Problems!

WOW!

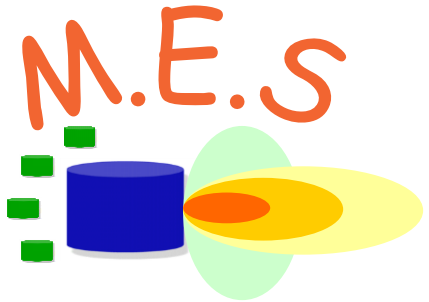
How to make (more) money for your company with advanced PE

RHODIA
SOLVAY GROUP

Presented by **Gabriel Nascimento**
Ronaldo Manzano

Agenda

- Solvay Institutional
- Motivation & Case
- How to build it!



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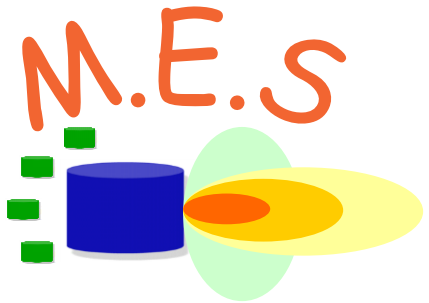


150 years of innovation **and many to come**

1863
Ernest Solvay invents the Solvay process for producing soda ash

1880
Solvay is the first industrial multinational operating simultaneously in the US and Europe

1950
Solvay invents the plastic bottle

2015
Solvay flies around the world with Solar Impulse

1878
Solvay innovates in social welfare
(paid vacations, social security, 8-hour day)

1911 & 1927
The congresses bring together the greatest physicists of their day

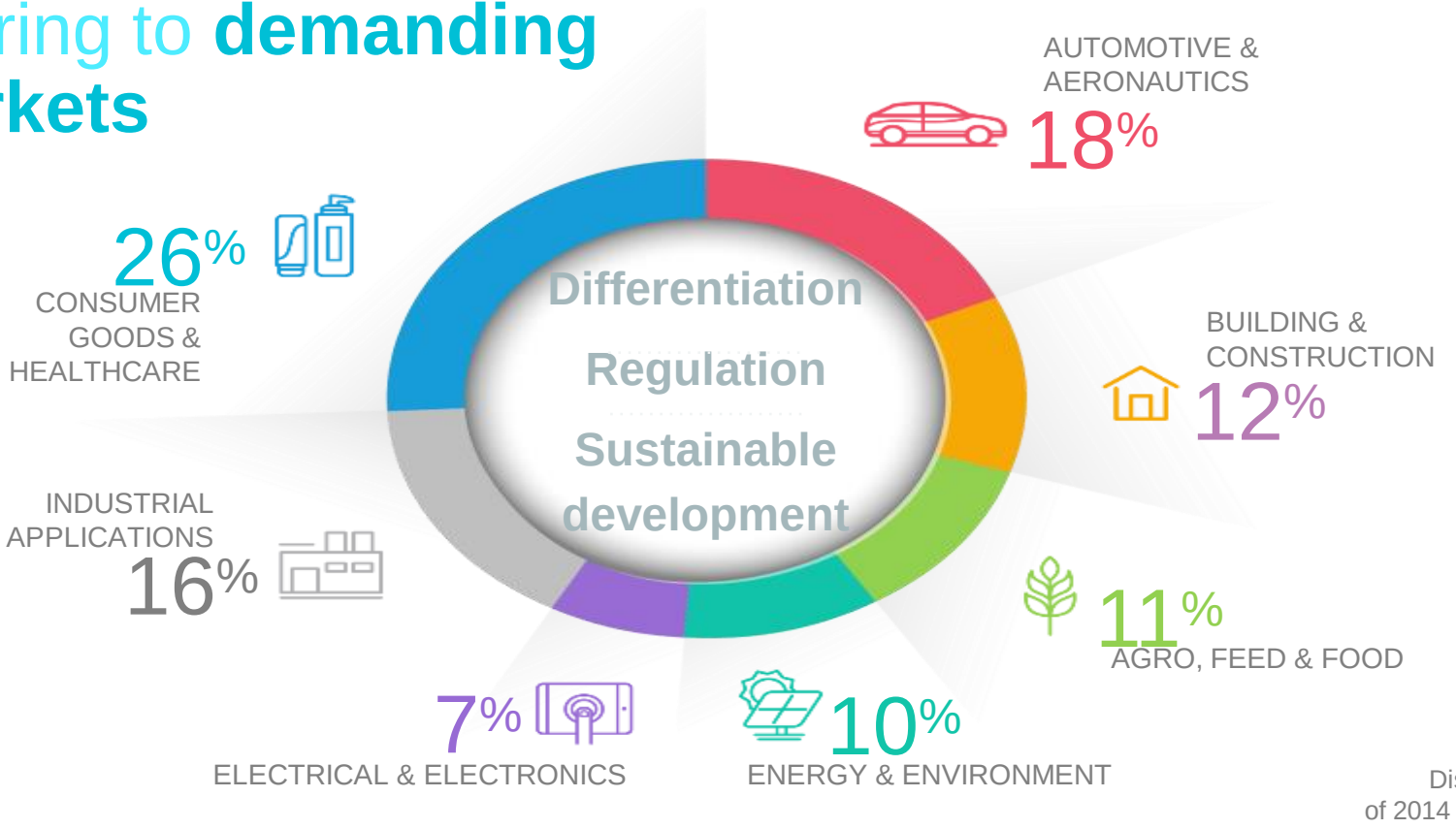
2011
Solvay acquires Rhodia

2015
2nd Chemistry for the Future Solvay Prize

We are a world leader
in the chemical industry

2014 figures

We adapt our product offering to **demanding markets**



Distribution of 2014 net sales

A balanced presence
in all growth regions

North America
23% of net sales

3,450 employees

28 industrial sites

Latin America
11% of net sales

3,050 employees

10 industrial sites

Europe
34% of net sales

13,500 employees

52 industrial sites

Asia-Pacific
32% of net sales

6,000 employees

29 industrial sites

The Solvay spirit
Making the impossible possible

Bringing together the leading scientists of the time, permitting major advances in quantum mechanics

THE 1911 & 1927 SOLVAY CONGRESSES

Si2 SOLARIMPULSE

Believing an airplane can fly on solar energy alone

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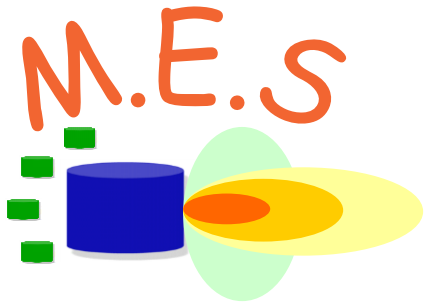


Motivation

Improve distillation efficiency by reducing steam consumption

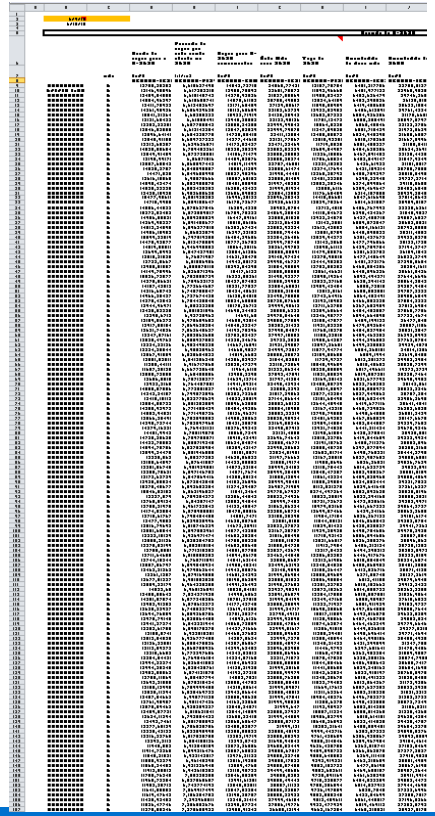
- Water must be removed from process production
- Removal is done by our distillation columns
- Distillation column system is our main steam consumer
- To reduce steam consumption we “must” be aware all the time about energy balance at the top and bottom of each column

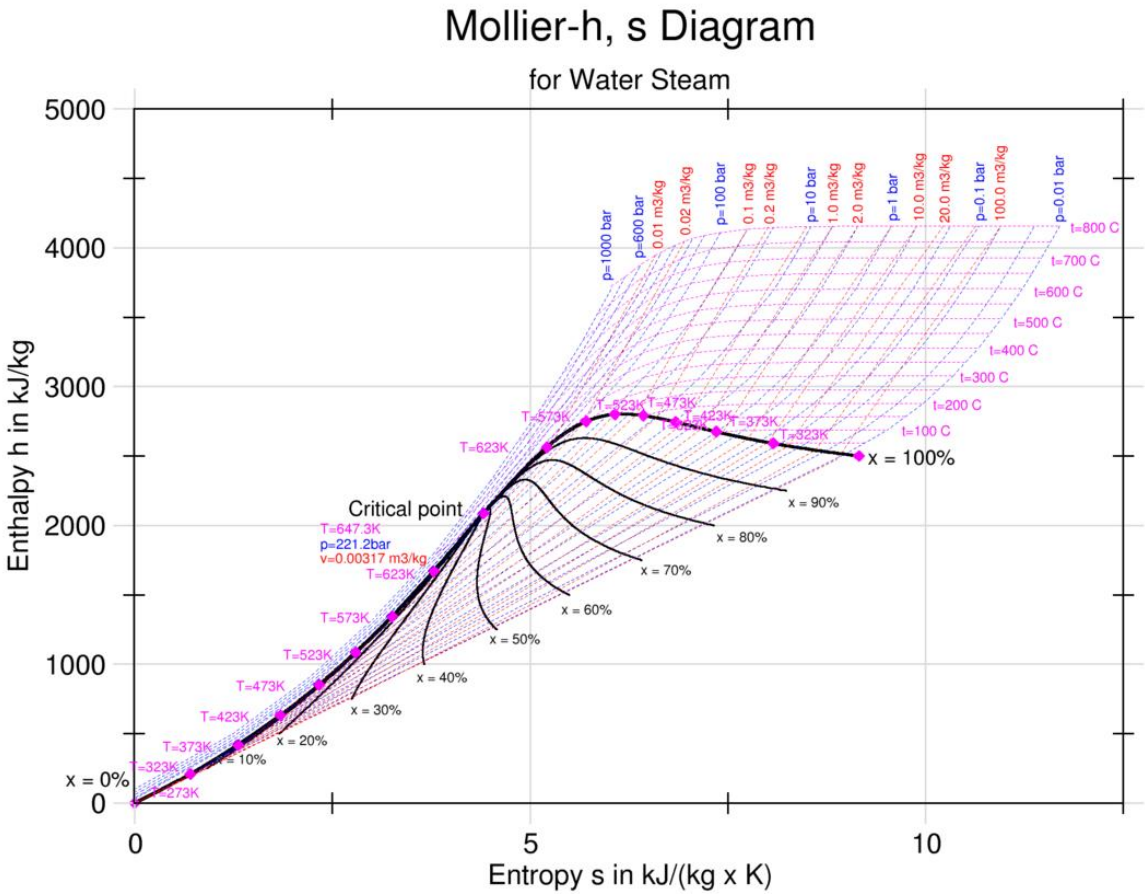
Case: Mass and energy balance calculation based on Enthalpy

First step: build a mass and energy balance

- A first version was done “ by hand” and not to rigorous
- Product: An excel data sheet that was not reflecting our situation on field

Case



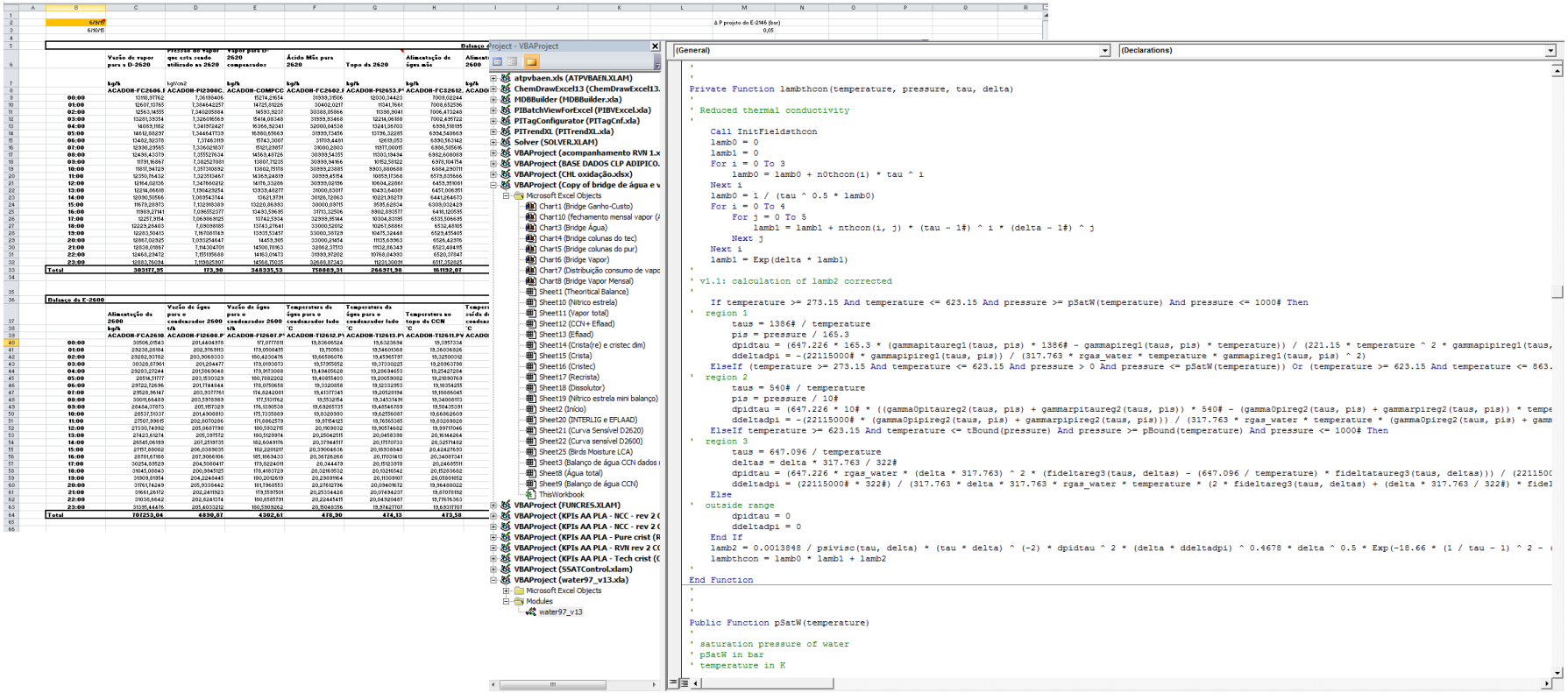


Case

Second step: build a **rigorous** mass and energy balance

- A second version was done taking in consideration enthalpy of each line
- Product: Not one, but two excel data sheet that was reflecting our situation on field, however it was huge, slow, and we need both files to work (.xls and .xla)

Case



Case

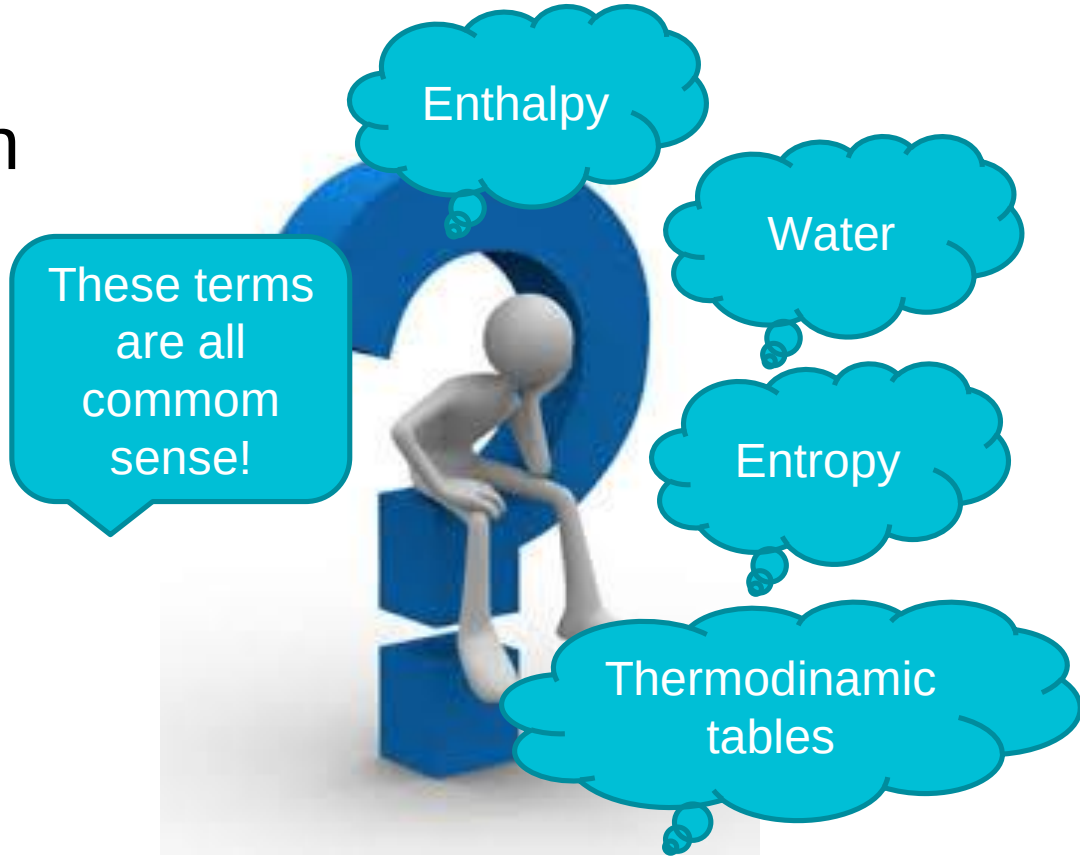
How to build a lightweight file that reach our expectation and be usable anywhere at Solvay?

- PI Ace: write all equations and tables from both excel files in a program?
- Excel file: Continue with our two Excel file?

Case

We chose to build with PI Ace, even though with hundreds of equations to be configured.

But there must be another way out!



Case

A huge problem was resolved with just two equations, already done by OSI with performance equation

PI Performance Equation LIBRARY!!

https://livelibrary.osisoft.com/LiveLibrary/content/en/PIServer2014R2-v1/GUID-E4370A7C-DB71-48C1-9894-D2CCDC47C3C3#addHistory=true&filename=GUID-3ED13DFE-2070-4EF9-884E-868DC4133D5F.xml&docid=GUID-3ED13DFE-2070-4EF9-884E-868DC4133D5F&inner_id=&tid=&query=&scope=&resource=&toc=false&eventType=lcContent.loadDocGUID-3ED13DFE-2070-4EF9-884E-868DC4133D5F

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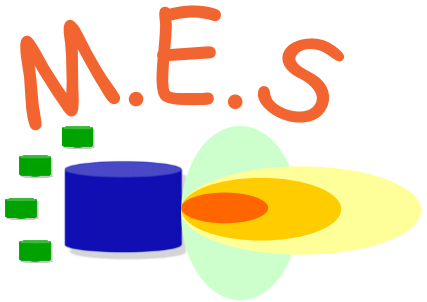


Where can I find it?

PI Server Applications User Guide

Chapter 4

– PI Performance Equations Syntax and Functions Reference

Chapter 5

– PI Steam Functions Reference

The PI Steam Functions module is an extension to the PI Performance Equations. Steam Functions provide a complete set of functions for deriving the thermodynamic properties of steam and water within Performance Equations. PI Steam Functions support both English and SI units, and are based on the ASME (American Society of Mechanical Engineers) Steam Tables, 6th Ed.

Page 179
StmSI_HsatT

StmSI_HsatT

Calculates the saturated vapor specific enthalpy as a function of temperature—all variables expressed in SI units.

Format

```
StmSI_HsatT(T)
```

Arguments

```
T
```

Steam temperature in degree C. The valid range is 0.0 to 374.15 degree C.

Returns

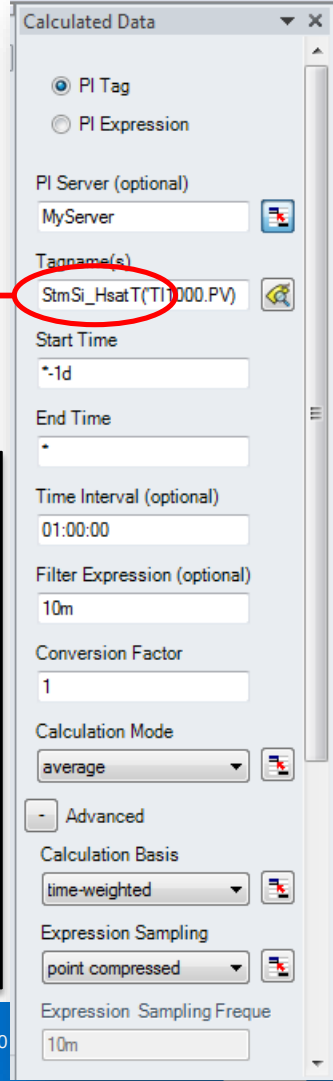
Computed specific enthalpy for saturated vapor in J/g or *Error* digital state.

Sample Values

Temperature	Vapor Enthalpy
50.	2592.2
200.	2790.9
350.	2567.7

Performance Equation created

StmSi_HsatT




```
=PIAdvCalcExpDat("StmSi_HsatT('TI1000.PV')",‘*-1d‘,‘*',"01:00:00","average","time-weighted","compressed","10m",0,1,0,“MyServer")
```

Final results

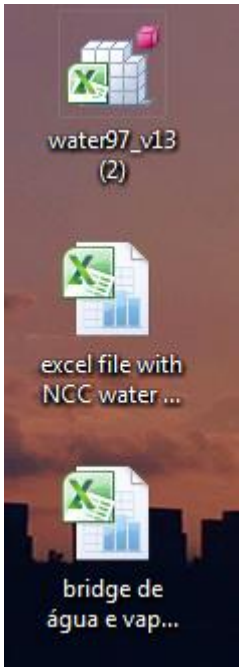
Final step: build a **rigorous** mass and energy balance using PE

- A third version was done taking in consideration enthalpy of each line but using PE
- Product: A excel data sheet that was reflecting our situation on field, and it was light and worldwide usable by anyone at Solvay

Final results

- Steam reduction
- Control over reflux ratios
- Measurement of efficiency
- Decisions about operation are quicker

Strong points



Simplicity

		Dissolutor		
Nível dissolutor	Densidade dissolutor	concentração de AA	concentração nitratos	
LT-1000	DT-1000	DT1001	DT1002	
68.01477984	1051.202867	46.549113	999.7476781	
66.89827866	1051.63341	46.56151016	1001.268244	
67.9457125	1051.732079	46.57390732	1002.78881	
69.09297956	1051.740918	46.58630448	1004.309376	

Quickness

More reliable and robust

Opened new opportunities
for Process reduction (water, steam,…)

Balance much more efficient and effective

Easier to handler

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THANK YOU

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