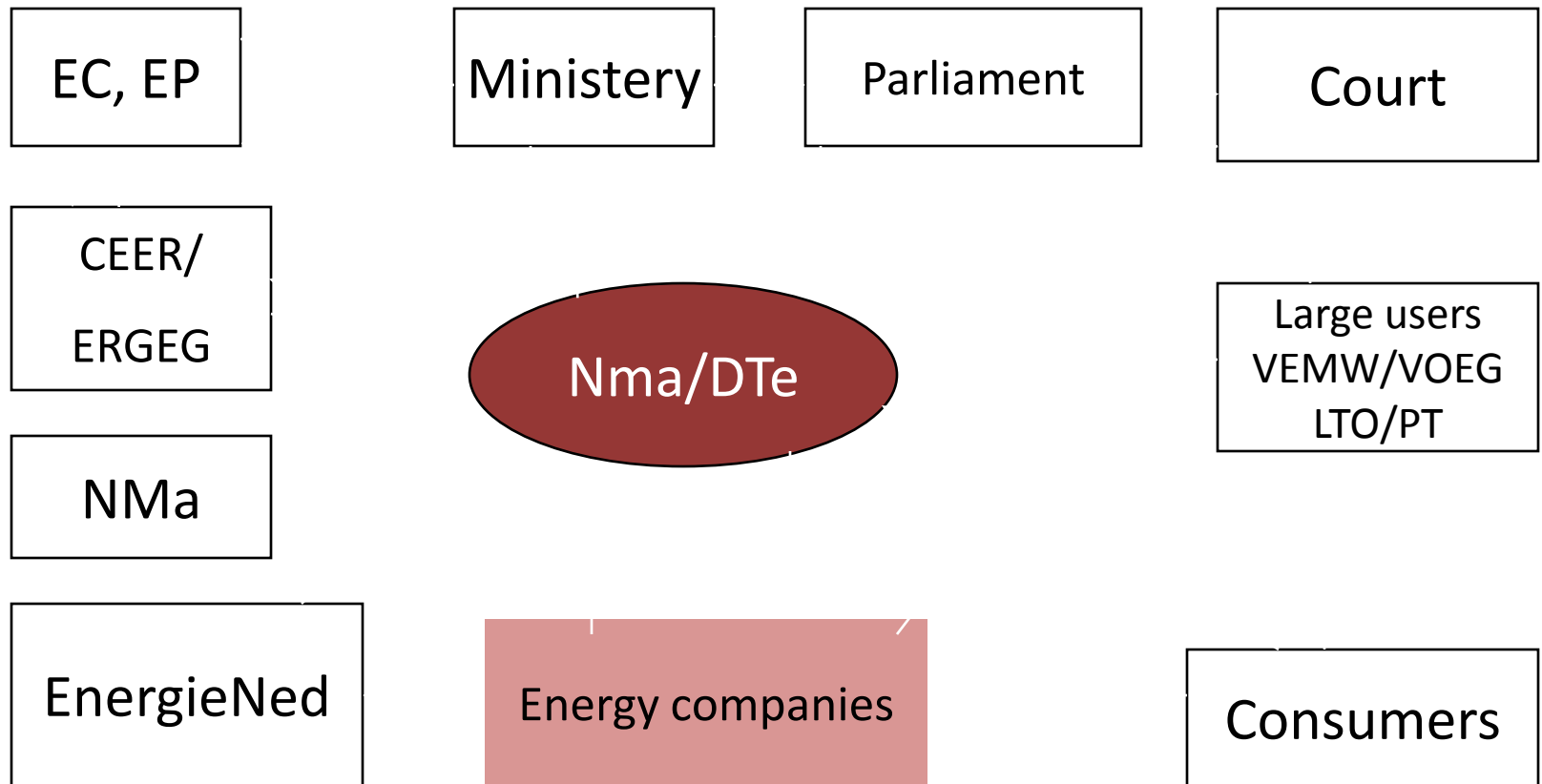


TSO regulation;
introduction to principles,
approaches and methodologies

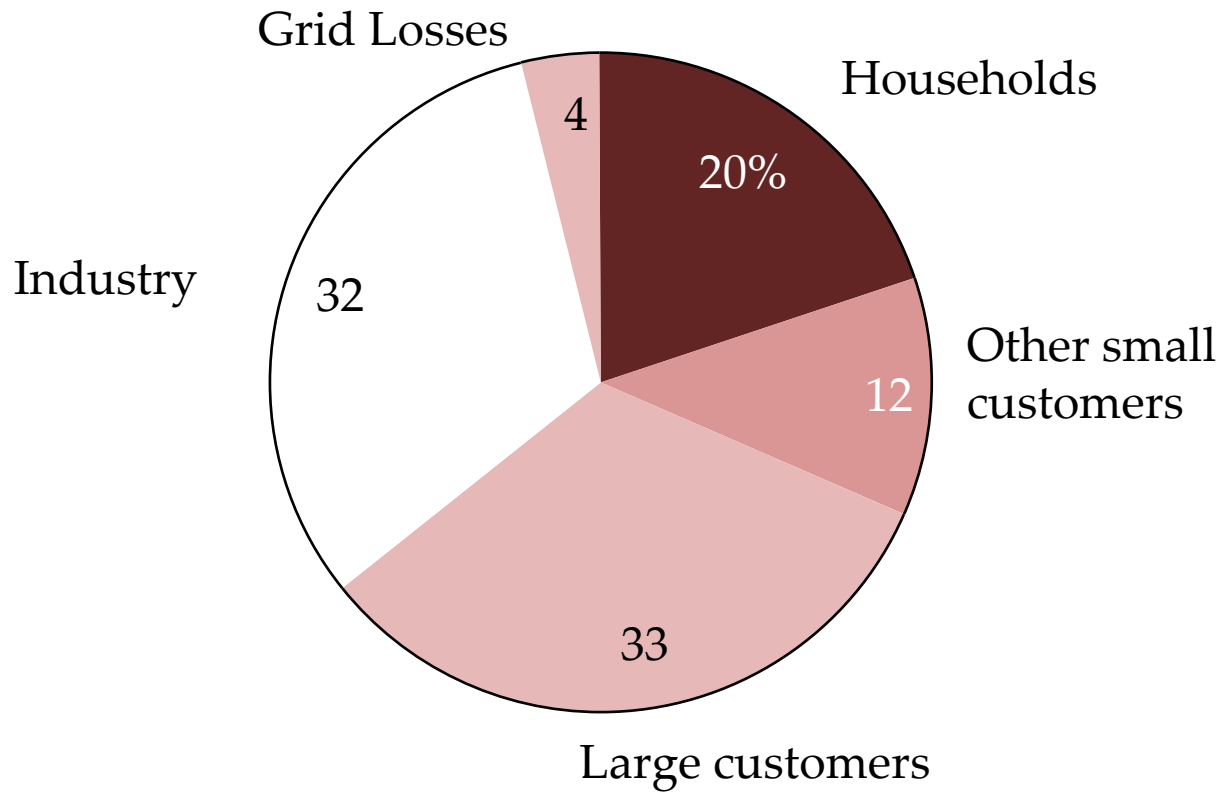
Jan-Peter Heida

Bucharest, April 8, 2008

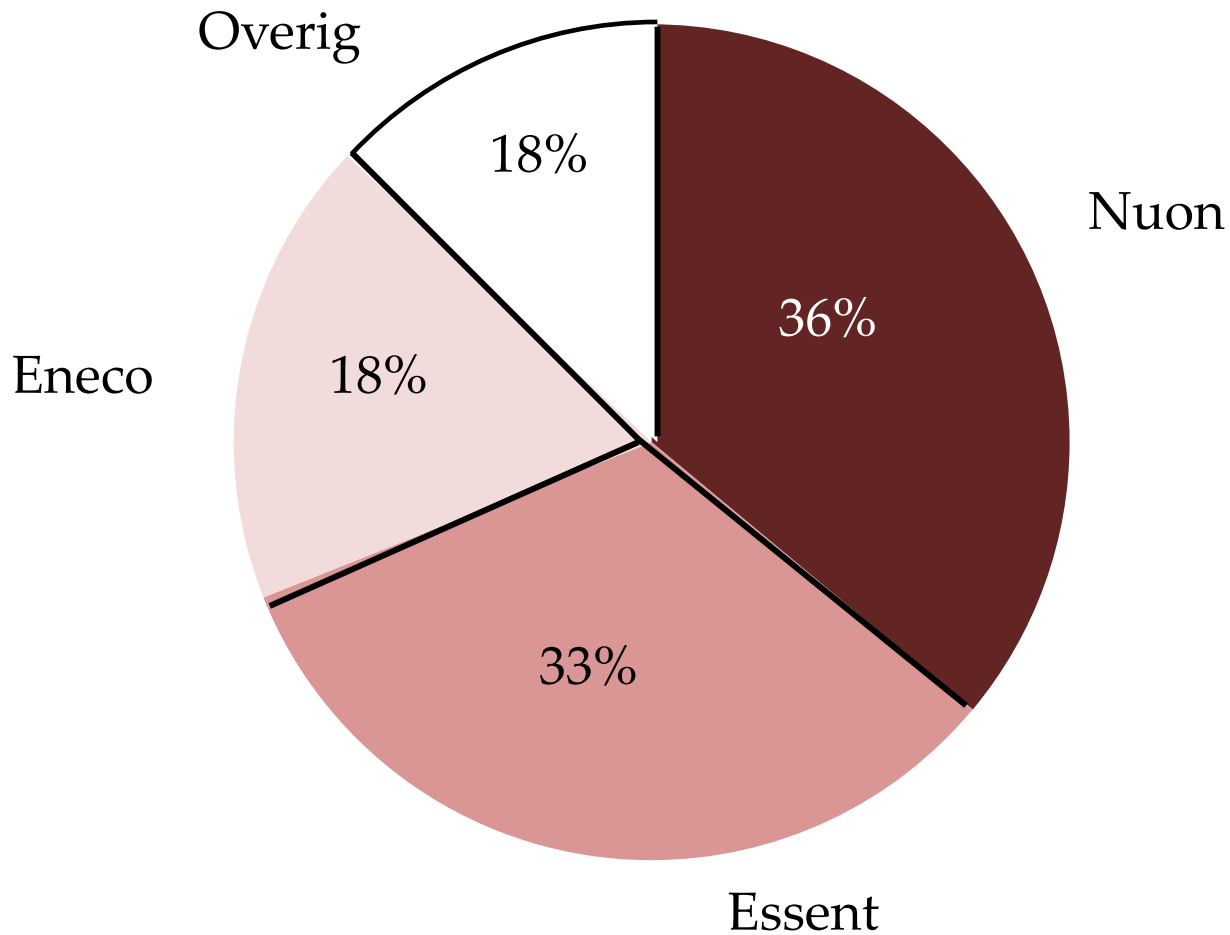
Regulation is faced with many stakeholders



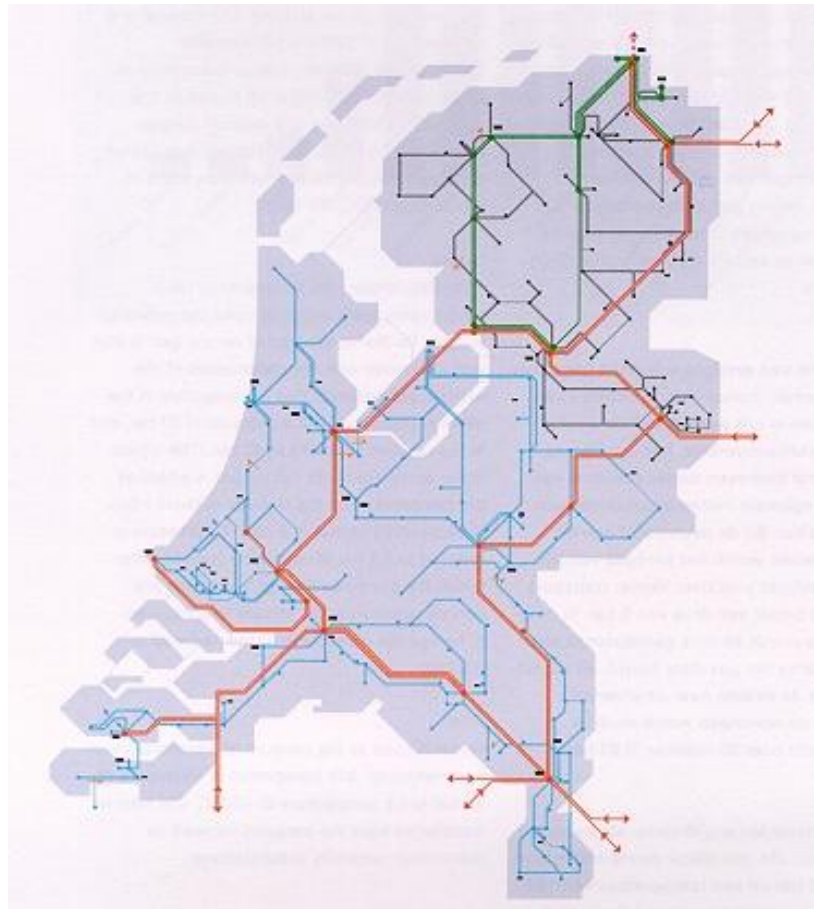
Use of electricity in the Netherlands



The Netherlands has a rather concentrated market for electricity



Transmission infrastructure in the Netherlands - Electricity



TenneT:

Grid (km):

380kV: 2,003

220kV: 683

Substations: 28

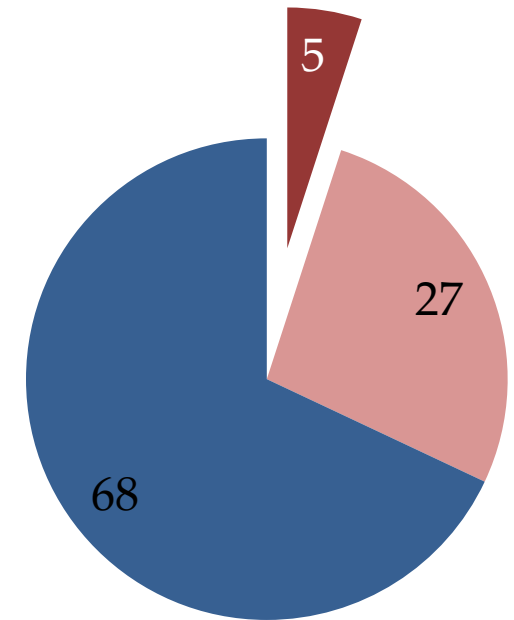
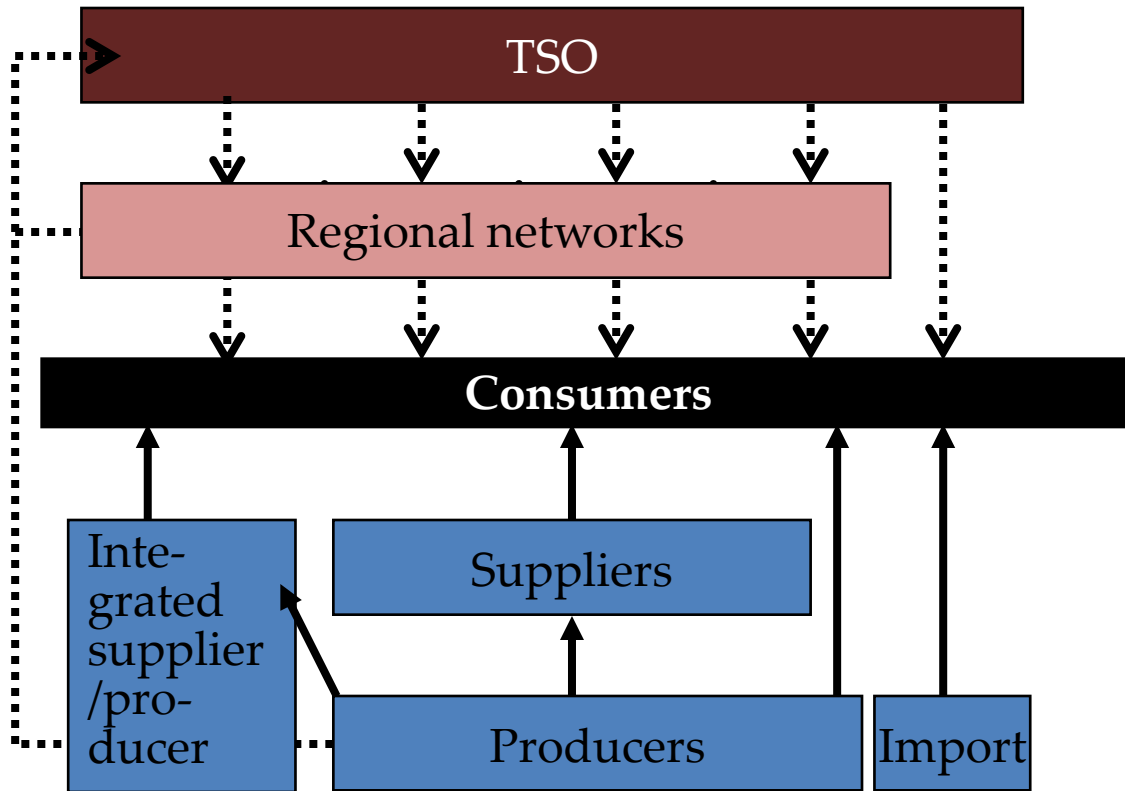
Foreign connections: 8

Import capacity: 3700 MW

Revenue: EUR 326 mln

TSO's are key to the market functioning at about 5% of the total market revenues

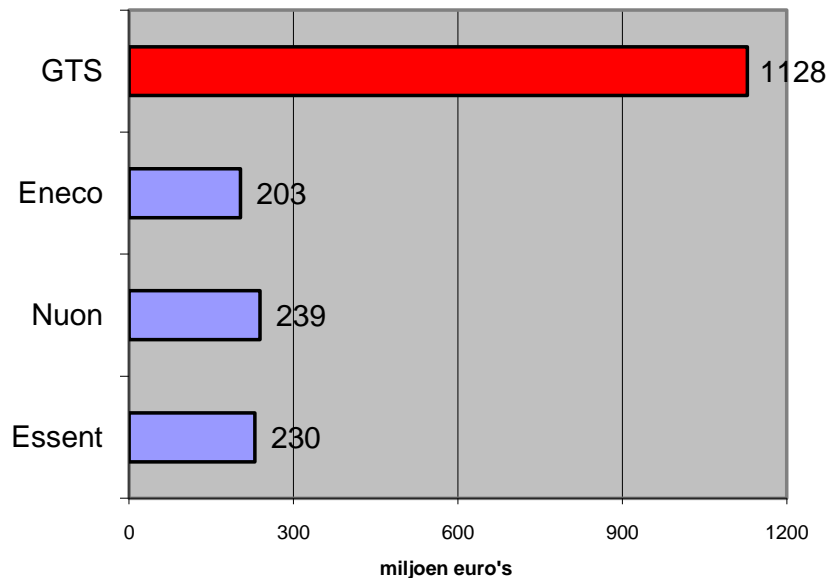
Network



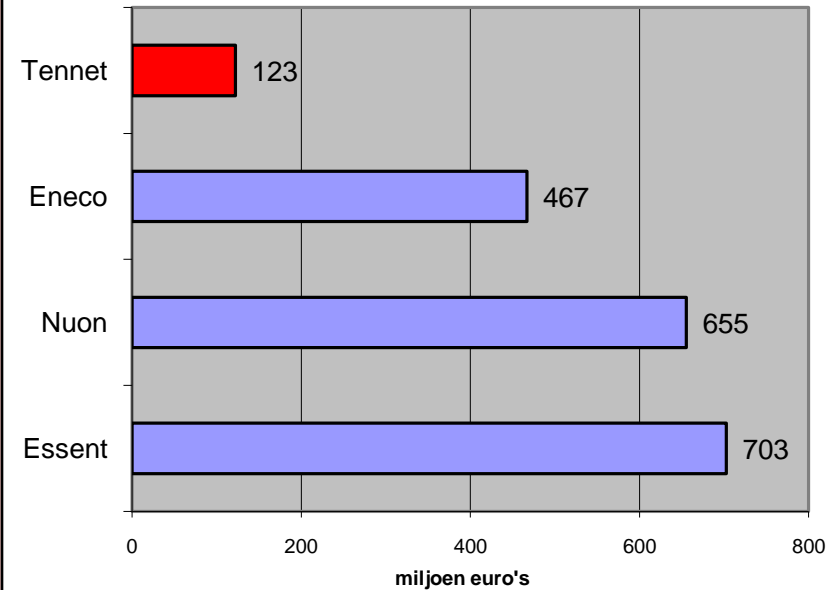
Energy

In gas the TSO is much larger than regional companies, in electricity it is smaller

Transport revenues - GAS



Transport revenues - ELECTRICITY



Key tasks of TSO regulator

Access

Non-discrimination for access of

- producers
- suppliers
- consumers

Tariffstructure

Tariffs based on cost causation

Investments

Investments timely to

- Facilitate market growth
- Maintain high quality
- Enable investment in production
- Enable international flows

Networkcosts

Value for money

No monopoly profit

No cross subsidies with liberalized markets

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Criteria for Dutch tariff code

- Incentivize short term efficient actions by users
- Incentivize long term security of supply infrastructure
- Non-discriminatory access
- No hindering of legal demands for the environment

Distribution of costs over Dutch tariff code

Connection

- First connection
- Disconnection/
change

- Initial investment costs, maintenance
- Calculation of expected costs

Transport

- TAVT

- Infrastructure: building, maintenance, depreciation
- Capital costs
- Operational costs
- SO task: network losses, congestion

- Reactive energy

- Reactive energy costs

System

- (non)spinning reserve, black-start, robustness

Tariff structure in Dutch tariff code: TSO tariffs on kW, load only

	Categories	Base of tariff
Connection <ul style="list-style-type: none"> • First connection • Disconnection/ change 	<ul style="list-style-type: none"> • Capacity 	<ul style="list-style-type: none"> • fixed fee categorie • calculation, maximum is first connection fee
Transport <ul style="list-style-type: none"> • TAVT <ul style="list-style-type: none"> • Reactive energy • Independent of transport 	<ul style="list-style-type: none"> • EHS, HS, TS, • MS, • LS • $LS < 3 \cdot 25A$ • $< MS$ of $\geq MS$ 	<ul style="list-style-type: none"> • kW:kWh 100:0 • kW:kWh 50:50 • kW:kWh 16:84 • kW:kWh: 0:100 • kvarh • # users
System		<ul style="list-style-type: none"> • $kWh_{\text{from net}} + kWh_{\text{generated}}$

Unbundling is key to ensure a well functioning market

Statements of EU

When TSO is integrated

- Possible to release market sensitive information to group members
- No incentive for developing the network
- High regulatory burden to ensure non-discriminatory access

Dutch experience

- 1998 TSO, 'TenneT' (380 kV network) was formed by joint electricity producers (SEP)
- 1999 Large user filed complaint with competition authority as it was refused rights to import; SEP still controlled investment decisions
- 2000 Temporary full State ownership of TenneT (Ministry of Finance is shareholder with little involvement)
- 2001 Indefinite State ownership
- 2004 Acquisition of small 150 kV network
- 2008 All 150 kV networks to TenneT

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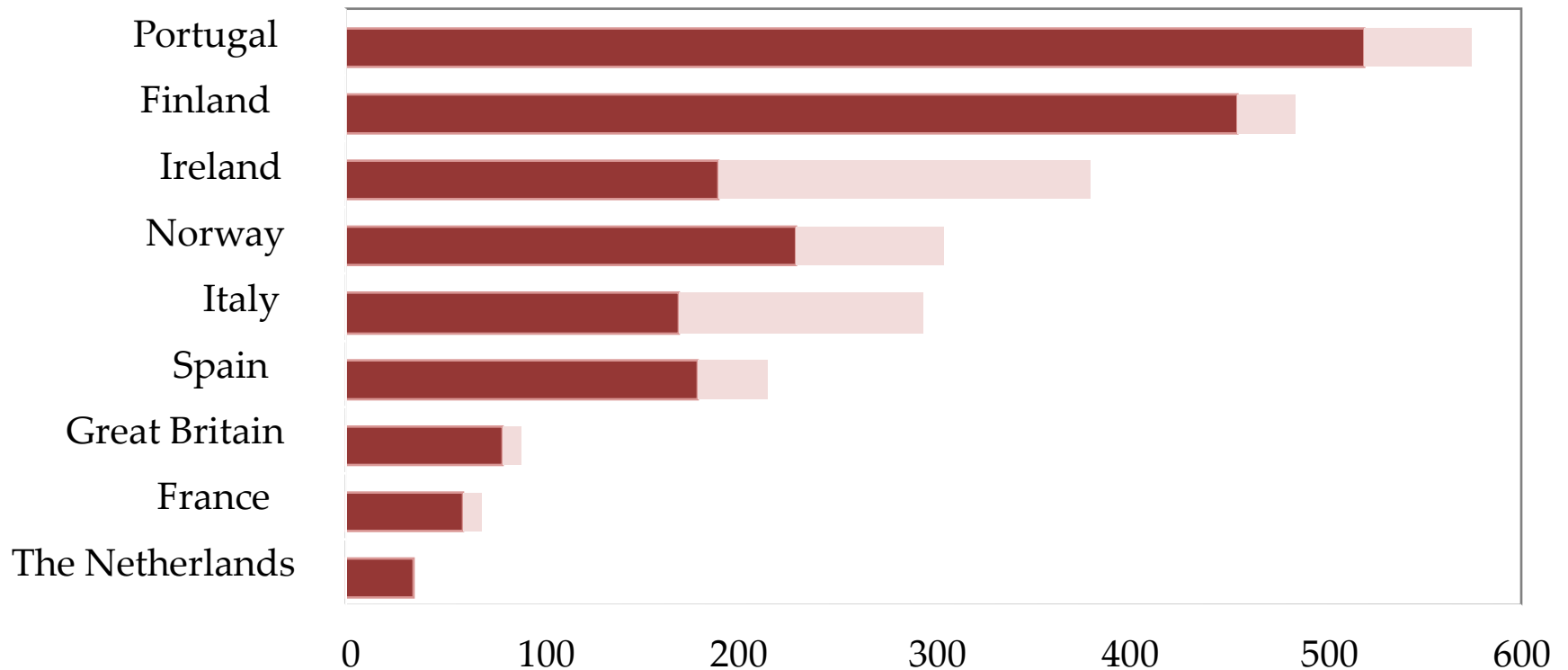
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The Netherlands has a reliable infrastructure

Lost minutes per customer, 2001 (non-notified and notified)

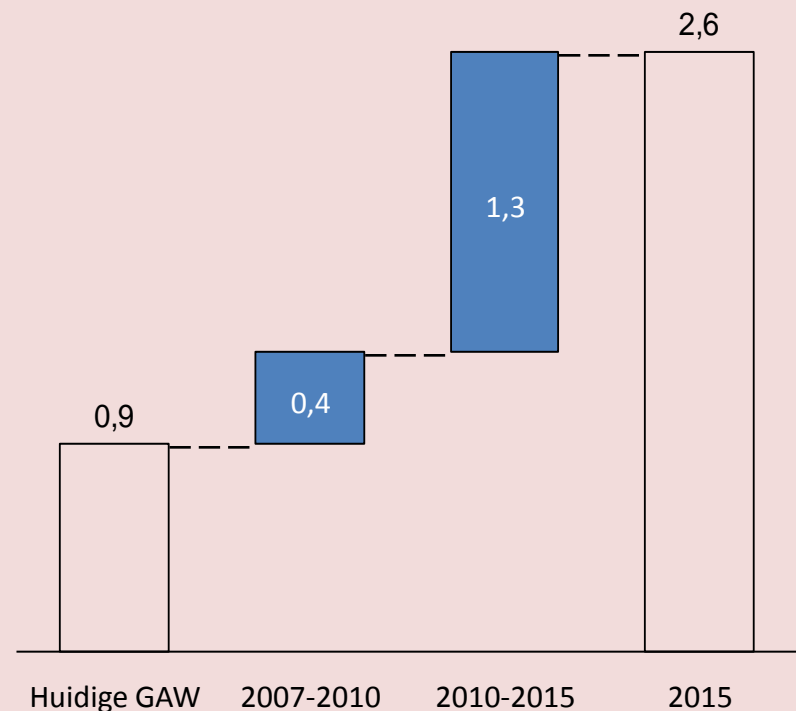


Between 2008 and 2015, large investments are planned for the 380 kV network

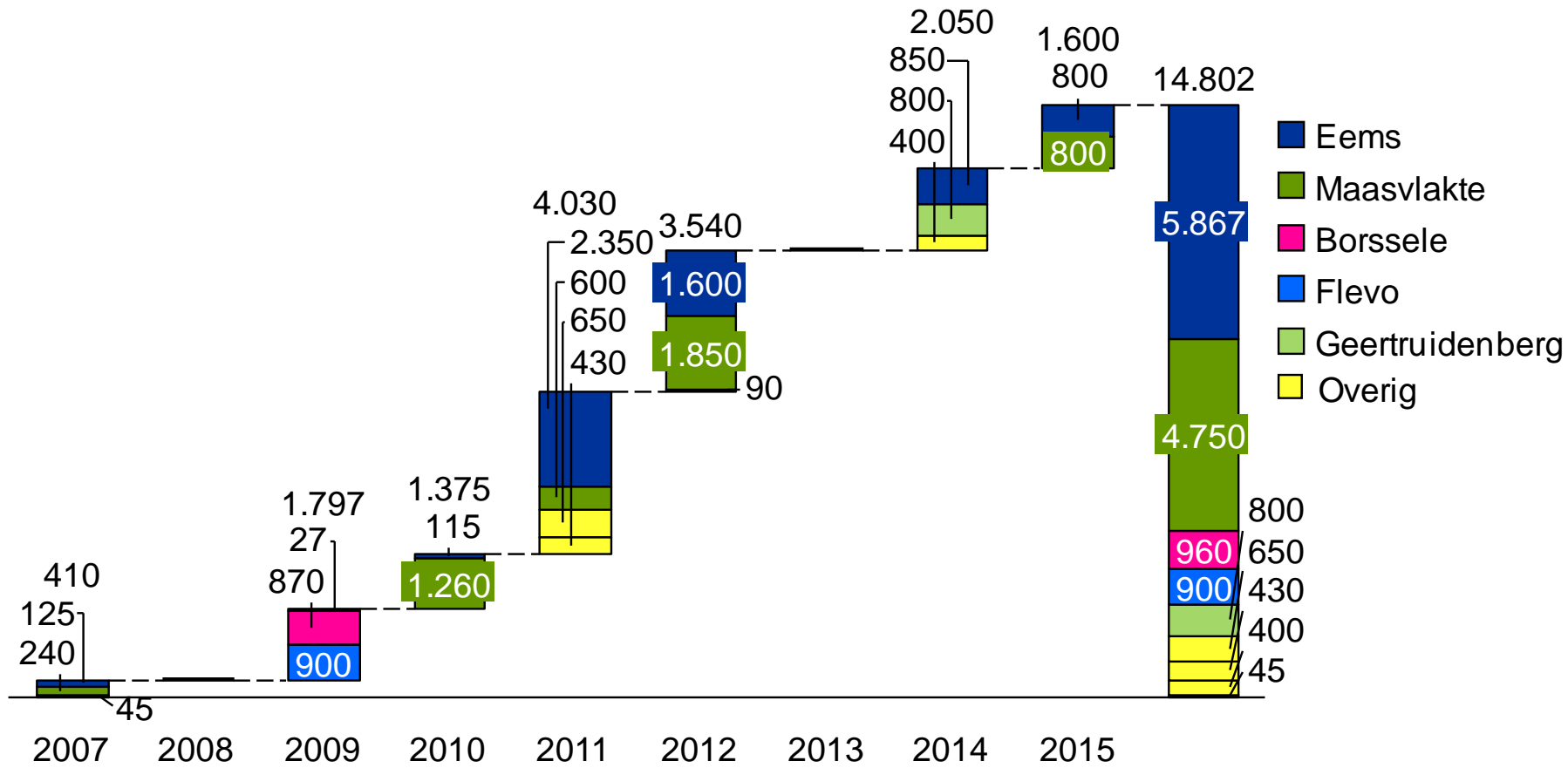
Reasons for new investment

- Closing ring structure in Randstad (most densely populated area)
- Increasing wind power on sea (6000 MW in 2020)
- Investment plans for large new coal power plants
- Increased consumption

Estimate of needed investments in 380 kV infrastructure [EUR, billion]



Producers plan to built another 15 GW in production capacity, mainly coal, until 2015



Investments can be regulated in roughly three different ways

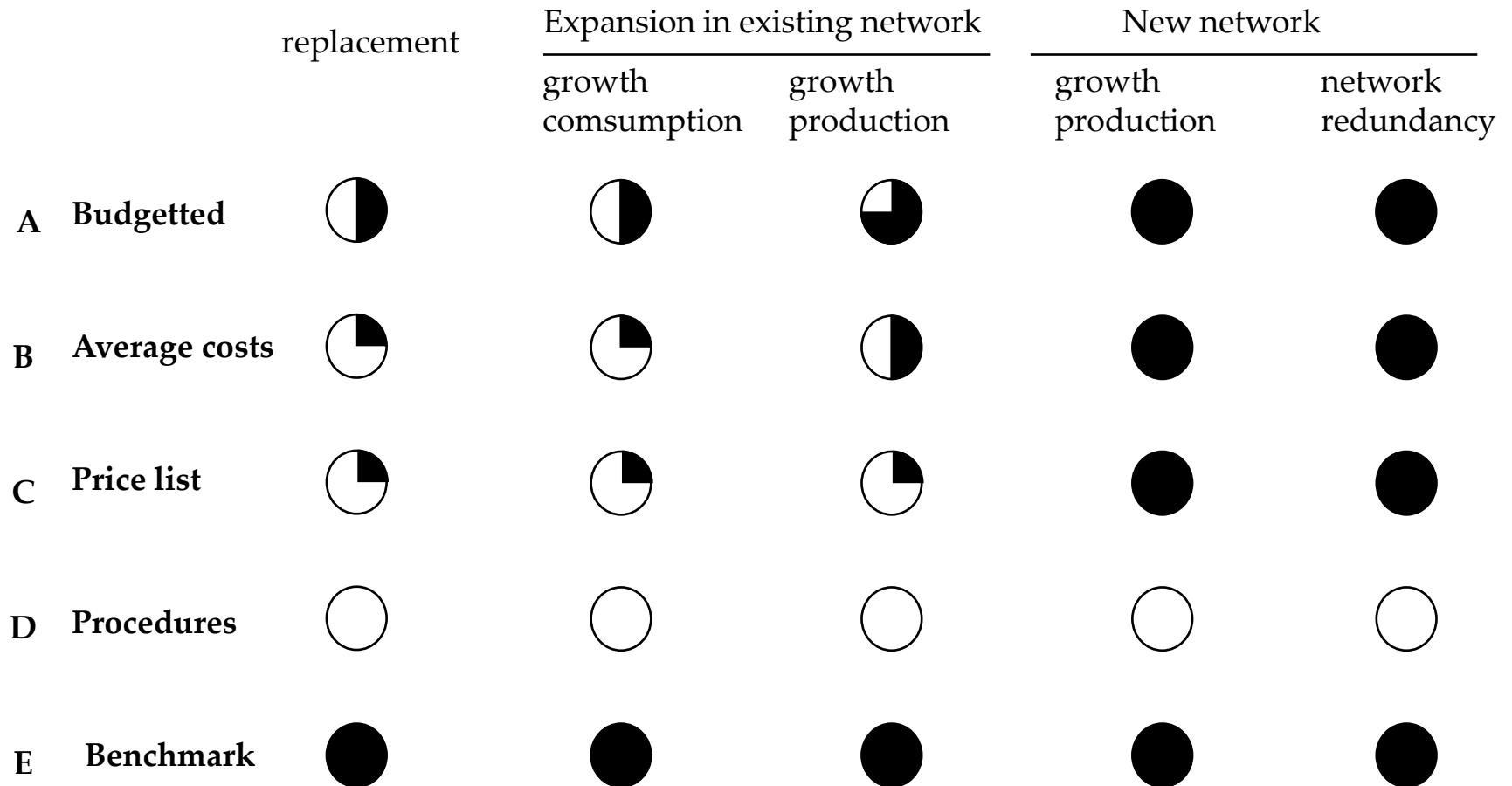
Ways of regulating TSO investments and timing

Period before investing	Period of investing	Period after investment
<p>Budget in advance (A,B,C)</p> <p>At the start of a period it is known what will be invested in. The TSO can get a budget in advance:</p> <ul style="list-style-type: none">A. Budget after study by independent consultantB. Average costs of current asset base (i.e. per kilometer)C. Standard pricelist for parts invested in <p>The budget is added to the RAB</p>	<p>Procedures during (D)</p> <p>If the TSO adheres to certain procedures in realising the investment, the RAB is automatically increased with realised costs.</p> <p>Procedures for instance:</p> <ul style="list-style-type: none">• Proper mandates for management, directors and board• European procurement procedures• Asset management certified	<p>Benchmark after (E)</p> <p>After the TSO has invested, it is benchmarked against other TSO's.</p> <p>Only efficient assets are included in the RAB.</p>

The risk for a TSO depends on the way of regulation and on the type of investment

DUTCH SITUATION

Less risk ○ 1 ◐ 2 ◑ 3 ◒ 4 ● 5 More risk








The degrees of freedom for investment decisions depends on the regulatory regime

Room for TSO decisions in investment process

 Little

 Much

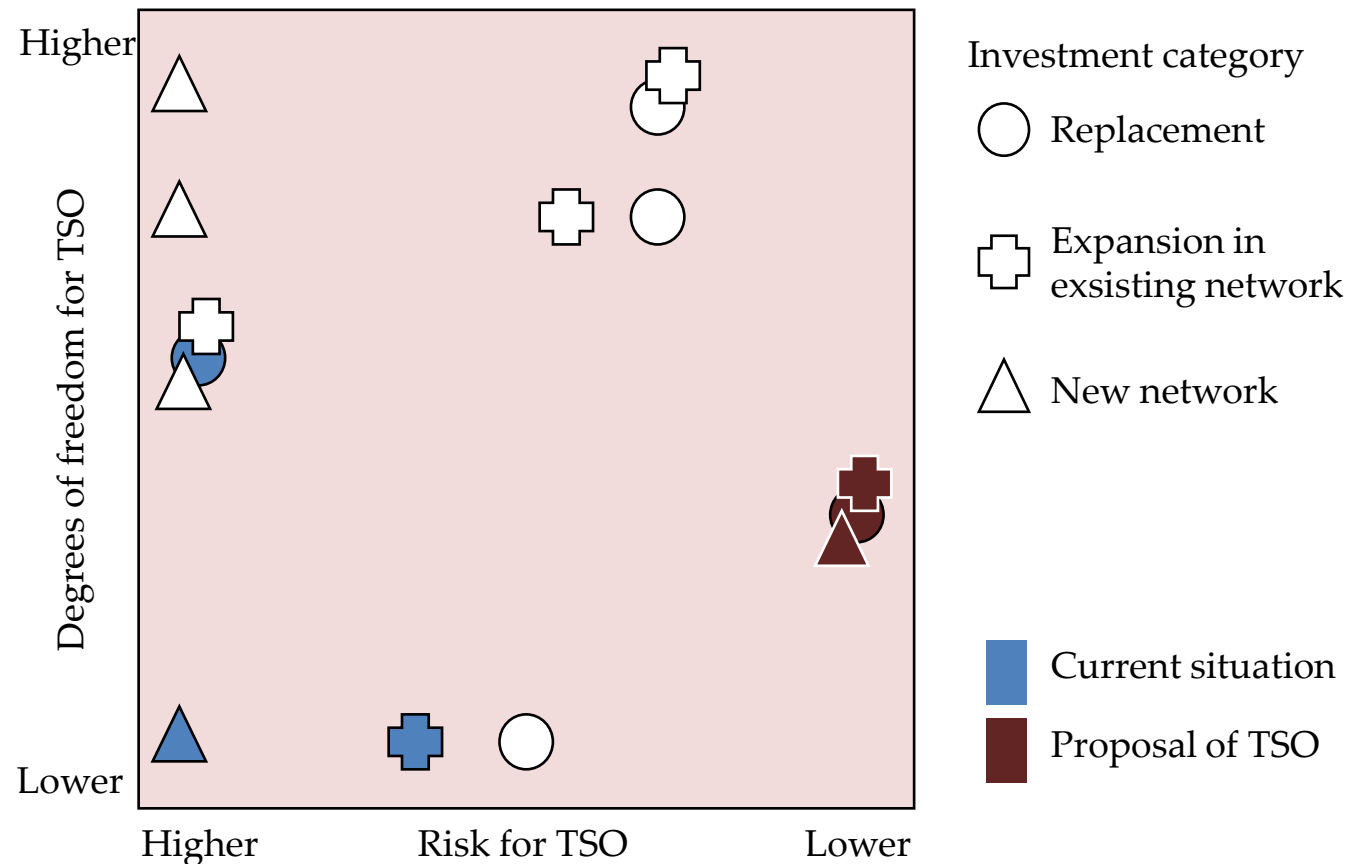
	Degrees of freedom	Type of regulation
A Budgetted		Regulator decides on all aspects of investments; TSO applies regulator's decision within budget set by regulator.
B Average costs		TSO gets a fixed price for increased capacity (e.g., EUR/ MVA). TSO is responsible for investment level and location
C Price list		Regulator sets a pricelist for network components at the beginning of a period. TSO can invest in necessary parts against set prices. Pricelist calibrated to markets (e.g., copperindex)
D Procedures		TSO has to show that it adheres to set procedures for decisions on and realisation of investments. Regulator audits procedures
E Benchmark		Regulator runs benchmark after investments are realised. TSO gets efficient asset base in RAB

For TSO and regulator, the preferred method is a trade off between risk and degrees of freedom

DUTCH SITUATION

Method of regulation

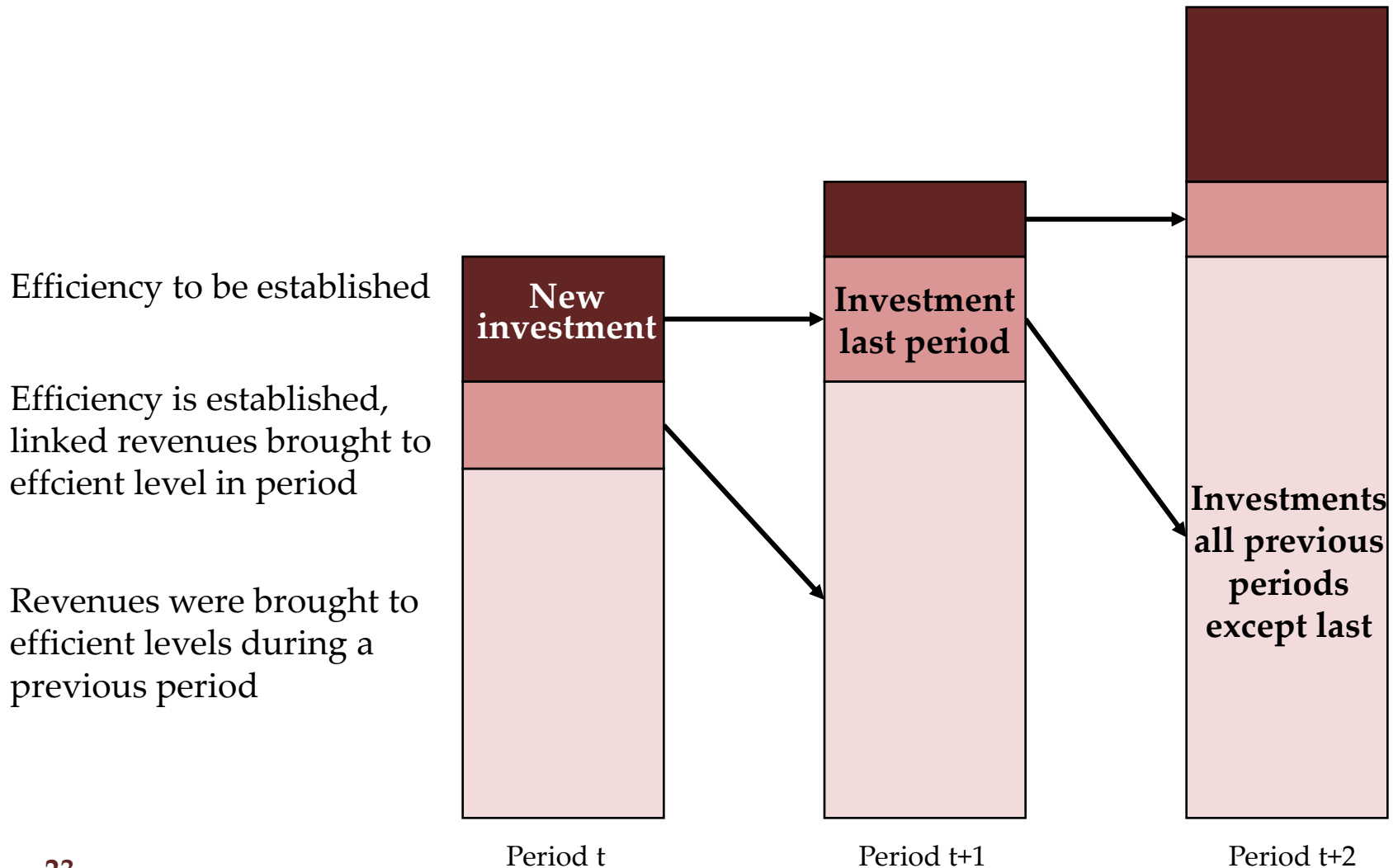
- List prices
- Average costs
- Benchmark
- Procedures
- Target budget



The three key decisions with investments should be approved by the relevant government body

Decision	Government body	Discussion
<ul style="list-style-type: none">- Need for investment	<ul style="list-style-type: none">- Ministry of Economic Affairs	<ul style="list-style-type: none">- Complex societal business case with large political impact
<ul style="list-style-type: none">- Implementation	<ul style="list-style-type: none">- Min. Economic Affairs- Min. For spatial planning- Local governments	<ul style="list-style-type: none">- Complex urban/rural planning implications with national and local trade-offs beyond TSO and electricity regulator
<ul style="list-style-type: none">- Costs	<ul style="list-style-type: none">- Regulator	<ul style="list-style-type: none">- Regulator should focus on costs

All assets of a TSO go through a regulatory cycle of three steps to avoid repetitive reduction of asset base



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The end

- Thank you for your attention
- Feel free to ask questions; now or later

Dr. J.P (Jan-Peter) Heida

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