

# Food Waste to Innovative Biobased products

Caroline Strain  
Head of Chemical Sciences  
**SCOTTISH ENTERPRISE**



# What is Scottish Enterprise?

## Scottish Enterprise is Scotland's main economic development agency

- Highlands and Islands Enterprise (HIE) is the economic development agency operating throughout the highlands & Islands of Scotland.
- Our role is to help identify and develop the best opportunities for economic growth.
- We support ambitious Scottish companies to compete within the global marketplace and build Scotland's globally competitive sectors
- We also work with a range of partners in the public and private sectors to attract new investment to Scotland and to help create a world-class business environment

Scottish Development International (SDI) is the international arm of SE, with 40+ offices internationally



2015 - 2018 Business Plan  
Building Scotland's International Competitiveness

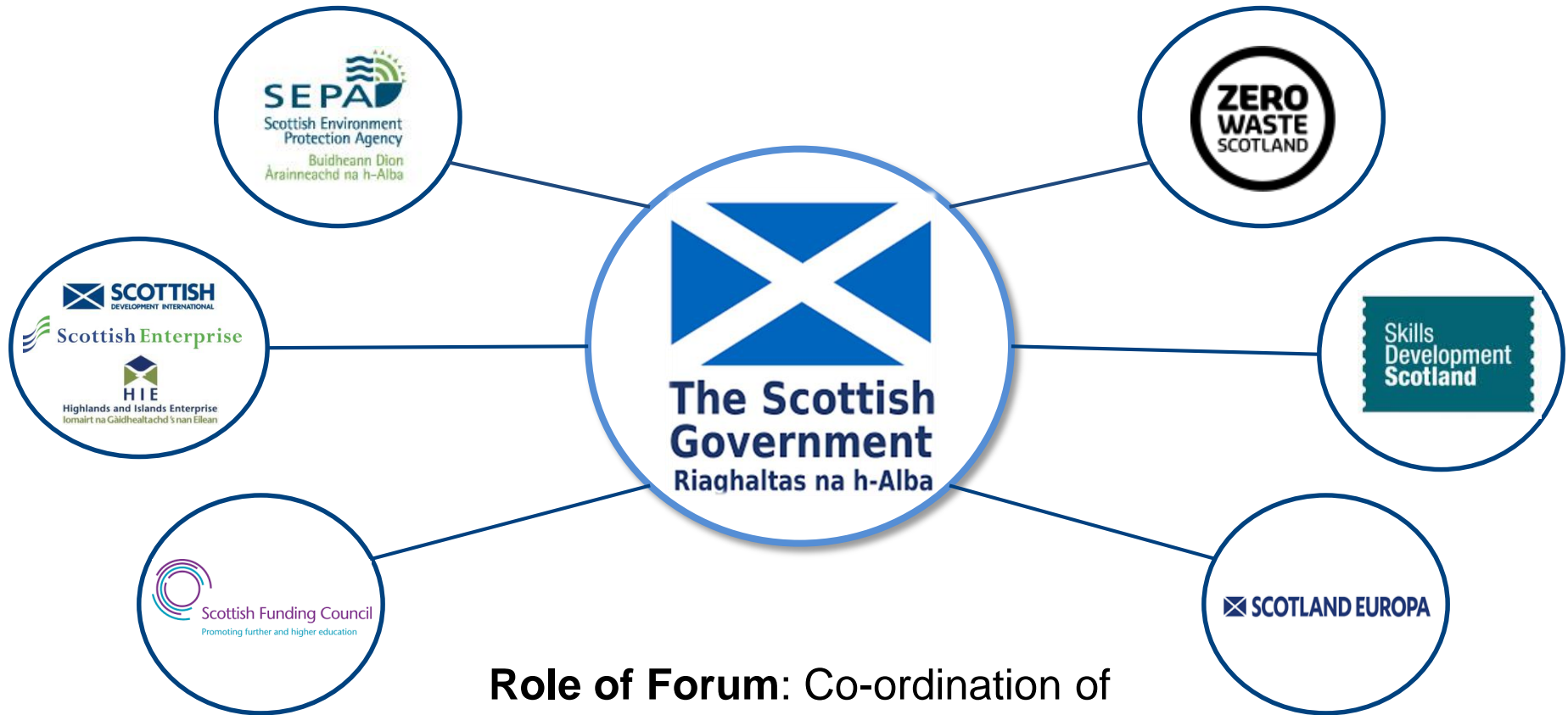
### 2015-18 Drivers of Growth

- Internationalisation
- Innovation
- Investment
- Inclusive Growth



<sup>1</sup> Scottish Enterprise Business plan 2013-2016

# Scottish Government Strategic Forum



**Role of Forum:** Co-ordination of Agencies & Impact across Scotland

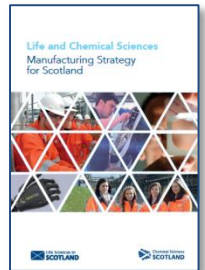
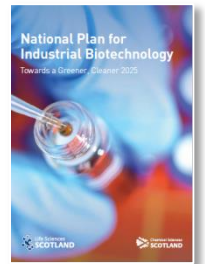
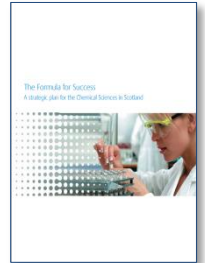
# Caroline Strain



**Background:** Chartered Surveyor  
Economics; Property Law; Valuation

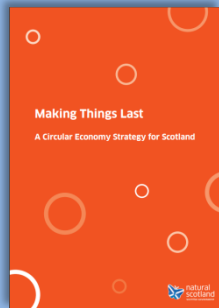
**Role:** Work with industry to develop Strategies for Growth.  
Work with agencies/industry to deliver strategies and economic impact.

**Projects:** Established Chemical Sciences Scotland (CSS)  
CSS Strategy  
Scotland's National IB Plan  
Life & Chemical Sciences Manufacturing Strategy  
Grangemouth Vision

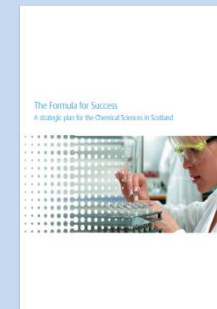


# Policy Context

## Government Strategies



## Industry Strategies



# Food Waste: Scottish Government Circular Economy Strategy

## Circular Economy Strategy for Scotland

- Scottish Government priorities for moving towards a more circular economy - retaining products and materials high value builds on Scotland's progress in the zero waste and resource efficiency agendas.
- Over 900m meals eaten out last year in Scotland. 30% of plated food going to waste.

### Target: To reduce Food Waste by one third by 2025

Food waste in Scotland is circa 1.3m tonnes p.a. 600kt p.a from domestic and 700kt from industrial. (33% reduction target puts Scotland on track to achieve UN Sustainable Development Goal).

### Key Milestones:

- To deliver £500m of savings by 2025.
- Food waste Theme being added to Scottish Government "Curriculum for Excellence"
- Mapping of waste resources is key: Comprehensive waste mapping exercise underway by ZWS/SE/SG/SEPA to understand what resource availability we have.

# National IB Plan: a tool for competitive & sustainable manufacturing

*Grow turnover from £189m to £900m by 2025.*

Through:

**Industry Engagement**

**Centres of Excellence**

**Biorefining**

**Skills**

Increase awareness and adoption of IB as a tool for transformation

Facilitate collaborations, partnerships and investments to drive innovation.

Create a positive environment for the establishment of biorefinery facilities

Create robust and sustainable skills programmes to address areas of unmet need

**Key Deliverables:**

No. of Companies using IB

IBIOIC, Synbio

Roadmap, Feedstocks, Waste mapping

Skills plan, Structured courses

**Outcomes:**

50+ Companies  
Turnover £220m

2 Centres of Excellence  
Scale up facilities

Pilot facilities, Company take-up

HND, Degree Masters, MBA

**Model Demonstrator Region (MDR):** Scotland is **1 of 6** European Commission Model Demonstrator Regions for manufacturing of sustainable chemicals:

•Woody Biomass

•Grangemouth

•CO2 Utilisation

# Agency Roles

## Zero Waste Scotland's Role

- Develop and deliver activity which contributed to waste reduction target:
- Initiatives in place:
  - Circular economy fund (ERDF)
  - Brewery/bakery specific pilot
- Early Indicators:
  - Launched in February 2017, too early to tell at this stage
  - Aiming for uses which attract the highest value for the 'waste' material.

## Scottish Enterprise's Role

- Develop and implement strategies which:
  - Ensure waste more efficiently utilised (currently mainly burning or landfill)
  - Assist business identify where wastes exist
  - Help innovate to support alternative use of identified waste streams
- Key deliverables
  - MDR
  - Companies utilising IB to develop new products
- Initiatives in place
  - IBIOIC
  - Links to EU initiatives e.g. Vanguard
  - Research into new & emerging areas
    - Symbiosis; root veg waste; waste recovery



# Successful Case Studies

## Vanguard - Bioeconomy Theme

- Woody Biomass Pilot
  - Co-operation with Biobased Delta, South Holland
  - 3 way company collaboration
- Food & Feed
  - Co-operation with:  
Flanders & North Brabant
  - Co-interaction with:  
**JHI; Arbikie Distillery; KVO** (Flanders)  
(beans & feeds→livestock feed)  
**Cells United; SARIA** (N.Brabant), **DUE MILJØ** (Norway)  
(fish by-products→nutritional drinks)  
**Horizon Proteins; Heineken** (N.Brabant)  
(brewery waste→fish feed)

## Emerging Technology/Farm Diversification

- **Ogilvy Spirits**  
(potato→vodka)
- **Mackie's**  
(milk→icecream/chocolate, potato→crisps)
- **Insignia**  
(plastic film→food 'use by' indicator)
- **Celtic Renewables**  
(whisky draff→bioethanol, biobutanol)
- **Cellucomp**  
(food waste: carrot/beet→H.V materials)
- **AMT**  
(microwave technologies which de-generate food waste)
- **3fbio**  
(integrated fermentation processes for food; fuel; food)

Ogilvy



## To add to the discussion.....

### Strengths

- Policy context in place
- Industry/Government support
- Agencies aligned working together
- MDR/Vanguard- EU alignment
- IC focused on industry moving up TRL
- Multiple feedstock streams

### Opportunities

- Commercialisation of IP
- Technology scale/development centres
- Cross EU collaborations
- Focused company engagement to raise potential of IB and link to feedstock

### Weaknesses

- Huge area to tackle- focus
- Limited resources –multiple priorities
- Track record of IP commercialisation
- “if it ain’t broke don’t fix it”- de-risking
- Limited company interaction in EU

### Unmet Challenges

- Acceleration of food waste reduction
- Reclassification of waste
- More technology businesses- quicker
- Impact of Brexit

# Case Study: CelluComp



## Scotland's CelluComp is leading the way in biorefinery, with the establishment of Europe's first biorefinery plant.

- Collaborating with local agriculture, CelluComp has devised a solution to the problem of unused vegetable by-product, creating a sustainable material with a variety of applications.
- Curran®, the company's revolutionary cellulose-based product, uses by-product that would be otherwise discarded by farms, and finds new life in household items such as paint.
- By recognising the significant potential presented by the production of bio-based products, CelluComp's vision could help various industries (forestry, timber, agriculture) realise major economic benefits
- In comparison with existing materials used as rheology additives, Curran® has a low carbon footprint, uses fewer fossil fuel based chemicals and is emission free.

*“With the natural resources we have in Scotland, coupled with the commitment made by the Scottish Government to support the growth of the industry, particularly around innovation, R&D, knowledge transfer and funding, Scotland is on the cusp of a real step change. “*

Christian Kemp-Griffin, CEO of CelluComp

# Case Study: Celtic Renewables



## Turning whisky into fuel with a healthy measure of support

- When Celtic Renewables cracked how to turn whisky by-products into usable butanol, there was still a long way to go to take their idea to market.
- The development of the original technology had been led by internationally-acclaimed founder, Professor Martin Tagney, at the bio-fuel research centre at Edinburgh Napier University.
- It was here that the Scottish Enterprise team became involved in supporting the project through:
  - Proof of Concept Programme to prove the idea was commercially viable (£267,000)
  - High Growth StartUp support to provide intensive business support once the company was formed and introduction to investors for the first tranche of private investment funding of £200,000
  - SMART SCOTLAND to help establish the company through a £70,000 feasibility grant
  - suggestions on further funding opportunities that led to grants from Zero Waste Scotland and the Shell Springboard Awards.

*“We have benefited from tremendous support from the HGSU team. The Scottish Enterprise network is very strong and well connected. This led to an introduction to our investor.”*

Mark Simmers, CEO of Celtic Renewables,



## Team Contact Details

Sub Sector	name@scotent.co.uk
Sub Sector	name@scotent.co.uk
Sub Sector	name@scotent.co.uk
Sub Sector	name@scotent.co.uk
Sub Sector	name@scotent.co.uk