Comments/Suggestions on the MERC's "Maharashtra Electricity Regulatory Commission (Renewable Purchase Obligation, Its Compliance and Implementation of Renewable Energy Certificate Framework) Regulations, 2019", by Prayas (Energy Group), Pune.

Firstly, we welcome the publication of this draft regulation as it is key for the growth of the renewable energy sector in the state and is equally crucial for managing the cost of power procurement for DISCOMs given the low price discovery of wind and solar power and the increasing cost of conventional sources of power.

Secondly, we also welcome the approach of strongly increasing the minimum procurement levels for renewable energy given its wide ranging social and economic benefits for the state as well as for the DISCOMs and consumers.

Our comments and suggestions on these draft regulations are laid down in two parts. The first part deals with the appropriate level of RPO targets and the second part has our detailed comments on the specific sections of the draft regulations.

Part 1: RPO targets

- 1. To begin with, section 1.2 of the Explanatory Memorandum (EM) notes that the wind power potential in Maharashtra is 9400 MW. This is an earlier estimate since according to the National Institute of Wind Energy, which is an autonomous R&D institution of the Ministry of New and Renewable Energy (MNRE), the latest estimate for wind power potential in Maharashtra at 100 m hub height level is 45,394 MW (Source https://niwe.res.in/department_wra_100m%20agl.php). Hence there is exists ample wind power potential in Maharashtra and this figure is likely to go up in the future given the ever-increasing wind turbine sizes and hub heights which become feasible in low wind sites.
- 2. Page 8 of the Explanatory Memorandum (EM) notes that "While formulating these draft Regulations, the Commission has been guided by different factors like, RE development in Maharashtra, RE Procurement planning of various DISCOMs, existing Market realities, Policies of GoM, Targets set by the GoI and Petitions filed by Obligated Entities seeking modifications in the existing Regulations etc."

It is useful to take note of few developments in this regard.

- a. The renewable energy policy of the GoM, July 2015 had an explicit goal of achieving 7,500 MW of transmission connected solar by 2020. (Source: Govt of Maharashtra, Renewable Energy Policy, 2015, pp. 2 of 16). As against this, only 1060 MW has been installed in the state as of June, 2019.
- b. Secondly, as the EM notes, "From the target of 175 GW by 2022 as set by the GoI, the share of Maharashtra is about 22 GW. As on 30 June, 2019, the installed RE capacity in the State is about 8.8 GW implying that Maharashtra needs to achieve a target of about 13 GW in less than 3 years." Again, the 175 GW national target and the 22 GW by 2022 share for

- Maharashtra was announced in early 2015 which was not reflected in the existing MERC RPO regulations in force until March 2020.
- c. Finally, at the recently concluded UN Summit on Climate Change (Sep, 2019), India has committed to increase the deployment of renewable energy from 175 GW by 2022 towards 450 GW in the coming years including a push towards electric mobility. This underscores the growing recognition of the need to significantly increase renewable energy generation capacity. Though this appears to be based on the recent draft CEA report for 2030, the above statement is still not committed to any time frame.
- d. These developments show that the GoM and GoI are strongly committed to rapidly increasing the share of renewable energy.
- 3. With regard to actual RPO percentages, the Commission is proposing to strongly ratchet up solar RPOs while keeping non-solar RPOs constant at 11.5% until 2025. This is in spite of the fact that in 2017-18, non-solar RPOs have been met by most DISCOMs except RInfra in comparison to solar RPOs which have not been met by any DISCOM. Additionally, the price of wind power (the largest share of non-solar) is similar to solar power and is highly competitive.

 While the Commission has accepted the National tariff policy suggestion of excluding hydro power from the total consumption while calculating RPOs, its solar power targets are still much lower than the ones suggested in the June 2016 Tariff policy amendment (8% by 2022) or the MoP guideline of 10.5% by 2022.

 Considering these two points and the commitment of GoM and GoI to rapidly increasing the share of renewables as outlined in the earlier section, we feel that higher RPO targets including increasing the share of non-solar RE would be more appropriate. Having a greater diversity of RE resources including non-solar would be beneficial and would reduce over-reliance on just one
- 4. Section 4.4 of the EM (pp. 16) correctly notes that "For evolving RPO targets for State of Maharashtra, the Commission apart from the RE potential has considered three basic factors viz. impact on consumer tariff, suitability/compatibility with State Load Curve and security of supply and ability of Obligated Entities to tie-up such incremental RE capacities."
 Let us look at each of these factors critically.

source, namely solar in spite of its various benefits.

a. **Impact on consumer tariff:** The EM itself addresses this issue succinctly. To quote it, "As far as impact on tariff on account of increased RPO target is concerned, the Commission notes that incremental RE energy being procured by Distribution Licensees through competitive bidding is at the rate comparable/marginally lower to/than the conventional power purchase rate. Hence, in the opinion of the Commission, if incremental energy consumption of Distribution Licensees is sourced from RE projects through competitive bidding at rate lower than Average Power Purchase Cost, then there would not be substantial impact on Tariff of end consumers. **In fact Distribution Licensee may plan procurement of RE as a measure to reduce average power purchase cost.** Hence, with RE achieving grid parity, financial implication on account of higher

procurement of RE is no longer an issue of concern, barring requirement of arranging balancing power and underutilisation of existing conventional capacities which might remain underutilised if enough demand is not there."

This is further substantiated by a recent MERC order (231 of 2019) in the new Koradi coal power plant case. The order notes that landed cost of coal at Koradi is likely to rise from Rs 4,284/ton in FY 23 to 9,974/ton in FY 47 (Figure 1, pp. 14) and hence ... 'the overall energy charges for Koradi Units are expected to fall in the range of Rs 3.53 – Rs 3.65/kWh on a levelised basis'... (pp. 16, Order 231 of 2019)

Further, as per the Monthly Merit Order Despatch Stack data from MSLDC for November, 2019, there is 11,431 MW of coal based capacity which has a variable charge between Rs 3-4/kWh, more specifically a weighted average of Rs 3.45/kWh. The table below gives a summary of the Merit Order Despatch Stack data for November.

Capacity	Variable charge between	Weighted Average Variable Charge
MW	Rs/kWh	Rs/kWh
11,611	3-4	3.44
6,469	2-3	2.87
5,283	< 2	1.78
23,363		2.91

Source: MSLDC, https://mahasldc.in/wp-content/reports/dr3 112019.pdf

Comparing the long term **fixed and total** price of solar and wind power at ~ Rs 2.75/kWh (which is likely to reduce further in the coming years) with **only the variable price** of existing and new thermal power plants (which is certain to increase in the coming years) as seen above, it is amply clear that substantially increasing the share of RE is a significant cost saving measure for the DISCOMs. This clearly substantiates the point made by the Commission in the EM, that 'Distribution Licensee may plan procurement of RE as a measure to reduce average power purchase cost'.

b. Suitability/compatibility with State Load Curve and security of supply: Considering the afternoon peaking system in Maharashtra, the Commission has rightly committed to a sharp increase in the solar RPO whose generation profile has a high capacity value for the Maharashtra load. The afternoon peaking effect in Maharashtra will further increase due to the win-win solar feeder policy of the GoM under which agriculture will be supplied reliable day-time power from 8 am – 6 pm (solar hours). Till date, MSEDCL and MSPGCL have filed 2,598 MW of solar capacity

under this policy for approval by MERC. MERC has till date approved 1,028 MW, while 1,570 MW are under re-negotiation for better price.

While the low (~ Rs 2.75/kWh) and long-term fixed-price nature of wind and solar power have already made them very attractive for DISCOMs in comparison to new coal power plants on a levelised generation cost basis, what level of renewable energy penetration by 2025 or 2030 would be optimal from a system-level remains a question since this involves exploring the techno-economic feasibility of reliably integrating large amounts of variable renewable energy. DISCOMs manage power procurement and are responsible for reliability and affordability. Hence, unless they are convinced of the benefits and the feasibility of the transition to renewables, they may hesitate or delay to commit to their part in meeting large national targets (175 GW by 2022 or 450 GW in the coming years) and could lose out on maximising the benefits of low generation cost of wind and solar power. Such medium to long term planning for the electricity generation sector will also have to consider various uncertainties in terms of sales migration by industry due to alternative options (Open Access, Captive and rooftop solar PV), price trajectories of solar, wind, coal, storage; transmission requirements, grid integration of renewables including the need for flexibility, financial health of the DISCOMs, supply quality etc. A robust approach to planning under such uncertainty requires modern analytical power system modelling tools that can comprehensively and objectively assess various options and possibilities.

Prayas (Energy Group) recently concluded such a detailed and rigorous exercise to assess the value and feasibility of a large share of renewables in the system. Specifically, we used the modelling tool (PLEXOS) to simulate the 2030 MSEDCL grid operations (without transmission constraints) with the objective to assess the ability of the MSEDCL system (within specified technical constraints) to absorb large share of RE without increase in costs compared to low RE scenario. Our analysis shows that it is potentially possible to meet demand in 2030 with ~50 % RE contribution in energy terms with similar reliability and costs as a BAU scenario (with 30% RE). This implies about 52 GW of cumulative renewable generation capacity (roughly 5 times the existing capacity) without any 'net addition to the existing coal fleet'. Such an ambitious 2030 RE target will be a low-risk and economically viable choice for the state in comparison to a BAU scenario as is seen from our economic analysis from the modelling. Further, considering the modular nature and low gestation period for wind and solar, a high RE trajectory is more prudent from DISCOM perspective and essentially a no regrets strategy delivering essential social and environmental benefits without any increase in costs.

A comprehensive and detailed slide-deck of this simulation is attached with this submission as Annexure 1.

As noted above, our detailed simulations for 2030 suggest that a 50% RPO target by 2030 is not just feasible but also highly desirable for the sector for various reasons listed above. Hence, it would be more appropriate to have a 30% RPO target by 2025 instead of the proposed 25%

RPO. Our simulations for 2025 suggest that a 30% RPO can be reliably integrated into the state power system without any additional cost over a BAU (low RE) scenario. A possible year wise RPO target from 2020-25 reaching 30% is shown in the table below.

Section 7.1 specifies that "Every Obligated Entity shall procure electricity generated from eligible RE sources to the extent of the percentages, out of its total procurement of electricity from all sources excluding energy from Hydro power in a year, set out in the following Table"

Given that these are minimum targets, this could be modified as,

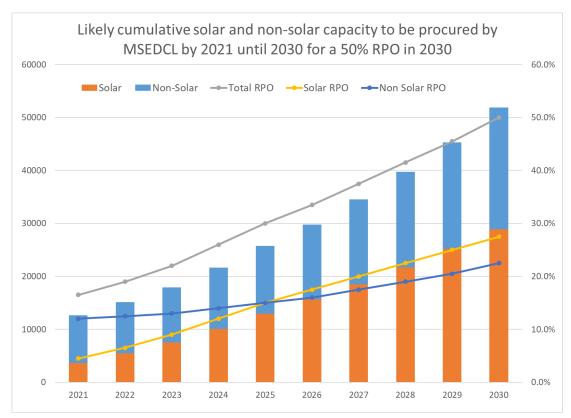
"Every Obligated Entity shall procure a minimum percentage of electricity generated from eligible RE sources, out of its total procurement of electricity from all sources excluding energy from Hydro power in a year. The minimum percentages of renewable energy are set out in the following Table"

Year	Minimum Quantum of purchase (in %) from Renewable Energy sources (in terms of energy equivalent in kWh)			
	Solar	Non-Solar (other RE)	Total	
2020-21	4.50%	12.00%	16.50%	
2021-22	6.50%	12.50%	19.00%	
2022-23	9.00%	13.00%	22.00%	
2023-24	12.00%	14.00%	26.00%	
2024-25	15.00%	15.00%	30.00%	

Such high RPO targets will need a paradigm shift in power procurement planning for the entire state and will entail various policy-regulatory steps to make this into a reality. As an example, to envisage the implications of such a rapid increase in RPO, we illustrate the case of MSEDCL.

As of March 2018, MSEDCL was procuring ~ 6.5 GW of renewables which contributed 14,104 MU of generation in 2017-18, or 11.57% of their total demand. This will need to grow to ~ 25.7 GW (13 GW solar and 12.8 GW non-solar), contributing around 54,710 MU to meet 30% of the demand in FY 25. This translates to planning for incremental addition of 2 GW/year of solar from FY 20-25 and 3.2 GW/year from FY 25-30. For non-solar it is 1.3 GW/year from FY 20-25 and 2 GW/year from FY 25-30. Such large RE targets are being contemplated by other states, Gujarat has announced a target of 30,000 MW by 2022 in its latest budget while Rajasthan has proposed a solar capacity of 50,000 MW by 2026 in its draft solar policy. In parallel, Gujarat has also announced that it will not permit to build new coal plants while Chhattisgarh has also publicly stated that it will not build any new coal plants.

The cumulative wind-solar capacity for MSEDCL along with RPO from 2021-2030 (for a 50% RPO by 2030) is shown in the graph below.



Source: Prayas (Energy Group) simulations for MSEDCL system in 2030 for a 50% RPO

For the state as a whole, close to 16,000 MU of renewable power was procured in 2017-18 and this will rise to 22,200 if solar RPO compliance reaches 2.5% and non-solar RPO compliance reaches 11% for all DISCOMs by 2019-20, assuming a growth in load of ~4%. If the 30% RPO is in place for 2024-25, this would need a RE procurement of ~ 60,000 MU in 2024-25, an increment of 37,800 MU from 2020 to 2025. This implies an addition of 13 GW of solar and 5 GW of wind, assuming a CUF of 23% and 28% for solar and wind respectively. This assumes that RE capacity is already tied up for meeting the RPO of 15% in 2019-20.

Hence, the combination of having an existing afternoon peaking system combined with load shifting to day time (solar feeder for agriculture), coupled with a certain amount of flexible resources (market/OCGT and battery systems) allows for a reliable integration of this high amount of wind-solar capacity in the system.

c. **Ability of Obligated Entities to tie-up such incremental RE capacities**: The gestation period for wind and solar projects is 18-24 months and project sizes are also highly modular. Secondly, all projects need not come up in the state but could be procured from other states and or from SECI. Finally, with close to a 4 GW rooftop target for Maharashtra by 2022 as

suggested by GoI, a large share of that capacity would automatically be available for solar RPO compliance for DISCOMs at not additional cost. Hence it is certainly feasible to tie up needed RE capacities provided comprehensive and dynamic planning with regard to medium-long term transmission is put in place.

5. Need and importance of specifying a long term (2030) guiding target in regulations

As the EM itself notes in section 4.3, "specifying RPO targets for longer period gives regulatory certainty which in turn drives confidence of the investors."

Presently, there is a need to provide a clear and rational signal for medium-long term power procurement planning to all electricity sector stakeholders. This long term perspective based on an indicative RPO trajectory (for up to 10 years) will enable better DISCOM preparedness and drive associated policy and regulatory measures needed for it. This will also allow for other stakeholders (investors, banks, system operators etc.) to be better prepared and further aid in long term planning for associated infrastructure such as land, transmission, road and water connectivity etc.

Hence, the Commission should put in place a guiding target for 2030 as part of their 2020-25 RPO regulations. We urge the Commission to state a guiding total RPO target of 45-50% by 2030 in these RPO regulations, in spite of their operative period being up to 2024-25. This long term guidance would be guiding in nature and not mandatory and would be reviewed at the time of next MYT period, but will go a long way in giving a clear signal to all the stakeholders to enable their preparation for 2030 and beyond. This could be framed in a new section as follows.

Section 8: RPO trajectory for long-term planning

Renewable energy generation is likely to significantly increase beyond the operating period specified in these regulations and total RPO target could be in the range of 45 % - 50 % by 2030. The Commission will specify actual 2030 RPO target before the end of current operational period. Distribution licensees and other obligated entities should take due cognizance of this in their long term planning.

Part 2: Comments/Suggestions on specific sections of the draft regulations

Section 3 Scope of Regulations and extent of application

6. Section 3.1 mentions that,

"These Regulations shall apply in all cases where the State Commission is to promote Cogeneration from renewable sources and generation of electricity from renewable sources and is to specify a percentage for procurement of energy generated from such sources on the basis of total consumption of electricity within the area of a Distribution Licensee.

Provided that total consumption of electricity shall exclude the consumption met from Hydro power."

Considering that these are minimum procurement percentages and there are proposed incentives to exceed them, this para could be modified as

'These Regulations shall apply in all cases where the State Commission is to promote Cogeneration from renewable sources and generation of electricity from renewable sources and is to specify a **minimum** percentage for procurement of energy generated from such sources on the basis of total consumption of electricity within the area of a Distribution Licensee.

Provided that total consumption of electricity shall exclude the consumption met from Hydro power.'

With regard to the proviso of excluding Hydro power from the consumption as suggested by the National Tariff Policy, 2016, we are in agreement with this change. However, it would be good to clarify whether the Hydro power mentioned in the proviso only holds for large hydro power > 25 MW.

Section 5 Obligated Entities

7. We welcome the change in lowering the limit for obligated OA and CPP consumers to 1 MW from the existing limit of 5 MW.

This will make it in consonance with all OA consumers for whom the minimum load limit is 1 MW. Further with the reducing costs of meters, this would be feasible and can even be further brought down to 500/100 kW in the future. This would become necessary in the future with the proliferation of group captive and possible lower minimum load limit for OA/CPP.

Section 7 Renewable Purchase Obligation target

8. Section 7.3 states that, "Obligated Entity can use surplus Solar energy upto 15% of total RPO target to meet short fall in non-Solar RPO target and vice-versa;

Provided that Obligated Entity by providing detailed justification may seek prior approval of the Commission for adjusting more than 15% surplus energy from one category against short fall in other RPO category."

The MoP clarification in this regard

(https://powermin.nic.in/sites/default/files/webform/notices/Clarification_on_Orders_related_to_Renewable_Purchase_Obligation_dated.pdf) mentions that

"Provided that on achievement of Solar RPO compliance to the extent of 85% and above, remaining shortfall if any, can be met by excess Non-Solar energy purchased beyond specified Non-Solar RPO for that particular year."

Hence it would appropriate to modify section 7.3 to reflect that the 15% leeway is for solar and non-solar RPO and not for the total RPO. Additionally, allowing for cross-over more than 15% would make the separate RPOs redundant and undermine the whole process. Hence the Commission may consider dropping this proviso.

Hence section 7.3 can be rephrased as

'On achievement of Solar RPO compliance by an Obligated Entity to the extent of 85% and above, remaining shortfall if any, can be met by excess Non-Solar energy purchased beyond specified Non-Solar RPO for that particular year and vice versa.'

- 9. Section 7.4 states that, "Any variation in the fulfilment of RPO targets by the Obligated Entity within a band of +/- 5% of the applicable RPO target (in terms of Energy Units or MWh) for the respective years shall be allowed for carry forward to subsequent year under exceptional circumstances subject to detailed scrutiny."
 While this appears to be a pragmatic step, this will significantly undermine the REC market which is designed specifically to meet such exigencies considering the uncertainty in load and RE generation in any particular year. Hence the Commission may consider to drop this clause.
- 10. We welcome the relaxation in section 7.5 to meet composite RPO for certain obligated entities.

11. Review and setting of RPO targets

One of the drawbacks of the five-year operating period for RPO regulations is that the new targets for the next five years are notified at the very end of the current operating period. So for example, RPO targets for 2020-2025 are being set in late 2019 or early 2020. This leaves relatively less time for procuring agencies and generation companies to plan for new capacity in the following 1-2 years, especially if the increase in the RPO is quite high as proposed. To avoid this possibility in the future, we propose a new section 7.7 as follows

7.7 The Commission will undertake a review of the existing RPO targets at the end of the third year within the five year operating period of the RPO regulations and

begin a process to set new RPO targets for the next five-year period and will put these in place at least 18 months prior to the end of the operating period.

So for example, as part of the RPO regulations whose operating period is from 2020-2025, the Commission will undertake a review of RPO targets immediately after March, 2023 and put in place RPO targets for 2025-2030 latest by September, 2023 (in six months), thus leaving at least 18 months prior to the end of the operating period of March, 2025. Further, the Commission would also put in place a guiding target for 2035 as part of their 2025-30 RPO regulations.

Section 12 Incentives and Penalty

- 12. We welcome the principle of providing explicit incentives and disincentives to not only meet minimum annual RPO targets as specified by the Commission but try and exceed them to meet the national objectives.
 - The proposed incentive of Rs 0.25/kWh for every incremental RE kWh over and above the minimum MERC RPO up to the total RPO notified by GoI is a reasonable incentive. Since this incentive mechanism is proposed to be continued beyond FY 2021-22 for the 'Total Targets' as and when specified by the GoI, we suggest that incentive quantum of Rs 0.25/kWh be explicitly revised after 2022 considering the GoI targets and prevailing RE prices.
- 13. While the penalties for non compliance should be applied to all obligated entities, we suggest that incentives should only be available for DISCOMs, since these will be paid for by their regulated consumers through the ARR process. Incentives for over-compliance by OA and CPP obligated entitles should not be provided by the state. This is essential because in the current scenario, RE supply options are in fact cheaper than conventional supply options for non-discom obligated entities such as captive and OA consumers.

Section 7.2 states that, 'RPO target stipulated above are minimum target to be achieved.

Obligated Entity shall endeavour to achieve RPO target notified by the Central Government from time to time for which it will be eligible for incentive as per Regulation 12.

This could be reworded to,

'RPO target stipulated above are minimum target to be achieved. Obligated Entity shall endeavour to achieve RPO target notified by the Central Government from time to time for which it will be eligible for incentive as per Regulation 12.

Provided that these incentives will only be applicable for DISCOMs and not for other obligated entities

Similarly, two additional provisos would be needed in section 12.2,

12.2 Obligated Entity shall endeavour to achieve total RPO target notified by the Central Government and for doing so it will get incentive of Rs 0.25 per kWh for RE procured above the

minimum percentage specified in Regulation 7 upto the percentage notified by the Central Government as under or as may be notified from time to time:

Provided such incentive will not applicable if Obligated Entity have not fulfilled Renewable Purchase Obligations on cumulative basis;

Provided further that RE procured during the year for meeting RPO of previous years shall be deducted while determining eligible RE quantum for incentives.

Provided that these incentives will only be applicable for DISCOMs and not for other obligated entities

Provided that the value of the incentive shall be revised in 2022 to be applicable for years beyond 2022.

14. Section 12.3 states that,

'Any shortfall in meeting the minimum percentage of RE as specified in Regulation 7 shall be carried forward to next year and Obligated Entity shall meet such shortfall on cumulative basis; Provided that Distribution Licensee shall be subjected to reduction in Annual Revenue Requirement at a rate of Rs 0.10 per kWh for shortfall in total RE procurement target for each year.

Provided further that other Obligated Entities shall be subjected to penalty of Rs. 0.10 per kWh for shortfall in total RE procurement target for each year.'

We suggest two changes in section 12.3. Firstly, the level of penalty should be the same as the level of the incentive and hence should be Rs 0.25/kWh to have a serious implication for the obligated entities. Additionally, a Rs 0.1/kWh penalty with perpetual carry forward would also go against the spirit of the REC framework whose floor prices are much higher than the proposed penalty.

Secondly, given the gestation of 18-24 months for wind-solar projects, we suggest that the maximum carry forward with a penalty of Rs 0.25/kWh should be limited to 2 years and a higher penalty be levied if the carry forward extends to the third year. Hence the section 12.3 can be modified as follows.

'Any shortfall in meeting the minimum percentage of RE as specified in Regulation 7 shall be carried forward to next year and Obligated Entity shall meet such shortfall on cumulative basis; Provided that Distribution Licensee shall be subjected to reduction in Annual Revenue Requirement at a rate of Rs 0.25 per kWh for shortfall in total RE procurement target for each year.

Provided further that other Obligated Entities shall be subjected to penalty of Rs. 0.25 per kWh for shortfall in total RE procurement target for each year.'

Provided further that such a carry forward of shortfall for Distribution Licensees and other Obligated Entities beyond two years shall attract a penalty of Rs 0.5 per kWh for each year.

15. Section 12.5 states that,

"Incentives and Penalties for other Obligated Entities shall be determined and collected or paid by the State Agency;

Provided that State Agency shall maintain separate account in the name of RPO Fund for this purpose;

Provided further that at the end of each Financial Year, State Agency shall submit certified details of all transaction under RPO Fund and also suggest options for utilising surplus or funding deficit in the RPO Fund."

This section also needs to be modified if there are to be no incentives for non DISCOM obligated entities. Further, with regard to the final proviso, we suggest that utilisation principles of the RPO fund be pre-specified by the Commission rather than keeping them open ended. Possible uses could include funding transmission, battery systems, improvement in F&S systems, and other research studies. Section 12.5 could be reworded as,

"Penalties for other Obligated Entities shall be determined and collected by the State Agency; Provided that State Agency shall maintain separate account in the name of RPO Fund for this purpose;

Provided further that at the end of each Financial Year, State Agency shall submit certified details of all transaction under RPO Fund"

Section 13 Monitoring and Implementation Framework

- 16. We welcome the comprehensive and web-based Monitoring and Implementation framework proposed by the Commission. We suggest that the Commission also state that the information on the web portal be placed in the public domain and be accessible to the public.
- 17. Given the importance of these regulations and the long lasting implications for consumers, we urge to Commission to hold a public hearing on these draft regulations before they are finalised.

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