of 5,000 tons or less or none at all.

The total trading volume in November was 566,800 tons where 95.8% of transactions were done through large-scale negotiations. The average negotiated price is KRW 21,987 while intraday average is KRW 23,406 – 6% higher than negotiated prices which implies that the market price does not reflect the appropriate transaction price leading to an overheating trend due to small-scale transactions.

Table 1. KAU18 Price Fluctuations and Trade Volume (November 2018)

	Date	Closing Price (in KRW)	Difference	Fluctuation Rate	Trade Volume		
					Intraday	Negotiated	Total
KAU18	9-Nov-18	23,300	▲100	▲0.43	-	-	-
	12-Nov-18	23,300	-	-	-	500,000	500,000
	14-Nov-18	23,300	-	-	10,000	-	10,000
	16-Nov-18	23,500	▲200	▲0.86	-	-	-
	20-Nov-18	23,500	-	-	5,000	23,000	28,000
	21-Nov-18	23,550	▲50	▲0.21	-	20,000	20,000
	22-Nov-18	24,500	▲950	▲4.03	813	-	813
	23-Nov-18	24,000	▼500	▼2.04	-	-	-
	26-Nov-18	23,500	▼500	▼2.08	3,187	-	3,187
	28-Nov-18	23,550	▲50	▲0.21	-	-	-
	29-Nov-18	24,000	▲450	▲1.91	4,800	-	4,800
Total					23,800	543,000	566,800

KOC closed the last trading day of November at KRW 23,900, down by 4.4% from the previous month as traders resumed trading. Since August 9th, KOC has been trading on a KRW 25,000 price, most of it without transactions. However, due to the price gap with KAU18, KOC was not able to conclude deals and prices started dropping.

Total KOC trading volume in November was 69,160 tons, all of which were done through intraday deals. For November, KOC average price is KRW 23,679.

On November 27th, a total of 1,573,049 tons of KOCs were issued through the 23rd Emissions Certification Committee. As most of the KOC issuance has already been completed, it is expected that at least 5% of KOCs will be supplied to the market.

Table 2. KOC Price Fluctuations and Trade Volume (November 2018)

	Date	Closing Price (in	Difference	Fluctuation Rate	Trade Volume		
					Intraday	Negotiated	Total
KOC	5-Nov-18	24,500	▼ 500	▼ 2.0	-	-	-
	6-Nov-18	23,500	▼ 1,000	▼ 4.08	5,000	-	5,000
	8-Nov-18	23,500	-	-	9,139	-	9,139
	12-Nov-18	23,700	▲ 200	▲ 0.85	11,538	-	11,538
	13-Nov-18	23,700	-	-	26,590	-	26,590
	30-Nov-18	23,900	▲ 200	▲ 0.84	16,893	-	16,893
Total		-	-	-	69,160		69,160

Table 3. Trading Performance of Market Commodities (November 2018)

KAU18	Current Price (Month End, in KRW)	24,000	Accumulated Trade Volume	Intraday	31,689
	Monthly Highest	24,500	(Ton)	Negotiated	1,608,000
	Monthly Lowest	23,200		Total	1,639,689
	Maximum Limit Price	26,250	Average Trading Price		22,015
	Minimum Limit Price	20,000	Accumulated Trading Value (in KRW 100 million)		361.0
KCU18	Current Price (Month End, in KRW)	21,800	Accumulated Trade Volume	Intraday	-
	Monthly Highest	21,800	(Ton)	Negotiated	-
	Monthly Lowest	21,800		Total	-
	Maximum Limit Price	23,950	Average Trading Price		-
	Minimum Limit Price	19,650	Accumulated Trading Value (in KRW 100 million)		-
KOC (from Aug. 10 '18)	Current Price (Month End, in KRW)	23,900	Accumulated Trade Volume	Intraday	69,160
	Monthly Highest	24,500	(Ton)	Negotiated	-
	Monthly Lowest	23,500		Total	69,160
	Maximum Limit Price	26,050	Average Trading Price		23,679
	Minimum Limit Price	21,350	Accumulated Trading Value (in KRW 100 million)		16.4

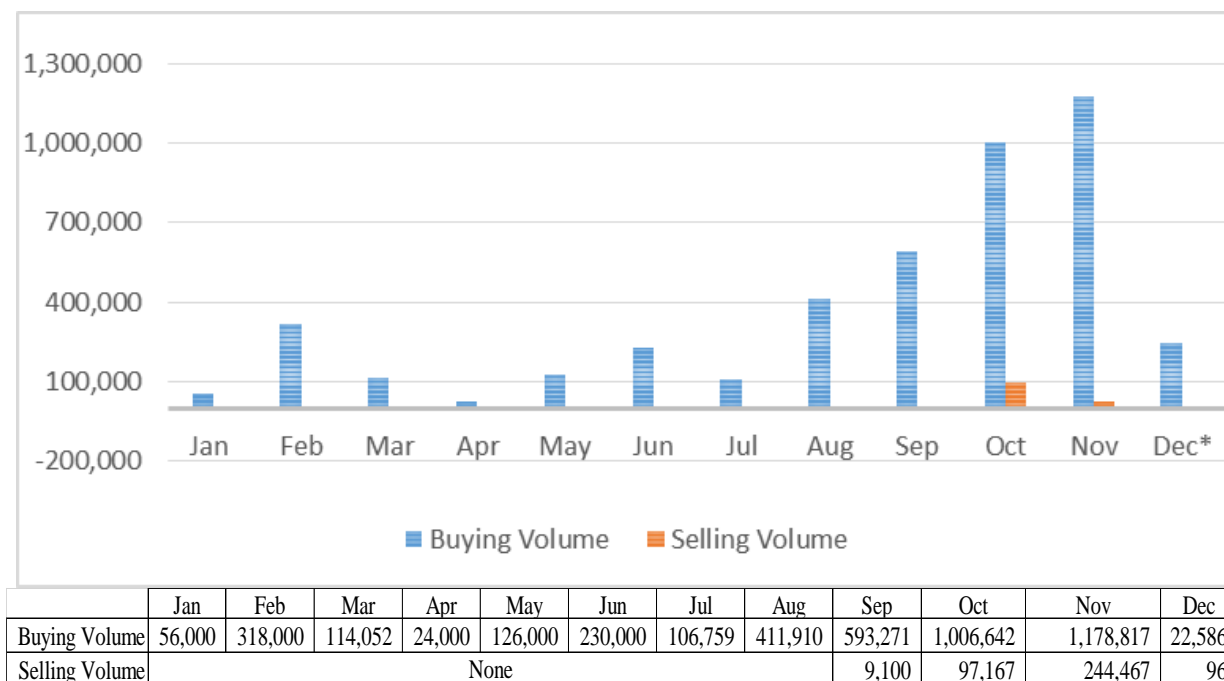
KAU17 and KAU18 closing prices in November 30th of both 2017 and 2018 settled at the same amount: KRW 24,000. However, in terms of trading volume, KAU17 was 2.8 times higher than that of KAU18. KAU17's intraday and negotiated ratio is 25.4% and 74.6%, respectively, while KAU18 stands at 1.9% and 97.8%, respectively.

The trading volume of KAU17 was bigger due to the closing of Phase 1 and overheating of the market was due to the delay in the announcement of quota allocation and a tight squeeze in the supply.

Since the auction is scheduled to begin in January 2019, companies are expected to establish their own trading strategies. KAU18 prices are expected to remain at current levels or slightly higher and price volatility is likely to remain bearable as the auction is expected to improve the supply and set appropriate prices to mitigate supply and demand imbalances.

KAU18 buying volume has gradually increased since August 2018 while the order volume remains low. Buying orders has been steady since the start of the year but selling orders only came from September 2018 rising to about 100,000 tons in October and 245,000 tons in November.

Figure 2. KAU18 Buy/Sell Orders (January 2018 - November 2018)



As of October 31, the total cumulative trading volume totaled to 1,099,000 tons of which 1,072,889 tons of negotiated deals accounted for 99.3% of the total trading volume whereas intraday volume stood at 7,889 tons.

KAU18 sales by business type showed that 46.6% came from the cement sector and 37.3% was from the power generation sector. The remaining came from the semiconductor, machineries, wood and collective energy. Meanwhile, the sector that purchased the most permits was the power generation/energy sector with 96.6% followed by industrial complex with 2.7%, waste with 0.4%, building with 0.2% and non-ferrous metals.

For the power generation industry, the quota adjustment factor for Phase 2 has been reportedly set at 0.741.

Carbon-i forecasts that electricity generation will increase by 3.1% compared to the previous year and large-scale purchases are expected to continue.

Figure 3. KAU18 Selling Sectors (as of October 2018)

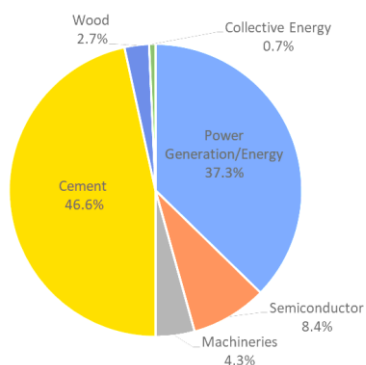
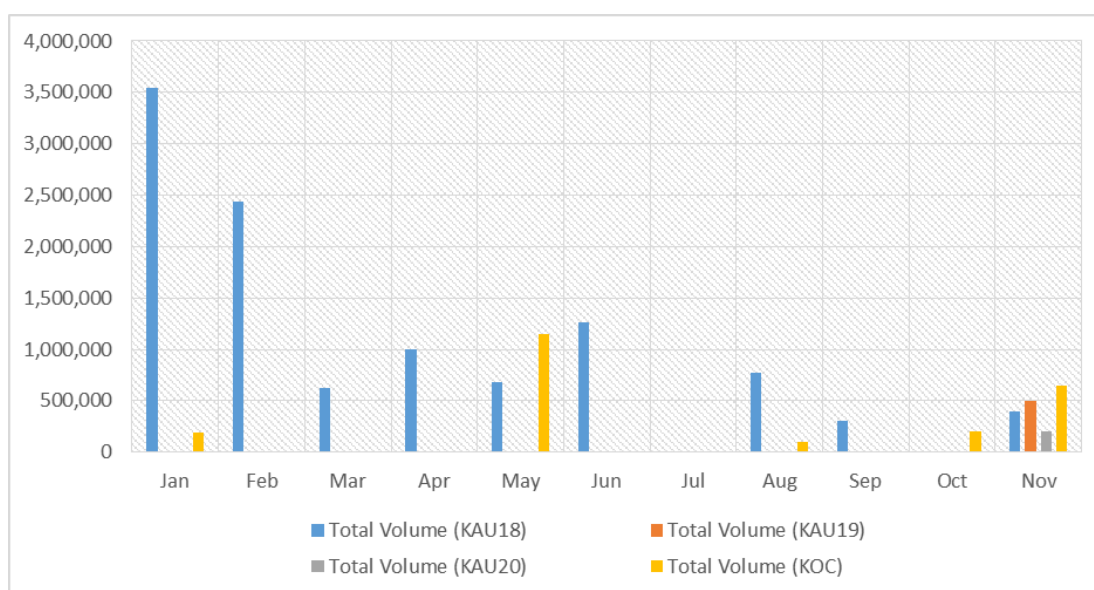
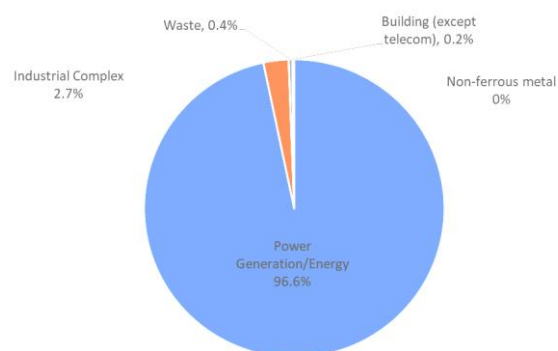


Figure 4. KAU18 Buying Sectors (as of October 2018)



Month	Total Volume (KAU18)	Total Volume (KAU19)	Total Volume (KAU20)	Total Volume (KOC)
Jan	3,542,517	None	None	191,484
Feb	2,440,000			-
Mar	630,000			-
Apr	1,000,000			-
May	684,163			1,143,590
Jun	1,264,652			8,084
Jul	-			1,000
Aug	770,000			102,409
Sep	300,000			-
Oct	-			208,025
Nov	400,000	500,000	200,000	648,372
Total	11,031,332	500,000	200,000	2,302,964

The 23rd Emissions Certification Committee issued 1,590,000 tons of KOCs from 12 project owned/operated by 8 companies. Most of the issued KOCs are confirmed for selling, thus, it is expected to be supplied to the market in small volumes, estimated to be about 5%.

Table 4. KOC Issuance from the 23rd Emissions Certification Committee (in tons)

Type	Project Name	Project Owner/Developer	Issued Amount
CDM	N2O Reduction Project in Hanwha Factory	Hanwha	217,716
		Korea Carbon Management	4,443
CDM	SF6 Recovery and Regeneration Project	Solvay Korea	130,656
		Ecoeye	1,333
CDM	Capro N2O Reduction Project	Capro	96,210
		Ecoeye	1,335
CDM	Huchems New Installation #5 N2O Reduction Project	Huchems	162,843
		Ecoeye	882
CDM	Huchems Factory N2O Reduction Project	Huchems	643,792
		Ecoeye	3,459
		Korea Carbon Management	9,541
CDM	Samsung Electronics SF6 Reduction Project	Korea Carbon Management	2,678
CDM	K-water Mini-Hydro Power Bundling Project	K-water	16,893
CDM	Daegu Bangcheonri Landfill Gas Project	Ecoeye	256,321
CDM	Jinju City Waste Landfill Gas Power Generation Pro	Ecoeye	35,069
General	Yesco Biomethane Generation and Supply Project	Yesco	9,878
Total			1,593,049

To date, the cumulative volume of KOC issued totaled to 24.07 million tons of which 15.39 tons were converted to KCUs in Phase 1. About 8.68 million tons of remaining KOCs is available for submission or trade in Phase 2.

KOC issuance in 2018 is about 4.48 million tons and it is expected that about 3 million tons will be issued annually from 2019-2020. KOC issuance from overseas GHG reduction project is expected to be 500,000 tons in 2019 and 2 million tons in 2020. As a result, the allowable offset allowances available in Phase 2 is 17.18 million tons including the currently available 8.68 million tons.

Table 5. Phase 2 Expected KOC Issuance (in tons)

		Phase 2			Total
		1st Year	2nd Year	3rd Year	
Issued Amount (2018.11)		8,680,000	-	-	8,680,000
Scheduled Issuance	Domestic	-	3,000,000	3,000,000	6,000,000
	Overseas	-	500,000	2,000,000	2,500,000
Total		8,680,000	3,500,000	5,000,000	17,180,000

Emission Trading Scenario in 2019

The free allocation and auctioning method is scheduled to start in January 2019. Only compliance entities that are registered members in the Korea Exchange are allowed to participate in the auction. Currently, there are 126 companies from 26 industries that are eligible

to participate.

Auctions will be done every second Wednesday of every month (once a month) for 1 hour (13:00 – 14:00). Auction announcements will be made in the KRX and Ministry of Environment's websites 5 trading days before the auction date and will include details on the auction date, auction time, auction method, auction condition, auction amount, bill payment, etc.

The total amount that is set to be auctioned for the second phase is 20.69 million tons.

Table 6. Phase 2 Auction Amount

Year	2019	2020	2021 (~ June)	Total
Amount for Auction	7,950,000	7,950,000	4,786,100	20,686,100

For 2019, the government has allocated 7.95 million tons that will be supplied in the amount of 550,000 tons monthly except in the second quarter (April – June 2019) where supply will be 1 million tons for three months in anticipation of a higher demand.

Table 7. Auction Schedule and Amount (2019)

Expected Auction Schedule (2019)	Amount for Auction (ton)
January 23	550,000
February 13	550,000
March 13	550,000
April 10	1,000,000
May 8	1,000,000
June 12	1,000,000
July 10	550,000
August 14	550,000
September 11	550,000
October 8	550,000
November 13	550,000
December 11	550,000
Total	7,950,000

*It is possible that auction quantity may change due to additional allocation in the future

*KAU18 (January – June), KAU19 (July – December)

The minimum bid quantity is 1,000 tons in the increments of 100 tons with a price of KRW 50 per ton. Bidding participants can only submit one bid price.

A bid deposit must be paid prior to participating in the auction and is calculated as bid price (bid price x bid quantity) + transaction fee (0.1%) + VAT (0.01%)

The Dutch method will be employed as a bidding method which means the lowest bid price

among bid quantities will be chosen as the successful bid.

The Ministry of Environment will decide the lower bid limit after the bidding deadline (14:00) every auction day. The lower bid price and the calculation will be unlisted.

The bidder's bid amount cannot exceed 30% of the auctioned quantity of the auction day. If the total number of bids received is less than the auctioned amount, the remaining will be carried over to the next month.

If two bid prices are the same, the winning bid will be assigned according to the bidding order: price > time

Table 8. Auction Process

Time	Task
13:00~14:00	Bid reception
	Determine bid price and quantity after bid notification
	Payment of the bid deposit to KRX (12:00 auction day)
	Submission of one bid request through the member trading system
14:00~14:30	Aggregation and submission of results (KRX → Ministry of Environment)
14:30~15:00	Confirmation of the lower limit of the winning bid and notification (Ministry of Environment → KRX)
15:00~15:30	Determination of winning bid price and successful bid amount distribution (KRX)
15:30~16:00	Checking of the winning bid history and prepare the auction result (for external use) (KRX)
16:00	Announcement of auction results (individual notification to bidder, homepage disclosure)
16:00~18:00	Verification of the emission balance and closure of the auction market (including market transactions, GIR)

Update on Power Generation and Expected Emissions Amount (2018, 1st – 3rd Quarter)

Analysis of Total Power Generation by Energy Source

- The total generation amount for the first until the third quarter is 427,680 GWh, up by 3.5% compared to the same period of the previous year. Coal takes up 42.4% followed by gas at 26.8%, nuclear at 22.6%, alternative energy with 5.6%, hydro with 1.3% and oil at 1.3%
 - ※ In 2017, coal accounted for 43.2%, nuclear at 27.7%, gas at 21%, alternative energy at 5%, oil at 1.7% and hydro at 1.3%
- Coal's generation amount rose by 1.5%, registering 181,215 GWh by the third quarter. However, coal's share of the total power generation is down by 0.8%

※ According to KEPCO, the price of bituminous coal rose by 26% and the fuel cost of power generation subsidiaries increased by 1 trillion Korean won (23.5%). The cost increase and tax eventually became a burden in coal consumption

- Gas power generation totaled to 114,747 GWh, an increase of 32.3% compared to the previous year.
- Nuclear power generation ranked third totaling to 96,834 GWh, a decrease of 15.5% compared to the previous year. The utilization rate of nuclear power plants gradually recovered to 54.9% in Q1, 62.7% in Q2, and 73.2% in Q3.
- Oil, meanwhile, is down by 23.7% with a generation amount of 5,498 GWh

Estimated ETS emissions

- Reflecting the first three quarter's actual data and carbon-i's 4th quarter power generation model estimates, the total power generation is expected to reach 570,574 GWh, a 3.1% increase compared to 2017
- Estimated ETS emissions will reach 278,169,000 tons (including new entrants), up by 2.5% from the previous year
- Considering that the estimated emissions is 278,169,000 tons and the pre-allocation of the energy transition sector (power generation, community energy) and industrial sector is 241,384,000 tons, it is expected that the shortage will reach around 36,785,000 tons.

Ecoeye, Your Carbon Desk

Ecoeye has developed various CDM projects such as high efficiency stoves, LED supply, forestation and agricultural methane reduction in 15 countries. Several projects are now in operation.

Table 9. Projects Approved by the CDM EB Board (with investors)

Country	Project	Investor
Kenya	High-efficiency Bioethanol Stoves (20,000 units)	Samsung Electronics
Bangladesh	Fixed-type High Efficiency Stoves (600,000 units)	KOMIPO, SK Securities
Myanmar	Stainless Steel Portable High Efficiency Stoves (100,000 units)	GS Caltex etc.
Ghana	Portable High-efficiency Charcoal Stoves (470,000 units)	Industrial Companies

Table 10. Projects with MOUs (under discussion)

Country	Project	Investor
India	LED Distribution (4 million units)	(unpublished)
Africa	Fixed-type High Efficiency Stoves	(unpublished)

Table 11. Projects Seeking Investors (for Q1 2019)

Country	Project	Investor
Myanmar	High-efficiency Stoves (about 200,000 units)	(open)
Africa	Fixed-type High Efficiency Stoves	(open)

Myanmar Project: Improved Cookstoves (November 27, 2018)

The Ecoeye team, together with our partners and investors, visited several villages in the Ayeyarwady region to observe the distribution of stoves and get feedbacks from local communities and distributors.



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