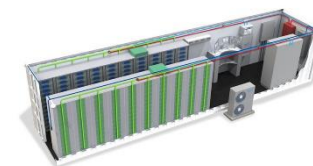
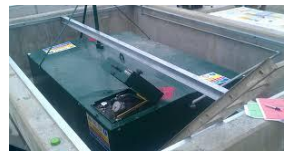
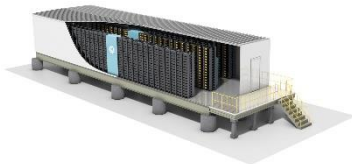


A Guide to Delivering a Standalone Battery Project

This guide has been created to provide Local Authorities with all the necessary information and reasons to instigate a strategy to deliver a standalone battery programme.



What Is Standalone Battery Storage?

Answer : It is a battery on a small parcel of ground that has no requirement for renewable energy generation

Electricity is purchased from the grid when prices are at their lowest and then resold between 4-7pm during the Red Zone when the highest prices can be obtained.

This transaction is controlled by an 'energy trader' whose responsibility it is to manage the battery and maximise the financial income achievable.

The battery must be carefully 'specified' to be able to charge and discharge quickly in order to for the process to be repeated at peak times. The quicker the process, the greater the revenue earning potential.

Procurement of energy trader and battery must be managed as a package.



Reasons To Consider Standalone Battery Storage?

Reason 1 : Financial Returns

- Attractive income for 10+ years
- Capital repayment within 7 years

Reason 2 : Urgency is Required

- Limited connection capacity in the grid
- Private developers are 'capacity bagging' in the same way as they did with ground mounted solar
- National Grid's storage contracts have been allocated to energy traders who are allocating them to battery owners on a first come basis



**LOCAL AUTHORITIES SHOULD MAKE FORMAL GRID APPLICATIONS
BY DECEMBER 2016 TO SECURE THEIR POSITION WITH THE GRID**

Reason 3 : Small Parcels of Land Required

- 1 MW of Battery Storage = 40ft container = 90 sq m of land required

Reason 4 : Local Authority Can Choose Level of Financial Risk and Financial Reward

- Three possible options available

Reason 5 : De Risked Delivery Process

- Asset Utilities can de-risk the delivery process and provide the local authorities with investment options to match a risk and reward profile

Example of Financial Returns : Option 1 – Local Authority Owns the Battery

This example is for a 2 MW (import of 2 MW and export of 1 MW) battery with no renewable energy generation.

Land required 180 sq m.

A 5 year model has been shown as the industry is only able to provide with present contracts for this period

Battery has a 10 year warranty which can extended to year 15.

The grid connection is an assumed maximum. A lower connection cost will enhance the financial model and reduce the capital repayment period.

Capital repayment is achieved in year 6.

Year		1	2	3	4	5
Date		2017	2018	2019	2020	2021
Cost of battery	-£1,144,000					
Battery installation	-£115,000					
Grid connection	-£734,000					
TRIAD		£93,080	£98,040	£112,180	£120,840	£149,080
Capacity market		£40,000	£40,800	£41,616	£42,448	£43,298
CM charge		£4,958	£5,058	£5,158	£5,262	£5,366
GDUoS		£4,508	£4,598	£4,690	£4,784	£4,880
FFR		£235,875	£235,875	£235,875	£235,875	£235,875
Running cost		-£37,000	-£37,740	-£38,495	-£39,265	-£40,050
Net income	-£1,993,000	£341,421	£346,631	£361,024	£369,944	£398,449
Cumulative income	-£1,993,000	-£1,651,579	-£1,304,948	-£943,924	-£573,979	-£175,530

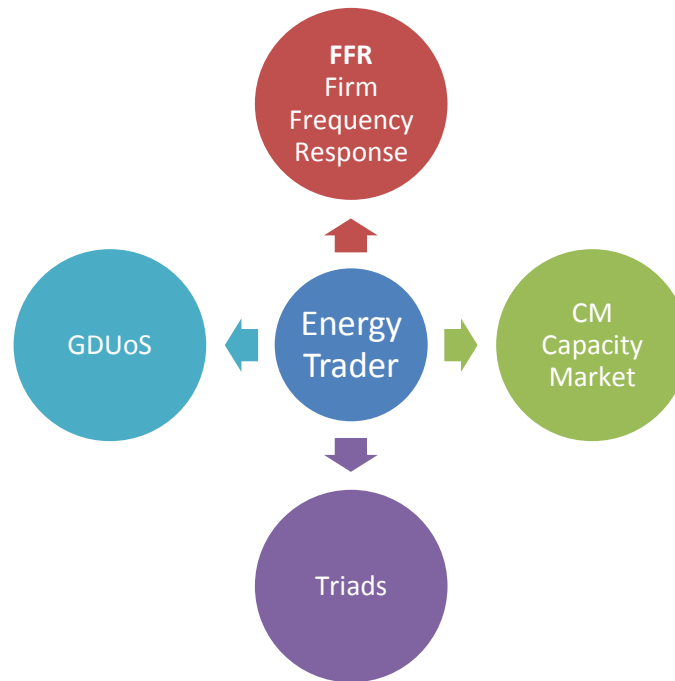
Further energy trading assumptions to support the model are available.

Battery Technology + Energy Trader = Required as a Package

Energy traders have the contracts with National Grid, which battery owners require to access

Energy traders will only accept projects that have a proven viability :

- Site Survey
- Full Financial Feasibility



Ownership and Investment Options

There are principally three options with different levels of risk and reward that can be considered.

	Option 1 Local Authority Owns the Battery HIGHER RISK : HIGHER REWARD	Option 2 Shared Income / Profit Model MEDIUM RISK : MEDIUM REWARD	Option 3 Local Authority Receives Rental income for 15 years LOWER RISK : LOWER REWARD
Reward Potential	Capital repayment within 7 years	By negotiation **	£7,000-£10,000 pa rental for a 1 MW battery
Grid Application *	Local Authority	Local Authority	Local Authority
Procures and Pays for Battery	Local Authority	Investor	Investor
Planning Application	Local Authority	Local Authority / Investor	Investor
Pays for Grid Connection	Local Authority	Local Authority / Investor **	Investor
Appoints and Manages the Energy Trader	Local Authority	Investor	Investor

Notes

* Grid Application – securing connection capacity increases the land’s capital value. The capital value will be further enhanced if no further capacity is available to other battery developers

** Share of Income or Profit – this is by negotiation on a site by site basis. The local authority is able to define what they wish to commit to the project e.g. the land, capital, the cost of the grid connection etc. which defines the financial reward received.

Key Strategic Actions and Considerations

Securing The Grid Connection

The starting point to secure the grid connection.

There is limited capacity in the grid and if the Local Authority fails to secure a grid connection, a private developer will.

Enhanced Land Value

The grid connection demonstrates the site can be developed for battery storage.

This site therefore has a value to battery investors, which enhances the land value.

Ownership and Investment Options Available

The Local Authority has the ability to choose the level of risk and reward required.

Option 1 : Local Authority Owns and Operates the Battery	HIGHER RISK : HIGHER REWARD
Option 2 : Shared Income / Profit Model	MEDIUM RISK : MEDIUM REWARD
Option 3: Local Authority Receives Rental income for 15 years	LOWER RISK : LOWER REWARD

Questions You Should Be Asking

Grid Connection

How do I know if there is capacity in the grid for a battery?
How much import and export capacity is required?
How do I make a formal application to the DNO?
How can this application process be managed effectively?
How can my application be ahead of the competition?
How can I reduce my connection costs?

Battery Choice and Location

What size and type of battery is required?
What size of land is required?
What distance do the battery sites need to be located to the DNO's connection point into the network?
What effect does that distance have on the connection cost and the financial returns?

Financial

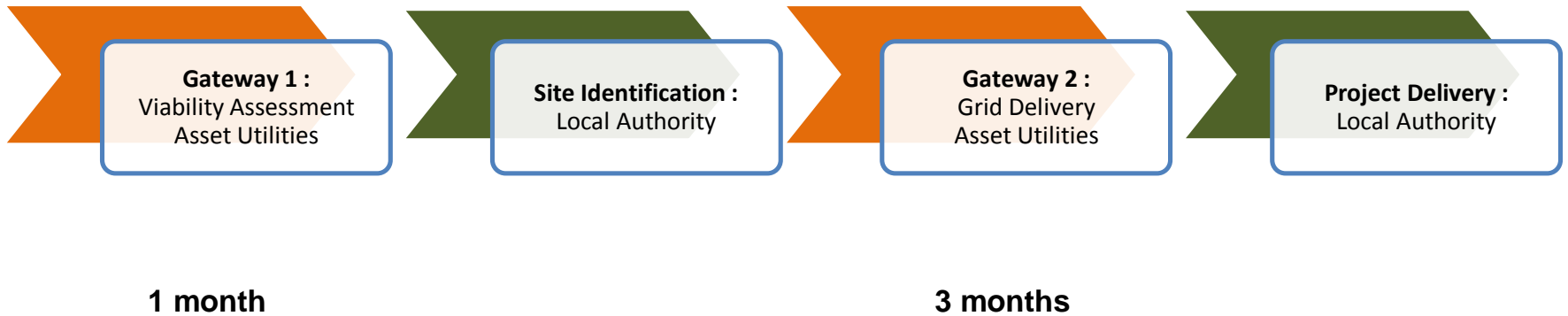
How is money made from the battery?
Who will managed the energy trading element?
How do I know this is being managed effectively?
What level of financial return can be achieved?
How can I use battery storage to enhance the capital value of my land?
How can I limit risk by working with a battery investor?

Delivery Process

What is the process from project commencement, to grid connection, to procurement to operation?
How can consultancy fees be limited to de-risk the project?
How can 'gateways' be built into the project to protect the local authority?
How can procurement procedures be managed effectively?
How do you procure a battery and an energy trading contract?
How quickly can an income be generated?

Which other local authorities can I work with to knowledge share?

Delivery Process



Delivery Process

Gateway 1 : Viability Assessment

Timescale : 1 month

Report demonstrating the viability of battery storage, the extent of delivery and financial benefits to the local authority.

This assessment ensures that the local authority only commits funding into viable projects

Grid Assessment

: Assess the import and export capacity at all DNO primary substations in the local authority area



OUTPUT

: This defines the size and number of batteries that can be connected to each substation

Site Location Assessment

: Identify the distance sites can be located from each primary substation,



OUTPUT

: Location report recommending where land should be identified

Energy Trading and Financial Modelling

: Produce financial models (high level) for different battery sizes at EACH primary substation SEE NEXT SLIDE
: Understand importance of working with an 'energy trader' to access CM (Capacity Market) and FFR (Firm Frequency Response)



OUTPUT

: Accurate financial modelling specific to the local authority's project
: Access to key players with National Grid contracts

Battery Storage Ownership and Investment Options

: Options provided that illustrate levels of risk and reward and the key players in the market



OUTPUT

: Local authority able to evaluate financial returns

Key Battery Storage Information

: Key information regarding battery container and land sizes, recycling, planning, visual impact etc



OUTPUT

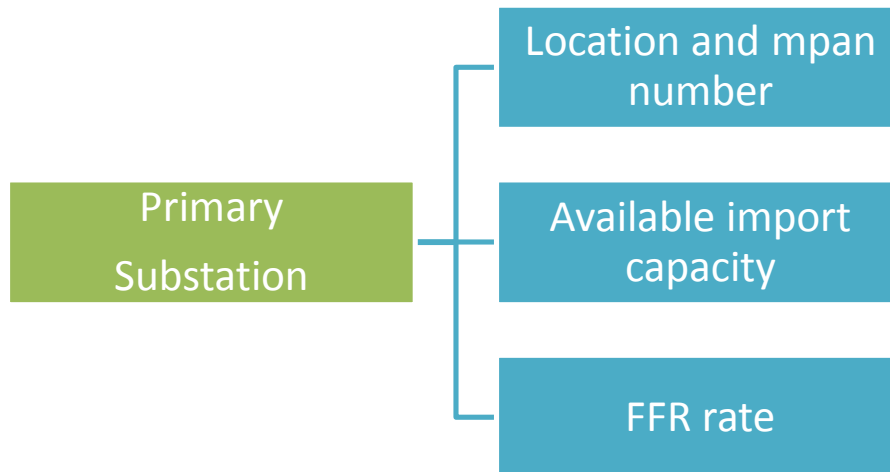
: Local authority able to strategically plan more effectively

Delivery Process

Gateway 1 : Viability Assessment

Energy Trading and Financial Modelling

: Financial models (high level) are different at EACH primary substation



GRID WORK

: required because each primary substation produces different results

: Local Authority can assess the financial models (high level) for each primary substations

Delivery Process : Site Identification – Local Authority



Local Authority locates sites within agreed distances to each primary substation.

Local authority can also consider purchasing suitable land.

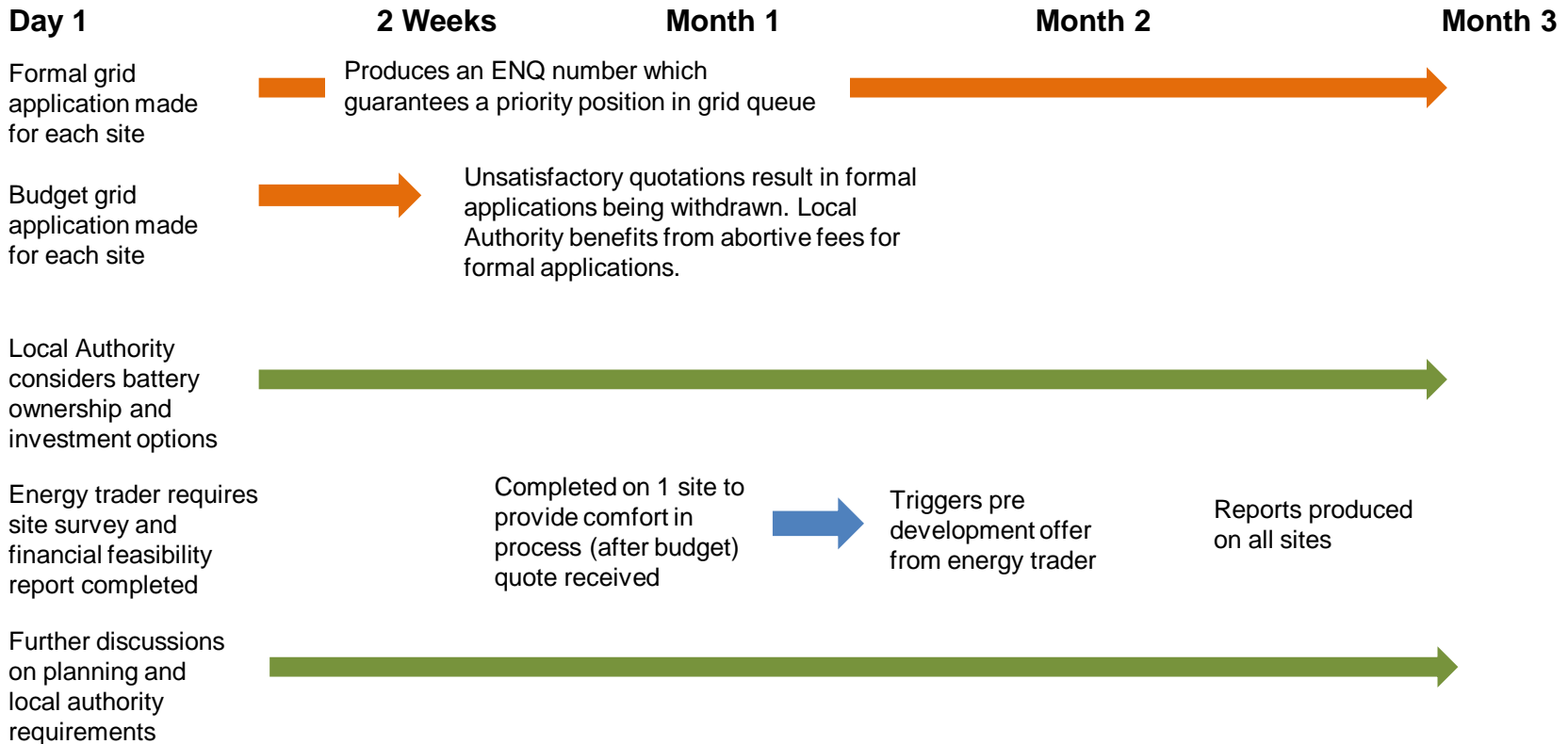
Delivery Process

Gateway 2 : Grid Delivery Timescale : 3 months

Delivering the project is completely subject to securing a grid connection.

Local Authorities can during the 3 month grid process complete all necessary due diligence

Timescale



Delivery Process : Project Delivery - Local Authority



Project Delivery is driven by the Local Authority and includes the stages and timescales to achieve cabinet approval.

Within this Gateway are the following considerations :

- Procurement of choice of battery and energy trader or negotiations with battery investor
- Timescale for battery ordering (typically 4 months)
- Commencement of planning application
- Acceptance of DNO formal offer (will have 90 day validity period)
- Instruction of DNO works and connection
- Instruction of onsite grid connection works
- Cabinet report and approval

Turning an Unviable GMS site into a Viable Project

Ground Mounted Solar

1 MW

- Connection cost £125,000

Answer

Develop the site as

Battery Storage
GMS

1 MW (import) and 500 kva (export)
500 kva

The battery generic financial model shows a payback before the end year 7.

However, model includes an assumed grid connection cost of £604,000 but actual cost is £125,000. The saving of £479,000 reduces the payback before the end of year 5.

The GMS site can then be developed at an agreed date with no connection charge

Year		1	2	3	4	5
Date		2017	2018	2019	2020	2021
Cost of battery	-£572,000					
Battery installation	-£60,000					
Grid connection	-£604,000					
TRIAD		£46,540	£49,020	£56,090	£60,420	£74,540
Capacity market		£20,000	£20,400	£20,808	£21,224	£21,649
CM charge		£2,479	£2,529	£2,579	£2,631	£2,683
GDUoS		£2,254	£2,299	£2,345	£2,392	£2,440
FFR		£117,938	£117,938	£117,938	£117,938	£117,938
Running cost		-£18,500	-£18,870	-£19,247	-£19,632	-£20,025
Net income	-£1,236,000	£170,711	£173,316	£180,512	£184,972	£199,225
Cumulative income	-£1,236,000	-£1,065,290	-£891,974	-£711,462	-£526,490	-£327,265

Next Stages



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