



Bi-Annual Monitoring Report
on activities related to cross-border transmission
capacity in the Energy Community for the period
July-December of 2017

Results for Albania, Bosnia and Herzegovina, fYR of Macedonia, Georgia,
Kosovo*, Italy, Montenegro, Romania, and Serbia

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1. Introduction

1.1. Background

The present report provides an update on results of the Market Monitoring Project for South East Europe and beyond for the second half of 2017. The Market Monitoring Project originated from the 2006 Energy Community Annual Electricity Forum ('Athens Forum') that invited the United States Agency for International Development (USAID) to support the Energy Community regulators in developing common standards for monitoring the activities of electricity transmission system operators. This resulted in development of the so-called South East Europe Market Monitoring Guidelines (hereinafter 'the Guidelines'),¹ prepared by the USAID-supported consultant *Potomac Economics* under the umbrella of the Electricity Working Group of the Energy Community Regulatory Board (ECRB). The purpose of the Guidelines is to harmonize and coordinate the activities of National Regulatory Authorities (hereinafter 'regulators' or NRAs) in monitoring electricity transmission grid activities to ensure that network users are granted access to the maximum amount of transmission transfer capacity on a non-discriminatory basis. This also includes monitoring the control of transmission transfer capacity by individual participants in order to identify potential market power.

The Guidelines define the data required to implement market monitoring, specific monitoring indicators, thresholds to establish reasonable range for the indicator values and actions for regulators when the indicator is outside the threshold ranges:

- Indicator 1 - The Base Case Exchange (BCE) Indicator: compares Base Case Exchange assumptions in the Network Model to Cross-Border schedules.
- Indicator 2 - The Already Allocated Capacity (AAC) Indicator: Compares AAC to peak commercial schedules.
- Indicator 3 - Critical Facilities Indicator: Compares estimated flows on critical facilities in the Network Model to actual flows on the facilities.
- Indicator 4 - Load Forecast Indicator: Compares forecast load in the Network Model to actual load.
- Indicator 5 – Generation Forecast Indicator: Compares forecast generation in the Network Model to actual generation;
- Indicator 6 – Transmission Reliability Margin (TRM) Indicator: Compares actual TRM values to proxy TRM values calculated using control area balance data and net exchanges.
- Indicator 7 – Market Share Indicator: Calculates market shares using auction data on cross-border interconnections;

The necessary data for carrying out monitoring by the regulators in line with the Guidelines shall be

¹ https://www.energy-community.org/dam/jcr:6ff463f1-4c0f-4c3f-943b-f769f2c065f9/ECRB_market_monitoring.pdf.

provided by the national Transmission System Operators (TSOs). Regulators shall direct TSOs to provide the data required by the Guidelines, complete the indicators on regular basis and intervene in cases of sustained variance from the predefined thresholds.

In monitoring access to the grid, the Guidelines focus on methods and data used by TSOs in calculating the Net Transfer Capacity (NTC) on cross-border interconnections. Monitoring access to the grid is intended to verify that the methods and data being used in estimating transfer capability are consistent with EU regulations and directives. It should not necessarily be interpreted to signal doubt about the conduct of TSOs.

In monitoring control of transfer capacity by individual participants pursuant to market activities, the Guidelines seek to identify circumstances that are consistent with a hypothesis of market power. However, the Guidelines are not intended to establish definitive conclusions regarding market power. Such conclusions are best addressed through referral to the competition authorities.

1.2. Methodology

Along with the Guidelines, USAID supported the development of the so-called South East Europe Automated Market Monitoring System (SEEAMMS). SEEAMMS allows the TSOs to upload data to a web-based interface where the data is stored, processed, and reported to regulators. A dry run of the SEEAMMS started in since 2010. The ECRB approval of the Guidelines in April 2014 marked an important step supporting cooperation among NRAs on market monitoring in accordance with Regulation (EC) 714/2009 and Directive 2009/72/EC.² It ratified the project's dry run which expanded the capacity of regulators to oversee and monitor key activities of TSOs. SEEAMMS operates on regional basis with regulators acting as the regional monitor centre on a rotating basis.

The present report was prepared by ECRB to summarize the periodic regional SEEAMMS results for July to December 2017. It summarizes recent results and explains the consequences of the various market monitoring indicators. It is based on the six predefined monitoring indicators plus the indicator of cross-border transmission capacity auction data.

The report covers those jurisdictions for which national TSOs submitted data to SEEAMMS, namely: Albania, Bosnia and Herzegovina, fYR of Macedonia, Georgia, Kosovo*³, Italy, Montenegro, Romania, and Serbia. TSOs of Croatia, Bulgaria, Greece, Hungary, Moldova, Slovenia, Turkey, and Ukraine did not participate in SEEAMMS.

² For the Energy Community applicable in the version adapted and adopted by Decision 2011/02/MC-EnC of the Energy Community Council.

³ Throughout this document the symbol * refers to the following statement: *This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.*

2. Findings

In April 2017, ECRB approved recommendations regarding the harmonisation of cross-border transmission capacity calculations in electricity,⁴ including two measures concerning the Base Case Exchange (BCE) Indicator and the Transmission Reliability Margin (TRM) Indicator. In order to prepare these recommendations, NRAs issued a number of inquiries to TSOs regarding variances in the market monitoring indicators that made it apparent that there exist certain inconsistencies in the TSOs' understanding and harmonization of the BCE and the TRM indicators. The following results of the indicator values and the interpretation of these results establishes a basis for the recommendations of this report.

2.1. Base Case Exchange Indicator

The main metric for cross-border trading capacity is the Net Transfer Capacity (NTC), established by TSOs using the Network Model. The BCE indicator monitors BCE assumptions in the Network Model. BCE assumptions are forecasts of commercial schedules in the Network Model. The purpose of the BCE indicator is to monitor the accuracy of the BCE assumptions in order to help ensuring an accurate Network Model and, consequently, accurate NTC values. It is important that the BCE value represents an accurate forecast of expected cross-border exchanges. Otherwise, the NTC value will be inaccurate and may underestimate the cross-border transmission capacity, and thereby reduce opportunities for market activity.

The BCE Indicator calculates a percentage forecast error between BCE values (the forecast) and the actual cross-border commercial schedules. **There is a lack of consistency throughout the region for the interpretation of the BCE value.** TSOs disagree on whether the BCE assumption represents a forecast of cross-border schedules or not. The related conclusions of this report are based on review of ENTSO-E documents as well as discussion between regulators and TSOs of the analyzed markets. It is recommended that the BCE value should reflect the best forecast of net commercial exchanges between two TSOs.

According to SEEAMMS records there are **72 BCE violations within the last six month of 2017** on various interconnectors. The violations are distributed among TSOs in the following manner:

⁴ https://www.energy-community.org/dam/jcr:0bceb87b-83c0-4bd7-ac70-147f7c6d6502/ECRB_crossborder_tramission.pdf.

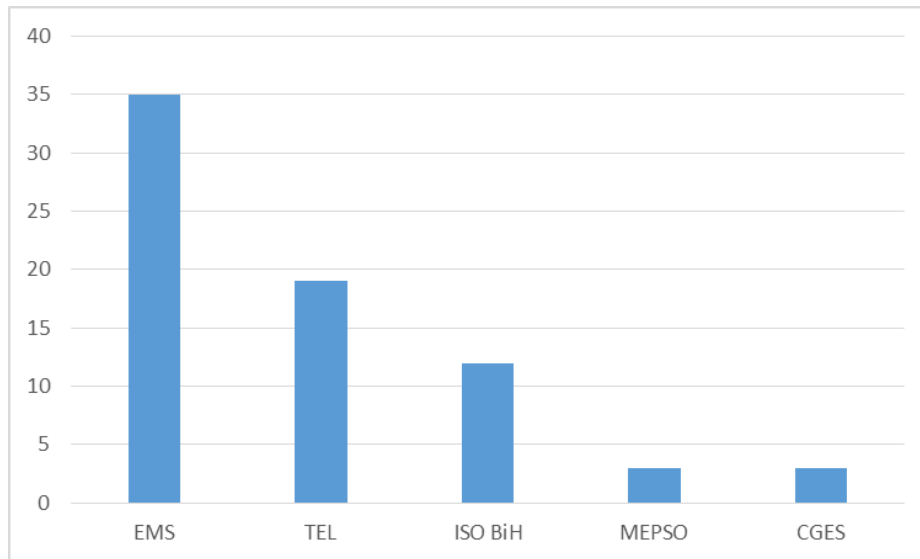


Figure 1 Distribution of BCE indicator violations among TSOs on the period July-December 2017⁵

The operator showing the highest number of violations is the Serbian TSO, EMS. Explanations on the violations were provided by EMS and CGES as follows:

- EMS: The forecasted values of exchanges are harmonized in the month M-2 for the month M for which the NTC is calculated. In the South East European region there is the practice that for each month, another TSO has the role of the coordinator, whose obligation is BCE harmonization and producing of the regional model which is further used for the calculations. Each TSO creates its forecasted exchanges, based on the totals which were received from its BRPs, in the Serbian case it is PE EPS, and these calculations are communicated to that month's coordinator, who is coordinating them afterwards. EMS proposes BCE values based on historical exchanges. Coordinator harmonizes BCE values, produces the regional model which is further used for the calculations and sends TSO table with proposed BCE values for confirmation;
- CGES: BCE indicator for the interconnection CGES-EMS, was in variance due to increased imports of the electricity in the system (October). The price of electricity and the need for it can affect actual exchanges, depending on weather conditions, leading to an increase and decrease in imports or exports in the electricity system, so that it can happen that the actual values can be very different from the forecast values. BCE reference values were agreed two months ahead and not always possible to envisage

⁵ EMS Serbia, TEL Romania, ISO Bosnia and Herzegovina, MEPSO fYR of Macedonia and CGES Montenegro.

The BCE indicator is a way to measure the accuracy of the BCE assumption used in the month-ahead network model. Because the BCE value on a border is intended to reflect the cross-border exchange of power, the BCE is a forecast of that exchange and, as a result, the BCE indicator is formulated as a forecast error. Therefore, the market monitoring indicator for the BCE was constructed to allow substantial discrepancy in the forecast error before SEEAMMS reports a variance. When the forecasted BCE value reveals a lack of correspondence to the peak exchange on the relevant interface, it raises the question what the forecasted value is intended to reflect and how accurate the network model for establishing cross-border capacity indeed is. Specifically high violations have been monitored for EMS in this respect. This is mainly the result of the fact that EMS has a large number of interconnections that are monitored, compared to other systems.

In October 2016 ENTSO-E proposed using the “net-positions” approach for creating a common grid model. This is slightly different from BCE as it calculates the net position considering all interconnections. Regulators would benefit if ECRB EWG would request a report or presentation by TSOs explaining the new approach. In light of this it may be necessary to replace the BCE indicator of the Guidelines with net positions indicator that would measure the forecast error in net positions in the entire control area rather than the current approach in measuring the forecast error on each interconnection individually. ECRB should further investigate on that.

Recommendation: Given NRAs’ responsibilities to monitor the activities for TSOs relating to cross-border NTC values, regulators shall require BCE values based on a forecast of net commercial schedules, using recent historical data, unless good cause exists to use other methods. ECRB should further evaluate the need to use the net positions indicator in line with the recommendations of ENTSO-E.

2.2. Transmission Reliability Margin Indicator

TRM is an amount of cross-border capacity set aside for TSOs to respond to frequency deviations and emergencies exchanges and other uncertainties. Because it consumes cross-border capacity, the higher the TRM value, the lower the NTC value and thus the possibilities for cross-border trade. The purpose of the indicator is to monitor the accuracy of TRM.

This TRM Indicator calculates a metric that is intended to track the ENTSO-E TRM formula, which is also approved in the Market Monitoring Guidelines. This ENTSO-E metric is compared to the actual TRM used by the TSO and any significant variance is identified.

The TRM indicator has often found to be in variance among the jurisdictions. In many instances the TRM values is not calculated in accordance with the recommended ENTSO-E approach. In some instances the TRM is agreed upon between TSOs as a fixed value that does not depend on the key operating statics.

According to SEEAMMS records there are **56 TRM violations caused only by two TSOs**, namely EMS (30 times) and Transelectrica (24 times).

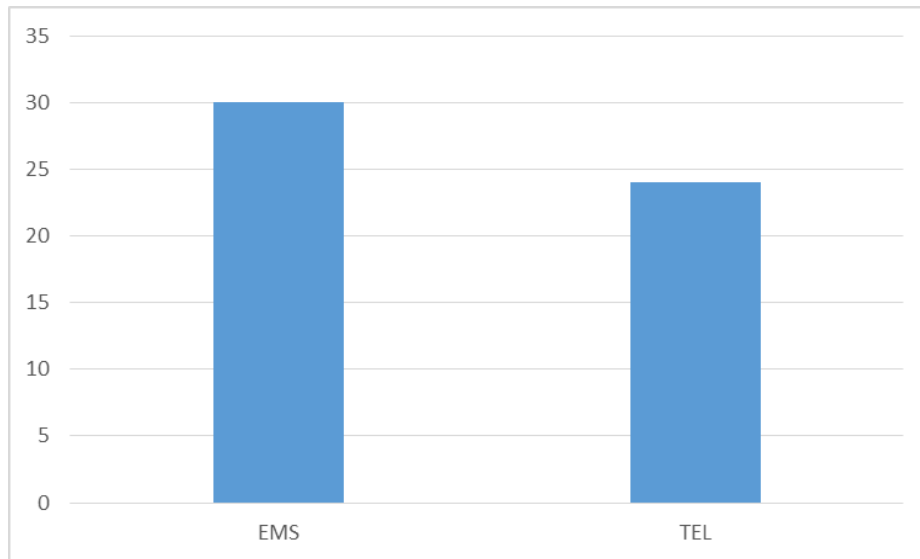


Figure 2. Distribution of TRM indicator violations among TSOs on the period July-December 2017

According to the explanations given by EMS there is the practice in the South East European region that TRM values are defined in by TSOs bilaterally on yearly basis. This explanation reveals that current practice of calculation of TRM is not done in line with the ENTSO-E guidelines and instead the values are fixed regardless of the anticipated margin needed for reliability under changing conditions. Issue requires further discussions. No response was given by Transelectrica despite several approaches for explanation.

Recommendation 2: As we have recommended in the past, NRAs should start working with their TSOs to adopt the ENTSO-E TRM formula based on ECRB Recommendation on Harmonising Cross-Border Transmission Capacity Calculations in Electricity. In many instances, this would improve access to interconnectors.

2.3. Already Allocated Capacity Indicator

Already Allocated Capacity (AAC) is the cross-border capacity that is reserved by market participants. The AAC indicator compares the reserved values to the values actually scheduled in the operating period. The purpose of the indicator is to detect whether participants are withholding capacity from the market by buying the capacity and not using it. Part of the capacity that is reserved but that is not scheduled on a sustained basis either causes transmission capacity to be withheld from other participants or require other participants to wait to for release of this capacity (which occurs only near in time to the operating horizon). Monitoring capacity usage will deter participants from withholding capacity from the market and will tend to open the market to wider competition.

The approach for this indicator involves identifying the hour with the greatest volume of commercial schedules (monthly peak schedules). This hour should be matched and compared to the corresponding reservations, i.e. the AAC, for that day.

The indicator confirms that **withholding cross-border capacity is generally not a problem in the region**. A summary of AAC indicator violation in last six months of 2017 year is shown in the table below.

Interconnection	Indicator Month	Entity in Variance
EMS-TEL	2017-Jul	EMS
CGES-ISO BiH	2017-Jul	ISO BiH
CGES-ISO BiH	2017-Aug	ISO BiH
TEL-UKRENERGO	2017-Aug	TEL
EMS-TEL	2017-Sep	EMS
CGES-ISO BH	2017-Sep	ISO BH
EMS-MEPSO	2017-Oct	MEPSO
EMS-TEL	2017-Nov	EMS
CGES-OST	2017-Dec	OST

Table 1 Summary of AAC indicator violations

2.4. Critical Facilities Indicator

Critical facilities are electrical facilities, usually transmission facilities that create a security issue when transferring power between TSOs. The Critical Facilities (CF) Indicator monitors simulated power flows on key transmission elements in the Network Model to determine if these key elements are the limiting elements in actual system operations. The purpose of the indicator is to detect whether transmission constraints in the Network Model that limit NTC values are constraints that actually occur in real-time operations. The monitoring is intended to ensure accurate Network Model and, consequently, accurate NTC values.

This indicator identifies “critical facilities” in the network model that limit NTC values. The base case flow on these critical facilities in the Network Model is compared to the peak flow in actual operations on these facilities. The critical facilities could be a transmission facility that is part of the interconnection or it could be a transmission facility internal to the transmission network.

In the reporting period the Critical Facilities Indicator has produced results that support a hypothesis that **internal congestion may be overestimated in many cases**. Over the last 6 months of 2017, TSOs tended to introduce lower values in the network model while actual flows were higher. It can be concluded

that TSOs are not fully utilizing full transfer capacities of critical facilities in the network model that is resulting in the lower NTCs as it could be in case of real capacities of CFs. Out of 103 cases, TSOs had 59 cases where the error had a negative direction. 94% of values have a 10% and greater error value while 38% of CF values have more than 100% errors in variance. In a significant number of cases, the TSOs' actual flows are four times higher than the estimated flows. In these extreme cases, the model assumptions will likely lead to over **estimating internal congestion and underestimating NTC values**. Table 2 demonstrates the distribution of Critical Facilities Indicator values for the last 6 months of 2017.

Percentile	Error Value
94%	10%
82%	30%
67%	50%
38%	100%
22%	200%
12%	400%
8%	<400%

Table 2: Distribution of Critical Facilities Indicator Values

Recommendation 3: Given these results, it is recommended that the NRAs engage directly with TSOs to better understand the source of these errors and consider potential follow-up activities at the ECRB EWG.

2.5. Generator Forecast Indicator

The Generator Forecast Indicator measures the accuracy of the generation forecast used in the network models. Accuracy of these forecasts helps ensure accuracy in the Network Model and, consequently, accuracy in NTC values. These Indicators calculate a percentage forecast error between forecasted load and the actual load.

Results show that generation forecast indicator violations have increased compared to 2017 year first bi-annual period. 90 cases of violation have been registered at SEEAMMS that is 5 times bigger than last reporting period. Average violation equals -30% indicating that TSOs tend to forecast peak generation with lower values compared to actual peak output.

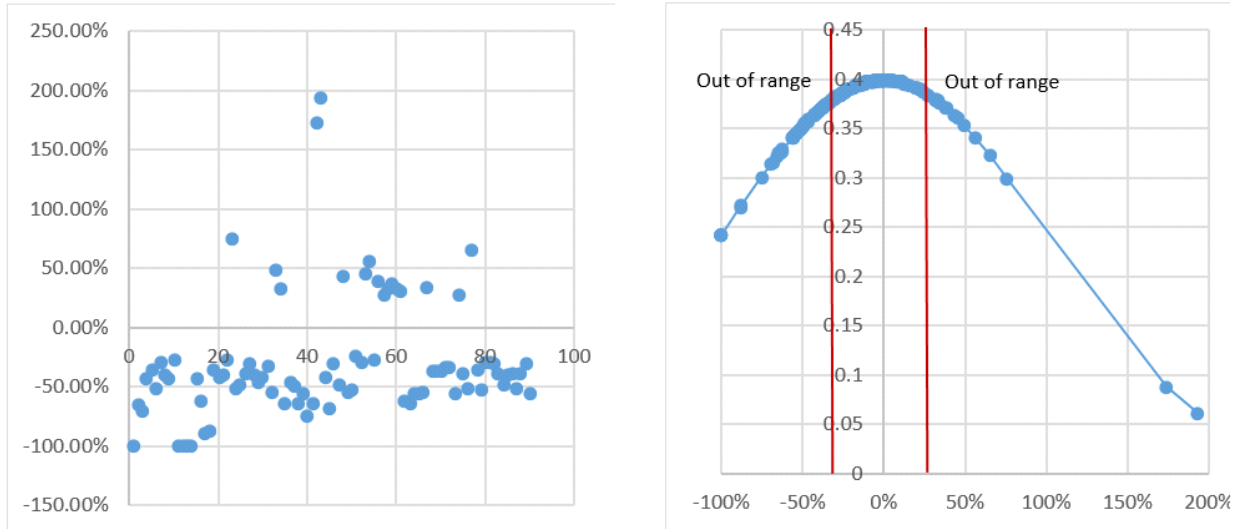


Figure 3. Distribution of generation forecast error

The TSOs showing variances are EMS, ISO BiH and OST⁶. EMS' general explanation on generation forecast variances is that they occurred because the forecasted generation values were taken from the Electric Power Industry in Serbia (EPS) scheduling plan/generation plan which is sent to EMS two months before the actual month. In this particular case, variances were caused by a wrong forecast by the generation company. Other TSOs did not provide explanations.

Recommendation 4: TSO should ensure that the generation data, which are necessary to create network model, are checked and validated by TSO before injecting them in the network model and to the extent possibly make corrections to the potential errors, including the data provided by power producers. In case deviation tends to continue several months in the row, TSOs must investigate the reason along with the data owner (Generation companies).

2.6. Load Forecast Indicator

The Load Forecast Indicator measures the accuracy of the load forecast used in the network models. Accuracy of these forecasts helps ensure accuracy in the Network Model and, consequently, accuracy in NTC values. These indicators calculate a percentage forecast error between forecast load and the actual load.

⁶ OST Albania.

Results show that the **load forecasts used in the Network Model are relatively accurate**, with only small variation from the actual values. Variances of this indicator are presented in the table below.

Data Provider	Month	Actual Peak Load	Forecast Load	%Error	Threshold Lower	Threshold Upper
CGES	2017-07	553	480	-13.20%	-8.50%	8.50%
	2017-11	531	420	-20.90%	-8.80%	8.80%
	2017-12	583	520	-10.80%	-8.80%	8.80%
EMS	2017-07	5,115	4,260	-16.70%	-8.50%	8.50%
	2017-08	5,077	4,184	-17.60%	-8.60%	8.60%
	2017-09	5,177	4,210	-18.70%	-8.60%	8.60%
	2017-10	5,699	4,932	-13.50%	-8.60%	8.60%
	2017-11	6,155	5,234	-15.00%	-8.80%	8.80%
GSE	2017-07	1,777	1,026.30	-42.20%	-8.50%	8.50%
	2017-08	1,817	1,075.90	-40.80%	-8.60%	8.60%
	2017-09	1,680	944.692	-43.80%	-8.60%	8.60%
	2017-10	1,769	1,001.60	-43.40%	-8.60%	8.60%
	2017-11	1,968	1,081.01	-45.10%	-8.80%	8.80%
ISO BH	2017-10	2,015	1,620	-19.60%	-8.60%	8.60%
KOSTT	2017-07	717	802	11.90%	-8.50%	8.50%
OST	2017-10	1,103	1,200	8.80%	-8.60%	8.60%
TEL	2017-07	8,147	7,400	-9.20%	-8.50%	8.50%
	2017-08	8,168	7,400	-9.40%	-8.60%	8.60%
	2017-11	8,998	8,200	-8.90%	-8.80%	8.80%

Table 3 Summary of load forecast deviations by TSOs

2.7. Market Share Indicator

The Market Share Indicator monitors the share of cross-border capacity controlled by market participants. The calculation indicates the share of import capacity controlled by individual transmission buyers combined for all interconnections. The purpose of the indicator is to measure market shares of import capacity and generation ownership. Market shares indicate potential market power. This statistic is important for the purpose of monitoring. However, the SEEAMS software is not currently configured to combine the values with the generation ownership.

Recommendation 5: As we recommended previously, improvements to tool to could address important issues.

3. Conclusions and next steps

NRAs should seek for responses from national TSOs concerning the recommendations flagged in the present report.

Monitoring of TSO activities on cross-border capacity revealed that the cross border capacity calculation methodologies are not harmonized among TSOs of the region, mostly concerning calculation of BCE indicator.

The TRM calculation is not done according to the ENTSO-E rules and ECRB recommendations and the old practice remains that imply agreement between TSOs in certain level of TRM in advance.

The Critical Facilities Indicator has shown a very high degree of forecast errors in the estimates of internal congestion. This is one of the most difficult problems to monitor as regulators and market participants have very little insight into how internal congestion affects cross-border capacity. NRAs should aim to understand this indicator as a potential area affecting cross-border capacity calculations.

Reporting bi-annual period covering last 6 month of 2017 shows increased variances in generation forecast compared to the first half of 2017 that deserves increased TSOs and NRAs attention.

The present market monitoring activity continued to rely on advice and guidance from the consultants previously assigned by USAID to this project. ECRB believes that such continued advice and guidance will be useful also in the future. As a result, ECRB recommends identifying a funding mechanism to support a moderate level of consulting service to support the continuation of market monitoring activities and further improvement of the SEEAMMS tool.