

Smart Cities – Smart Waste

APSE Scotland Fleet, Waste and Grounds Seminar
Aviemore
16th May 2019

Magda Jakub – Smart Waste Systems Officer

Donna Rigby - Waste Services Co-ordinator

Perth & Kinross Council



European Union

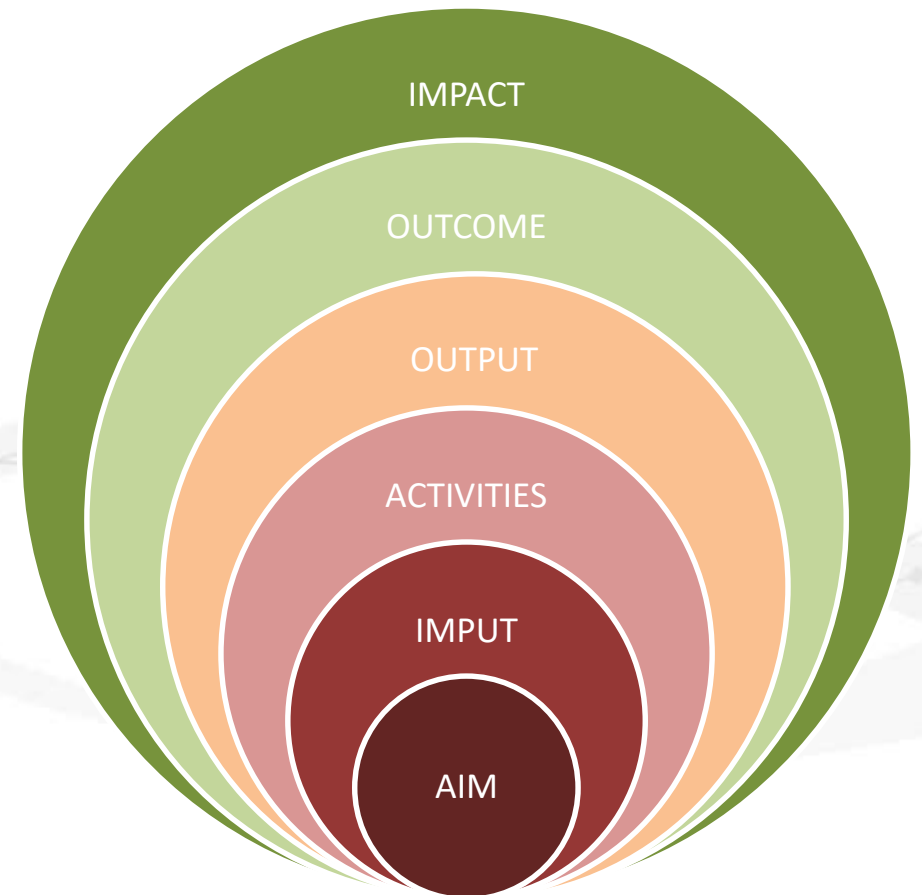


gov.scot

EUROPE & SCOTLAND
European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

Smart Cities – Smart Waste

- ▶ Smart Waste part of Smart Cities
- ▶ Smart Cities aims to generate datasets which are accessible through Open Data Portal platforms
- ▶ Smart Waste Project impact – easy to forget



Smart Waste – Phase 1 Projects

Smart Bin Sensors

- ▶ Litter bins and Mini glass points

FlyMapper – TotalMobile

- ▶ Phone application and new ways of working

Dynamic weighing system

- ▶ Commercial lorries, food and glass data and no RFID tags

Smart Waste – Data & Technology

- ▶ Data and technology goes hand in hand and work together?



Data Accuracy

1. Only correct data can lead to the right decisions and beneficial changes (Sensor data)




Data Capture

2. What is measured well, can be managed well
(Food Waste – weighing system)

	A	B	C	D	E	F	G	H	I
1	Date	RFID TBG	NetWeigh	TareWeigh	GrossWeigh	Lifterside	Lat	Long	
2	----	-----	-----	-----	-----	-----	---	---	
3	27/08/2018	0	0	0	0	1	56.3756	-3.42054	
4	27/08/2018	0	41.5	9	50.5	1	56.3871	-3.43749	
5	27/08/2018	0	78	9	87	1	56.3871	-3.43746	
6	27/08/2018	0	80	9.5	89.5	1	56.3871	-3.43745	Glenearn community campus
7	27/08/2018	0	38	9	47	1	56.3903	-3.46002	
8	27/08/2018	0	82.5	10	92.5	1	56.3899	-3.45871	
9	27/08/2018	0	82.5	10	92.5	1	56.3899	-3.45871	
10	27/08/2018	0	74.5	10	84.5	1	56.39	-3.45876	Perth academy/ primary school
11	27/08/2018	0	71	10	81	1	56.3899	-3.45875	
12	27/08/2018	0	39.5	10	49.5	1	56.39	-3.45877	
13	27/08/2018	0	87.5	9.5	97	1	56.3918	-3.46673	
14	27/08/2018	0	100.5	9.5	110	1	56.3918	-3.46671	perth high school / oakbank primary school
15	27/08/2018	0	10	9	19	1	56.3918	-3.46663	
16	27/08/2018	0	34.5	9	43.5	1	56.3925	-3.46683	
17	27/08/2018	0	18.5	9	27.5	1	56.3925	-3.4668	
18	27/08/2018	0	33.5	14.5	48	1	56.3976	-3.48148	
19	27/08/2018	0	54.5	11	65.5	1	56.3976	-3.48148	
20	27/08/2018	0	90.5	9.5	100	1	56.4045	-3.46807	letham primary school
21	27/08/2018	0	74.5	10	84.5	1	56.4046	-3.46807	
22	27/08/2018	0	37.5	9	46.5	1	56.4019	-3.47182	

Project Scale

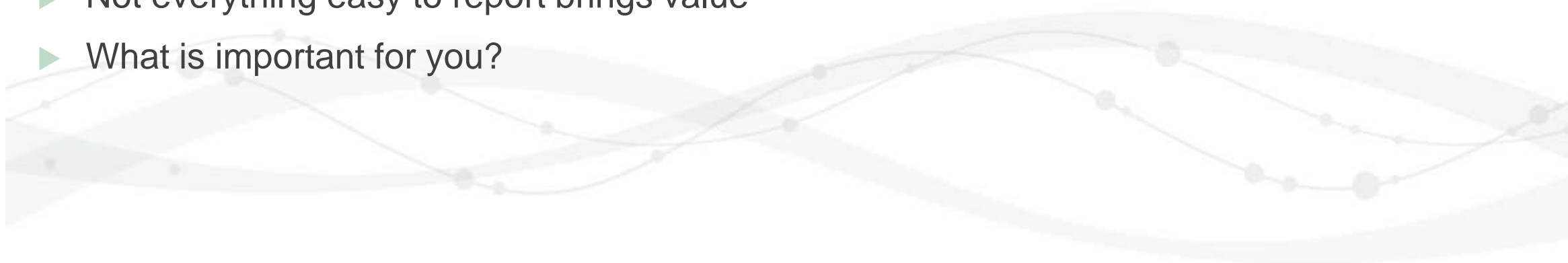
3. Think about the scale of the innovative technology

- ▶ Start with a small area to be improved and focus on it
 - ▶ Gather and analyse the data
 - ▶ Make improvements (if possible)
 - ▶ Master and scale up
- 

Data Reporting

4. Make the important measurable and not the measurable important

- ▶ Lots of easy accessible data is not the answer (Bin sensors)
- ▶ Not everything easy to report brings value
- ▶ What is important for you?



Challenges

5. Technology is the easy part

- ▶ Purchase and installation – starting point
- ▶ Importance of integration – in the existing and future developments
- ▶ Convince Operations of the “new ways of doing things”
- ▶ Experience vs data

Data Format

6. Data format – is it really important?

	A	B	C	D	E	F	G	H	I
1	Date	NetWeight	TareWeight	GrossWeight	Long	Lat	UPRN	StreetName	FullAddress
2	Mar 05, 2018	0	0	0	-3.42098	56.3754	124094713	FRIARTON ROAD	NETHER FRIARTON AGRICULTURAL GROUND, FRIARTON ROAD, PERTH
3	Mar 05, 2018	58.5	10	68.5	-3.44281	56.3899	124000069	ABBOT STREET	CRAIGIE PRIMARY SCHOOL, 15 ABBOT STREET, PERTH, PH2 0EE
4	Mar 05, 2018	25.5	9.5	35	-3.43747	56.3872	124092366	GLENEARN ROAD	RECREATION CENTRE, GLENEARN COMMUNITY CAMPUS, GLENEARN ROAD
5	Mar 05, 2018	37	9.5	46.5	-3.43744	56.3872	124092366	GLENEARN ROAD	RECREATION CENTRE, GLENEARN COMMUNITY CAMPUS, GLENEARN ROAD
6	Mar 05, 2018	0.5	9.5	10	-3.43744	56.3872	124092366	GLENEARN ROAD	RECREATION CENTRE, GLENEARN COMMUNITY CAMPUS, GLENEARN ROAD
7	Mar 05, 2018	83.5	10	93.5	-3.43601	56.3791	124017480	GLENGARRY ROAD	98 GLENGARRY ROAD, PERTH, PH2 0AB
8	Mar 05, 2018	47.5	11.5	59	-3.43164	56.3866	124014408	EDINBURGH ROAD	CHILLI PEPPER, 2 EDINBURGH ROAD, PERTH, PH2 8AR
9	Mar 05, 2018	19	10	29	-3.42803	56.3948	124105774	PRINCES STREET	4 PRINCES STREET, PERTH, PH2 8NG
10	Mar 05, 2018	21.5	36.5	58	-3.42573	56.3964	124012260	TAY STREET	CAPITAL ASSET, 26 TAY STREET, PERTH, PH1 5LQ
11	Mar 05, 2018	1	36	37	-3.42572	56.3965	124012260	TAY STREET	CAPITAL ASSET, 26 TAY STREET, PERTH, PH1 5LQ
12	Mar 05, 2018	38.5	37.5	76	-3.42571	56.3964	124012260	TAY STREET	CAPITAL ASSET, 26 TAY STREET, PERTH, PH1 5LQ
13	Mar 05, 2018	53.5	27	80.5	-3.4259	56.3965	124012260	TAY STREET	CAPITAL ASSET, 26 TAY STREET, PERTH, PH1 5LQ
14	Mar 05, 2018	23	36.5	59.5	-3.42584	56.3964	124012260	TAY STREET	CAPITAL ASSET, 26 TAY STREET, PERTH, PH1 5LQ
15	Mar 05, 2018	34	10	44	-3.42784	56.3967	124025752	HIGH STREET	50 HIGH STREET, PERTH, PH1 5TQ
16	Mar 05, 2018	56.5	9.5	66	-3.42791	56.3963	124083038	KIRKGATE	RECYCLING POINT, KIRKGATE, PERTH
17	Mar 05, 2018	49.5	9.5	59	-3.42793	56.3964	124055170	ST JOHN STREET	STRUTT AND PARKER, 5 ST JOHN STREET, PERTH, PH1 5SP

Learn the hard way

7. Don't be afraid to fail



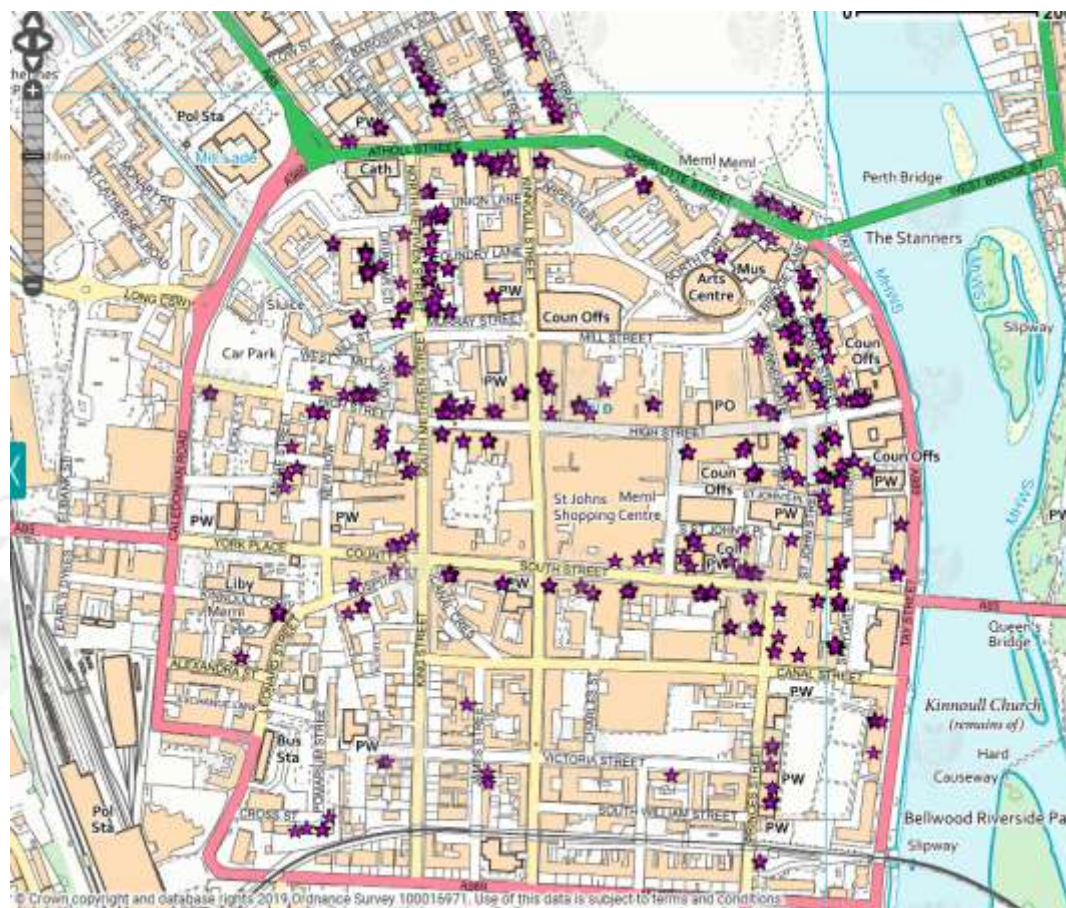
Key Findings

- ▶ Generate the data which is relevant and based on local conditions
- ▶ Think locally - Act locally
- ▶ Key to success – people !
- ▶ Smart Waste Phase 1 - opens the door for future improvements

Smart Waste – Phase 2

- ▶ Sensor Technology – Communal Bins
Recycling Bells
- ▶ In Cab Technology
- ▶ Automatic Number Plate Recognition

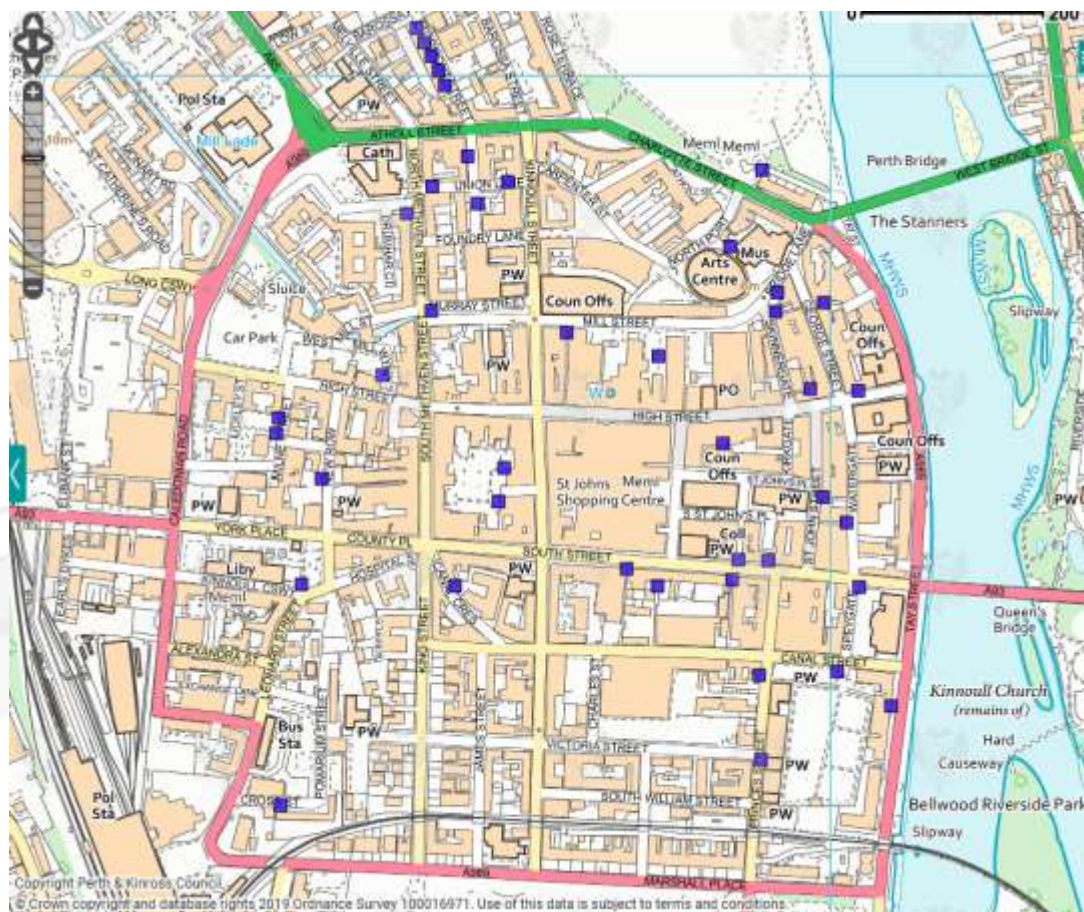
City Centre Pink Sack Collections



Pink Sack Collection Issues



City Centre Containerisation

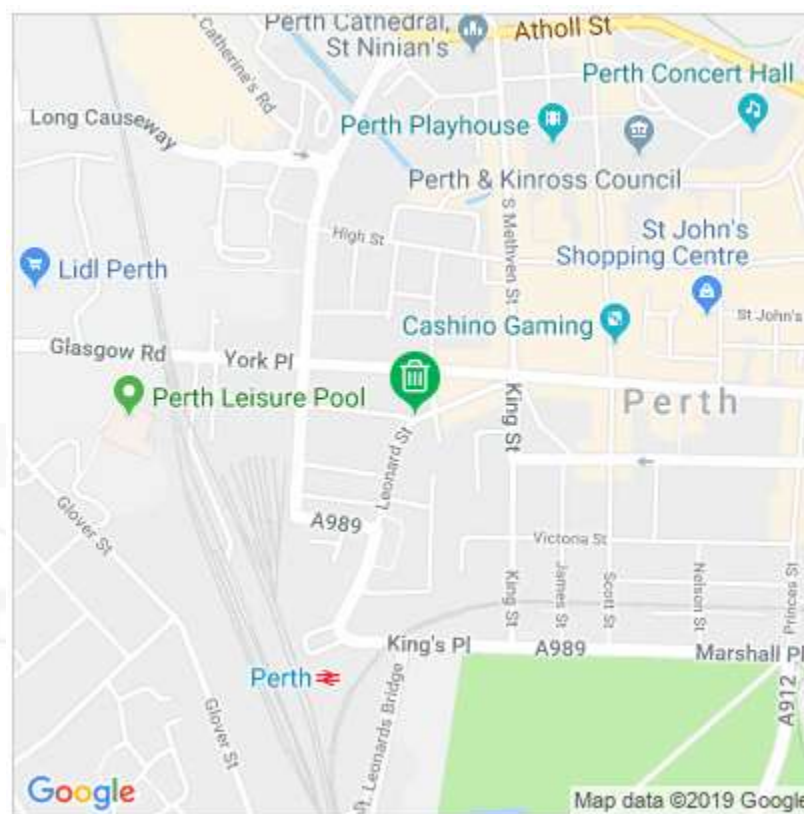


Sensor Trial Bin Hub



Bin Monitoring Data

- Fill Level Monitoring
- Lift Logging
- Usage Patterns



April 2019

prev today next

Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	2	3	4	5	6	7
	11:20 37%			11:08 62%		
8	9	10	11	12	13	14
				11:14 67%		
15	16	17	18	19	20	21
	07:54 33%			08:04 21%		
22	23	24	25	26	27	28
	07:53 39%			08:04 6%		
29	30	1	2	3	4	5
	08:07 16%					
6	7	8	9	10	11	12
	07:54 73%					

Data Management

- ▶ Email Alerts
- ▶ Routing
- ▶ Capacity Required

All locations

Status of 2 Bins



Showing 1 to 2 of 2 filtered results.

Results selected: 0

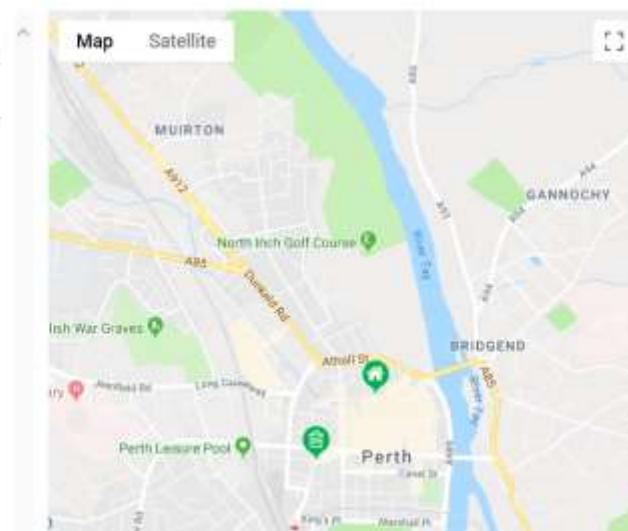
☒ (select all) Actions: [Export data](#) [Edit bin type](#) [Edit recycling profile](#) [Search/filter](#) [Auto-update](#)

Sub-locations in All locations

[Show/hide](#)

+  United Kingdom Status  Total 2 Sub-locations () Average fill 10%

+ <input type="checkbox"/>	1100 Lid-in-Lid	Fill level  10%	
+ <input type="checkbox"/>	1100 Reverse Lid	Fill level  10%	

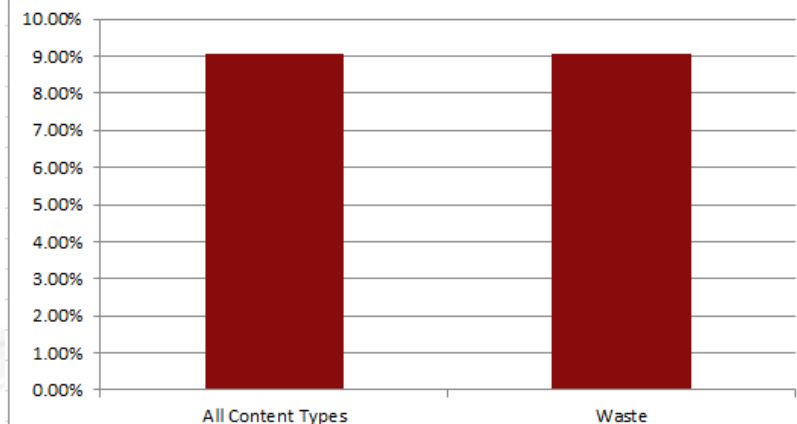


Export Data

History



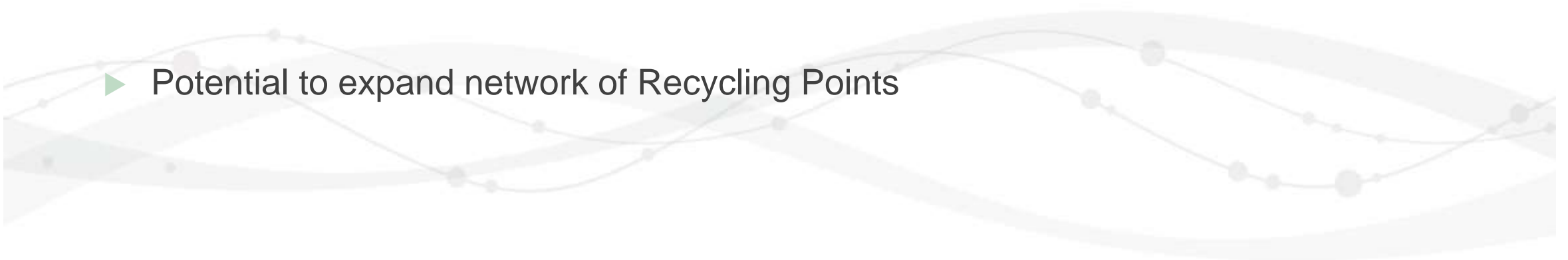
Average Daily Fill Rate (%) - by Contents



Location	Name	Bins	Average Fill Time (Day)	Average Daily Fill Rate (%)	Service Efficiency (%)	Average Days Between Collection	Content Capacity (l)	Capacity Unused @ Collection	Days Bin Full (>90%)	Total Collection < 50%	>= 50%	Collect Within 8 Days	
All Locations		2	11.06	9.04%	35.46%	4.41		64.54%	1.08%	18	14	4	0
United Kingdom		2	11.06	9.04%	35.46%	4.41		64.54%	1.08%	18	14	4	0
United Kingdom		2	11.06	9.04%	35.46%	4.41		64.54%	1.08%	18	14	4	0
Trial Bins		2	11.06	9.04%	35.46%	4.41		64.54%	1.08%	18	14	4	0
	1100 Lid-in-Lid		11.24	8.90%	38.63%	4.96	Waste 1100	61.38%	2.16%	8	6	2	NO
	1100 Reverse Lid		10.89	9.19%	32.30%	3.86	Waste 1100	67.70%	0.00%	10	8	2	NO

Recycling Point Sensors

- ▶ Reactive Servicing
- ▶ Route Optimisation
- ▶ Potential to expand network of Recycling Points



In Cab Technology

- ▶ IT hardware and software – supports communication with crews
- ▶ Real time messaging, reporting and event logging
- ▶ System Integration



Automatic Number Plate Recognition

- ▶ Monitor Recycling Centre vehicle usage
- ▶ Identify frequent users
- ▶ Prevent commercial abuse



Commercial Waste Charging

- ▶ Replace pre-paid voucher system
- ▶ Tablet system with contactless technology
- ▶ Cashless Payments



Thank You

Donna Rigby

Waste Services Co-ordinator

donnarigby@pkc.gov.uk

Magda Jakub

Smart Waste Systems Officer

mjakub@pkc.gov.uk