

***Seminar Of Electricity Supply Quality
Milan, June 8th, 2001***

**Regulatory Approach for Controlling
the Quality of the Electric Power
Distribution
in Argentina**

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DISTRIBUTION AREA OF BUENOS AIRES



Demand: 25.291 GWh

Total System Demand: 57.748 GWh

Percentage: 43.8 %

DISTRIBUTION AREA OF BUENOS AIRES



Customers Area:	4.800.000
Customers EDESUR:	2.200.000
Customers EDENOR:	2.350.000
Customers EDELAP:	250.000
Area EDESUR:	3309 km2
Area EDENOR:	4637 km2
Area EDELAP:	5780 km2

DISTRIBUTION AREA OF BUENOS AIRES



	MEDIUM VOLTAGE		LOW VOLTAGE	
	CABLE	LINE	CABLE	LINE
	KM	KM	KM	KM
EDENOR	3688	2573	3537	19234
EDESUR	4245	1508	6624	11221
EDELAP	556	1340	343	3541

DISTRIBUTION

Regulatory Principles Established

- u Natural monopoly with regulated tariffs**
- u Obligation to meet demand and ensure adequate service.**
- u Open access to third parties**
- u Tariffs must be fair and reasonable covering operating costs, taxes, amortization and a rate of return**
- u Quality standards established by concession contract.**

PENALTIES



The purpose is double:

To compensate the consumer directly for the cost of receiving a inferior quality

To give a signal to distributors as an incentive to promote new investments and correct service operation

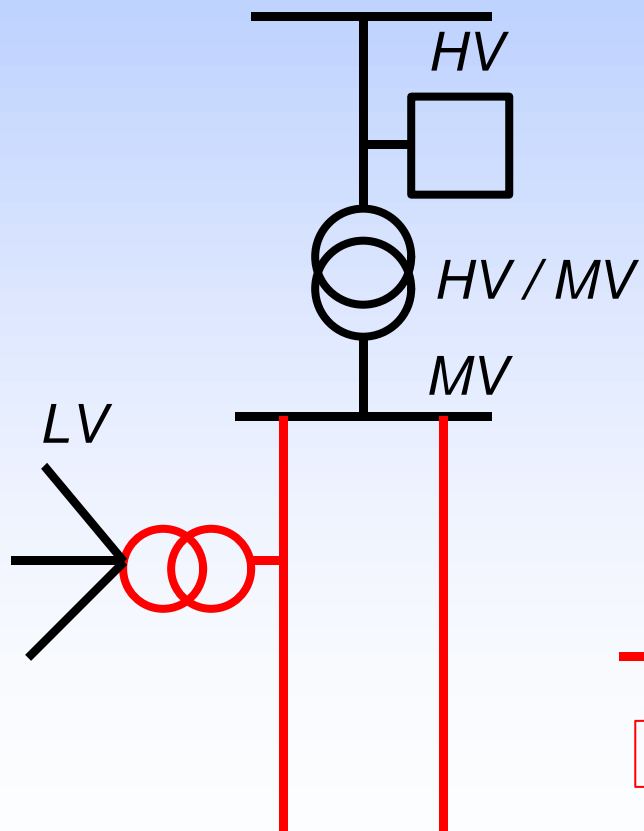
QUALITY OF SERVICE CONTROL



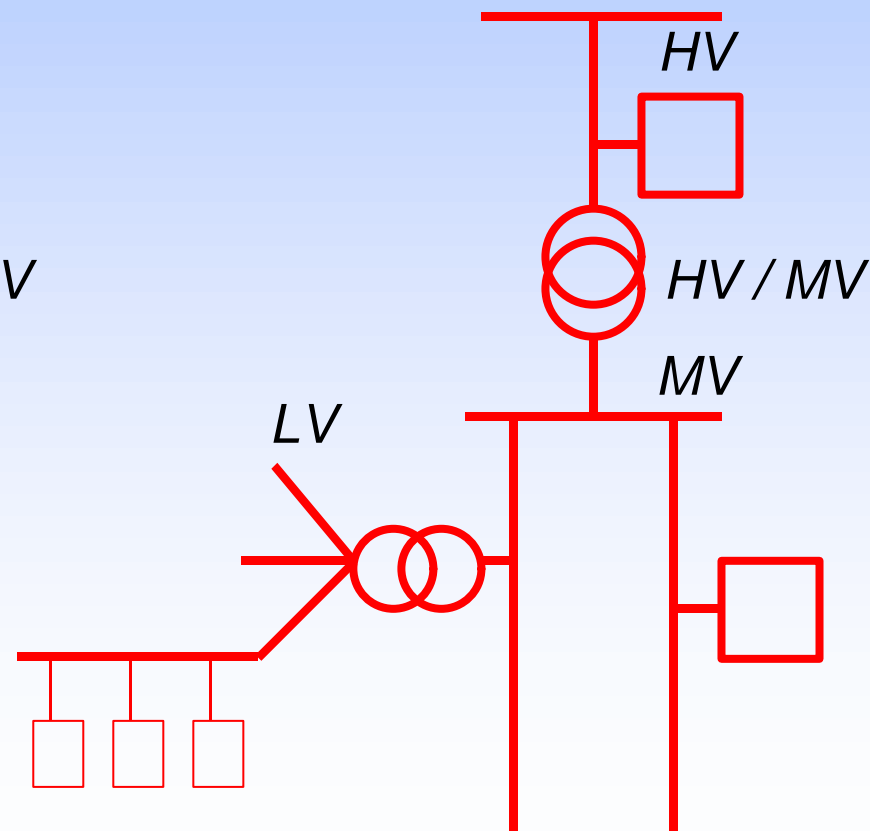
	PRELIMINARY 1 year	PHASE 1 set / 93 - 31 ago / 96	PHASE 2 set / 96
Service Quality (Interruptions)	no control activity	Global Indicators Frecuency and Duration of interruptions	Per Customer Indicators Frecuency and Duration of Interruptions
Quality of Waveform	no control activity	Voltage Level	Voltage Level Harmonics Flicker
Commercial Service	no control activity	Conection Delay Estimated Billing Billing Errors Supply Interruption Complaints	Conection Delay Estimated Billing Billing Errors Supply Interruption Complaints

QUALITY CONTROL PHASES

1° PHASE



2° PHASE



PHASE 1 - INDEXES



Transformer interruption Index

- n FMIT: Mean frequency of interruptions per transformer
- n TTIT: Total time of interruptions per transformer

Transformer KVA interruption index

- n FMIK: Mean frequency of interruptions per KVA
- n TTIK: Total time of interruptions per KVA

PHASE 1 - INDEXES

$$FMIT = \sum_i Q_{fs_i} / Q_{inst}$$

$$TTIT = \sum_i Q_{fs_i} \times T_{fs_i} / Q_{inst}$$

$$FMIK = \sum_i KVA_{fs_i} / KVA_{inst}$$

$$FMIK = \sum_i KVA_{fs_i} \times T_{fs_i} / KVA_{inst}$$

OUTAGES TYPES

Internal Outage

**Due to failures in equipment and facilities
pertaining the Distributon Company**

External Outage

**Due to failures in Generation and the
Transmission System, not pertaining the
Distribution Company**

PHASE 1 - WAIVERS



TRANSFORMER		
Sub-phase	Frequency	Time
<i>Internal</i>		
1	3 times semester	12 hs. per semester
2	2,5 times semester	9,7 hs. per semester
3	2,2 times semester	7,8 hs. per semester
<i>External</i>		
1	5 times semester	20 hs. per semester
2	3 times semester	12 hs. per semester
3	2 times semester	6 hs. per semester
kVA INSTALLED		
Sub-phase	Frequency	Time
<i>Internal</i>		
1	1,9 times semester	7 hs. per semester
2	1,6 times semester	5,8 hs. per semester
3	1,4 times semester	4,6 hs. per semester
<i>External</i>		
1	5 times semester	20 hs. per semester
2	3 times semester	12 hs. per semester
3	2 times semester	6 hs. per semester

PHASE 1 - ENS CALCULATION

If FMIT exceed limit:

$$ENS \text{ (kWh)} = (FMIT_{reg} - FMIT_{lim}) \times \frac{TTIT_{reg}}{FMIT_{reg}} \times Pot_{distrib}$$

If TTIT exceed limits:

$$ENS \text{ (kWh)} = (TTIT_{reg} - TTIT_{lim}) \times Pot_{distrib}$$

$$Pot_{distrib} = \begin{matrix} \text{EDENOR} & - & \text{EDESUR} & 740.000 \text{ kW} \\ \text{EDELAP} & & & 100.000 \text{ kW} \end{matrix}$$

PHASE 1 - PENALTIES

- u ENS valued at 1 U\$S/Kwh**
- u The total amount of penalties applied is credited to all users regardless their category**

PHASE 2 - WAIVERS

INTERRUPTION FREQUENCY (semester)

Clients in HV :	3
Clients in MV :	4
Clients in LV (large demands) :	6
Clients in LV (Small and Medium Demands) :	6

MAXIMUN TIME OF INTERRUPTION (hours/interrupt)

Clients in HV :	2
Clients in MV :	3
Clients in LV (large demands) :	6
Clients in LV (Small and Medium Demands) :	10

PHASE 2 - ENS CALCULATION

If the frequency of interruptions or the total time of interruptions exceed the limits imposed, the ENS is calculated as follows:

$$ENS \text{ (kWh)} = \sum_j T_j \times K_j \times (EA / 525 . 600)$$

- Tj : Sum of the minutes the client has not been supplied
- EA : Energy invoiced to the client in the last twelve months
- Kj : Factor representing the load curve (from table)

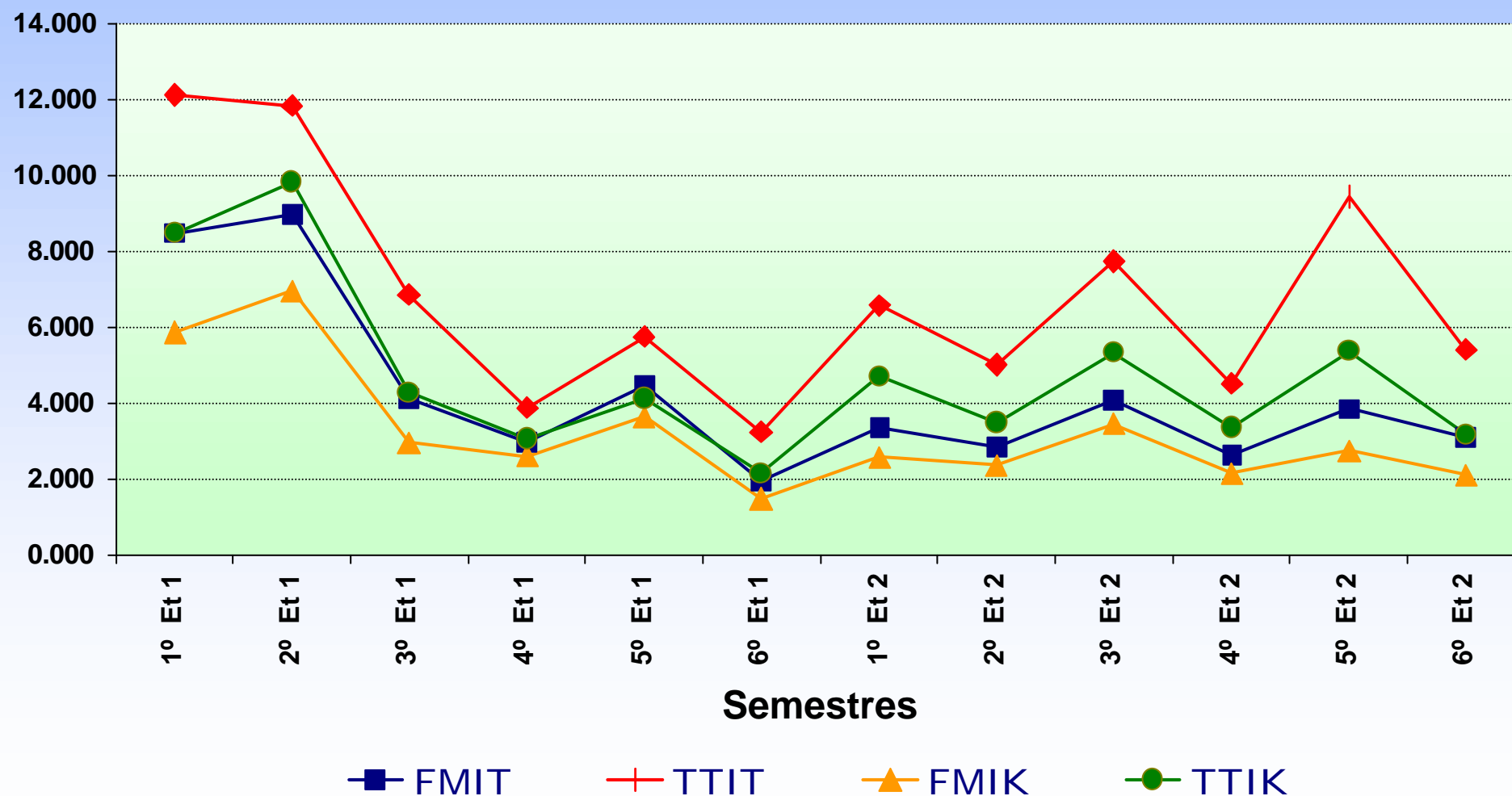
PHASE 2 - PENALTIES

- u ENS valued from 1,40 to 2,71
U\$/kWh according the client
category**
- u The amount of penalty applied
becomes a credit to the particular
client with energy not served**

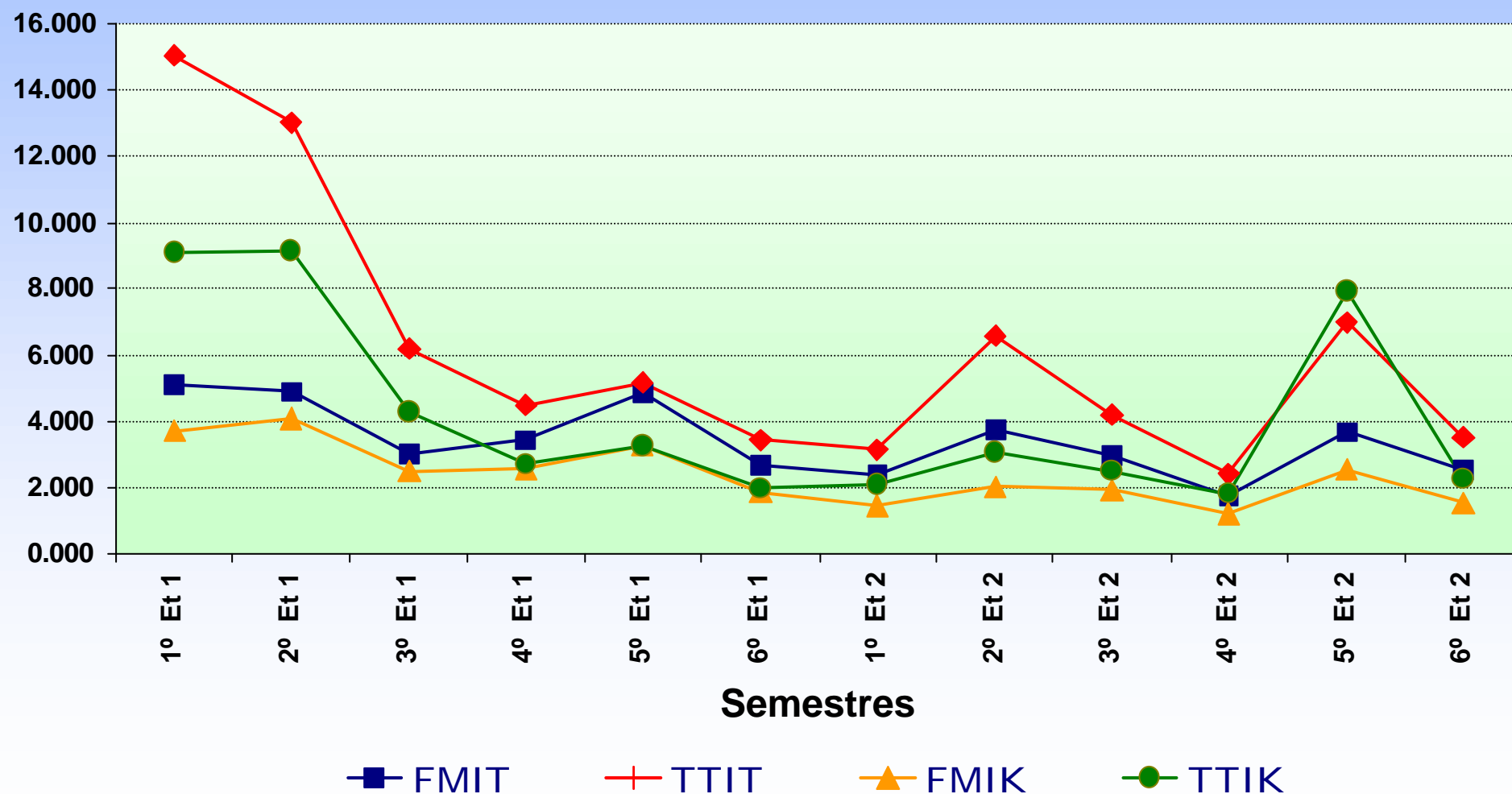
IMPLEMENTATION

- The distributor informs ENRE in a monthly and semestral basis the interruptions registred and the events of “force majeure”
- ENRE evaluates the inform and the proof presented, and determines the events accepted as “force majeure”
- ENRE issues an order to calculate the penalties and credit them to the clients affected (tiem of interruption longer than 3 minutes)
- The Distributor can appeal the ENRE’s decision by presenting additional proof
- The Distributor informs ENRE the penalty calculation to be credit the next semester
- The Distributor certifies by means of an external audit the accreditation of the penalties to the users

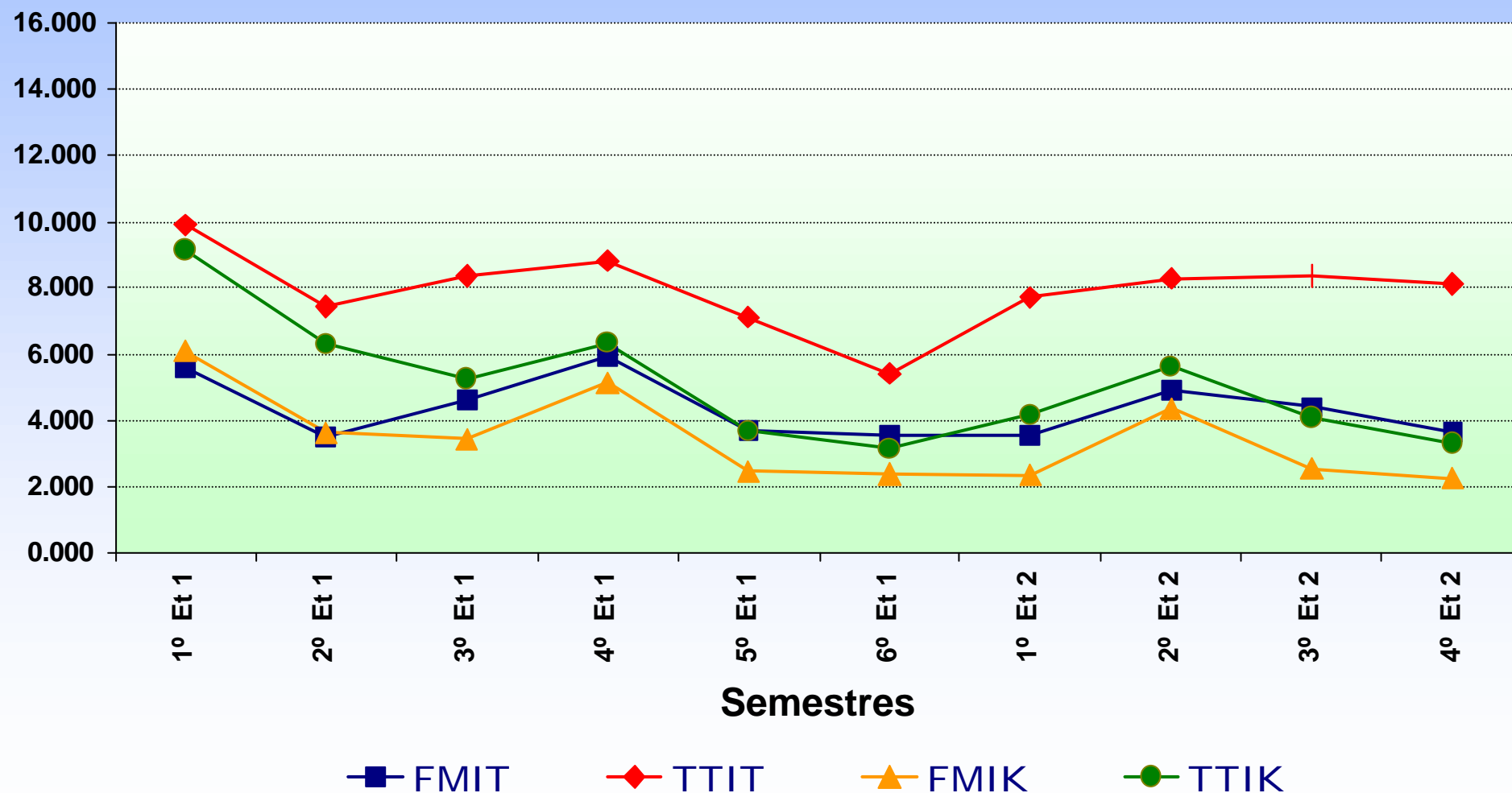
Evolution of Quality Indexes EDENOR S.A.



Evolution of Quality Indexes EDESUR S.A.



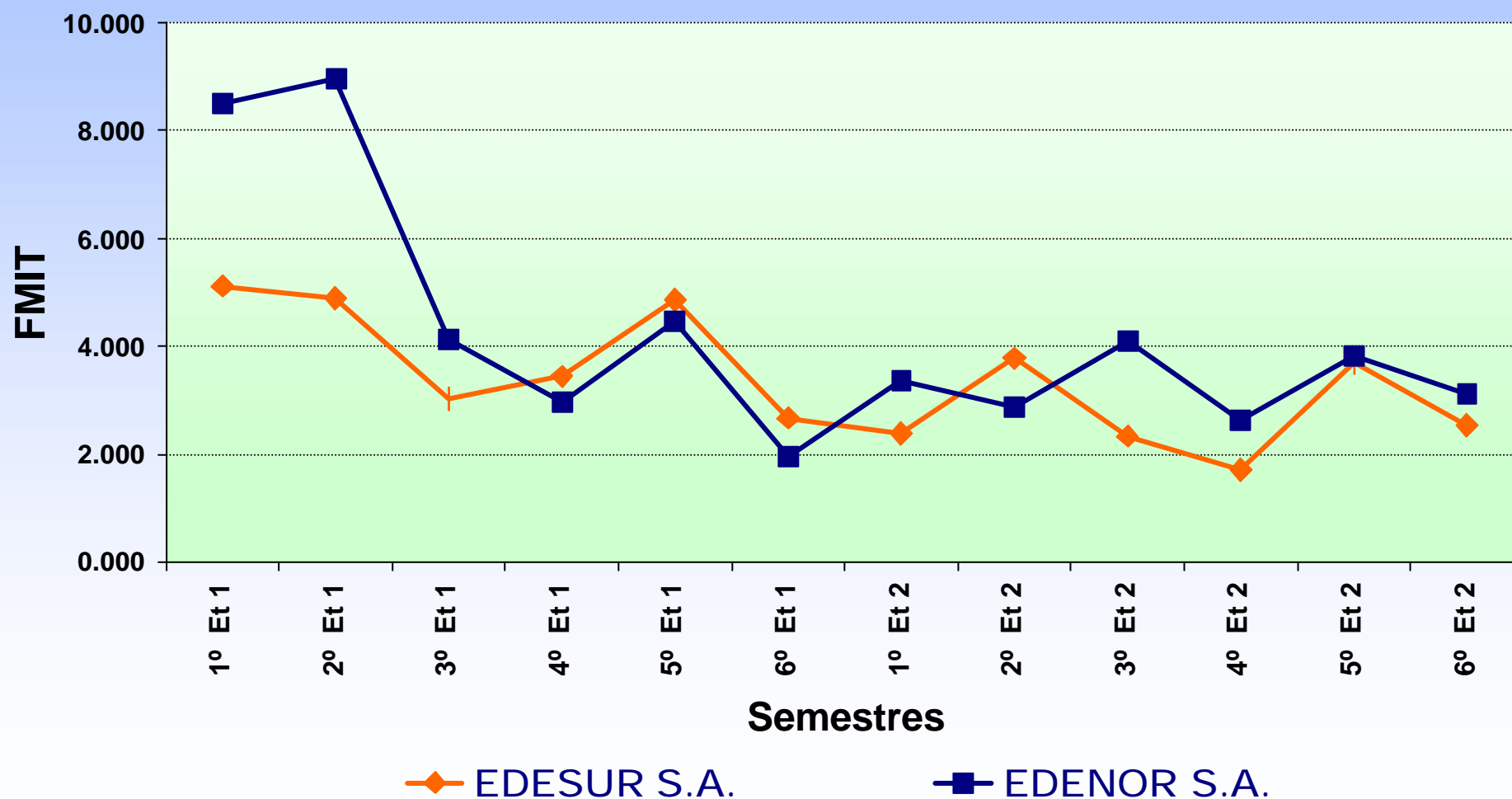
Evolution of Quality Indexes EDELAP S.A.



Quality Index Evolution

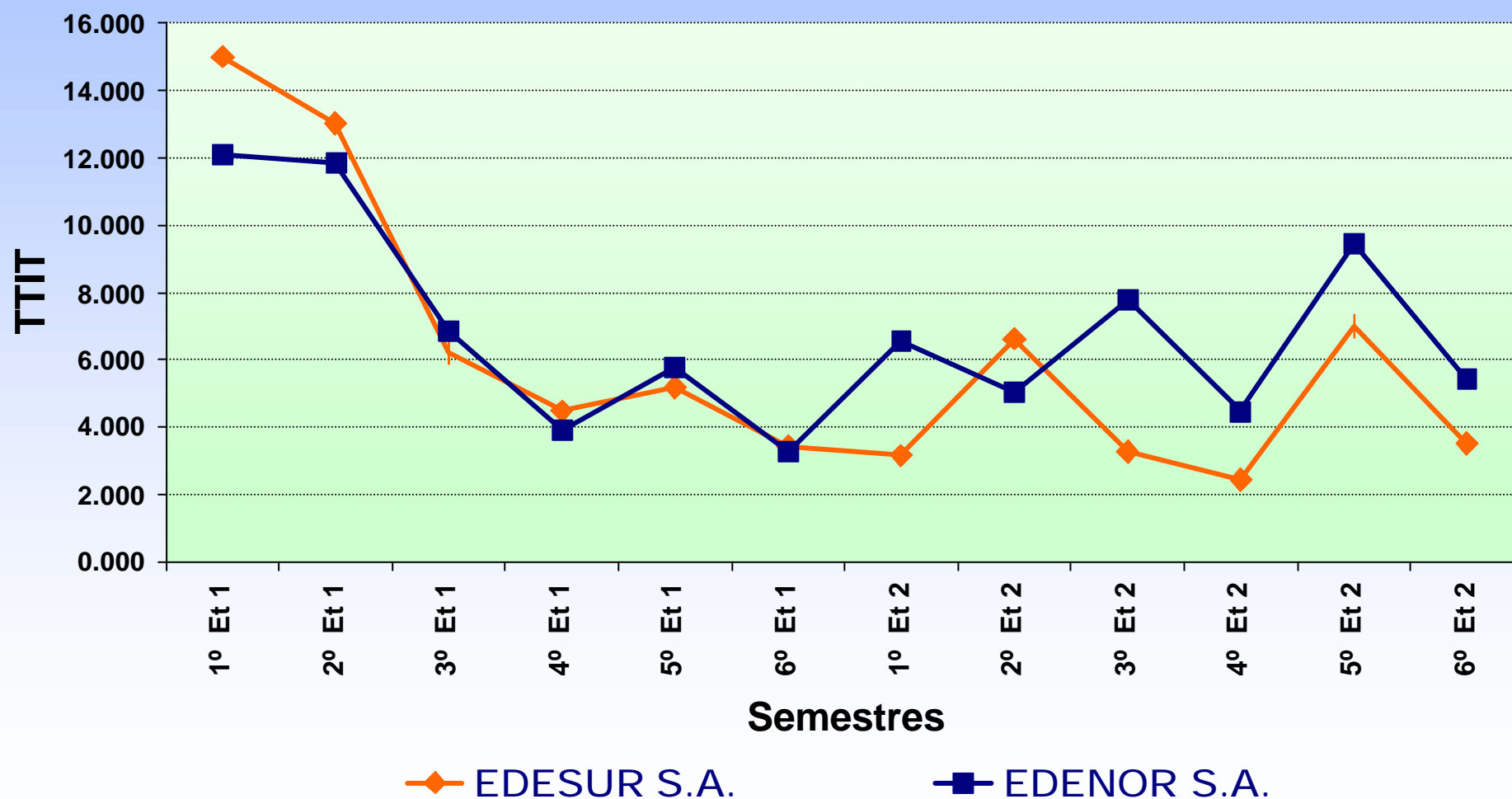
Medium Frequency Interruption per Transformer (FMIT).

(Values in Stage 2 are fixed on statistics purpose)



Quality Index Evolution

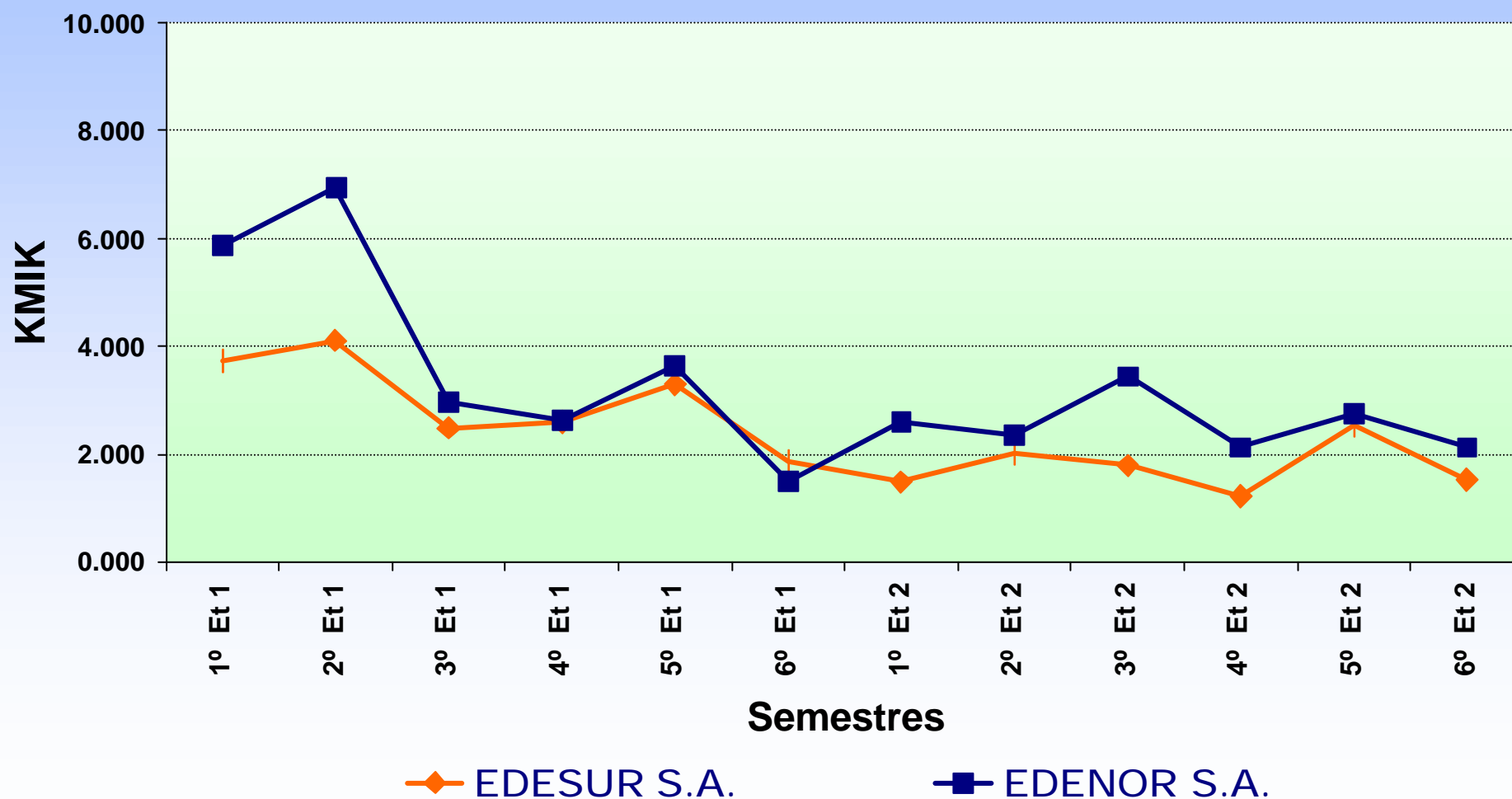
Total Interruption Duration per Transformer (TTIT),
(Values in Stage 2 are fixed on statistics purposes)



Quality Index Evolution

Medium Frequency per installed KVA (FMIK)

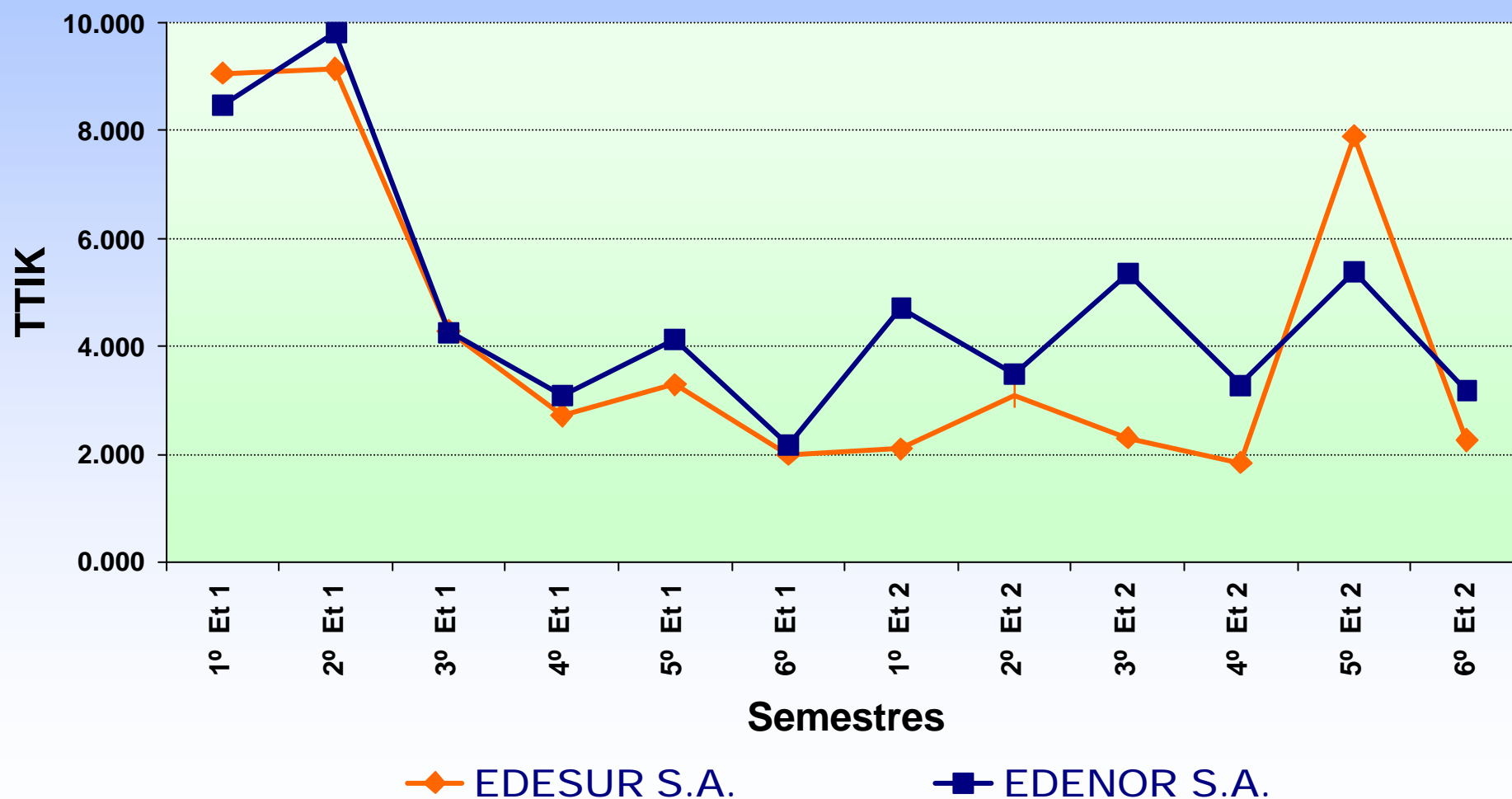
(Values in Stage 2 are fixed on statistics purpose)



Quality Index Evolution

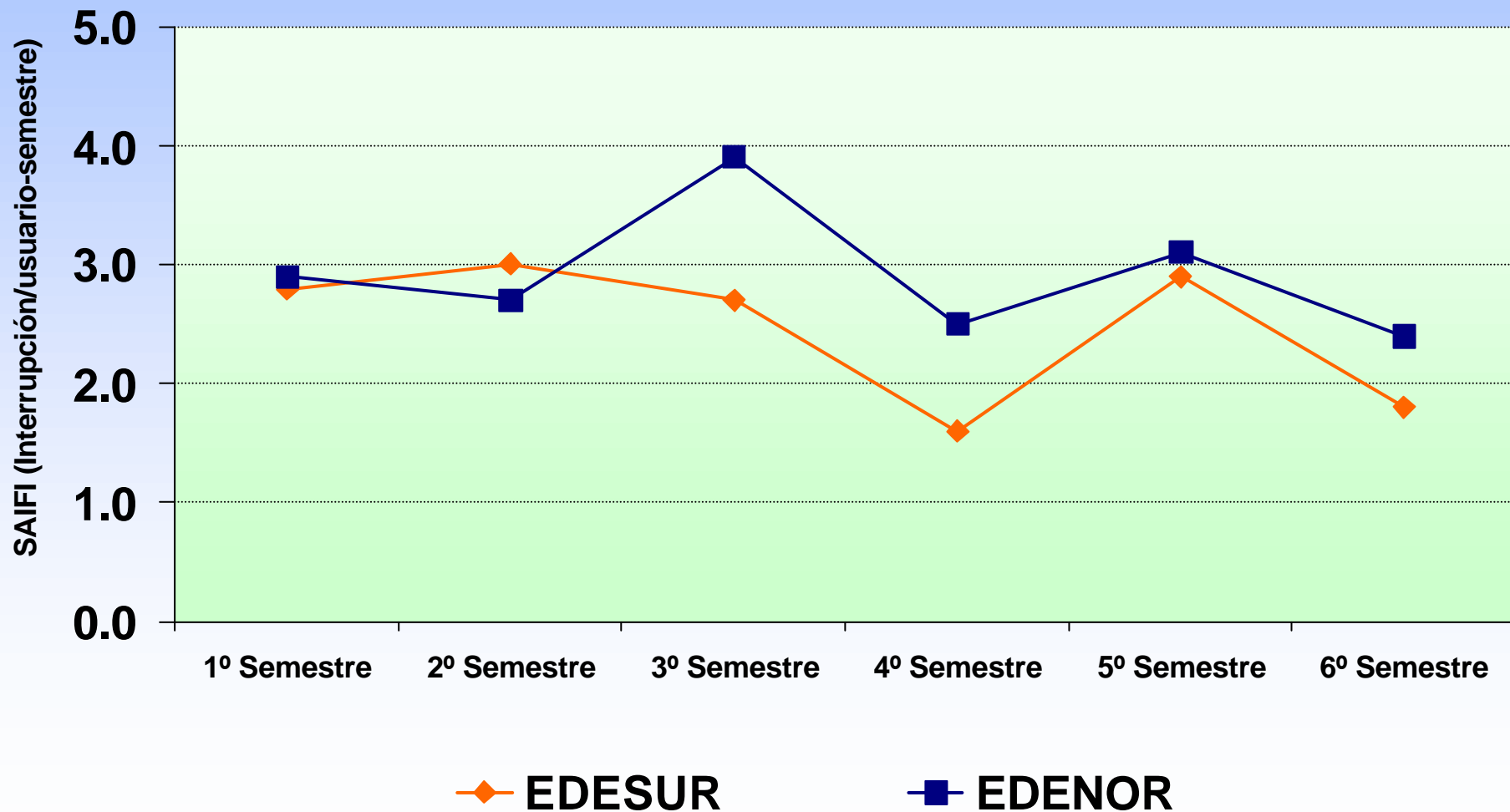
Total Interruption Duration per KVA (TTIK),

(Values in Stage 2 are fixed for statistics purpose)



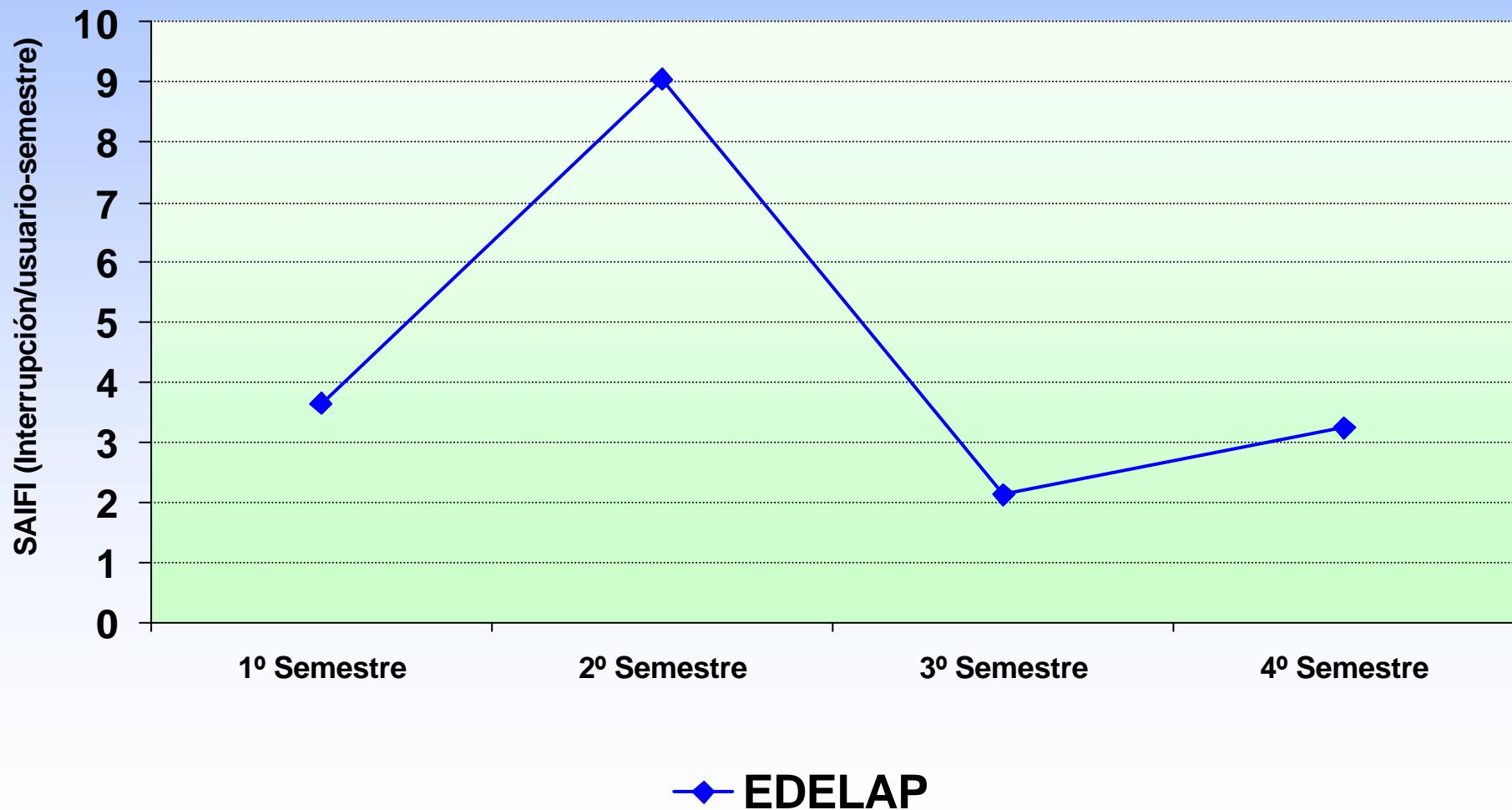
Index Evolution - Stage 2

System Average Interruption Duration Index (SAIFI) EDELAP S.A.



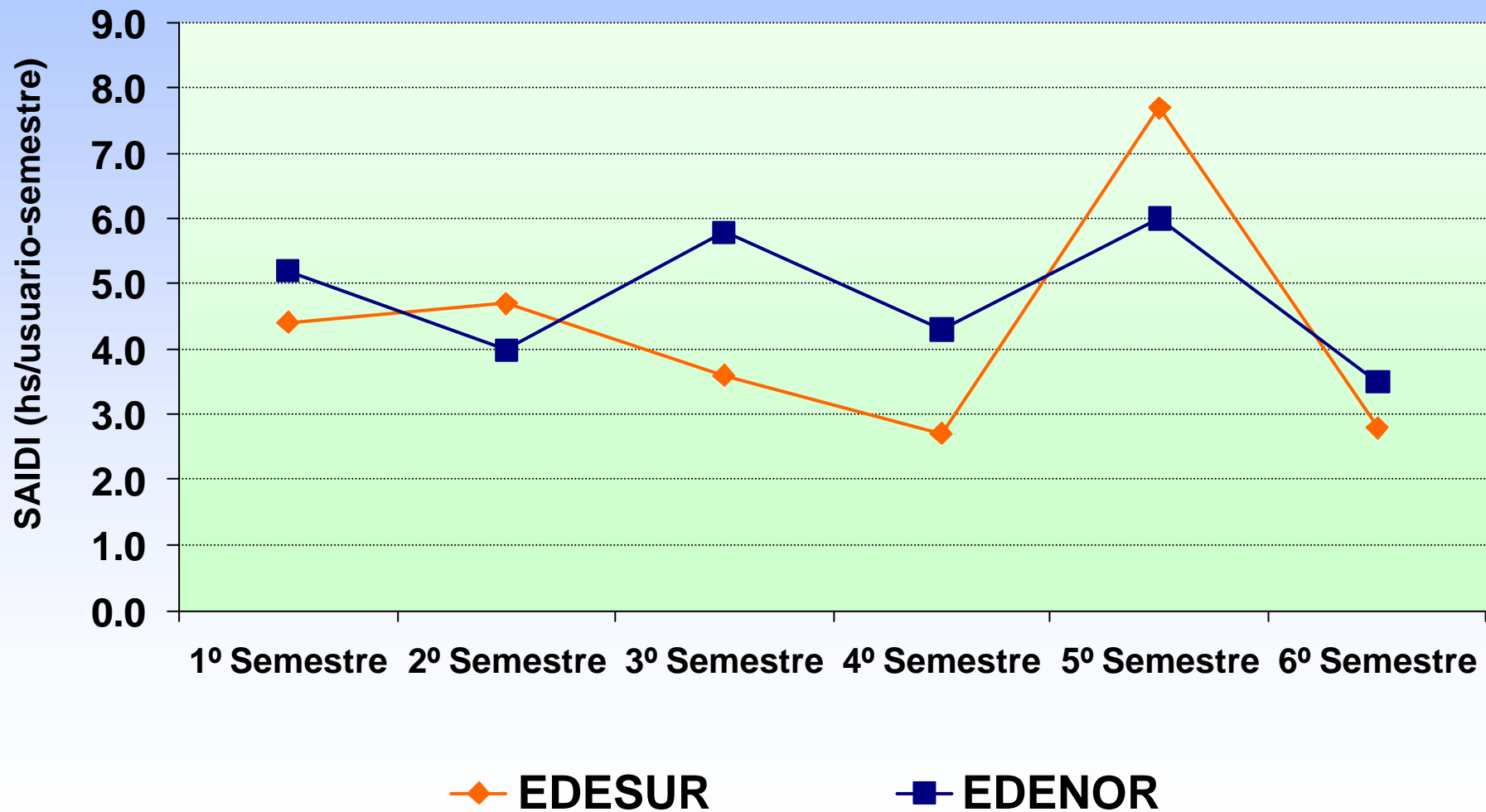
Index Evolution - Stage 2

System Average Interruption Duration Index (SAIFI) EDELAP S.A.



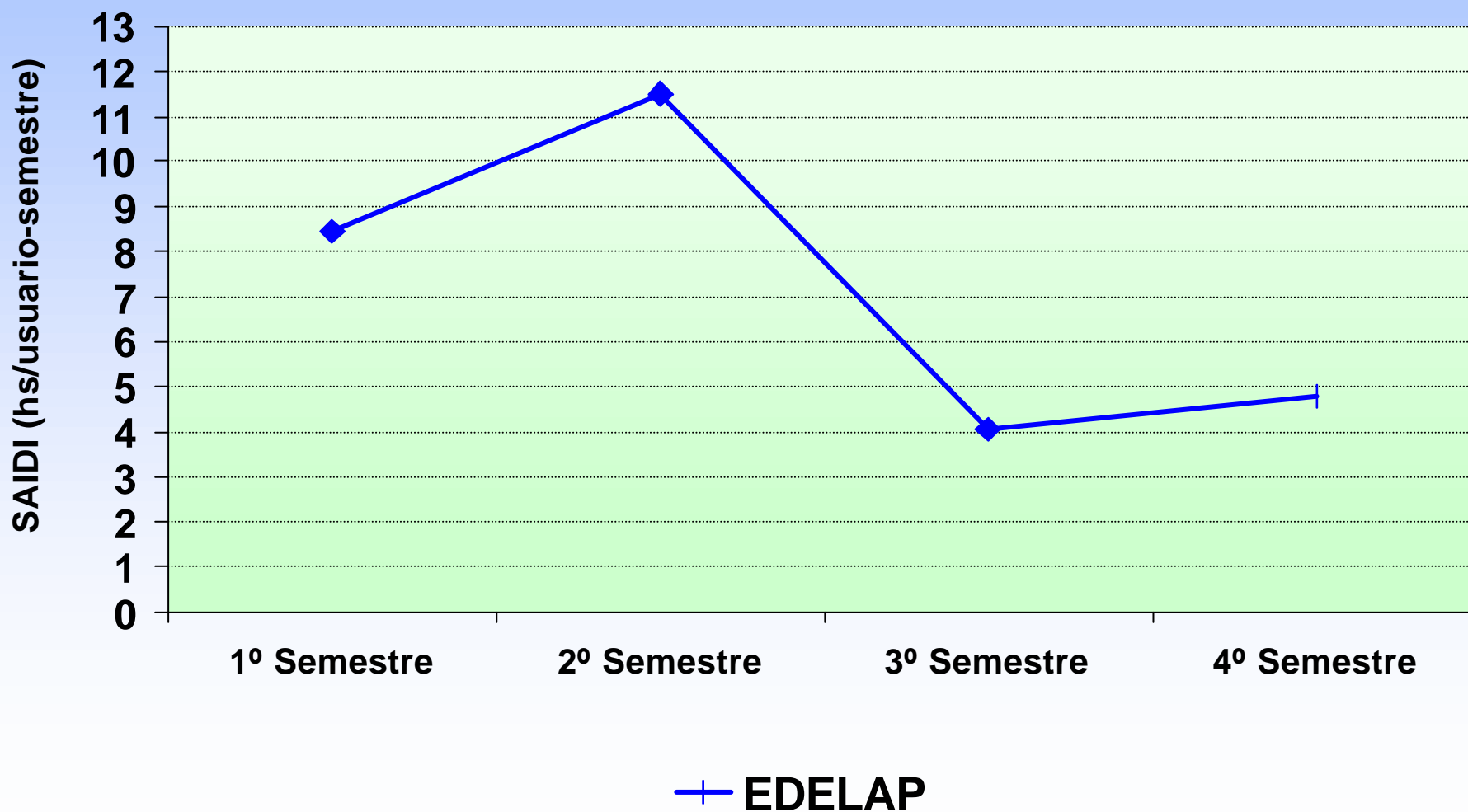
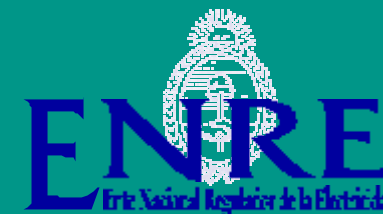
Index Evolution - Stage 2

System Average Interruption Duration Average (SAIDI)



Index Evolution - Stage 2

System Average Interruption Duration Average (SAIDI) - EDELAP S.A.



PENALTIES APPLIED BY ENRE

(as at October 30, 2000)



	EDENOR S.A.	EDESUR S.A.	EDELAP S.A.	Total	%
Technical Service	\$21.029.692	\$63.948.632	\$3.466.290	\$88.444.614	61,6%
Technical Product	\$6.855.314	\$3.503.392	\$1.038.836	\$11.397.542	7,9%
Commercial Quality	\$4.360.918	\$3.556.690	\$2.098.349	\$10.015.957	7,0%
Public Safety	\$9.148.236	\$9.055.559	\$5.022.246	\$23.226.041	16,2%
As Regional Transp (FTT)	\$2.640.254	\$4.059.287	\$116.995	\$6.660.277	4,6%
Consumers's Claims	\$775.205	\$2.677.010	\$345.701	\$3.797.916	2,6%
	\$44.809.619	\$86.800.570	\$12.088.417	\$143.542.347	100,0%

The amount for EDESUR under Technical Service includes extraordinary penalties applied due to Azopardo Substation failure in Feb. 1999

NOTA: Besides penalties to distributor por FTT, also applied penalties for US \$40,868,834 (including T.I.) to the rest of transmission concessions.

