Microgrids

Emerging Microgrid Technologies - challenges

Bucharest, 4 September 2018

Agenda

- **Technical Challenges – SENSIBLE Project**

- **Network Planning Challenges**

- **Conclusion**

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Technical Challenges – SENSIBLE Project

Grant Agreement No 645963

- Under SENSIBLE project, EDPD developed a demonstrator in Evora (Valverde), installing a storage unit that enables a secondary substation to act as microgrid.

- SENSIBLE was developed with **LABELEC and EDP NEW R&D**

- Allows the islanding and synchronization of the LV network associated with a secondary substation, on the premises of a Evora University's campus

- Furthermore, allows for load management (peak-shaving, consumption deferral)

- **Addressed the challenges**
  - ✓ Optimizing storage dispatch in extended islanding
  - ✓ Optimizing LV storage dispatch in normal operation
  - ✓ Islanding transition and main grid synchronization
  - ✓ Residential flexibility management in markets

Évora's storage pilot project

- **Located in Évora University Campus**
- **Lithium-Ion batteries, 480 kW, 196 kWh, commissioned in Dec. 2015**

Grid operation domain

Client/market domain

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SENSIBLE

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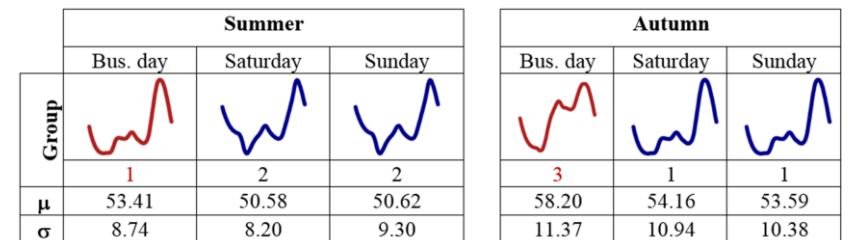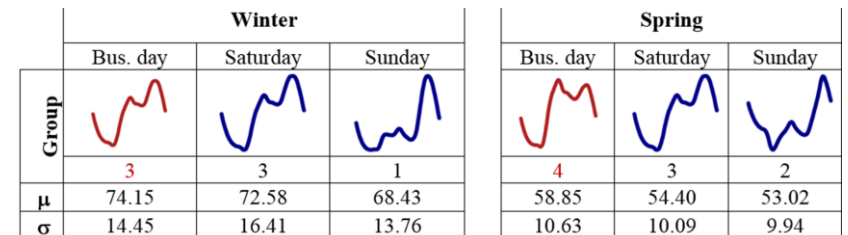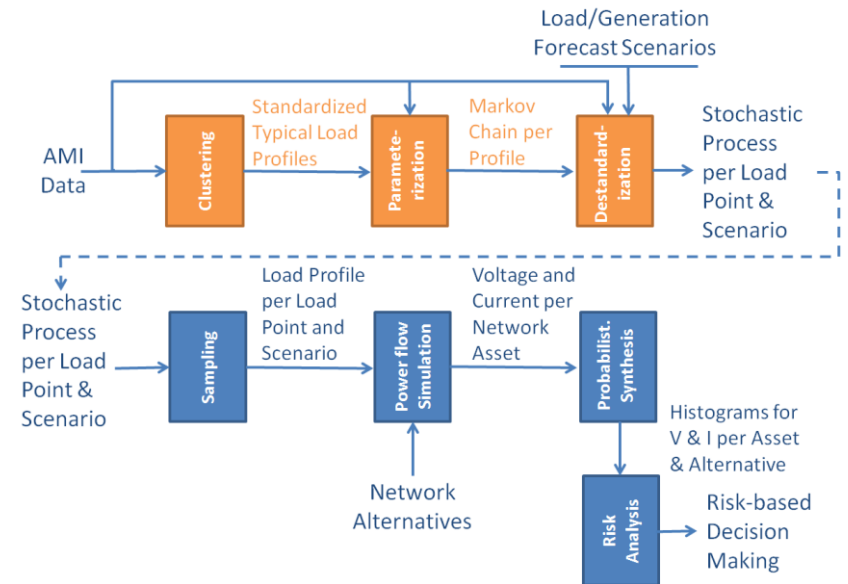
Network Planning Challenges

- Networks have several end-user categories, with different usage patterns:
  - ✓ Loads
  - ✓ Renewable DG
  - ✓ Storage
  - ✓ Flexible loads/generation

- **As a result, load flows are more complex and unpredictable → need to enhance network planning tools**

- **EDPD developed and implemented a new probabilistic methodology, accruing from AMI data,** building synthetic load and generation diagrams

- **This new probabilistic methodology support risk controlled network planning**

Winter	Bus. day	Saturday	Sunday
Group	3	3	1
μ	74.15	72.58	68.43
σ	14.45	16.41	13.76

Spring	Bus. day	Saturday	Sunday
Group	4	3	2
μ	58.85	54.40	53.02
σ	10.63	10.09	9.94

Summer	Bus. day	Saturday	Sunday
Group	1	2	2
μ	53.41	50.58	50.62
σ	8.74	8.20	9.30

Autumn	Bus. day	Saturday	Sunday
Group	3	1	1
μ	58.20	54.16	53.59
σ	11.37	10.94	10.38

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Network Planning Challenges

- Simulation is performed by running a full AC power-flow analysis for each 15min period of the sampled load profiles of each year

- Branch current and nodal voltage results are computed and synthesized to be compared to technical limitations

- **This simulations allow to quantify the probability of having a load flow above a certain value, for each network component**

- **EDPD is also using probabilistic assessment to evaluate network investment projects – calculating the NPV and CB for probabilistic demand scenarios**
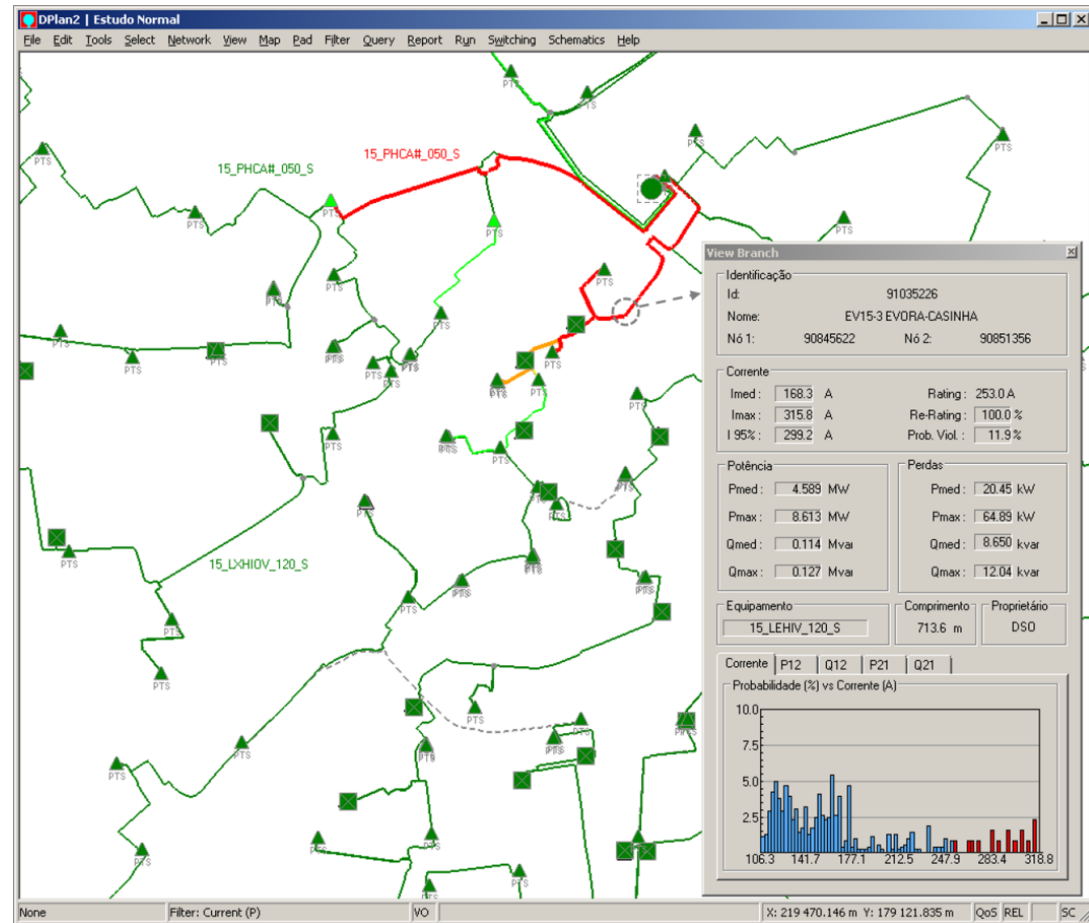
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CONCLUSION

- DSO are cornerstones in enabling the implementation of policies addressing climate change. These policies foster the connection of renewable DG, and the emergence of new loads (EV, flexible loads).

- **EDPD is a neutral market facilitator, empowering consumers and ensuring security of supply**

- **EDPD is promoting the transition to smartgrids, enabling it to address the new challenges of the electrical energy sector**

  - ✓ +1,6 million smart meters deployed (6 million consumers)

  - ✓ Development of probabilistic network planning methodologies, suited for scenarios with large penetration of renewable generation and with flexible DER available

- **EDPD is developing technical expertise that allows it to be prepared for the emergence of microgrids**

  - ✓ Participation in SENSIBLE project, which developed a microgrid

  - ✓ Participation in other FP7 projects – including the coordination of InteGrid, testing a flexibility provided by storage and through a market hub.

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Thank you!