



# CirCIE 2019

## Challenges for the Islands in the era of the Circular Economy

## ***Impact of EV Penetration to the Distribution Grid***

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*Hellenic Distribution Network Operator*

Under the auspices of



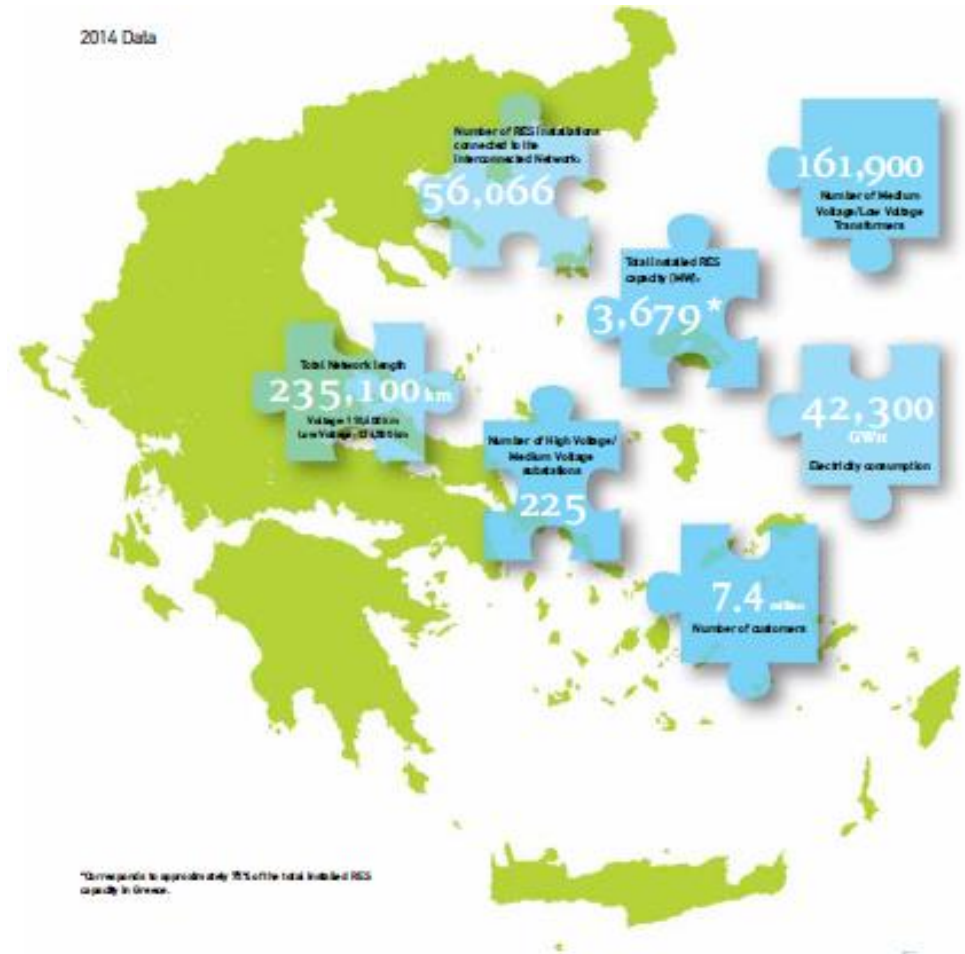
# SMile 2019

## 6th Sustainable Mobility & Intelligent Transport conference



- Hellenic Electricity Distribution Network Operator
- Established in May 2012
- Spin-off of the Distribution segment of PPC S.A.
  - (Law 4001/2011, in compl. with 2009/72/EC)
- 100% subsidiary of PPC S.A.
- Functionally independent; impartial towards all market actors
- **Objective:** Operation, maintenance and development of the Distribution Network throughout Greece

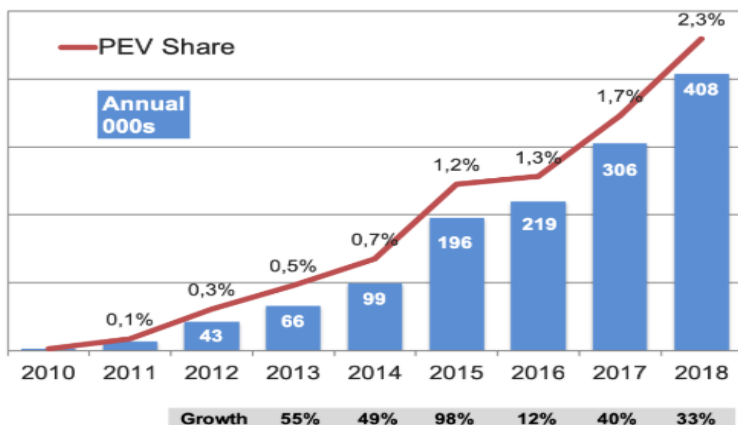
- ~7,5 M customers
  - 5th Biggest DSO in EU
- 235.000 km LV & MV lines
- Employees
  - Directly ~7.000
  - Indirectly ~5.000



# Transport electrification is a fact

Current EV market share

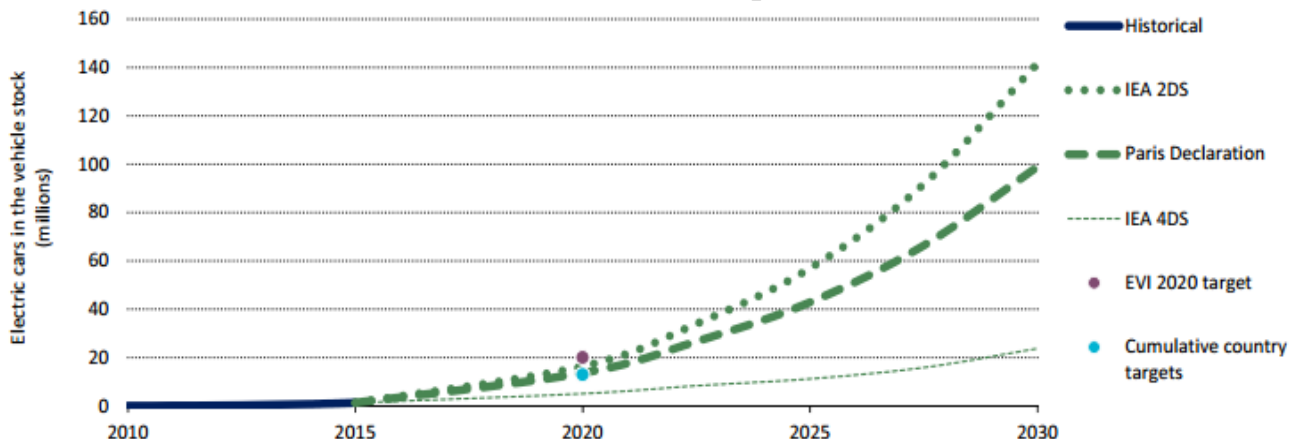
Europe Plug-in Vehicle Sales & Share EV VOLUMES.COM



Plug-in electric vehicle is a reality (EV stock >4M in 2018)

## Future ambitious plans

Ambitious EV share targets in global, EU and national levels



Source: IEA Report 2018, "EV global outlook"

# Electric vehicles towards future smart grids

production

consumption

production

consumption

Large power plants

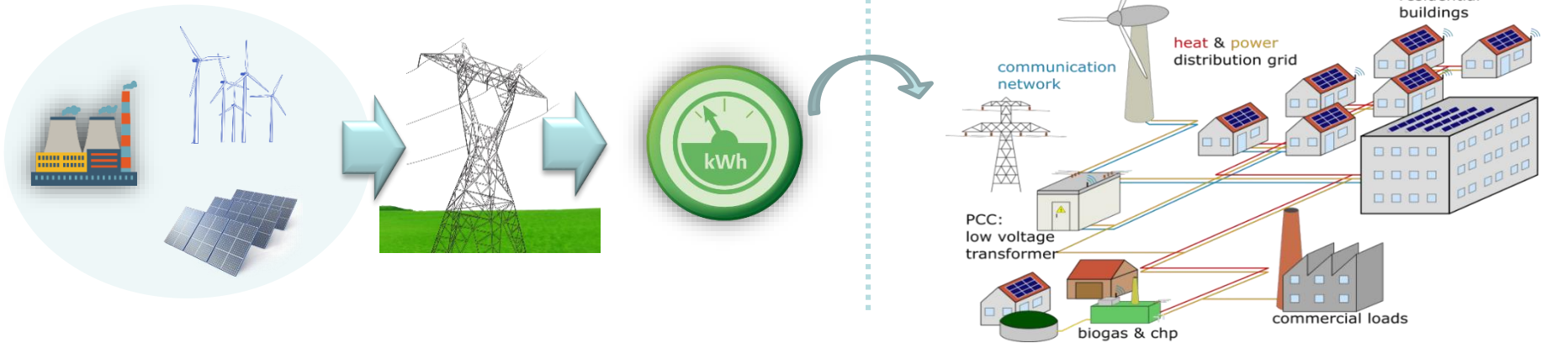
Electricity Grids

Consumption

**Electric Vehicles**

Flexible loads      Storage

DGs

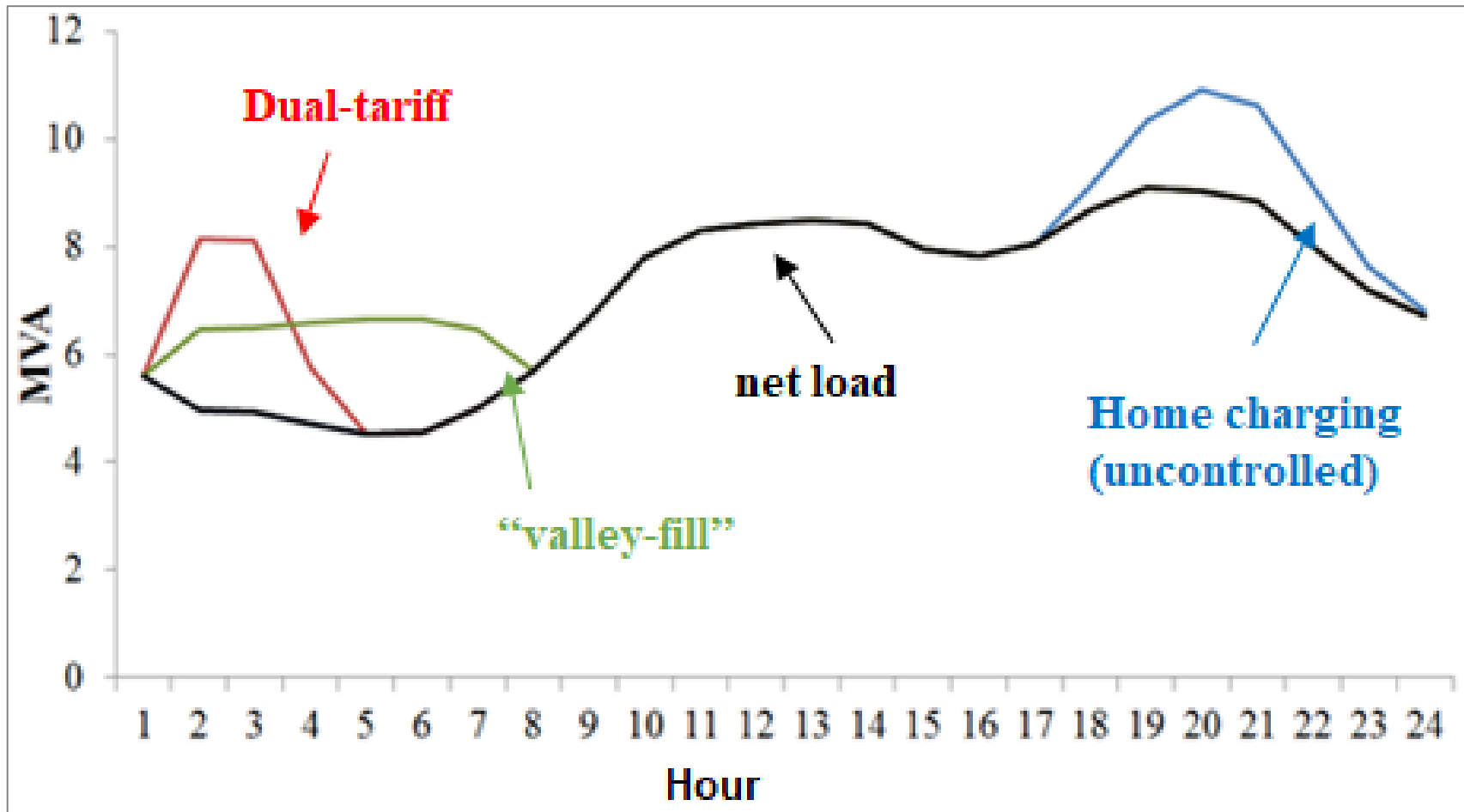


# EV Hosting Capacity

- EV charging: New, variable load in space and time
- EV Hosting Capacity
  - Case by case, per specific network line parameters
  - Urban → Limited by substation/line capacity
  - Rural → Limited by voltage deviation
    - i.e. Island group microgrids: up to 50km MV lines, seasonal load variations
- Methodology is under development, for the network studies in order to connect new charging stations
  - How different is a charging station to a typical big LV (up to 135KVA) load?
  - Different load factors (with/without smart charging)?

# New challenges for DSOs

Urban network – Typical winter daily network load curve



Source: SmartRue/NTUA studies

# Conclusion

- EV penetration expected to require flexibility services in the distribution grid.
- HEDNO monitors the developments in smart grid by participating in EU funded research programs (H2020) and international associations (CENELEC, EURELECTRIC, E.DSO).
- HEDNO works on strategic projects (telemetering, GIS, SCADA), which are prerequisites for future operation of smart grids.



# Thank you for your attention!



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