# MULTISHARM

User meeting March 13th 2019

Marte Fodstad

# Day-ahead Bidding with Multiple Short-term Markets

- Research project approaching the end
- Short-term bidding and scheduling
  - SHOP/SHARM
  - Market modelling
  - Stochastic optimization

The Research Council of Norway

Statkraft

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Hydro

agder energi

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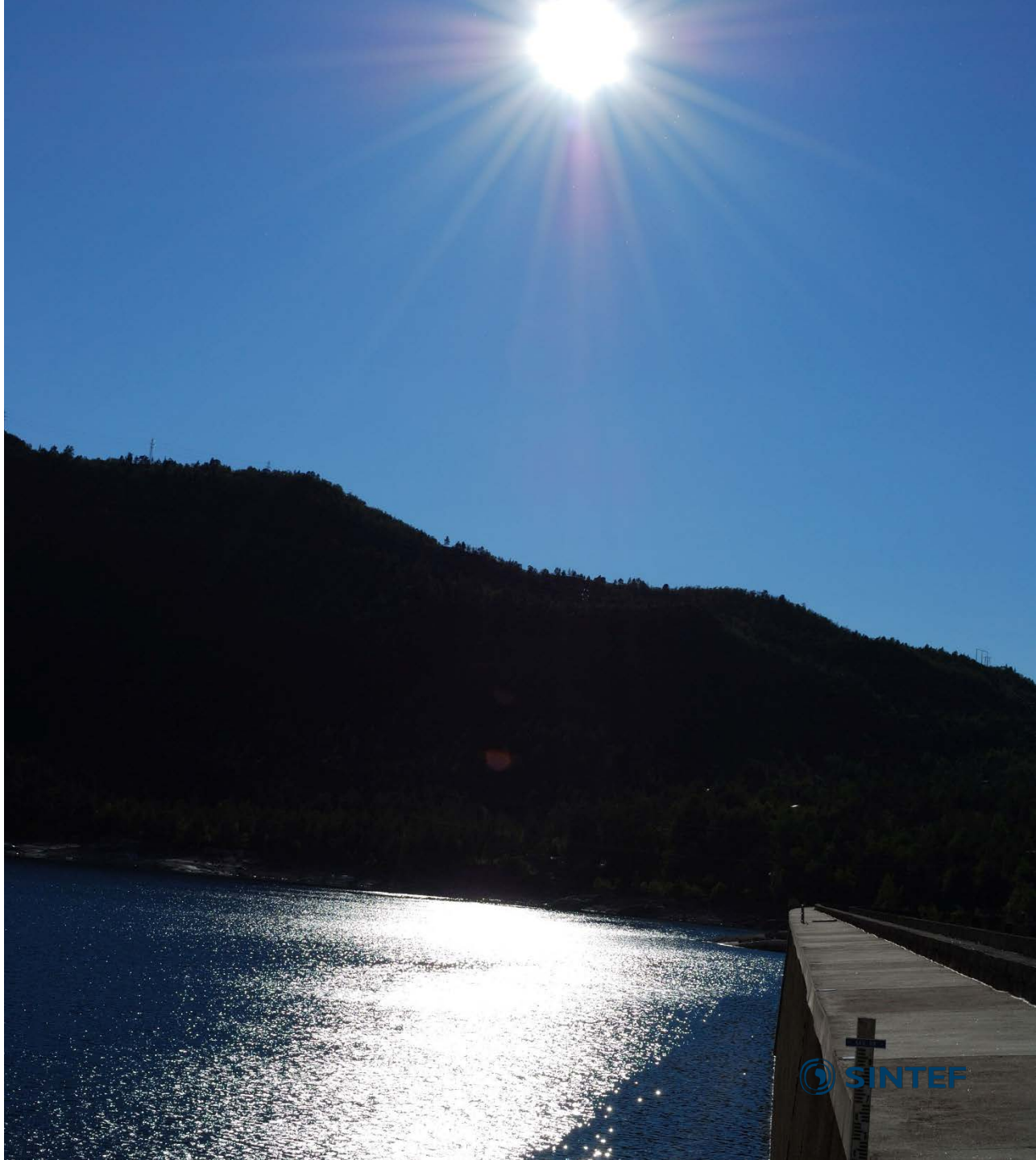
# Evaluate different market approaches

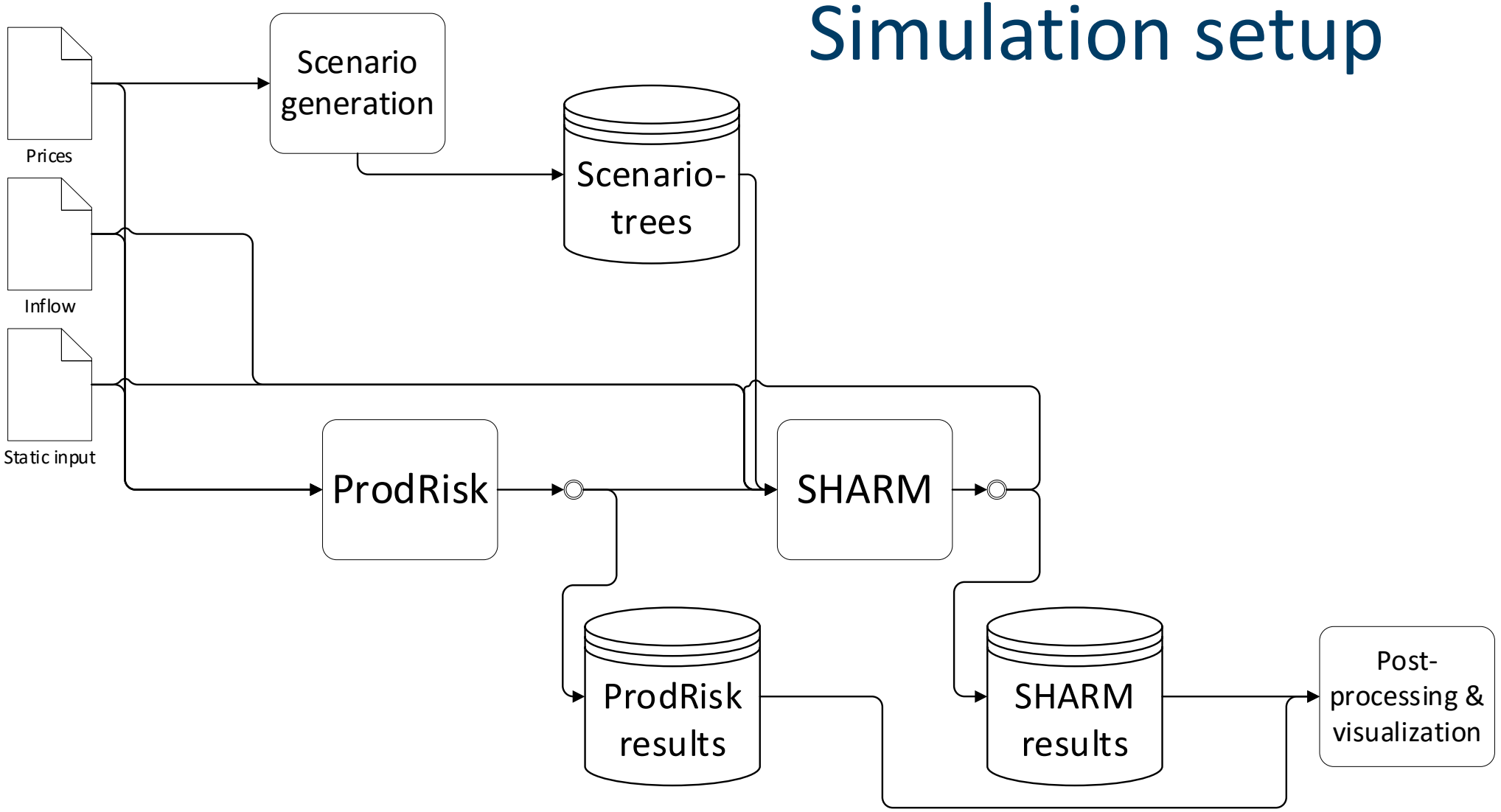
- Market approaches
  - DA = Single market trade
  - DA-ID = Sequential trade
  - DA+ID = Coordinated trade

- Multiple markets in one optimization model?

=> need proper representation of uncertainty!



# Simulation setup



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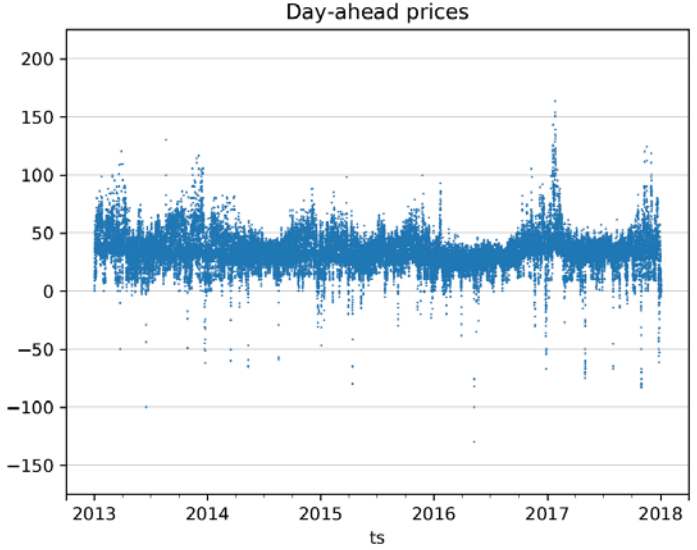
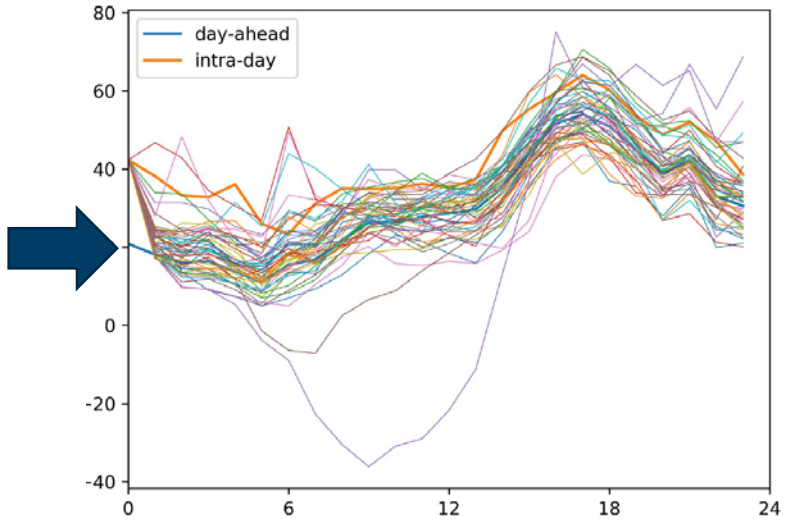
# Market modelling




- Descriptive statistics to understand market properties and guide scenario generation approach
- Uses historically realized prices as "actual"
  - =Known current price
- Identify "similar" states from history and reuse the price paths from these states in scenario tree
  - =Uncertain future price



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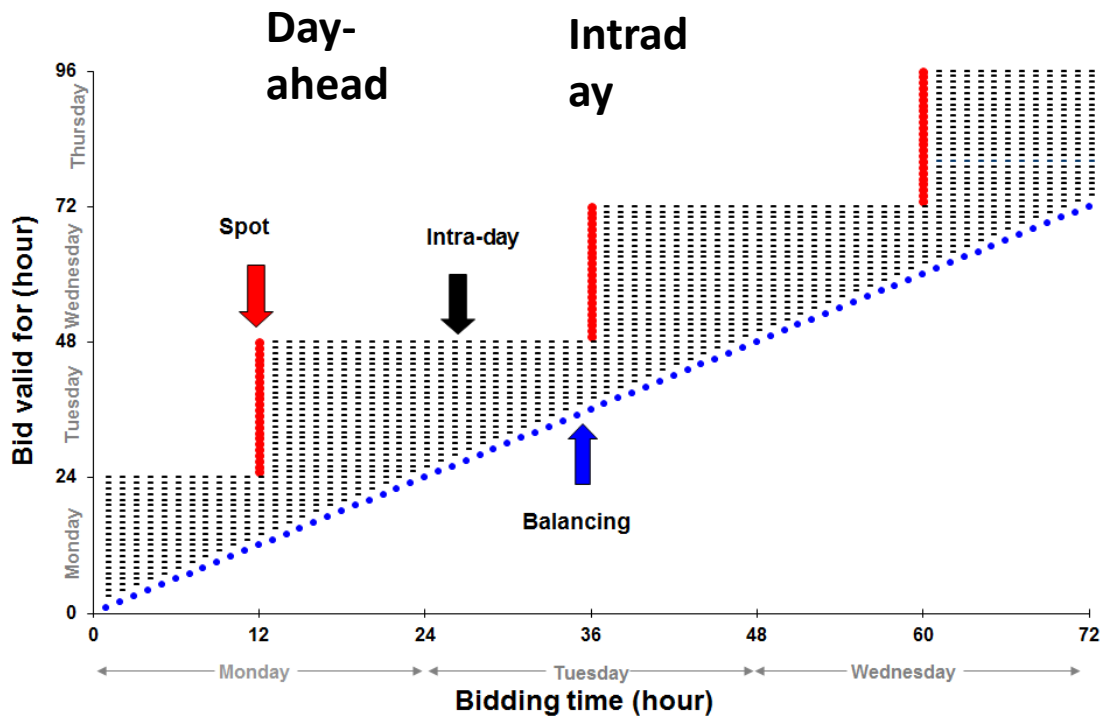
# Simulate decision process

- DA trade at noon for the coming day
  - Calculates 24h batches
  - Sale only
- Hourly ID trade close to operating hour
  - Calculate hour-by-hour
  - Sale and purchase



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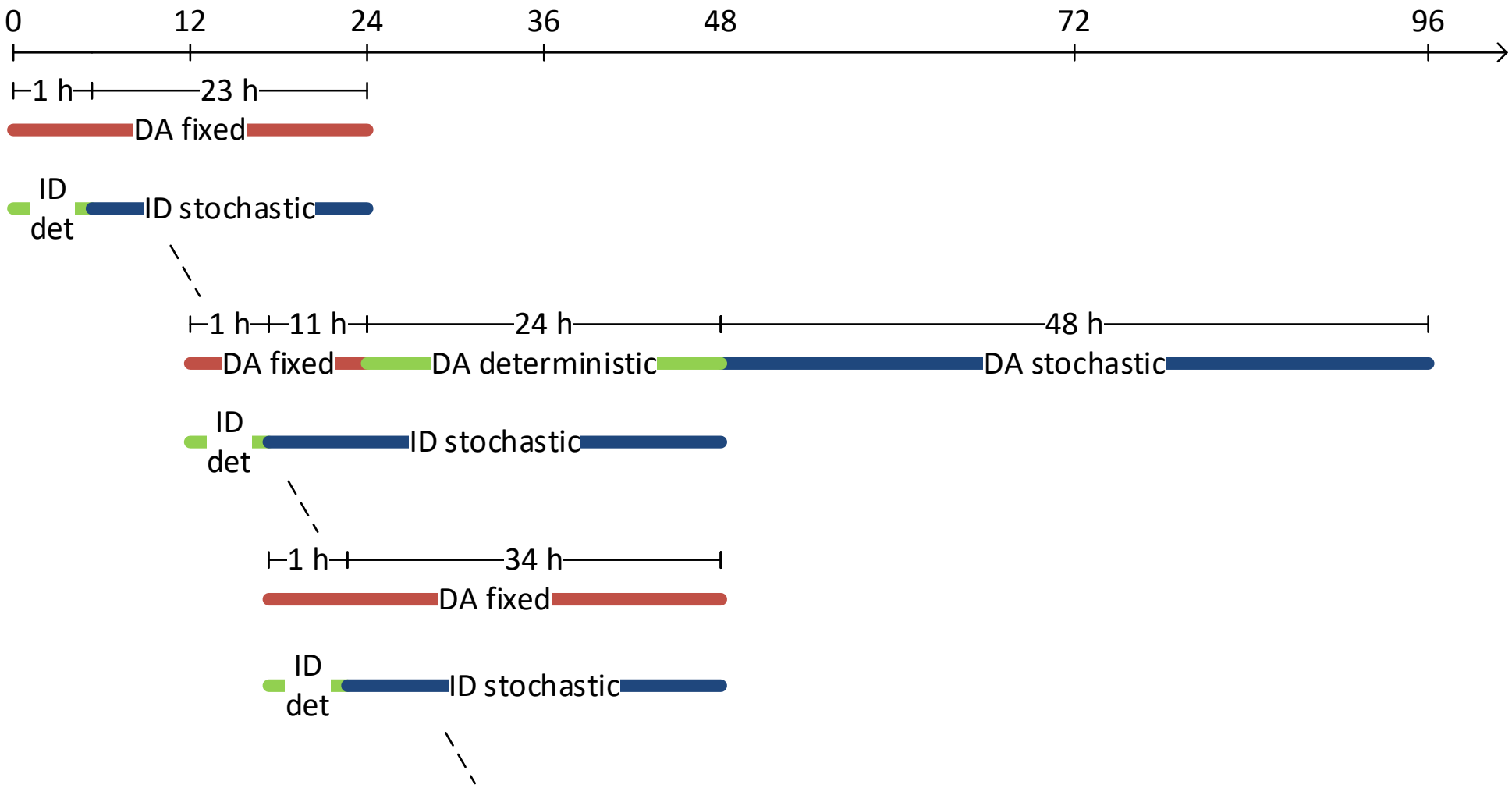
# Simulate decision process



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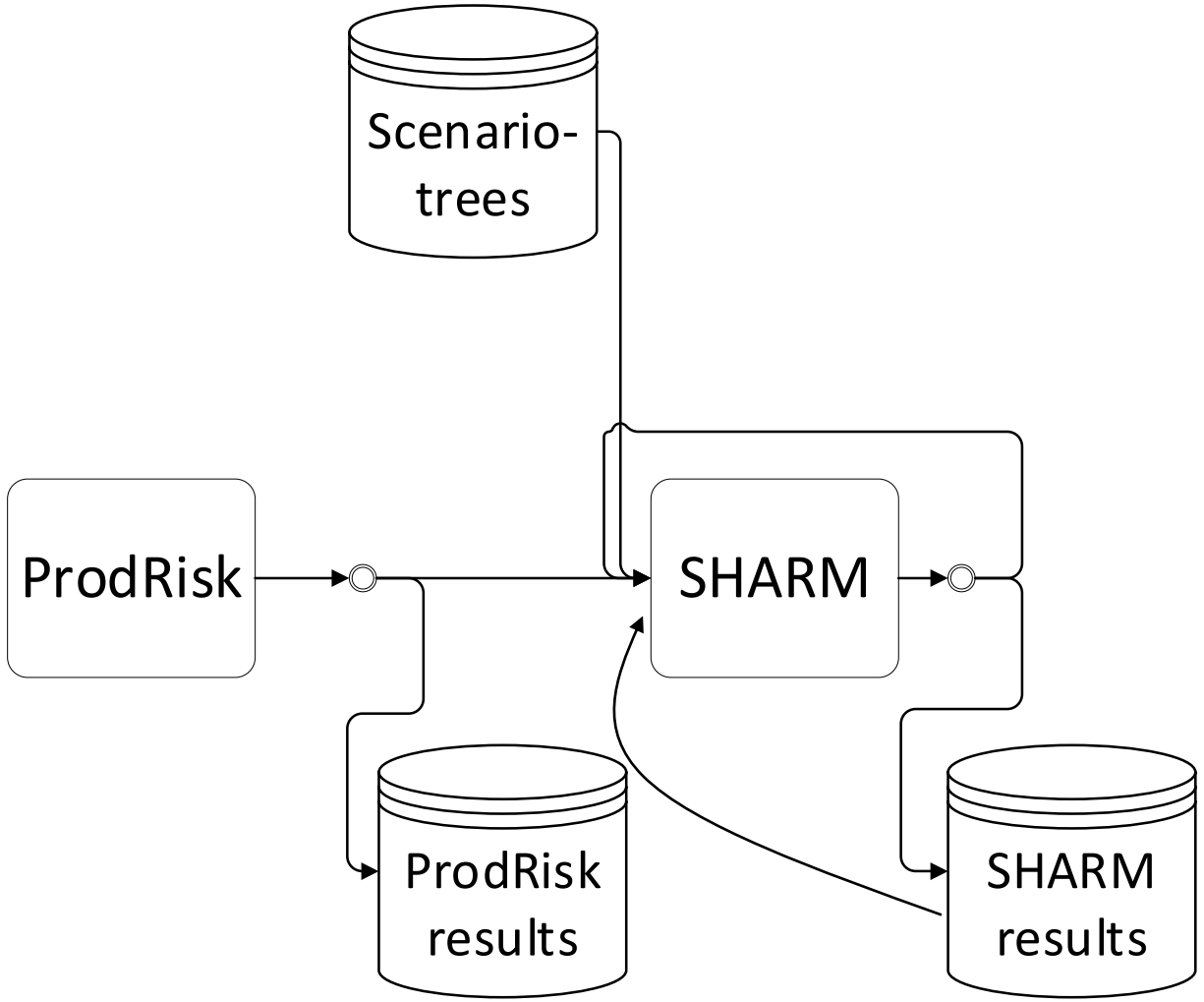
# Model interaction

- Weekly water values (cuts) calculated by ProdRisk up front
- SHARM(t) -> SHARM(t+1)
  - Reservoir level
  - Generator state
- SHARM(DAonly) -> SHARM(DA-ID)
  - DA sale become load



# Evaluation of market approaches

Market approaches
- DA
- DA-ID
- DA+ID

- Benchmarking between different simulations
- Each simulation is allowed to develop freely over the simulation horizon
  - End valuation of reservoir important as levels might be substantially different
- Optimization horizons largely overlapping – need post processing of objective values for comparison

# Experiences

- Python APIs very flexible and useful for large number of optimisation runs
- Particularly useful with stochastic model –> large amounts of data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