Pathways towards a 100% renewable electricity system

Reform Grid Regulation

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- 100% renewable electricity: climate-friendly, reliable, affordable

IT‘S POSSIBLE (8 Scenarios)

- Transition to a fully renewable energy supply necessitates political leadership and a mix of wide ranging policies
  - SRU Report Chapter 6: EU energy and climate policy
  - Chapter 7: Energy efficiency
  - Chapter 8: Reform of renewable energy act (EEG)
  - ***Chapter 9: Electricity grids***

Bottleneck electricity grid infrastructure

- Large-scale expansion of domestic and international transmission capacity is a prerequisite for 100% renewables
- Investments are currently insufficient
- Complex set of actors with diverging interests
- Obstacles to investment are located differently

Reasons for delayed grid investments

Insufficient incentives arising from grid regulation	Protracted planning and approval procedures	Public acceptance issues

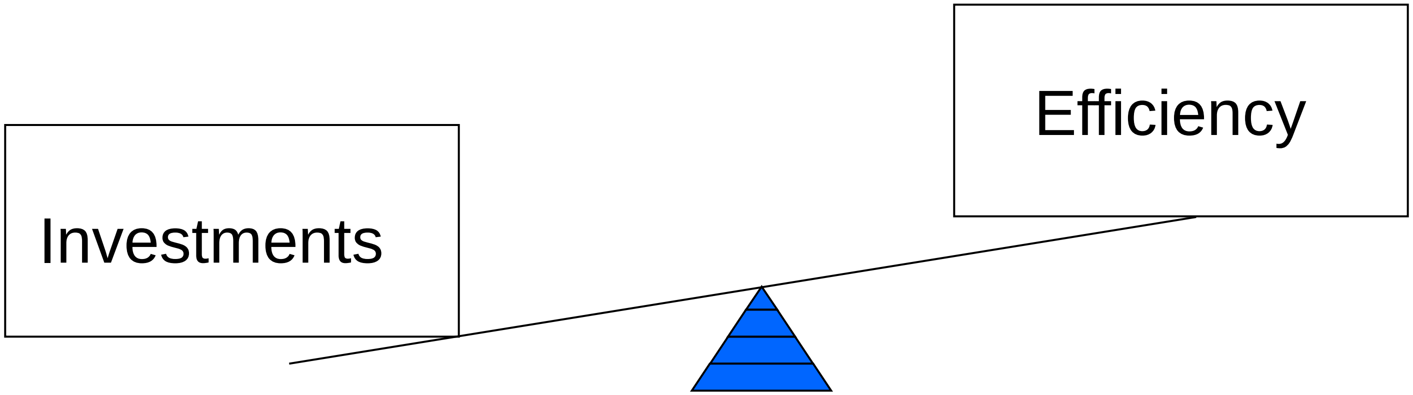
Focus of today's presentation

Regulatory triangle

- Legal investment obligations
  - Specific: e. g. § 9 EEG
  - Systemic: §§11, 12 EnWG
  - → BUT: Difficult to oblige TSOs to build specific connections which might be regarded necessary for achieving certain energy policy goals
- Investment planning obligations
  - Third legislative package on EU Electricity & Gas markets
  - ENTSO-E Ten Year Network Development Plan
  - → BUT: no state planning of needs; focus on private industry interest
- Incentive based regulation (ARegV)

Conflict between investments and efficiency

- ARegV establishes cap on revenues from network charges
- Establishes incentive to reduce network costs
- But also incentive to reduce expenditures
- Conflict of goals



Investment budgets (§ 23 ARegV)

Are the investment incentives strong enough?

- Investment budgets introduced to overcome conflict of goals and to guarantee investment security
- Granted by Federal Network Agency (BNetzA) for capital expenditure on extension and restructuring investments
- If budget is granted, then cost of capital and debt will be added on top of revenue cap and are not subject to efficiency criteria

Investment budgets (§ 23 ARegV)

Are the investment incentives strong enough?

- High initial investments that pay relatively constant and secure dividends
- 9,29% return on equity

BUT

- Deductions from this rate are made in the approval process of investment budgets
- Expected return risks to be substantially lower

→ Financial risks increase, grid investment becomes less attractive and might turn unprofitable

Investment budgets

Deductions in the approval process

- Deductions for avoiding double accreditation of investment costs within the revenue cap and the investment budgets
- Indirect deductions as a result of the limited cost of debt that is approved
  - BNetzA approves only cost of debt that are equivalent to the net yield of low-risk fixed-interest securities; reference is not the market for loanable funds
  - If cost of debt are greater, return on equity decreases
  - Problem is heightened for unbundled TSOs
- Lower return as a result of limited running time of investment budgets

Investment budgets

What to take from this

- → If financial incentives are the chosen policy tool, then they have to be set at an adequate level
- → What is a sufficient return on equity?
- → Change approval practice?
- → KfW loan program as a quick fix for high borrowing costs
- → Investment budgets likely the wrong system for encouraging investments in high voltage direct current power lines

Public tenders for high-power lines

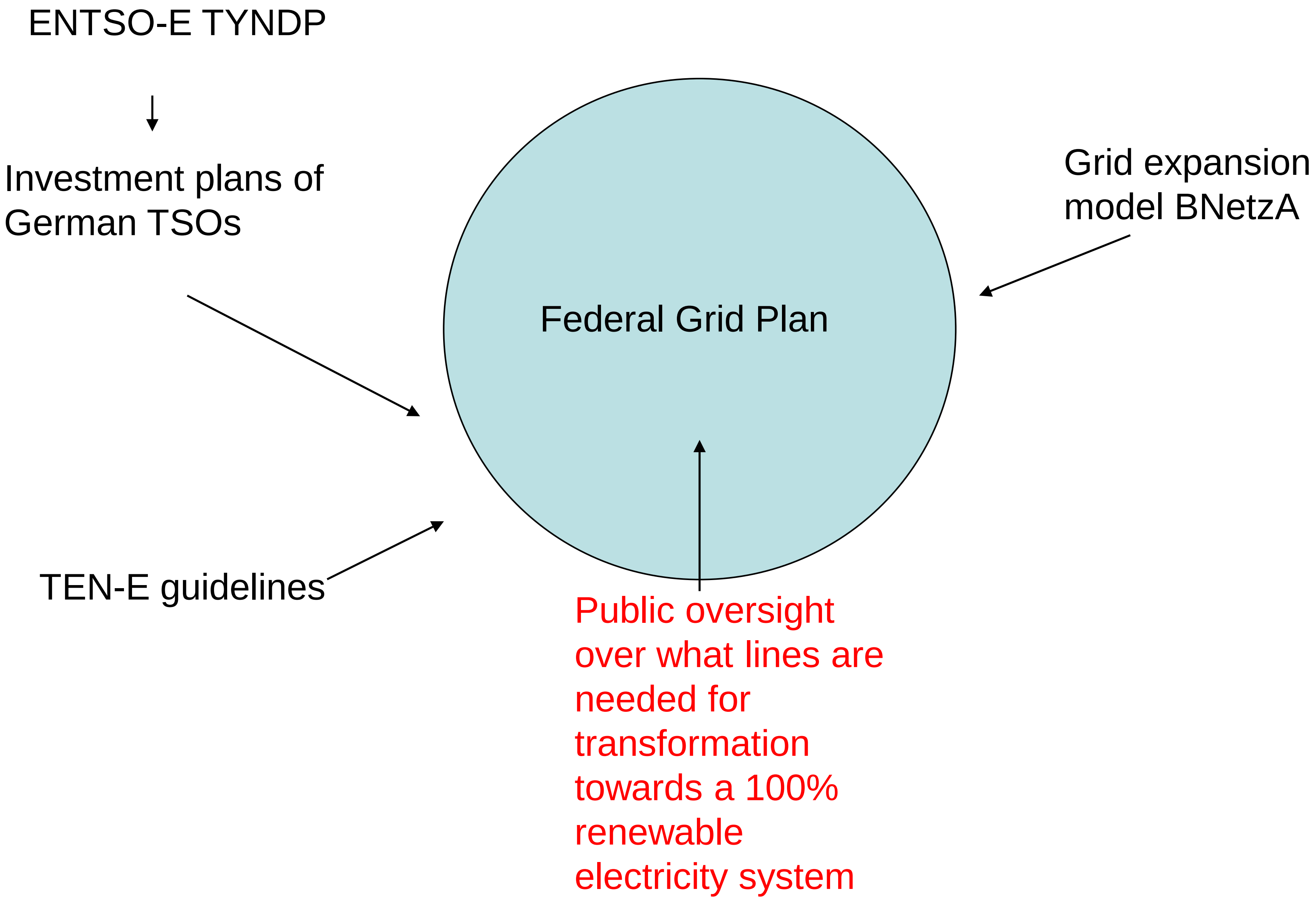
- Tendering contracts with a required minimum capacity for specific transmission lines
- Bidder that offers to build a certain line in conjunction with the lowest grid charges over a 20-year period is awarded the public contract
- Basis of tenders is a federal grid plan that defines the relevant needs for transmission lines and their routes and allows a public debate concerning alternative routes
- Process could be divided into tenders for project development and construction plus operation
- Milestones and penalties can guarantee construction

Public tenders for high-power lines

Advantages

- Adequate rate of return on such an investment must not be predefined but becomes transparent in bidding process
- Enables co-ordinated transformation/expansion of the electricity grid based on needs
- Competition between bidders secures cost-efficiency

Federal grid plan



Thank you very much!

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