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Developing a New Risk Assessment Methodology for Distribution System Operators Regulated by Quality Regulation Considering Reclosing Time

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Abstract – In the restructured electricity market, Performance-Based Regulation (PBR) regimehas been introduced to the distribution network. To ensure the network stability, this regime is used along with quality regulations. Quality regulation impose new financial risks on distribution system operators (DSOs). The poor quality of the network will result in reduced revenues for DSOs. The mentioned financial risks depend on the quality indices of the system. Based on annual variation of these indices, the cost of quality regulation will also vary. In this paper with regard to reclosing fault in distribution network, we develop a risk-based method to assess the financial risks caused by quality regulation for DSOs. Furthermore, in order to take the stochastic behavior of the distribution network and quality indices variations into account, time-sequential Monte Carlo simulation method is used. Using the proposed risk method, the effect of taking reclosing time into account will be examined on system quality indicators and the cost of quality regulation in Swedish rural reliability test system (SRRTS). The results show that taking reclosing fault into consideration, affects the system quality indicators, particularly annual average interruption frequency index of the system (SAIFI). Moreover taking reclosing fault into consideration also affects the quality regulations cost. Therefore, considering reclosing time provides a more realistic viewpoint about the financial risks arising from quality regulation for DSOs.

Keywords: Distribution systems**,** Quality regulation, Monte carlo simulation, Reclosing time, Risk assessment, Distribution system operators

1. Introduction

In the restructured electricity market, Performance-Based Regulation (PBR) regime was introduced to the distribution network. Formerly, cost-based regulatory regime was used in the distribution network. In a cost-based regulation regime, distribution system operators (DSOs) could charge the customers based on actual cost plus a certain percentage of profit [1]. In the next stages of electricity market liberalization, in order to provide efficient economic incentives and a competitive environment, PBR regime was introduced [2]. In this regime, DSOs no longer had a guaranteed profit and profits would be earned by cost savings. In order to avoid cost savings in maintenance and investment that will lead to deterioration of network stability, in most countries PBR is applied with a quality regulation [3]. Quality Regulation is a new and important issue in the electricity market which was introduced in Italy in 2000 for the first time [4]. The purpose of quality regulation is to implement the economic regulations to maintain distribution network stability [5]. Therefore, quality regulation imposes new financial risks on DSOs.

In distribution network, quality regulation is used in three regions: commercial quality, continuity of supply (reliability) and voltage quality. Among which continuity of supply (reliability) is of greater importance [1]. In this paper, only the effect of quality regulation on continuity of supply (reliability) will be examined.

Quality regulation is divided into two categories: direct and indirect. The purpose of indirect quality regulation is to provide information about the performance quality of DSOs for customers [6]. But in direct control, the regulator directly applies financial incentives such as rewards, penalty and/or coercion to pay compensation to customers on DSOs [6]. There are three types of direct control: reward-penalty schemes (RPS), guaranteed standard for the worst served customers (GS) and premium quality contract (PQC).

In [7] and [8], the effects of using RPS and GS have been studied using Monte Carlo simulation, respectively. In [6] a risk-based method is presented for quality regulation cost assessment based on the Monte Carlo simulation method. But in [6] the influence of considering reclosing fault which also includes short term interruptions is

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ignored. This paper develops a risk-based approach to assessment the financial risks imposed on DSOs due to quality regulation with taking reclosing fault into account. Based on annual changes in quality indicators, the annual quality regulation costs will also be different [6]. Therefore, in developed risk method, risk assessment tools have been used to calculate quality regulation cost in extraordinary years (the years that have many expenses).

2. Quality Regulation Design

Using PBR has led to a decline in quality of networks in many countries [9, 10]. For example, 1991 in Argentina, a sharp drop was occurred in the quality of the networks as a result of applying PBR regime [9]. The reason for this was cost savings in investment and maintenance costs to increase the profits. This clearly shows the necessity of using PBR regime accompanied by a quality regulation. Quality regulation can be explained according to system quality indicators and system output quality. System quality indicators are divided into two categories: customer-based indices and load-based indices. The most important customer-based quality indices include system average interruption duration index (SAIDI) and system average interruption frequency index (SAIFI), and the most important load-based quality indicator is energy not supply (ENS) [6].

As has been stated, there are three types of direct control: RPS, GS and PQC. These controls are a function of system quality indices. RPS is used for network quality control on system level, while GS and PQC are used for network quality control on customer level.

2.1 Regulations for system reliability

On the system level, the regulator uses RPS to control the stability. RPS uses financial incentives for network quality control with setting the standards for system quality indicators. Four different types of RPS scheme are shown in Fig. 1.

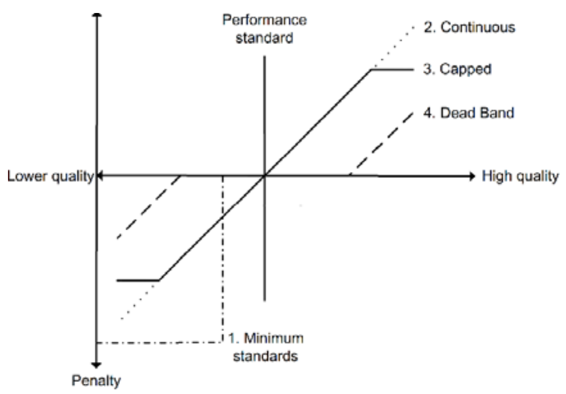

Fig. 1. Four different types of RPS.

Minimum standard, capped, continues and dead band are the four different types of RPS scheme [11]. It should be noted that the design of RPS can be a combination of the four above designs, like a capped dead band. Slope of the scheme indicates the financial value of quality indicator, which is called incentive rate. In some countries, they use customer surveys to determine the incentive rate [5]. In [12] the incentive rates are defined according to customer surveys as follows:

$$IR_{SAIDI} = \sum_{i=1}^{n} P_i \times N_i \times VE_i \ \ (\$/h) \tag{1}$$

$$IR_{SAIFI} = \sum_{i=1}^{n} P_i \times N_i \times VP_i \ \ (\$) \tag{2}$$

where:

- n: The number of customer categories.
- P_i: The annual average load of customers in the i^{th} category in (kW).
- N_i: The number of customers in the i^{th} category.
- VE_i: The value of energy not supplied to customers in the i^{th} category in ($/kWh).
- VP_i: The value of interrupted power for customers in the i^{th} category ($/kW).

In capped designs, usually the highest rate of financial incentives will be defined as a percentage of DSO annual income [4, 2].

2.2 Regulation for customer reliability

By defining standards such as maximum interruption duration, GS and PQC control the stability of the customers' level. If DSO fails to fulfil these standards, it will be penalized and usually must pay compensation to the affected customers [5]. Usually the amount of compensation varies according to the customer type and increases with increasing deviation from the defined standards [4]. GS and PQC designing is like minimum standards scheme shown in Fig. 1. GS will be determined by the regulator, but PQC is a contract between the customer and a DSO [2]. In some regimes of PBR, unfulfilled GS standards lead to a decrease in earnings of DSOs [5]. As shown in [13], it is necessary to use GS and PQC along with RPS.

3. Total Quality Regulation Cost

As mentioned the quality regulation, will impose new financial risks to DSOs as RPS, GS and PQC. Then the cost of quality regulation is:

$$C_{TotReg} = C_{RPS} + C_{GS} + C_{PQC} \tag{3}$$

RPS cost is also defined as follows:

$$C_{RPS} = PEN - REW \tag{4}$$

According to Equation 4, C_{RPS} can be a negative and/or positive value, so that if DSO has a stability level equal to standard, less or more than the standard the costs of RPS for this DSO will be zero, a positive value (fine) and a negative value (reward) respectively.

This paper only examines the cost of quality regulation and will not include decision for investment. However, it should be noted that the cost of quality regulation is an important factor in selection of projects for investment in the distribution network [8].

4. Risk Assessment Method

Risk is defined as random and measurable event, which can be explained by the probability distribution function [14]. The concept of risk involves the likelihood and consequences of an event, which can be beneficial or harmful [15]. In [16] risk types of distribution network have been introduced. In this paper, the risk is electric power interruption and the financial outcomes, results from it.

To evaluate the risk in the distribution network, three risk models are needed: A cost model, a load model and a reliability model [17].

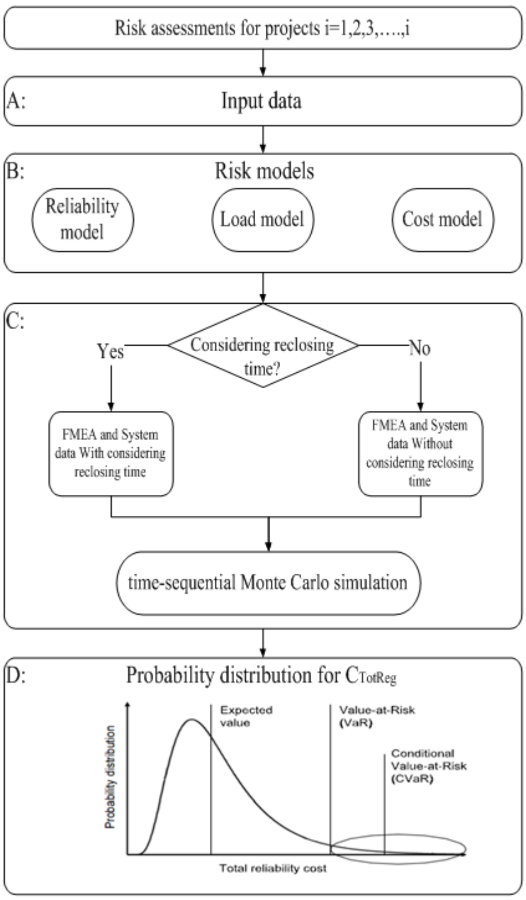

Fig. 2. The developed risk assessment methodology.

Cost model is presented in Section 3. In order to calculate ENS, a load model is needed which can measure the losses of each interruption [6]. In order to calculate the probability of each interruption, a reliability model is needed which can define the process of failure and repair of equipment [6].

In this paper, developed risk method has been used by considering the reclosing fault in the reliability model and hence in Failure Mode and Effect Analysis (FMEA). This method is shown in Fig. 2. The cost of quality regulation is equal to entire costs due to the three direct controls performed by quality regulation. Instead of the annual average cost of regulation, this developed method calculates the probability distribution of costs and uses the risk tools from industrial economics to measure the costs for the extraordinary years.

Four steps, shown in Fig. 2, describe the developed risk assessment methodology:

A. The first step is to acquire input information including network configuration, reliability data, load data and customer information.
B. In this part, cost, load and reliability models are modeled based on the input data.
C. A FMEA is performed. FMEA is a systematic technique to analyze the failure to obtain possible failures for each component and their impacts on the load points [18]. FMEA will be different based on whether the faults due to reclosing are considered or not. In this paper, the information related to reclosing time is included in FMEA and therefore we can analyze the effects of considering reclosing time on the annual cost of quality regulation. Based on FMEA, the results of the three risk models in Monte Carlo simulation are used to calculate the annual cost of quality regulation. Monte Carlo simulation results are a function of the probability distribution of quality regulation costs. Difference in yearly quality indicators result in variable annual quality regulation costs. Using Monte Carlo simulation method, we can consider the effects of annual system quality indicators changes in quality regulation costs calculation and obtain the probability distribution function of quality regulation cost. In this paper, time-sequential Monte Carlo simulation method, presented in [3, 6] is used.
D. Instead of considering just the average cost of quality regulation, the developed risk method, uses the probability distribution function of quality regulation cost from risk assessment tools, Value-at-Risk (VaR), conditional value-at-risk (CVaR) to calculate the cost of extra ordinary years.

VaR represents the maximum expected loss on portfolios and/or total investments during the given period and under normal conditions of the market. Simply, we are X percent confident that, during the next N days, we will not surely suffer a loss more than the amount of VaR. Here X is the confidence level. For example, if the amount of calculated VaR with a confidence level of 95% is equal to 100 thousand U.S. dollars for a week, there is only 5% chance that the expected loss more than 100 thousand dollars be possible in each week. In this paper, the potential loss is Ctotreg. VaR is defined as follows [19]:

$$VaR_{\alpha} = \inf\{x \epsilon R: P(X > x) \leq 1 - \alpha\} \quad (5)$$

The weak point of VaR is that it cannot show how the costs are increased for the remainder probability of 1-X [19]. The concept of CVaR has been introduced with the purpose of estimating these costs. CVaR is a risk assessment technique often used to reduce the probability of a portfolio to incur large losses. This is performed by assessing the likelihood (at a specific confidence level) that a specific loss will exceed the VaR. Mathematically speaking, CVaR is derived by taking a weighted average between the VaR and losses exceeding the VaR. $CVaR\alpha$ is defined as follows:

$$CVaR_{\alpha} = \mathrm{E}\{x | x \geq VAR_{\alpha}\} \quad (6)$$

The risk estamination, Stages A to D is performed for each the reliability project to calculate their effect on the quality regulation costs.

5. Reclosing time

In order to determine whether the fault is permanent or temporary, the breaker is opened and closed. If the fault is fixed, the system continues to work; otherwise, it is a permanent fault. This type of fault is called a reclosing fault. The duration of this process is called reclosing time. According to [20], automatic reclosing was first performed on radial feeders protected by Instantaneous relays and fuses for the first time in the early 1990s. Results showed that 73 to 88 percent of reclosing have been successful. According to the data of various studies, 60 to 90 percent of reclosing are successful [21, 20].

As has been mentioned before, regulator used quality indicators for quality regulation. The main quality indicators is formulated as below [18]:

$$SAIF = \frac{\sum_{i=1}^{N} \lambda_i N_i}{\sum_{i=1}^{N} N_i} \quad (7)$$

$$SAIDI = \frac{\sum_{i=1}^{N} U_i N_i}{\sum_{i=1}^{N} N_i} \quad (8)$$

$$ENS = \sum_{i \in s} P_i . U_i \quad (9)$$

where:

λ_i: Interruption frequency at load point *i*
N_i: Number of customers at load point *i*
U_i: Annual unavailability or outage time at load point *i*
P_i: Average load demand at load point *i*
S: Set of load points in the considered system.

SAIDI is based on the duration of interruptions. Reclosing times are short and after taking into account reclosing time has no significant effect on duration of interruptions. So it has a small impact on the SAIDI index.

ENS is based on energy. The wasted energy during reclosing time is negligible. So considering reclosing time does not have a significant effect on the ENS. However, it causes a slight change in this index.

SAIFI is based on numbers of the faults. The number of faults which will be resolved through reclosing is remarkable. So considering the reclosing fault should have a significant effect on this system quality indicator.

Therefore, system quality indicators, particularly SAIFI will be changed due to considering reclosing time in the distribution network analysis. Since the quality regulation is formulated based on system quality indicators, so taking reclosing into consideration should also affect on quality regulation cost.

The impact of taking reclosing time into consideration on system quality indicators and cost of quality regulation in the studied test system has been discussed in Section 7.

6. Case Study

The purpose of the case study was to evaluate the effects of considering reclosing time on system quality indicators and quality regulation cost in various reliability projects. The studied reliability projects are as follows:

Case 1: Status-quo alternative used as reference
Case 2: Replacing four uninsulated lines shown in Fig. 3 with underground cables.
Case 3: Using the new supply at Module A feeds the load points LP11 a - LP17 a.

6.1 Test system

In the case study Swedish rural reliability test system (SRRTS) has been used which has been introduced in [22]. SRRTS is shown in Fig. 3. This system has 44 load centers and 943 customers in five rural, agricultural, industrial, commercial and public sectors. All information related to the testing system such as diagrams of load, switching time parameters and reconstruction time parameters are presented in [22].

There are five different customer types in the test system: rural residential, industrial, commercial, agricultural and public sector. The average load of each customer type is shown in Table 1. It should be noted that each customer type has a common average load for its entire customer. For each customer type, set of different load curves presenting time-varying load demand are need, i.e.

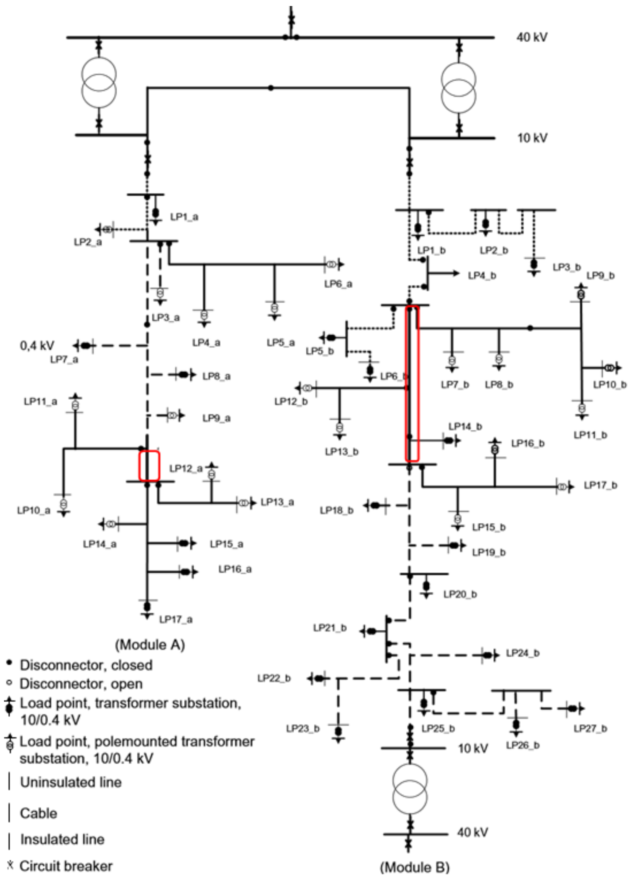

Fig. 3. Swedish Rural Reliability Test System (SRRTS).

seasonal, daily, and hourly load curves. These load curves are presented in [23]. During occurring a fault, to obtain the power consumption, the load average is multiplied with an index number in form a load curve [22].

The reliability model date includes reclosing time (Rct), switching time (S), restoration time (r), and failure rate (λ).

The data regarding the reclosing time has been placed in the testing system based on [24]. The parameters related to reclosing time are shown in Table 1. Reclosing time has been considered with log-normally distributed and therefore it also includes standard deviations (StD) in the Table 2.

The permanents of r, S and λ are shown in Table 3. λ is considered to be exponentially distributed while S and r are considered to be log-normally distributed.

The disconnector faults are ignored in the reliability model and assumed that the generation and transmitting system are 100% reliable.

6.2 Swedish regulation

In Swedish quality regulation, RPS is used on system level and customer level, some kind of GS called Gurdun rules is used [6]. Gurdun laws were formulated after the Gurdun storm, which occurred in 2005 in Sweden. PQC is not used in Sweden.

Table 1. Average load per customer category and number of customers for each load point.

Load point		Res. (kW)	Ind. (kW)	Comm. (kW)	Agr. (kW)	Pub. (kW)	Nr. of cust.
	Module A						
1		3.03	41.01	33.16	0.00	0.00	10
2,5-10,13,15,17		14.14	13.67	8.29	2.08	3.24	19
3,4,11,12,14,16		11.11	0.00	8.29	7.28	0.00	19
	Module B						
1,5,10,22,25		16.16	0.00	24.87	7.27	0.00	26
2,3,6-9, 11-21,23,24,26		16.16	13.67	8.29	4.16	3.24	23
4		0.00	68.35	24.87	0.00	0.00	8
27		18.18	0.00	24.87	10.4	0.00	31

Res.= Residential power demand (kW)
Ind.= Industry power demand (kW)
Comm.= Commercial power demand (kW)
Agr.= Agriculture power demand (kW)
Pub. Sect.= Public Sector power demand (kW)
Nr. of Cust.= Number of customers

Table 2. Reclosing time data for the component.

Component	R_{ct}(s)	$STD\ for\ R_{CT}$ (min)
Cable	-	-
Insulated line	0.083	2
uninsulated line	0.083	2
Breakers(MV)	0.083	2
Breakers(HV)	0.083	2
Transformer substations(10/0.4kV)	-	-
Transformers(40/10 kv or 130/10 kV)	0.083	2
Busbars(40 or 130 kV)	0.083	2

Table 3. Reliability and component data.

Component	$\boldsymbol{\lambda_t}$	$\boldsymbol{r}$	StD for $\boldsymbol{r}$	s	*Std for s*
Cable	0.019	690	138	60	24
Insulated line	0.03	300	60	60	24
uninsulated line	0.123	300	60	60	24
Breakers(MV)	0.006	240	24	60	24
Breakers(HV)	0.0058	480	48	60	24
Transformer substations	0.0155	600	60	60	24
Polemounted transformers	0.02	600	60	60	24
Transformers(40/10 kvor 130/10 kV)	0.003	-	-	60	24
Busbars(40 or 130 kV)	0.001	120	24	60	24
Busbars(10 kV)	0.001	120	24	60	24

$\boldsymbol{\lambda_t}$= total failure rate (f/yr) [for lines/cables (f/yr.km)]
$\boldsymbol{r}$ = restoration time (min)
s = switching time (min)
StD= standard deviations

According to Gurdun laws, the DSO must pay compensation to customers who have suffered interruptions more than 12 hours [6]. Incidents including war, terrorist activities, earthquakes, and intentional sabotage are not included in these interruptions [6]. The amount of customers compensation depends on customers' tariffs **(t)**, duration of interruption **(d)** and Swedish price base amount

Table 4. Compensation levels regulated by the Gurdun Laws (GLs).

Outage duration (d)	Customer compensation	Minimum level of compensation
$12 \le d \le 24$	12.5% of t	2% of β
$24\ n < d \le 24\ (n+1)$ $n = 1, 2, 3, \dots$	12.5%+n.25% of t	(n+1).2% of β

Table 5. Network tariff and energy consumption per customer type.

Customer sector	Tariff per MWh (€/MWh)	Tariff per MWh (€/MWh)	Network tariff [€/yr]	Number of customers
Residential	40.8	8.84	359	627
Industrial	18.5	119.72	2215	38
Commercial	18.6	72.60	1350	61
Agricultural	27	9.15	247	187
Governmental	18.6	28.37	528	30

Table 6. Parameters in RPS.

	SAIDI<12h [h/cust, yr]	SAIFI<12h [nr/cust, yr]
Slop values [€/kWh, €/kW], I^j	1.96	4.39
Performance standards, q_s^{-j}	2.79	1.58
Share factor, F	1	1
Capped values in RPS(€) (3% of annual revenue)	14500	14500

(β) [6]. Since the tariffs are different for each type of customers, thus compensation will also be different for each type of customers (Table 5). The minimum amount of compensation is determined based on Swedish basic price, (β), which had been set to € 4280 in 2009. The information regarding Gurdun laws is shown in Table 4.

In Swedish quality regulation, capped RPS is used based on SAIDI and SAIFI quality indicators [6]. Since for more than 12 hour interruptions DSO has been fined by GS, system quality indicators are only calculated for less than 12 hours interruptions so a DSO would not be fined two times for an interruption [6]. RPS parameters are presented in Table 6.

The cost due to capped RPS for an unplanned interruption year τ is described in [2] as below:

$$C_{RPS}(\tau) = \sum_{j\in J} F\left(q_s^j(\tau) - q_s^{-j}\right)\frac{E(\tau)}{H} I^j \qquad (10)$$

Where $J = \{SAIDI_{<12},\ SAIFI_{<12}\}$ Based on interruptions shorter than 12 h; the F = share of the financial cost paid by the DSO; $q_s^j(\tau)$ = Measured system quality indicator j year τ [h, 1]; q_s^{-j} = performance standard for system quality indicator j [h, 1]; $E(\tau)$=energy consumption year τ [kWh]; H= number of hours per year [h]; I^j= cost parameter for system quality indicator j based on national averages [€/kWh, €/kW].

7. Results

In the first step, the impact of considering reclosing time on system quality indicators in test system is examined. Results are shown in Table 7.

As can be seen in Table 7, taking reclosing time into consideration has a significant effect on SAIFI indicator and also will lead to very slight changes in SAIDI and ENS indicators. The reason for these changes is presented in Section 5. Fig. 4 clearly shows the impact of considering reclosing time on system quality indicators.

In the second step, we will investigate the impact of considering reclosing time on quality regulation cost in the test system. For analyzing quality regulation cost in extraordinary years, VaR and CVaR are used. It is noteworthy that Monte Carlo simulation output is the probability distribution function of quality regulation cost.

As stated in Swedish quality regulation, C_{PQC}= 0 and C_{RPS}, and C_{GS} will be calculated based on Tables 2 and 4 respectively.

SAIDI and SAIFI system quality indicators will also be calculated based on less than 12 hour interruptions.

In this section, we will use the coefficient of variation, maximum tolerance error of 2.5% for ENS as the simulation stopping criterion. In multi-indicator studies, the criterion for stopping the simulation will be chosen based on the indicator with the lowest rate of convergence [18]. Here ENS has the lowest level of convergence. The stopping criterion (γ) formulates as below:

$$\gamma = \frac{\partial_X}{m_X * \sqrt{n}} \qquad (11)$$

Where

X= The estimated index

Table 7. Results for quality indicators with/without considering reclosing time.

index	Without reclosing time	With reclosing time
SAIFI	1.638	2.9304
SAIDI	3.613	3.7805
ENS	7.041	7.2591

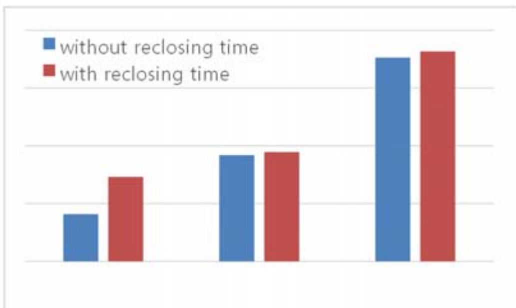

Fig. 4. Compare quality indicators with/without considering reclosing time.

Table 8. Total regulation cost of reliability projects with/without considering reclosing time.

Ctotreg	Without Rct			With Rct		
	Case1	Case2	Case3	Case1	Case2	Case3
Mean[k€]	3.27	1.87	-2.05	11.2	9.62	4.73
VaR[k€]	21.6	19.7	15.22	28.08	27.26	23.95
CVaR[k€]	26.6	25.34	21.76	30.5	30.1	28.32

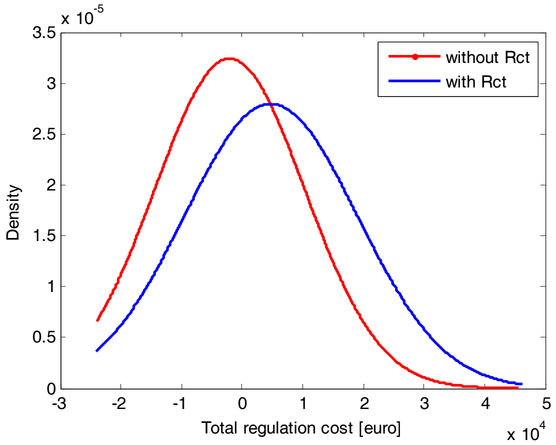

Fig. 5. The probability distribution of the total regulation cost with a normal distribution fit for case 3 with/without considering reclosing time.

∂_x = Sample standard deviation of the estimated index
m_x = Sample mean of the estimated index
N = Number of samples taken

Expected Quality regulation cost, VaR and CVaR are shown in Table 8, for the three studied projects in both states of with / without taking reclosing time into consideration.

As can be seen in Table 8, considering reclosing time increases mean, VaR and CVaR of quality regulation cost of all the three projects. The greatest difference can be seen in the third case in which the average cost of quality regulation has changed from a negative value (profit) to a positive value (loss). Fig. 5 shows the probability distribution function of the third project in both states of with/without taking reclosing time into consideration. Fig. 5 clearly shows the impact of considering reclosing time on quality regulation cost.

In Fig. 6, probability distribution function of quality regulation cost is shown for the three studied projects with considering reclosing time. The average cost of quality regulation, VaR and CVaR in the second and third modes of reliability projects have been reduced compared to the base case. The average cost of quality regulation in the third case has decreased almost 7500 € compared to the first case.

The reliability indices for three investigated projects considering reclosing time are shown in Table 9. ASUI is an average System Unavailability Index and could be a valuable index for evaluation reliability of the system. As can be seen from Table 9, case 3 has the best quality indices between three investigated projects.

Table 9. The reliability indices for three investigated projects with considering reclosing time

	Case1	Case2	Case3
SAIDI (h/cust.yr)	3.7642	3.5862	3.081
SAIFI (f/cust.yr)	2.9317	2.7459	2.2147
ENS (h/cust.yr)	7.212	6.8561	5.9139
ASUI (% of time)	0.0043	0.0041	0.0035

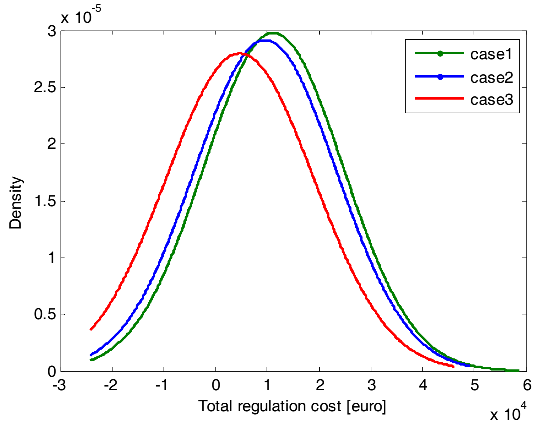

Fig. 6. The probability distribution of the total regulation cost with a normal distribution fit for case 1, case 2 and case 3 with considering reclosing time.

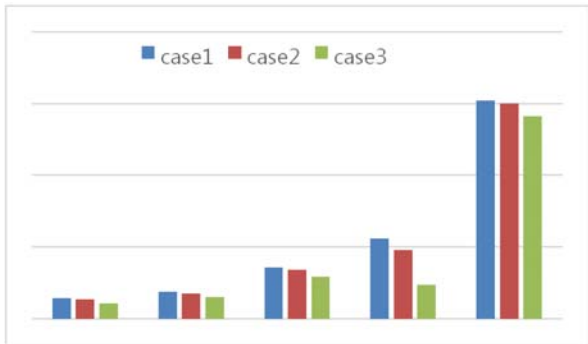

Fig. 7. The relation between reliability indices and cost of quality regulation for case 1, case 2 and case 3 with considering reclosing time.

In Fig. 7 the relation between reliability indices and cost of quality regulation are shown. As can be seen better reliability indices lead to lower cost due to quality regulation.

8. Conclusion

Quality regulation imposes new financial risks on DSOs.

In this paper, we have developed a risk-based method based on Monte Carlo simulation to evaluate this new financial risk by taking reclosing time into account. The proposed risk assessment technique was implemented in the test system and the impact of taking reclosing time into consideration on system quality and quality regulation cost indicators were examined.

In the first step, the results showed that considering reclosing time affects on the system quality indicators and particularly on SAIFI. In the second step, developed risk methodology was conducted on various reliability projects in the test system and under Swedish quality regulation. The results showed that considering reclosing time has a significant impact on the average, VaR and CVaR of quality regulation cost in all projects of reliability. DSOs require accurate information about system quality indicators and quality regulation cost to assess financial risks due to quality regulation in order to make informed decisions about the selection of projects to improve the reliability in the distribution network under PBR regime. As the results showed, considering reclosing time leads to develop a realistic viewpoint about system quality indicators and quality regulation cost. So it is recommended that in the assessment of the financial risks due to quality regulation, DSOs decidedly consider the reclosing time in their risk assessment.

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