# The Economic Value of Renewable Energy Deployment

## WP 2 – Variables and methodologies for value creation impact assessment

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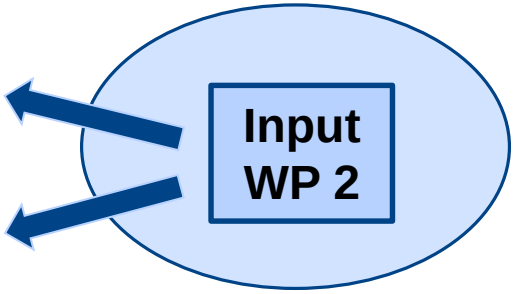
# Work Package 2 within the overall project

| | |
|---|---|
| Chapter 1 | Introduction to value creation opportunities along the solar and wind energy value chain |
| Chapter 2 | **Variables and methodologies** for value creation impact assessment |
| Chapter 3 | Policies enabling value creation for solar/wind |
| Chapter 4 | Case studies and comparative analysis |
| Chapter 5 | Conclusions and policy recommendations |
| Annex 1 | Guidelines for policy instruments enabling value… |
| Annex 2 | Description / Tutorial for using the tool database |



# Partners and state of work

## Partners:

IRENA International Renewable Energy Agency

Fraunhofer ISI

RETD IEA - RENEWABLE ENERGY TECHNOLOGY DEPLOYMENT

gws

IDAE Instituto para la Diversificación y Ahorro de la Energía

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

teri

t.b.d.

Deutsche WindGuard

prognos

*(Coordination on behalf of BMU)*

## State of work

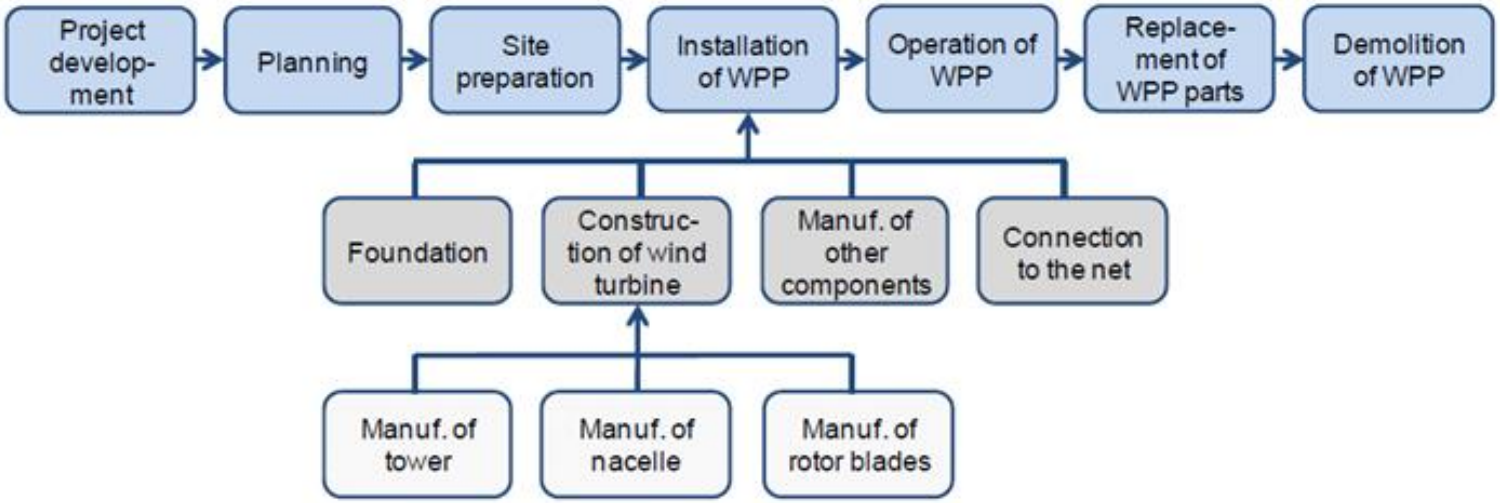
- Structure of WP 2 and outline has been developed
- Interested partners have been identified and contacted
- First partner inputs on the content of the WP 2 analysis and the available literature have been received

# Terms and definitions

- **Value creation**
  - conversion, transformation, processing and refinement of existing resources to new products
  - results in net value added
- **Value-added**
  - total sales less the value of intermediate inputs into the production process
  - comprises profits and labour income for workers, i.e. wages and salaries
  - one possible route to determine a country's GDP
- **GDP**
  - equals the sum of value-added in all economic sectors of a country (net of subsidies plus taxes)

# Life cycle and value chains of RET

- The renewable energy industry is a cross-sectional industry
- The complete life cycle of RET has to be considered in assessing economic effects of RET
- Each part of the life-cycle of a RET project is supported by a value chain
- Each of the different value chains outlines the details of manufacturing and transportation of the respective component of the RE- technology




**Example of the life cycle and value chains of a wind power plant, source: Breitschopf et al. 2011**

# Variables and scope

**Variables of major interest to policy-makers**

- Employment
- Impact on GDP (growth)

**Key question:**

**What kind of economic value do we want to measure – gross or net?**

- Gross:
  The RET sectors' contribution to overall value added within an economy.
- Net:
  The impacts on overall economic performance indicators, such as positive or negative changes of GDP or employment.

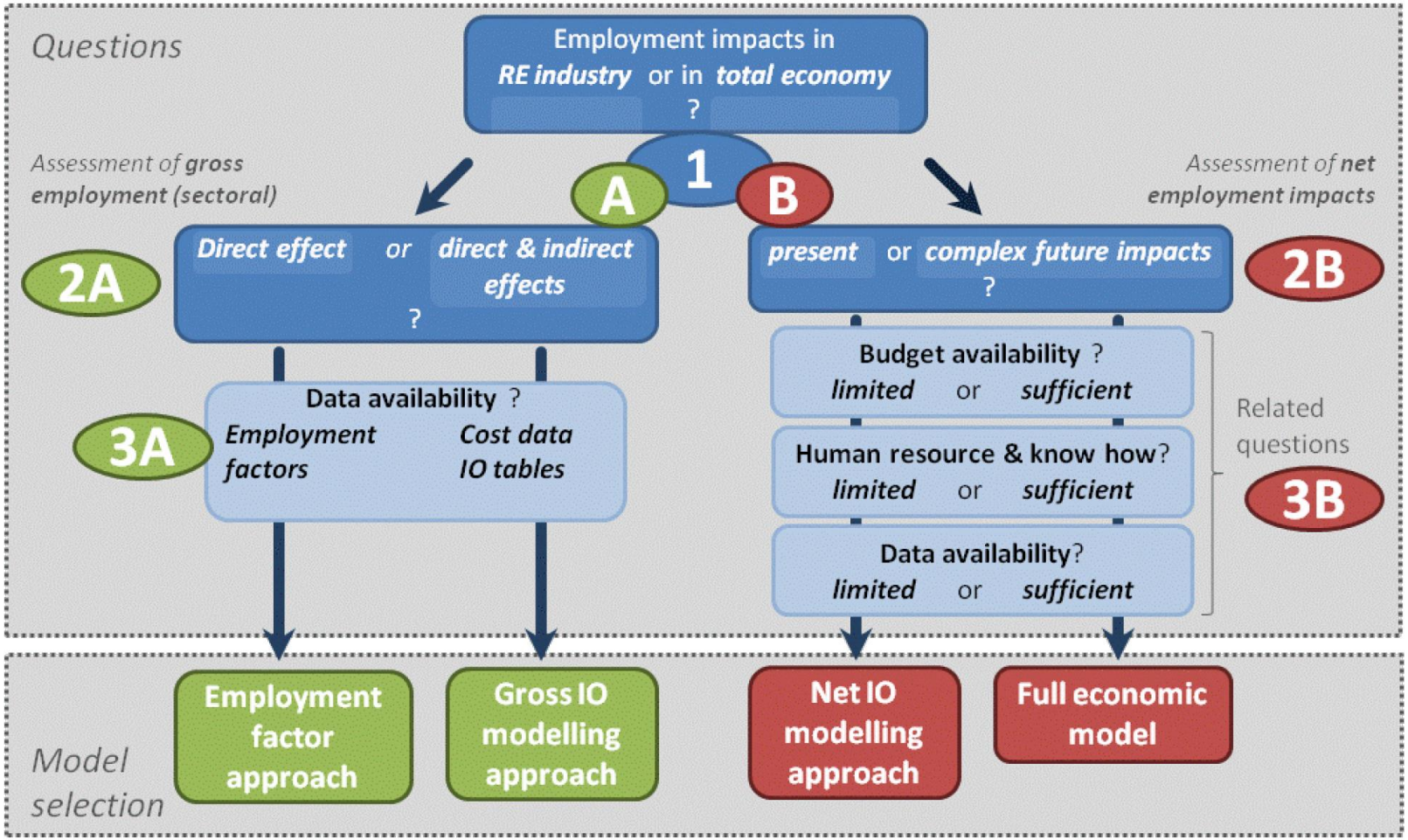
# Scope

**The project creates a synthesis of existing research on jobs…**

- RETD-EMPLOY report
  - on methodological guidelines for estimating the employment impacts of using renewable energies (Breitschopf et al. 2011; 2012)
- UKERC report
  - on evidence for net job creation from policy support for energy efficiency and renewable energy (Allan et al. 2012)

**… and complements it with methodological options for assessing economic value creation more broadly**

# Example for choosing an approach: jobs




**Source: Breitschopf 2012**

# Gross approaches – Strengths and weaknesses

| Approach | Employment factors | Gross Input-Output (IO) models |
|---|---|---|
| **Complexity and cost** | • Employment only<br>• Only direct jobs in the RE industry<br>• Lower cost | • Employment and other economic impacts (value added)<br>• Covers indirect jobs in upstream industries, too<br>• Higher cost |
| **Appli-cability** | • Quick assessments and simple monitoring of employment in the RE industry | • More sophisticated monitoring of the RE industry |

# References


- Allan et al. (2012), “Report on the evidence for net job creation from policy support for energy efficiency and renewable energy: An appraisal of multi-sectoral modelling techniques”, Commissioned by the UK Energy Research Centre’s (UKERC) Technology and Policy Assessment theme, led by Sussex Energy Group (SPRU) and Centre for Energy Policy and Technology (Imperial College)
- BMU (2013), Renewably employed! Short and long-term impacts of the expansion of renewable energy on the German labour market
- Breitschopf (2012), “Presentation of Employ: Employment Impact of using RE Sources in Electricity Generation”, on behalf of IEA-RETD. IEA-RETD Workshop “Capitalising on Renewables: Short- and Medium-term Opportunities and Economic & Employment Benefits”. 27 September 2012, Ottawa, Canada.
- Breitschopf et al. (2012),“EMPLOY. Methodological guidelines for estimating the employment impacts of using renewable energies for electricity generation”, Study commissioned by IEA-Renewable Energy Technology Deployment
- Breitschopf et al. (2011), “EMPLOY. Final report – Task 1 – Review of approaches for employment impact assessment of renewable energy deployment”, Study commissioned by IEA-Renewable Energy Technology Deployment
- Lehr, U., Lutz, C. & Edler, D. (2012): Green jobs? Economic impacts of renewable energy in Germany. Energy Policy 47, 358-364.

- Additional input welcome
  - Partners invited to join
  - Additional references, approaches,…

# Thanks for your attention!

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# Backup slides

# Net approaches – Strengths and weaknesses

| Approach | Net Input-Output models | Macroeconome-tric models | Computable General Equilibrium (CGE) models | System dynamic models |
|---|---|---|---|---|
| **Comple-xity and cost** | • Medium data requirements<br>• Lower cost | • Higher data requirements<br>• Higher cost | • Higher data requirements<br>• Higher cost | • Complex structures<br>• Higher cost |
| **Appli-cability** | • Rough net assessment | • Short to medium-term assessments | • Long-term assessments | • Long-term assessments |

# Gross approaches – Strengths and weaknesses

| Approach | Employment factors | Gross Input-Output (IO) models |
|---|---|---|
| **Strengths** | • Easy to use at low cost, if factors are available<br>• Fast, technology-specific estimates and updates | • Employment and other economic impacts (value added) in consistent framework<br>• Covers indirect jobs in upstream industries, in addition to direct jobs in the RE industry |
| **Weak-nesses** | • Employment only; and only direct jobs in the RE industry<br>• Few reliable sources for country-specific factors<br>• Exports are difficult to integrate | • Higher cost than for simple employment factor approaches<br>• Assumption that aggregate indus-tries in IO model represent RE com-panies and supply chain adequately |
| **Appli-cability** | • Quick assessments and simple monitoring of employment in the RE industry | • More sophisticated monitoring of the RE industry |

# Net approaches – Strengths and weaknesses

| Approach | Net Input-Output models | Macroeconome-tric models | Computable General Equilibrium (CGE) models | System dynamic models |
|---|---|---|---|---|
| **Strengths** | • Simplicity<br>• Medium data requirements<br>• Low cost | • Explain policy impact over time<br>• Relax the strict assumptions of CGE models | • Flexible at different levels of aggregation<br>• Can demonstrate unintended consequences | • Positive/negative feedback loops<br>• Integration of several fields of RE use (heat…) |
| **Weak-nesses** | • No feedback loops<br>• Limited price and quantity changes | • Great effort for specification<br>• Simplistic functional form may lead to inconsistencies | • Data intensive<br>• "Black box" nature needs sensitivity analy-sis for transparency<br>• Assumptions of efficient markets and optimising agents | • Complex structures due to feedback loops<br>• Mixed theoretical foundation |
| **Appli-cability** | • Rough net assessment | • Short to medium term assessments | • Long-term assessments | • Long-term assessments |