



**CEER**

**Council of European  
Energy Regulators**

**CEER Workshop on Power Losses**  
**European experiences in the treatment of  
losses / Summary of a survey among  
NRAs**

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## BR on Power Losses – overview

- CEER-Benchmarking Report on Power Losses aims at giving a detailed overview of national practices regarding the definition, procurement, and regulatory treatment of network losses
- Based on ERGEG's 2008 analysis of network losses
- Features that need to be tackled in order to promote a level-playing field when comparing losses at a European-wide level will be discussed.
- Two questionnaires have been prepared to get a better insight of regulatory practice and views of all parties involved
  - ▶ Questionnaire for NRAs has already been answered
  - ▶ Questionnaire for stakeholders will follow



## BR on Power Losses - objectives

- To benchmark the level of power losses in different countries
- To contribute to clarification and potential harmonization of:
  - ▶ Definition of power losses
  - ▶ How losses are calculated in each country
- To identify existing incentive regulation on power losses
- To identify changes introduced by distributed generation
- To address the treatment of non-technical losses
  - ▶ How are non-technical losses calculated?
  - ▶ Strategies implemented to reduce non-technical losses and respective results of the strategies



# Questionnaire for NRAs

- **Structure of the questionnaire**

- ▶ Definition of losses
  - Overview about definitions and differences in definitions
- ▶ Calculation of losses
  - Overview about included voltage levels and methods of measurement / calculation / estimation
- ▶ Procurement of losses
  - Who is responsible for the procurement of losses and what are the procedures of procurement?
- ▶ Regulatory incentives
  - Are there any regulatory incentives in force and which areas do they cover?
- ▶ Values for the years 2010 to 2015
  - For TSO / DSO level
  - For voltage levels
  - Values and percentages

- **Participation**

- ▶ A total of 23 NRAs have answered the questionnaire
  - Austria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta, The Netherlands, Norway, Portugal, Poland, Romania, Slovenia, Spain, Sweden



## Definition of Losses

- What is the legal definition of losses in your country?
  - ▶ 23 responses in total, basic dividing into three categories:
    - “**Some**” definition is in place (14 responses)
      - Croatia, Cyprus, Finland, Germany, Greece, Latvia, Lithuania, Norway, Portugal, Romania, Slovenia, Spain, Sweden, The Netherlands
    - “There is no **legal definition** of losses” (7 responses)
      - Austria, Czech Republic, Estonia, Hungary, Iceland, Malta, Poland
    - **Unfilled answer** although other parts of questionnaire are responded (2 responses)
      - Denmark, Ireland
- Do power losses refer only to technical losses or do they also include non-technical losses?
  - ▶ 23 responses in total, only two possibilities as an answer:
    - “**Only technical losses**” (6 responses)
      - Estonia, Germany, Iceland, Lithuania, Norway, Sweden
    - “**Technical losses & non-technical losses**” (17 responses)
      - Austria, Croatia, Cyprus, Czech Republic, Denmark, Finland, Greece, Hungary, Ireland, Latvia, Malta, Poland, Portugal, Romania, Slovenia, Spain, The Netherlands



## Definition of Losses

- Types of losses included in the calculation of losses
  - ▶ Number of responses vary (20 to 23) from question to question, table below shows the **number of countries** that include particular type of losses in the calculation of losses:

	Transmission	Distribution
Technical (physical) losses	22	22
"Hidden" non-technical losses (e.g. in-house consumption)	7	13
Non-metered consumption (e.g. public lighting)	6	10
Theft	11	17
Others (e.g. metering errors, differences in metering, billing and data processing)	13	17



# Definition of Losses

- **Initial findings**

- ▶ **# 1**

- Approximation of answer is that losses are the difference between energy injected into and withdrawn from the network.

- ▶ **# 2**

- According to responses it is not obvious, „where“ the legal definition is stated (Energy Law, Public Notice, Grid Code etc.).

- ▶ **# 3**

- Power losses in most of countries (17) refer to both technical & non technical losses.

- ▶ **# 4**

- All countries (23) include technical losses in the calculation of losses. For non-technical losses the picture is more inconsistent insofar that not all components of non-technical losses are included



## Calculation of losses

- General question on how losses are calculated
  - ▶ Various answers
  - ▶ In most cases losses are calculated simply as difference of injections into the grid and withdraws from the grid
  - ▶ Some countries use mathematical modelling
- In most countries there are no discussions on changing the method of estimation for losses





## Calculation of losses

- Table below shows number of countries that calculate power losses for certain voltage levels and how (measured / estimated)

Where and how Power Losses are calculated	Yes	Measured	Estimated
EHV	13	9	2
EHV / HV	16	11	4
HV	18	12	3
HV / MV	14	7	5
MV	18	5	8
MV / LV	15	6	7
LV	16	3	10



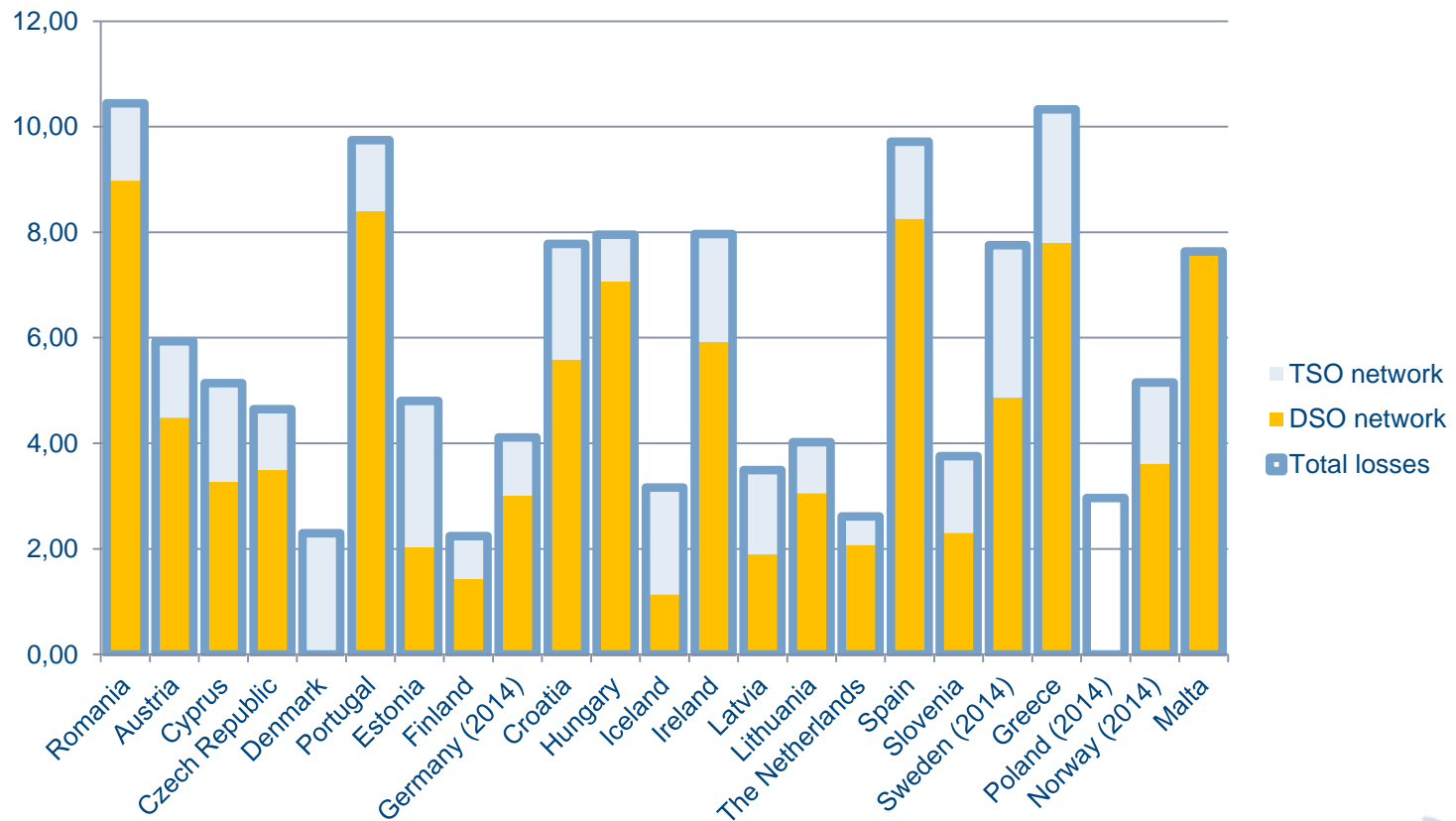
## Calculation of losses

- **Standards regarding the level of accuracy for measurement of losses**
  - ▶ 12 countries report that they have a regulation or standards in force for the level of accuracy
  - ▶ They can be divided into
    - General agreements (between System Operator and NRA)
    - Guidelines for accuracy classes of the metering equipment
    - Official and binding standards.
- **Obligations for having meters per customer**
  - ▶ In 16 countries obligations exist for having meters per customer installed
  - ▶ Not all are legally binding
  - ▶ With some limitations though



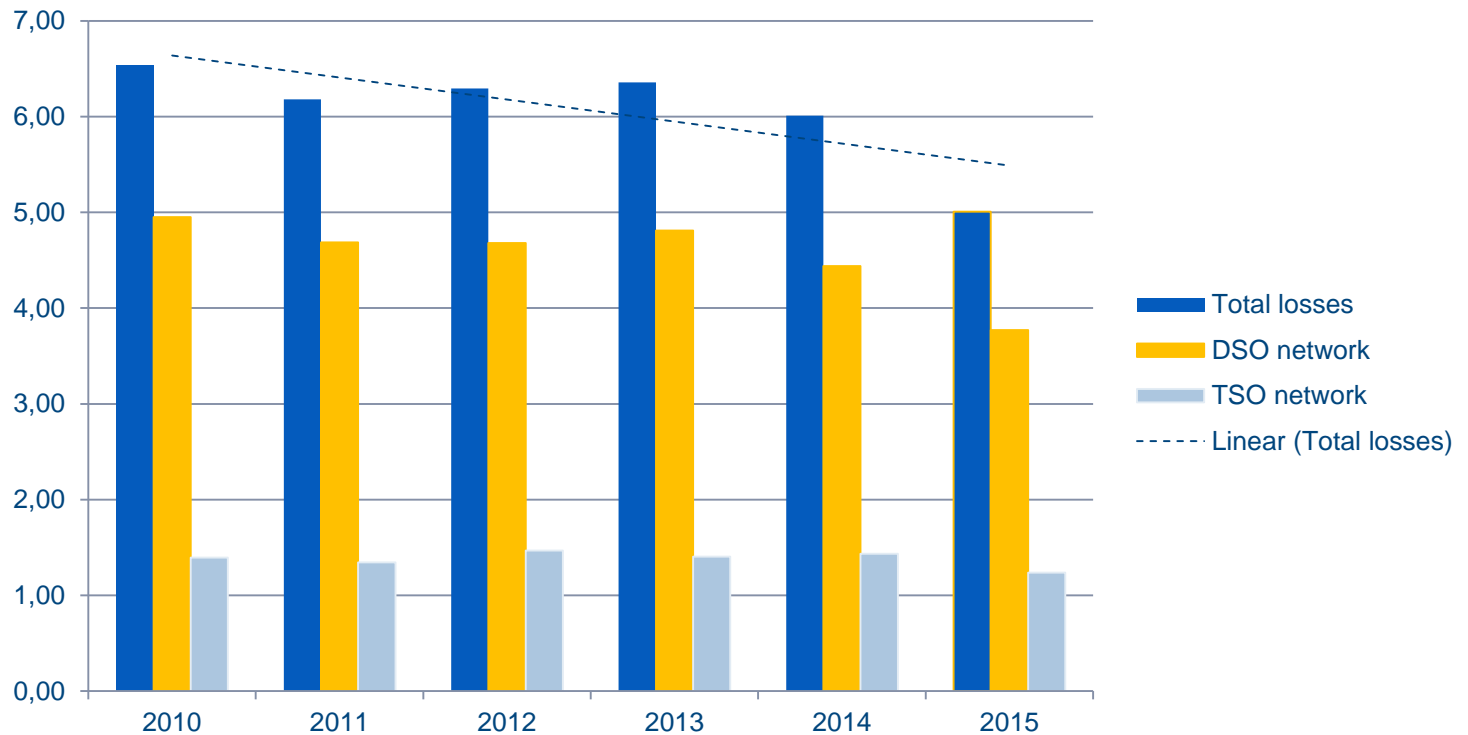
# Values

- Losses in % of Total Injections (2015)



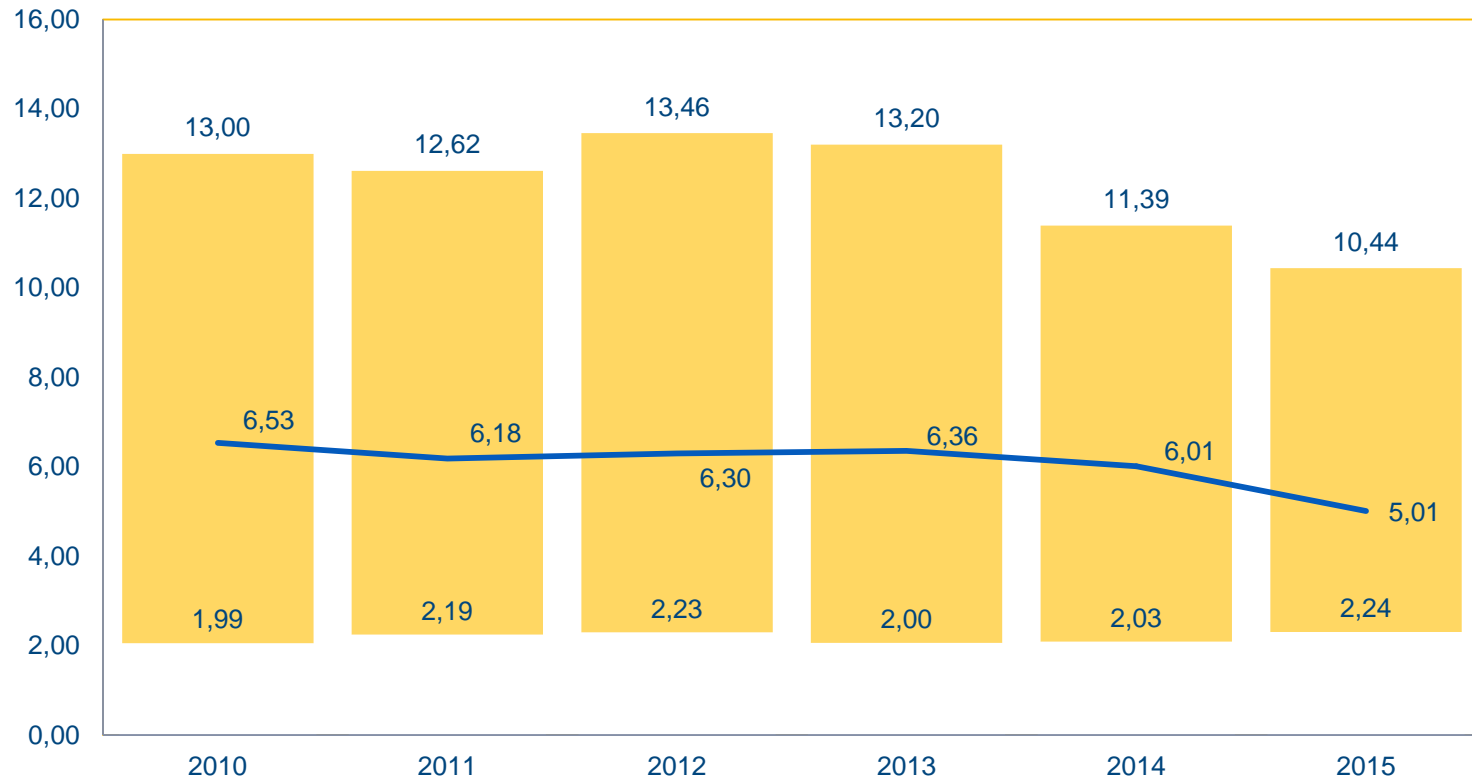
# Values

- Development of Losses (average numbers)



# Values

- Total Losses (mean, max, min)



# Regulatory incentives

- **Implementation**

- ▶ Of the 23 countries that responded, 14 use regulatory incentives to reduce losses
  - As objective of energy efficiency
  - In order to reduce costs for grid users

- **Experiences with incentives and their financial effects**

- ▶ Some countries have only recently introduced incentives
  - Spain (2016)
  - Czech Republic (2016)
  - Sweden (current regulatory period)
- ▶ Countries where such incentives have been used longer have had positive experience and noticed reduction in losses over the years

- **Profits / Savings**

- ▶ Either kept by the DSOs or
- ▶ Split between the DSOs and the customers (e.g. Sweden, Czech Republic, Norway)



# Regulatory incentives

- **Case studies**

- ▶ **The Netherlands:**

- DSOs undergo yardstick regulation
    - They have to perform against a goal based on the average performance of the DSOs
    - When outperforming the yardstick goal, the DSO will have a direct increased profit
    - NRA does not prescribe how the DSO should reduce its costs. For example, a transformer could be replaced with a new one (increase in CAPEX) with less losses (decrease in cost for energy losses)
    - In this way the DSO is incentivised to find an optimal balance to reduce the total costs
    - No yardstick for TSO

- ▶ **Norway:**

- DSOs have incentives to minimize total costs, but freedom to choose the optimal solution based on local conditions
    - In regional distribution and transmission, network losses are regarded as a pass-through cost because the DSOs and the TSO have limited influence on power flows
    - However, all network assets in higher voltage levels require a license and network losses are part of the assessment by the licensing authorities



# Regulatory incentives

- Case studies

- ▶ Portugal:

- The incentive mechanism for power losses reduction applies only to distribution networks, where higher losses (in percentage) have been observed
    - It started in 1999
    - NRA sets the reference values for distribution network losses for each year
    - Until 2014, if losses were under (or above) the reference value, the DSO was entitled to a financial reward (or penalty) proportional to the difference between those values (capped to a maximum value also set by NRA)
    - From 2015, due to the uncertainties of RES penetration, a neutral zone was introduced

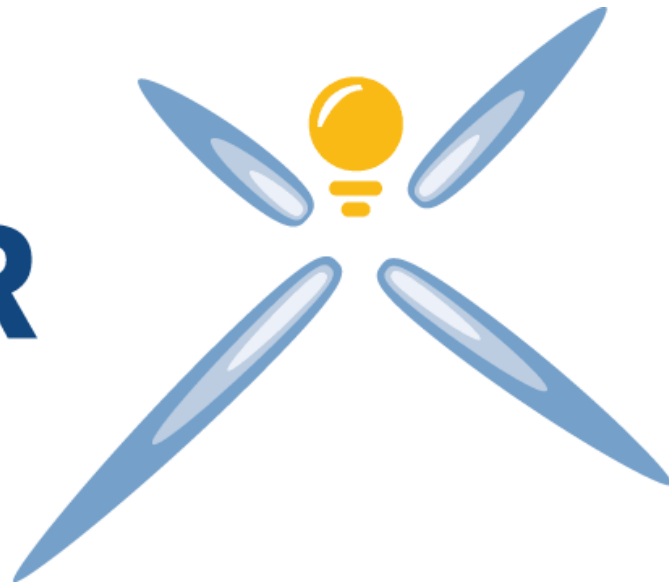




# Thank you for your attention!

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