ENTSO-E ITC TRANSIT LOSSES DATA REPORT 2019

Published following the requirements of Articles 4.2 and 4.3 of the Annex of Regulation (EU) No 838/2010, Part A

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European Network of Transmission System Operators for Electricity

entsoe

Background and purpose of this document

The Inter Transmission System Operator Compensation (ITC) Agreement is a multiparty agreement concluded between ENTSO-E and ENTSO-E member countries. It offers a single frame to compensate parties for costs associated with losses resulting with hosting transits flows on networks and for the costs of hosting those flows. All parties removed previously applied transit charges. This report offers a transparent overview of the method to compute losses resulting from transits flows and the amount incurred by all parties.

The Inter Transmission System Operator Compensation mechanism is governed by Article 49 of Regulation (EU) 2019/943. The ITC mechanism is further specified by Commission Regulation (EU) No 838/2010 of 23 September 2010 on laying down guidelines relating to the inter-transmission system operator compensation mechanism and a common regulatory approach to transmission charging. According to Articles 4.2 and 4.3 of the Annex, Part A, of Commission Regulation (EU) No 838/2010, ENTSO-E is mandated to determine the amount of losses incurred on national transmission systems by calculating the difference between:

(1) the amount of losses actually incurred on the transmission system during the relevant period; and

(2) the estimated amount of losses on the transmission system which would have been incurred on the

system during the relevant period if no transits of electricity had occurred. ENTSO-E is also responsible for publishing this calculation and its method in an appropriate format. This document contains these publications.

Method

The losses caused by transits in each transmission system are determined by:

- recording the load flow situation for each party to the ITC mechanism (ITC Party) for 6 monthly snapshots τ (3rd Wednesdays of a month and preceding Sundays at 03:30h, 11:30h and 19:30 CET/CEST):
  - with transit represented on the interconnected system;
  - with transit represented on the disconnected system;
- the losses caused by transit for the particular hour ΔPloss k (T) is then determined as the difference of the losses observed in the two situations;
- based on a mapping that attributes every hour of the month to one of the six snapshot timestamps τ, each snapshot timestamp is given a weight wτ;
- the overall monthly amount of transit losses for each ITC party is derived by aggregating the weighted transits for the particular hours.

Annex 1 contains further illustrations of this method.

Calculation

Annex 2 contains the calculation results for the year 2019.

Annex 1: Illustration of the methodology

WWT = "With and Without Transit". To assess the losses caused by transits, TSOs compute what would have been the losses without transit and compare the outcome with the metered values (with transits).

Monthly WWT Calculation: Introduction

- The losses caused by transit $\Delta P_{loss}\ (\tau,\ k)$ are determined for each ITC Party k for 6 monthly snapshots τ (3rd Wednesday of a month and preceding Sunday at 03:30 h, 11:30 h and 19:30 h CET/CEST) .
- Based on a mapping that attributes every hour of the month to one of the six snapshots timestamps τ, each snapshot timestamp is given a weight w_τ.
- The monthly WWT compensation is yielded by ITC Party k's losses cost $C_{losses}\ (k)$ multiplied by the losses energy caused by transit.

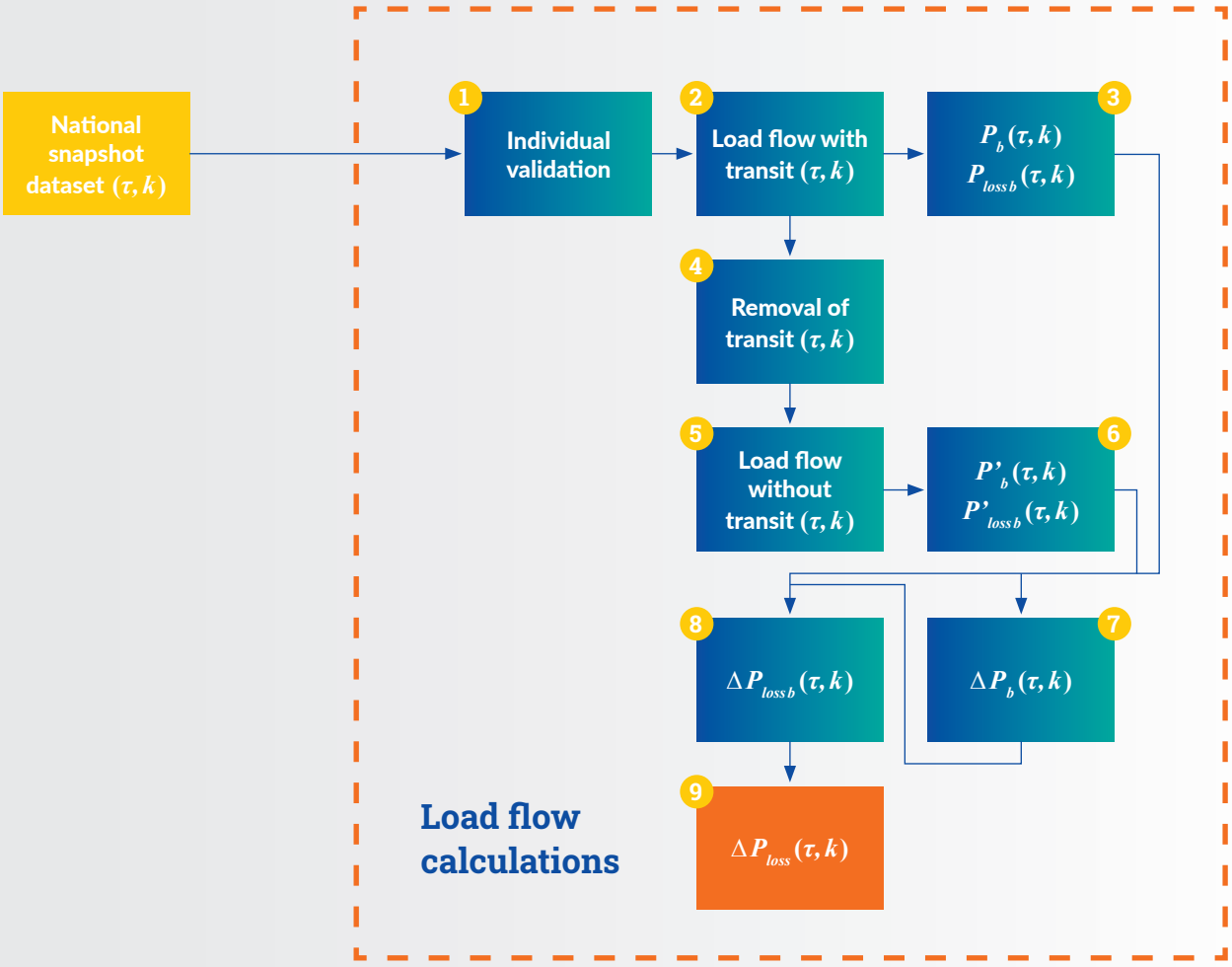
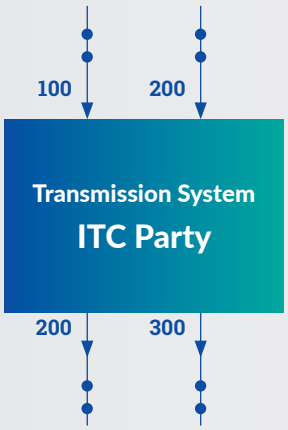


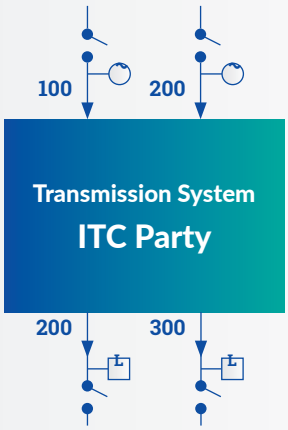
Figure 1: Monthly WWT Calculation

$\Delta P_{loss}(\tau, k)$ – Load flow calculation (Module 2 – 3)

Recorded Situation with transit represented on interconnected system (snapshots) (measured load flow, result from State Estimation)



Recorded Situation with transit represented on disconnected system (measured load flow, result from State Estimation)



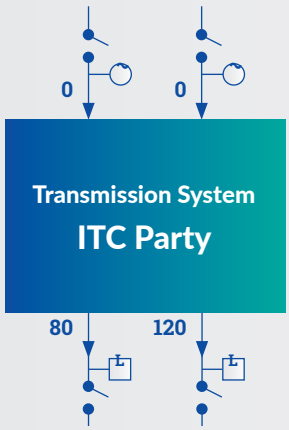
Transit = Minimum $\{\sum Export_i, \sum Import_j\}$

Example: $\sum$ Export = 500 MW, $\sum$ Import = 300 MW

Transit = Minimum {500 MW, 300 MW} = 300 MW

$\Delta P_{loss}(\tau, k)$ – Load flow without transits (Module 4, 5, 6, 7)

Simulated Situation without transit represented on disconnected system (measured load flow, result from State Estimation)



Removal of transit by modifying the flows on tie-lines

$$\text{If } \left(\sum_i Pex_i \geq \sum_j Pim_j\right) \text{ then } Pex'_k = Pex_k \times \left(1 - \frac{\sum_i Pim_i}{\sum_j Pex_j}\right)$$

$$Pim'_m = 0$$

$$\text{If } \left(\sum_i Pex_i < \sum_j Pim_j\right) \text{ then } Pim'_k = Pim_k \times \left(1 - \frac{\sum_j Pex_j}{\sum_i Pim_i}\right)$$

$$Pex'_m = 0$$

Distribution of the overall modification in losses observed on the slack note to all generate nodes

$$P'_i = P_i \times \left(1 + \frac{\Delta P_{loss}}{\sum_n P_n}\right)$$

$\Delta P_{loss}(\tau, k)$ – for each branch (Module 8)

In case the relative share of losses caused by transits exceeds the relative share of power flow caused by transits, it shall be delimited to this proportion.
(Interpretation of ERGEG Guideline)

$$\Delta P_{loss\ b}(\tau,k) = P_{loss\ b}(\tau,k) - P'_{loss\ b}(\tau,k)$$

$$\Delta p_{loss\ b}(\tau,k) = \Delta P_{loss\ b}(\tau,k) / P_{loss\ b}(\tau,k)$$

$$\Delta p_{b}(\tau,k) = \Delta P_{b}(\tau,k) / P_{b}(\tau,k)$$

If $\{\text{sign}(\Delta p_{loss\ b}(\tau,k)) = \text{sign}(\Delta p_{b}(\tau,k))$ and $|\Delta p_{loss\ b}(\tau,k)| > |\Delta p_{b}(\tau,k)|\}$

then

$$\Delta P_{loss\ b}(\tau,k) = \Delta p_{b}(\tau,k) \times P_{loss\ b}(\tau,k)$$

else

$$\Delta P_{loss\ b}(\tau,k) = P_{loss\ b}(\tau,k) - P'_{loss\ b}(\tau,k)$$

k = country
b = branch
τ = snapshot timestamp
ΔP_{loss} = relative increase in losses
ΔP = relative increase in flows

$\Delta P_{loss}(\tau, k)$ – sum for ITC Party k (Module 9)

Sum of all branches within a country

$$\Delta P_{loss}(\tau,k) = \sum_{b} \Delta P_{loss\ b}(\tau,k)$$

The losses energy caused by transit is the scalar product of the $\Delta P_{loss}(\tau,k)$ vector times the w_τ vector that attributes each hour of the month to a snapshot

$$Compensation\_WWT(k,m) = C_{losses}(k) \sum_{t=1-6}^{b} \left[\Delta P_{loss}(\tau,k) \quad w_\tau \right]$$

Annex 2: Calculation Results 2019

2019												
WWT												
weighted												
MWh												
Country	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Albania / AL	18.75	225.23	554.02	−18.85	278.01	284.92	11.21	−376.95	129.81	73.28	1,301.40	3,194.25
Austria / AT	20,153.96	20,392.75	19,696.09	34,256.06	12,585.73	15,102.95	16,183.87	29,013.59	23,267.54	28,871.83	15,368.84	19,835.71
Bosnia / BA	3,428.94	1,362.72	3,818.90	1,601.34	1,202.16	1,076.34	997.20	1,997.55	2,406.73	1,788.48	613.32	735.25
Belgium / BE	14,759.17	9,176.66	7,831.19	3,554.41	5,216.09	16,483.09	3,037.68	9,227.26	3,243.71	8,032.86	18,169.87	11,422.57
Bulgaria / BG	1,906.87	1,271.01	1,970.22	3,456.47	5,206.11	2,626.60	362.17	376.00	701.14	1,369.27	836.43	3,236.25
Switzerland / CH	47,927.30	51,050.92	43,665.73	37,331.26	25,333.94	22,469.90	9,427.20	10,812.65	29,084.56	52,016.38	38,515.80	61,164.31
Czech Republic/ CZ	39,871.93	26,017.30	21,590.44	31,806.78	3,542.97	8,621.66	29,822.50	6,955.81	44,730.23	25,123.49	−29.97	58,461.50
Germany / DE	−13,681.78	45,088.85	17,357.51	−2,927.21	15,338.25	26,753.33	35,506.03	65,354.13	4,478.95	17,204.75	59,291.09	66,033.85
Denmark / DK	30,695.20	16,585.23	37,378.38	19,241.73	8,463.85	14,217.48	8,386.10	5,363.89	32,770.92	13,599.80	10,082.93	47,758.63
Estonia / EE	6,603.81	11,747.29	10,274.24	8,491.92	4,604.02	11,824.30	15,410.90	6,898.69	3,523.79	1,467.46	6,114.31	5,142.23
Spain / ES	18,388.47	10,672.38	33,780.02	37,607.37	4,353.29	5,608.85	13,478.50	26,671.41	27,086.80	27,125.82	22,312.79	23,547.48
Finland / FI	6,300.30	30,778.75	14,890.30	16,334.61	7,016.15	46,138.23	49,645.77	14,911.78	11,329.05	9,698.61	18,621.72	11,681.86
France / FR	118,926.49	22,557.68	75,464.03	38,287.94	748.71	388.79	3,486.24	10,320.80	21,234.36	5,642.21	86,986.44	59,518.97
Great Britain / GB	201.64	−835.74	−24.38	2,679.43	1,912.34	2,305.87	6,315.40	1,053.82	34,982.33	16,800.06	16,265.96	507.48
Greece / GR	4,439.44	575.52	1,211.53	1,088.25	0.00	−12.96	73.92	330.19	424.69	1,598.51	1,691.40	165.17
Croatia / HR	3,076.51	2,972.14	4,767.22	3,976.21	2,241.92	1,899.05	1,597.65	683.82	1,429.74	3,007.03	7,102.84	1,378.00
Hungary / HU	12,480.67	3,281.91	3,420.80	6,488.93	2,727.65	1,351.28	4,517.41	5,878.06	10,270.11	6,884.39	2,561.88	5,033.15
Ireland / IE	0.00	0.00	0.00	0.06	0.00	29.69	70.95	30.20	16.55	605.48	50.23	344.77
Italy / IT	−1,219.36	2,516.99	1,261.46	2,150.52	5,016.29	5,128.81	2,068.39	8,840.01	6,119.81	12,398.47	8,160.88	4,750.83
Kosovo* / KS*	1,394.89	1,261.13	1,362.07	2,002.46	706.91	1,848.26	746.70	656.83	805.88	668.42	952.99	1,705.48
Lithuania / LT	2,667.09	8,067.05	12,157.51	9,189.22	306.35	8,786.64	9,226.57	11,314.63	8,933.08	3,860.66	11,662.22	10,098.03
Luxembourg / LU	216.76	132.17	54.37	213.85	9.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Latvia / LV	3,478.86	4,401.52	3,665.20	3,609.87	1,340.74	5,525.34	9,488.23	−1,770.87	2,176.88	638.95	3,831.53	1,215.68
Montenegro / ME	449.28	334.28	1,797.36	1,755.47	482.26	1,183.45	1,202.33	785.59	1,502.85	1,500.25	2,247.46	5,463.00
FYROM / MK	758.04	192.36	597.37	717.86	731.19	867.56	896.95	491.38	738.11	267.34	494.07	922.78
Northern Ireland / NI	285.62	110.18	58.25	443.63	7.55	0.72	195.12	5.10	677.48	497.73	357.70	25.38
Netherlands / NL	30,966.11	12,418.45	9,253.98	18,547.28	2,921.90	5,731.97	2,098.32	3,327.83	18,240.28	5,219.58	3,891.49	31,841.16
Norway / NO	16,004.82	2,132.58	2,615.95	−1,309.87	−541.70	15,763.21	6,566.02	−1,142.10	1,815.42	5,179.36	−6,826.43	−3,770.46
Poland / PL	33,798.33	14,489.78	13,510.87	12,705.02	15,896.23	7,137.37	7,718.28	3,788.33	30,534.44	10,015.44	4,677.42	33,324.49
Portugal / PT	2,964.12	944.78	−160.44	59.51	84.70	731.32	−4.97	0.38	−318.87	−104.20	2,283.40	1,521.13
Romania / RO	−8,852.27	−7,407.90	−3,324.71	−3,537.92	−13,275.66	−92.07	−4,508.91	−933.02	−535.41	−1,579.83	4,249.64	−9,225.36
Serbia / RS	794.89	3,559.15	1,311.88	3,972.32	2,524.38	3,553.23	1,224.81	748.48	−1,177.02	−240.31	3,050.55	2,658.35
Sweden / SE	19,432.89	22,746.69	15,285.17	19,088.75	10,796.14	24,078.79	23,237.93	11,779.52	21,239.41	29,342.90	28,040.27	23,683.10
Slovenia / SI	5,257.03	6,028.17	7,959.56	7,245.02	5,411.61	7,001.12	7,316.52	2,295.20	5,296.53	2,806.04	3,877.84	4,281.83
Slovakia / SK	15,748.06	11,945.32	5,994.54	9,977.06	2,281.50	5,491.23	5,151.92	7,269.44	10,631.21	11,216.32	1,216.88	17,632.35
TOTAL	**439,642.83**	**336,793.32**	**371,046.62**	**330,086.78**	**135,471.55**	**269,906.33**	**270,954.88**	**242,959.41**	**357,791.09**	**302,596.82**	**378,025.16**	**505,289.20**

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ENTSO-E, the European Network of Transmission System Operators, represents 42 electricity transmission system operators (TSOs) from 35 countries across Europe. ENTSO-E was established and given legal mandates by the EU's Third Legislative Package for the Internal Energy Market in 2009.

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