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Employment Effects of RE – Methods and Case Studies

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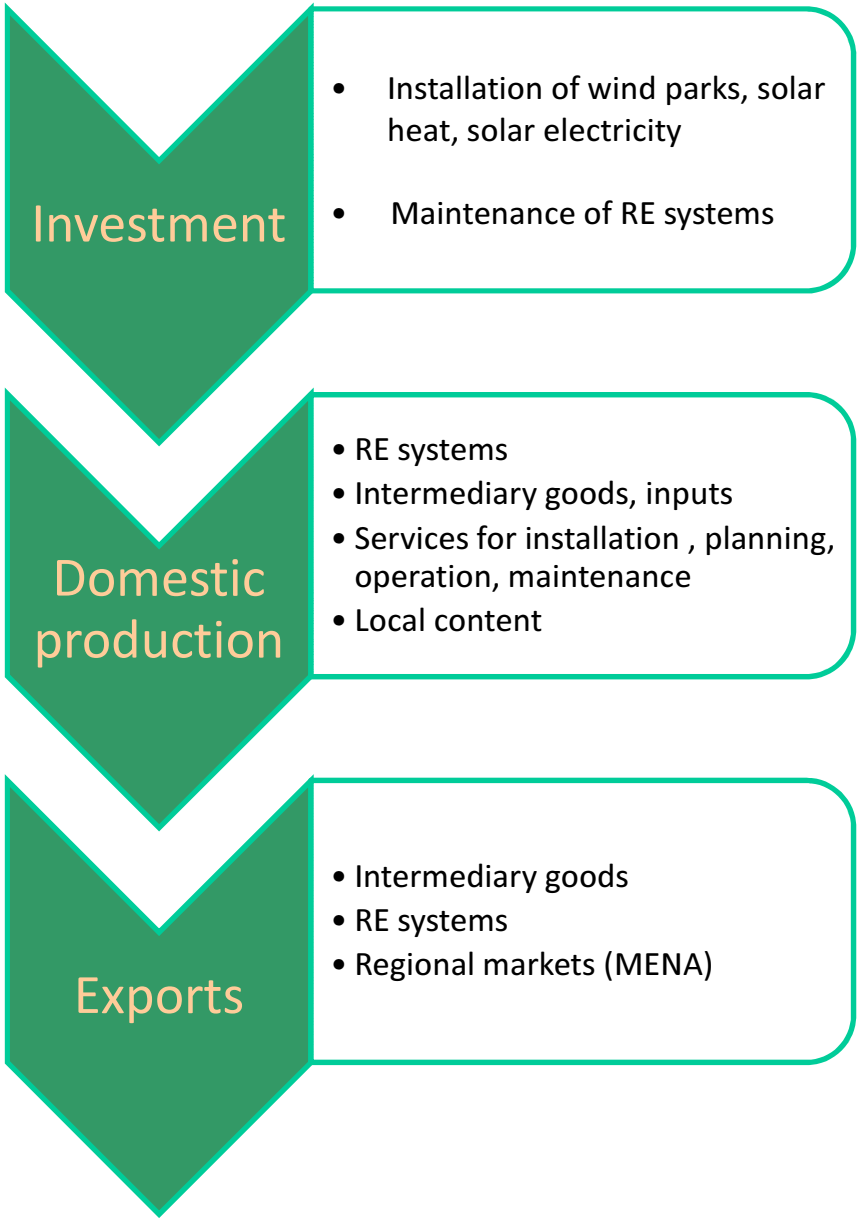
What drives employment in RE?

ELEMENTS OF EMPLOYMENT FROM RENEWABLE ENERGY

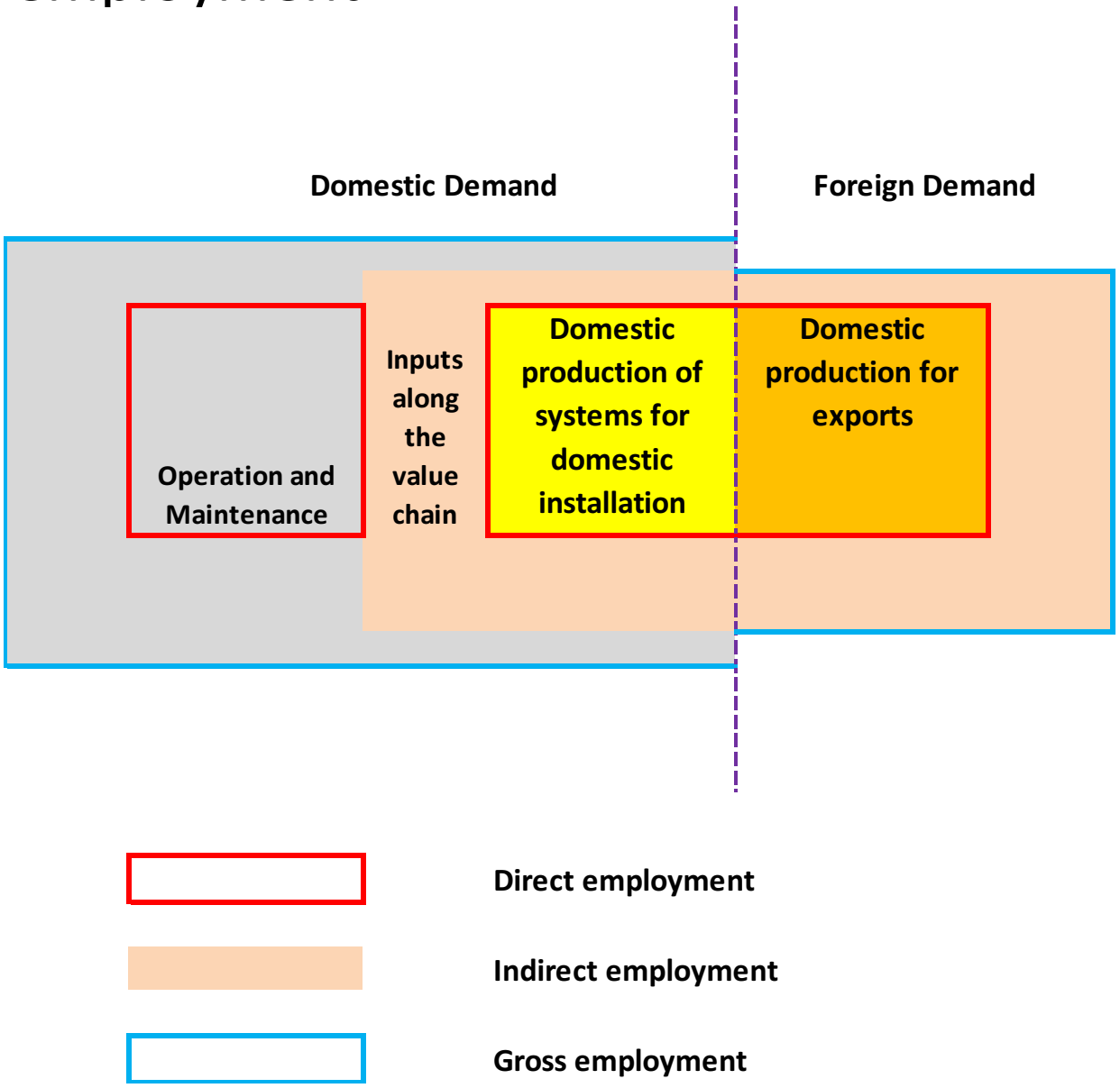
International experience shows that RE employment is driven by:

- **Ambitious RE plans (domestic market)**
- **Development of the domestic industry (qualified work force and investment incentives)**
- **Stable framework conditions**
- **Export opportunities**



How do we measure employment from RE? – Concepts and methods

Gross employment



Domestic production along the value chain => Local content

Intermediary goods:= inputs

- % imports PV
- % imports wind
- Etc.

Production of RET

- % imports PV
- % imports wind
- Etc.

Operation and Maintenance

- % domestic

German Experience (Monitored since 2004 by consortium ZSW/GWS/DLR/DIW

How do we quantify the effects for Germany?

Investment in Renewable Energy (RE), O&M

Export of RE facilities

Import of RE facilities

} Base year 2007: statistical data, survey

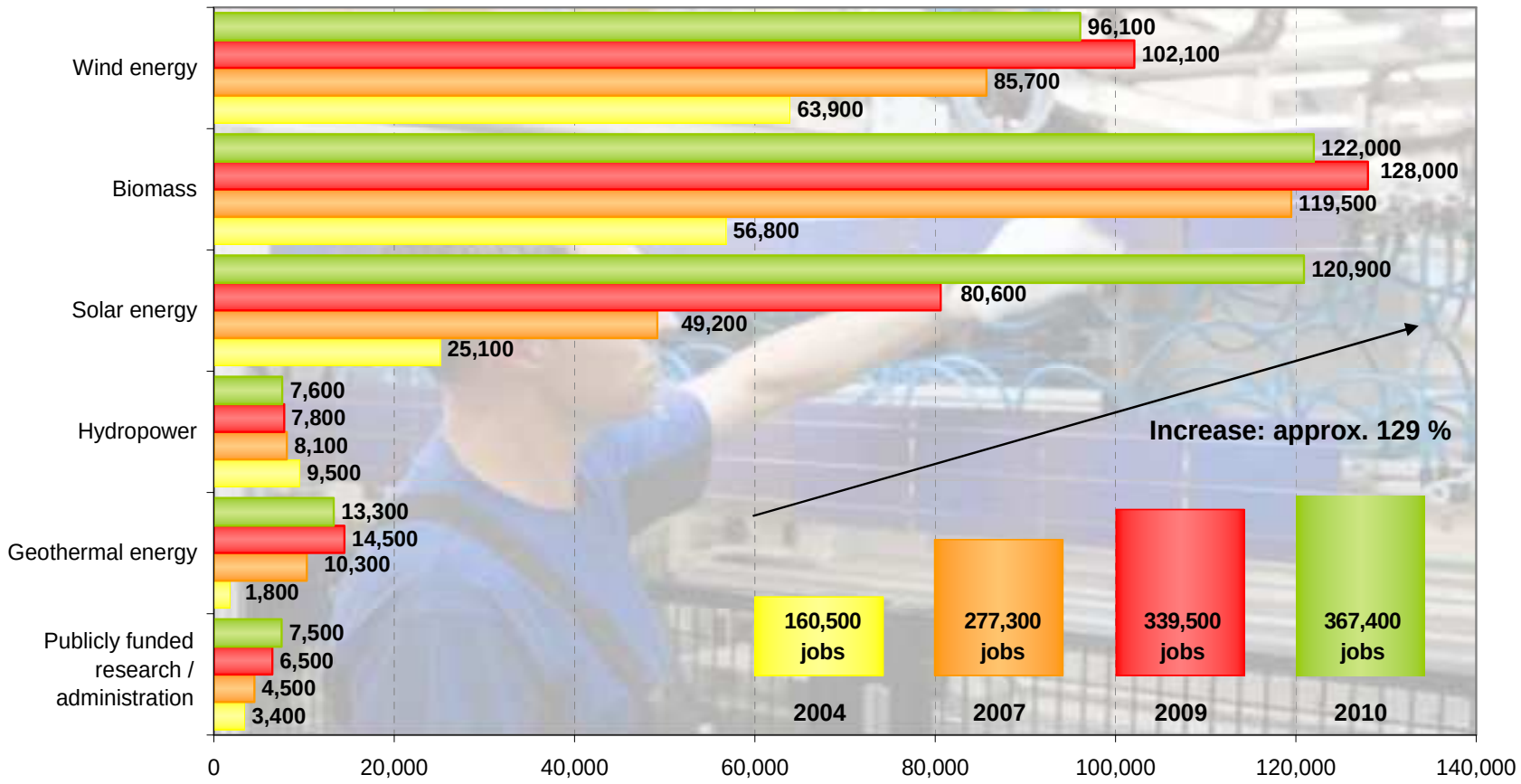
Future: Scenarios

=> Resulting gross employment → Input-Output-Tables (extended with vectors for RE)

Impact on economic indicators, balance

= > net effect → Macro-econometric model: PANTA RHEI

Jobs in the renewable energy sources sector in Germany



Figures for 2009 and 2010 are provisional estimate; deviations in totals are due to rounding;
Source: O'Sullivan/Edler/van Mark/Nieder/Lehr: "Bruttobeschäftigung durch erneuerbare Energien im Jahr 20010 – eine erste Abschätzung", as at: March 2011; interim report of research project „Kurz- und langfristige Auswirkungen des Ausbaus erneuerbarer Energien auf den deutschen Arbeitsmarkt"; image: BMU / Christoph Busse / transit

Manufacturing of Systems and Components

15.2 billion €

Of which 53 % domestic and 47 % export

Operation and Maintenance *

3.9 billion €

Of which 100 % domestic

* additional € 5.6 billion combustibles and fuel

Thereof Domestic Intermediate Inputs

Equipment for generating, distributing, etc. electricity

907 million €	267 million €	1.2 billion €

Machines

671 million €	310 million €	1 billion €

Business-related services

655 million €	142 million €	0.8 billion €

Metal products

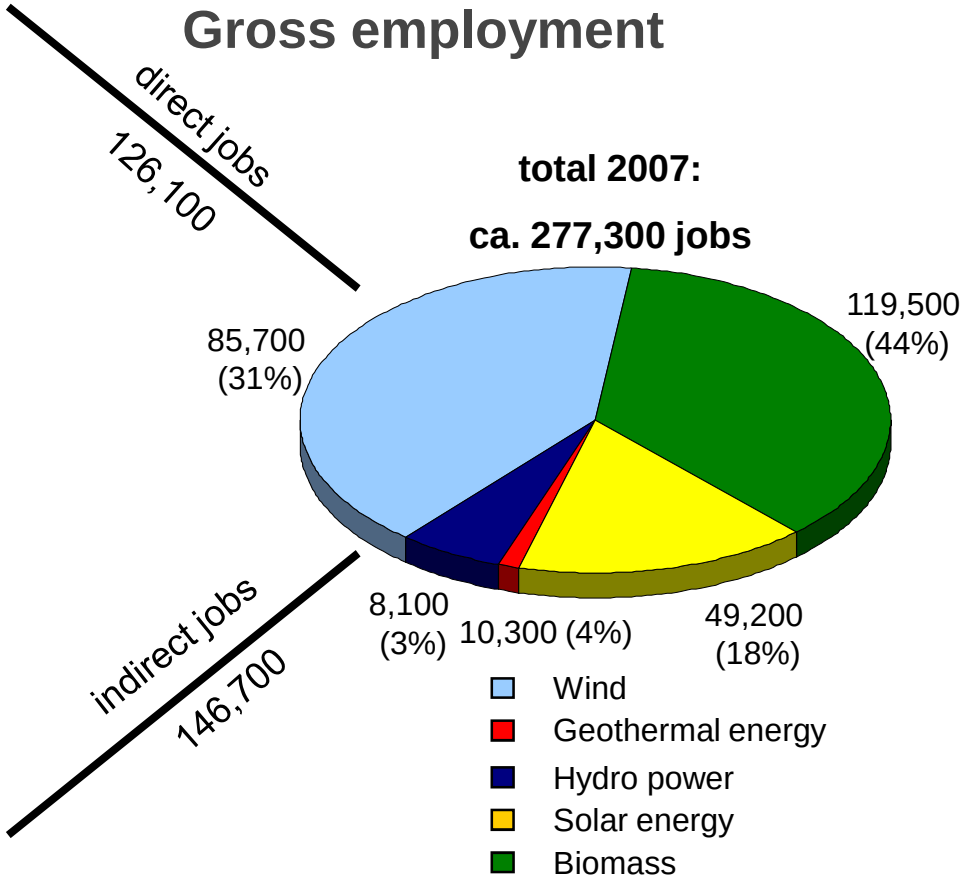
474 million €	283 million €	0.8 billion €

Construction

439 million €	275million €	0.4 billion €

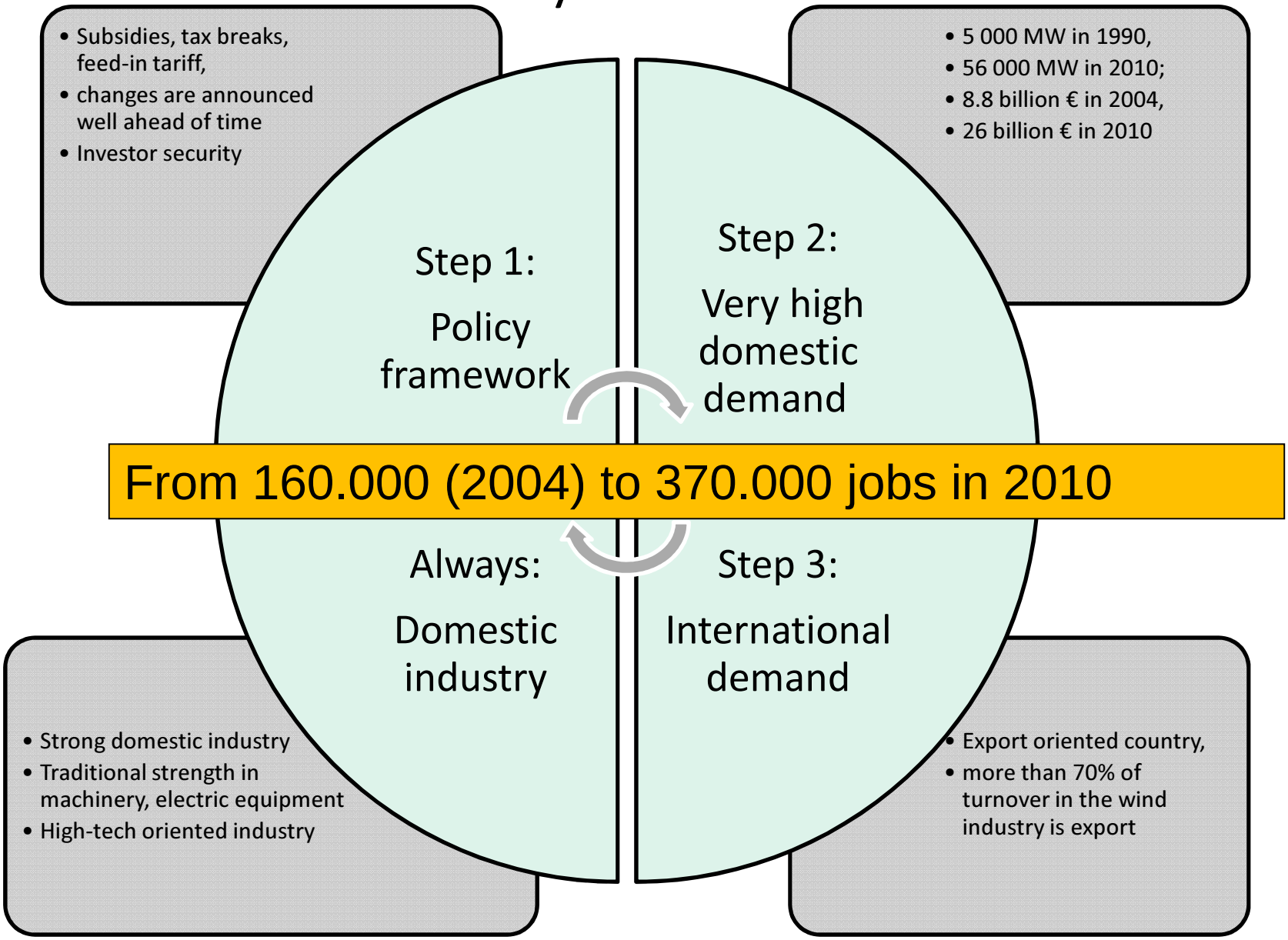
For information only: imported intermediate inputs € 1.1 billion

From Input-Output Analysis: Direct + indirect employment= Gross employment



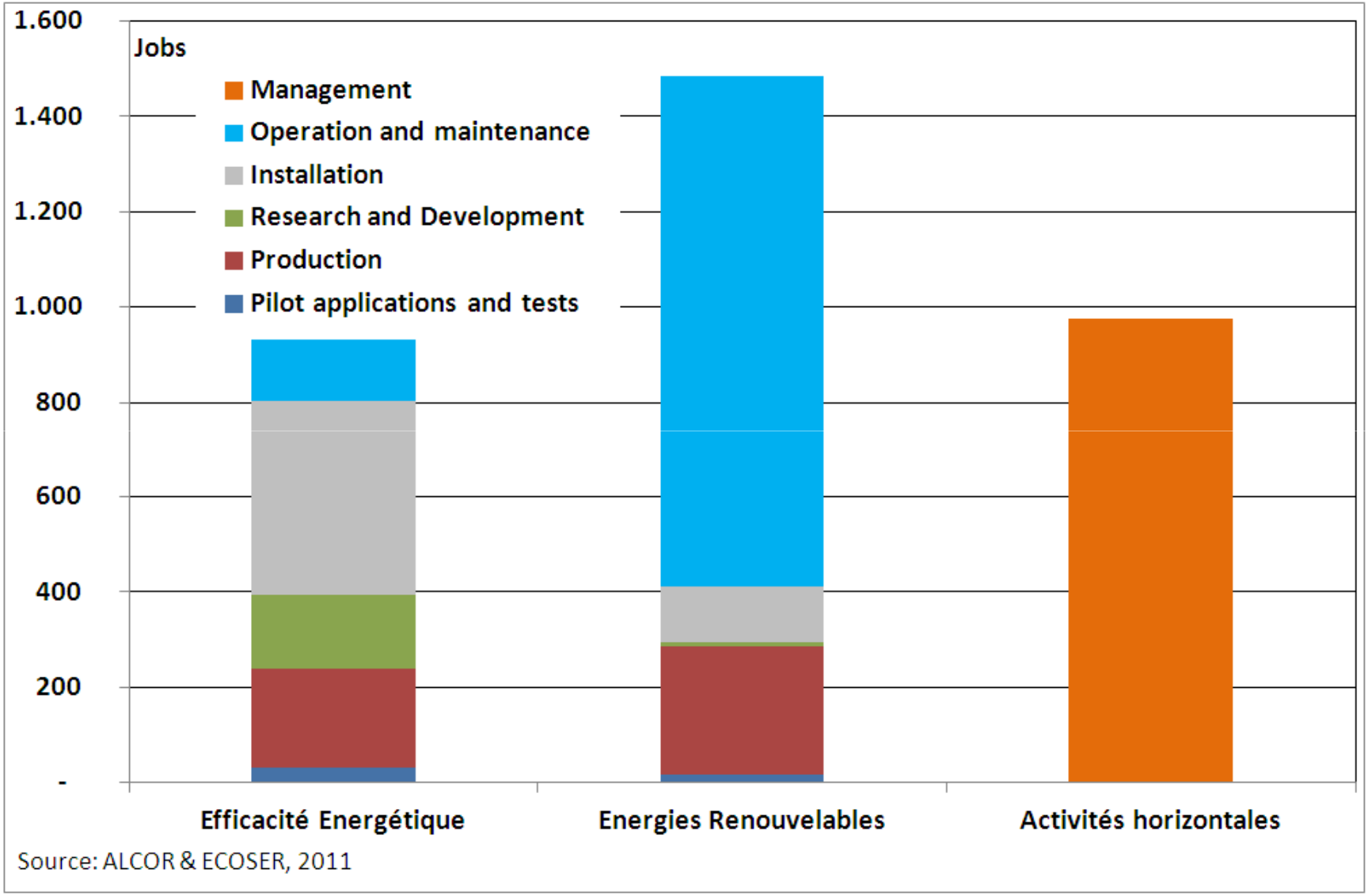
2008: 322,100
2009: 339,500
2010: 367,000

Success factors: Germany



CASE STUDY TUNISIA: ADAPTING THE APPROACH TO DEVELOPING COUNTRIES

Employment from RES and efficiency 2005 – 2010



Source: ALCOR & ECOSER, 2011

Program	Pilot application and tests	Production	Research and Develop-ment	Installation	Operation and maintenance	Management	Total employment 2005-2010
Energy efficiency	***30***	***210***	***153***	***409***	***129***		***931***
Renewable Energy	***15***	***270***	***8***	***118***	***1.074***	***-***	***1.485***
PROSOL Résidentiel	15	270	-	85	1.043		1.413
PROSOL Tertiaire		-	5	8	5		18
PROSOL Elec	-	-	-	22	5		27
Rural electrification	-	-	-				
Wind energy	-	-	3	3	21		27
Cross-sectional activities						***975***	***975***
Total	**45**	**480**	**161**	**527**	**1.203**	**975**	**3.391**

How do we quantify the effects for Tunisia?

Investment in Renewable Energy (RE), O&M

Local content in production

Local content in O&M

Export possibilities

} Base year 2010: survey; Future: Scenarios

=> Resulting gross employment → Combination of:

Local Input-Output-Tables for Local production structures

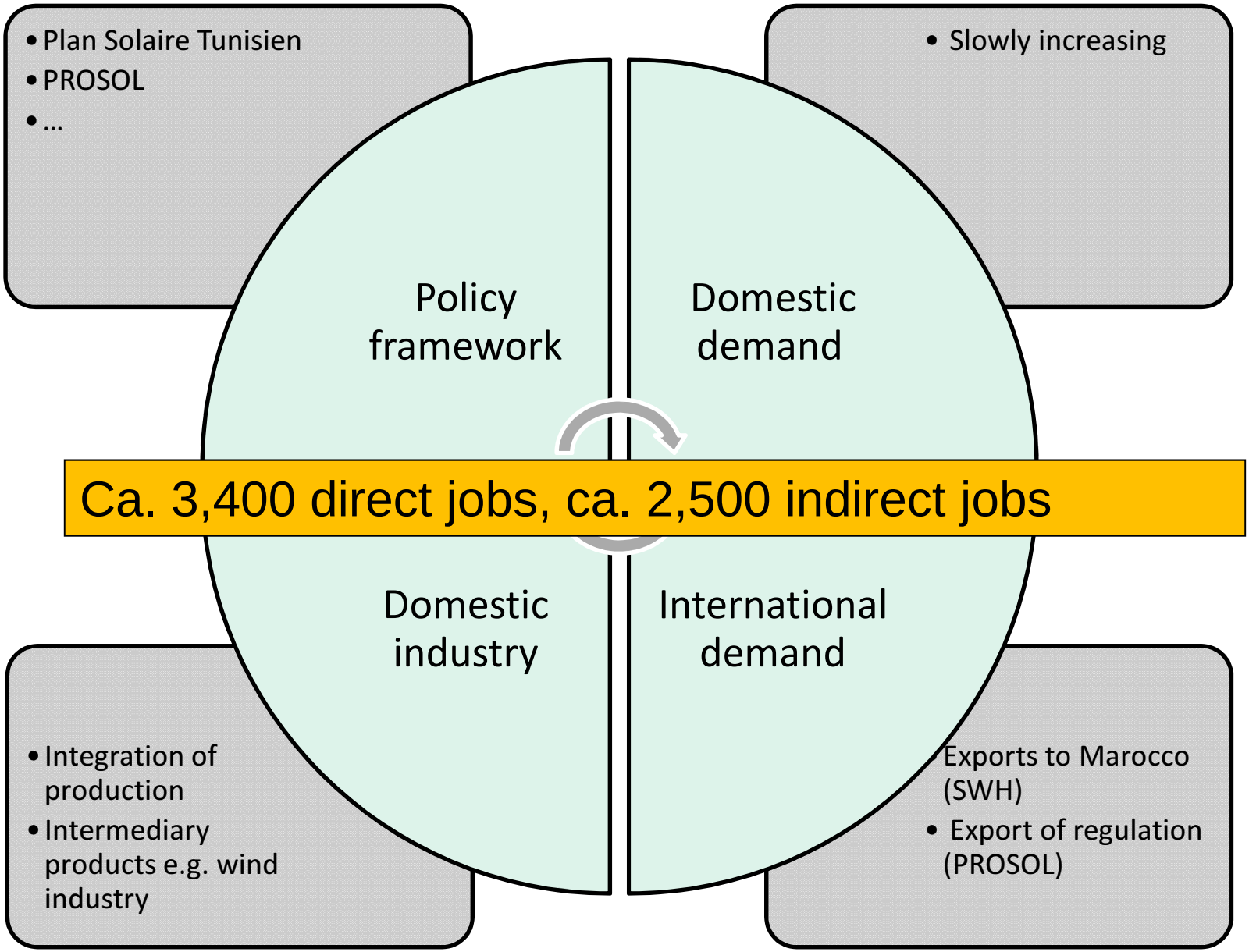
International input vectors for RE

Impact on economic indicators

GDP, Employment

→ Small model, GDP, imports, exports

MENA: the example of Tunisia



Thank you for your attention!

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Tunisian Solar Plan

Targets for 2 time periods

The Tunisian Solar Plan aims at the provision of clean energy and at the diversification of energy supply

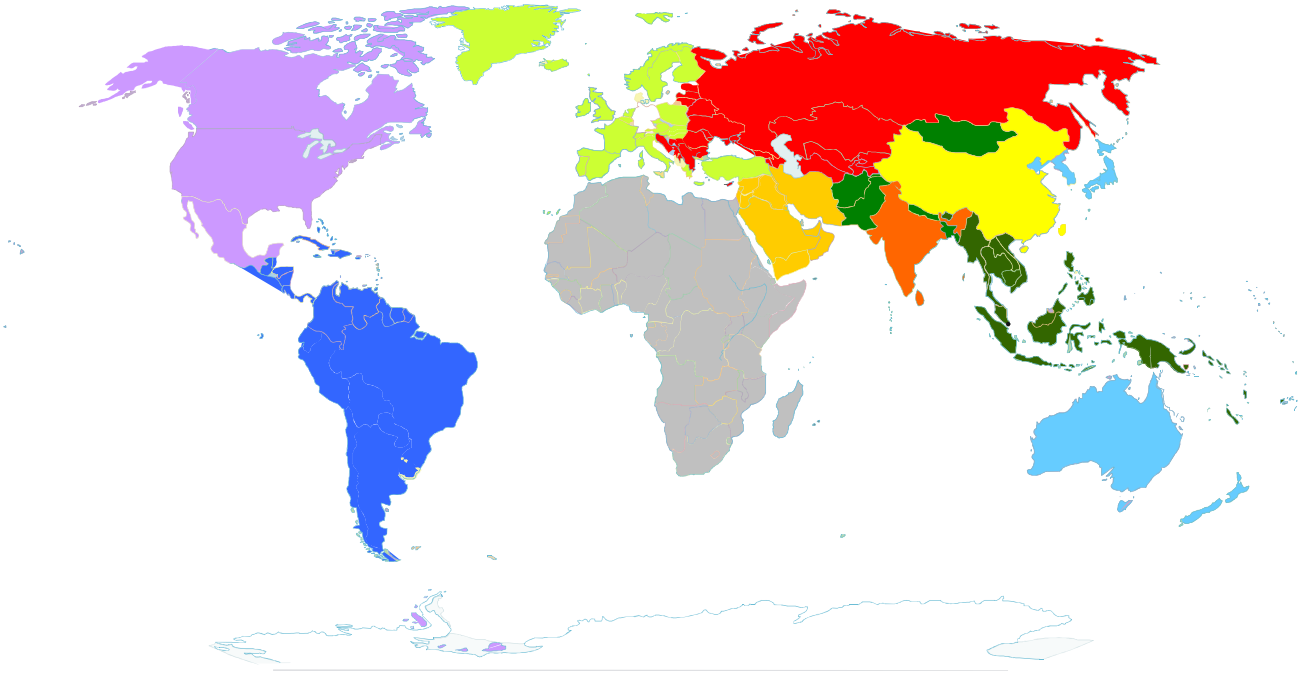
- **Objectives 2016**
  - ***16% of electricity from RES*** by 2016.
  - ***24% reduction of primary energy consumption*** by 2016.

- **Objectives 2030**
  - ***40% of electricity from RES*** by 2030.
  - ***40% reduction of primary energy consumption*** by 2030.

North America	Investment in RES	in bil. €
Electricity	2020 2030	87,92 85,41
Heat	2020 2030	21,57 40,12

Europe without Germany	Investment in RES	in bil. €
Electricity	2020 2030	39,87 42,71
Heat	2020 2030	10,03 28,04

Transition countries	Investment in RES	in bil. €
Electricity	2020 2030	17,01 24,69
Heat	2020 2030	16,10 17,76



China	Investment in RES	in bil. €
Electricity	2020 2030	48,25 81,41
Heat	2020 2030	13,49 18,83

India	Investment in RES	in bil. €
Electricity	2020 2030	19,76 33,95
Heat	2020 2030	10,01 18,31

Other Asia	Investment in RES	in bil. €
Electricity	2020 2030	15,34 26,25
Heat	2020 2030	14,18 15,53

Lateinamerica	Investment in RES	in bil. €
Electricity	2020 2030	20,99 30,53
Heat	2020 2030	9,74 8,91

Africa	Investment in RES	in bil. €
Electricity	2020 2030	8,33 21,29
Heat	2020 2030	9,12 10,59

Middle East	Investment in RES	in bil. €
Electricity	2020 2030	9,22 29,12
Heat	2020 2030	10,70 13,45

Pazific	Investment in RES	in bil. €
Electricity	2020 2030	14,74 21,07
Heat	2020 2030	8,16 8,99