WG ELE - Least-cost distribution network tariff design in theory and implementation in the Palestinian Electricity System

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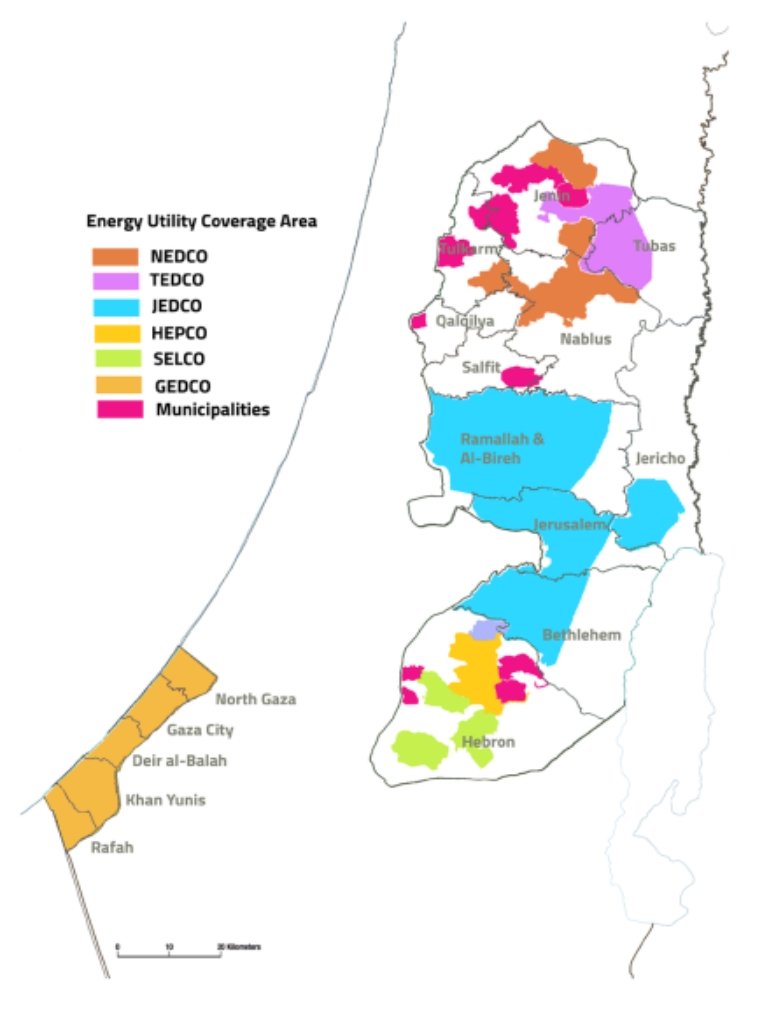
WG ELE Reports - PERC



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PERC – The Electricity market in Palestine is facing a considerable grow of DER that combined with the traditional energy security challenges require support in :

- Guidelines to evaluate infrastructure investment planning
- Impact on tariff structure (and level)

The report also provides details on:

- Theoretical details of cost models
- Numerical example and simulation based on PERC KPI

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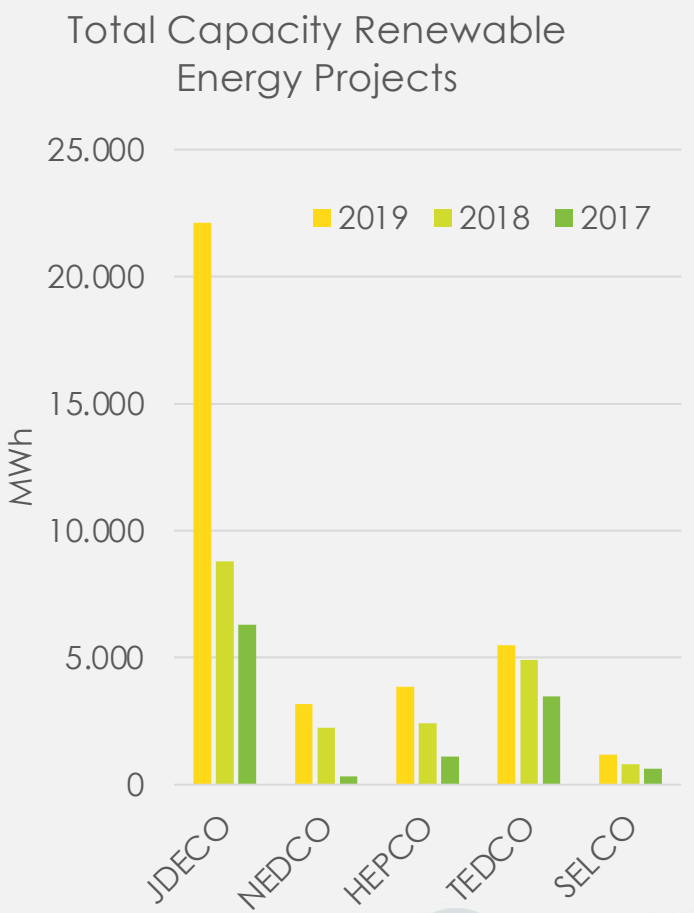
Least-cost distribution network tariff design in theory and implementation in the Palestinian Electricity System

- Embedded Renewable Energy Capacity connected with distribution network is growing at 63% (2019 YoY)
- Most additional capacity operated under the net metering scheme

This causes two main problems:

1. Reversed welfare transfer: wealthier households and businesses can more easily invest in rooftop PV and pay less network services.
2. Risk of misplaced investments in the distribution network that might be reinforced not where it is mostly needed

Well designed tariff structure can solve both issues and can also guarantee to be cost reflective



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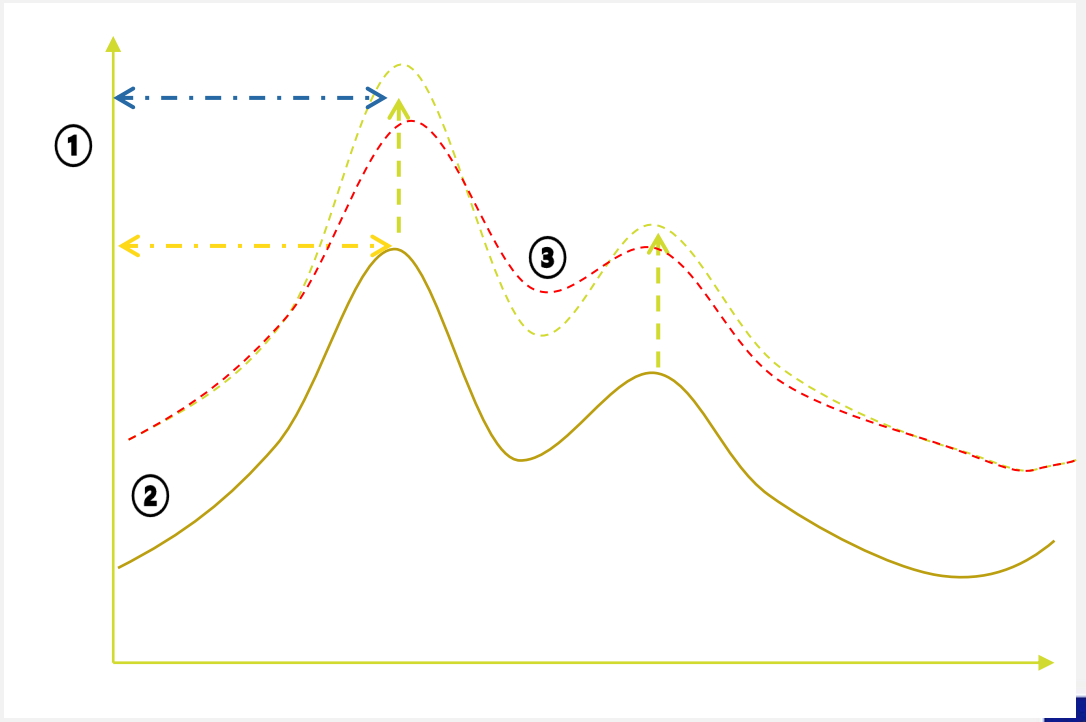
Main feature that are predict to impact the Palestinian Electricity System

1. Increase in peak demand and system peak
2. Increase in the average demand at most time interval, as well as an increase in the average consumption
3. Increase of RES generation, or otherwise decrease of the net demand, at peak hours for the distributed prosumers in the systems

How power bills will be impacted following the implementation of the deterministic scenario?



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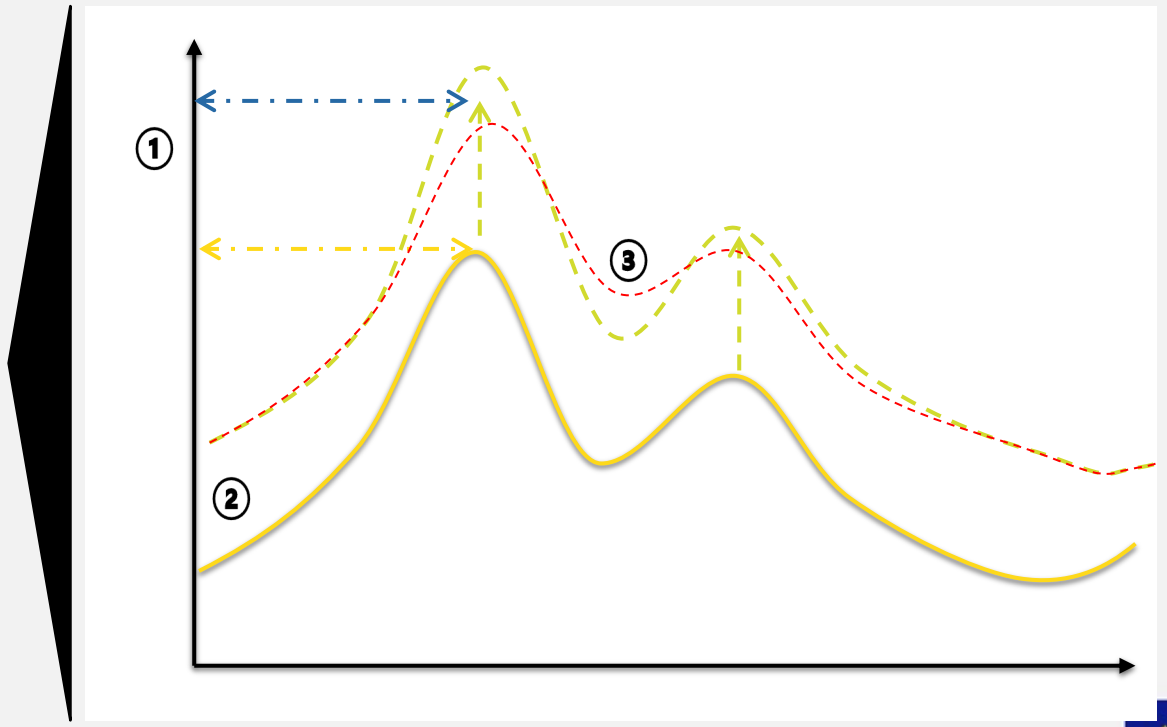
Forward looking impact on power bills components

	Tariff component	Unit of measure	Function	Situation in Palestine	Impact on the component
1	Capacity	€/kW	Recover generation and network capacity costs. Should be based on demand (kW) at time of system peak, as this is the driver of investment needs	The system peak is likely to increase in Palestine as more consumers will be online, together with increased generation transmission capacity	
2	Volume	€/kWh	Used to recover the variable costs of additional electricity supply in each interval	Electricity supply is likely to increase at each time interval. Better interconnection and greater availability of more reliable generation capacity will boost supply and demand at each time of the day	
	Fixed	€/point of delivery	Used to recover the costs of customer related activities such as metering, billing and collections which do not vary with customer demand or consumption	The increase in the number of customers will introduce some economies of density and concentration. The likely impact is declining	
3	Capacity	€/kW	Recover generation and network capacity costs. Should be based on demand (kW) at time of system peak, as this is the driver of investment needs	The increase in distributed generation is likely to flatten the peaks and shave the demand in the central hours of the day, shifting it to off peak hours. It will contribute to reduce the capacity component of the tariff	



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Overview of different tariff structures

Tariff component	Fixed	Capacity		Volume
		ex ante	ex post	
	€/point of delivery	€/kW		€/kWh
Advantage	• Simple • Stable • Predictable	Signals that capacity has a price	• Signals that capacity has a price • Cost Reflective	Acceptable to consumers
Disadvantage	Does not signal long term costs and so does little to encourage energy efficiency and system flexibility	Reflect capacity costs to a limited extent	• Requires smart metering • Complex • Less Predictable • Less acceptable to consumers	• Does not reflect capacity costs • Can raise revenue uncertainty for DSOs

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Overview of different tariff structures – Case studies

Several other countries have experienced similar conditions and are currently testing alternative tariff structures to accommodate the changes occurring in the electricity systems and avoid either increase in the Distribution tariffs or

We have selected 4 case studies that have one (or more) characteristics useful for this analysis

Case	Tariff Component			Tariff charging basis		Net Metering	Main responsibility in setting tariffs
	Fixed	Capacity	Volume (weight)	Non-Linear	Time of Use		
Italy	YES	YES	YES (66%)	YES	NO	YES	NRA
Portugal	NO	YES	Yes (62%)	NO	YES	NO	NRA
Romania	NO	NO	YES (100%)	NO	NO	NO	NRA
The Netherlands	YES	YES	NO (0%)	NO	NO	NO	DSOs

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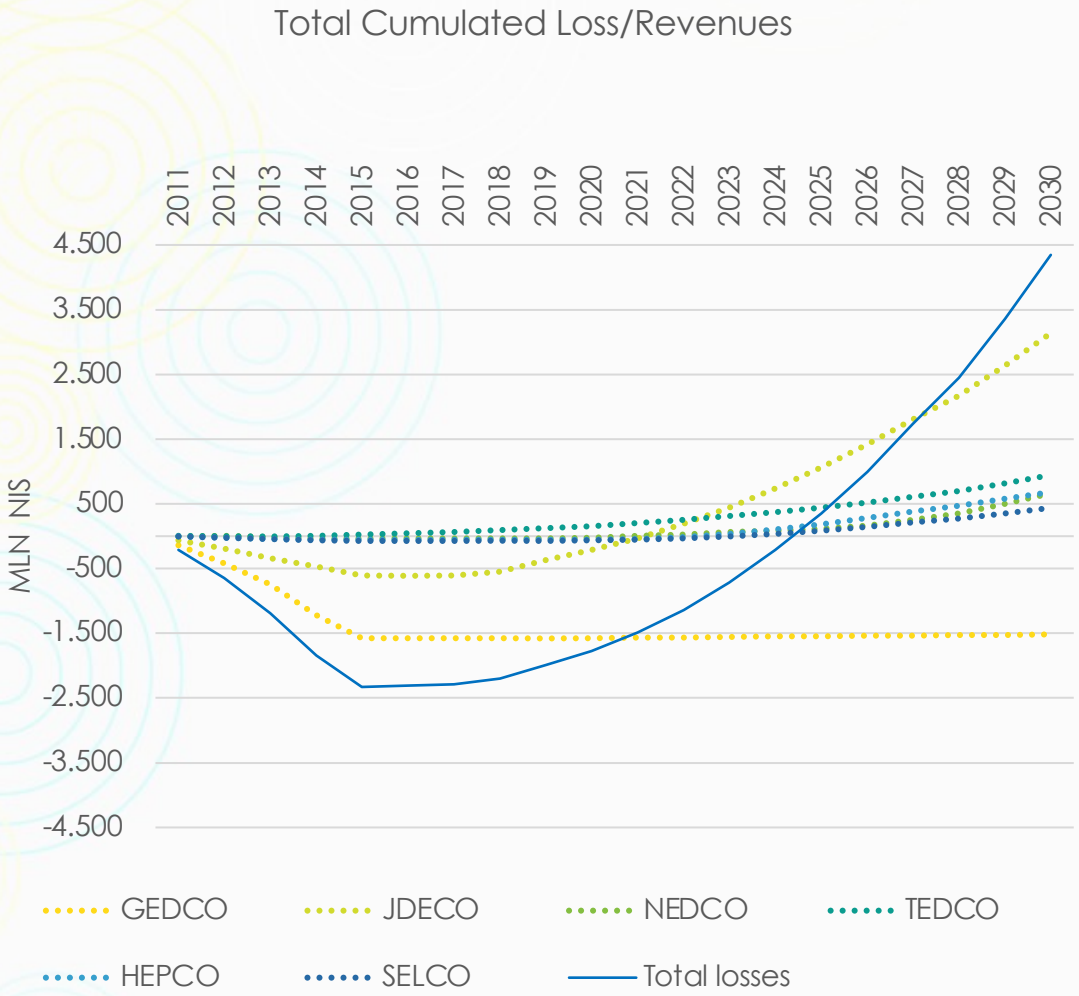
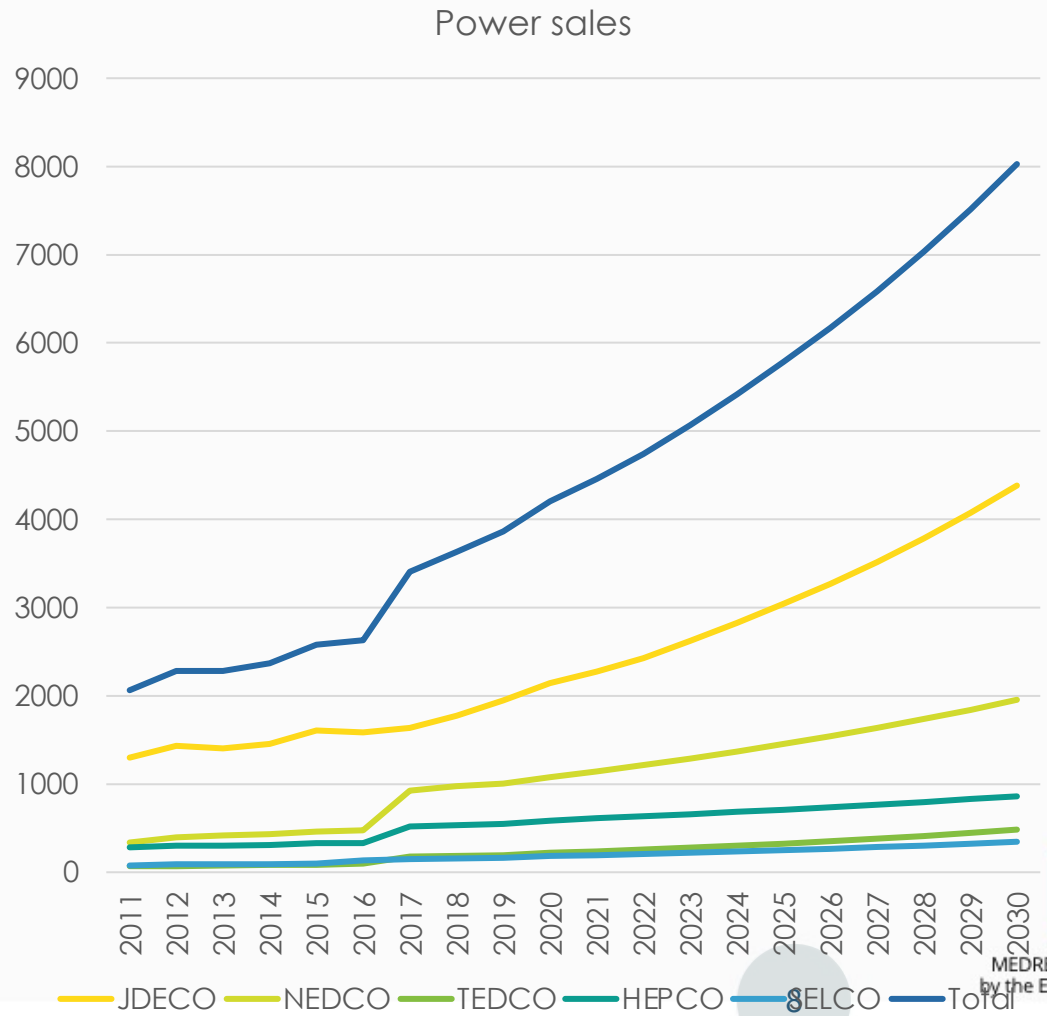
Analysis provided – Cumulated loss/revenues and Power Sales (2011-2030)





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Set up and result of the model
Analysis provided

- The financial model of the Palestinian Authority power sector is considered at the simplest level by analysing the cash flow models of the six Palestinian power distribution utilities DISCOs (JDECO, GEDCO, HEPCO, NEDCO, SELCO & TEDCO).

- The baseline scenario results provide an overview of the situation in different DISCOs. Since the model returns the "Electricity average equilibrium cost" per each different distribution companies we can evaluate the economic situation that the average retail tariff imposes to each DISCO

- **Result of the model**
  - A capacity component should be included in the revised distribution tariff in 4 out of 5 DISCOs
  - The tariff levied in each DISCO depend on the specific situation of the distribution companies
  - The range of the optimal tariff varies considerably (from 26 NIS/Year to 179 NIS/Year)
  - Some of this Capacity Charges are not affordable for the average customers
  - Specific subsidy policy needs to be consider to increase financial sustainability of the measure

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