Esylys Energy

Data Driven Decision Making

Data has replaced oil as the most valuable commodity in the world. Companies are switching to digital and data driven decision making from traditional methods like testing, prototyping, proof of concept and installation workflows.

But how exactly does it work?

The key to understanding how data helps is to use the DIKW philosophy which was developed as an answer to a question posed by the American poet, **T.S. Eliot**.

Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?

T.S. Eliot, *The Rock (1934)*

Engineering decisions therefore should be taken after crystallising wisdom out of data.
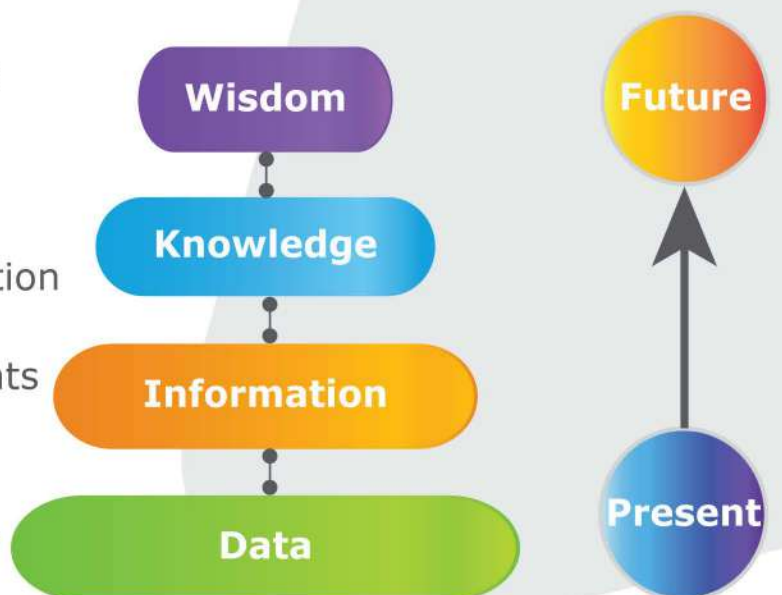
The DIKW (Data, Information, Knowledge, Wisdom) Model.

Reflecting back, understanding patterns, increasing awareness

Planning, sharing, analysing and discussing the quantified information

Results of simulations, experiments or audits using the raw data

Non quantified raw information, trends, or possibilities

Wisdom

Knowledge

Information

Data

Future

Present

What does this mean in real-life engineering ?

Analysing a future prototype or an idea requires...

Predicting the behaviour of complex engineering systems or plants in real time

This can be done either by making prototypes and extensive testing

But both these methods are expensive and not feasiblefor small scale engineering entities

The next option would be to use complex simulations

But that involves understanding really complicated equations and algorithms used mostly in academia

Well what if ......

Engineering prototypes from simple components to complex plants could be simulated

And all it takes is......

Opening the web browser and clicking some buttons

What is RENLE?

RENLE (Renewable Energy Library- ESYLYS) is a library of components from which a digital twin of an engineering idea can be assembled

What base components does it contain?

Several basic components for hydraulic, electrical and thermal applications are available.
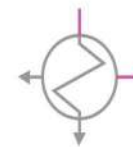
What types of engineering systems can be assembled from the components?

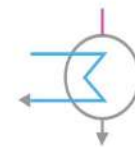Any scientifically valid combination of hydraulic, electrical or thermal components could be simulated

Thermal Components

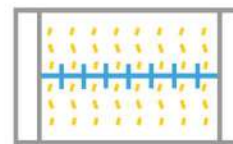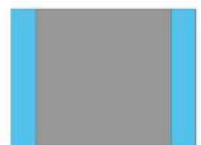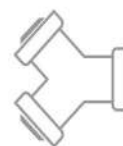|			
Water heater	Heat Exchanger (Gas-Gas)	Heat Exchanger (Liquid-Gas)	Spray Condenser
Boiler	Oven with finned tube	Combustion Chamber	Barometric Condenser

Fluid Components

Mixer	Accumulator	Drum	Barrage
Flow Junction	Reservoir	Tank	Finite Element Tube

Mechanical/Control Components
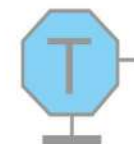
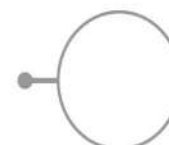|			
Turbine	Flow Sensor	ID Fan	Fluid Source
Valve	Pump	State Sensor	Fluid Sink
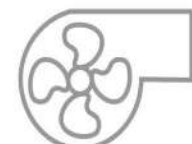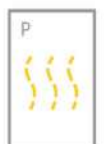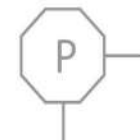
Electrical Components

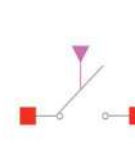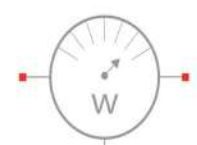|			
Transmission Line	Grid	Generator	Network Grid
Load	Breaker	Frequency Sensor	Power Sensor

What does this mean in real-life engineering ?

Digital systems are assembled

User sets parameters and simulates in the browser

Cloud Computing Engine (ESYLS) updates the results in real time

How does it look at the user end?

Process Flow Diagram

Real Time Simulation Results

esylys

Simulation Overview

Ramp
duration=1s

Source

Steam Turbine

Ramp1
duration=1s

Sink
Constant Speed

3000/60

Simulation Result vs Actual Reading

Torque[Nm]

100k

80k

60k

40k

20k

0

1   2   3   4   5   6   7   8

Time[s]

Simulation Result
Actual Reading

Design Speed   500   rpm
Inlet Temperature   600   K
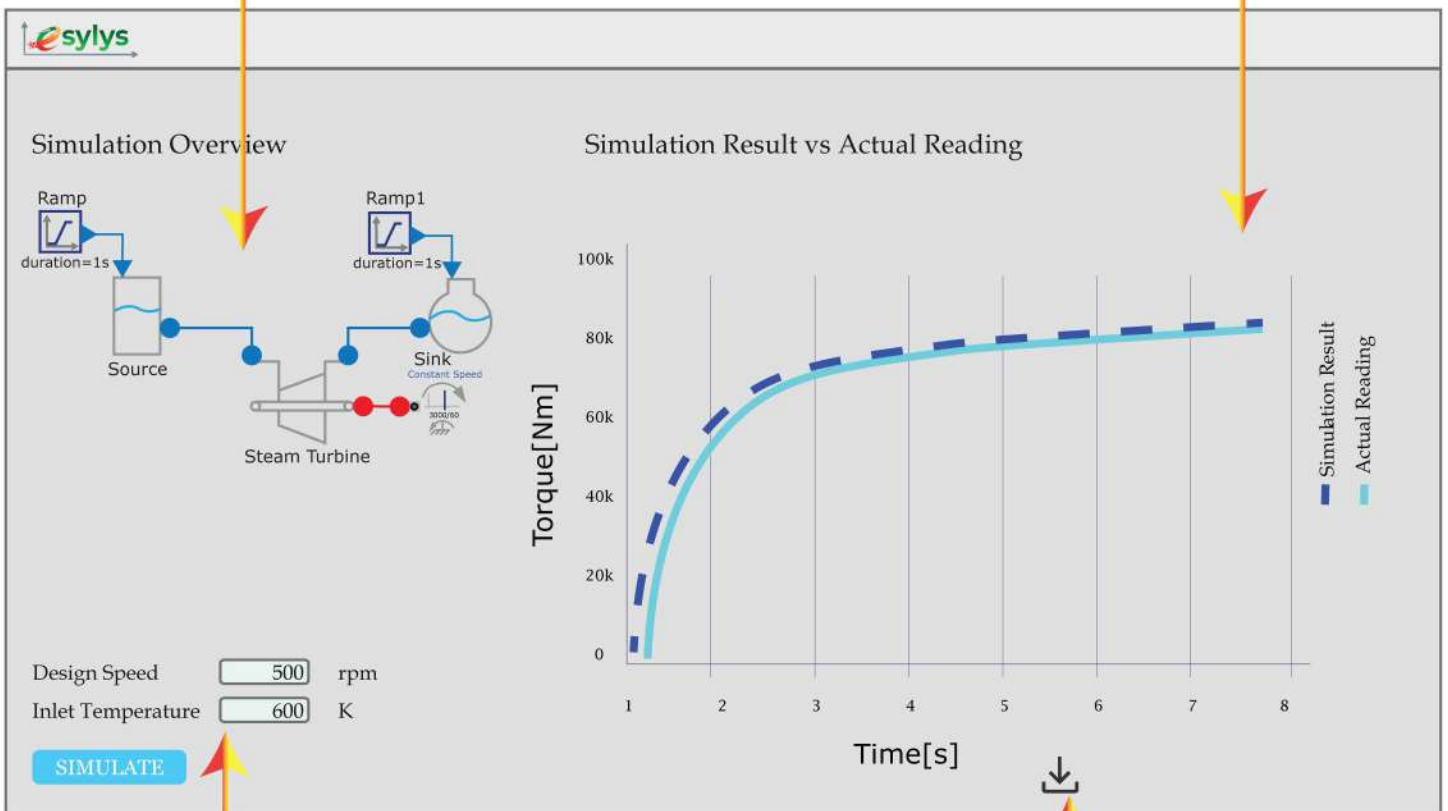
SIMULATE

Set Process Parameters from the Browser

Save Data

What systems can be simulated?

| Thermal	Electric	Fluid	Biological
Brayton cycle	Electric Vehicles	Pumping Systems	Biogas systems
Kalina cycle	Grid Distribution	Building Hydraulics	Biological Reactions
Rankine cycle	Solar Panel and Wind Systems	Pipeline Systems	Heart Circulation
CHP Sytems	Electrical circuits	Valves	Biomechanical Systems

Tools used:

Is sensitive data stored on our servers?

There is a long answer and a short answer. The short answer is NO. No sensitive data is stored in our servers. They are exclusively stored locally at the user end. We just provide the computation engine.

Post processing and visualising the data

How does the data visualisation look like?

Data visualisation is handled by our custom made data analytics package in Python. The final results could be plotted using several static as well as dynamic plots and contours. Customised solutions can be made as well.
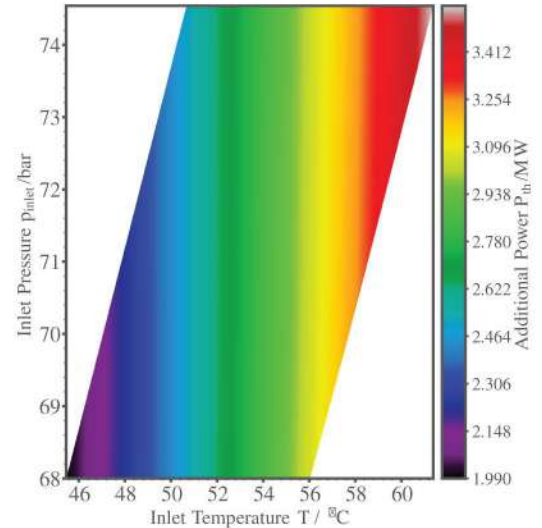
If you want to discuss all this over a nice cup of coffee, please get in touch: info@esylys.com

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