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Flexibility & process planning: Case study Prayon Engis steam turbine

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Intro

Want to know more?

Scan and get more **insights**

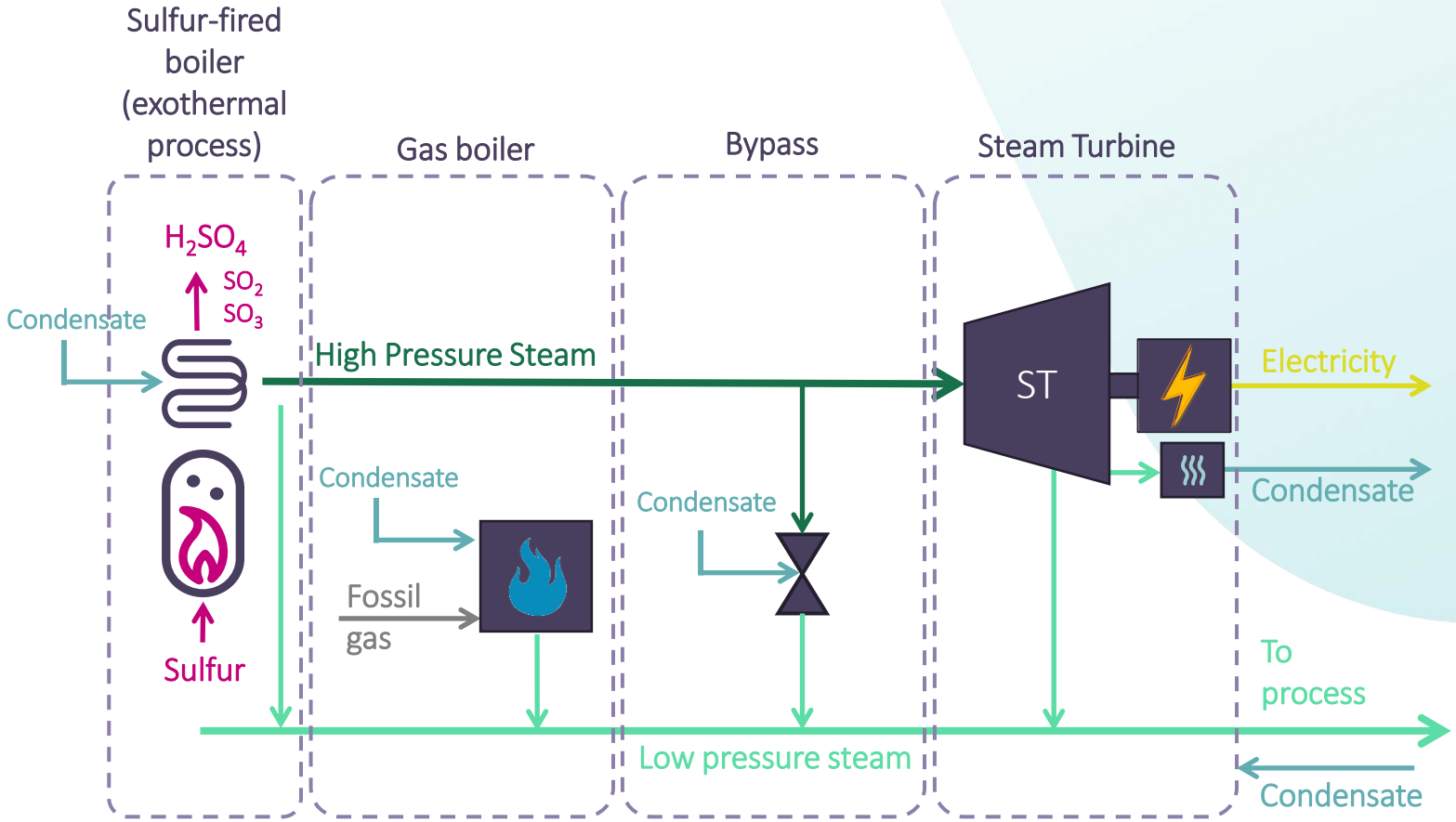
This is what will happen

- We ask to answer some questions, for our survey ‘industrial flexibility’
- You get in return
  - **Access to use cases with detailed information**
  - **The (anonymous) results of the survey**
  - **Slide with flex revenues for different use cases**

Prayon Engis steam system

Simplified schematic overview

- Producing sulfuric acid is an exothermal process.
- Valorise chemical heat by means of steam turbine with low pressure (LP) steam tap & condensor
- LP steam is used in other processes
- LP steam can also be produced by bypassing the steam turbine or with a fossil gas boiler



Case study Prayon Engis steam turbine

How the flexibility is valorised…

- Default operational mode
  - fullfill LP steam demand with ST tap, remaining HP steam to produce electricity

- Provided flexibility
  - Prayon successfully offered steam turbine flexibility on '***mFRR up***' market for several years with aggregator
    - = produce more electricity on demand, by closing low pressure steam tap
  - Prayon occasionally went to '**full electricity mode**' when day-ahead spot prices were extremely high
    - Alternative to providing mFRR up service

- Solution
  - **Energy efficient process**: maximum heat recuperation & production of electricity with waste heat
  - **Additional value** from **flexibility**

Case study Prayon Engis steam turbine

...proves to be suboptimal & more difficult than on first sight

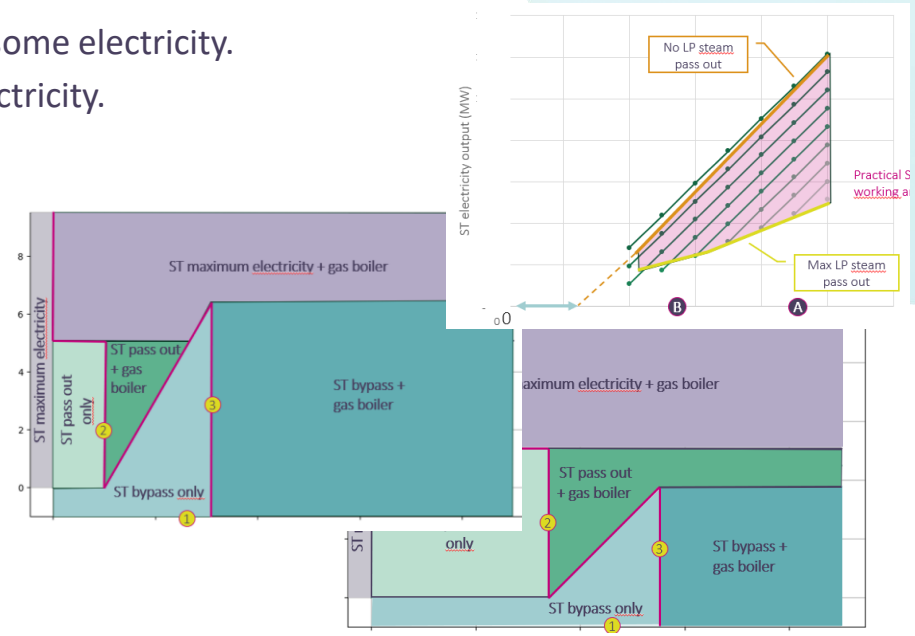
Some limitations:

- Possible mFRR capacity varies with the availability of HP steam, resulting from the variability of the sulfuric acid production. Results in suboptimal solution: **penalties** when less HP steam & **missed opportunity** when more HP steam available
  - **Process planning** has impact – link between process & mFRR capability was unclear
  - Manual interaction by operators to communicate mFRR capability to aggregator
- Decision to go to “full electricity mode” requires **many manual actions** by Prayon operators & staff: fetching of energy market prices, strike price calculations, communications with aggregator, communicate with planning, etc.
- Solution proved to bring value, but was considered to be suboptimal for Prayon

Case study Prayon Engis steam turbine

How to optimise & automate? Not so straight forward…

- Industry typically operates in fixed regime, with focus on process & energy efficiency
  - Enter energy transition: prices become volatile (negative!)
- Process options: What to do with the HP steam?
  - Maximise electricity production. Make low pressure steam with fossil gas.
  - Extract low pressure steam from turbine, condense remaining HP steam. Make some electricity.
  - Make low pressure steam over bypass. Do not use steam turbine to produce electricity.
- Market options: Which energy markets to address?
  - Sell/buy electricity on day-ahead market. Need to nominate?
  - Imbalance exposure?
  - Providing services to Elia (FCR, aFRR, mFRR). What is the value?
- Operational constraints
  - Less sulfuric acid production is less HP steam and thus, limited steam turbine capabilities
  - Steam turbine characteristics
  - **Production planning** gives insights into future capabilities

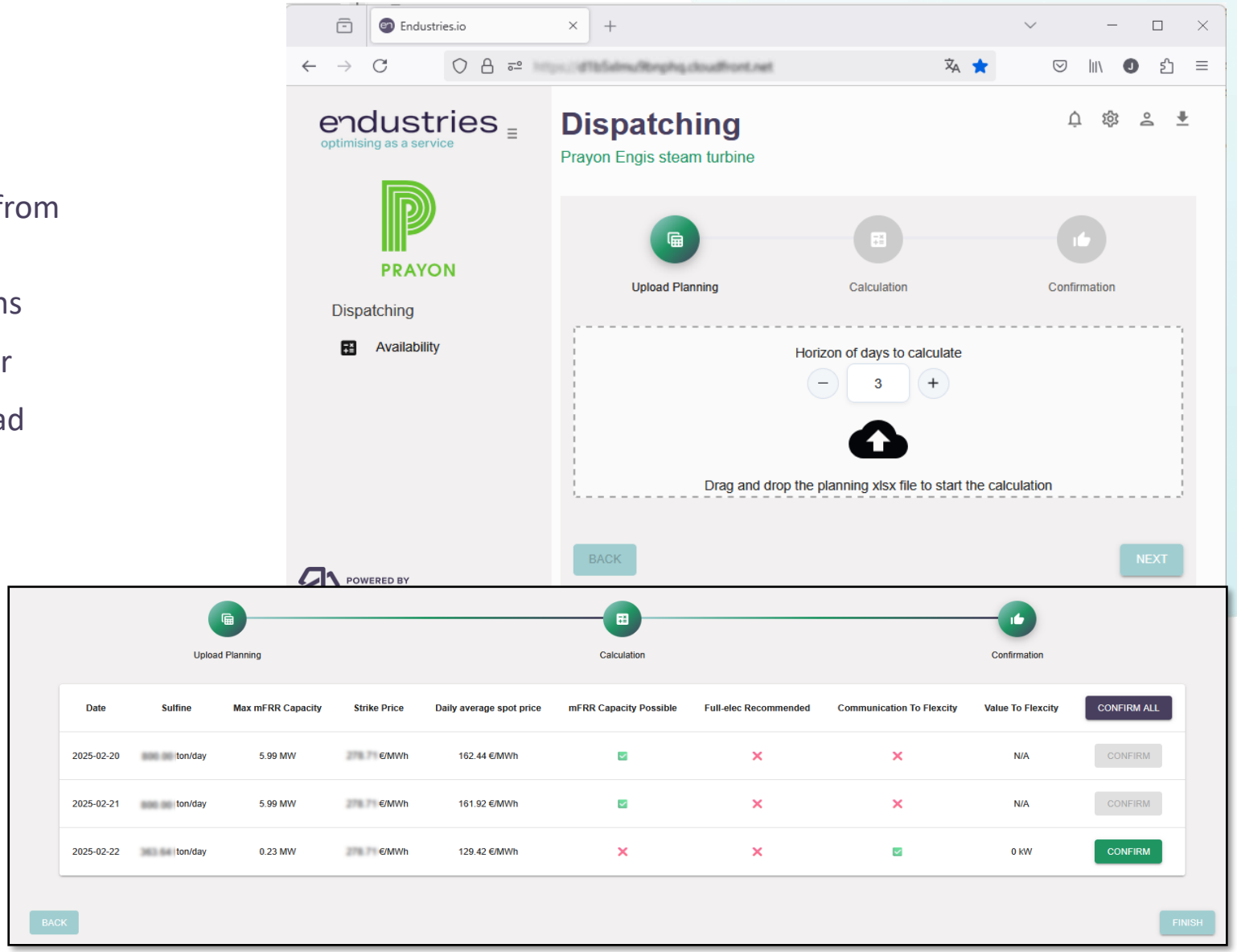


Multi-dimensional problem with technical, operational, economical & timing constraints

Endustries tool by Entras

For Prayon Engis

- Easily integrates with their system, starting from their process planning files
- Automates all calculations & communications
- Single click confirmation by process operator
- Reduce mFRR penalties & increase day-ahead opportunities = increased flex revenue



Why us?

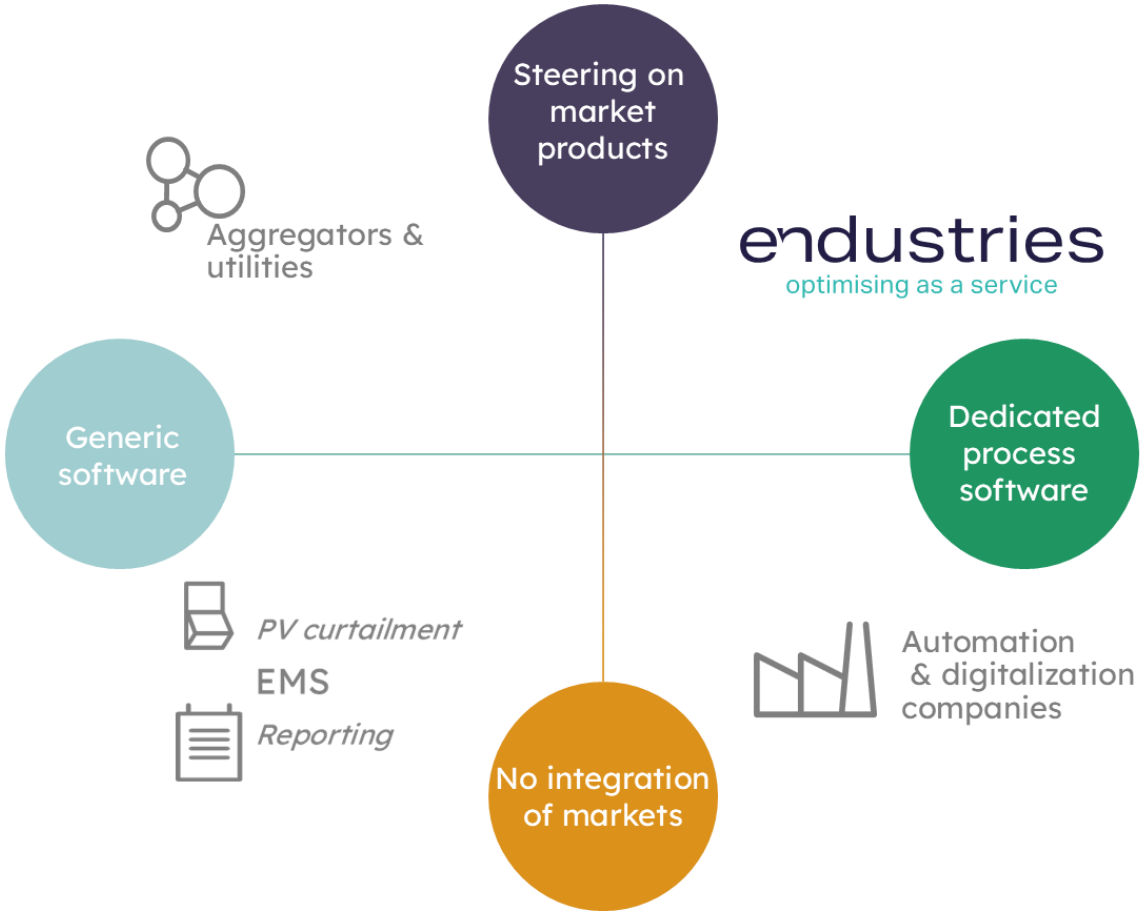
#1 › **Process first**
all technical & operational constraints are respected by the algorithm

#2 › **Integrated**
optimizes process *and* economics
easy integration with existing EMS and local control & safety logics

#3 › **Independent**
customer remains free to choose his energy supplier & aggregator

The market

Unique positioning to unlock industrial flexibility



Outro

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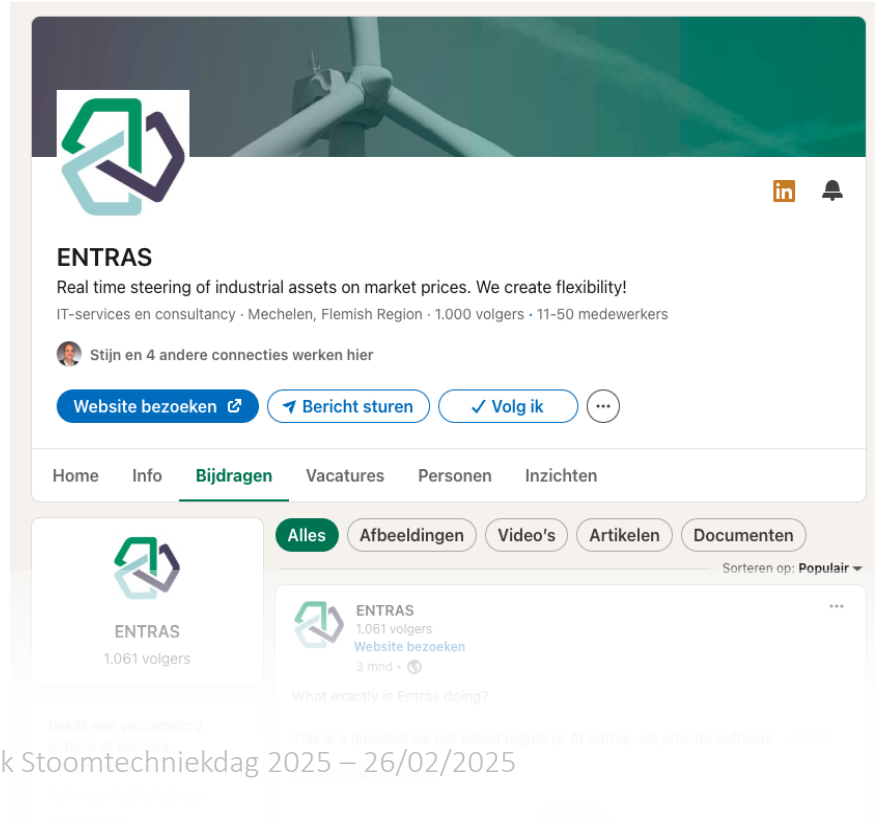


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