



## Decentralized generation investments

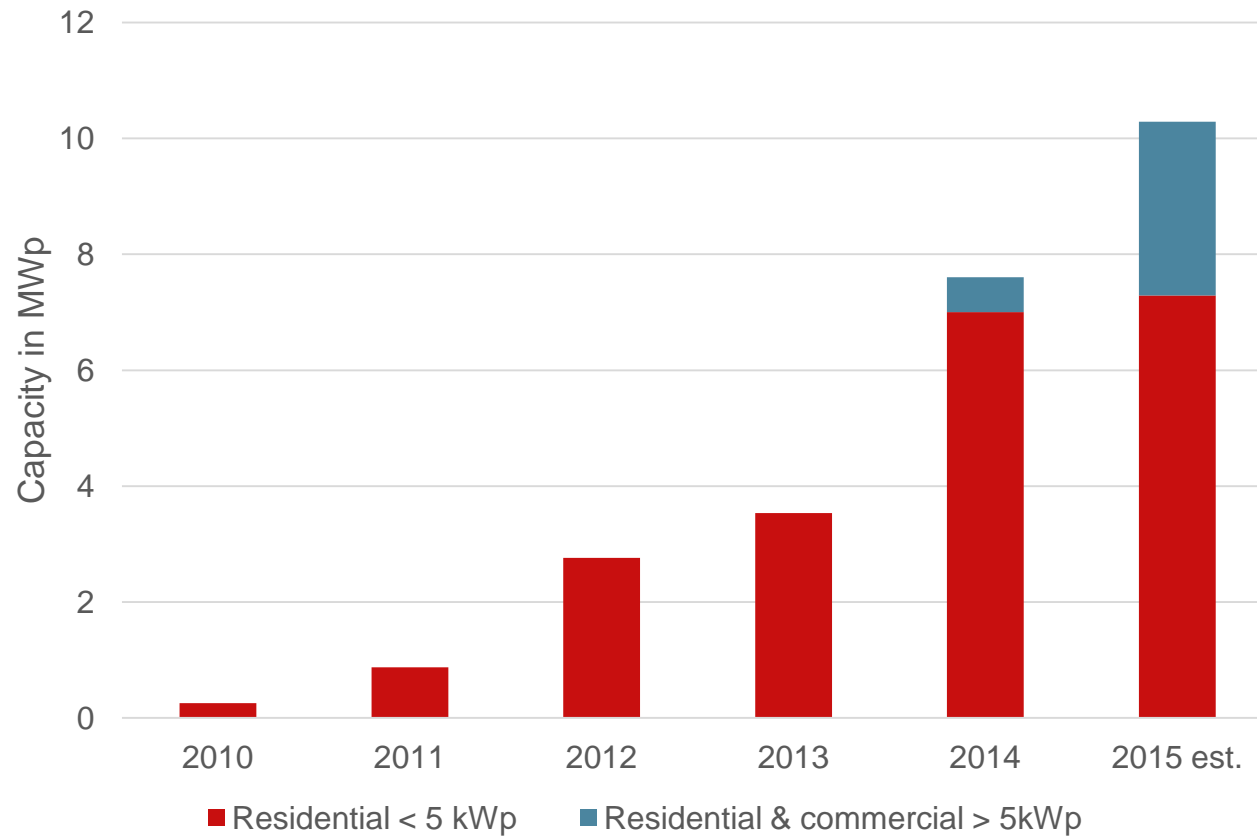


Promoting small and medium-sized PV installations  
in Tunisia

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## Annual PV market development based on net metering so far



Source: ANME 2016

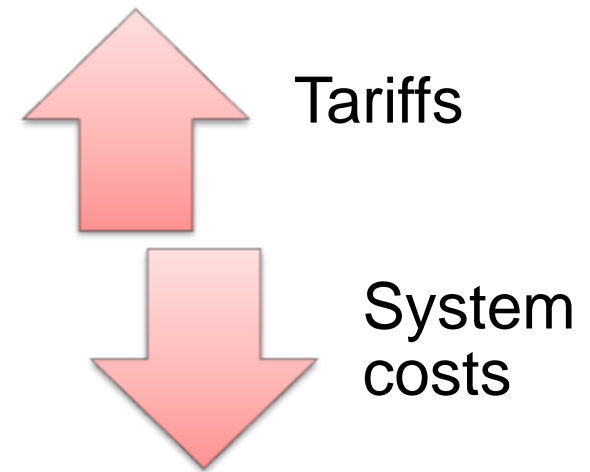


# Why?



## Main drivers

- Sharp decline in PV system costs, translation of international market developments
- Reduction of state subsidies for fossil fuels / electricity and rising electricity tariffs
- Attractive incentive framework for small-scale installations





## Net Metering framework

### Residential/Small Commercial (LV)

- Net Metering
- 1 year net billing cycle, monthly credit offset
- No extra capacity charge (grid usage)
- Maximum PV capacity limited to subscribed utility capacity and PV production must remain below previous consumption characteristics

#### Government support:

- Investment subsidy 30%
- PROSOL ELEC: Supported loan for residential PV through utility MMR +1.2% (currently 5.5%)  
→ **Today residential systems are sold for down to 0% upfront investment!**

### Commercial/Industrial (MV)

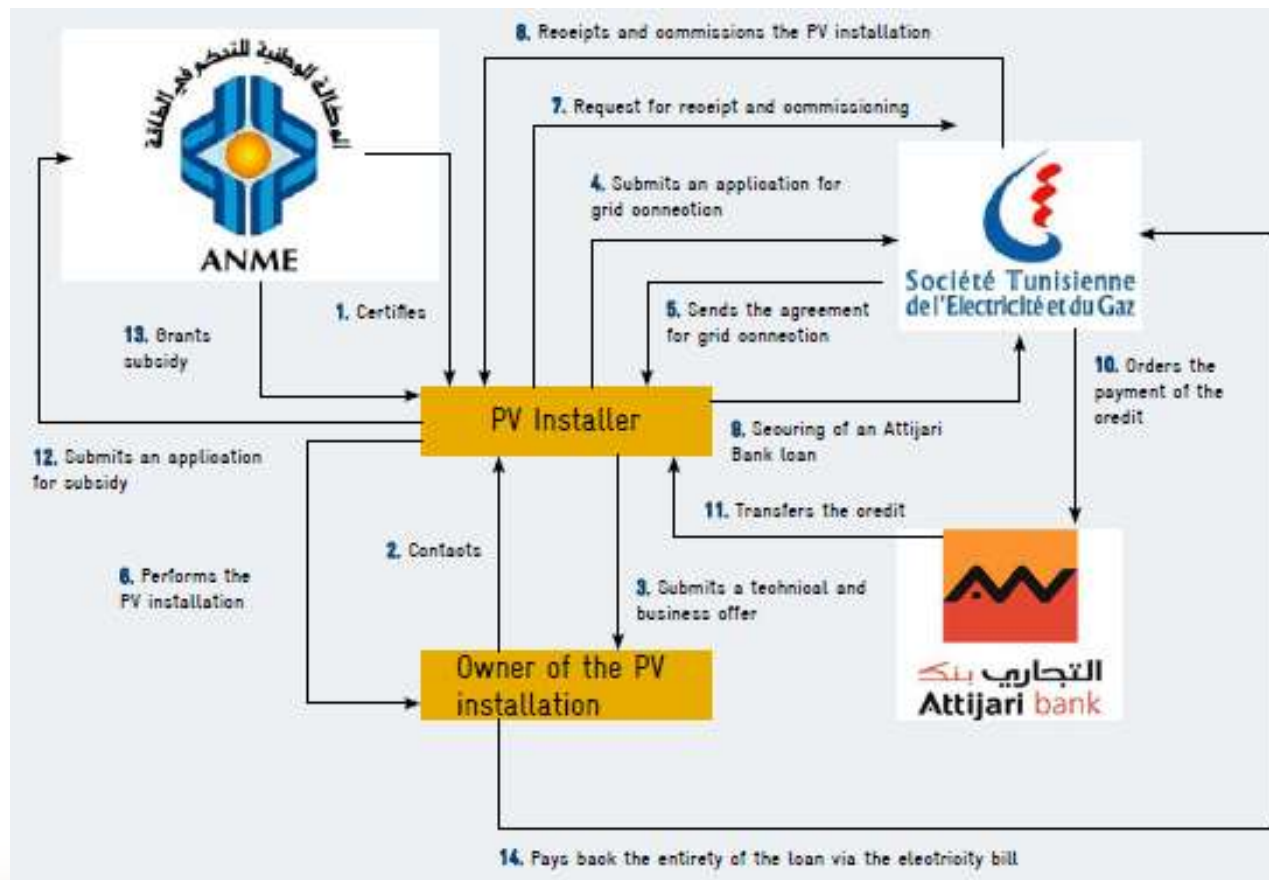
- Net FIT (not yet in place)
- 1 month net billing cycle / TOU tariffs
- No extra capacity charge (grid usage)
- Maximum PV capacity limited to subscribed utility capacity and PV production must remain below previous consumption characteristics
- Procedures are under development

#### Government support:

- Investment subsidy 20%



# Administrative procedures for PROSOL ELEC





## Examples of PV profitability

Low voltage level	Residential PV (2 kWp)	Small service (17 kWp)
<b>Support Mechanism</b>	PROSOL ELEC	Solar Building
<b>Equity Internal Rate of Return</b>	18%	42%
<b>Amortization (yrs)</b>	10	4

Source: GIZ 2016, 2014: Enabling PV in the MENA region – The emerging PV market in Tunisia



## Advantages

- No upfront investments for residential prosumers necessary
- Fast uptake by investors
- PV production correlates with mid-day peak demand (high variable cost savings) & supports utility in times of high demand
- State savings for gas & electricity subsidies
- Connection rules are optimized in a working group

## Challenges

- For residential operators, solar PV is profitable with a monthly consumption > 400 kWh vs. utility is only winning with a prosumer having a consumption < 317 kWh
- Cross-subsidies in case of overall tariff increase, an privileged group benefits
- No mechanism for the compensation of grid and administrative costs
- Regional imbalance in the distribution of systems





## Conclusions

- Only a few systems have been installed in the commercial and industrial sectors so far. Procedures that are supposed to give clarity to the investors are under development.
- The combination of subsidies, net metering and a supported loan have fostered investments in the residential segment and kick-started Tunisia's market development.



# Thank you!

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# Tariffs

Tariff	Sector	Capacity fee (mill/kVa/ month)	Electricity price for each monthly consumption block (mill/kWh)					
			1-50	51-100	101-200	201-300	301- 500	501 +
<b>Economy rate</b> (1 and 2 kVA & C° ≤ 200 kWh/ month)	Residential	500	75					
	Residential and Non-Residential		108					
	Residential and Non-Residential		140					
<b>Economy rate</b> (1 and 2 kVA & C° > 200 kWh/ month)	Residential	500					280	350
	Non-Residential		151			184	250	295
<b>Normal rate</b> (> 2kVA)								



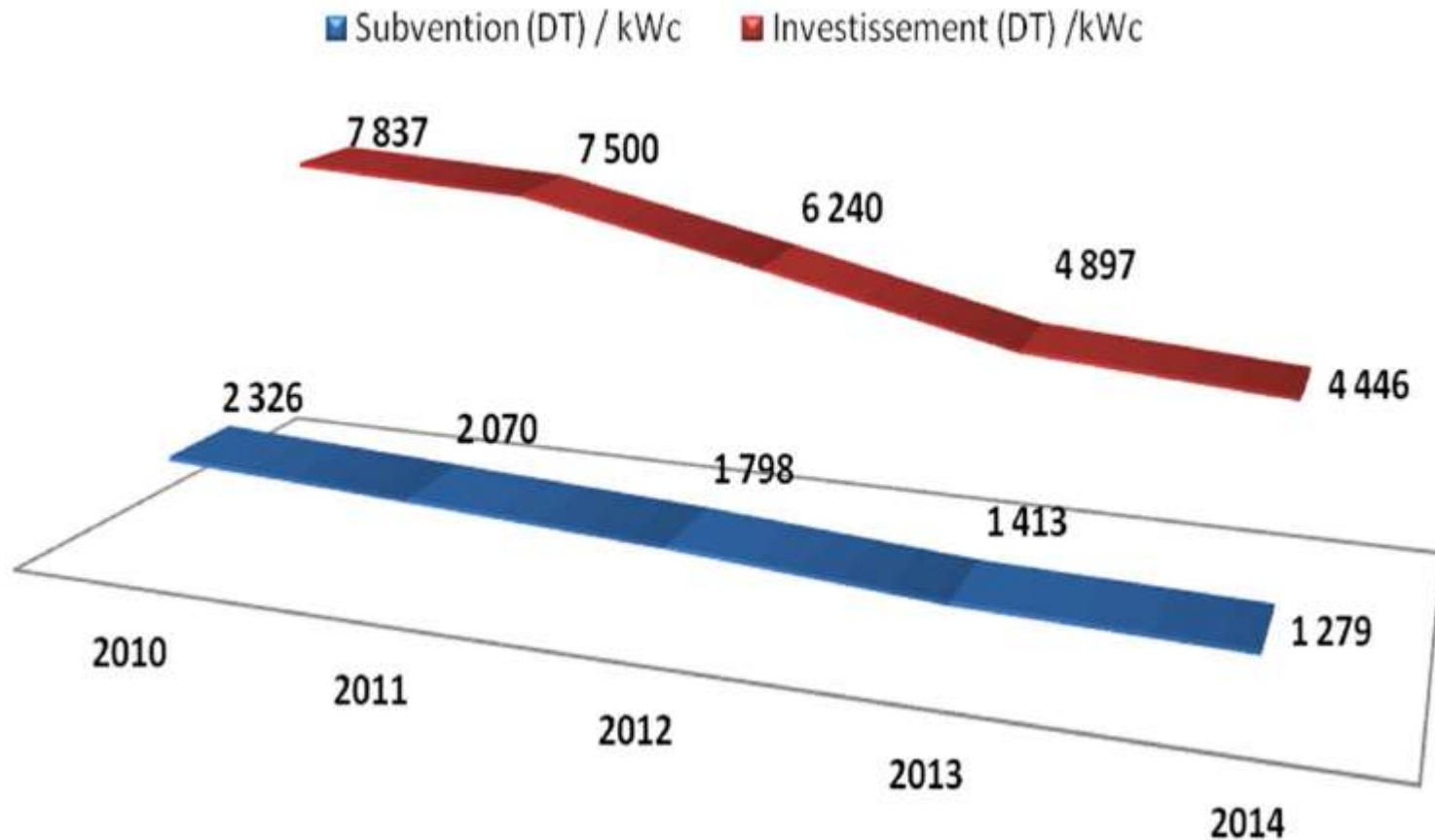
# PV Subsidies

Stand: Oktober 2016

Modell	Prozentueller Zuschuss	Deckel / Zuschuss
<b>Prosol Elec</b>	30%	1 500 DT / kWc pour IPV < 1,5 1 200 DT / kWc pour IPV > 1,5 Geförderter Kredit ueber Attijari Bank
<b>Batiments Solaires</b>	30%	3 000 DT
<b>Weitere netzgekoppelte Modelle: Investitionen in Material</b>	20%	100 000 DT
<b>Investitionen in Dienstleistung</b>	70%	70 000 DT



## Evolution of residential subsidy and investment costs



# Commercial Net Metering Examples in Tunisia

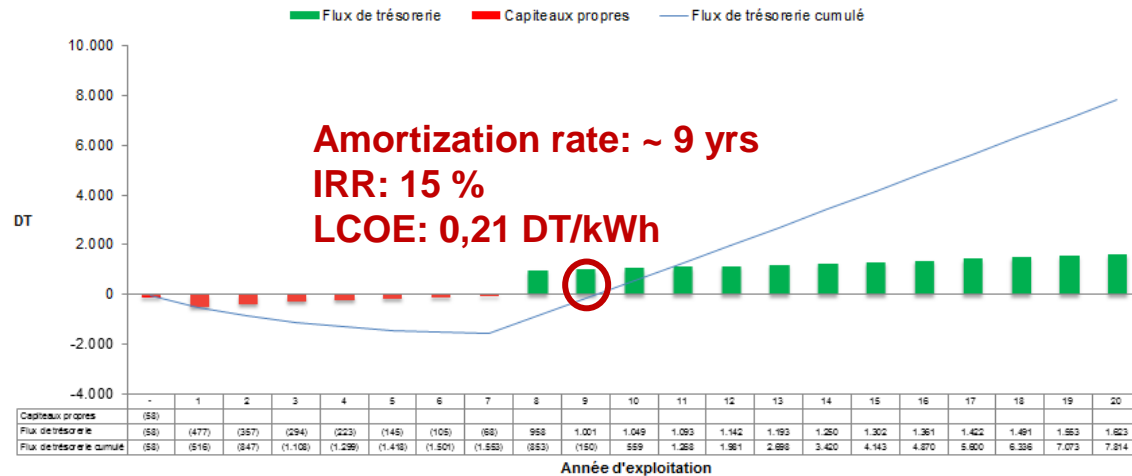


- 30 kWc Sfax
- Réalisé par SPECTRA
- Client: société de transformation des métaux
- 60 kWc Tunis
- Réalisé par VOLTA PV
- Client: Poulailier
- 150 kWc Sfax
- Réalisé par SATER Solar
- Client: Ferme Meher Mseddi

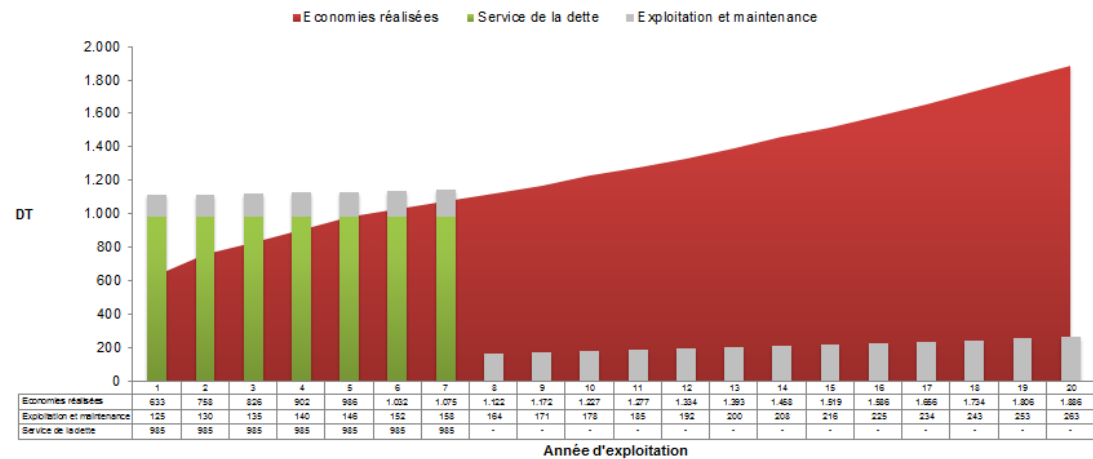


System Size	2 kWp
Specific System Price (after subsidies)	2.800 DT/KWp
Total System Cost (after subsidies)	5.600 DT/kWp
Specific Yield	1.600 kWh/kWp/yr
Degradation	0,5 %/yr
O&M	1,5 %/yr
Project Duration	20 yrs
Monthly Consumption	350 kWh
Discount Rate	4 %
Inflation	4 %
Debt	100 %
Interest rate	5.5 %
Loan Tenor	7 years

### Investissement et flux de trésorerie de capitaux propres



### Produits d'exploitation et service de la dette



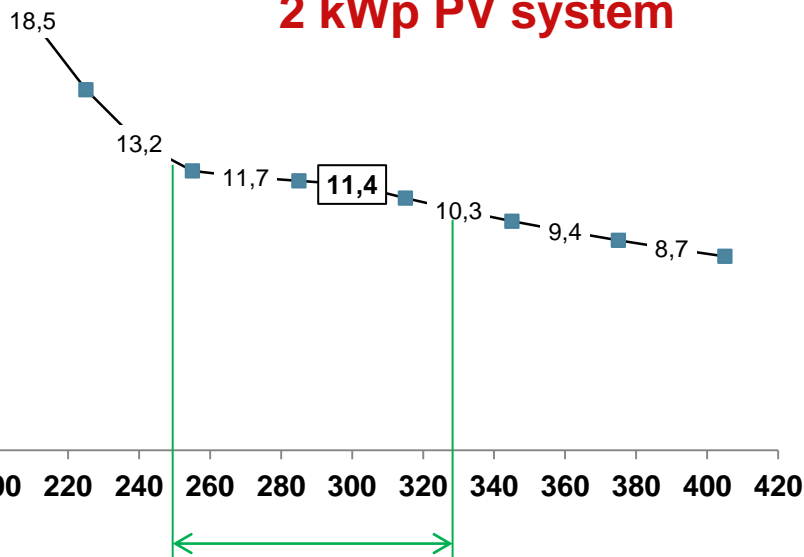


# PROSOL ELEC – Consumption vs. Payback

Monthly consumption [kWh/month]

—■— Amortization [a]

**2 kWp PV system**



TARIF	SECTEUR	REDEVANCE DE PUISSANCE <sup>(1)</sup> (mill/kVA/mois)	PRIX D'ENERGIE POUR CHAQUE TRANCHE DE CONSOMMATION MENSUELLE (mill/kWh) <sup>(1)(2)</sup>					
			1-50	51-100	101-200	201-300	301-500	501 et +
<i>Tranche économique</i> (1 et 2 kVA & C* ≤ à 200 kWh/mois)	Résidentiel <sup>(3)</sup>	500	75					
	Résidentiel <sup>(4)</sup> & Non Résidentiel		108					
	Résidentiel <sup>(5)</sup> & Non Résidentiel <sup>(1)</sup>		140					
<i>Tranche économique</i> (1 et 2 kVA & C* > à 200 kWh/mois)	Résidentiel	500		151		184	280	350
<i>Tranche Normale</i> ( > à 2 kVA )	Non Résidentiel					250	295	

Economic tranches

Average consumption of a German household = 250 - 333 kWh/month

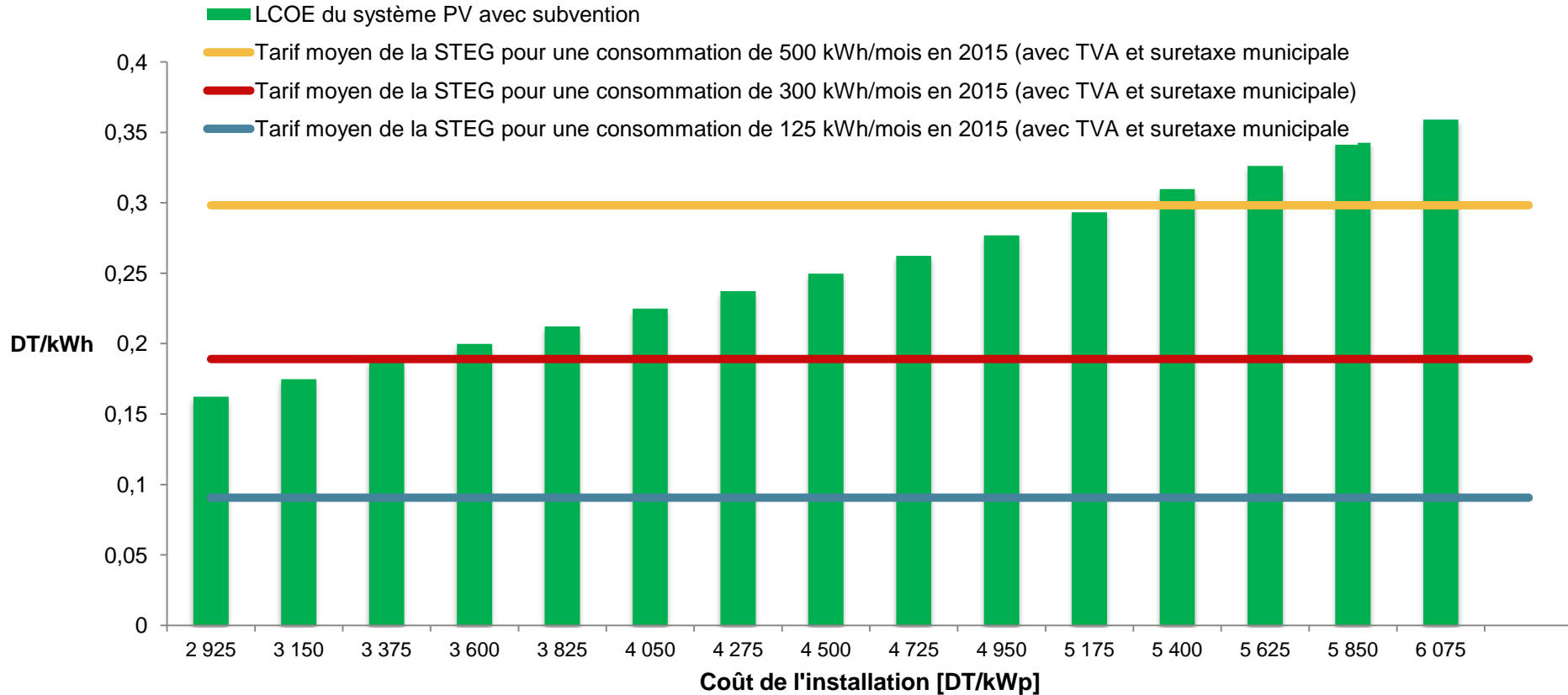
Average consumption of a Tunisian household = 125 kWh/month

→ Solar PV is only interesting to strong consuming clients (> 400 kWh / month) !





## Investment Cost and LCOE



– Grid parity can be reached at a monthly consumption of 405 DT/kWh