Generating Solar Energy from Car Parks

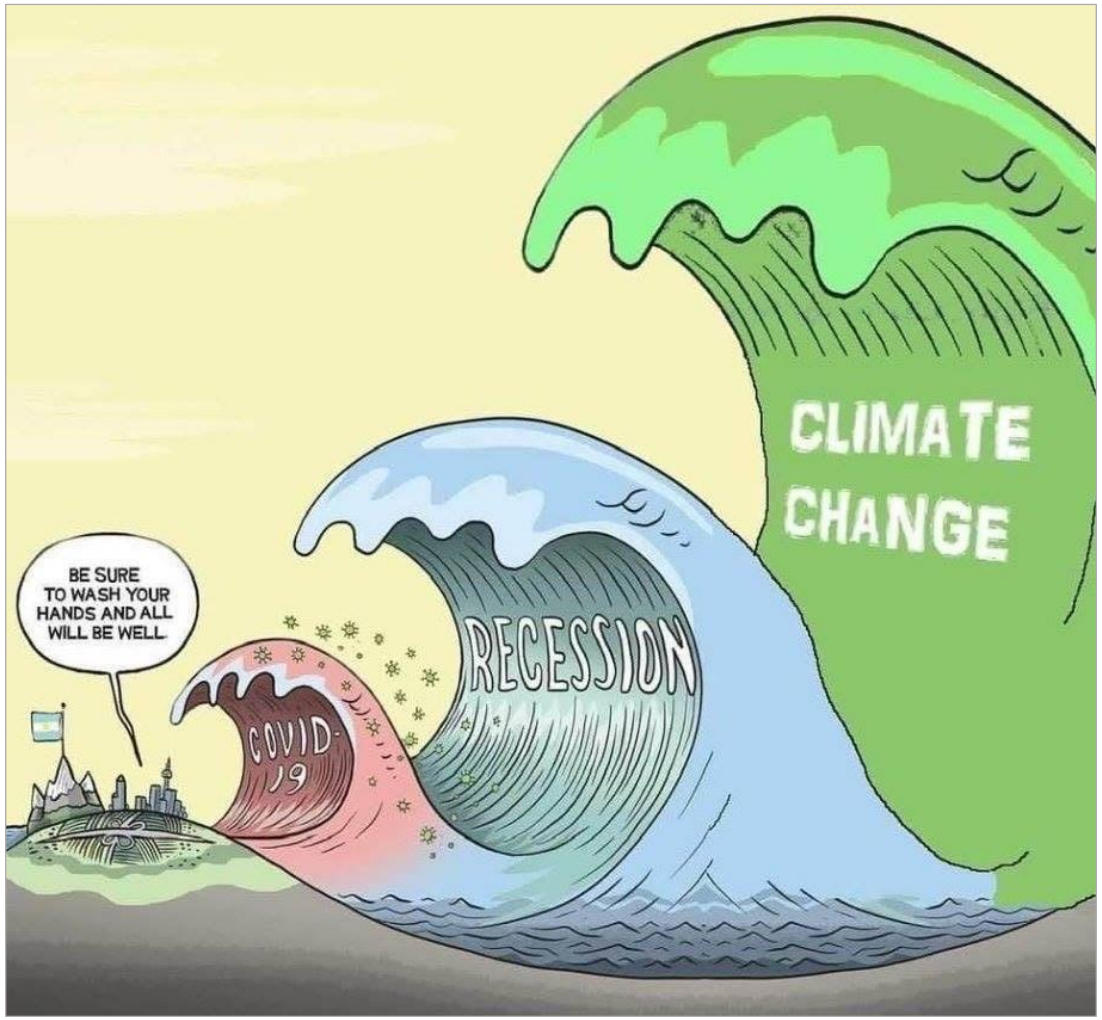
Case Studies: Bentley Motors & JP Morgan Chase

9th July 2020

Contents

Section	Page
Why Solar Car Parks?	3
What is a Solar Car Park?	6
JP Morgan Chase - Assessment	8
JP Morgan Chase - Development	9
Bentley Motors - Finance	11
Bentley Motors - Construction	12
Bentley Motors - Operation & Maintenance	14
Contact Details	16
Appendix - Team	17

Why Solar Car Parks? Facilitate EV Uptake & Green Recovery



Why Solar Car Parks? Tackle 68% of UK GHG Emissions

Sources of UK Greenhouse Gas Emissions								
(MtCO2e)	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2017**	**2018**
Transport	**128**	**130**	**133**	**136**	**125**	**124**	**126**	**124**
Energy Supply	**278**	**238**	**222**	**232**	**207**	**145**	**112**	**105**
Business	**114**	**112**	**116**	**109**	**94**	**85**	**81**	**79**
Residential	80	82	89	86	88	67	67	69
Agriculture	54	53	50	48	47	45	46	45
Waste Mgmt	67	69	63	49	30	21	20	21
Industrial	60	51	27	21	13	13	11	10
Public	14	13	12	11	10	80	8	8
LULUCF	0	(2)	(4)	(7)	(9)	(10)	(10)	(10)
Total	**794**	**745**	**708**	**684**	**601**	**498**	**461**	**452**

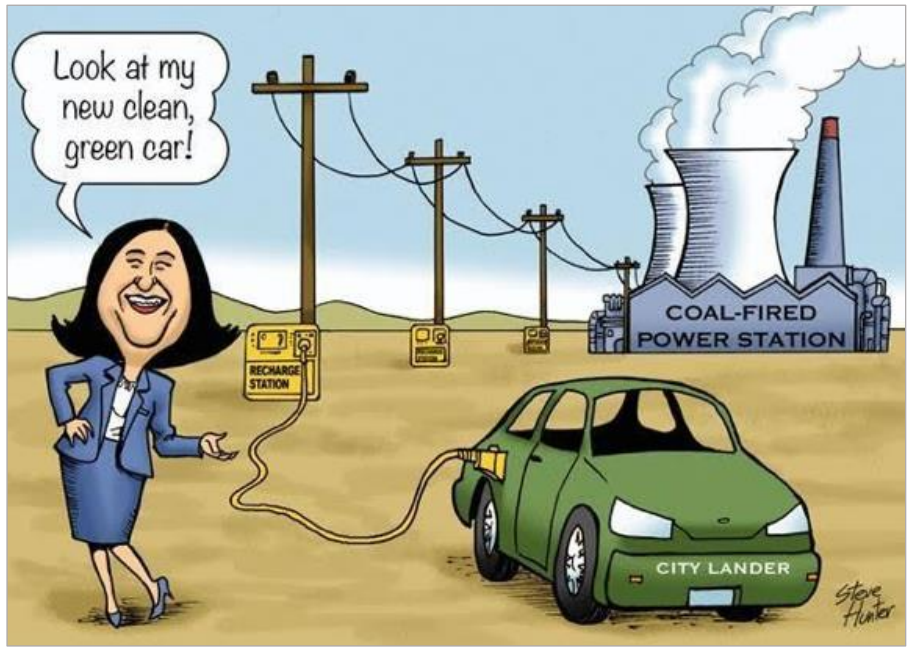


Table source: Department for Business, Energy & Industrial Strategy: 2018 UK Greenhouse Gas Emissions, Final figures

Why Solar Car Parks? 3Ti Vision

We see a world in which organisations & vehicles are powered by solar car parks

We know carbon emissions are the biggest driver of climate change & account for 81% of the UK's greenhouse gas emissions[1]

We know that climate change is humanity's greatest threat

We know that transport (28%), energy supply (23%) & business (17%) account for 68% of UK carbon emissions[1]

We believe that organisations can drive the transition

We believe that the time is now

We believe that solar car parks are beautiful

We believe in democratised, decentralised renewable energy

We believe in EVs & that they must be fuelled by renewable energy

We believe that EV charging must be clean & simple

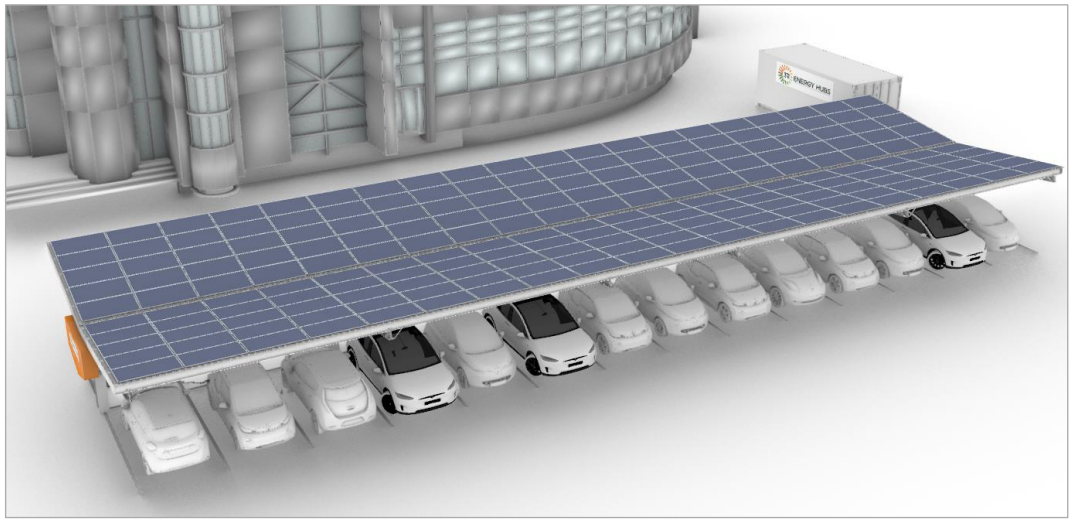
[1] *Department for Business, Energy & Industrial Strategy: 2018 UK Greenhouse Gas Emissions, Final figures*

What is a Solar Car Park? Powering EVs & Organisations

3Ti Design, Finance, Build & Operate Solar Car Parks that supply Electric Vehicles & Organisations with Solar Power

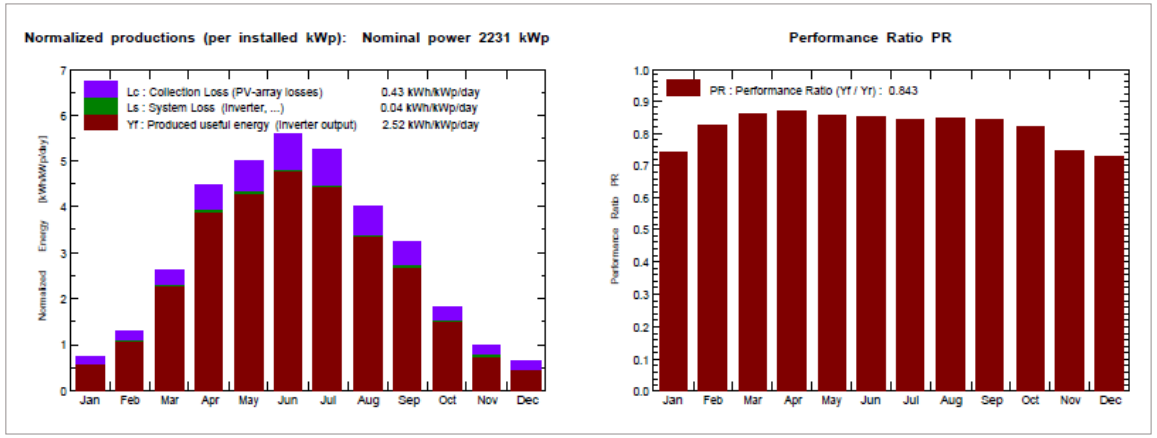
What is a Solar Car Park? 3Ti Process

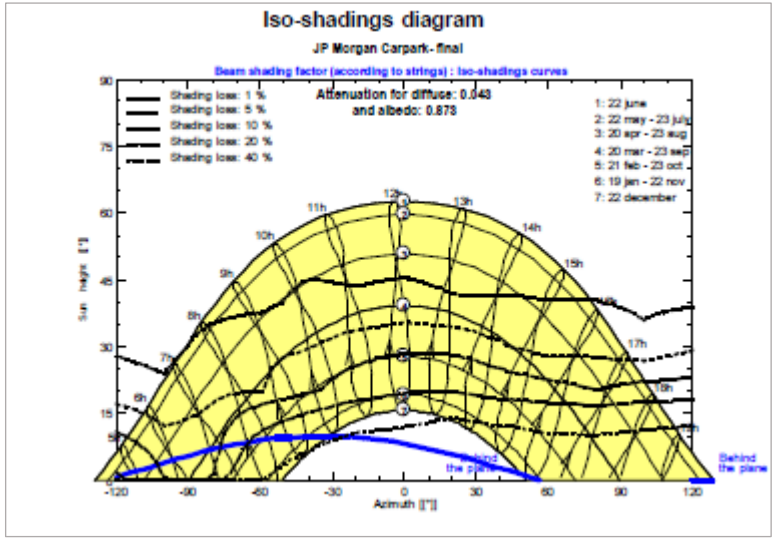
Assessment → Development → Finance → Construction → Operation & Maintenance



JP Morgan Chase - Assessment: Solar Modelling, Shading, Surveys, DNO

Car Park Size:	821 Spaces
PV Installation:	2.24 MWp
PV Panels Installed:	5,337
Annual Yield:	2,352 MWh
Battery Storage:	n/a
Funder:	JP Morgan Chase
DNO:	SSEN





JP Morgan Chase - Development: Detailed Design, Structure, Planning

3Ti ENERGY HUBS 3Ti Energy Hubs Limited 6 Plaza Gardens Putney, London, SW15 2DT United Kingdom	Project J.P Morgan Car Parking Structure				Job Ref.	
	Section Preliminary Main Frame Structural Calculations				Sheet no./rev. 1 / 00	
	Calc. by AY	Date 1/17/2020	Chk'd by AA	Date 1/20/2020	App'd by	Date

STEEL MEMBER ANALYSIS & DESIGN (EN1993-1-1:2005)

In accordance with EN1993-1-1:2005 incorporating Corrigenda February 2006 and April 2009 and the UK national annex

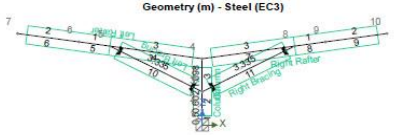
Tedds calculation version 4.4.01

ANALYSIS

Tedds calculation version 1.0.30

Geometry

Geometry (m) - Steel (EC3)



Materials

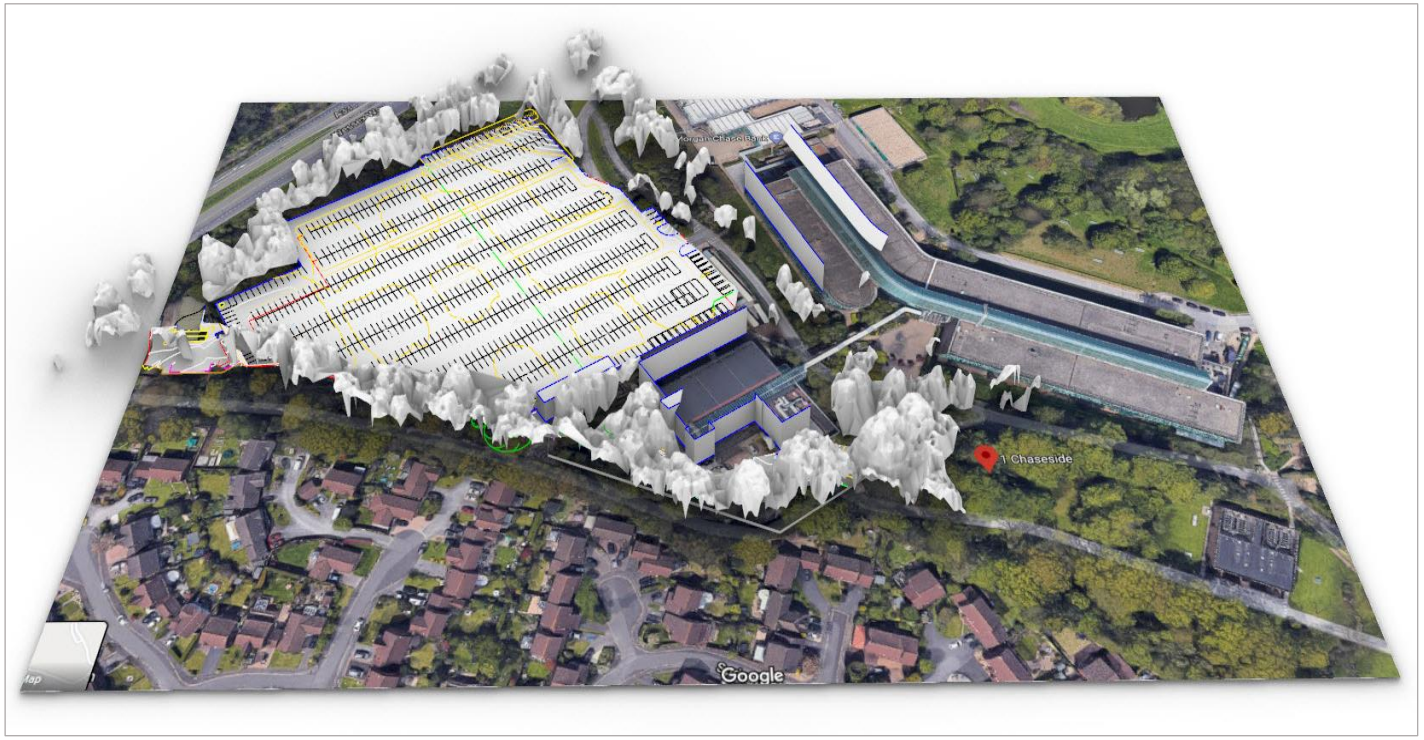
Name	Density (kg/m³)	Youngs Modulus kN/mm²	Shear Modulus kN/mm²	Thermal Coefficient °C⁻¹
Steel (EC3)	7850	210	80.8	0.000012

Sections

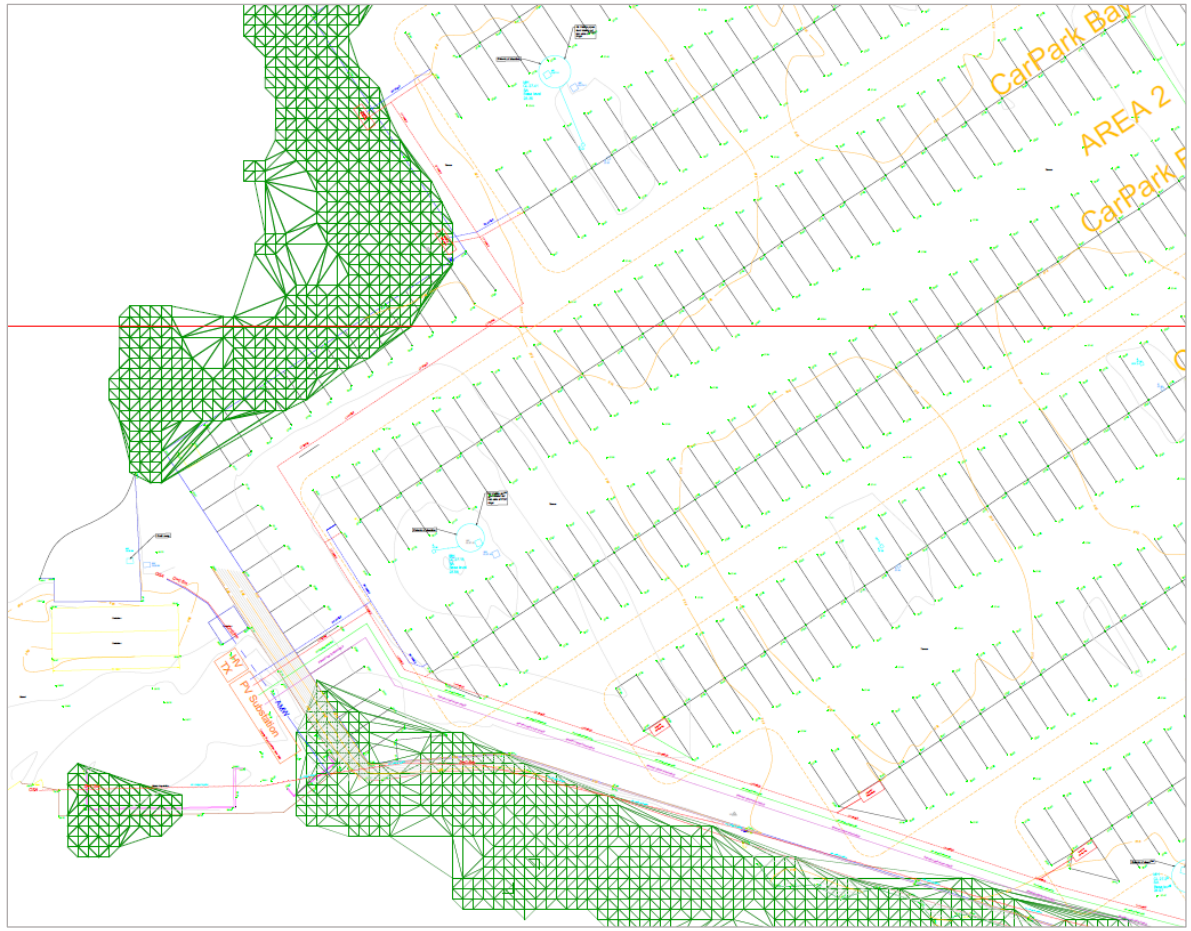
Name	Area (cm²)	Moment of inertia Major (cm⁴)	Moment of inertia Minor (cm⁴)	Shear area parallel to Minor (cm²)	Shear area parallel to Major (cm²)
CHS 88.9x4.0	10.7	96.3	96.3	5.3	5.3
UKB 305x165x54	68.8	11695.9	1063	24.5	41.2
CHS 88.9x5.0	13.2	116.4	116.4	6.6	6.6
UB 305x165x54	68.8	11695.9	1063	24.5	41.2
UKB 356x171x57	72.6	16038.3	1108.2	29	40.3

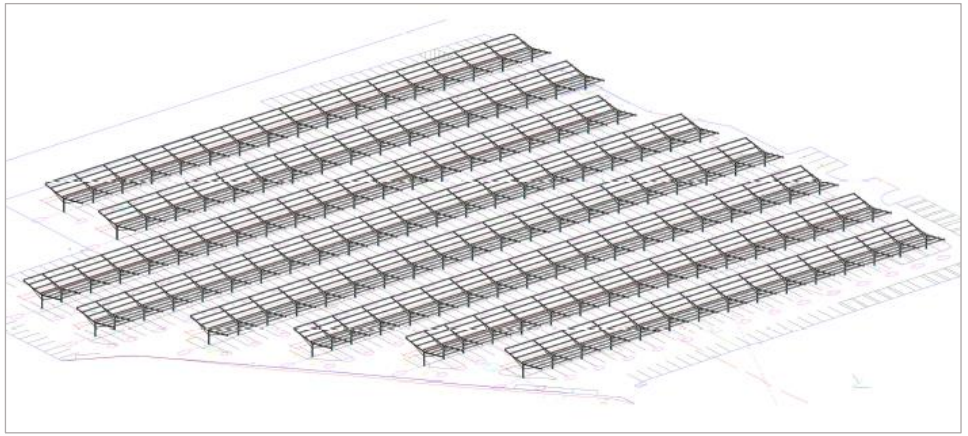
Nodes

Node	Co-ordinates X (m)	Co-ordinates Z (m)	Freedom X	Freedom Z	Freedom Rot.	Coordinate system Name	Coordinate system Angle (°)	Spring X (kN/m)	Spring Z (kN/m)	Spring Rot. kNm/°
1	0	0	Fixed	Fixed	Fixed		0	0	0	0
2	0	0.5	Free	Free	Free		0	0	0	0
3	0	1.102	Free	Free	Free		0	0	0	0
4	0	2.2	Free	Free	Free		0	0	0	0
5	-2.971	2.618	Free	Free	Free		0	0	0	0
6	-3.961	2.757	Free	Free	Free		0	0	0	0
7	-5.942	3.035	Free	Free	Free		0	0	0	0
8	2.971	2.618	Free	Free	Free		0	0	0	0
9	3.961	2.757	Free	Free	Free		0	0	0	0



JP Morgan Chase - Development: Contracting, Delivery Plan, Mobilisation





Bentley Motors, Crewe - Finance: PPA, Battery & EV Chargers

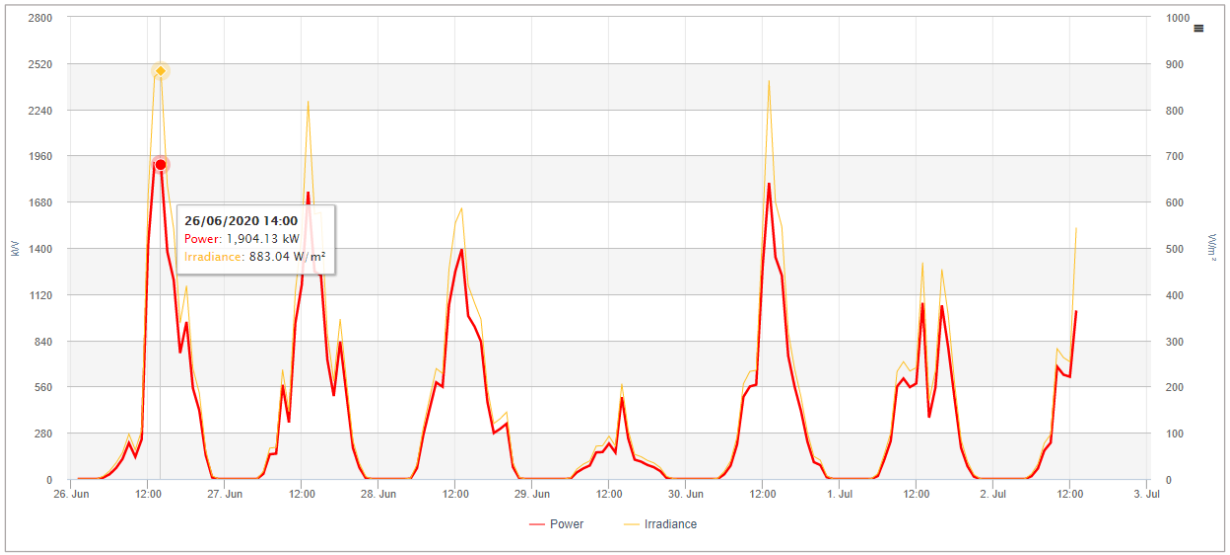
The UK's Largest Solar Car Park

Car Park Size:	1,378 Spaces
PV Installation:	2.70 MWp
PV Panels Installed:	10,000
Annual Yield:	2,592 MWh
Battery Storage:	4.60 MWh (planned 2021)
PPA Term:	30 years
Funder:	Third-Party
O&M Contract:	3Ti Energy Hubs Limited

Bentley Motors, Crewe - Construction: The Devil in the Detail

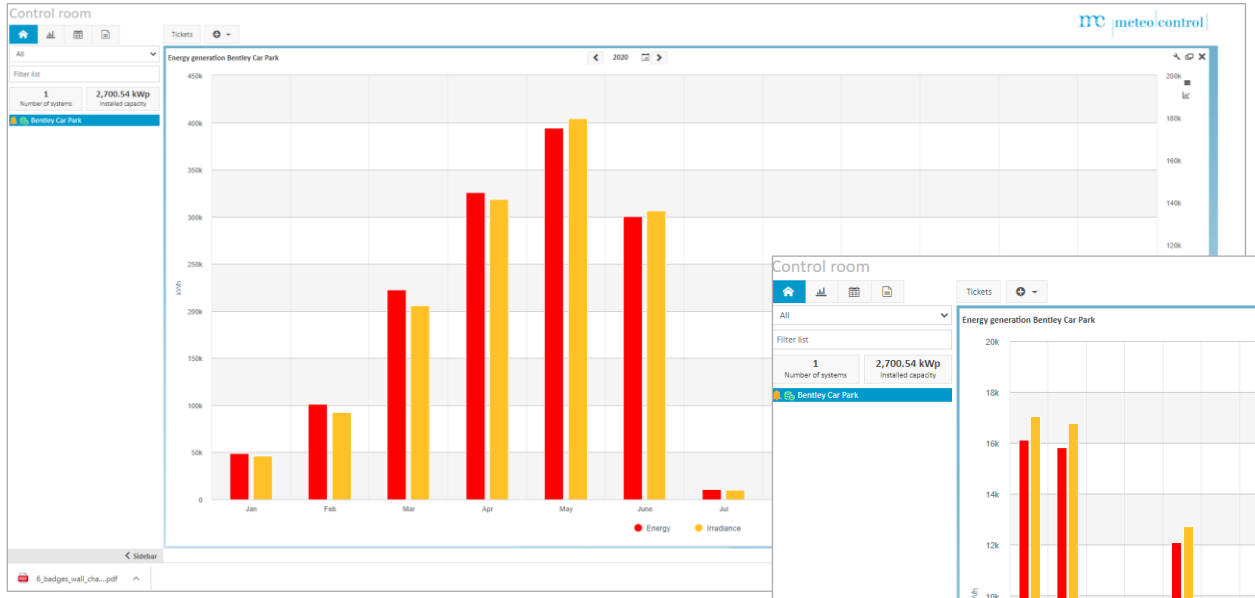
Bentley Motors, Crewe - Construction: Team Work & Innovation

Bentley Motors, Crewe - O&M: Back Office, Monitoring & Reporting

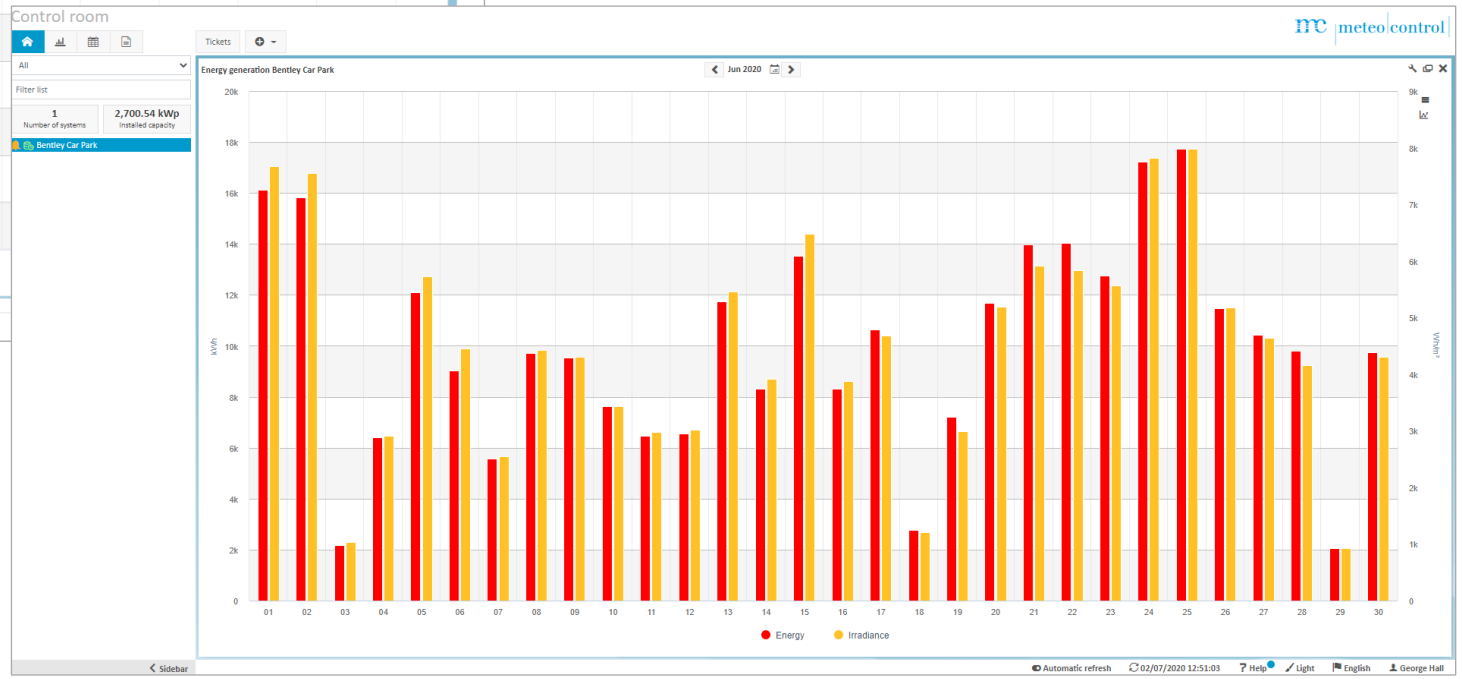


Daily Generation, June/July 2020

Bentley Motors, Crewe - O&M: Attention to Detail



Monthly Generation, 2020



Daily Generation, June 2020

3Ti ENERGY HUBS

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