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How the Market and Regulatory Framework has Evolved in the U.S., Australia and Chile

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**When the automobile economy looked so different
Charging an electric car in 1905**

“Mr. Edison and I have been working for some years on an electric automobile which would be cheap and practicable....

The problem so far has been to build a storage battery of light weight which would operate for long distances without recharging. Mr. Edison has been experimenting with such a battery for some time.”

- Henry Ford, *The New York Times*,
January 11, 1914



Long-term contracts allow Energy Storage to be financed like traditional assets



Grid Scale

Business

Market Watch

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John Parnell

Head of content



AES closes US\$2 billion in finance for gas plus energy storage project

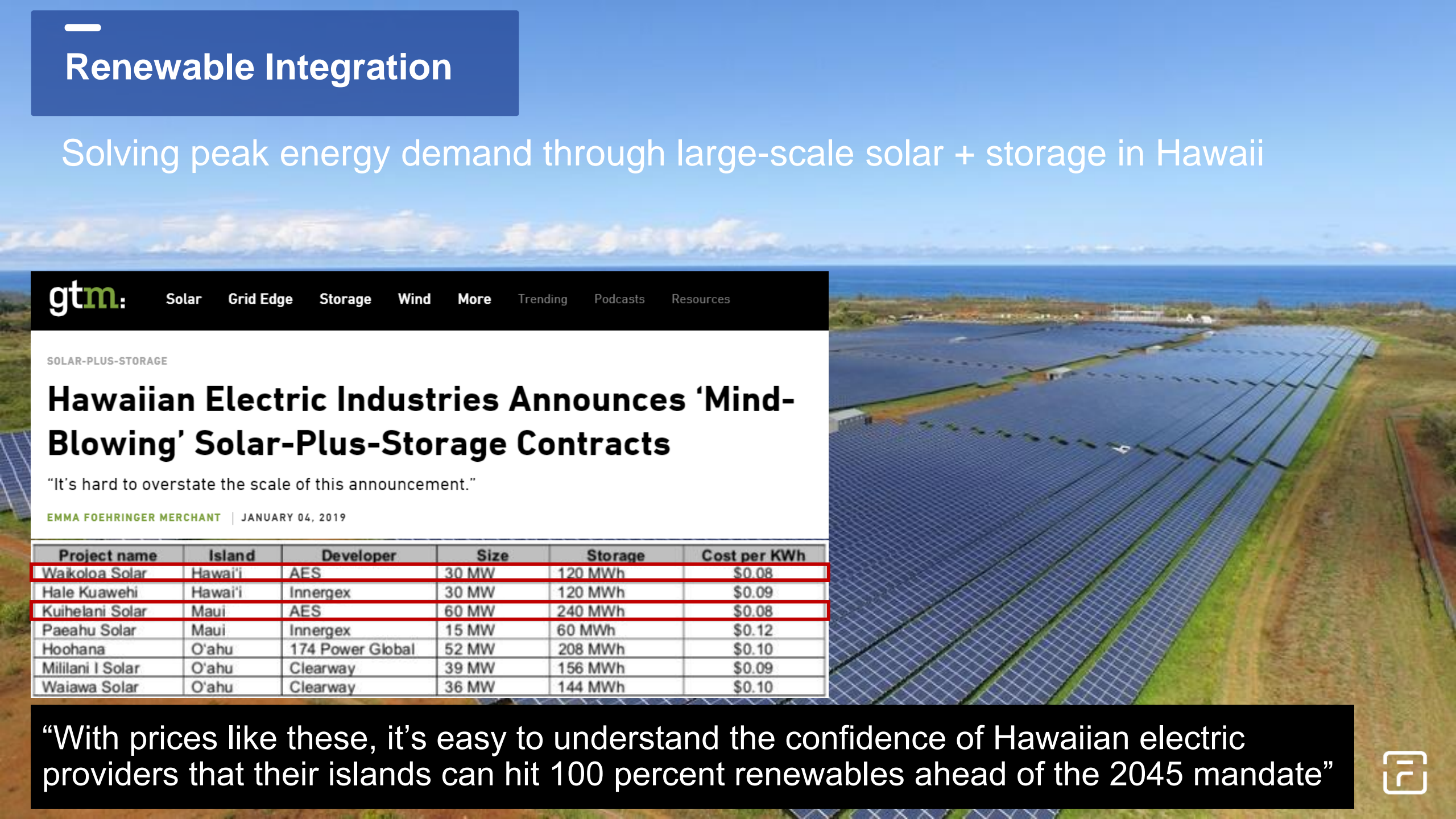


Batteries as part of an AES 'Advancion'-branded utility-scale installation. Image credit: AES



Renewable Integration

Solving peak energy demand through large-scale solar + storage in Hawaii



gtm: Solar Grid Edge Storage Wind More Trending Podcasts Resources

SOLAR-PLUS-STORAGE

Hawaiian Electric Industries Announces 'Mind-Blowing' Solar-Plus-Storage Contracts

"It's hard to overstate the scale of this announcement."

EMMA FOEHRINGER MERCHANT | JANUARY 04, 2019

Project name	Island	Developer	Size	Storage	Cost per kWh
Waikoloa Solar	Hawai'i	AES	30 MW	120 MWh	\$0.08
Hale Kuawehi	Hawai'i	Innergex	30 MW	120 MWh	\$0.09
Kuihelani Solar	Maui	AES	60 MW	240 MWh	\$0.08
Paeahu Solar	Maui	Innergex	15 MW	60 MWh	\$0.12
Hoohana	O'ahu	174 Power Global	52 MW	208 MWh	\$0.10
Mililani I Solar	O'ahu	Clearway	39 MW	156 MWh	\$0.09
Waiawa Solar	O'ahu	Clearway	36 MW	144 MWh	\$0.10

"With prices like these, it's easy to understand the confidence of Hawaiian electric providers that their islands can hit 100 percent renewables ahead of the 2045 mandate"



Transmission & Distribution Enhancement

Arizona Public Service (APS)

Punkin Center, Arizona, United States

2 MW / 8MWh

SERVICES

- Transmission upgrade deferral
- Peak management

IMPACT

- Power reliability at half the cost of a transmission line



Transmission + Market

AusNet / Energy Australia

Ballarat, VIC, Australia

30 MW / 30 MWh

SERVICES

- Peak transmission reliability
- Local capacity
- FCAS/Ancillary Services

IMPACT

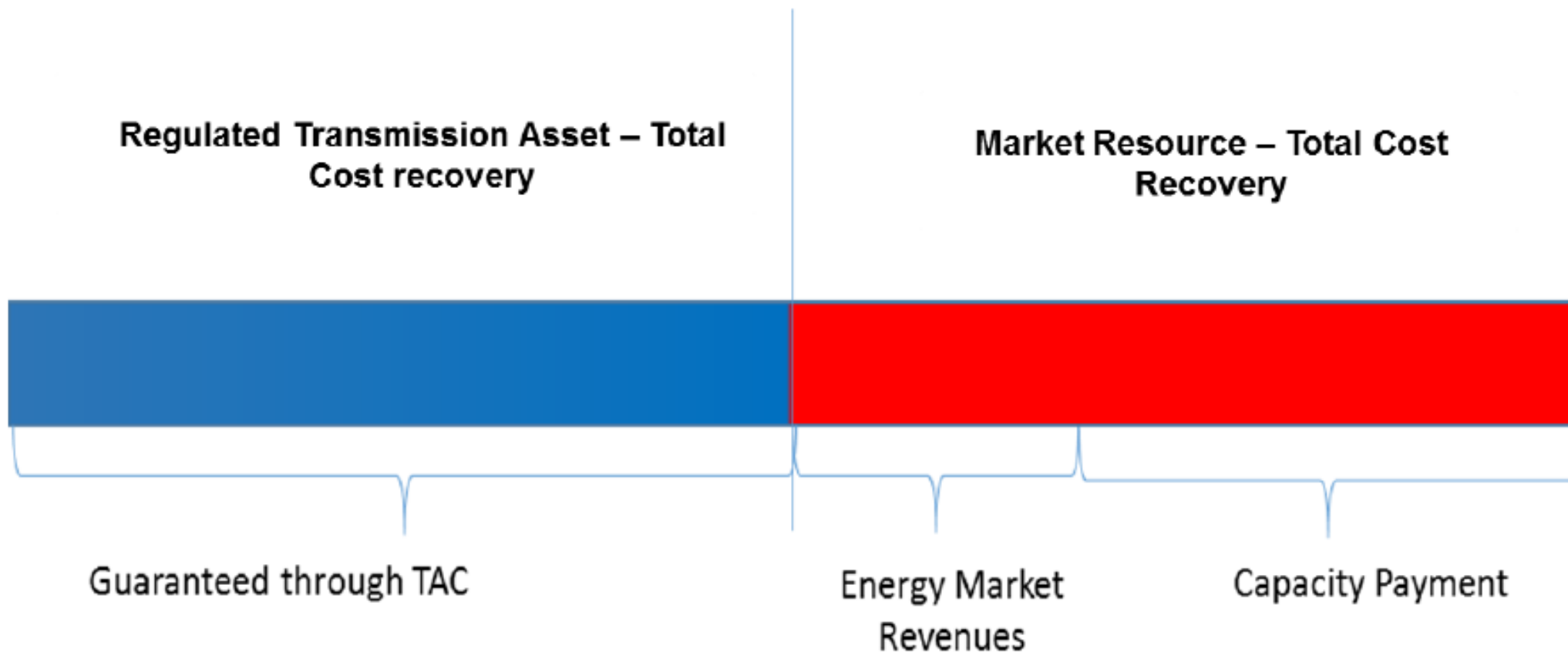
- Competitive selection
- Maximizes transmission
- Strengthens network



Storage as a transmission asset

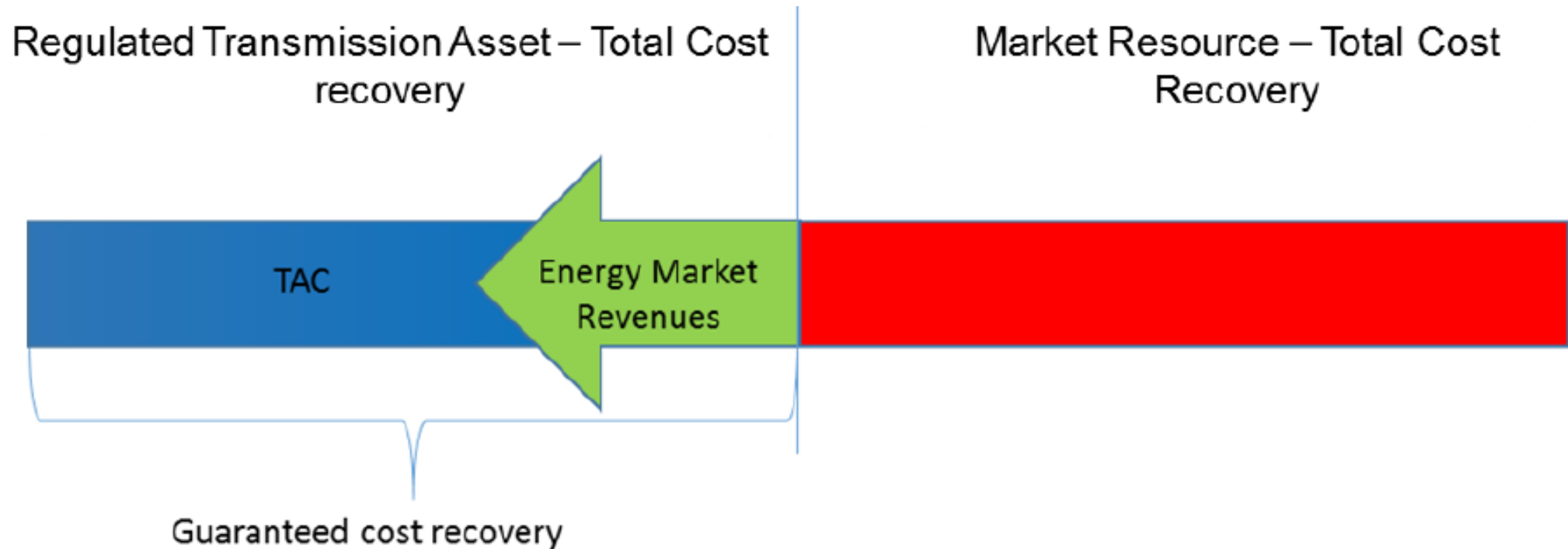
CAISO is currently exploring storage providing cost-based transmission services and also participate in markets

Figure 1: Traditional separation between transmission and market resources



CAISO current models under consideration

Market-based revenues can reduce the costs of the asset recovered under a cost-of-service contract



Benefits:

- Reduce the burden on rate-paying consumers
- Provide ratepayer benefits with greater flexibility to the grid



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Muchas Gracias!

