

# Using Monte-Carlo simulation to assess the adequacy of the Energy Community national power systems

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# Generation adequacy of power systems

- Generation adequacy is fulfilled when there is sufficient generating capacity present to meet demand in both base-load and peak periods.
- Net Generating Capacity (NGC): maximum electrical net active power that can be produced throughout a long period of operation in normal conditions
- Reliably Available Capacity (RAC): the capacity which is available to power plant operators and electricity traders
- Adequacy Reference Margin (ARM): required level of capacity to provide the expected level of security of supply



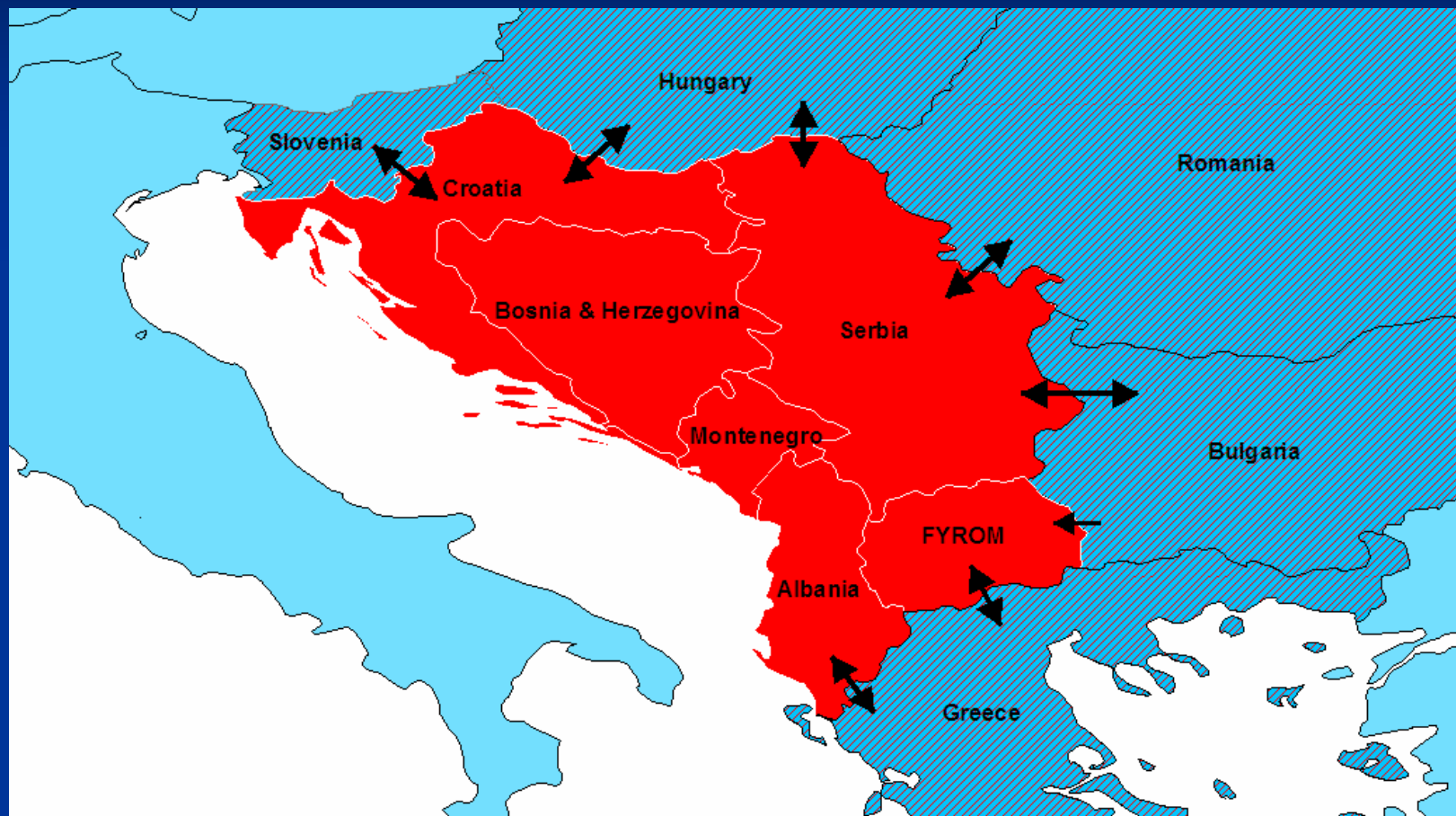
# Methodology

- Net generating capacity
  - Present capacity plus the future generation projects whose commissioning is certain
- Reliably Available Capacity
  - UCTE methodology
- Load
  - Fixed monthly profile
  - Annual growth rate
  - Random variation of day to day load

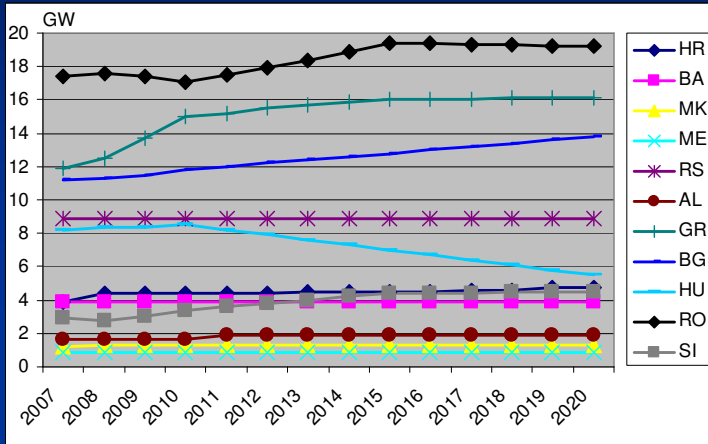
**A Monte Carlo model** generates random dates and respective loads and generating capacities



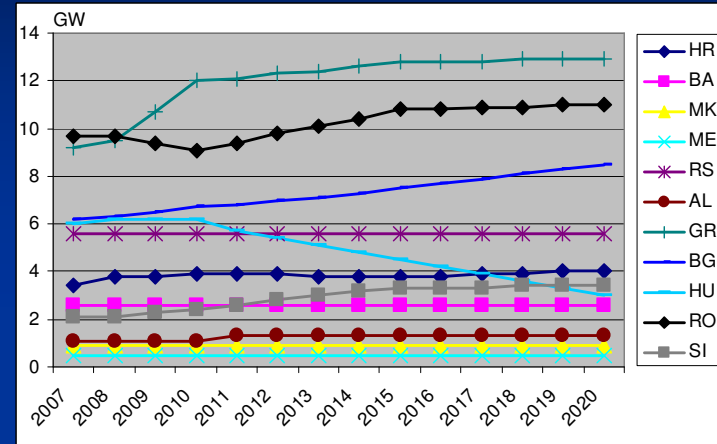
# Application to Energy Community



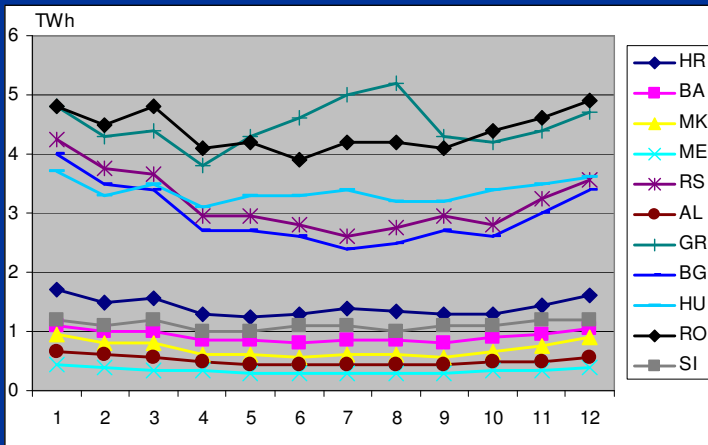
# Input data



Net generating capacity



Reliably available capacity



Monthly load profile

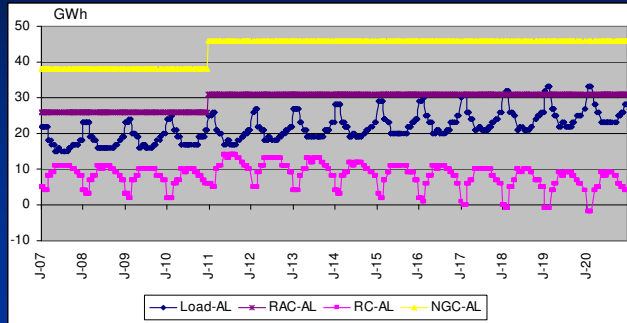
|     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| AL  | BA  | HR  | MK  | ME  | RS  |
| 4.0 | 3.0 | 3.2 | 2.5 | 0.7 | 1.1 |
| GR  | BG  | HU  | RO  | SI  |     |
| 3.5 | 1.6 | 2.0 | 2.6 | 2.9 |     |

Annual load growth (%)

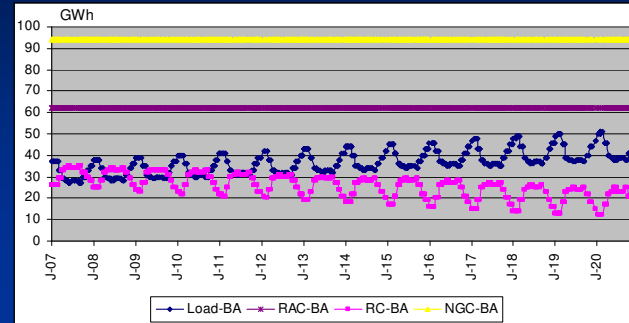


# Results

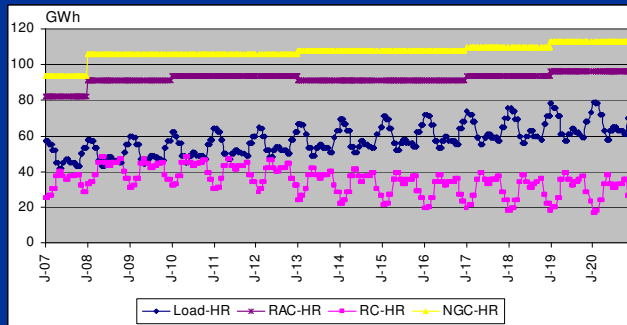
AL



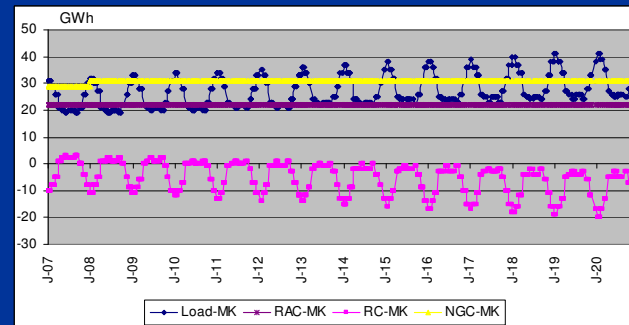
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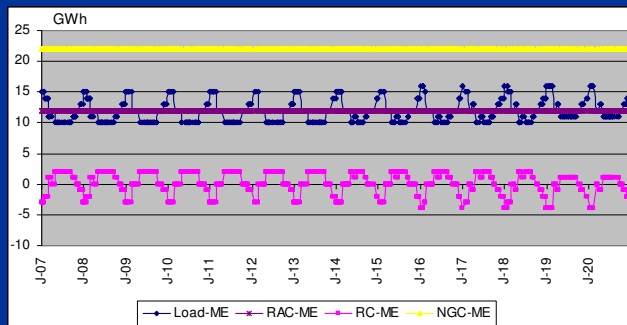
HR



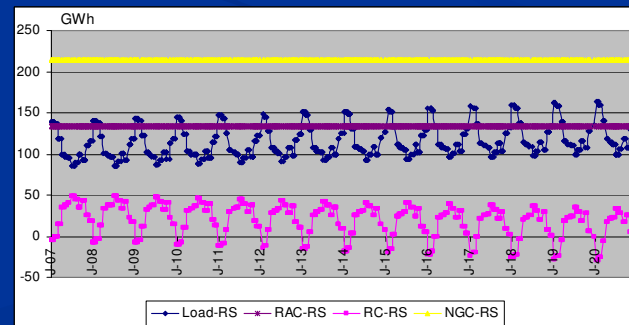
MK



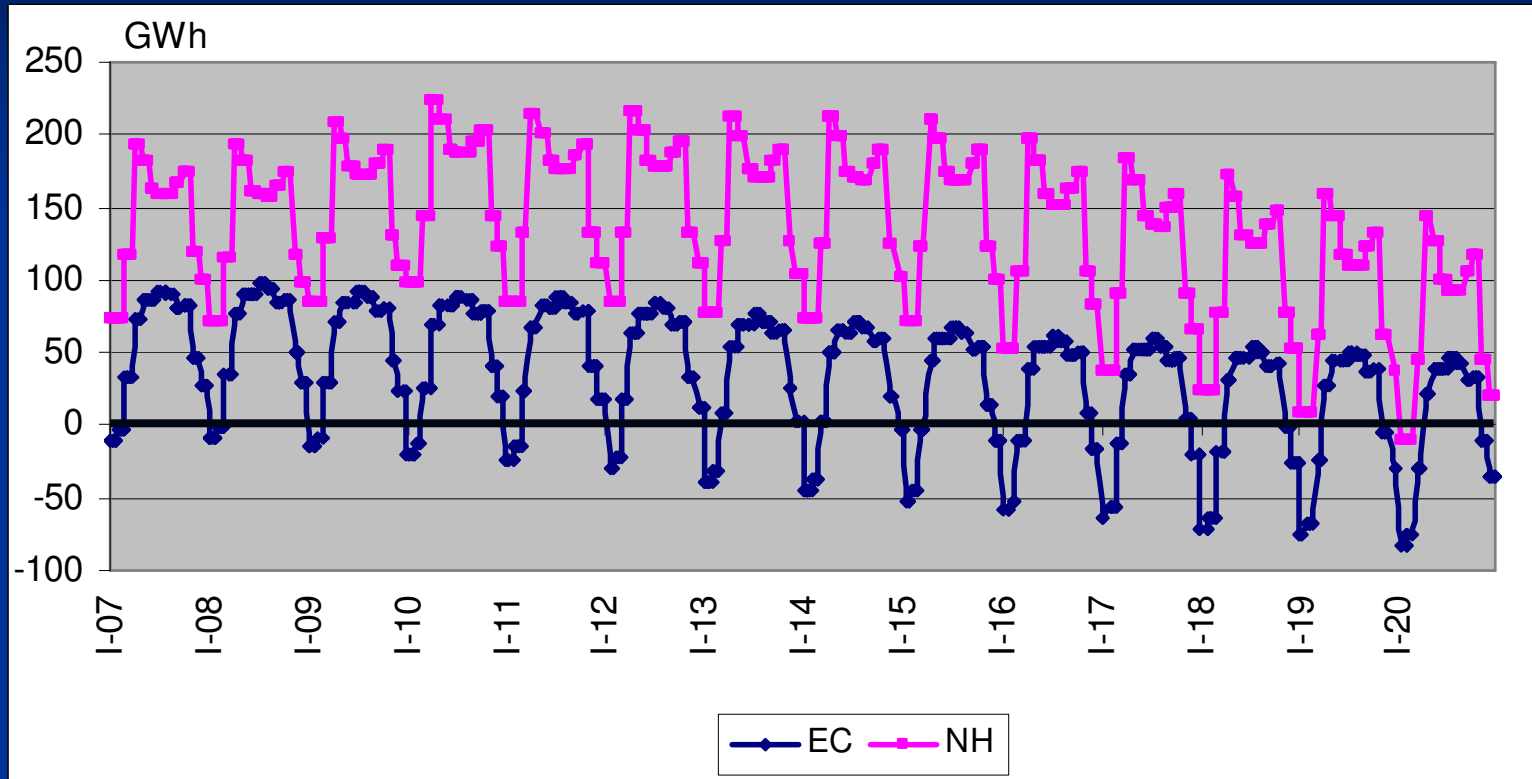
ME



RS



# Results



EC: HR, BA, MK, ME, RS, AL

NH: GR, BG, RO, HU, SI



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# Conclusions (model)

- Fully parameterized model
- Capability of introducing random variables and events
- Daily results
- Quick run-time





# Conclusions (application)

- A number of EC countries lack generating capacity
- A common power market improves EC regional adequacy and utilizes economies of scale
- EC countries can depend on imports from neighboring regions for about a decade
- Investments to ensure adequacy are needed, preferably of regional scale



# Contact us

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**Thank you!**



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