RES West Africa| Dakar
2019, December 2nd

NOTRE MISSION

HISTOIRE INSCRITE DANS L'INNOVATION

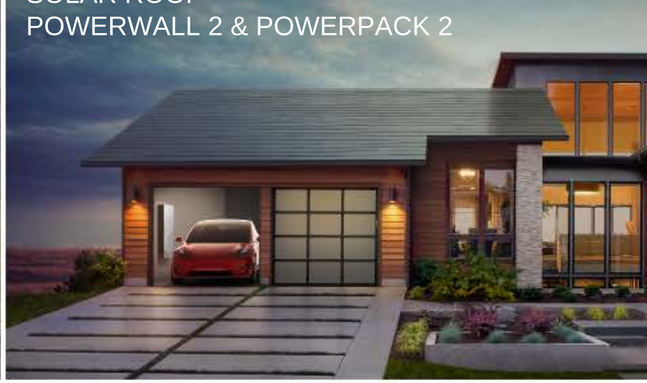
2003
CREATION DE TESLA

2010
SUPERCHARGER

2012
TESLA ENERGIE

2014
GIGAFACTORY

2016
ACQUISITION DE SOLARCITY
SOLAR ROOF
POWERWALL 2 & POWERPACK 2



2008
ROADSTER

2012
MODEL S

2015
MODEL X

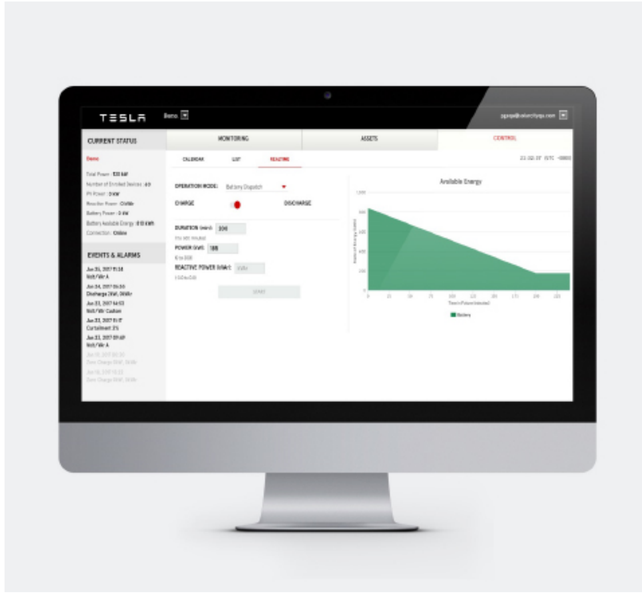
2017
MODEL 3

AMBITIONS DE TESLA

Automobile | Semi | Charge | Solaire | Powerwall | Powerpack | Logiciels | Megapacks

Tesla Energie

UNE SOLUTION DE STOCKAGE CLE EN MAIN



Powerpack/Megapack

BATTERIES LITHIUM-ION

REFROIDISSEMENT LIQUIDE

CONVERTISSEUR DC-DC ISOLE

Onduleur

BI-DIRECTIONNEL

MODULAIRE

CONNECTE AU RÉSEAU OU MICRO- RÉSEAU

99% EFFICACITÉ PEAK

Logiciel intégrés

OPTIMISATION

BATTERY MANAGEMENT SYSTEM

CONTRÔLEUR LOCAL

Contrôle en ligne

PILOTAGE ET SURVEILLANCE AND DIRECT

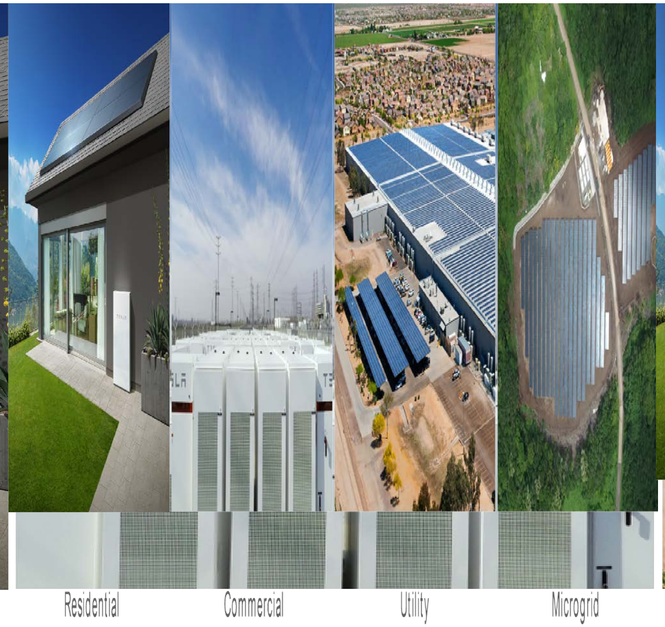
PARTICIPATION ACTIF ET RÉACTIF

OPTIMISATION DU DISPATCH ET PARTICIPATION AU MARCHES

TESLA

La contribution du stockage a travers l’ensemble des segments

Résidentiel



Commercial

Utility

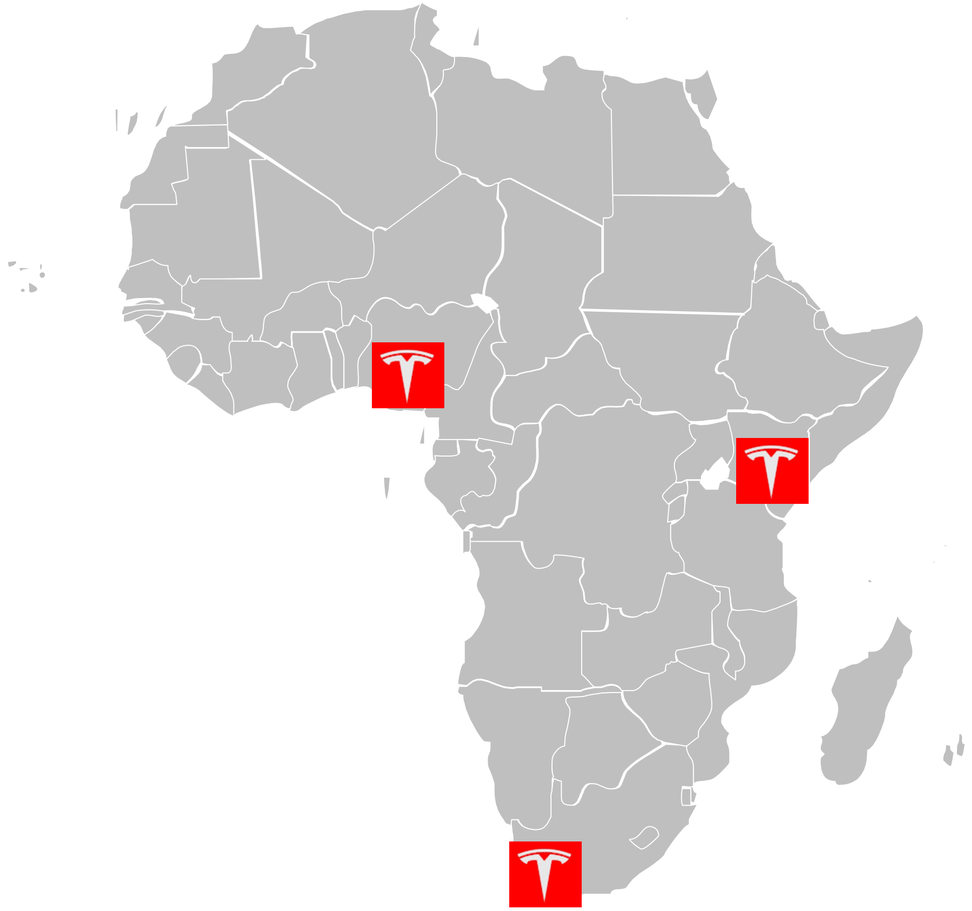
Micro-réseau

L’Afrique et Tesla

50+ systèmes contractualises

20+ systèmes déployés

15+ pays

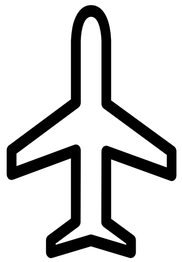


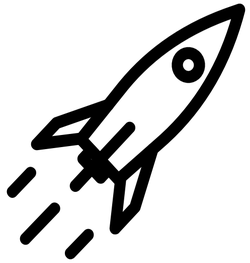
1er système déployé en mars 2017

Micro- réseau backup & économie de diesel

Réduction moyenne de la consommation de diesel de 70%

Notre approche

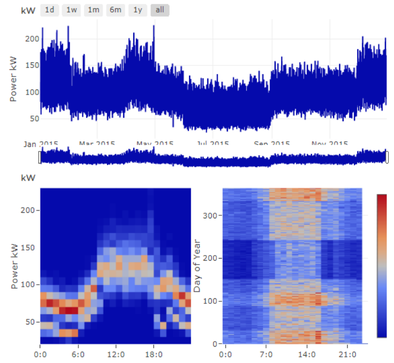




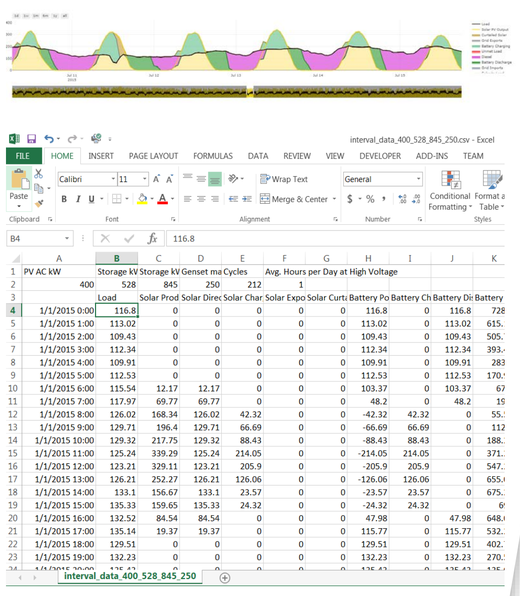
1 – Proof of concept <1MWh	2 – C&I 1-10MWh	3 – Utility scale >10MWh
Les micro-réseaux batteries co-localisés avec le solaire permettent de réduire drastiquement la consommation des générateurs. Site très isolés. Ex: resort touristique ou infrastructures de santé.	Les systèmes micro-réseaux et back-up combine avec du solaire ou non permettent de réduire la consommation des générateurs. Site isolés avec un accès électrique limite et/ou non fiable. Ex: usines et électrification rurales.	Services réseaux, Optimisation des investissements réseaux, ↗ pénétration ENR et remplacement des “peakers”. Ex: Les sous-stations clés et les projets de co-localisation avec des générations d’ampleurs.

OUTILS D'OPTIMISATION ET DIMENSIONNEMENT DES MICRO-RÉSEAUX

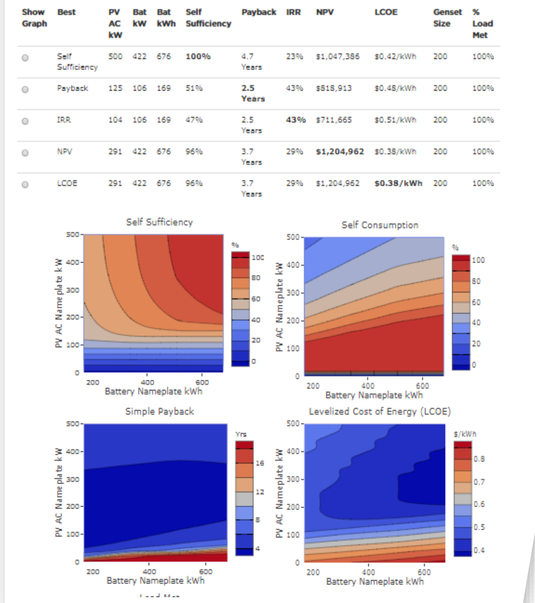
Inputs site et systèmes



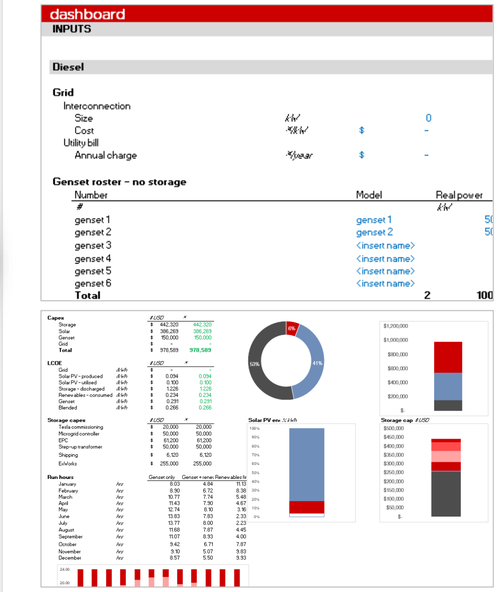
Simulation du disptach



Definition des optimales



Analyse économique



TOURISME DURABLE: GREAT PLAINS MPALA JENA, ZIMBABWE

Micro-réseau

Solaire (130 kWp) + Powerpack (106kW I 420kWh)

Mise en service 2018

Safari lodge est alimente par une énergie silencieuse, fiable et renouvelable avec une réduction de l’usage du diesel par ~90%

ENERGISÉ DES CENTRES DE SANTE ISOLES: BORNO STATE, NIGERIA

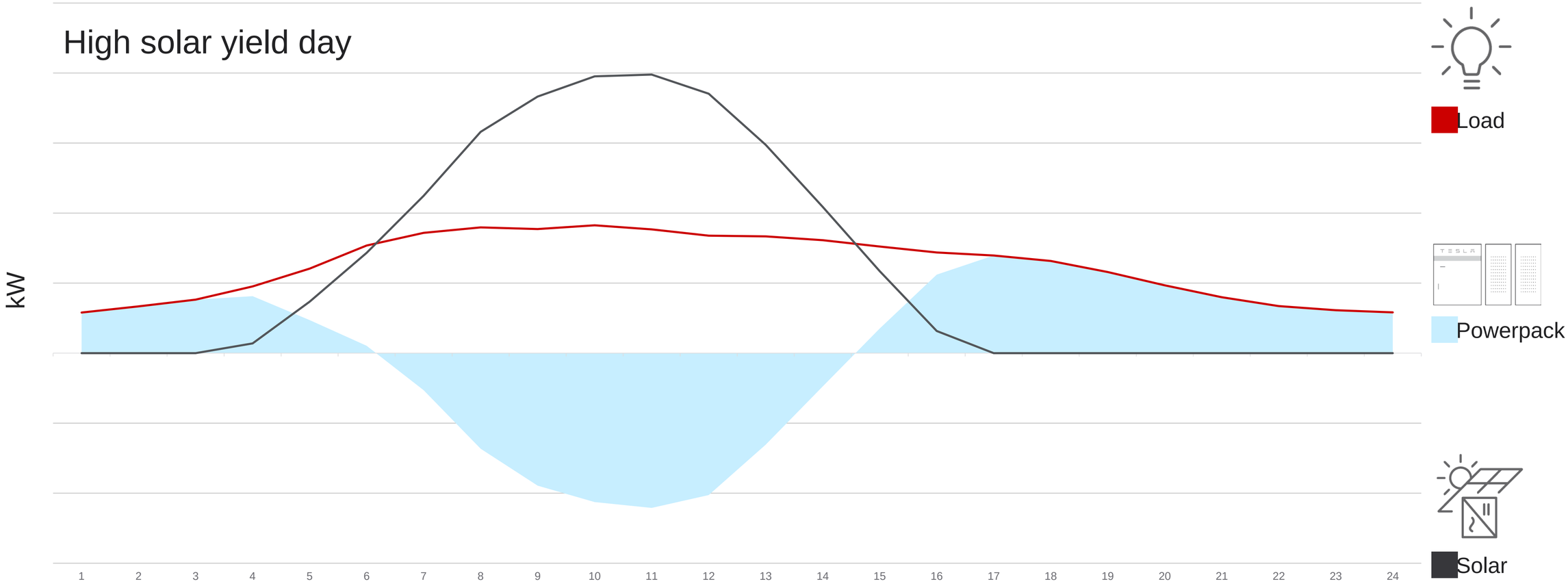
6 x Micro-réseaux

Solaire (0.8MWp) + Powerpack (0.6 MW I 2 MWh)

Mise en service 2018/2019

Une énergie renouvelable, fiabilité et économique pour des centres de sante dans le Nord du Nigeria.

RENEWABLES ONLY: GRID-FORMING POWERPACK ENABLES HIGH RENEWABLES PENETRATION



Storage charges exclusively from renewables on days with typical solar production

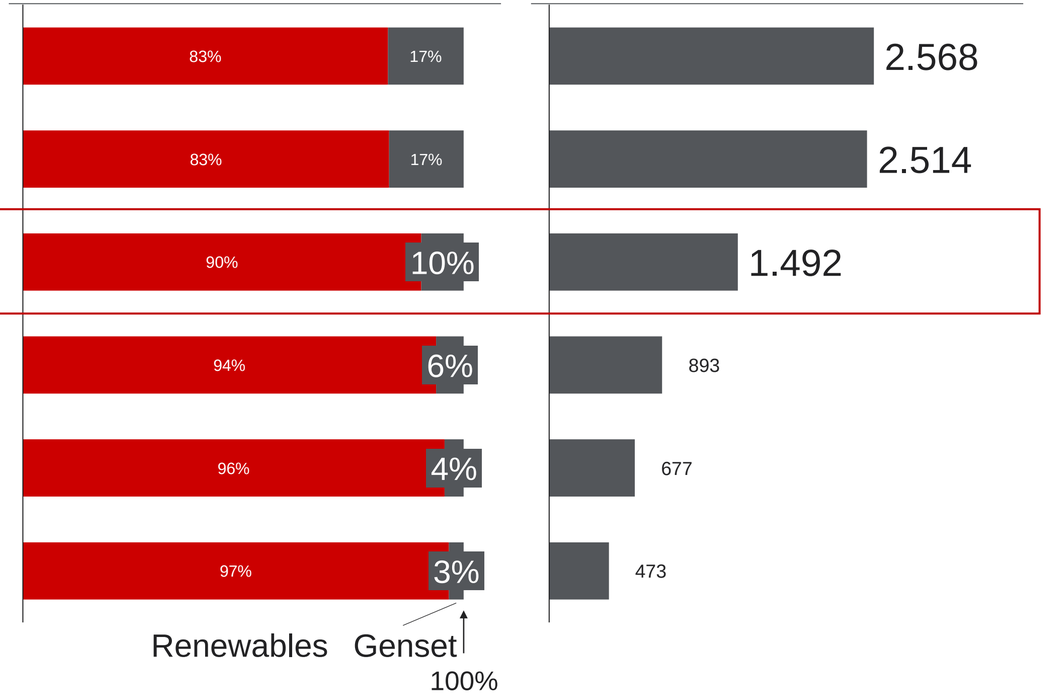
Fossil fuel generators shut down completely while renewables power batteries and load

Renewables are sized well above max load with a Powerpack system sized to absorb all excess generation

MICROGRID ANALYSIS-SIZING

>80% RENEWABLES WITH 15-25% IRR OVER A 20YR PROJECT VIEW FOR A REMOTE ISLAND (0.50 $/KWH DIESEL TODAY)

Solar PV	Storage power	Storage energy	Storage Capex	LCOE	Payback	IRR
kWAC	kW	kWh	‘000 $	$/kWh	years	%
500	400	1600	650	0.236	4.7	24.0
500	500	2000	825	0.254	5.3	21.0
600	400	1600	650	0.227	4.8	23.3
600	560	2200	910	0.238	5.3	20.7
700	450	1800	730	0.231	5.1	21.3
700	500	2000	825	0.234	5.3	20.6



Scenario recommended to client, giving lowest overall LCOE for site at 90% renewables penetration

ELECTRIFICATION RURALES: AREZA AND MAIDMA, ERITREA

2 x Micro-réseaux

Solaire (2MWp) + Powerpack (0.9MW I 4.2MWh)

Mise en service 2018

De l’energie solaire et fiable pour 2 villages qui totalisent 40 000 personnes

PLANTATION ET USINE DE THE: KISUMU, KENYA

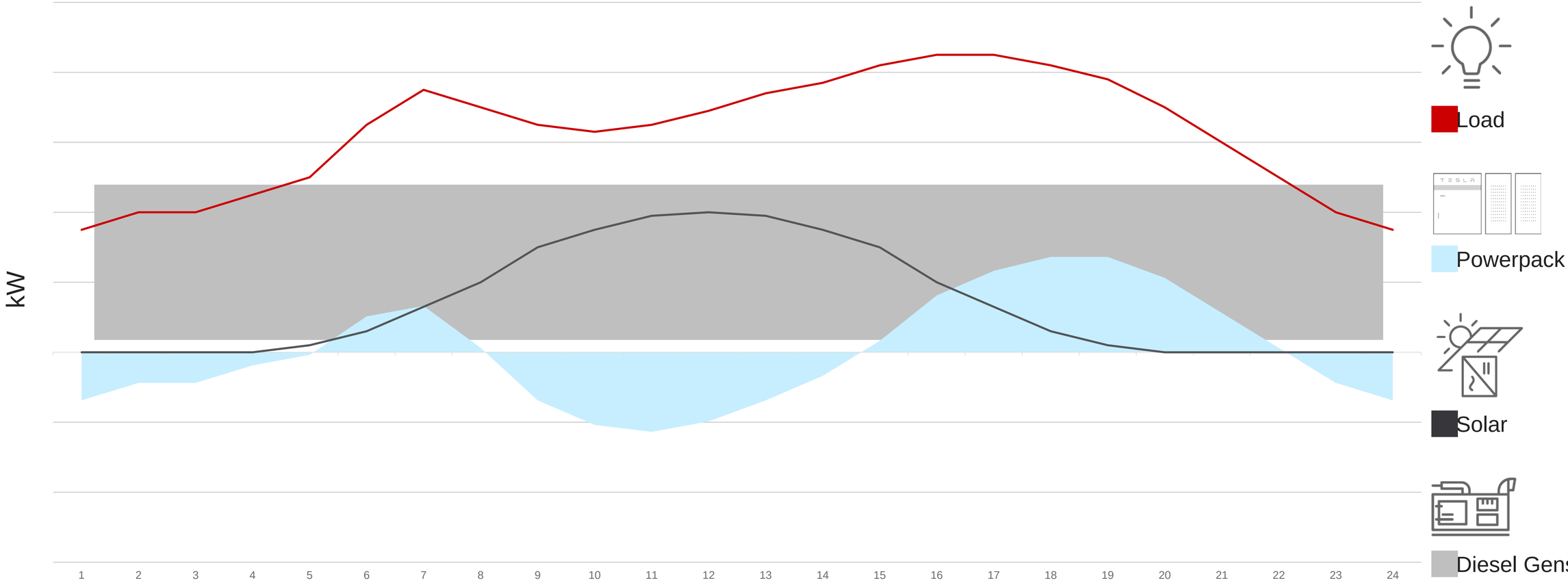
Off-grid connecte au réseau

Solaire (1.2MWp) + Powerpack (1MW I 4MWh)

Mise en service T1 2020

Energisé un site industriel qui se situe au bout du réseau.

INTERMITTENCY MANAGEMENT: POWERPACK INTELLIGENTLY BALANCES THERMAL BASELOAD AND RENEWABLES

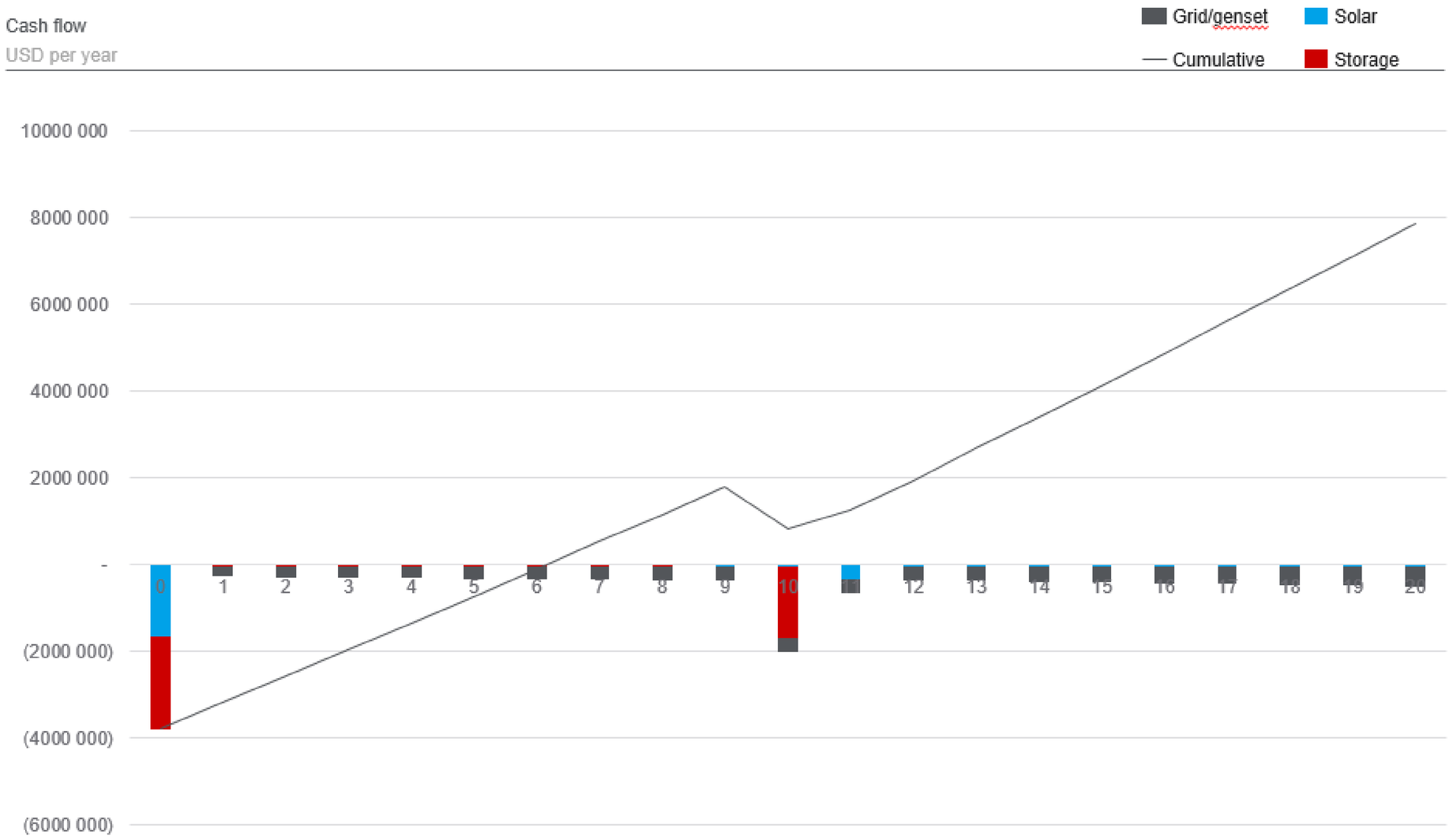


Storage charges primarily from renewables as well as from excess thermal baseload generation

Lower speed / larger fossil engines run as ‘baseload’ generators

Renewables limited relative to generators and storage power

BUSINESS CASE | 1.5 MW PV, 1.12 MW – 4.42 MWH STORAGE



HORNSDALE POWER RESERVE CO-LOCATED WITH 309MW WIND FARM

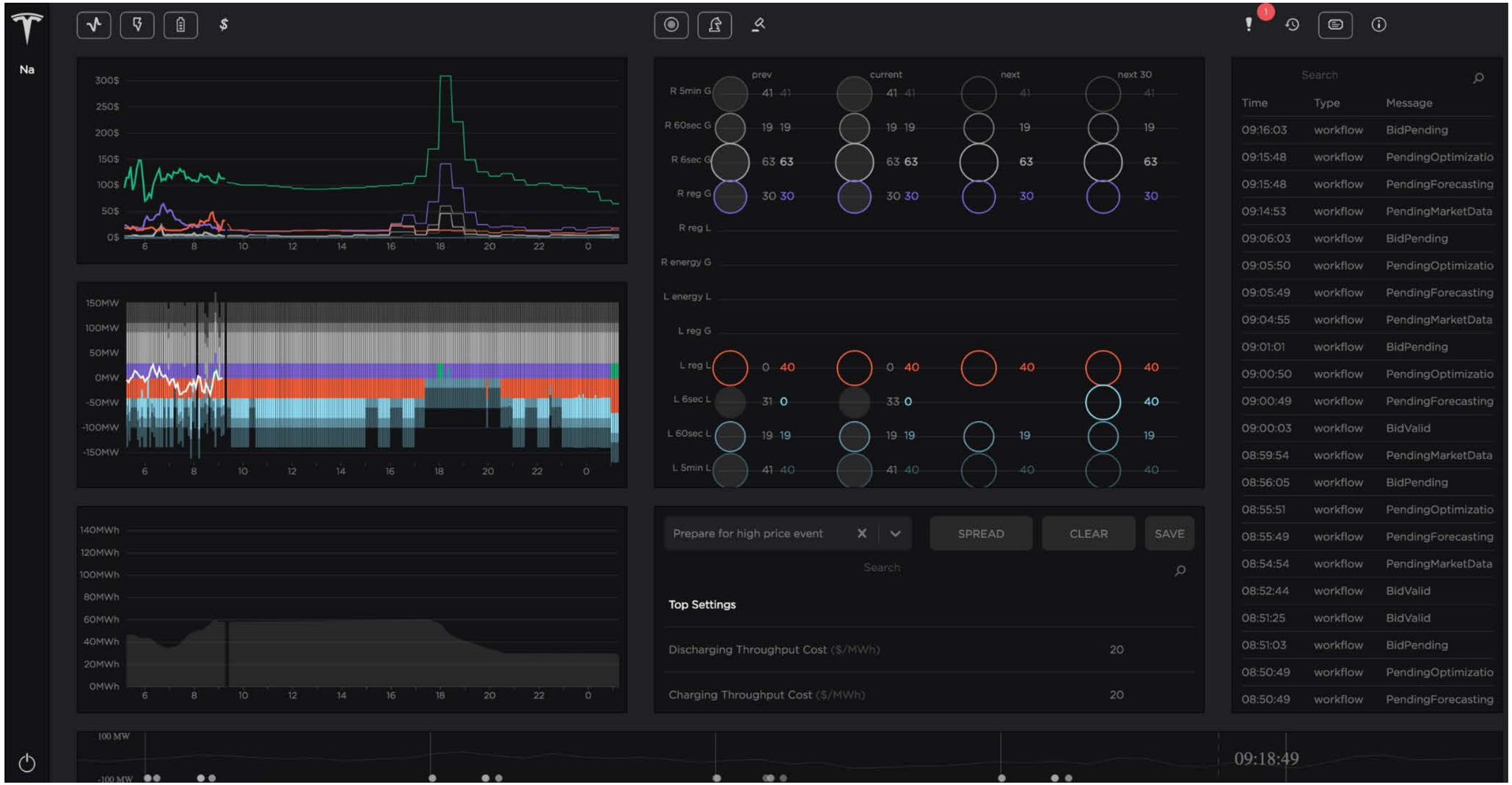
Hornsdale, South Australia

~~100 MW | 129 MWh~~
150MW | 193 MWh

~~Commissioned December 2017~~
Commissioned Q1 2020

TESLA

HORNSDALE POWER RESERVE CO-LOCATED WITH 309MW WIND FARM



1. **Grid Services market participation**

2. **Strategic Reserve**

FREQUENCY REGULATION

Figure 1 Accuracy and speed of regulation FCAS response – large conventional steam turbine

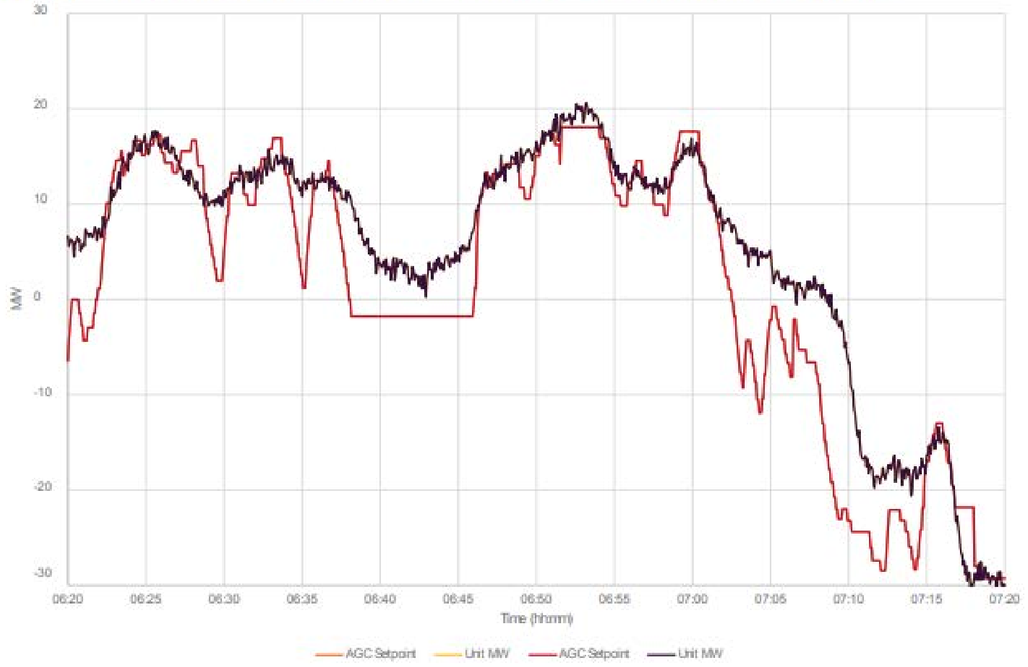
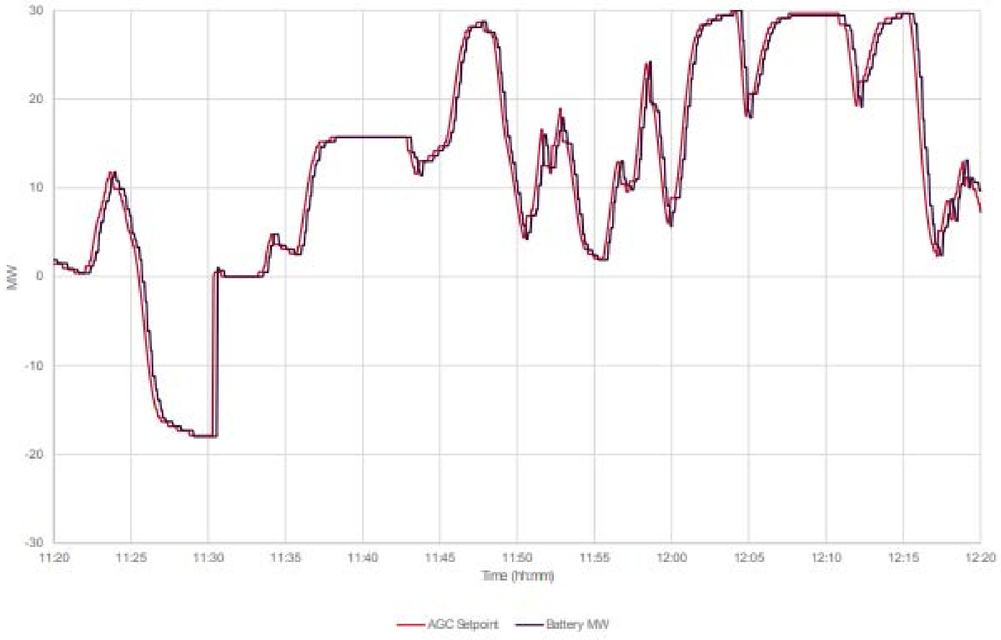


Figure 2 Accuracy and speed of regulation FCAS response – Hornsdale Power Reserve

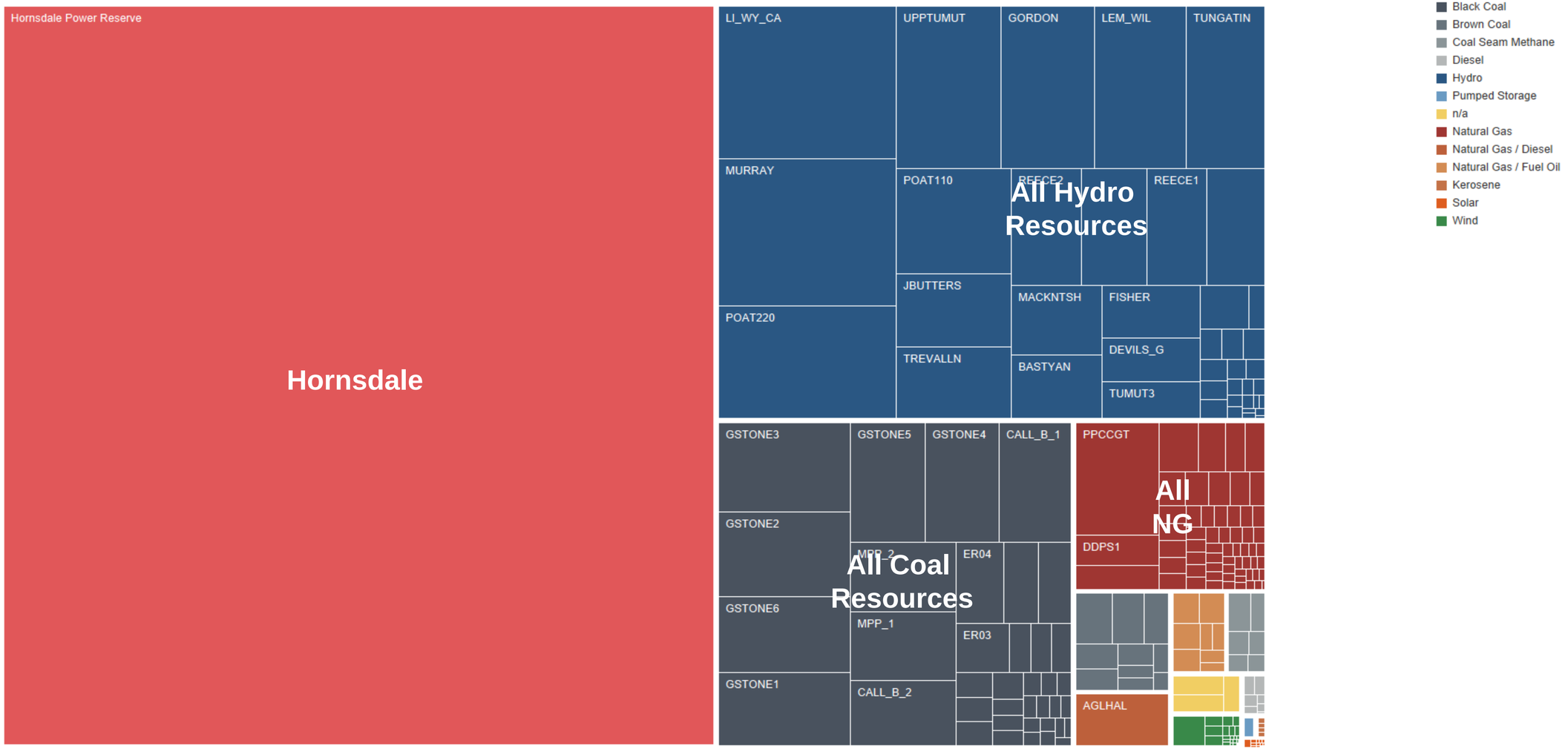


Superior accuracy and speed demonstrated by Hornsdale battery

Source: AEMO, April 2018

MARKET ACTIVITY BY RESOURCE - OPERATIONS IMPACT

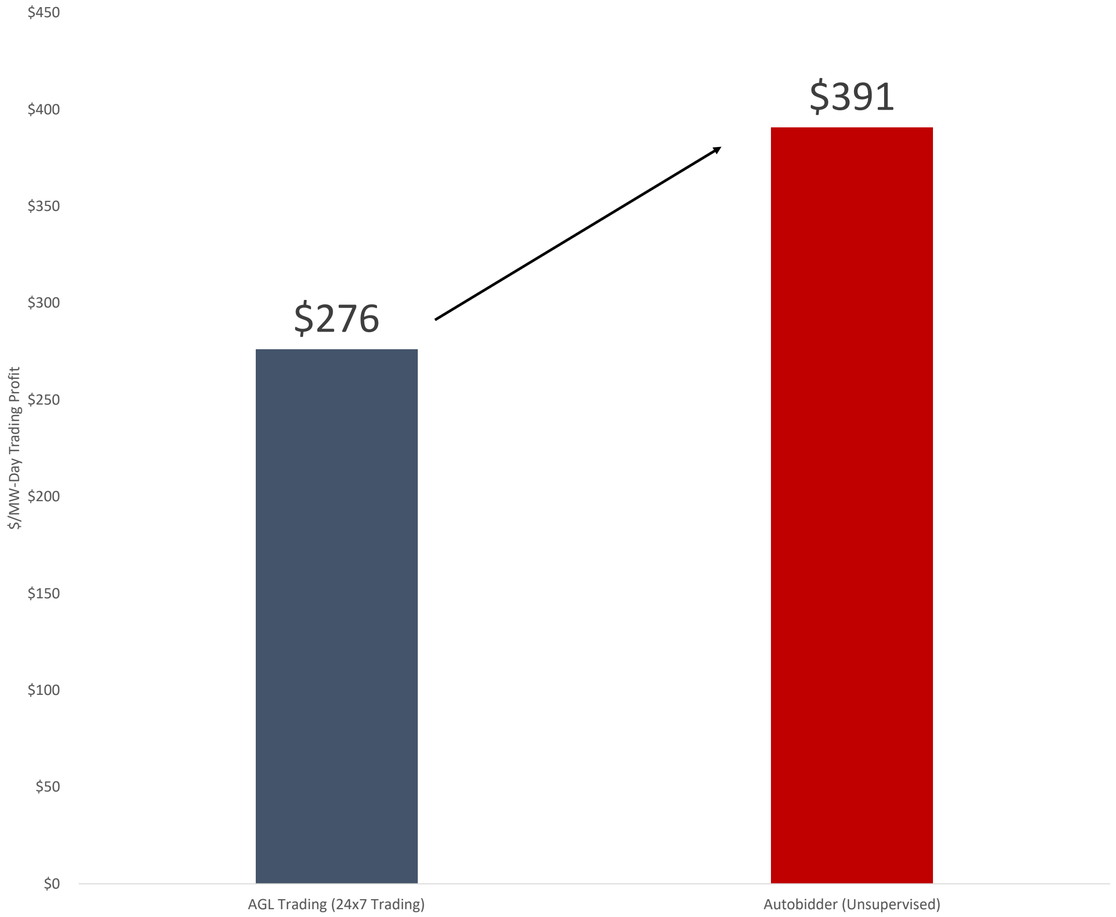
Market Activity by Resource (# of Real-Time Bids)



BENCHMARKING PERFORMANCE

Autobidder vs. AGL Trading

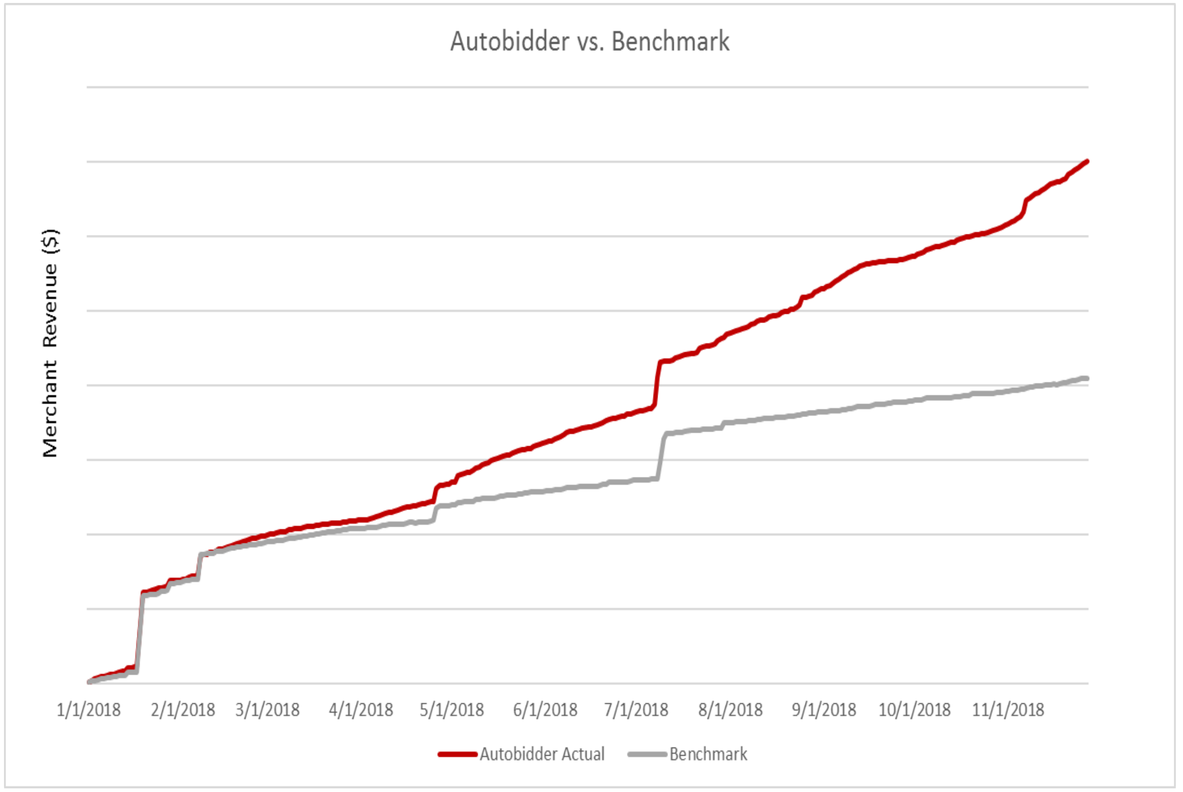
30MW/8MWh, Dec 14 – Jan 25



42% Revenue Premium on 24/7 Trading Team

Autobidder vs. Decision Tree Algorithm

Hornsdale, 2018 Benchmark Year



65% Revenue Premium versus Decision Tree Strategy

KAUAI ISLAND UTILITY COOPERATIVE (KIUC)

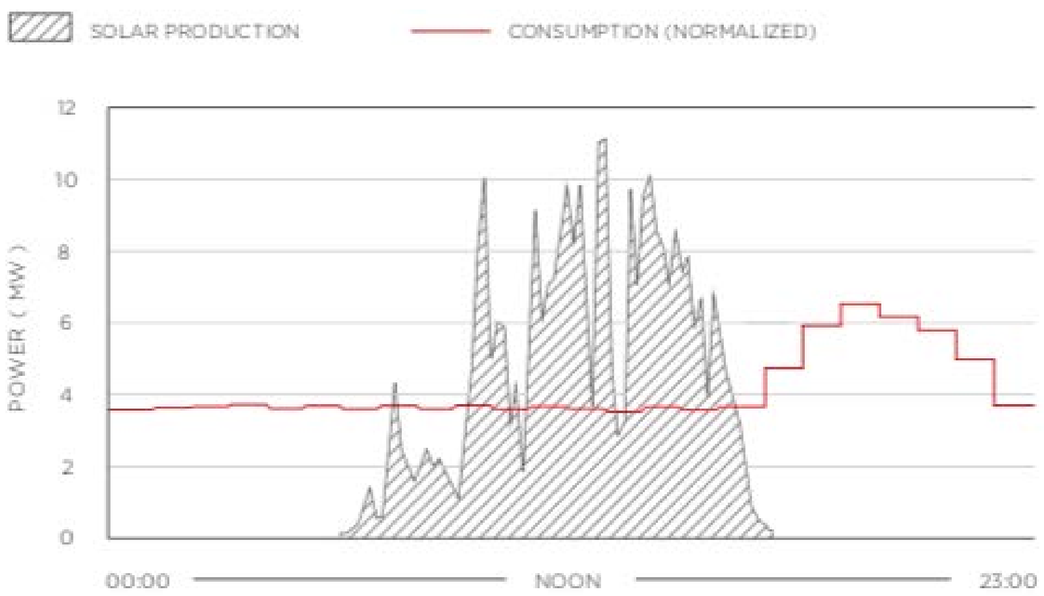
Kauai Island

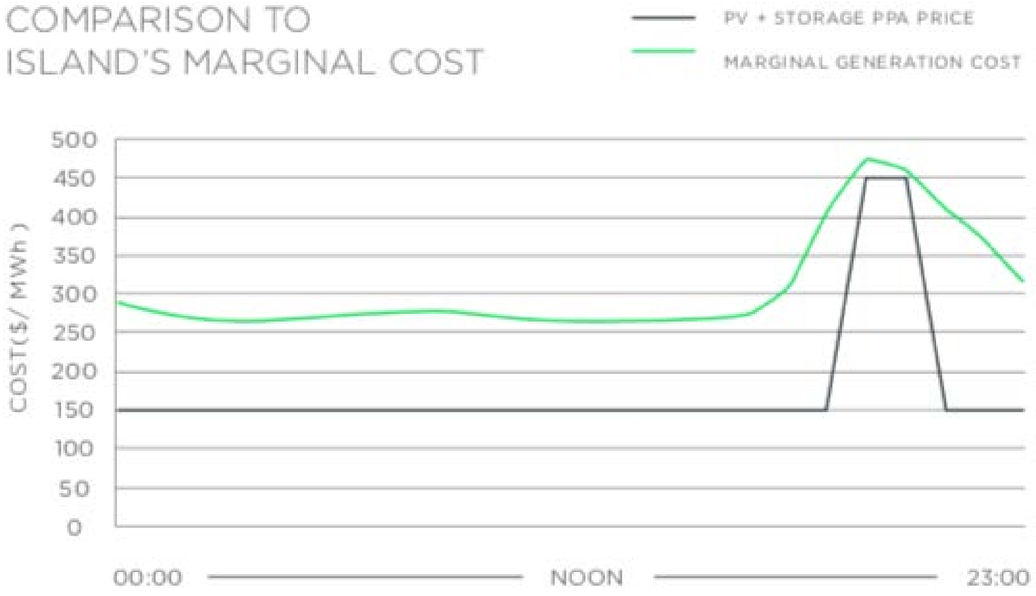
13 MW | 52 MWh (13 MW Solar PV)

Commissioned 2017

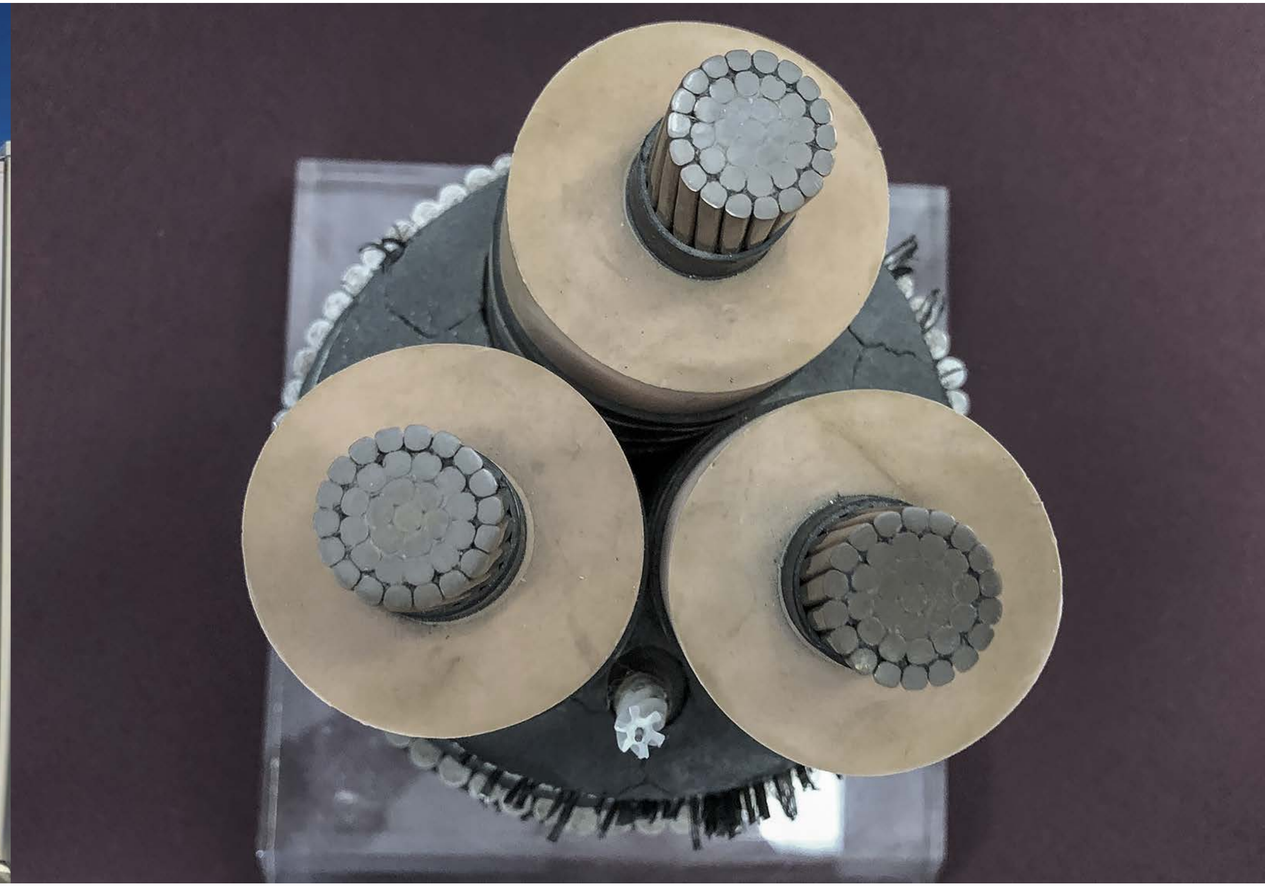
Solar self-consumption & Load shifting

KAUAI ISLAND UTILITY COOPERATIVE (KIUC)





NANTUCKET- NEW ENGLAND



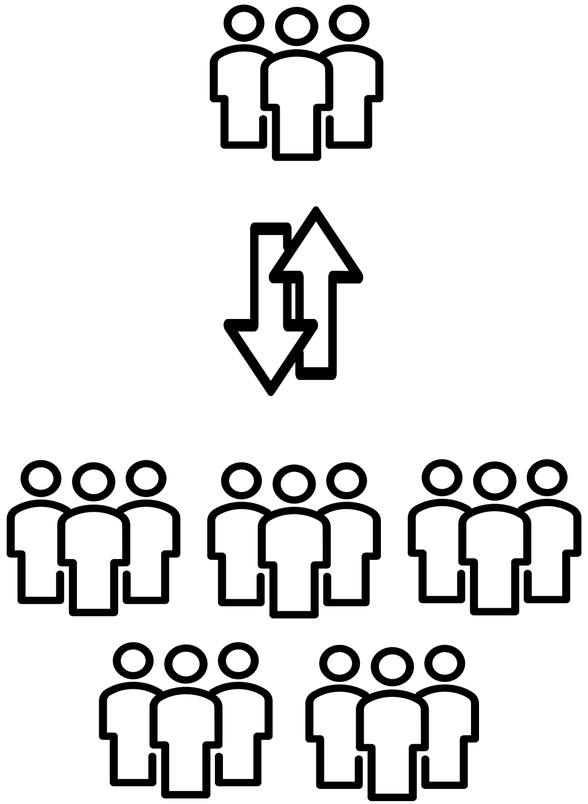
Nantucket

6 MW | 48 MWh

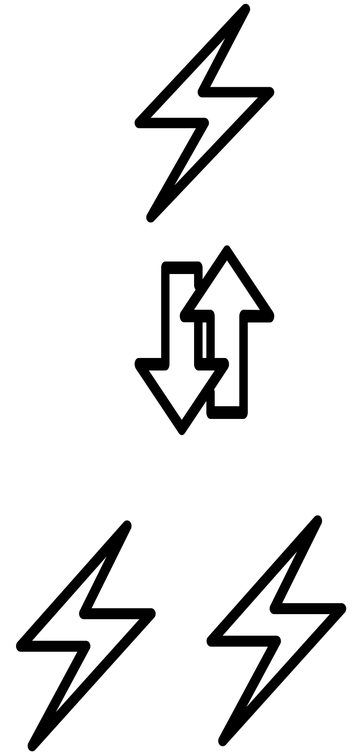
T&D Upgrade Deferral

Commissioned 2019

NANTUCKET- NEW ENGLAND

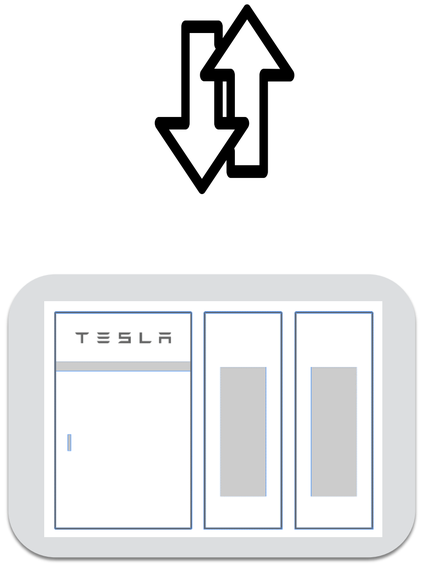


X 5 in Summer



25 MW --> 50 MW

A third subsea cable



200M USD → 81M USD

M E R C I