

Renewable energies and their impact on local value added and employment

The german experience and a modelling approach



*-Economic Effects of Renewable Energy
Modelling Regional Value Added-*

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Brief outline: The Institute for Ecological Economy Research (IÖW)



- **Sustainable economy research and political consulting since 1985**
- **Two locations: Berlin (central office), Heidelberg / 35 researchers**
- **Focuses on different subjects:**
 - **Climate and Energy**, Ecological economics and environmental policy, Ecological consumption, Water and land management, Innovation and technology, Evaluation and assessment, Participation and communication, Environmental Services
- **Many years of experience with the analysis, development and evaluation of:**
 - Innovations and markets
(focuses: Renewable energies (especially photovoltaics and biomass), energy efficiency (especially: buildings))
 - Political instruments and climate protection strategies
- **Independent , 100% financed by third-party funds**
- **Mainly public clients, but also NGOs, foundations and enterprises**
- **www.ioew.de**

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1. Motive and Leading Questions

- **Municipalities and regions in Germany**
 - Play an important role in the transition from fossil-fuel based to RE systems
 - Many have ambitious objectives with regard to an energy supply system based on RE, some exceeding national targets of RE expansion or 100%-targets
- **Motive:** **Regional economic effects that can be induced by the use of RE, supporting structurally weak areas and backing up other social-ecologic motives**
- **Central questions:**
 - What is the extent of value added and employment effects on a local or regional level?
 - What are the potentials to generate local value added by different RE technologies?

2. Defining Local Value Added



sales revenue

output of the business company / the region

tax payments

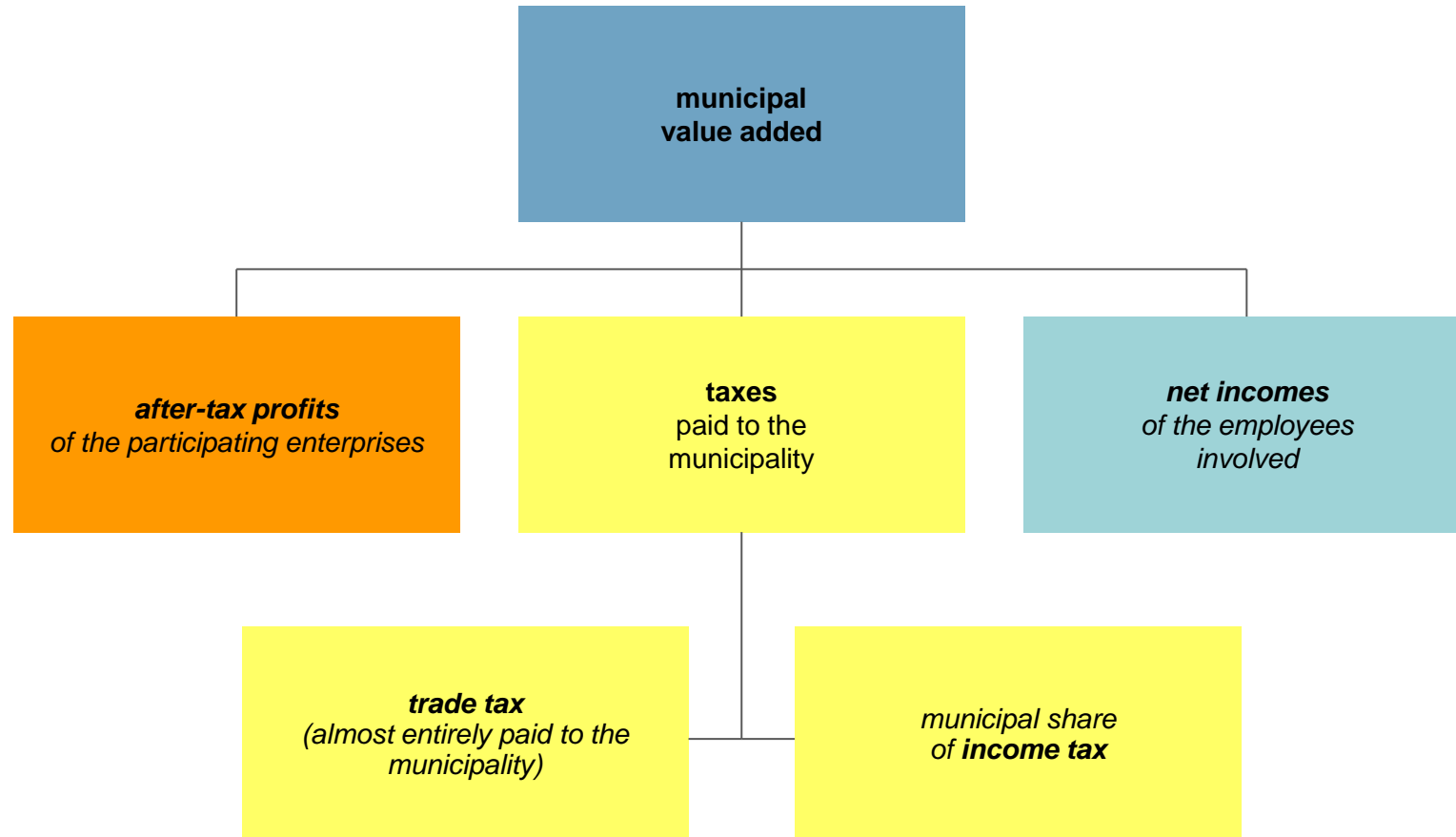
**net profits of
shareholders**

**net wages and
salaries**

depreciations

intermediate consumption

2. Defining Local Value Added



3. The IÖW Model



- **29 RE technology value-added chains**
(decentralized power and heat generation, provision of wood and biofuels)
- Value-added chains are derived from the specific cost structures of each RE technology
- **4 value-added stages**
 1. systems manufacture
 2. planning & installation
 3. operation & maintenance
 4. system operator
- Each value-added stage can be subdivided in several value-added steps
- Basis for the assessment of value added: specific turnovers / cost item in relation to the installed capacity (€/kW) / installed collector surface (€/m²) / produced amount (€/l, €/t,...)

3. The IÖW Model



Value-chain stage	Example of value-chain step	Investment or operational costs (€/kW)
Systems manufacture	Rotor blades	183,10
Planning & Installation	Foundation	54,00
Operation & Maintenance	Maintenance	12,48
System operator	Profit	48,07

3. The IÖW Model



- **Calculation of net profits:**
 - Cost item of value-chain steps as turnover volume of the involved stakeholders (€/kW installed capacity)
 - Assignment of a „return on sales“ specific for the economic sector for every value-chain step
 - Sector-specific segmentation of the profit into capital companies and joint partnerships
 - Subtraction of profit taxes for each type of company



Net profits

3. The IÖW Model



- **Calculation of net wages and salaries:**
 - Calculation of the employment effect with a sector-specific coefficient of „employees per turnover“ for every value-chain step
 - Multiplying by sector specific wages
 - Subtraction of income taxes



Net wages and salaries

3. The IÖW Model



- **Calculation of fiscal revenues:**

- Business tax revenue: business tax payments of the companies less regional specific levy for the federal state and the republic
- Income tax revenue (incl. capital gains tax): municipal share (15%) income tax payments from the shareholders of joint partnerships and from employees

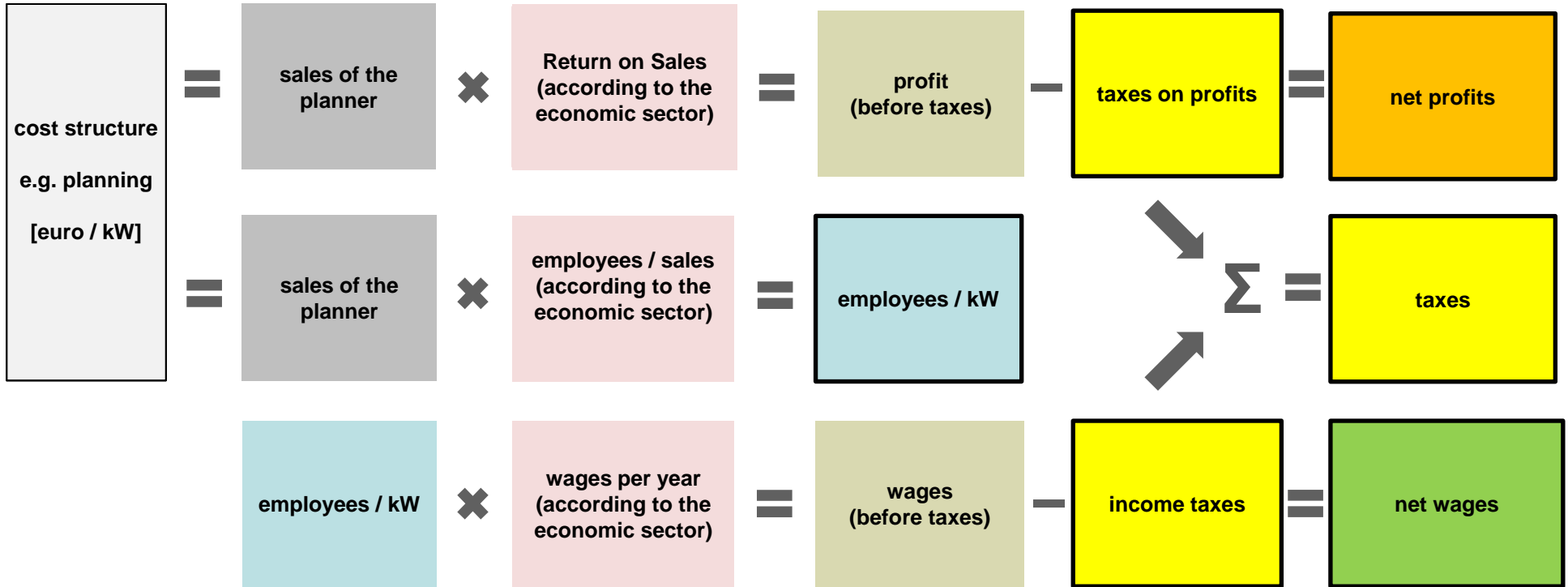


Municipal tax revenues

- **Expandable by:**

- Business tax levy for federal state and republic
- State and republic share of income tax payments and other taxes to be due only to the states and the republic

3. The IÖW Model



3. The IÖW Model



- **Profit of system operator**
 - No profit and loss account but use of average return on equity rate
 - Absolute profits decrease with learning curve effects of investment costs
 - Subtraction of profit taxes for different corporate forms
 - Joint stock company
 - Joint partnership
 - Cooperative
 - Limited liability company

3. The IÖW Model

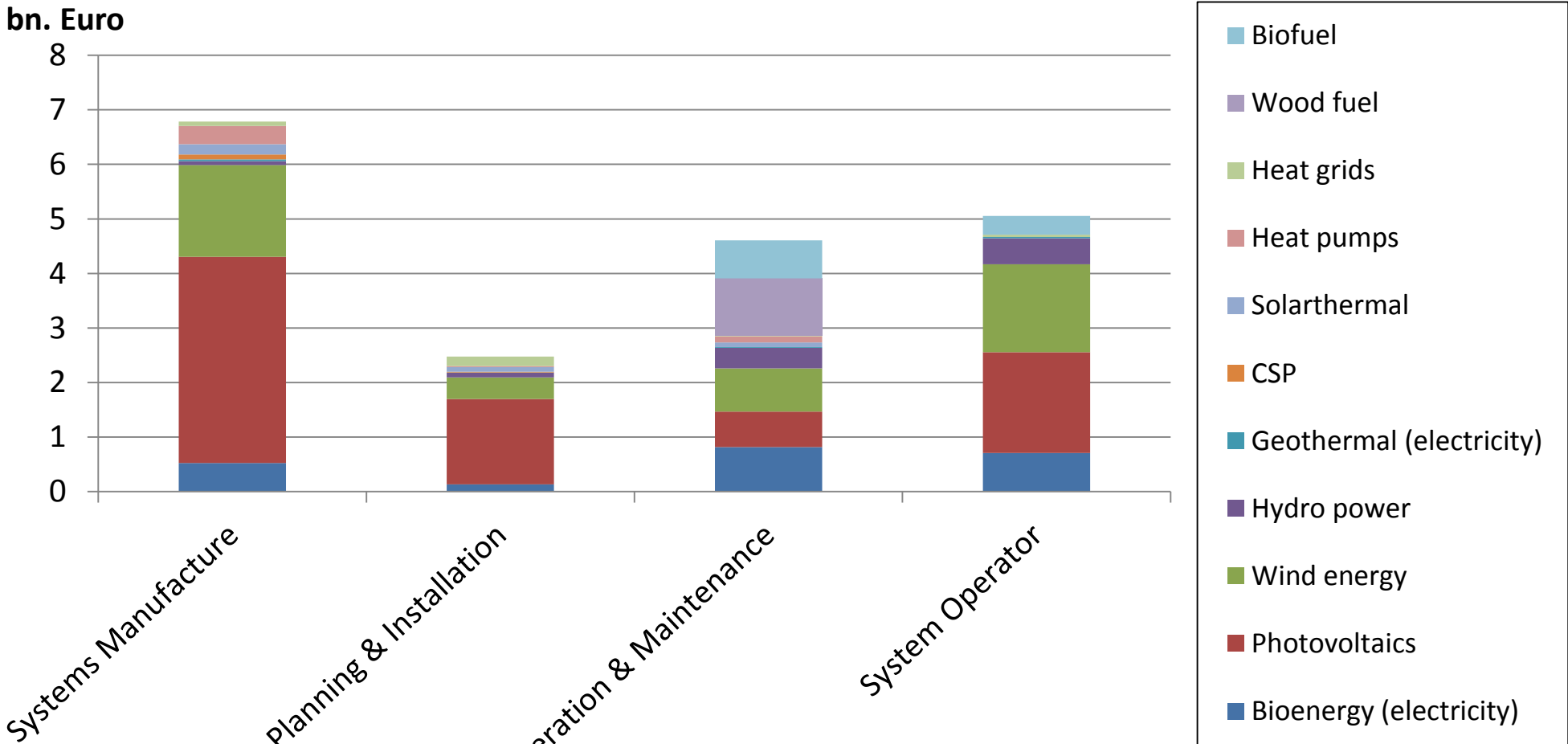


- **Projection of the capacity specific value added indicators – required data**
 - For Germany:
 - Capacity expansion for the stages of systems manufacture and planning & installation (minus plant imports plus plant exports)
 - Current stock of RE plants (plus a part of the annual expansion) for the stages of operations & maintenance and system operator
 - For a regional study:
 - Consideration of regional turnover for the stages of systems manufacture and planning & installation (including export turnover)
 - Consideration of technology specific quotas of the participation of regional stakeholders (assumptions, empirical results) for the stages of operations & maintenance and system operator

4. Selected results in Germany



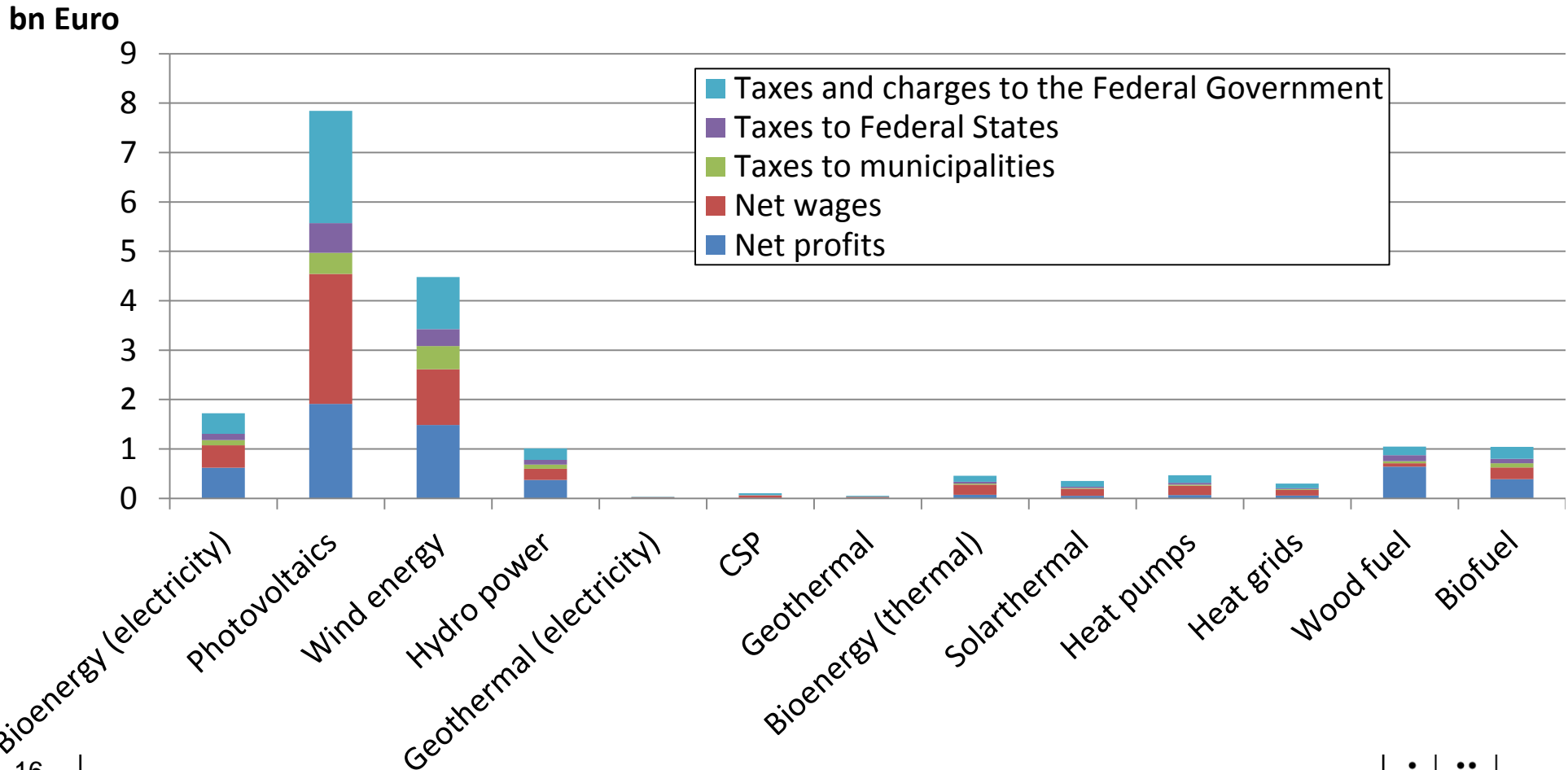
stage- and technology-specific local value added by RE in Germany



4. Selected results in Germany



component- and technology-specific local value added by RE in Germany



4. Selected results in Germany



- **Examples of other applications:**
 - For federal states:
 - Brandenburg
 - Baden-Wuerttemberg
 - Mecklenburg-Hither Pomerania
 - Hesse
 - Berlin
 - Saxony-Anhalt

4. Selected results in Germany



- **Examples of other applications:**
 - For communities and regions
 - 100% RE-power county *Luechow-Dannenberg* (known for a temporary storage site for nuclear waste)
 - Bioenergy region *Schwaebisch Hall*
 - RE community *Morbach* (using former military area as RE park)
 - County of *Steinfurt* (well known for their great efforts for climate protection measures)
 - Free to use online value-added calculator for 24 RE value-added chains on www.kommunal-erneuerbar.de (*hosted by the Renewable Energies Agency*)

5. Scope and limits of the IÖW Model



- **IÖW model can be used to quantify effects of value added and employment for:**
 - Different RE technologies
 - Every value-added step
 - Every component of value added
 - Different geographical units
- **Limits of the method:**
 - No assessment of indirect effects generated on upstream value-added stages (e.g. steel production)
 - Impacts from a substitution or a crowding out of economic activities due to the use of RE cannot be quantified
 - Ecological and social aspects are not considered

6. Transferability of the model to other countries



- **Overall findings (for Germany):**
 - (decentralized) RE have the potential to create value added and employment in many regions all over the country
 - Trigger for value added and employment are local companies engaged in all parts of the RE technology value-added chains
- **Possible difficulties / points to discuss:**
 - The model requires a great number of statistics and data and has to be adapted to the tax system
 - typical RE-technologies and corresponding value-added chains in other countries?
 - Import of RE technologies and services vs. local content?
 -



7. Conclusion

- Economic arguments are a central driver for engagement of regional governments and municipalities in RE next to other important factors evaluated by social-ecologic research
- Due to decentralized technologies, RE create possibility for many communities to profit from their introduction
- Effects of value added and employment creation are considerable
- Triggers for value creation and employment are local and regional companies engaged in all parts of the RE value chains
 - Planning & installation
 - Maintenance and repairs
 - Local investors (energy cooperatives, municipal utilities, etc.)

Thank you for your time and attention



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