



# **REGULATION OF ELECTRICITY SUPPLY QUALITY IN SPAIN**

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## 1 Distribution & Transmission: Main Figures (I)

● <b>MARKET (2000)</b>	Energy(GWh)	Power(MW)	Customers
Low Voltage (< 1kV)	110.346	103.618	21.165.088
Medium Voltage (1 kV < V < 36 kV)	38.647	17.315	70.129
High Voltage (> 36 kV)	46.807	6.623	1.220
Total	195.800	127.556	21.236.437

### ● **COMPANIES**

#### υ **Distribution:**

✓ Around 350 small distributors (2% of energy)

✓ 4 big distribution companies

□ Iberdrola and Endesa share 80%

#### υ **Transmission: REE + 4 companies**

□ REE owns the 80% of transmission facilities



# 1 Distribution. Main Figures (I)

## DISTRIBUTION FACILITIES

Substations HV/MV (MVA): 90.840

Transformers MV/LV (MVA): 49.866

	LV	MV	HV
Lines (km)	281.678	219.167	60.396

## TRANSMISSION FACILITIES

	400 kV	220kV
Substations HV (MVA):	44.287	43.417
Substations HV (positions) :	591	1.441
Lines (km)	14.523	16.756

## SUMMARY OF TOTAL COSTS

	1996	1997	1998	1999	2000
Generation	77,3%	74,1%	71,8%	71,6%	72,4%
Transmission	4,6%	4,5%	4,8%	4,4%	4,5%
Distribution	14,9%	17,9%	19,7%	22,0%	21,1%
Retailing	3,3%	3,5%	3,6%	2,0%	2,0%
Total	100,0%	100,0%	100,0%	100,0%	100,0%



## ② Legal and Regulatory Framework (I)

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- **General Framework from 1998: Electricity Law 54/1997**
  - υ ***Introduction of Competition***
  - υ ***Restructuring***
    - ✓ **Vertical Separation**
      - λ **Generation and Retailing: Competition**
      - λ **Transmission and Distribution: Regulated**
    - ✓ **Privatization**
  - υ ***Gradual Implementation of Reform***
    - ✓ **Eligible Customers**
    - ✓ **Stranded Costs**



## ② Legal and Regulatory Framework (II)

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### ● Transmission under New Framework (from 1998)

$$TR_{in} = TR_{1998in} + IINT_{in} + ID_{in}$$

- ✓  $TR_{in}$  : cost of the transmission acknowledged to the company “i” in year “n”
- ✓  $TR_{1998in}$  : accredited cost associated to the transmission activity updated to the year “n”
- ✓  $IINT_{in}$  : accredited cost on December 31<sup>st</sup> of year “n” associated to the set of new investments that have come into operation between January 1<sup>st</sup>, 1998 and December 31<sup>st</sup> of year “n-1”, made by the company “i”.
- ✓  $ID_{in}$  : incentive for the availability of the facilities of the company “i” in year “n”



## ② Legal and Regulatory Framework (III)

### ● Distribution under New Framework (from 1998)

#### υ Incentive Regulation: Revenue Cap

$$✓ R_t = R_{t-1} * (1 + \text{CPI} - X) * (1 + D * EF)$$

#### υ Incentive Regulation: Losses Reduction

✓ Standard Coefficients

✓ Incentives for Losses Reduction

✓ Customers benefit through updating of losses coefficients every 4 or 5 years

#### υ Incentive Regulation: Quality of Service Standards

✓ 3 concepts: Continuity, Product and Commercial

✓ Regulator will set minimum indicators to comply with

■ Less Income if not met by distributors

■ Gradual Implementation



## ② Legal and Regulatory Framework (IV)

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### QUALITY OF SERVICE

#### ● Legal Documents

- υ Incentive Regulation: Revenue Cap
- υ National Energy Plan (1991)
- υ Electricity Law (1997)
- υ Royal Decree 1955/2000 on Transmission, Distribution, Retailing, supply and authorisation of electric energy installations procedures

#### ● Regulatory Institutions

- υ Ministry of Economy
- υ CNE (National Energy Commission)
- υ Regional Governments



## ③ Quality of Service Regulation (I)

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### ● Before Regulation

- υ Decree from 1954
  - ✓ Maximun limits for voltage and frecueney variation
  - ✓ Obligation of maintaining supply except act of God
- υ 1991 National Energy Plan
  - ✓ General Principles to improve quality in order to achive EU levels

### ● Actual Regulation: Royal Decree 1955/2000

- υ 3 concepts: Continuity, Voltage and Commercial
- υ Individual and Zonal Indicators to comply with
- υ Compensation Payments if standards are not met
- υ Measurement, Monitoring and Information Systems



### ③ Quality of Service Regulation . Continuity (I)

- Indicators: TIEPI and NIEPI
- Required Standards

#### υ Individual

	TIEPI		NIEPI	
Area	MV	LV	MV	LV
Urban	4	6	8	12
Semi-Urban	8	10	12	15
Rural Concentrated	12	15	15	18
Rural Disperse	16	20	20	24

#### υ Zonal

Area	TIEPI	80 PERCENTILE TIEPI	NIEPI
Urban	2	3	4
Semi-Urban	4	6	6
Rural Concentrated	8	12	10
Rural Disperse	12	18	15

#### υ Areas Definition

Urban	Supplies Group > 20.000 (included capital cities)
Semi-Urban	2.000 < Supplies Group < 20.000
Rural Concentrated	200 < Supplies Group < 2.000
Rural Disperse	Supplies Group < 200 + disperse supplies

- Distribution companies, transmission companies and system operator's responsibility is to comply with individual and zonal quality indicators



## ③ Quality of Service Regulation . Continuity (II)

### ● COMPENSATION PAYMENTS

#### ↳ Non Eligible Customers

- ✓ Failure in the number of hours:  $\text{Discount} = P_w * DH * 5 * P$  (max 10% annual billing)

$P_w$  = billed annual average power

$DH$  = difference between the number of consumer interruption hours and the hours fixed in the required standards

$P$  = kWh price

- ✓ Failure in the number of interruptions:

$\text{Discount} = P_w * H * P * DN / 8$  (max 10% annual billing)

In the case of non-compliance with both standards, the most favourable one for the consumer will be taken

$P_w$  = billed annual average power

$H$  = number of interruption hours valued to the kWh price of his tariff

$P$  = kWh price

$DN$  = difference between the number of consumer interruptions and the number interruptions fixed in the required standards



## ③ Quality of Service Regulation . Continuity (III)

### ● COMPENSATION PAYMENTS

#### ∩ Eligible Customers

##### \* For Acces Rates:

##### ✓ Failure in the number of hours:

$\text{Discount} = P_w * DH * 5 * P_a$  (max 10% annual billing)

$P_w$  = billed annual average power

$DH$  = difference between the number of consumer interruption hours and the hours fixed in the required standards

$P_a$  = kWh price corresponding with his access tariff

##### ✓ Failure in the number of interruptions:

$\text{Discount} = P_w * H * P_a * DN / 8$  (max 10% annual billing)

$P_w$  = billed annual average power

$H$  = number of interruption hours valued to the kWh price of his tariff

$P_a$  = kWh price corresponding with his access tariff

$DN$  = difference between the number of consumer interruptions and the number interruptions fixed in the required standards

In the case of non-compliance with both indicators, the most favourable one for the consumer will be taken



## ③ Quality of Service Regulation . Continuity (IV)

### \* For Energy:

- ✓ Failure in the number of hours:  
 $\text{Discount} = P_w \cdot D_H \cdot 5 \cdot P_m$  (max 10% annual billing)  
 $P_m$  = pool kwh annual average hourly final price
- ✓ Failure in the number of interruptions:  
 $\text{Discount} = P_w \cdot H \cdot P_m \cdot D_N / 8$  (max 10% annual billing)

In the case of non-compliance with both indicators, the most favourable one for the consumer will be taken

### ● Monitoring Systems

- υ Measurement and control procedure, homogeneous for all companies and subject to audit
- υ The plan shall be presented by distribution companies with a time limit of 6 months since the approval of the Decree and approved by Ministry, reported by CNE
- υ Distribution companies shall have a system to record incidents according to monitoring procedure approved by Ministry. The deadline to implement it is 1 year
- υ Consumers will be able to install a monitoring system of incidents if they want to test the values measured by distribution companies. The installation of this system shall have to be agreed by distributor and consumer



## ③ Quality of Service Regulation . Continuity (V)

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### ● Information

- υ **Distribution Companies shall draw up detailed information on an annual basis for TIEPI, 80 percentile TIEPI and NIEPI**
- υ **The information shall be audited**
- υ **The information on quality of service will be sent annually to the Ministry, who will communicate it to CNE and Regional Governments**
- υ **Ministry will use the information to publish an annual summary of the quality levels obtained for each of the stipulated indicators.**
- υ **Retailers shall be entitled to receive information from distributors about the quality corresponding to the consumers that are supplied through their networks**



## ③ Quality of Service Regulation . Voltage (I)

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- **Indicators:**

- υ Not defined yet
- υ **UNE-EN 50.160 Criteria and Spanish Supplementary Technical Standards will be followed**

- **Required Standards**

- υ **Zonal Voltage variation: 7%**
- υ **Frecuency: 50 Hz**
- υ **In one year the spanish Supplementary Technical Standards have to approved by Ministry, reported by CNE.**

- **Compensation payments**

- υ Not defined yet
- υ **Distribution companies must take actions to ovverlook the causes leading to bad voltage quality in a maximun time period of 6 months**



## ③ Quality of Service Regulation . Voltage (II)

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### ● Information

- υ **Distribution Companies shall draw up detailed information on an annual basis for the quality aspects defined in standard UNE-EN 50.160 in each of the provinces where they operate**
- υ **Distribution companies shall give precise information on product quality to potential customers so that their redundant supply protection means and their location can be analysed**
- υ **The information on quality of service will be sent annually to the Ministry, who will communicate it to CNE and Regional Governments. The information shall be audited.**
- υ **Ministry will use the information submitted by companies to publish an annual summary of the quality levels obtained for each of the stipulated indicators.**
- υ **Retailers shall be entitled to receive information from distributors about the quality corresponding to the consumers that are supplied through their networks**



## ③ Quality of Service Regulation . Commercial (I)

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- **Indicators and Standards:**

- υ **Deadlines for preparing informations on prices for new supplies**
- υ **Deadlines for setting up the facilities needed for new supplies**
- υ **Deadlines for connecting and installing the metering equipment (5 days since the contract is signed)**
- υ **Deadlines for reconnecting supply (24 hours after paying bill)**
- υ **Deadlines for giving notice of a programmed interruption (24 hours minimum)**
- υ **Deadlines for giving and keeping appointments**

**To inform customers on best tariff and power to contract when they want to sign a contract**

- **Compensation payment:**

- υ **Compensation payments per breach are defined**
- υ **Discount of billing: Maximum of following amounts: 30 Euros or 10% of the first full bill**



## ③ Quality of Service Regulation . Commercial (II)

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- **Information:**

- ∪ **Distribution companies shall draw up detailed information on an annual basis of the values concerning quality in the attention and relation with customers in each province**
- ∪ **The information on quality of service will be sent annually to the Ministry, who will communicate it to CNE and Regional Governments**
- ∪ **Ministry will use the information furnished to it by companies to publish an annual summary of the quality levels obtained for each of the stipulated indicators. The information shall be audited**



## ③ Quality of Service Regulation (II)

### ECONOMIC PLANS FOR QUALITY IMPROVEMENT

Only for non-compliance with zonal Continuity Standards :

- The distribution companies have to develop “THE IMPROVEMENT PLANS”
  - υ These plans might be included in the tariff (now not)
    - ✓ Collaboration agreements signed by the Ministry, Regional Governments and Cities and companies.
    - ✓ Criteria to split the annual amount among the different areas:
      - The total amount shall be shared out in the following way: 60% to rural areas, 30% to semi-urban areas and 10% to urban areas
      - These shall be aside for areas with greatest difference in indicators compared to the national average for each type of area.
      - No area may be included in these plans for more than 2 years.

During the working-out and fulfilment process of the plans, with a maximum of 2 years, no discounts of billing will be applied as a result of not meeting the required quality standards



### ③ Quality of Service Regulation (III)

#### RESOLUTION OF DISPUTES

##### TYPES OF DISPUTES

- **SYSTEM OPERATOR AND DISTRIBUTION COMPANIES**
  - υ Who is responsible of the supply faults?
- **DISTRIBUTION COMPANIES AND CONSUMERS**
  - υ Who is responsible of the quality faults?
  - υ Compliance with individual quality standards
  - υ On data considered to calculate discounts

##### DECIDED INSTITUTIONS

CNE

**REGIONAL  
GOVERNMENTS**



## 4 Quality levels results (I)

- **Only Data on Continuity of Supply**

- υ **Interruption Hours (TIEPI)** 

- ✓ 12 years at province level

- ✓ 1997 to 1999 at province and zonal level

$$TIEPI = \frac{\sum_{i=1}^K (PI_i \times H_i)}{\sum PI}$$

- **Data are reported by Distribution Companies**

- υ No audits have been made

- υ Lack of Homogeneous Measurement Procedures  
Regional Governments

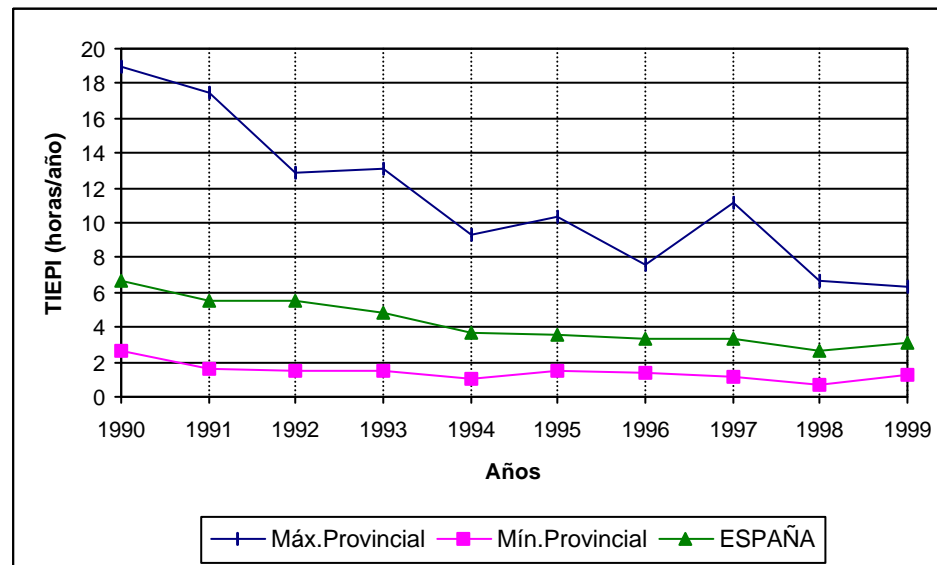
- υ Small distributors do not report data



## ④ Quality levels results (II). Continuity of Supply

### TIEPI. Province Dispersion

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Máx.Province</b>	18,91	17,47	12,9	13,06	9,35	10,36	7,6	11,1	6,63	6,31
<b>Mín.Province</b>	2,64	1,57	1,51	1,55	1,03	1,46	1,34	1,19	0,66	1,25
<b>SPAIN</b> (Average)	6,67	5,57	5,47	4,81	3,73	3,58	3,36	3,33	2,64	3,13

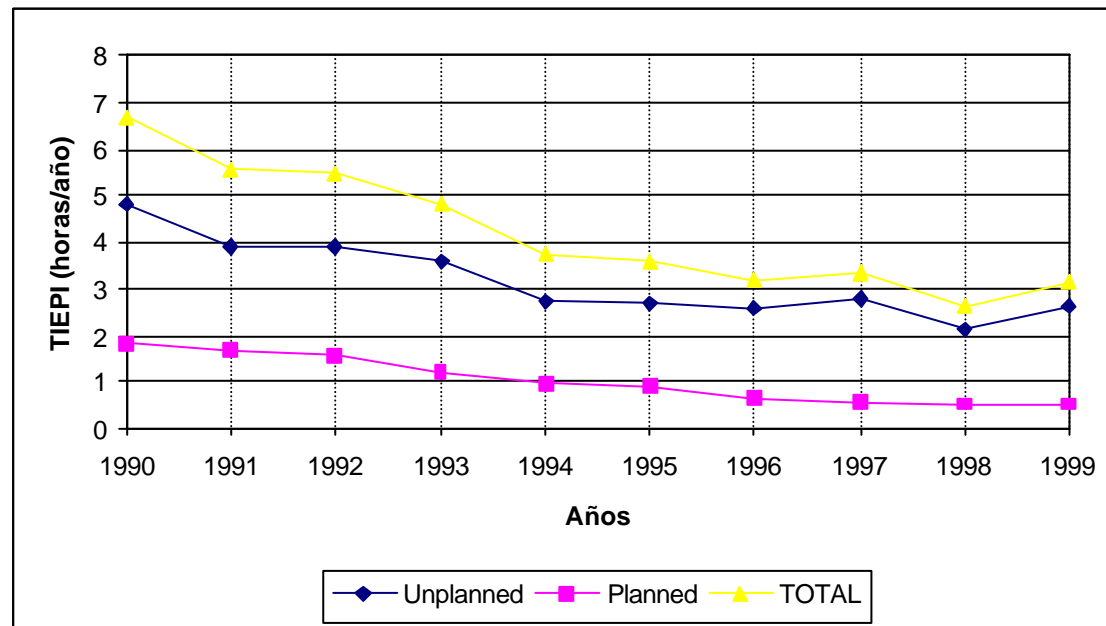




## ④ Quality levels results (III). Continuity of Supply

### TIEPI by causes

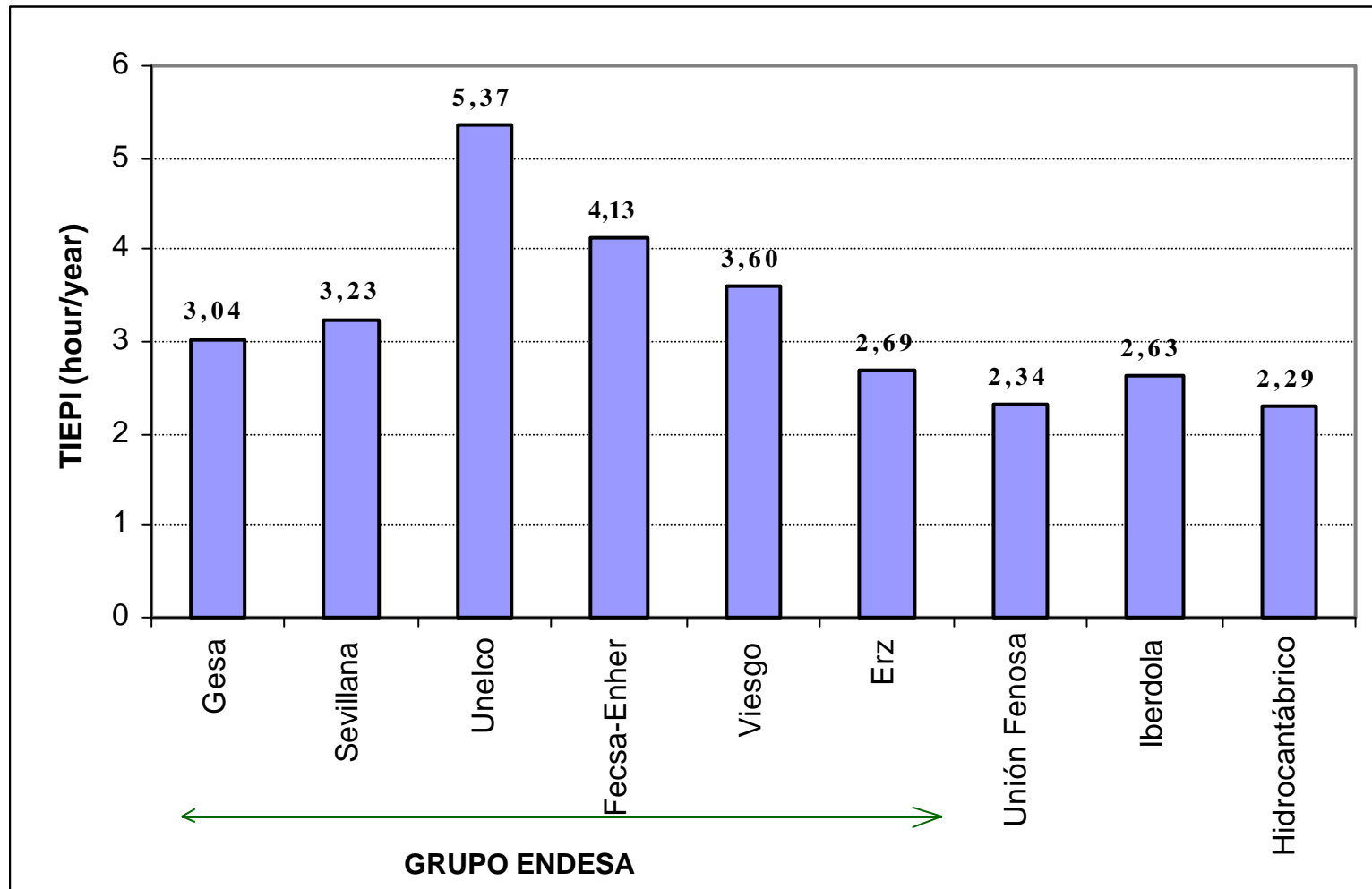
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Unplanned</b>	4,83	3,9	3,9	3,59	2,75	2,69	2,59	2,79	2,11	2,61
<b>Planned</b>	1,84	1,67	1,58	1,21	0,98	0,89	0,67	0,54	0,53	0,52
<b>TOTAL</b>	6,67	5,57	5,47	4,81	3,73	3,58	3,20	3,33	2,64	3,13





## ④ Quality levels results (IV). Continuity of Supply

### TIEPI by companies (1999)





## ④ Quality levels results (V). Continuity of Supply

### TIEPI by Areas

	1997	1998	1999
URBAN	1,71	1,45	1,78
SEMI-URBAN	3,63	2,93	3,31
RURAL	6,39	4,74	5,42
<b>TOTAL</b>	<b>3,33</b>	<b>2,64</b>	<b>3,04</b>

URBAN: Supplies > 20.000 (Capital Cities Included)

SEMI-URBAN: 2.000 < Supplies < 20.000

RURAL: Supplies < 2.000



## 4 Quality levels results (VI). Continuity of Supply

### REMARKS

- **TIEPI Decrease Trend** No audits have been made
  - υ - 45% growth rate 1993-1999 period
  - υ Expected increase, however, in the next years
- **High Dispersion** 45% growth rate 1993-1999 period
  - υ By company
  - υ By Province
  - υ By area
    - ✓ 50% of Population live in areas with TIEPI < 2 hours
    - ✓ 5% of Population live in areas with TIEPI > 9 hours