Securing a Greener Future

RESS, LCOE & Beyond

Bill Sadlier, NTR

October 2018

Signatory of:

PRI Principles for Responsible Investment

www.ntrplc.com

NTR – 40 Years of Infrastructure

Ireland's largest investor in & operator of toll

US 4th largest ethanol producer

600MW solar developed in US

€600m capital invested via NTR Wind 1 LP fund

1978 €3 billion sustainable infrastructure transactions over 15 years

2015 Renewables funds

Europe's largest water waste treatment facility

Largest private recycler in US. Also in UK, Ireland

1.8 GW of wind constructed & operated

2018 – NTR wind and solar Fund 2 launched

NTR

Bill Sadlier – 15 Years of Renewable Energy

1. 5 Years: Project Finance; Energy & Transport
2. 5 Years: Greenfield Development; Wind & Solar; UK, Iberia and Ireland
3. 5 Years: Private Equity & Investment Management; Ireland, France, UK, Nordics

Partnering with wind and solar developers to develop and bid projects into RESS.
€50m DevEx risk capital to be invested into Ireland, UK and France.
€1.2bn of equity and debt to be invested into projects across Europe.
NTR focus: development, procurement, financing, construction and 30 year asset management.

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IWEA Energy Committee – LCOE Working Group

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Vestas

ABO WIND

**LCOE
Onshore
Wind
€60 MWh
2030**

Brookfield

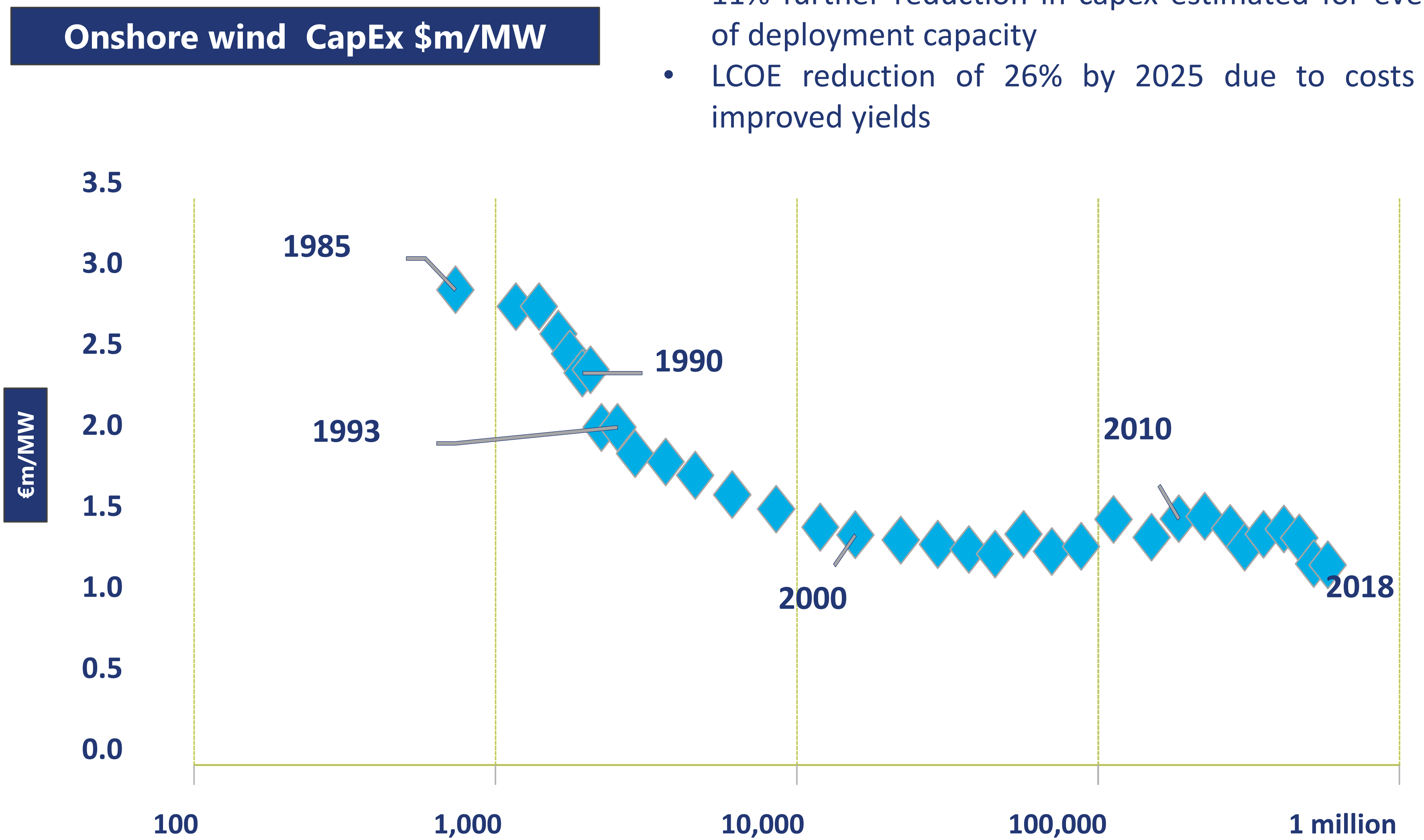
everoze

elementpower

IWEA
Irish Wind Energy Association

Global Onshore Wind (CapEx per MW) – WHERE ARE WE IN THE CYCLE

- Onshore wind costs reduced by 50% since 2009
- 11% further reduction in capex estimated for every doubling of deployment capacity
- LCOE reduction of 26% by 2025 due to costs down and improved yields



Sources : Bloomberg NEF (2018) / IRENA (2017)

LCOE – Key Concepts

1 Measures the present value of lifetime costs divided by energy production (without inflation).

$$\frac{(\text{DevEx} + \text{CapEx} + \text{OpEx})}{\text{Energy}}$$

2 Its not the auction bid price!

3 Allows the comparison of different technologies (e.g., wind, solar, natural gas) of unequal life spans, project size, different capital cost, risk, return, and capacities

LCOE Inputs – Key Assumptions 2015-7 to 2018

Assumption	Value
Project Life	25 Years
Installed Capacity	20 MW
Platform	2.0 MW
Array Size	10 turbines
Turbine Rotor Diameter	90 meters
Turbine Tip Height	126 meters
Net Energy Production – P50	58 GWh p.a. (33%)
DevEx	€1.1m over 5 years
Turbine Cost per MW	€900,000
Turbine OpEx	Yr 1 – 5 @ €6 MWh Yr 6 – 10 @ €9 MWh Yr 11 – 25 @ €12 MWh
Discount Rates	DevEx @ 20% Constr. @ 10% Ops @ 9%

2015-7
€77 MWh

Local Authority Rates
€81 MWh

REFIT Imbalance Cost
€84 MWh

RESS Community Benefit
€86 MWh

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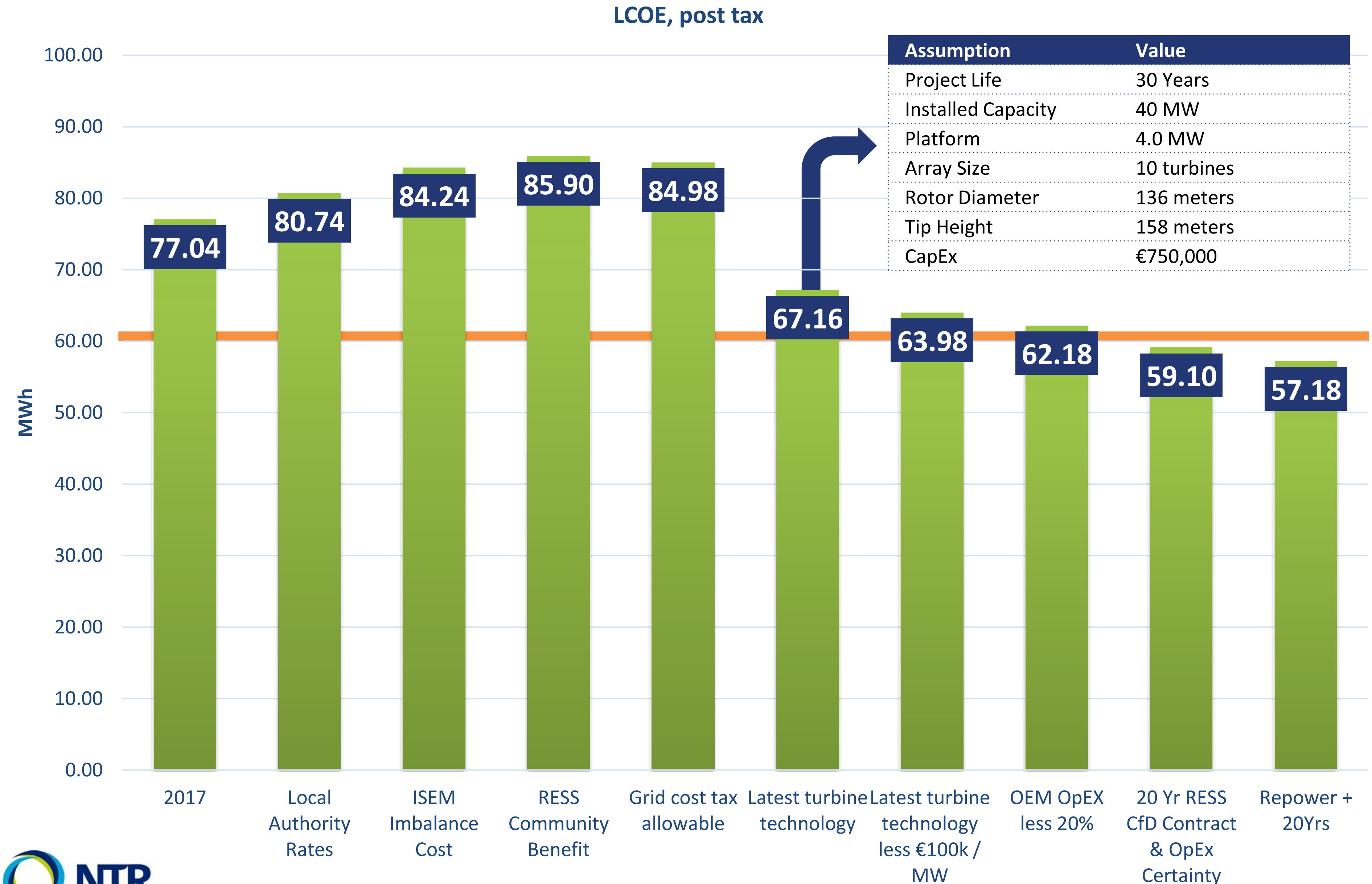
Achieving €60MWh LCOE



Assumption	Value
Project Life	30 Years
Installed Capacity	40 MW
Platform	4.0 MW
Array Size	10 turbines
Rotor Diameter	136 meters
Tip Height	158 meters
CapEx	€750,000

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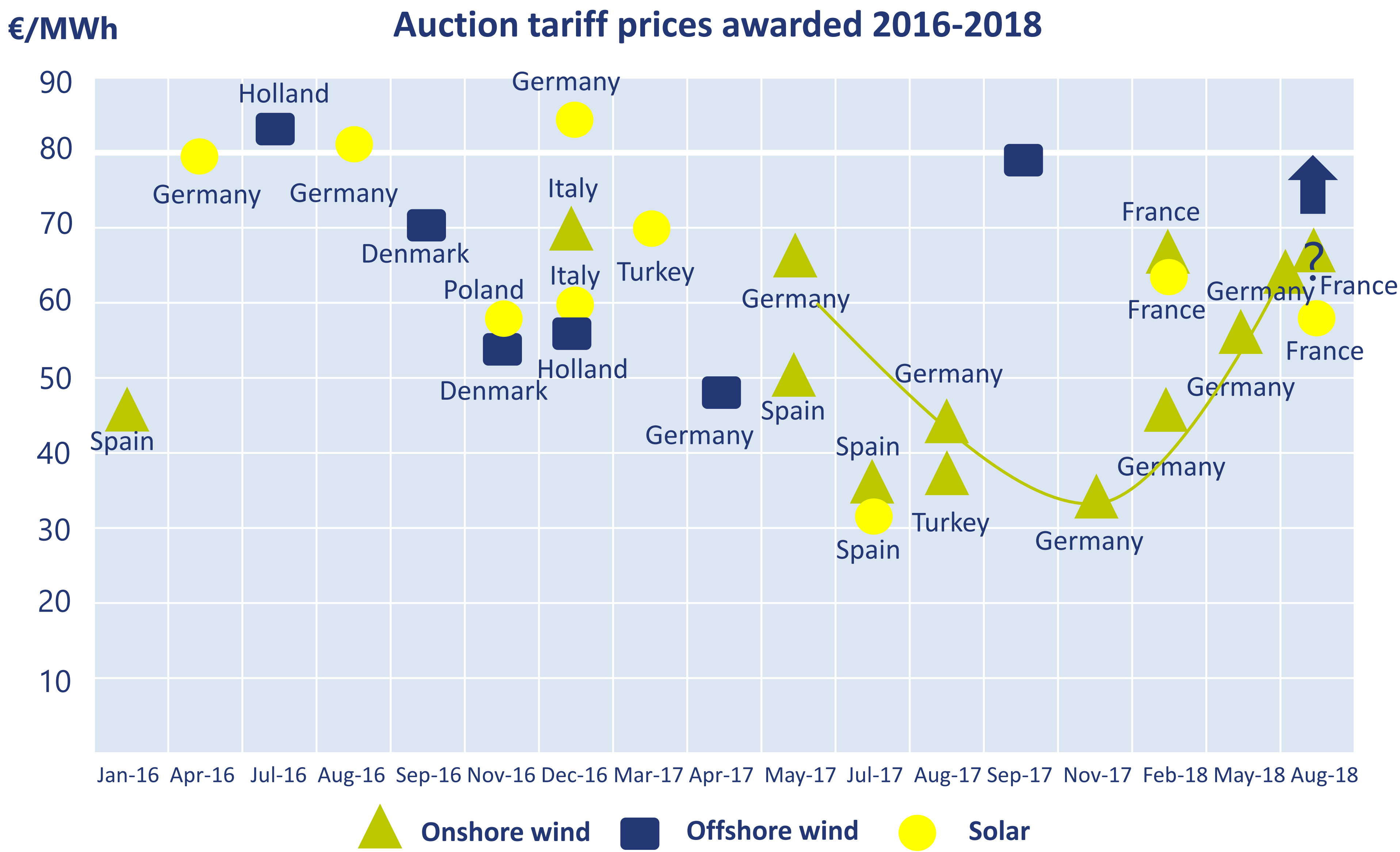
Auction prices stabilising – even rising……(important to compare Apples with Apples)



Sources : Public auction results

Drawing a Line in the Sand & Moving Way from 'Cost'

1

Policy needs to enable lower LCOE to benefit the consumer through lower PSO contributions – industry is working hard to reduce cost and improve efficiencies. IWEA Energy Committee will work with other Committees to enable lower LCOE to support the 2030 Energy Vision LCOE of €60/MWh by 2030.

2

The importance of focusing on wider value and revenue as well as just cost.
LCoE implicitly assumes that every kWh is equal; it isn't. The closer we get to a subsidy-free future, the more inadequate LCoE becomes as a metric.

For example:

- What new revenue opportunities does DS3 create?
- To what extent can wind projects access the CfD reference price?
- How could synthetic offtake models help?
- What do EU developments on Guarantees of Origin (GoOs) mean for wind project value?
- What can Ireland learn from subsidy-free models being developed in GB and Iberia?
- How can wind asset owners work with energy users to better manage imbalance risk?

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Thank You

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