



# Roadmap for the Transition of Western Macedonia to the post-lignite era

Nikos Mantzaris WWF Greece  
Brussels, July 13 2018



# Roadmap for the Transition of WMR



## ROADMAP FOR THE TRANSITION OF THE WESTERN MACEDONIA REGION TO A POST-LIGNITE ERA

- ✓ Collaboration with Panteion University
- ✓ Published in 2016
- ✓ First presented to local stakeholders in Kozani



European  
**Climate Initiative**  
EUKI

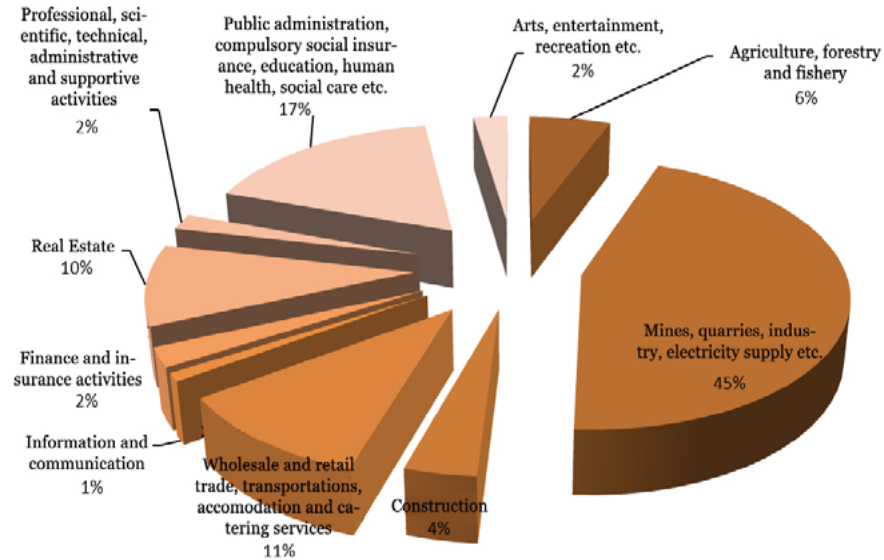
Supported by:



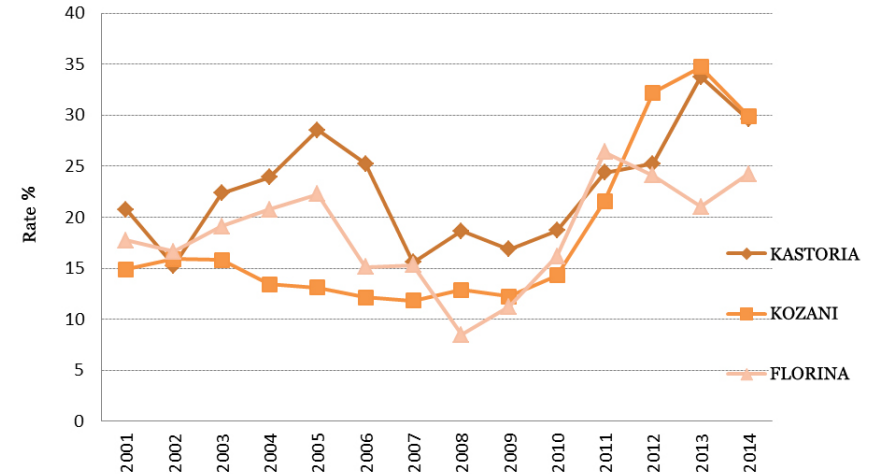
Federal Ministry for the  
Environment, Nature Conservation,  
Building and Nuclear Safety

based on a decision of the German Bundestag

# The Region of W. Macedonia (WMR)



Contribution of each sector to the GDP of WMR (2013)



\* For Regional Units with an estimated population below 50,000, such as the Grevena Regional Unit, ELSTAT provides no estimates due to large sampling errors.

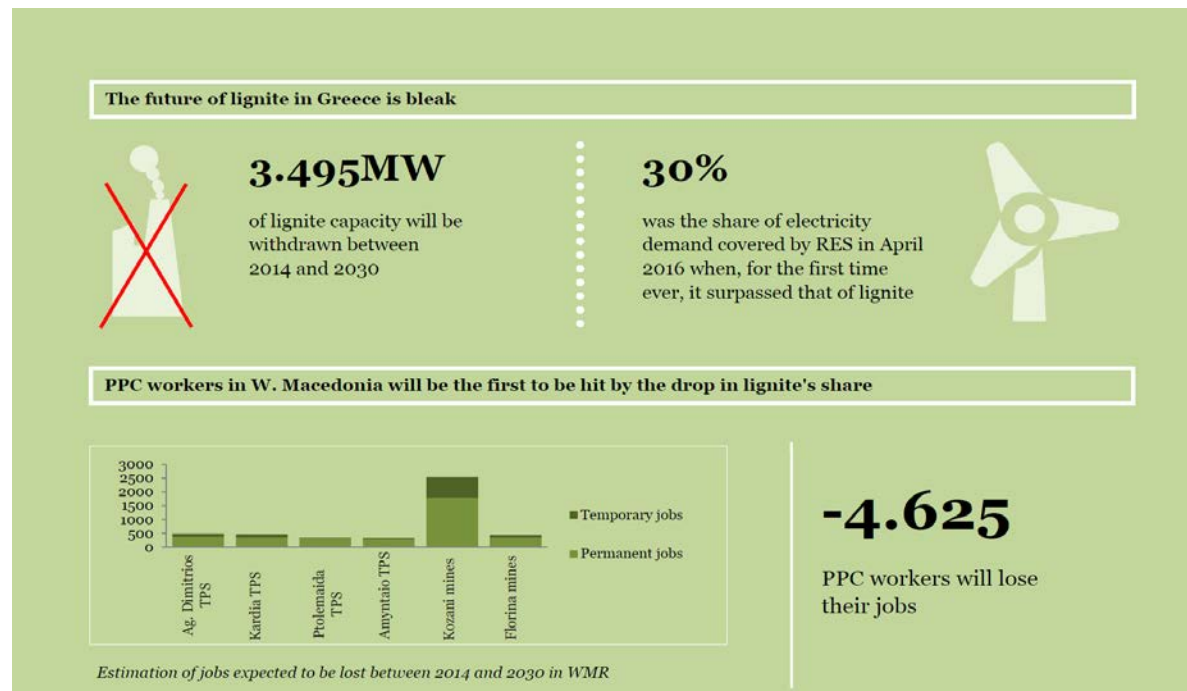
Average unemployment rate per Regional Unit 2001-14

- ✓ Mines, electricity production etc: 45% of regional GDP
- ✓ PPC: ~46% of direct jobs in secondary sector
- ✓ WMR 9<sup>th</sup> in unemployment rates amongst EU regions
- ✓ Increasing unemployment trends

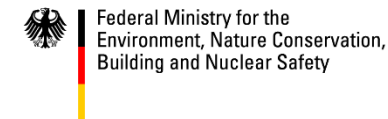


# Decommissioning Schedule

- Ptolemaida III and IV (425 MW): 11/2014
  - Kardias I-IV (1250 MW): until 2023
  - Amyntaio I-II (600 MW): until 2023
  - Ag. Dimitrios I-IV (1220 MW): until 2030
- ✓ 2014-2030: retirement of **3495 MW** in WMR



Supported by:



based on a decision of the German Bundestag



# Input-Output model

## ➤ Lack of input-output matrix, technological coefficients and multipliers @ regional level

- ✓ Calculation of national Technological Coefficients from national input-output matrix (data: ELSTAT 2010)
- ✓ Calculation of the Location Quotients (employment and GDP data from ELSTAT 2011)
- ✓ Calculation of Regional Technological coefficients from Location Quotients (Matrix A)
- ✓ Calculation of Regional Multipliers (Matrix  $L=(I-A)^{-1}$ )

## ➤ Calculation of the Time - Sectoral Dimension of the Multiplier Effects: $L \times f_n$ where $f_n$ = vector of direct jobs or direct regional GDP



# “Inaction” Scenario

**Table 6.7:** Total Jobs and Local Added Value in the "Inaction" Scenario

ELSTAT multipliers				
SECTOR	Jobs		Local Added Value	
	Direct Results	Multiplying Results	Direct Results	Multiplying Results
Agriculture, forestry and fishery	0	-28	0.00	-5.21
Mines, quarries, industry, electricity, natural gas, steam, air conditioning and water, sewage treatment, waste management and remediation	-4,625	-5,044	-857.28	-934.87
Processing	0	-420	0.00	-77.79
Construction	0	-9	0.00	-1.60
Wholesale and retail trade, car and motorcycle repair, transport and storage, accommodation and catering services	0	-177	0.00	-32.79
Information and communication	0	-31	0.00	-5.71
Finance and insurance activities	0	-105	0.00	-19.42
Real Estate	0	-90	0.00	-16.73
Professional, scientific and technical activities, administration and support activities	0	-178	0.00	-33.05
Public administration and defence, compulsory national insurance, education, activities related to human health and social care	0	-19	0.00	-3.45
Arts, entertainment, recreation, other service-based activities, household activities as employers, undifferentiated household activities regarding the production of goods and services for own use, activities of extraterritorial organisations	0	-28	0.00	-5.27
<b>Total</b>	<b>-4,625</b>	<b>-6,128</b>	<b>-857.28</b>	<b>-1,135.87</b>

✓ **6.128** lost jobs and **€1,14 billion** lost regional GDP



European Climate Initiative  
EUKI

Supported by:



Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the German Bundestag

# Scenario «Ptolemaida V»

**Table 6.8:** Total Jobs and Local Added Value in the "Ptolemaida V" Scenario

SECTOR	ELSTAT multipliers			
	Jobs		Local Added Value	
	Direct Results	Multiplying Results	Direct Results	Multiplying Results
Agriculture, forestry and fishery	0	6	0.00	1.03
Mines, quarries, industry, electricity, natural gas, steam, air conditioning and water, sewage treatment, waste management and remediation	912	995	169.05	184.35
Processing	0	83	0.00	15.34
Construction	0	2	0.00	0.32
Wholesale and retail trade, car and motorcycle repair, transport and storage, accommodation and catering services	0	35	0.00	6.47
Information and communication	0	6	0.00	1.13
Finance and insurance activities	0	21	0.00	3.83
Real Estate	0	18	0.00	3.30
Professional, scientific and technical activities, administration and support activities	0	35	0.00	6.52
Public administration and defence, compulsory national insurance, education, activities related to human health and social care	0	4	0.00	0.68
Arts, entertainment, recreation, other service-based activities, household activities as employers, undifferentiated household activities regarding the production of goods and services for own use, activities of extraterritorial organisations	0	6	0.00	1.04
<b>Total</b>	<b>912</b>	<b>1,208</b>	<b>169.05</b>	<b>223.98</b>

✓ Ptolemaida V will recover only **20%** of the lost jobs and lost regional GDP

# Scenario «Ptolemaida V & Meliti II»

**Table 6.9:** Total Jobs and Local Added Value in the "Ptolemaida V and Meliti II" Scenario

SECTOR	ELSTAT multipliers			
	Jobs		Local Added Value	
	Direct Results	Multiplying Results	Direct Results	Multiplying Results
Agriculture, forestry and fishery	0	9	0.00	1.60
Mines, quarries, industry, electricity, natural gas, steam, air conditioning and water, sewage treatment, waste management and remediation	1,417	1,545	262.65	286.42
Processing	0	129	0.00	23.83
Construction	0	3	0.00	0.49
Wholesale and retail trade, car and motorcycle repair, transport and storage, accommodation and catering services	0	54	0.00	10.05
Information and communication	0	9	0.00	1.75
Finance and insurance activities	0	32	0.00	5.95
Real Estate	0	28	0.00	5.12
Professional, scientific and technical activities, administration and support activities	0	55	0.00	10.12
Public administration and defence, compulsory national insurance, education, activities related to human health and social care	0	6	0.00	1.06
Arts, entertainment, recreation, other service-based activities, household activities as employers, undifferentiated household activities regarding the production of goods and services for own use, activities of extraterritorial organisations	0	9	0.00	1.61
<b>Total</b>	<b>1,417</b>	<b>1,877</b>	<b>262.65</b>	<b>348.01</b>

✓ Ptolemaida V and Meliti II will cost ~ € **2,5 billion**

✓ Will recover only **30%** of jobs and regional GDP





# Alternative Economic Activities

- Primary Sector
  - ✓ Saffron
  - ✓ Aromatic plants
  - ✓ Energy plants
  - ✓ Forestry
  
- Secondary Sector
  - ✓ Renewables
  - ✓ Energy Savings (Buildings)
  - ✓ Fly ash
  - ✓ Waste Management
  - ✓ Processing of aromatic and pharmaceutical plants
  
- Tertiary Sector
  - ✓ Higher Education and Research
  - ✓ Industrial tourism
  - ✓ Eco-tourism



European  
**Climate Initiative**  
EUKI

- 3 scenarios: «**Mild**», «**Medium**» and «**Strong**» Development

Supported by:



Federal Ministry for the  
Environment, Nature Conservation,  
Building and Nuclear Safety

based on a decision of the German Bundestag

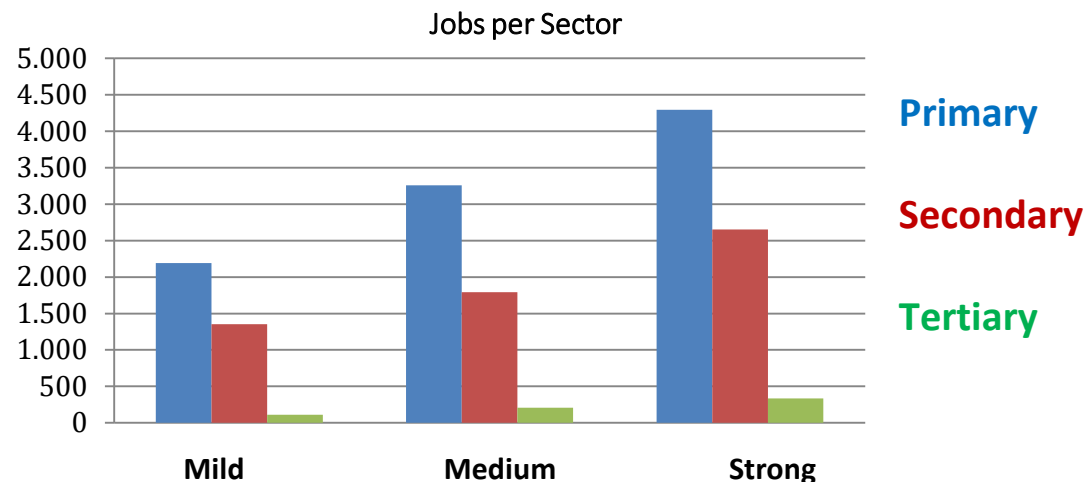


# Direct Jobs/r-GDP and Investments

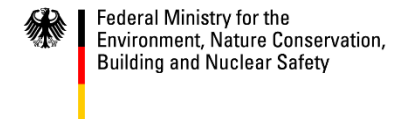
	Mild Development	Medium Development	Strong Development
<b>Jobs</b>	3,657	5,257	7,284
<b>Regional GDP (million €)</b>	1,025.82	1280.10	1,723.14
<b>Investments (million €)</b>	1,228.5	1,666.69	<b>2,351.67</b>

→ 60% more than what will be lost

→ 50% more than what will be lost

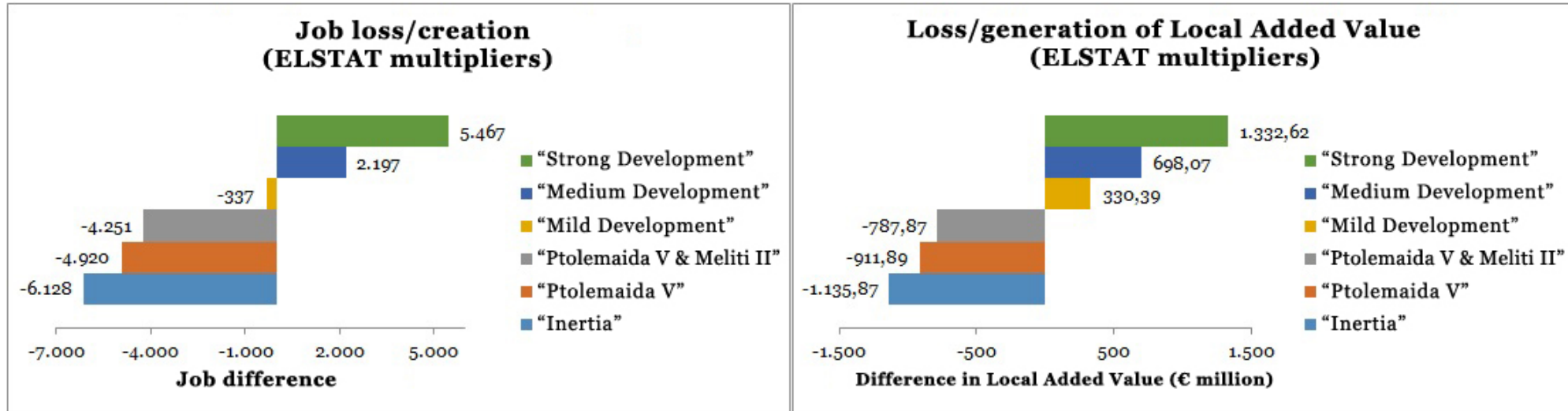


Supported by:



based on a decision of the German Bundestag

# Comparison between scenarios



- ✓ «**Mild Development**»: (almost) covers jobs and regional GDP loss from plant retirement
- ✓ «**Medium Development**»: Creates 2.197 more jobs and €700 million greater regional GDP from the ones lost from plant retirement.

- ✓ «**Strong Development**»: Creates x2 jobs more and more than double the regional GDP lost from plant retirement
- ✓ Investments comparable with the installation cost of Ptolemaida V and Meliti II (€2,5 billion).



# RES-based Solutions for District Heating

## ***Technologies***

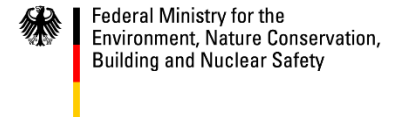
1. Combined Heat and Electricity production from biogas
2. Solar thermal systems with seasonal storage using heat pumps
3. Biomass boilers
4. Combined Heat and Electricity production from biomass with the Organic Rankin Cycle (ORC)

## ***Scenarios***

1. Biomass boilers
2. Biomass boilers, Biogas CHP, Solar thermal/Heat Pumps
3. Biomass boilers and CHP– ORC
4. CHP-ORC
5. Biogas CHP, Solar thermal/Heat Pumps and CHP-ORC
6. Biogas CHP, Solar thermal/Heat Pumps, biomass boilers and CHP-ORC



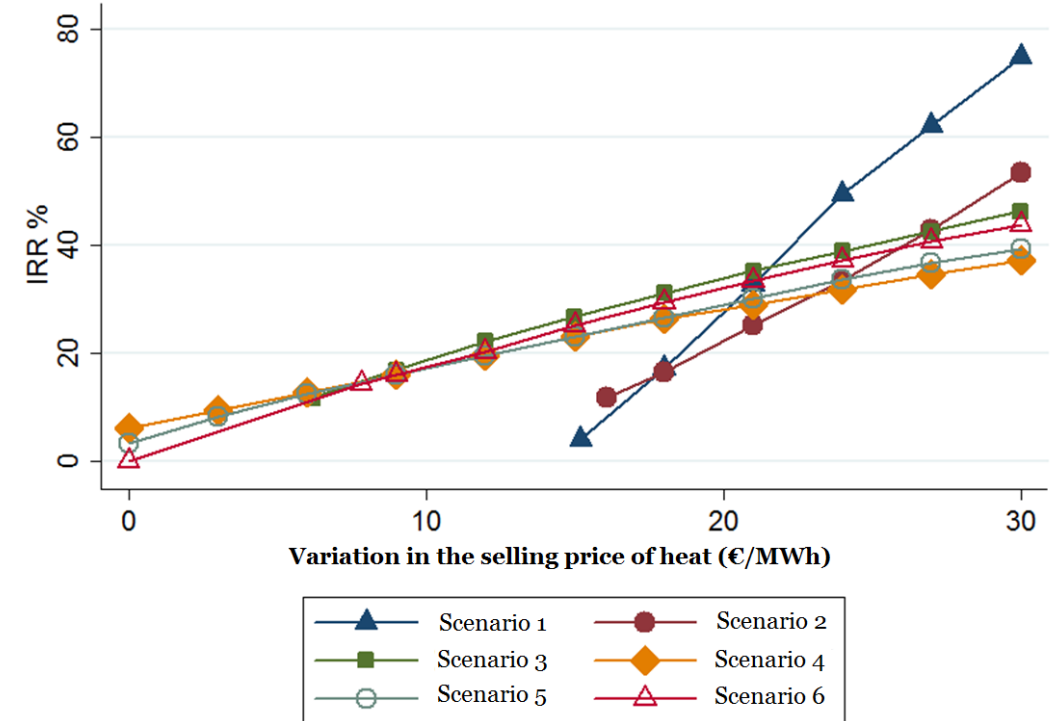
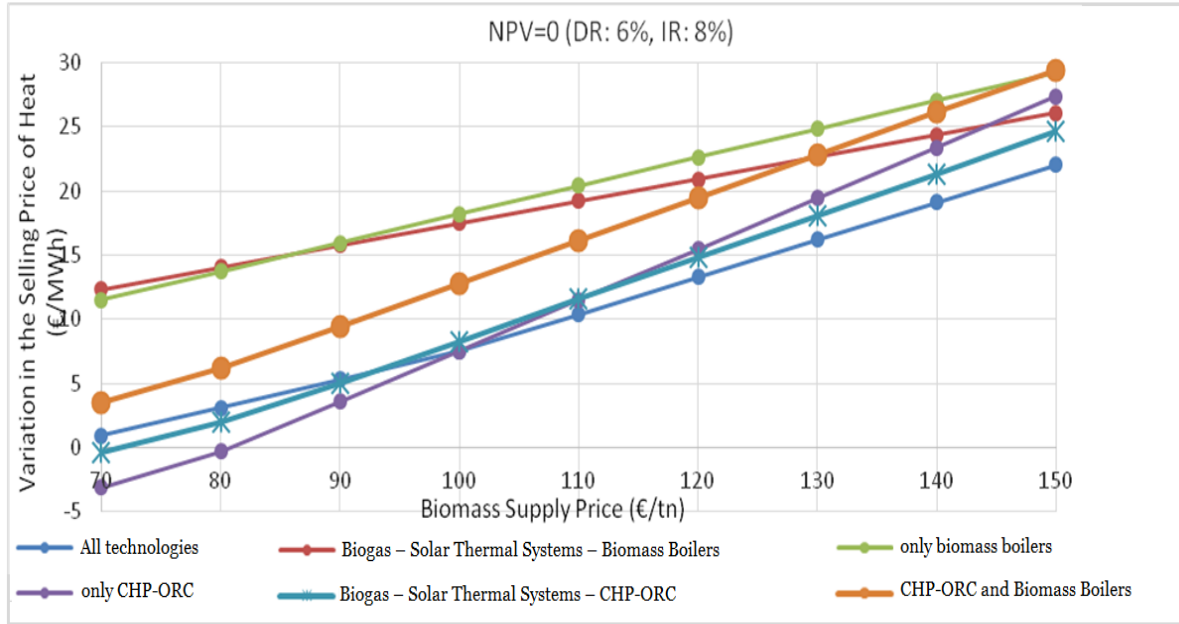
Supported by:



based on a decision of the German Bundestag



# Comparative Evaluation

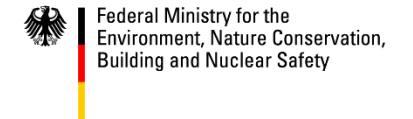


- ✓ All 6 scenarios achieve much better thermal energy supply prices than those of oil.
- ✓ Solutions based on biomass CHP with ORC units offer economically competitive (to lignite CHP) selling prices

✓ *Optimal Solution combines biomass CHP-ORC, biogas CHP and solar thermal*



Supported by:



based on a decision of the German Bundestag



# Summary - Conclusion

---

- ✓ Inaction is not an option for the region of Western Macedonia.
- ✓ Construction and operation of 2 new lignite plants will not solve the problem.
- ✓ «Strong Development»: creates double the jobs and more than double the rGDP compared to the losses from plant retirement. The necessary investments less than the installation cost of the 2 new lignite plants.
- ✓ RES based solutions for district heating are economically competitive to CHP from lignite.
  - Optimal solution is based on biomass CHP-ORC. Also includes biogas CHP, solar thermal and/or biomass boilers.

*The rejuvenation of the regional economy in Western Macedonia **is possible** provided funds are directed towards sustainable economic activities and not wasted in the wrong ones (e.g. “clean” coal technologies, lignite subsidies etc)*



# Current state of play in Greece

✓ **National Just Transition Fund** from auctioning CO<sub>2</sub> allowances:

## ***Priorities***

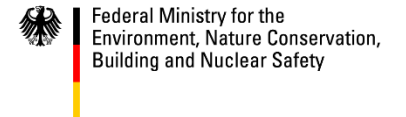
1. Renewables
2. Energy Efficiency
3. Circular Economy
4. Primary sector
5. Industrial heritage
6. Re-skilling of workers

## ***However...***

- ✓ Only €20 million/year
- ✓ More than €50 million/year to energy intensive industries
- ✓ €100 million/year to electricity providers



Supported by:



based on a decision of the German Bundestag



# What needs to be done?

---

- Unified approach and clear priorities @ regional, national and EU levels
  - ✓ 6 priority axes proposed by the ministry of Environment and Energy
- Technical assistance by EC to develop specific projects within these priority axes
- Transparency and broad participation of **all** stakeholders in JT process @ regional, national and EU levels
- Dedicated Just Transition Fund in the next MFF





Thank you for your attention!