Stirling Council Solar Canopy Projects

Solar Canopies Overview

Looking at feasible future developments integrating sustainable energy and transport and investigating income generation opportunities to the Council through renewable energy using existing assets

- Currently, EV charging is an ever-increasing cost to the Council
- Solar canopies have the potential to transform grey, windy car parks into "energy hubs" generating cheap, green electricity for buildings, streetlighting and electric vehicles
- Added incentive of having extensive car parking within the Council estate currently which would result in optimising the utilisation of existing assets and bring about an income generation stream not currently being optimised
- These car park portfolio land assets that Stirling Council already own form the basis of this business case, looking at using these assets to their full potential to:
    i. generate income
    ii. create local jobs
    iii. bring additional cost savings to the Council through the potential to use the electricity we generate

LCTT Funding Opportunity

Two funding calls through ERDF-Transport Scotland's LCTT Funding Programme – one unsuccessful, one successful

- Deliver a minimum of 6 x Low Carbon Travel & Transport Hubs
- Construct, upgrade or bring back to use up to 53km of cycle networks or walking paths
- Increase the number of ULEV registrations in Scotland by 50
- Increase the proportion of journeys to work by public and active travel by 0.75%
- 70% match funding intervention
- Stirling Council business case on the basis that PWLB was available

Castleview Project Overview

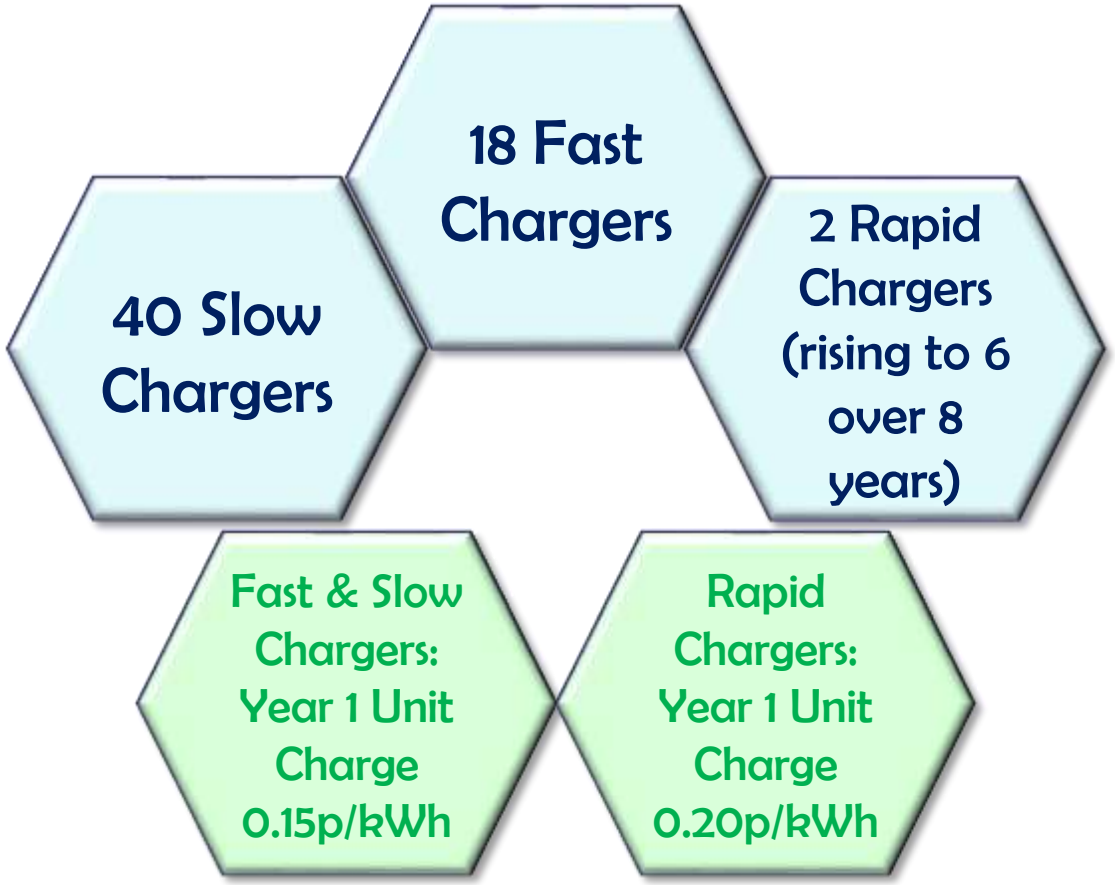
Castleview chosen due to its proximity to national road network, as well as being good size for pilot. Main aim is to provide commuters, residents and visitors increased opportunities for active and low carbon travel and income generation potential

- Generate and store renewable energy through solar canopies and battery storage, providing energy for smart EV charging; e-bikes; and on-site use
- Surplus fed back to grid or to local users
- Innovative element is the battery storage array smoothing the charging availability profile
- Provide and promote low carbon transport opportunities (bike share scheme; EV and e-bike charging; EV car hire through Car Club)
- Provide and promote active travel opportunities (bike lockers and racks; bike and e-bike hire)
- Enhanced, safe connectivity for functional journeys

Castleview Project Schematics

Castleview Project EV Infrastructure

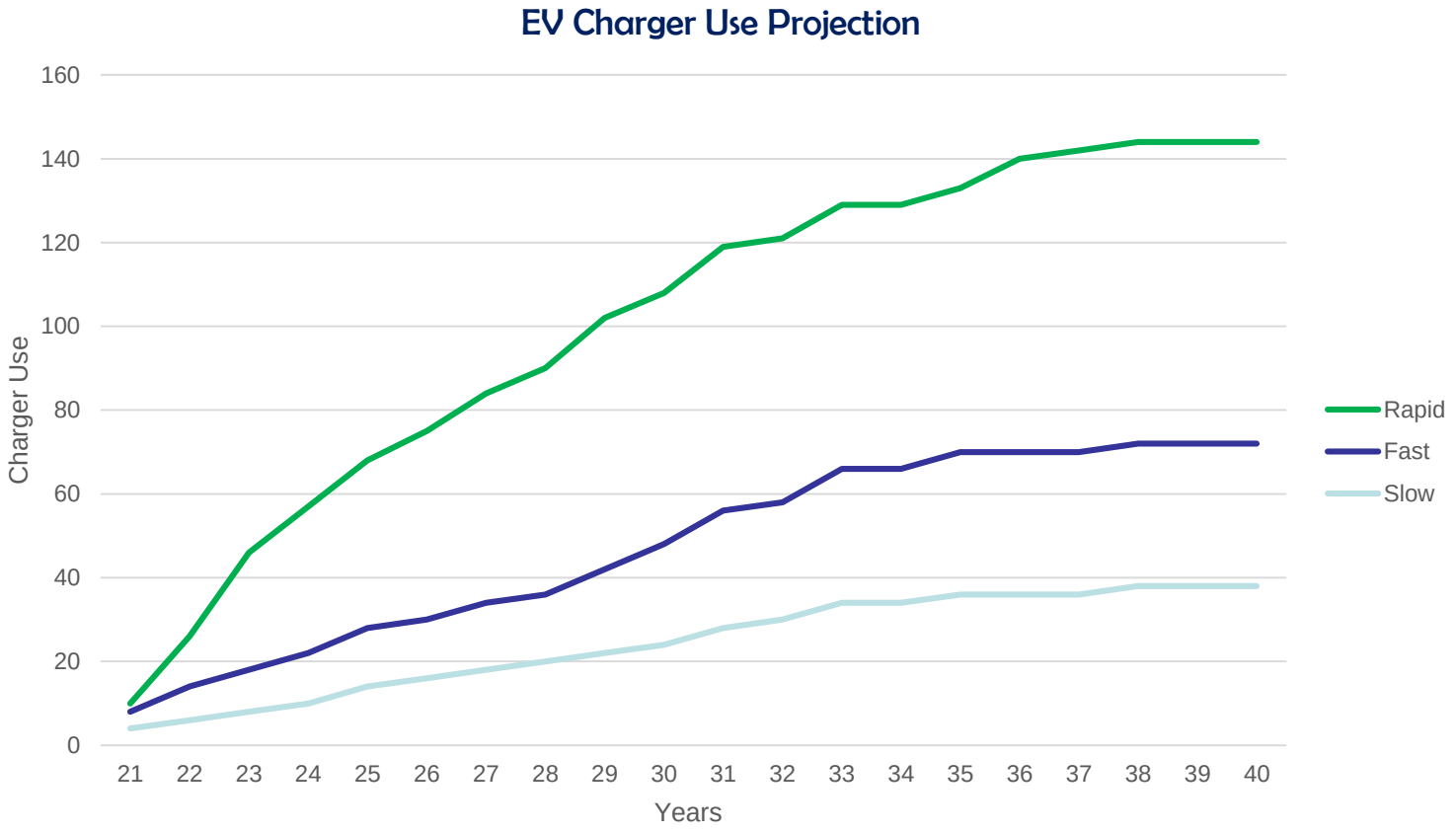
Currently 1 x fast and 1 x rapid at the site. Intend to use Charge Place Scotland platform and network for charging and back office issues. Additional EV Charging Infrastructure will be made up of:



After 20 years: Total 66 Chargers (40 slow; 19 fast; 7 rapid)

Minimum Charge £1.50; rising to £1.60 by Year 5; £1.80 by Year 10

Castleview EV Projections



EV Charging Use per Day			
Year	Slow	Fast	Rapid
2021	4	4	2
2022	6	8	12
2023	8	10	28
2024	10	12	35
2025	14	14	40
2026	16	14	45
2027	18	16	50
2028	20	16	54
2029	22	20	60
2030	24	24	60
2031	28	28	63
2032	30	28	63
2033	34	32	63
2034	34	32	63
2035	36	34	63
2036	36	34	70
2037	36	34	72
2038	38	34	72
2039	38	34	72
2040	38	34	72

Castleview Project Business Case

The income generation is made up of 3 main elements:

- Electricity generation from solar PV
- EV "charging for charging"
- Exporting surplus electricity to the grid

With additional opportunities around:

- Integrated LED lighting leading to lower energy consumption
- Potential for advertising as an additional means of generating income

Added bonus: Public attitudes - solar consistently receives the most support (over 80%)

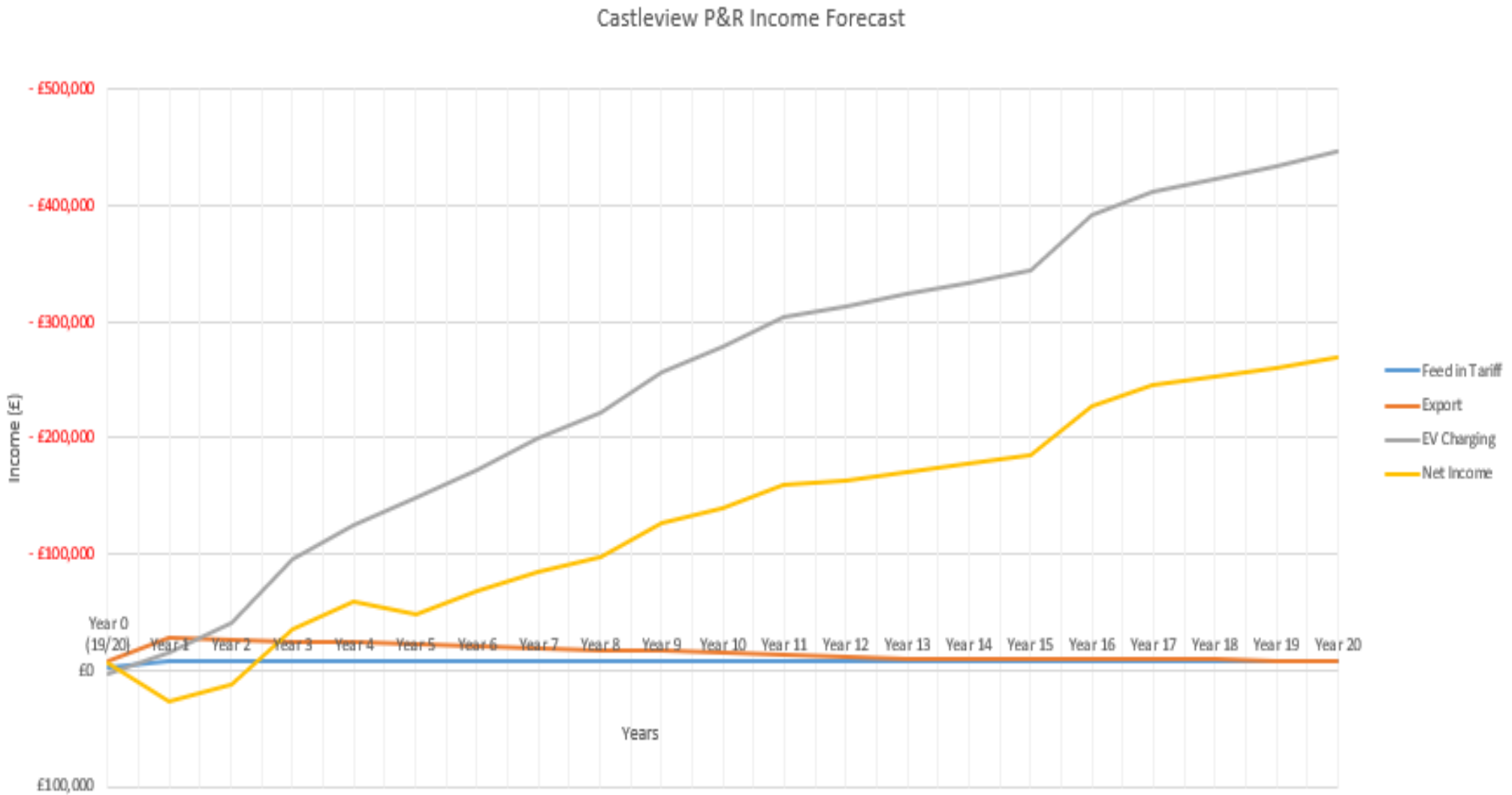
Castleview Business Case

Power kWp	**700**	[redacted]	Generation kWh	567,630 kWh Per year
Costs				
Installation @ £1,150 per kWp				£805,000
E-bike Charging				£70,000
Paths				£156,000
Integrated EV 50kW Rapid Charger				£30,000
Integrated EV Charge points (22kW Fast Charge-18pcs)				£17,100
Integrated EV Charge points (7-22kW Slow Charge 20 Dual)				£34,020
Battery				£771,505
Lighting				£7,000
Substation connection				£30,000
Marking and Signage				£40,600
Planning Application				£2,016
Staff costs				£88,929
Promo				£5,000
Sub-Total				**£2,057,170**
Contingency (10%)				£205,717.00
Total				**£2,262,887**

Castleview Business Case

		EV Charging income				EV Charging Costs					
		Slow Charger	Fast Charger	Rapid Charger	TOTAL Revenue	EV O&M	Transaction fees	Capital costs	TOTAL costs	Net Income	Cumulative income
21	Year 1	-£2,190	-£2,190	-£11,680	-£16,060		£2,291		£2,291	-£13,769	-£13,769
22	Year 2	-£3,351	-£4,468	-£36,792	-£41,260		£5,503	£0	£5,503	-£35,757	-£49,525
23	Year 3	-£4,468	-£5,585	-£89,936	-£95,521		£10,695	£30,000	£40,695	-£54,826	-£104,351
24	Year 4	-£5,585	-£6,701	-£117,530	-£124,231		£15,218	£0	£15,218	-£109,013	-£213,364
25	Year 5	-£8,176	-£8,176	-£140,160	-£148,336	£30,840	£16,218	£0	£47,058	-£101,278	-£314,642
26	Year 6	-£9,344	-£8,503	-£164,250	-£172,753	£31,457	£18,303	£0	£49,759	-£122,994	-£437,636
27	Year 7	-£10,512	-£9,344	-£189,800	-£199,144	£34,486	£20,775	£30,000	£85,261	-£113,883	-£551,519
28	Year 8	-£11,680	-£9,531	-£212,868	-£222,399	£37,576	£22,679	£0	£60,255	-£162,144	-£713,664
29	Year 9	-£12,848	-£11,680	-£245,280	-£256,960	£38,327	£25,917	£0	£64,245	-£192,715	-£906,379
30	Year 10	-£14,016	-£15,768	-£262,800	-£278,568	£39,094	£27,835		£66,929	-£211,639	-£1,118,018
31	Year 11	-£18,396	-£18,396	-£285,138	-£303,534	£39,876	£30,562	£0	£70,437	-£233,097	-£1,351,115
32	Year 12	-£19,710	-£18,764	-£294,336	-£313,100	£43,073	£31,307	£0	£74,380	-£238,720	-£1,589,835
33	Year 13	-£22,338	-£21,024	-£303,534	-£324,558	£43,935	£33,035	£0	£76,970	-£247,588	-£1,837,423
34	Year14	-£22,785	-£21,444	-£312,732	-£334,176	£44,813	£33,453	£0	£78,266	-£255,911	-£2,093,334
35	Year 15	-£24,309	-£22,959	-£321,930	-£344,889	£45,710	£34,584	£0	£80,293	-£264,595	-£2,357,929
36	Year 16	-£24,795	-£23,418	-£367,920	-£391,338	£46,624	£37,609	£0	£84,233	-£307,105	-£2,665,034
37	Year 17	-£25,291	-£23,886	-£388,944	-£412,830	£47,556	£38,832	£0	£86,388	-£326,442	-£2,991,476
38	Year 18	-£26,353	-£24,364	-£399,456	-£423,820	£48,507	£39,670	£0	£88,177	-£335,643	-£3,327,119
39	Year 19	-£26,880	-£24,851	-£409,968	-£434,819	£49,477	£40,147	£0	£89,624	-£345,195	-£3,672,314
40	Year 20	-£27,418	-£25,348	-£420,480	-£445,828	£50,467	£40,624	£0	£91,091	-£354,737	-£4,027,051

Castleview Business Case



Challenges & Risks

Steep learning curve but knowledge sharing and lessons learned will be key

Funding? PWLB?

PPA Sale Price

Non Contestable Works

Fault Mitigation Levels

Statutory Consultees

Behaviour Change/ Modal Shift

Feasibility/ Technical Expertise

Business Case Certainty

Large Capital Outlay

PPA Contract/ Legals

Grid Constraints

Timescales

Planning Process

Stakeholder Engagement

Technology Mix

Fear of the Unknown

Not Traditional Council Business

Financial Modelling

O&M/ Insurance/ Business Rates

Removal of Incentives

Certainty of Data

National Park

Differing Priorities

Community Engagement

Running the Asset – Metering & Billing

Benefits

Optimum in sustainable asset utilisation – area above car parks being otherwise unexploited brownfield site that can be used to generate renewable energy

- Significant renewable power generation for both onsite use and export to the grid
- Revenue from Year 1 and stable income over planned asset lifetime
- Suitable for Power Purchase Agreements to sell on electricity generated
- Provide protection to both the car and individual from the elements
- Integrated with LED lighting as well as drainage water recycling
- Councils already generally have substantial car park portfolio within their estate
- Car park areas often larger than roof space and avoids rooftop hazards; roof warranty issues
- Offer simplified and economical alternatives to complex and expensive roof mounted systems
- Low maintenance and offer easy access to panels so reduces O&M costs
- High levels of public acceptance and support for solar PV currently exists

Thank You