

OMOptim presentation

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Context

Two projects

- *Mines ParisTech* : CERES : energy efficiency in industrial processes
 - Key parameters
 - Technology choices
- *PELAB* : SSF Proviking EDOp
 - Dynamic optimization

What is OMOptim ?

What OMOptim intends to be ?

Optimization **platform** designed to :

- Facilitate algorithms development
- Share optimization functions
- Apply optimization easily and efficiently

Two main users

Academics

A platform to **develop and test optimization methods**

Industrial

A user-friendly tool to **perform process optimizations**

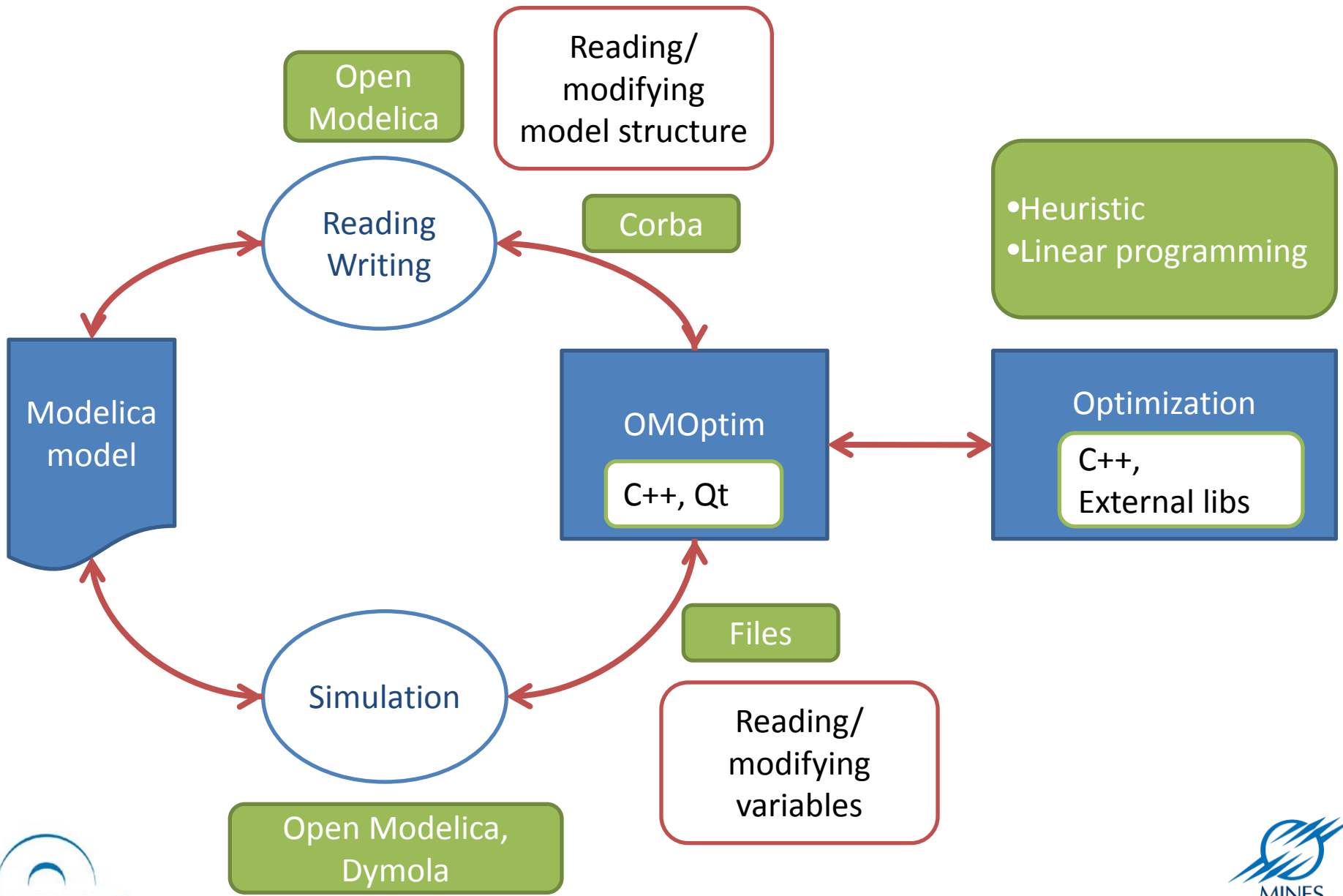
Types of problems

- Static parameters' optimization
- Structure optimization
- Data reconciliation
- Parameter estimation
- Sensitivity analysis
- Dynamic optimization
- ...

OMOptim

Current version OMOptim 0.9

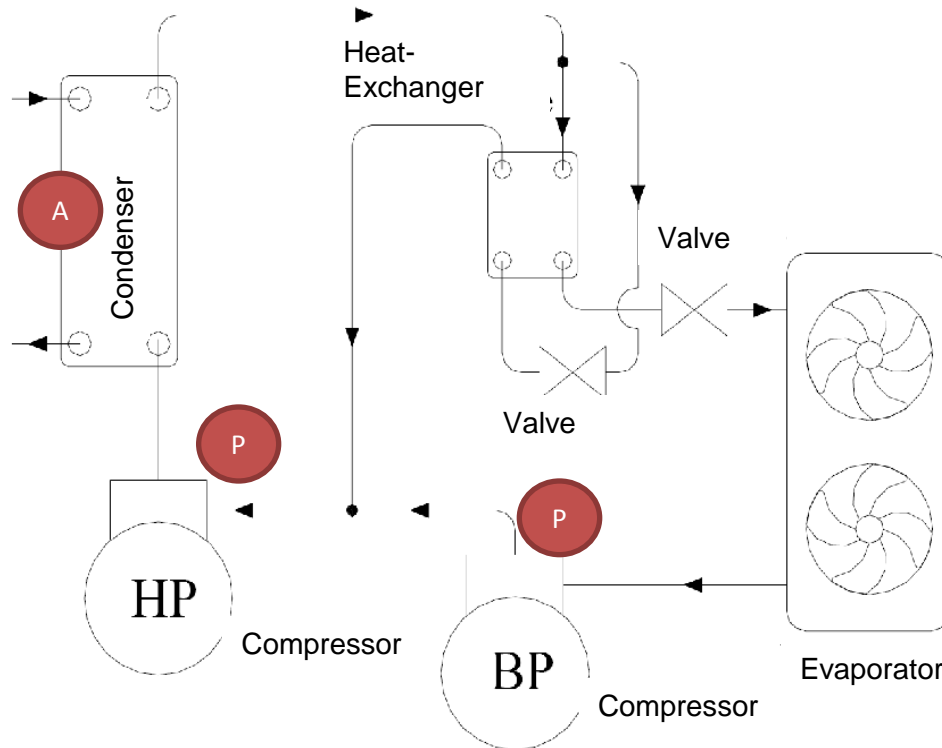
OMOptim – Current structure



What OMOptim can do ?

Static parameters optimization

e.g. Optimization of heat-pump parameters



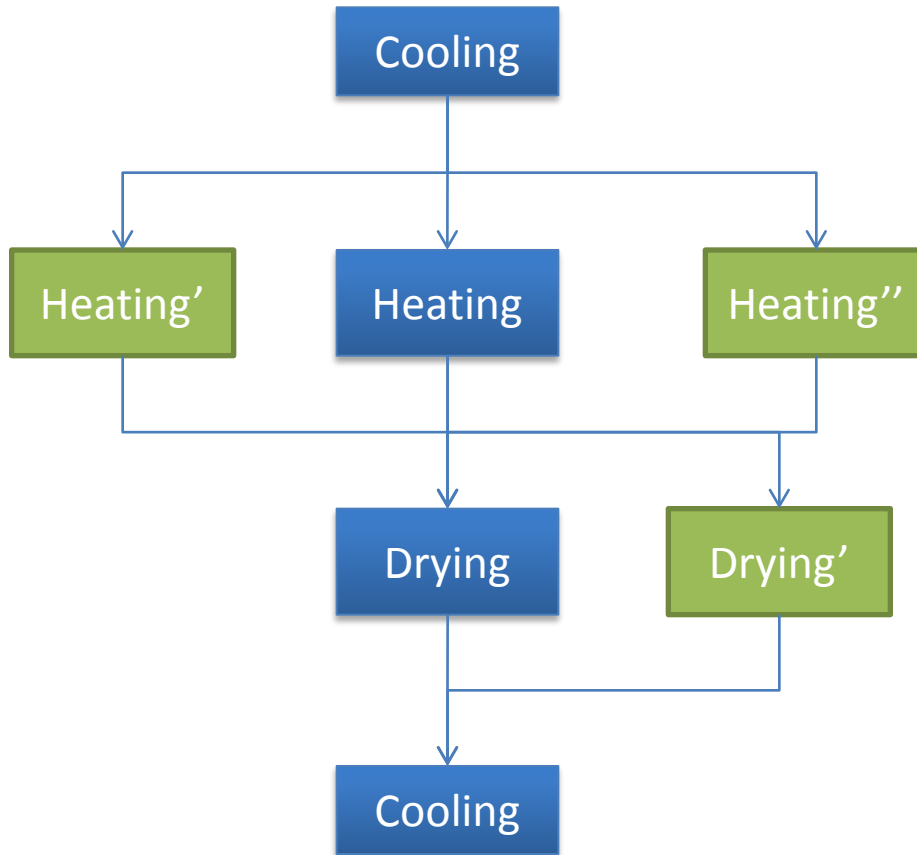
- pressure levels
- heat-exchanger area

- Parameters are static : constant during one simulation
- Simulation can still be dynamic

What OMOptim can do ?

Structure optimization

Structure optimization



- Introduction of alternative options
- Optimal choice

Structure optimization

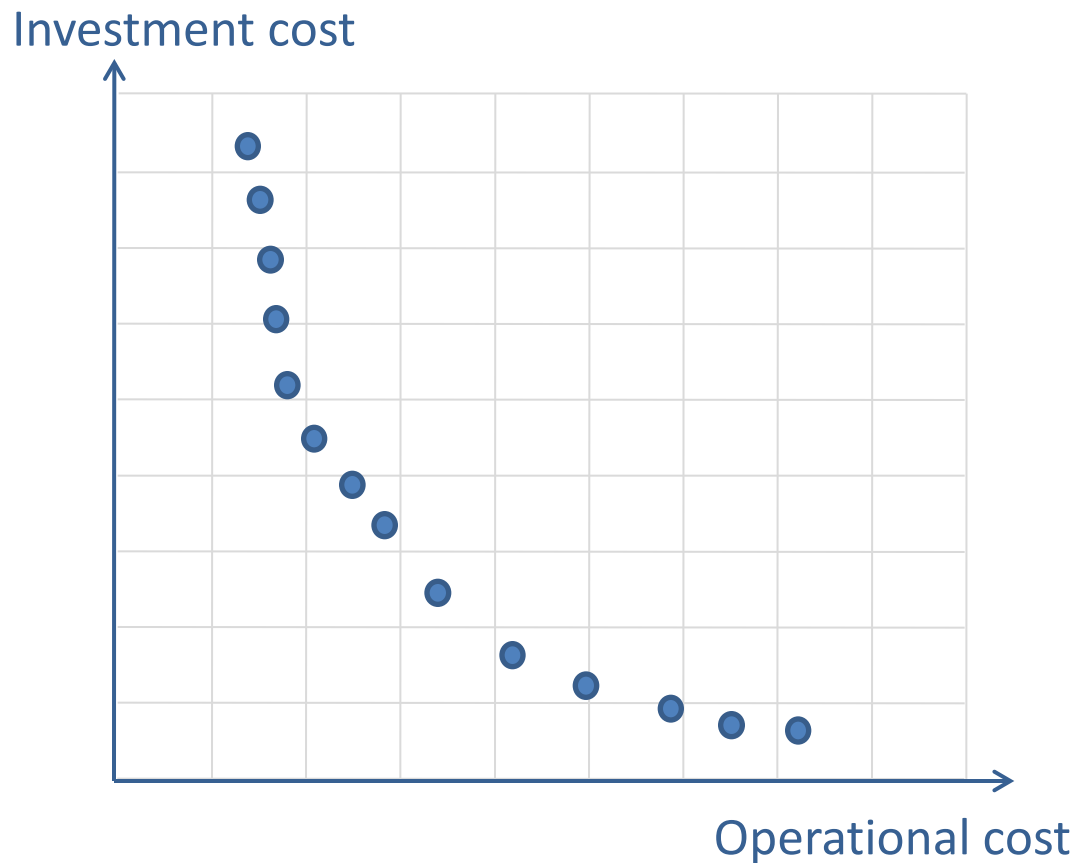
- Current :
 - One compilation per configuration
- Challenge :
 - « Dynamic » change of model structure

What OMOptim can do ?

Which objectives ?

Multi-objectives

Pareto criteria allows several objectives simultaneously



What does it look like ?

Model structure

Model Variables

Optimized parameters

Optimized Objectives

The screenshot displays the MinEIT software interface with the following components:

- Model structure (left panel, red border):** A tree view listing model components such as Pc, Va, Vb, Ia, Ib, Ic, Ea, Eb, Ec, coutdinvestissement, gaincoutoperationnel, EmCO2PAC1, Ca, Cb, Cc, Puissae, Puissbe, Puissce, n, na, nb, nc, OCb, OChp, coutdefonctavecPAC, TOSygmaA, TOSygmaB, TOSygmaECS, COPECSSystem, PElecECSMax, EchIAOutCold, Sortieeffluents, echA, Sourcemod, scenarioEchA, scenarioPACA, and echB.
- Model Variables (center panel, green border):** A table listing variables with their values and descriptions. The table is filtered and contains the following data:

Name	Value	Description
global.sourceeadeville.h	1,18294e+06	[J/kg]
global.sourceeadeville.flowPort.p	100000	
global.sourceInEchColdB.h	1,41347e+06	[J/kg]
global.sourceInEchColdB.flowPort.p	100000	
global.sourceInEchColdB.debit	12,78	[kg/s]
global.sourceEffluentsECS.h	1,35495e+06	[J/kg]
global.sourceEffluentsECS.flowPort.p	100000	
global.sourceEffluentsECS.etat	1	
global.sourceEffluentsECS.debit1	0	
global.sourceEffluentsECS.debit	1	[kg/s]
global.sourceEffluentsB.h	1,35495e+06	[J/kg]
global.sourceEffluentsB.flowPort.p	100000	
global.sourceEffluentsB.etat	1	
global.sourceEffluentsB.debit	1,22612	[kg/s]
global.sourceEffluentsA.h	1,35495e+06	[J/kg]
global.sourceEffluentsA.flowPort.p	100000	
global.sourceEffluentsA.etat	1	
global.sourceEffluentsA.debit	0,601234	[kg/s]
global.scenariosourceEadeville.debit	0,940001	[kg/s]
global.scenariodepartB.z	0	
- Optimized parameters (right panel, blue border):** A table listing optimized variables with their descriptions and optimal minimum values.

Name	Description	Opt Minimum
global.sourceEffluentsB.debit	[kg/s]	0
global.sourceEffluentsA.debit	[kg/s]	0
global.scenarioPACB.MySpecPcomp		0
global.scenarioPACA.MvSpecPcomp		0
- Optimized Objectives (bottom right panel, orange border):** A table listing optimization objectives with their descriptions, directions, and values.

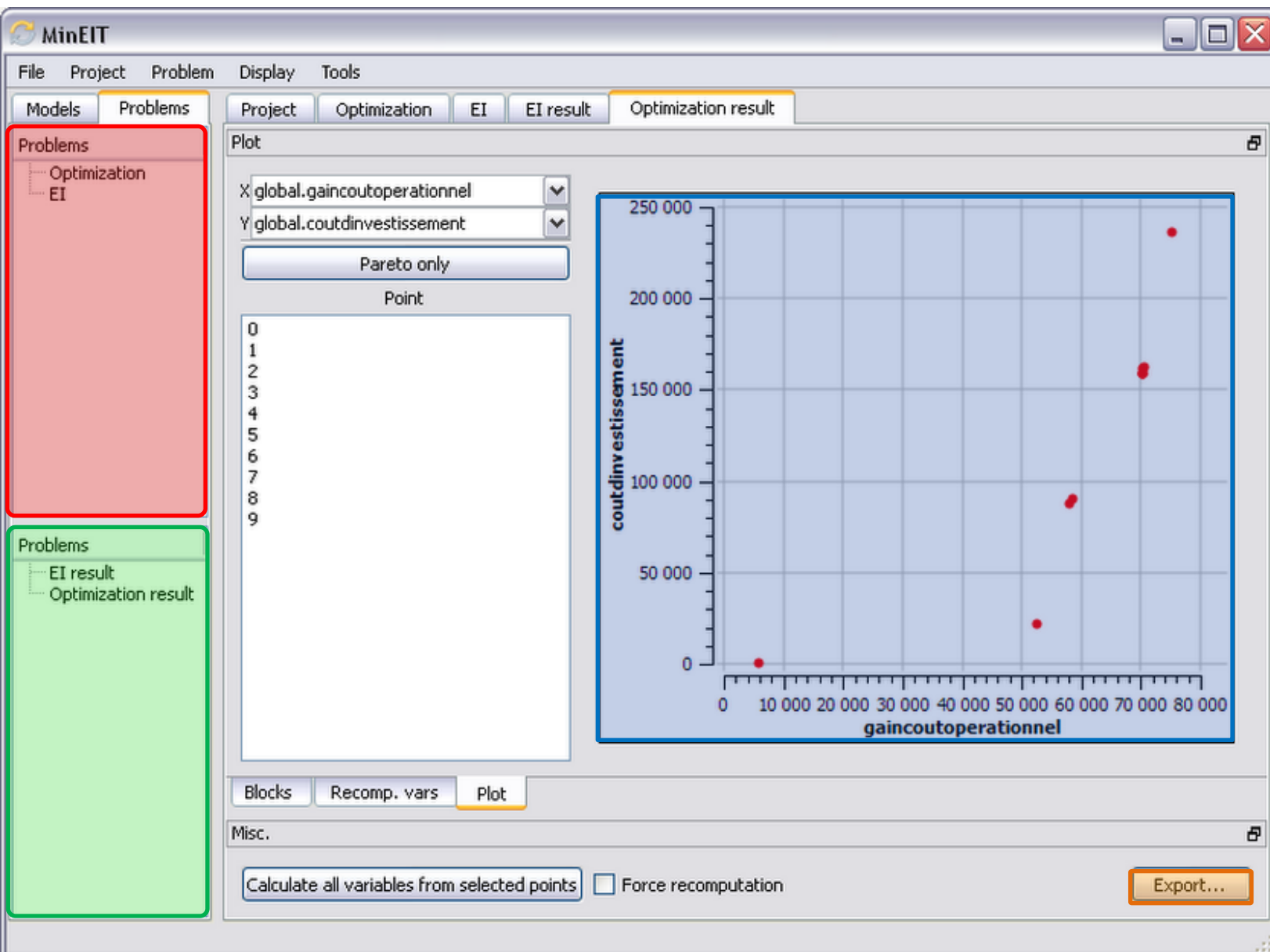
Name	Description	Direction	M
global.gaincoutoperationnel		Maximize	0
global.coutdinvestissement		Minimize	0

Problems

Solved problems

Result plot

Export result data .csv



Future work

To be done ...

- Finalize OMOptim structure
- Strengthen link Simulation – Optimization
 - Derivative information
 - Structural change
 - Parallelization
 - Dynamic optimization
- Organize sharability of optimization functions

OMOptim for you...

- You're welcome to use it and to develop in !
- Version is still 0.9
- Share our ideas about structure, algorithms...

Thanks for your attention