

“Mapping EE and RES market potential areas with higher impact on local economy and job creation”

Employment, qualification and economic effects of RE & EE in Tunisia

Tuesday, 12 November 2019 – Cairo, Egypt

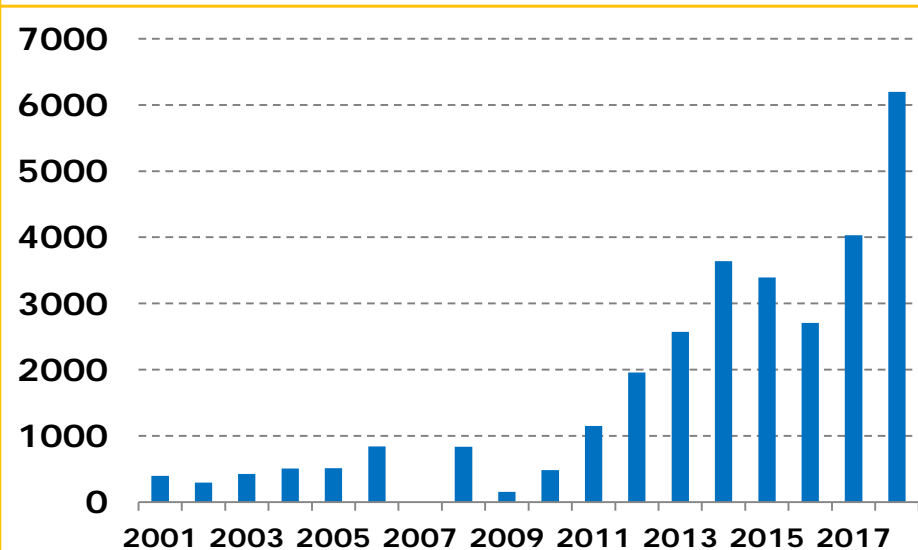
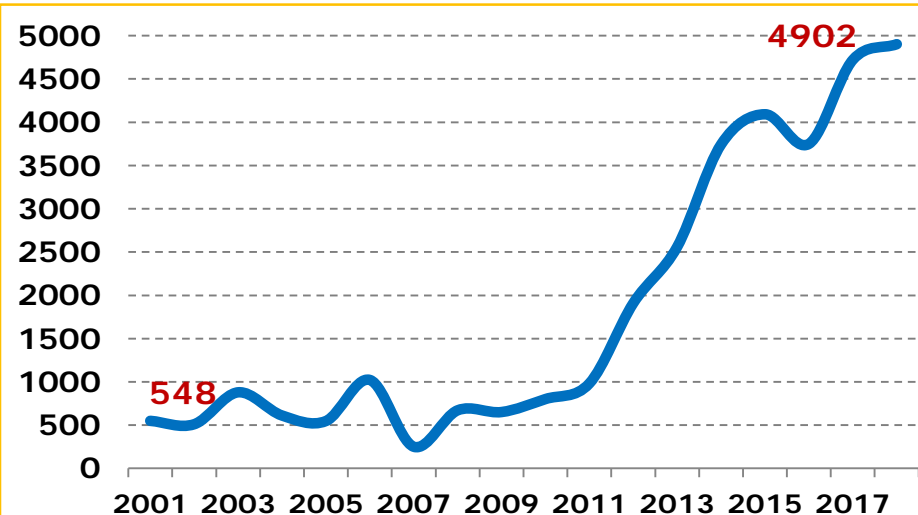


The Tunisian energy context



RE and EE jobs in Tunisia

National Energy context



Since 2000, Tunisia became net energy importer.

In 2018, the energy independency rate was around 49% with a deficit of 4,9 millions of toe.

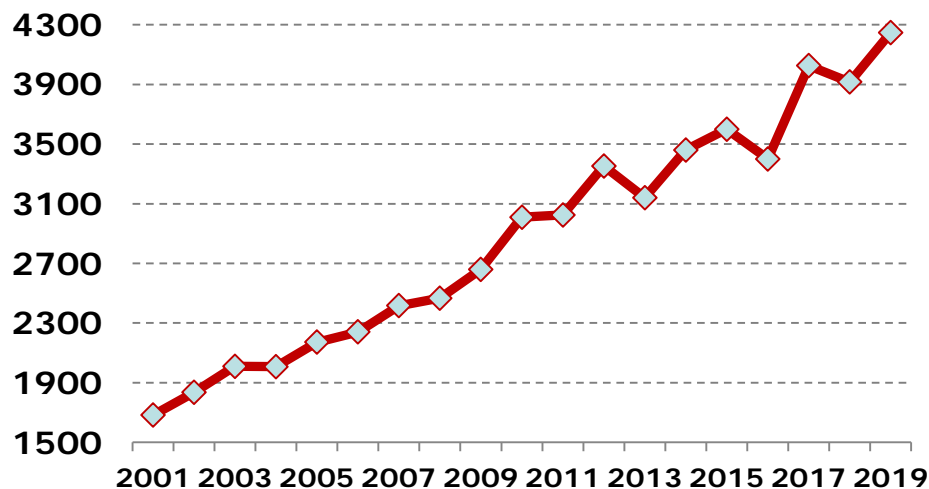
Regression of energy resources and constancy increase of demand

National energy bill reached 6 milliards of dinars

RE and EE jobs in Tunisia

National Energy context

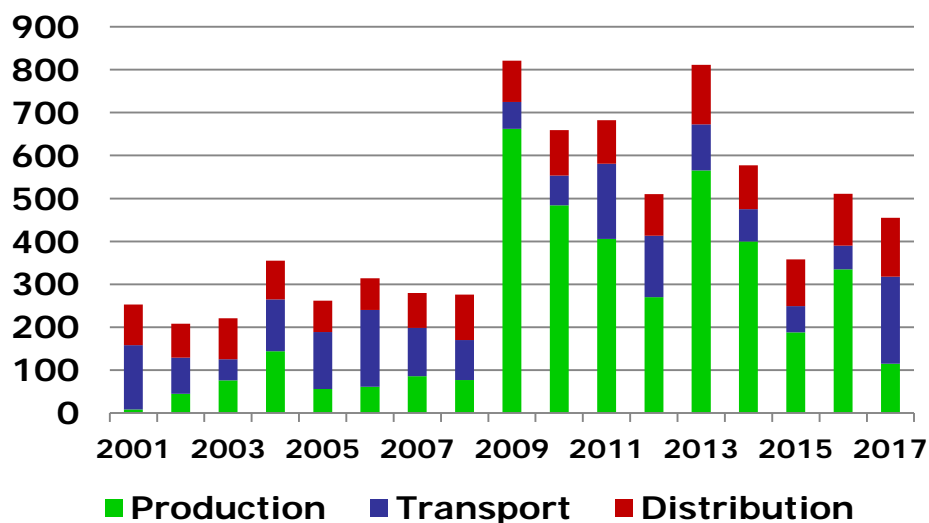
Peak and investment needs



Rapid growth in summer power peak generating a growing need for investment in electricity generation capacity.

In 2017 and for the first time, the summer electricity peak increased by 18% compared to 2016, registering an increase of 625 MW.

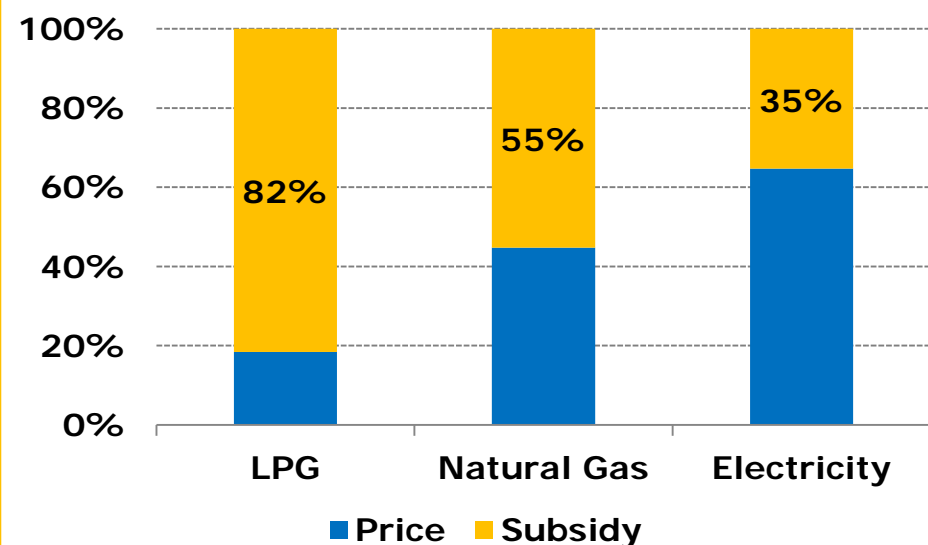
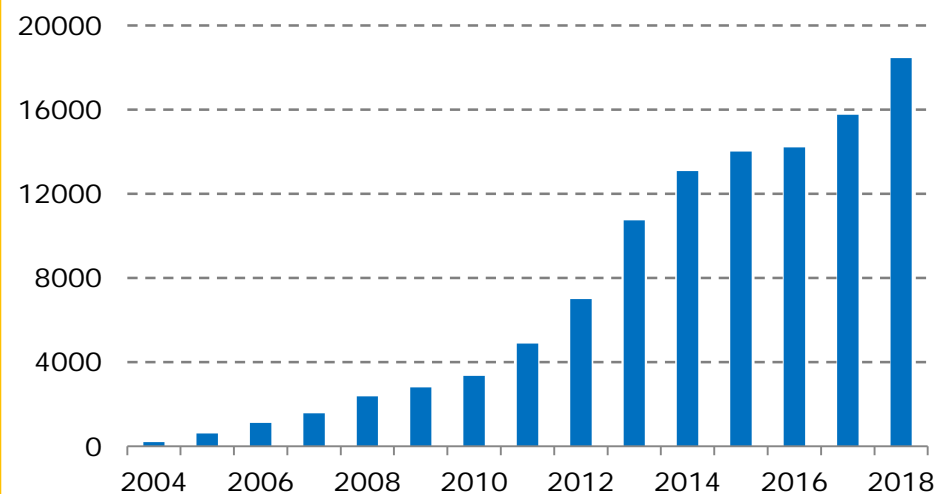
As a result of this increase, investments in the electrical system increased significantly, registering a cumulative of 4.9 billion dinars over the period 2009-2017 compared to 2.1 billion dinars over the period 2001-2008



RE and EE jobs in Tunisia

National Energy context

Energy subsidy

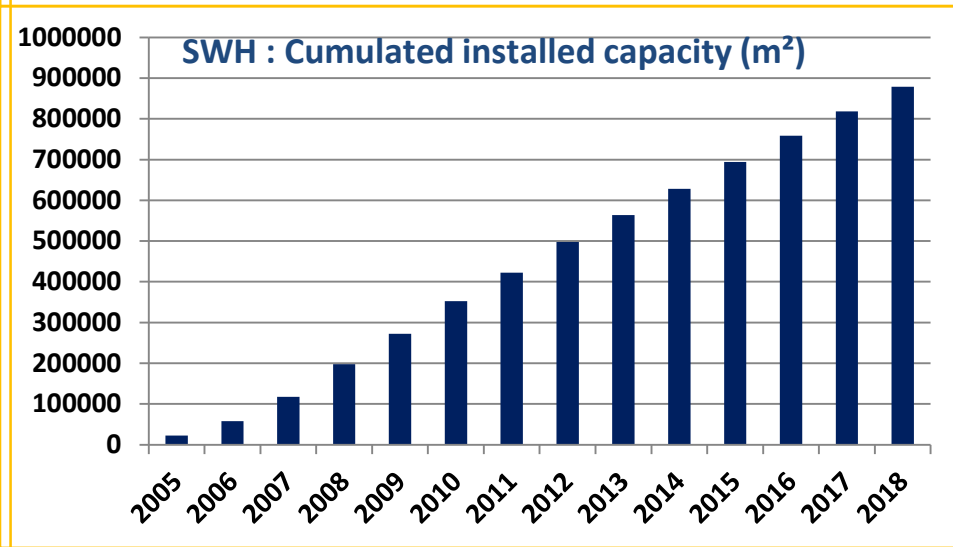
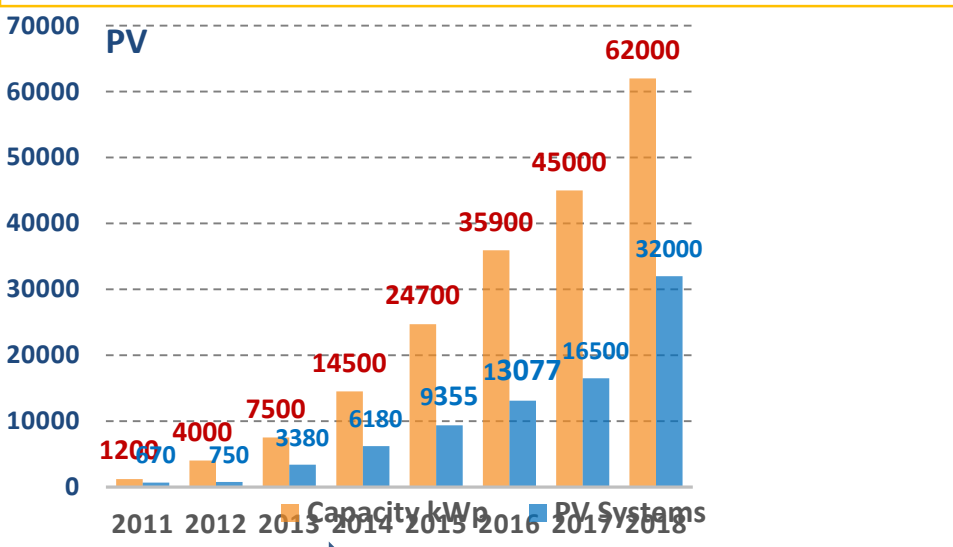
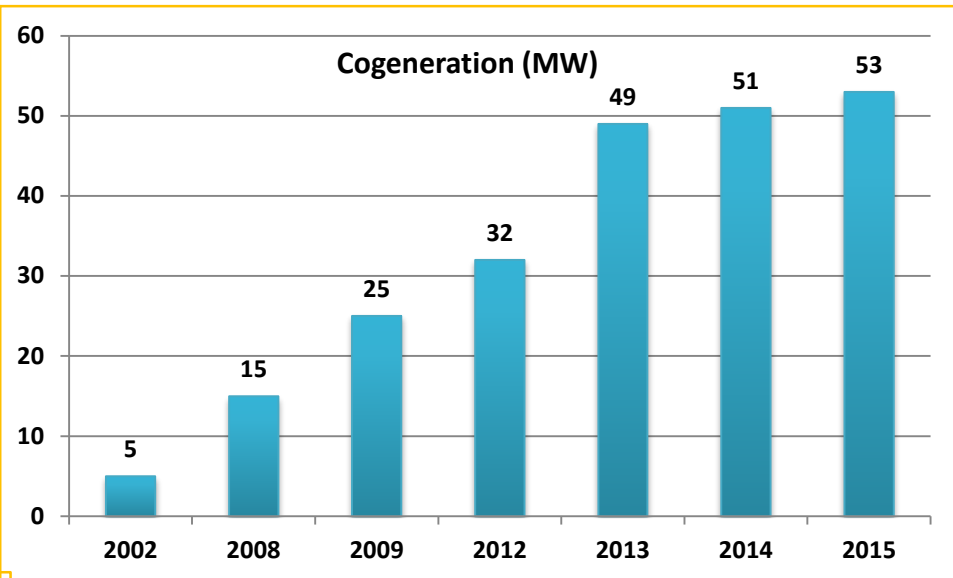
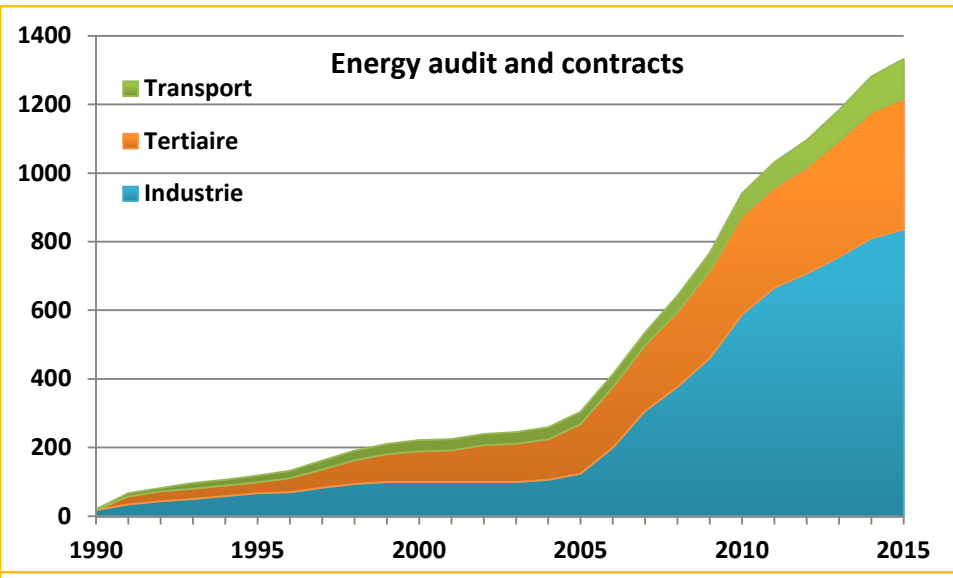


The energy subsidy has put great budgetary pressure on the government.

From 2004 to 2018, energy subsidies reached 18.5 billion TND.

RE and EE jobs in Tunisia

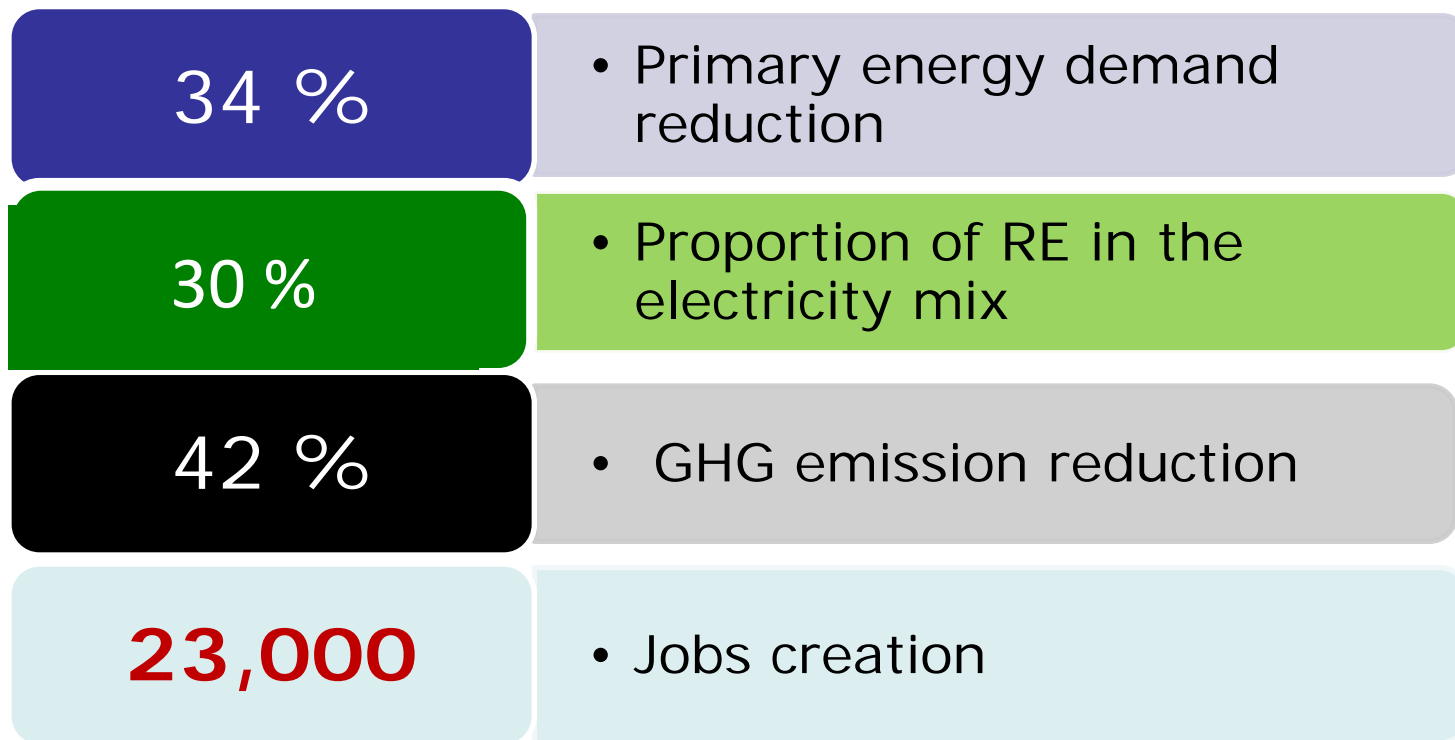
National Energy context



Decrease of the energy intensity 3% a year

RE and EE jobs in Tunisia

The strategy 30|30



Source: ANME 2016, Les objectifs de la stratégie nationale de transition énergétique

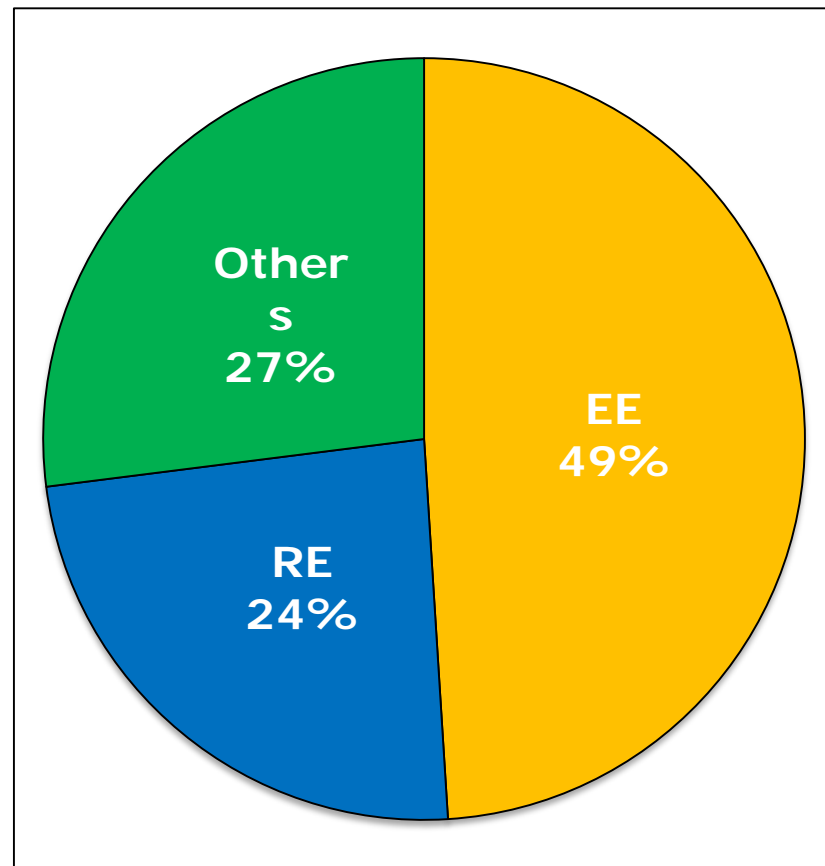
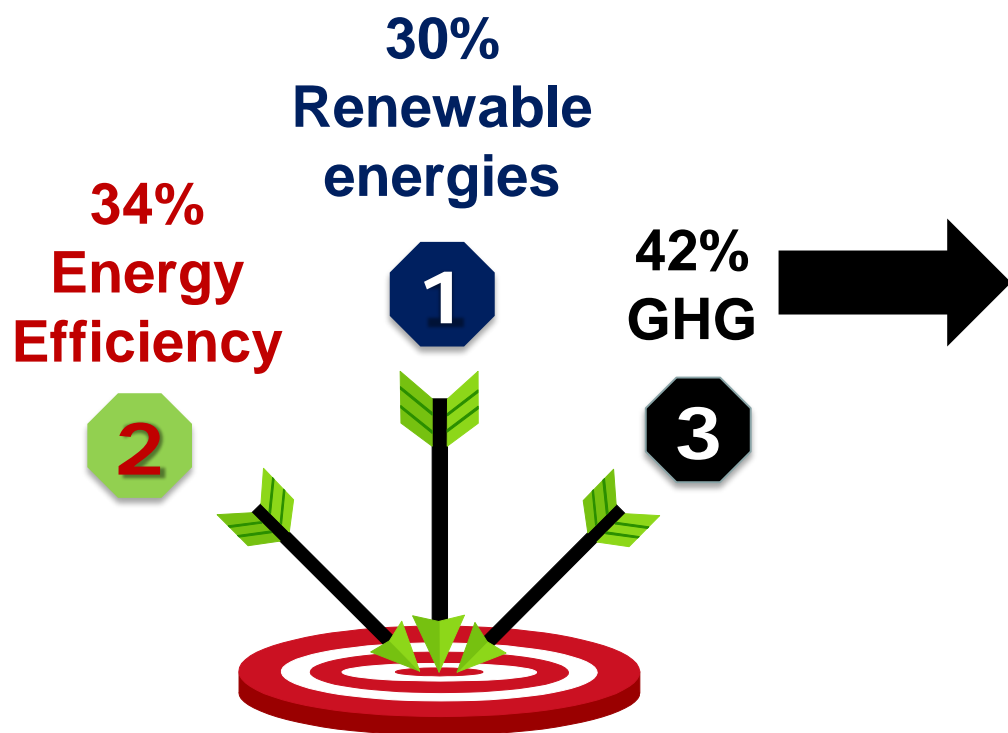
TUNISIAN SUSTAINABLE ENERGY POLICY

The main objectives of the national sustainable energy policy are:

- ✓ Reducing the country's energy dependence;
- ✓ Improve energy supply security;
- ✓ Improve the competitiveness of the economy by reducing their energy bill.

RE and EE jobs in Tunisia

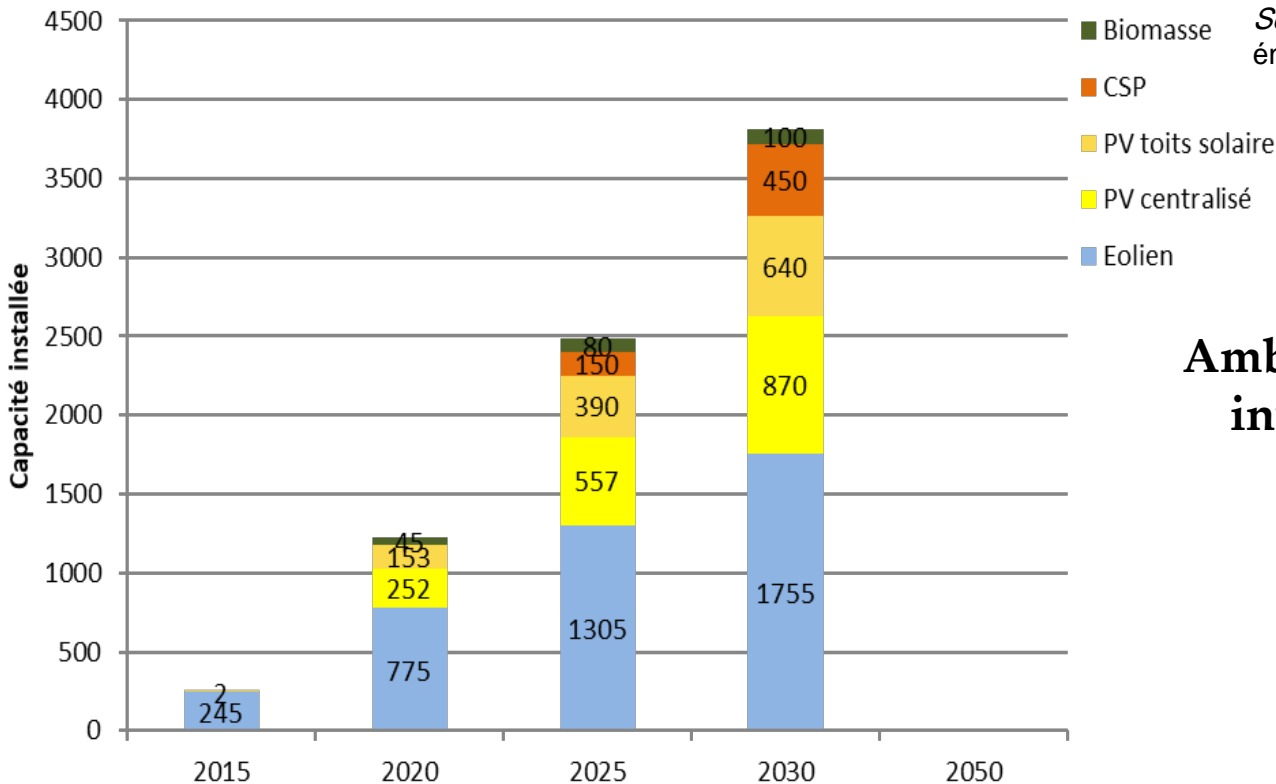
National Energy and Climate Indicators



RE and EE jobs in Tunisia

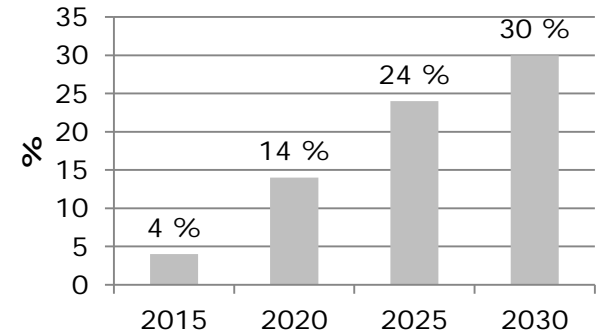
National Energy context

RE capacity per technology



Source: ANME

Penetration rate of RE in power generation



Source: STEG 2015, Développement des énergies renouvelables par la STEG

Ambition's target and heavy investment estimated to
14 000 Millions DT



The social impacts of the EC policy

RE and EE jobs in Tunisia

Main technologies and services for EE and RE

Considered period: 2005-2015

■ Energy Efficiency

- Residential:
Insulation; efficient equipments
- Industry:
cogeneration; efficient equipments
- Tertiary sector :
Insulation; efficient equipments
- Transportation:
Engine diagnosis

■ Renewable Energies

- Power generation
 - Wind
 - PV
 - CSP
 - Biogas/Landfill
- Heat generation
 - Solar thermal/SWH
 - Accessories SWH

RE and EE jobs in Tunisia

Methodology

Matrix for calculation of employment ratio: EE

Activity	Tests & measuring	Study	Manufacturing	Supply & installation	Operation & maintenance
Audit & CP	Inventory	Estimation			
EE buildings		Survey	Estimation	Survey	
Cogeneration		Survey		Estimation	Estimation
Transport (engine control)				Survey	Estimation
Energy saving equipment					

RE and EE jobs in Tunisia

Methodology

Matrix for calculation of employment ratio: RE

Activity	Tests & measuring	Study	Manufacturing	Supply & installation	Operation & maintenance
PROSOL residential	Inventory		Survey	Survey	Survey
PROSOL Tertiary		Estimation		Survey	Estimation
PROSOL Elec (Roof top)			Survey	Survey	Survey
Wind		Estimation			

RE and EE jobs in Tunisia

Methodology

Employment Ratio: EE

Activity	Value Chain	Study	Manufacturing	Supply & installation	Operation & maintenance
Audits & CP		0,4 Jobs/ audit 0,7 Jobs/ 1.000 m ²			
EE Building		0,3 jobs/ audit 0,14 Jobs/ 1.000 m ² (mise en œuvre)	0,1 Jobs/ 1.000 m ²	0,35 Jobs/ 1.000 m ²	
Cogénération		0,1 emplois/ projet		5,9 Jobs/ projet	4 Jobs/ project
Engine Control					0,3 Jobs/ station

RE and EE jobs in Tunisia

Methodology

Employment Ratio: RE

Activity \ Value Chain	Study	Manufacturing	Supply & installation	Operation & maintenance
PROSOL Residential		5,2 Jobs/ 1.000 m ²	17,2 Jobs/ 1.000 m ²	0,8 Jobs/ 1.000 m ²
PROSOL Tertiary	1,4 Jobs/ 1.000 m ²		2 Jobs/ 1.000 m ²	1,1 Jobs/ 1.000 m ²
PROSOL Elec		14 Jobs/ MW	42 Jobs/ MW	0,8 Jobs/ MW
Wind			0,3 Jobs / MW	0,4 Jobs/ MW

RE and EE jobs in Tunisia

Created jobs

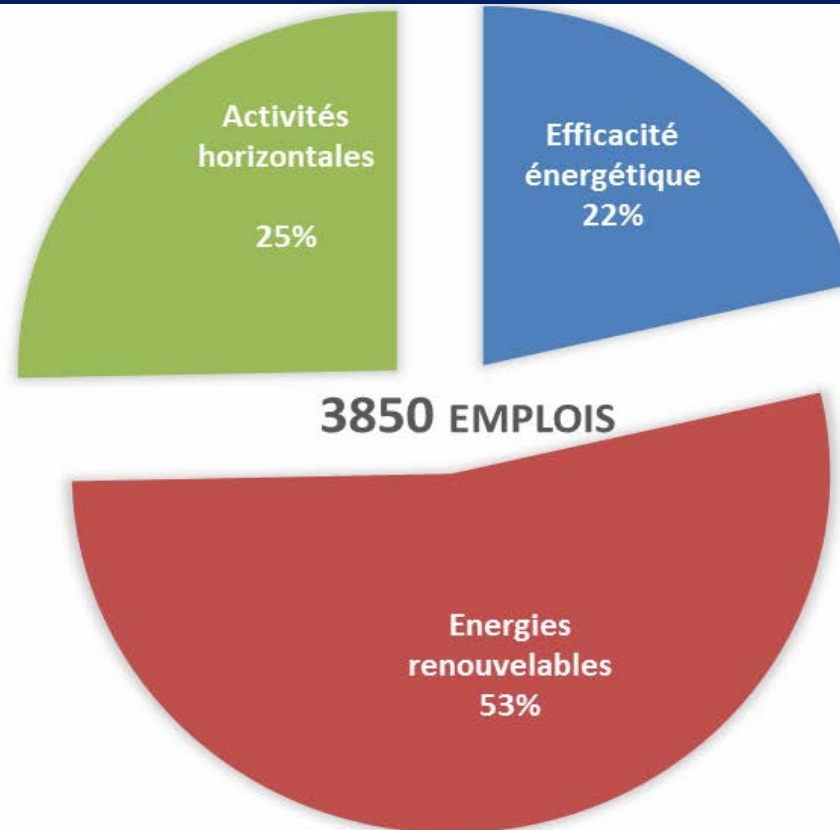
Activity	Jobs					Total 2015	Jobs
	Measuring & tests	Study & Development	Manufacturing	Supply & Installation	O & M		
EE	30	53	99	543	98	822	
Audits & CP	-	47	-	-	-	47	
EE in Building	25	6	99	242	-	372	
Cogeneration	-	0,5	-	41	63	105	
Engine Control	-	-	-	-	35	35	
Energy saving devices	5	-	-	260	-	265	
RE	15	2	265	1 391	379	2 052	
PROSOL Residential	15	-	237	950	264	1 465	
PROSOL Tertiary	-	2	-	11	5	18	
PROSOL Elec	-	-	29	430	12	471	
Wind	-	-	-	-	98	98	
TOTAL EE & RE	45	55	364	1 934	476	2 874	

- RE represents more than 70% the total direct jobs created;
- Distributed activities are more intensive in term of job creation.

RE and EE jobs in Tunisia

Created jobs

Estimated created jobs for EE and RE programs in Tunisia
2005-2015

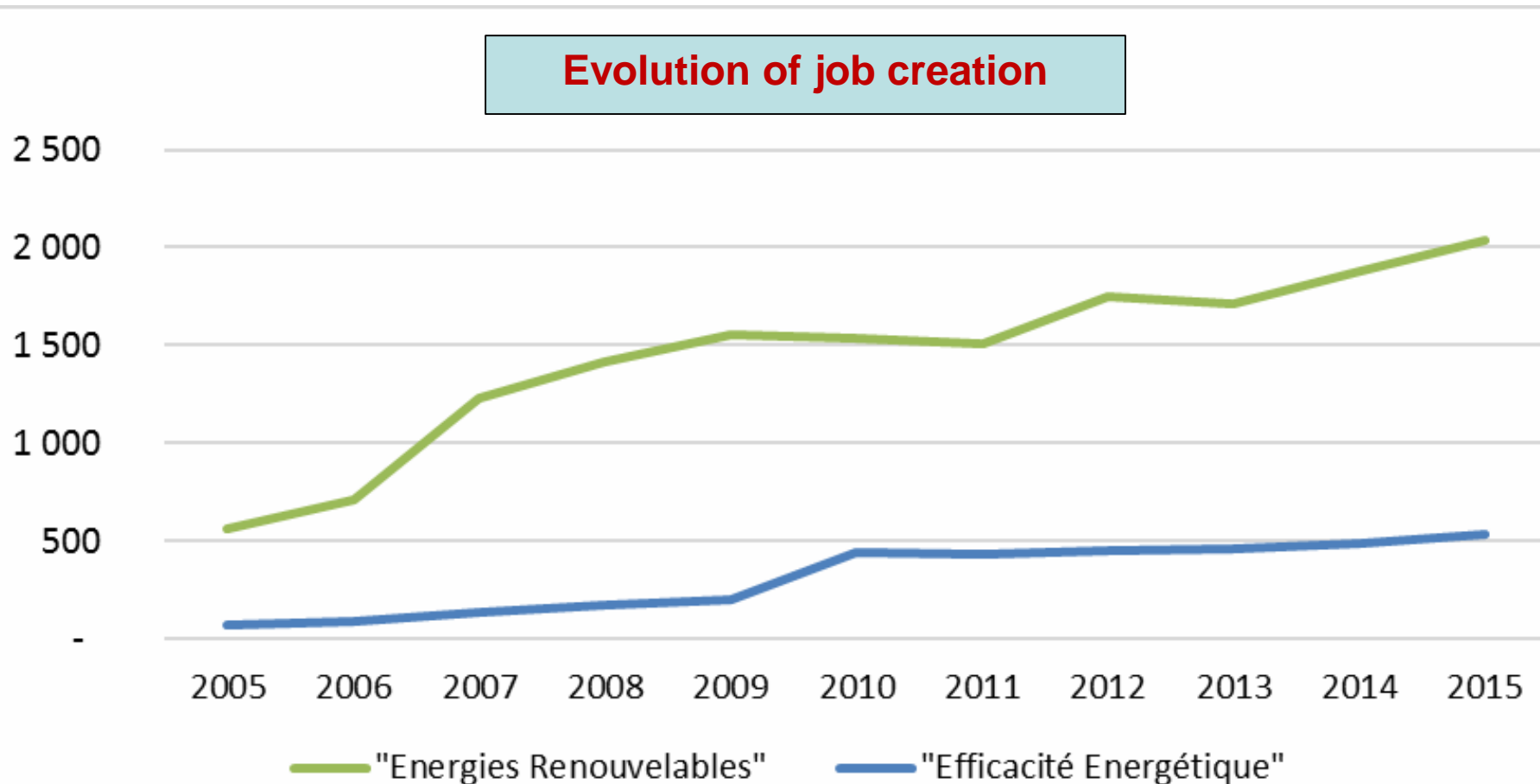


- RE are more intensive in terms of job creation ;
- EE is always more profitable for the end user ;
- Support activities create also jobs (950 estimated jobs).

RE and EE jobs in Tunisia

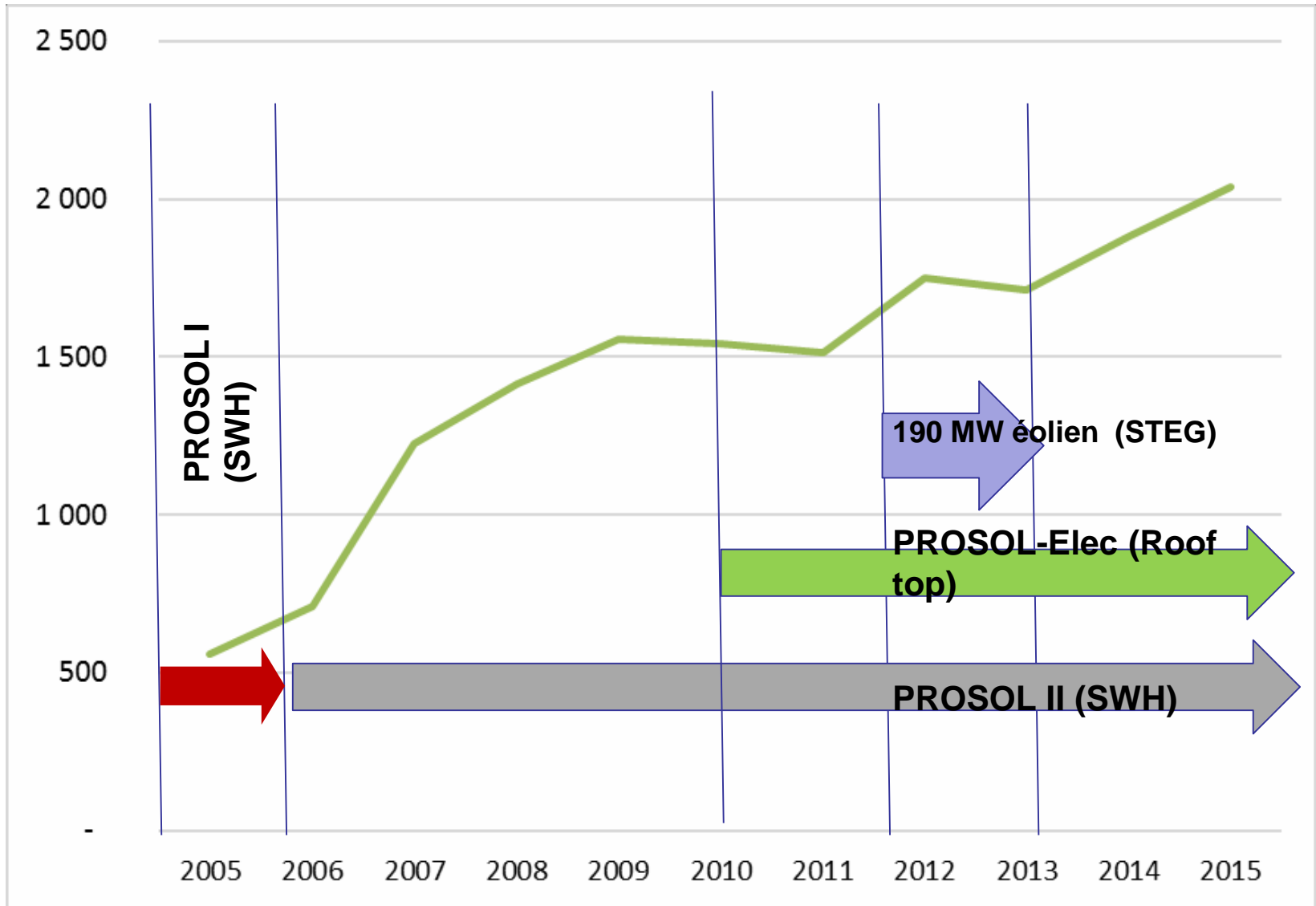
Created jobs

Evolution job creation per programme (Source : ALCOR / 2016)



RE and EE jobs in Tunisia

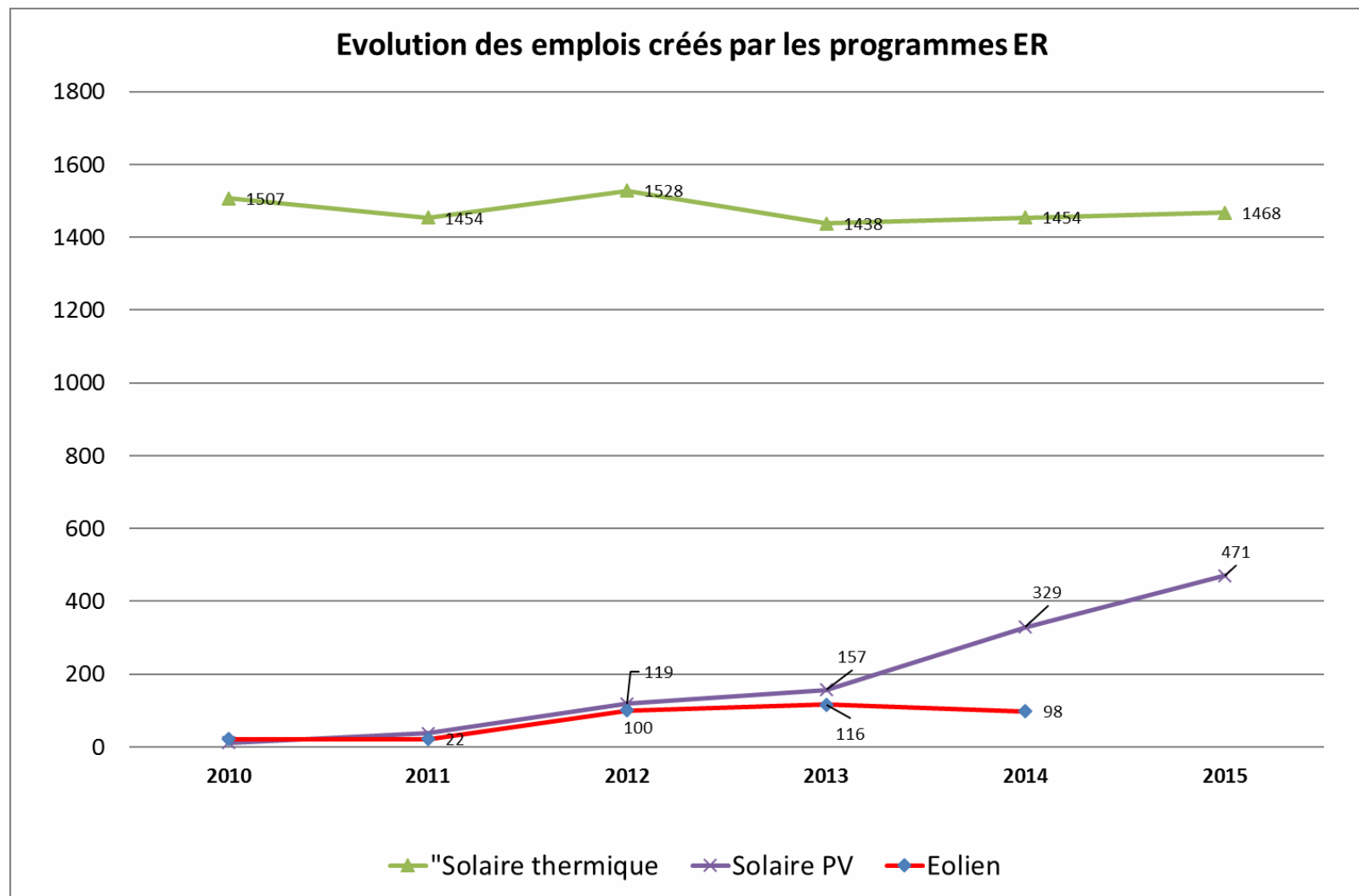
Created jobs : RE



RE and EE jobs in Tunisia

Created jobs : RE

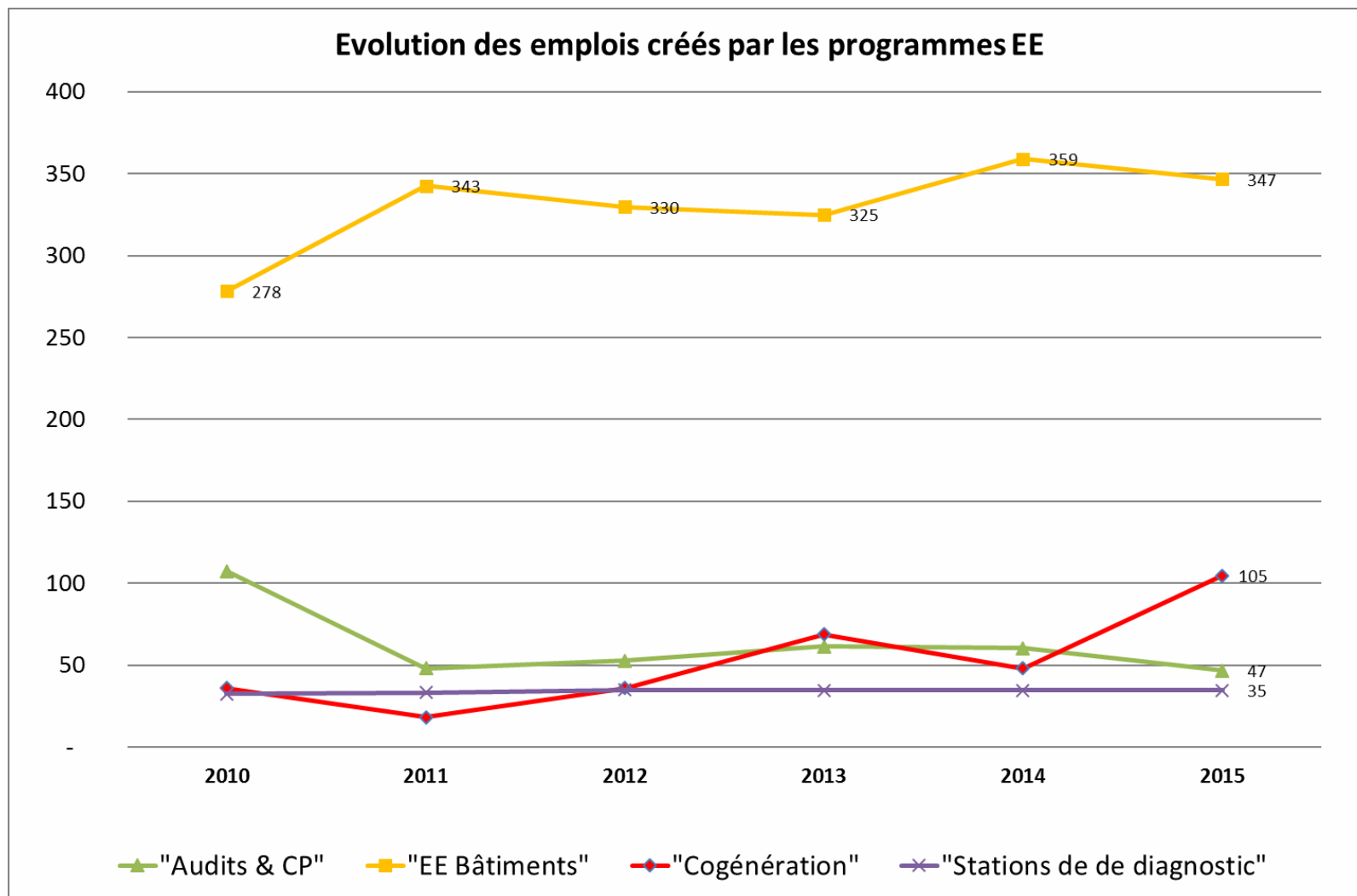
Evolution of job created per programmes ER (Source : ALCOR / 2016)



RE and EE jobs in Tunisia

Created jobs :EE

Evolution of job created per programmes EE (Source : ALCOR / 2016)



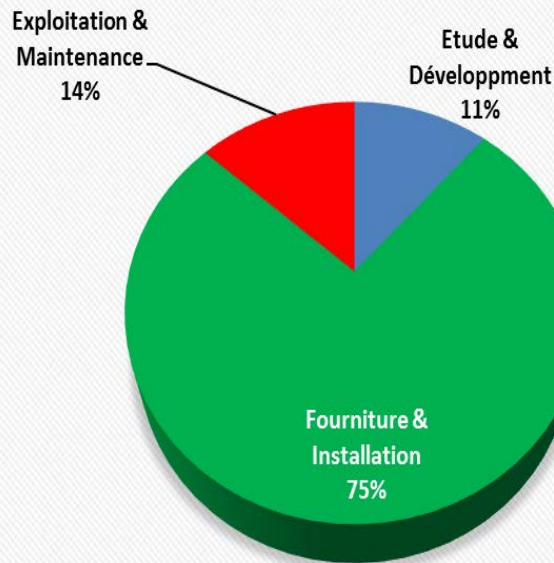
RE and EE jobs in Tunisia

Created jobs : Value Chain EE & RE

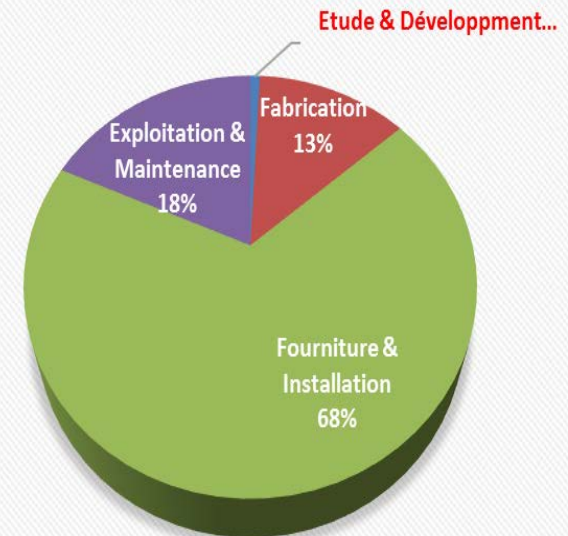
Distribution of created jobs according to value Chain 2005-2015

Source: ALCOR 2016

Efficacité Energétique



Energies Renouvelables



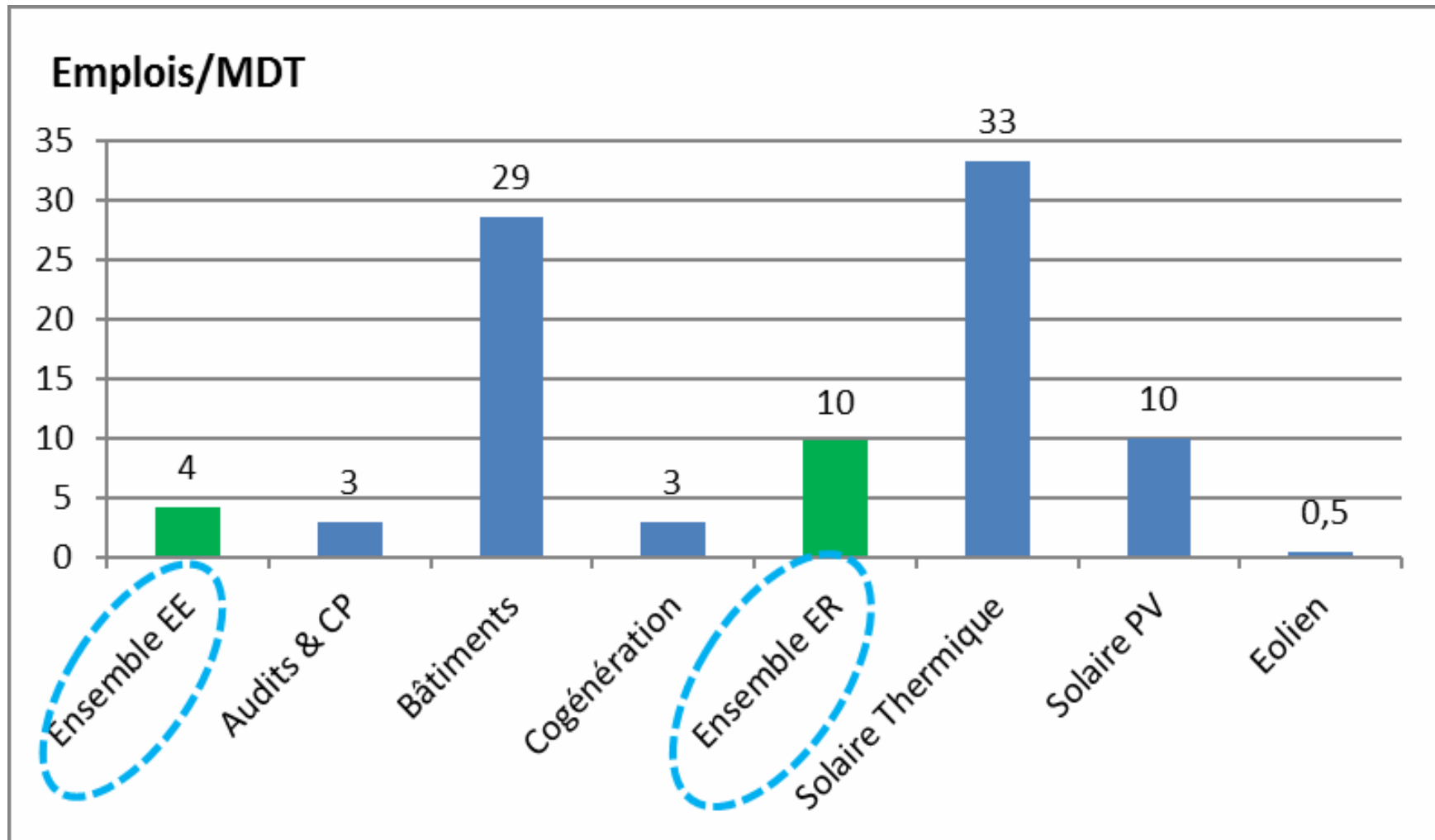
- Supply of EE is more intensive in jobs;
- Study & Development need a stable market;
- O& M are interesting for job creation

- Supply and installation of RE are more intensive in job
- Manufacturing need visibility and stable market
- O&M are interesting for job creation

RE and EE jobs in Tunisia

Created jobs : Indicators

'Economic' employment factor (jobs/millionTND) per activity(Source: ALCOR)

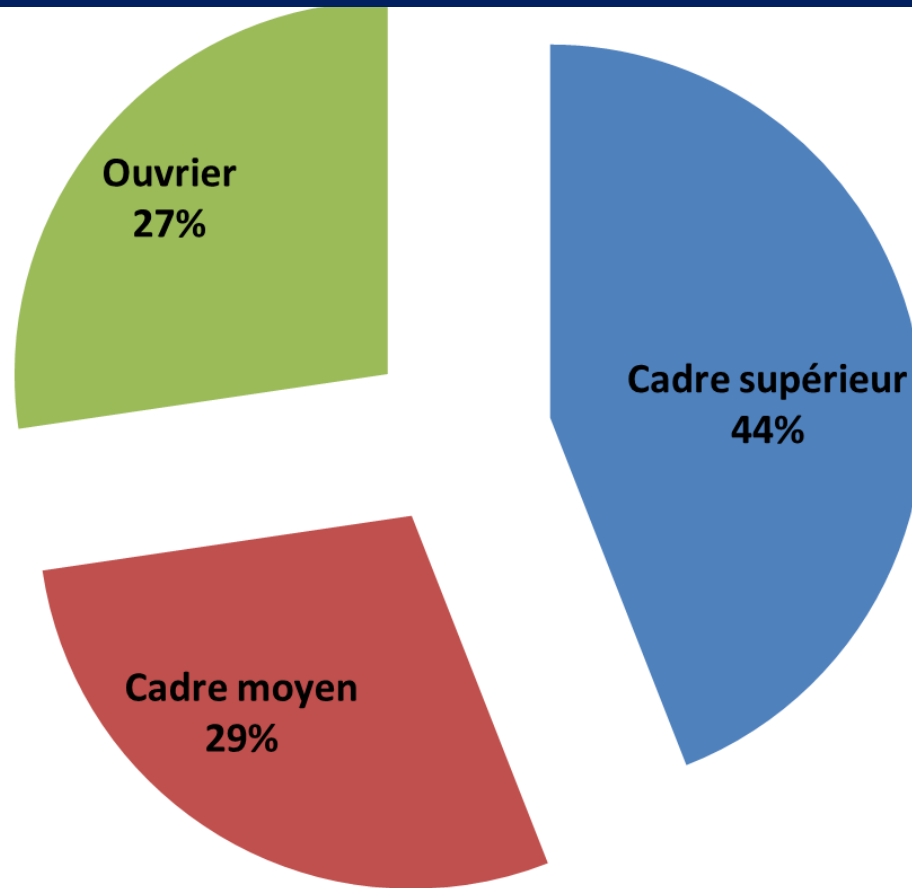


Jobs created from RE and EE in Tunisia

Distribution among qualification

Distribution of created jobs according to qualification 2005-2015

Source: ALCOR



Employment in EE and RE

Employment measurement

In order to measure the impact on employment the main indicator defined is :

- The '**economic**' employment potential ratio (jobs/TND million) relationship between jobs created and investment.
- Total EE and RE : 7 Jobs/ 1000 DT invested
- Renewable Energies : 10 Jobs/ 1000 DT invested
- Energy Efficiency : 4 Jobs /1000 DT invested

Employment in RE is higher, but, cost of energy saving is also higher:

- Total EE and RE : 237 TDN/toe
- Renewable Energies : 1281 TDN/toe
- Energy Efficiency : 131 TDN/toe

1\$=2,8 TDN



But, what can we expect for the future?

Perspectives for job creation in RE and EE in Tunisia

Scenarios DivRen + in detail

DivRen scenario:

- + **25%** RE in the electricity production compared to BAU (30% in total)
- **1520 MW** wind
- **1930 MW** PV in the Tunisian south
- **595 MW** CSP in the Tunisian south
- **Total : 11,065 GWh electricity**
- **14 Billion DT investment**
- **343 million DT par an pour exploitation et maintenance**

Completed by:

- **37 MW/year** SWH (2008-2010: 25 MW/year) target: 700 MW 2030
- **3 MW/year** biogas

Perspectives for job creation in RE and EE

The Model

■ **Inputs Renewable Energies**

- Investment
- Structure of production in Tunisia
- Structure of costs, intermediaries products
- Learning curves in the international level

■ **Inputs Energy Efficiency**

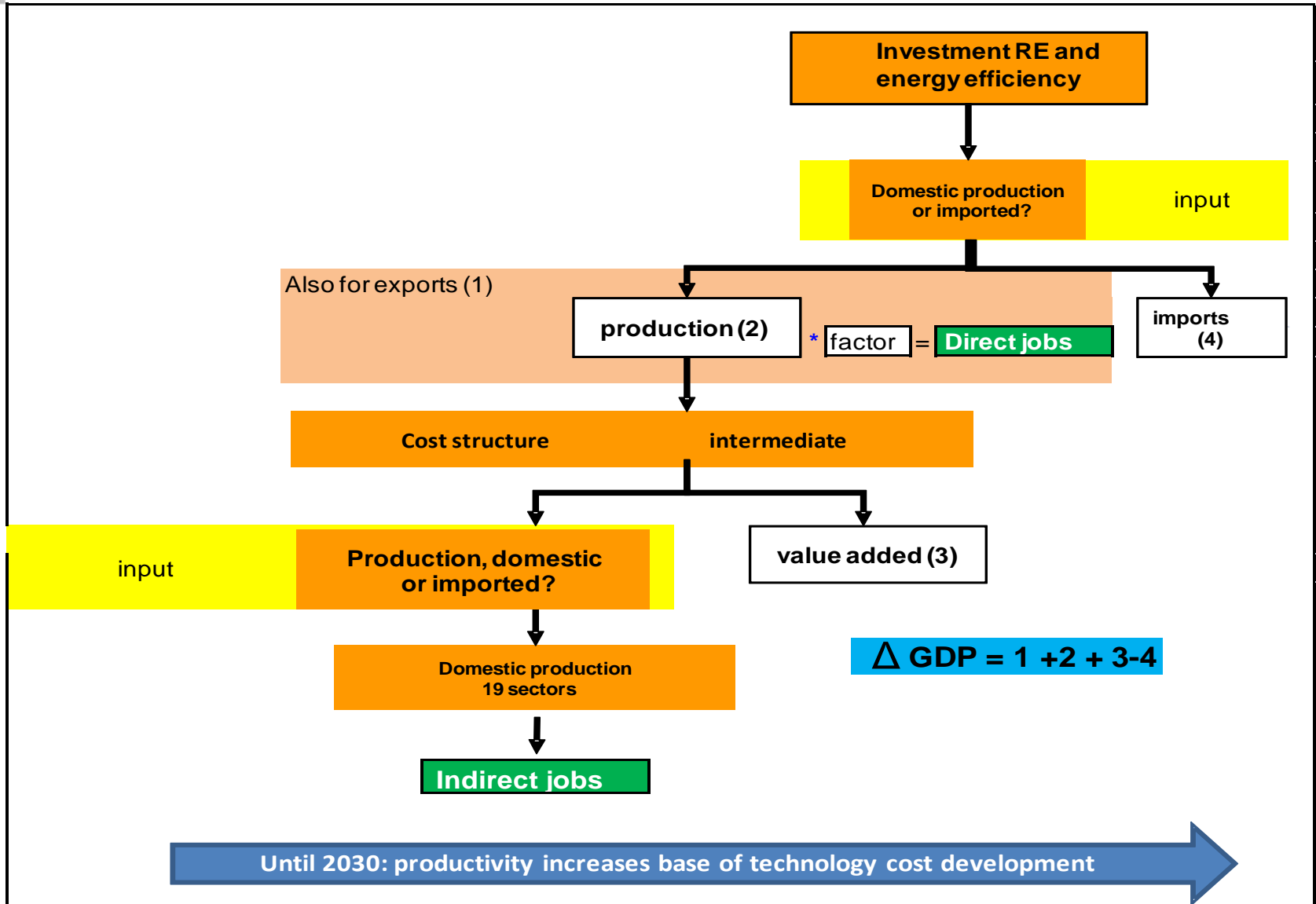
- Investment per sector
- Structure of costs
- Projection for productivity improvement

■ **Results**

- Jobs
- Δ GDP
- Jobs per sector

Perspectives for job creation in RE and EE in Tunisia

The Model



Perspectives for job creation in RE and EE in Tunisia

The results

■ Scenario ER+

- 85% of systems (wind, PV, CSP) imported
- 7,000 jobs in 2021

■ Scenario ER+ +

- 10% of systems (wind, PV, CSP) imported
- 23,000 jobs in 2018



What are the main outcomes?

Perspectives for job creation in RE and EE in Tunisia

Which strategy?

« Immediate employment »

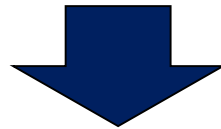
1. Efficiency
2. SWH
3. PV
4. Wind
5. CSP



Additional employment mostly Efficiency

« Technology development »

1. SWH
2. Wind
3. Efficiency
4. PV
5. CSP



Mostly produced domestically

« Foreign investment »

1. Wind
2. CSP
3. Efficiency
4. PV
5. SWH

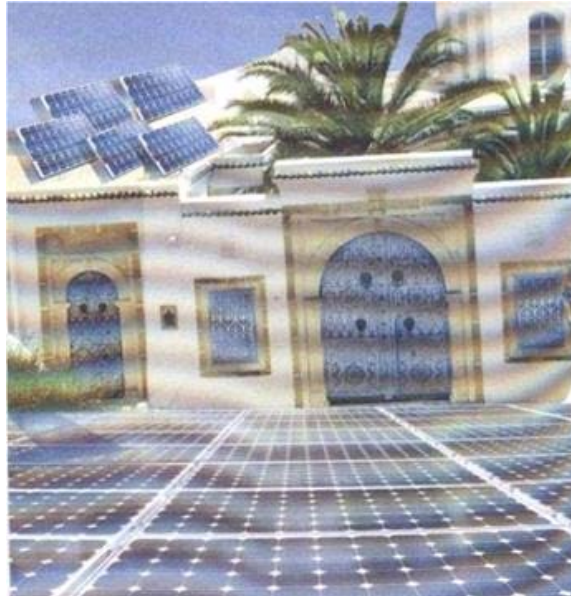


Go for large scale applications

Conclusion

- RE and EE have a **positive effect** on employment and economic development in general;
- Compared to EE, RE is more **intensive** in term of employment, but with a high cost of investment;
- On the short and mid terms, employment should be considered as a **co-benefit** and not as a key criteria for RE or EE prioritization;
- On the long term, employment and industry development could be justified for public investments in the fields of RE with a high **added value**;
- The sustainability of RE and EE markets is necessary for the **stability** of permanent jobs and the transformation of intermittent to permanent jobs;
- Employment in RE and EE is a **common responsibility** : Policy, finances, vocational training, R&D, industrials, etc.

Thank you for your attention



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RE and EE jobs in Tunisia

Objectives

■ The political question

What are the employment impacts from renewable energy deployment in Tunisia?

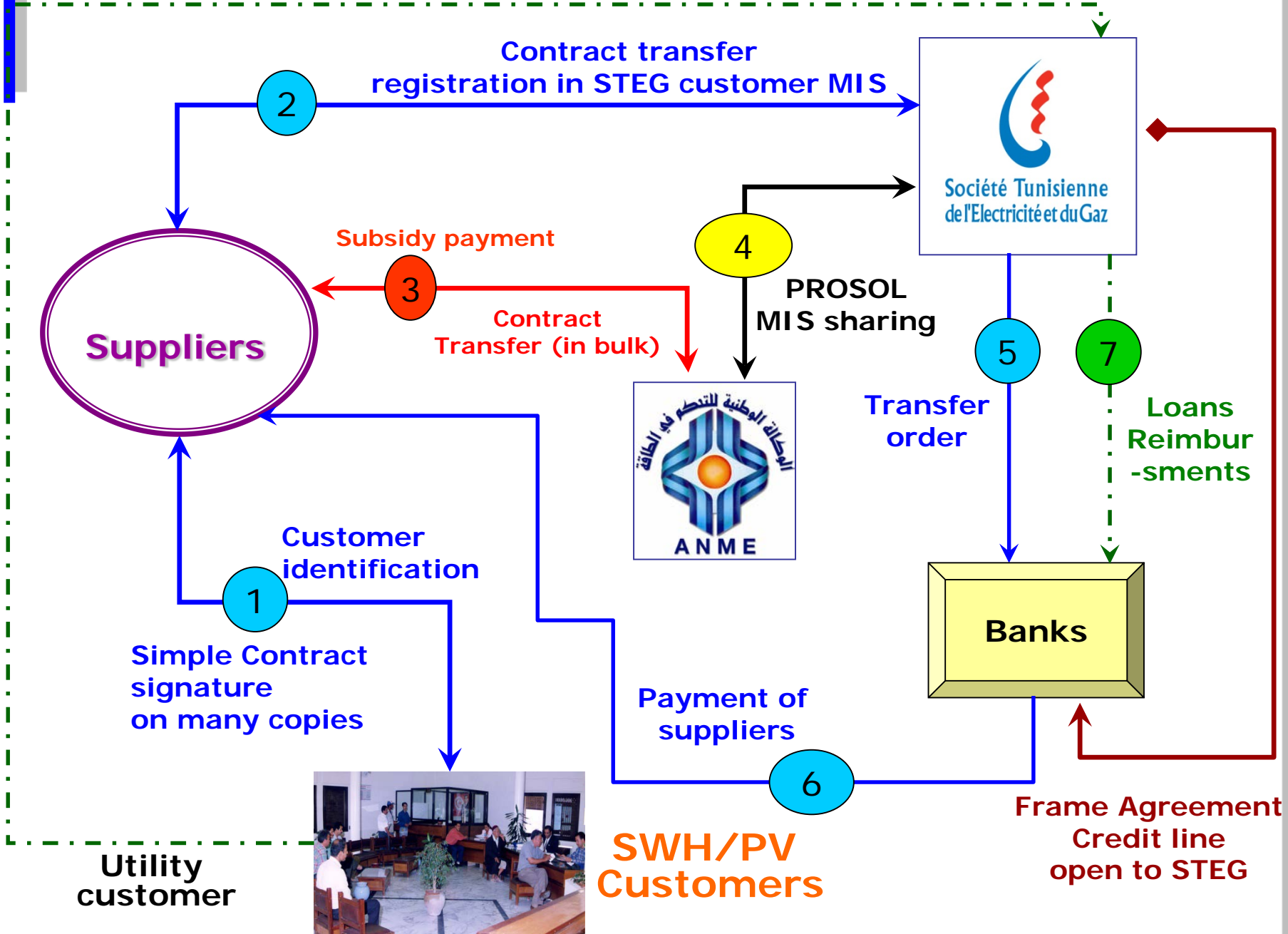
- How many people currently work in the sector?
- How many jobs will be created in the sector by 2030? (Gross effect)
- Which type of qualification will be needed?
- What are the drivers and barriers of green jobs in Tunisia?

■ The research question

How can we measure this?

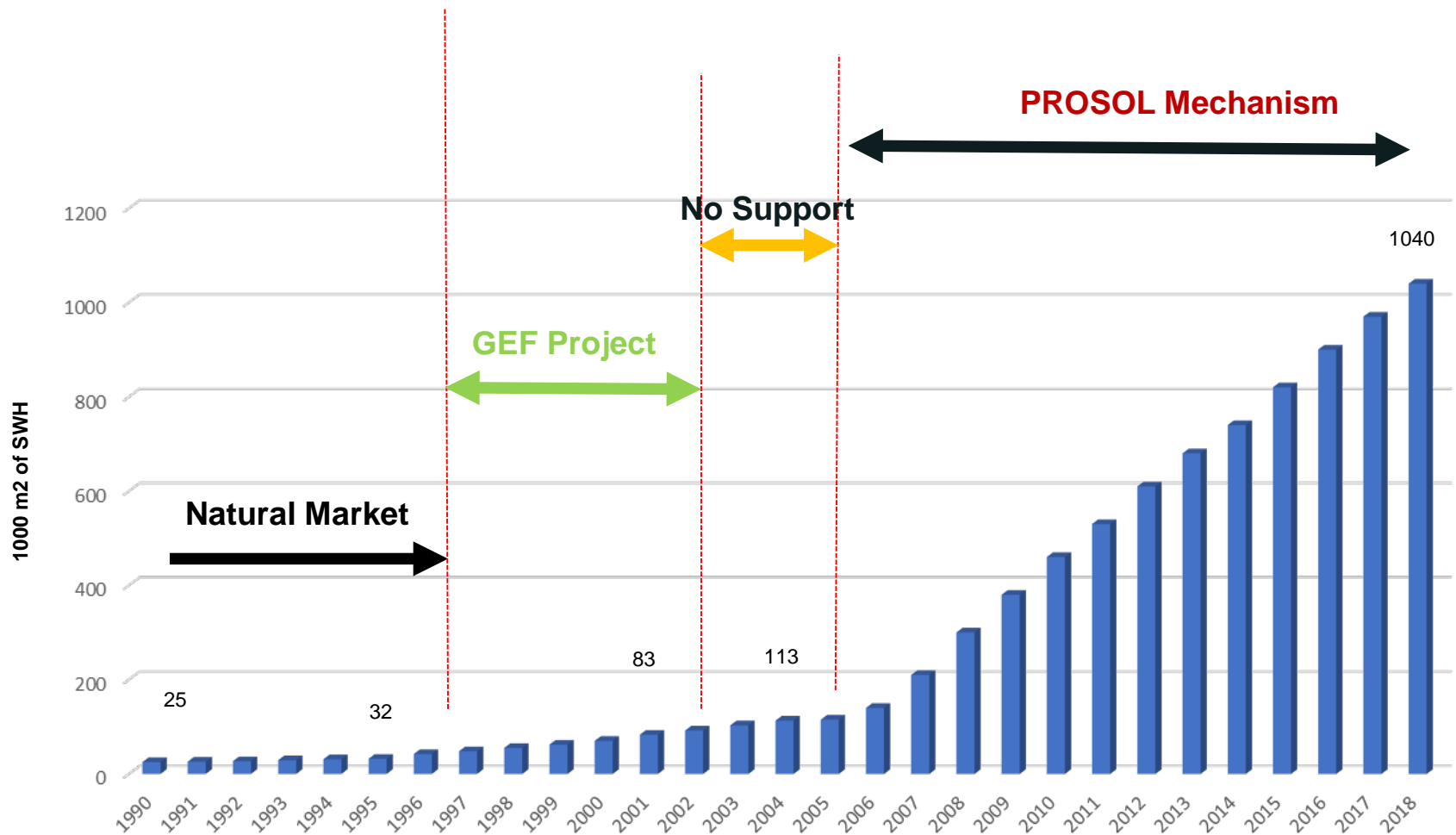
- What is the „renewable energy industry“?
- How does it fit into our economic framework with I/O tables and the existing 19 sectors?
- Does the method developed for industrial countries work for developing countries?

Loan reimbursement collection through the electricity bill



PROSOL Achievement

SWH installed Capacity in Tunisia

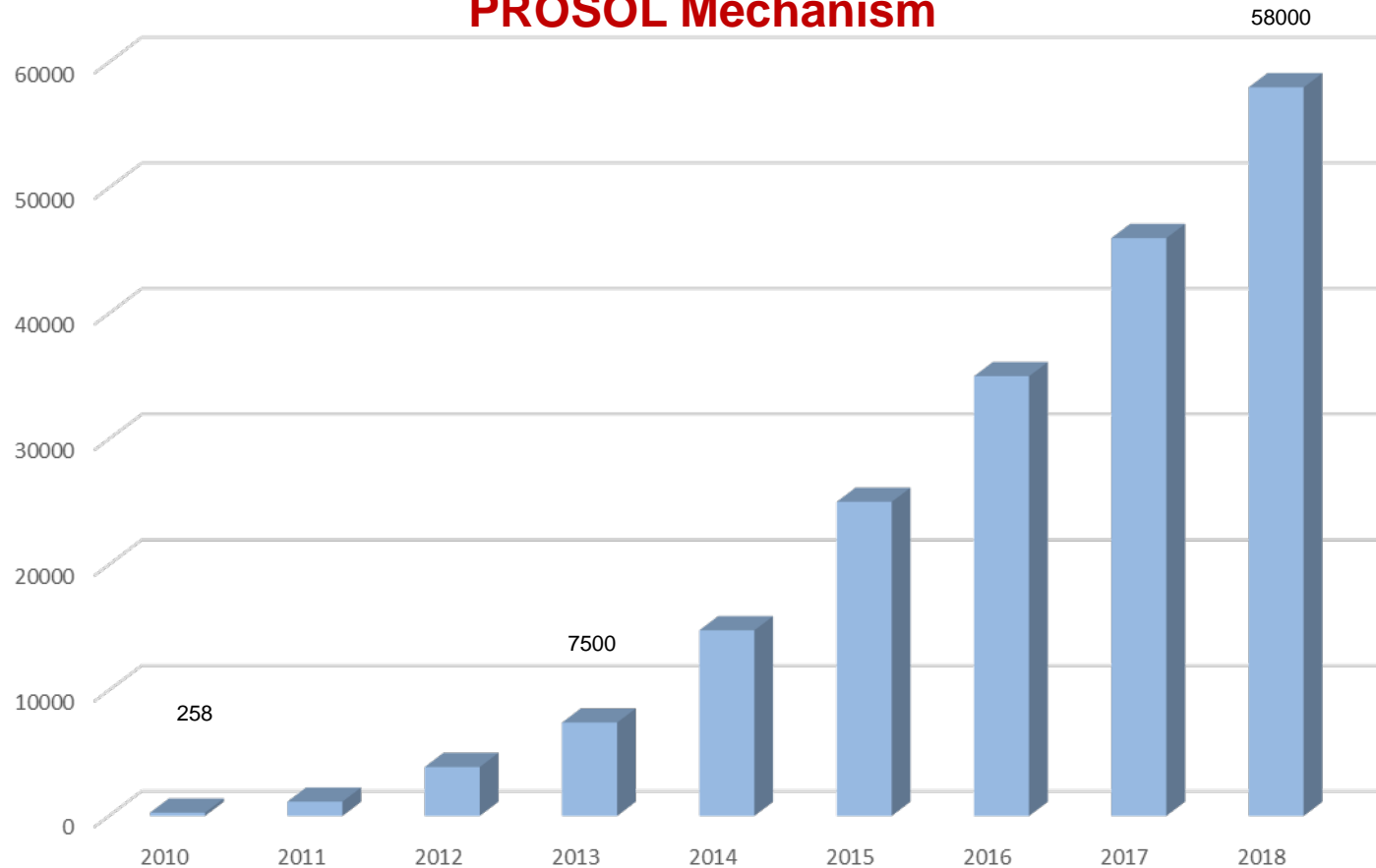


PROSOL Elec Achievement

PV installed Capacity in Tunisia

PROSOL Mechanism

KWp of PV



Next step

