WEBINAR

Illuminating Probabilistic Risk in Renewable Energy: An @RISK Approach based on Renewable Energy Risk Modelling

October 17

6 PM CEST/ 12 PM EDT

@RISK

MANUEL CARMONA

Trainer at EdyTraining,
PMI-RMP®-MBA

Agenda

- Who uses @RISK?
- What @RISK is used for?
- Do we need to assess the risk of energy project?
- There are some uncertainties and risks and scenarios which are important to model.

Solutions

Learn more about @RISK

Learn more about DTS

Upcoming Events

WEBINAR

Incorporating Risks from a Risk Register Into a Joint @RISK Cost and Schedule Risk Analysis

October 30
11 A.M (EST)

STEVEN L. VAN DREW
PhD, PE

WEBINAR

Forecasting Asset Renewal & Replacement Using @RISK

November 2
12PM EST

JD SOLOMON
PE, CRE, CMRP, founder of JD Solomon, Inc

Lumivero

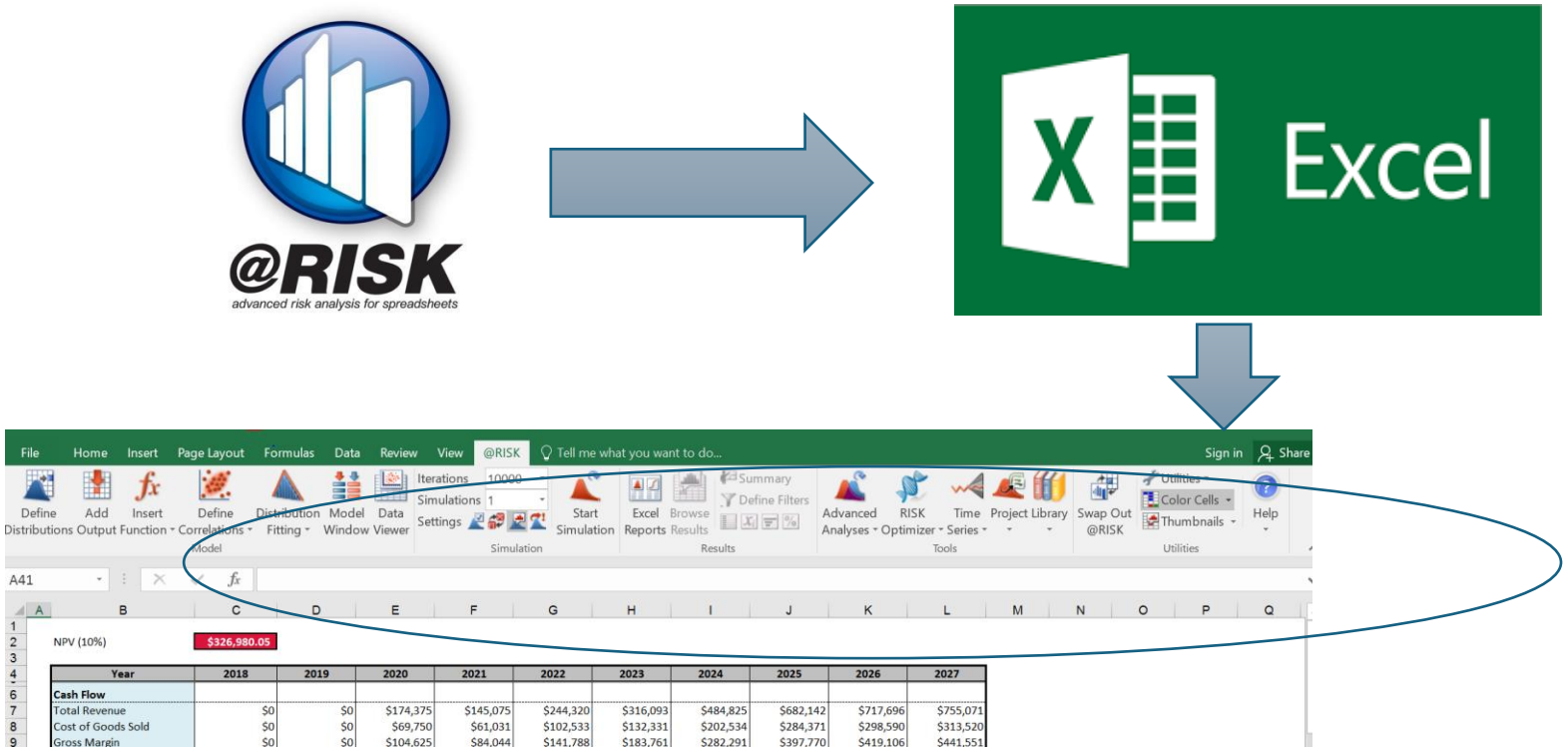
- Manuel Carmona, Lumivero Consultant.
- Lumivero has been working since 1984 in the development of software applications for statistical analysis, risk and decision support.
- Leading distributor of analytical software.
- Lumivero's software is used in hundreds of university programs around the world and is used by most Fortune 500 companies.
- To access relevant content on risk analysis and decisions, please visit our website: www.lumivero.com

What is probabilistic analysis used for?

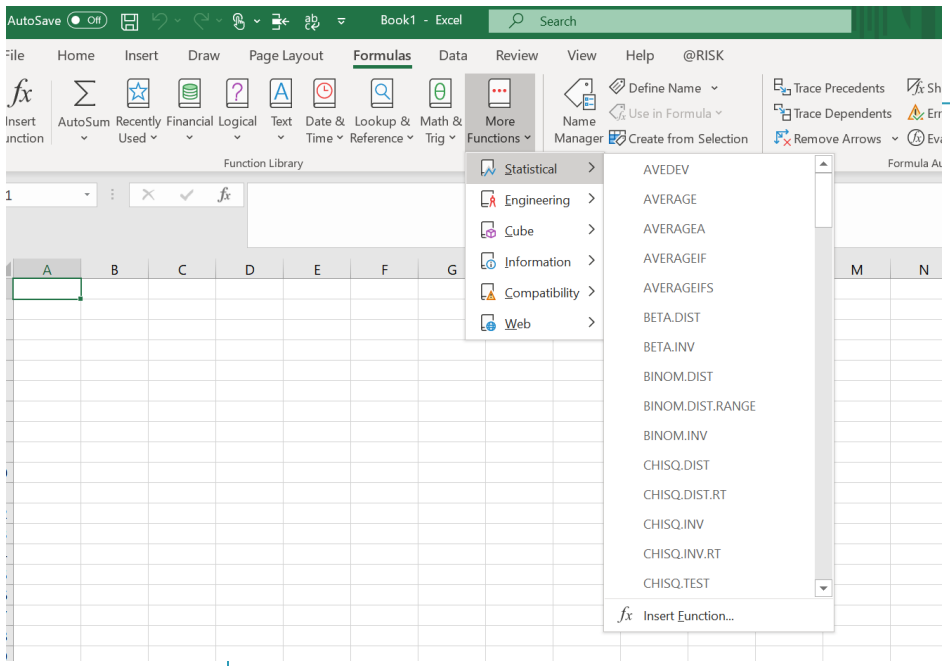
- Probabilistic modeling can answer questions such as:

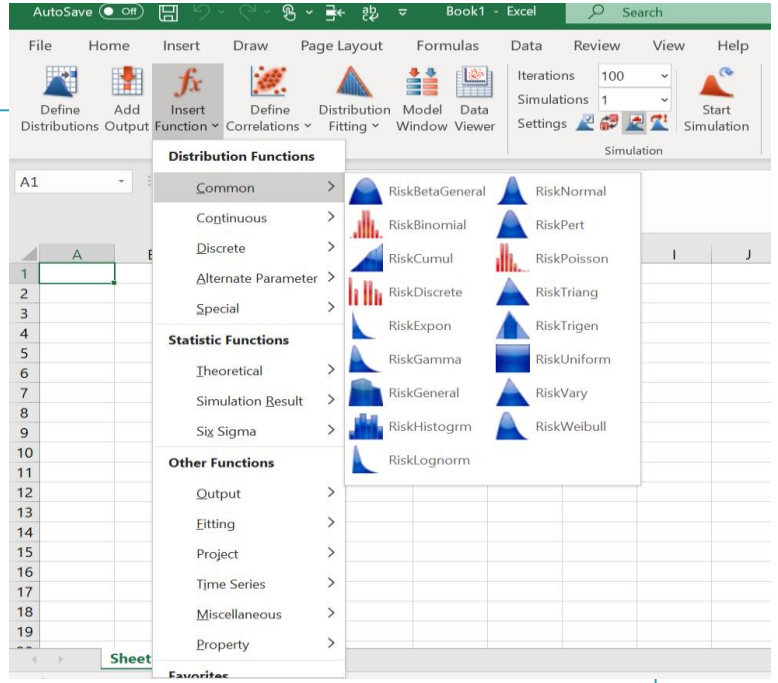
Which project has the highest chance of success and should receive funding?
What is the likelihood that my project will be completed on time and on budget?
What are our chances of meeting a deadline?
How realistic are the contingencies for our cost estimation?
Calculation of the expected NPV.
What is the effect of implementing a certain mitigation policy on my project?
What is the likelihood that my costs will exceed budget?
What tasks are likely to cause my total cost to go over?
Where in the project is it most reasonable to mitigate?

Easy to use! Lumivero software works in Excel



@RISK functions are built-in just like Excel functions





Building a Risk Model: Traditional Approach vs. Monte Carlo Simulation

- Single point estimates (usually mean values).
- Best/worst-case scenario
- Incremental "what if" analyses.
- Traditional (deterministic) approaches lack the ability to know the full range of possible outcomes and their probability of occurrence.

@RISK is an ideal tool for building prototypes quickly.

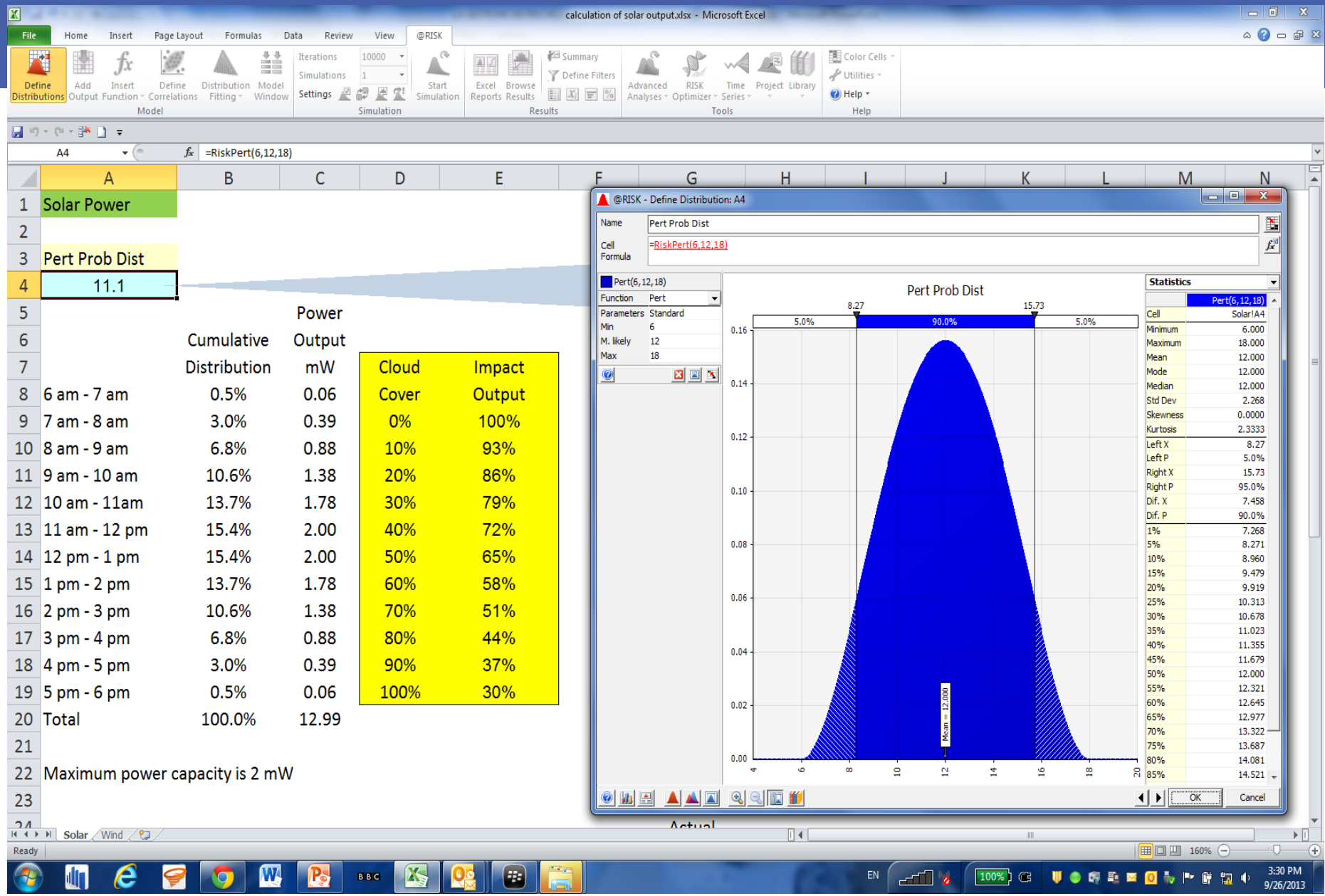
Monte Carlo Simulation

- We use probability distributions to drive the collection of random number samples.
- Thousands of possible scenarios and their probability of occurrence are calculated in just a few seconds.
- We get advanced analytics and features like tornado plots, scatter plots, input-output sensitivities, correlation effect, stress analysis, scenario analysis, etc.

Case Study: Renewable Energy Project.

- To reduce the cost of a production plant, we are considering the construction of a renewable energy facility.

We need a hybrid installation that consistently delivers a power of at least 8MW/h.


calculation of solar output.xlsx - Microsoft Excel
=RiskPert(6,12,18)
Solar Power
Pert Prob Dist
11.1
Power
Cumulative Output
Distribution mW
Cloud Cover
Impact Output
6 am - 7 am 0.5% 0.06 0% 100%
7 am - 8 am 3.0% 0.39 10% 93%
8 am - 9 am 6.8% 0.88 20% 86%
9 am - 10 am 10.6% 1.38 30% 79%
10 am - 11am 13.7% 1.78 40% 72%
11 am - 12 pm 15.4% 2.00 50% 65%
12 pm - 1 pm 15.4% 2.00 60% 58%
1 pm - 2 pm 13.7% 1.78 70% 51%
2 pm - 3 pm 10.6% 1.38 80% 44%
3 pm - 4 pm 6.8% 0.88 90% 37%
4 pm - 5 pm 3.0% 0.39 100% 30%
5 pm - 6 pm 0.5% 0.06
Total 100.0% 12.99
Maximum power capacity is 2 mW
@RISK - Define Distribution: A4
Name
Pert Prob Dist
Cell Formula
=RiskPert(6,12,18)
Pert(6, 12, 18)
Function Pert
Parameters Standard
Min 6
M. likely 12
Max 18
Pert Prob Dist
8.27
15.73
5.0%
90.0%
5.0%
Mean = 12.000
Statistics
Pert(6,12,18)
Cell Solar!A4
Minimum 6.000
Maximum 18.000
Mean 12.000
Mode 12.000
Median 12.000
Std Dev 2.268
Skewness 0.0000
Kurtosis 2.3333
Left X 8.27
Left P 5.0%
Right X 15.73
Right P 95.0%
Dif. X 7.458
Dif. P 90.0%
OK
Cancel
Solar
Wind
Ready

@RISK

Model I Renewable Energy Project.

- Solar Energy Uncertainty
- Electricity production depends on several factors such as cloud cover, irradiance, temperature orientation, etc.
- It works only during daylight hours.
- Wind Energy Uncertainty
- Production depends on a given wind speed range and the location of the turbines, among others.

Benefits of the Monte Carlo Risk Analysis Model

- We can simulate the output with a certain degree of accuracy.
- We can optimize the cost of the installation against the expected average production, and other variables such as electricity prices.
- We can calculate the expected savings or revenue from selling excess energy back to the grid.

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The Data Landscape

LUMIVERO

The most complete collection of research, data and decision-making tools available anywhere

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