

Certification of Digestate in New Zealand

LEARNING FROM OTHERS

TASK 2

Task 2 – Scope

Review international literature of established certification schemes

Review and summarise NZ regulatory requirements

Identify strengths and weaknesses of each existing short listed scheme

Recommend a methodology for certification of digestate as fertiliser

International schemes

EU

- Germany – half of EU's digestate production
- Sweden – one of the most AD-developed countries (mixed feedstock)
- Austria – information available to BANZ

UK

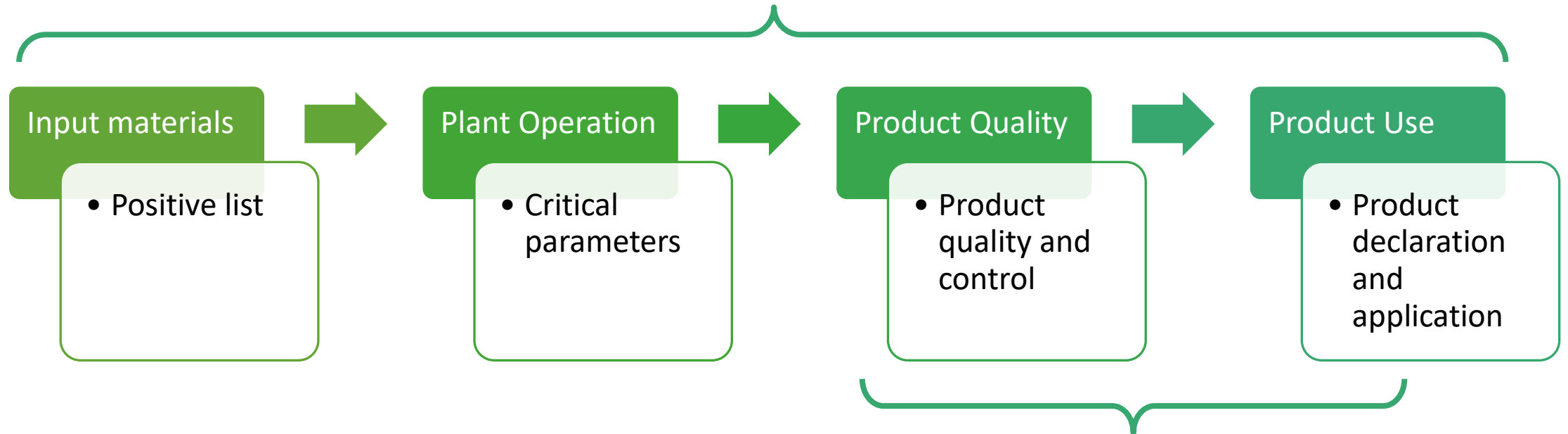
- England and Wales – considered most developed scheme
- Scotland – agri export-oriented economy

Canada – non-EU, long established biogas industry with a strong growth

United States – an example of a different approach

Principles

Quality Assurance European Union, UK



Quality Control Canada, United States

EU main points

GUIDING LEGISLATION

Waste Framework Directive – defines **End of Waste Criteria** for Biodegradable Waste Subjected to Biological Treatment – key element of legislation

Animal By-Products Regulation - specifies, inter alia, which animal by-products are allowed to be composted or digested and, after this, used in agriculture

Fertilisers Regulation - allowing free trading of fertiliser within EU

REQUIREMENTS

Input materials:

- a list of component material categories (CMC) – only separately collected organic materials permitted - CMC 3 – Compost, CMC 5 - non-energy crop digestate

Process requirements –

- ECN-QAS and in several national quality assurance schemes

Product quality-

- organic pollutants, impurities (glass, metals, and plastics) and stability

External Conformity Assessment –

- obligatory by a notified body - including process and product control.

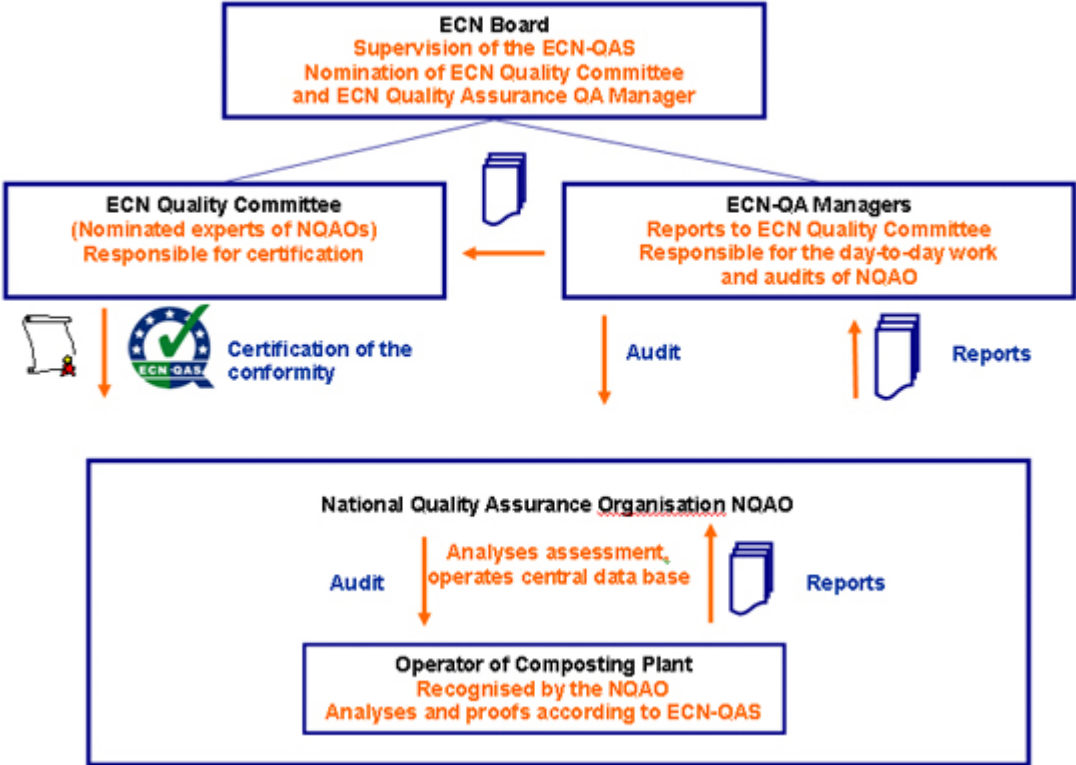
ECN-QAS



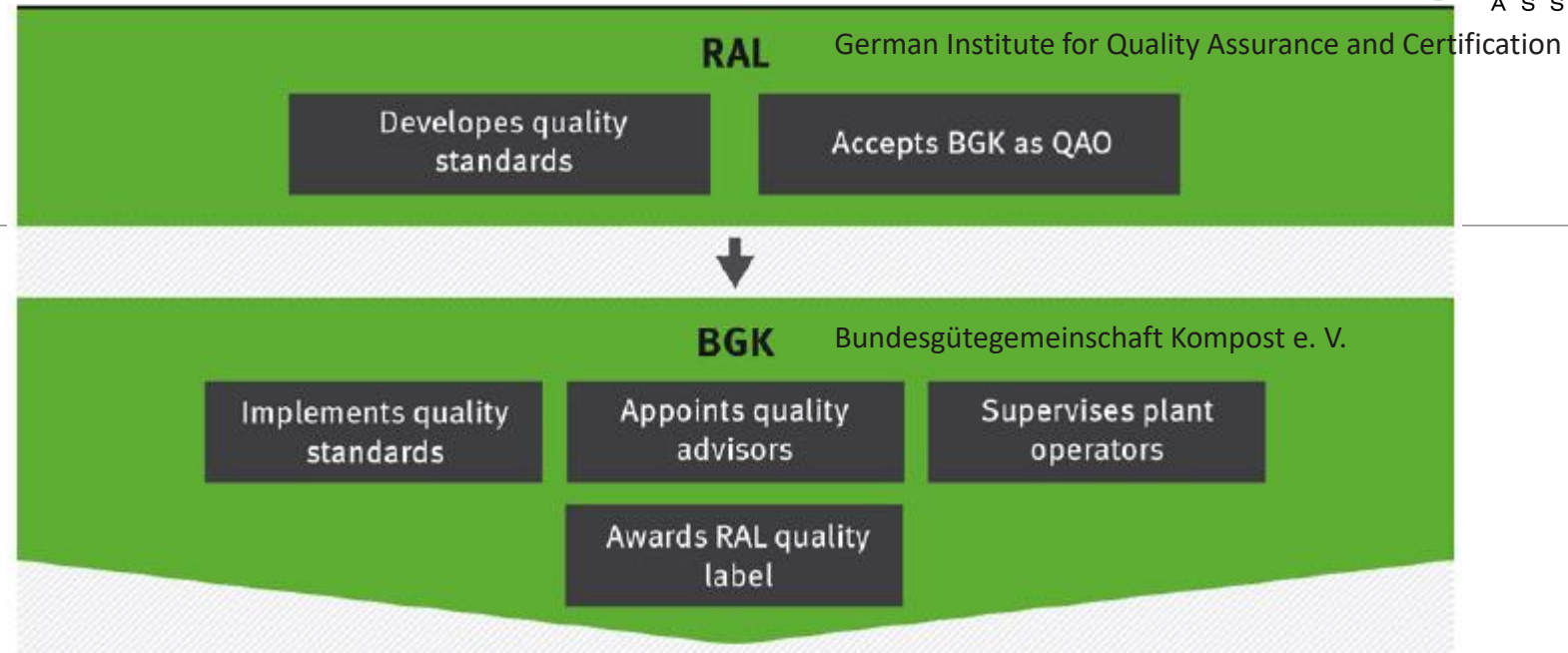
Quality assurance schemes for compost and digestion residuals

The targets of ECN-QAS are:

- to harmonise the requirements for compost and digestate across Europe to build up an European-wide market for quality compost and digestate,
- to harmonise the existing quality assurance schemes across Europe and
- to support national quality assurance organisations (NQAO) establishing quality assurance schemes for compost and digestate



Germany



Compost
Bio-waste



Digestate
Bio-waste



Digestate
Renewable
plants



Sewage sludge



Sewage sludge
Compost



Fertiliser Ashes
from wood
incineration

Germany

Organisational units of BGK

- BGK board
- Federal Quality Committee
- BGK office

Operational units of BGK

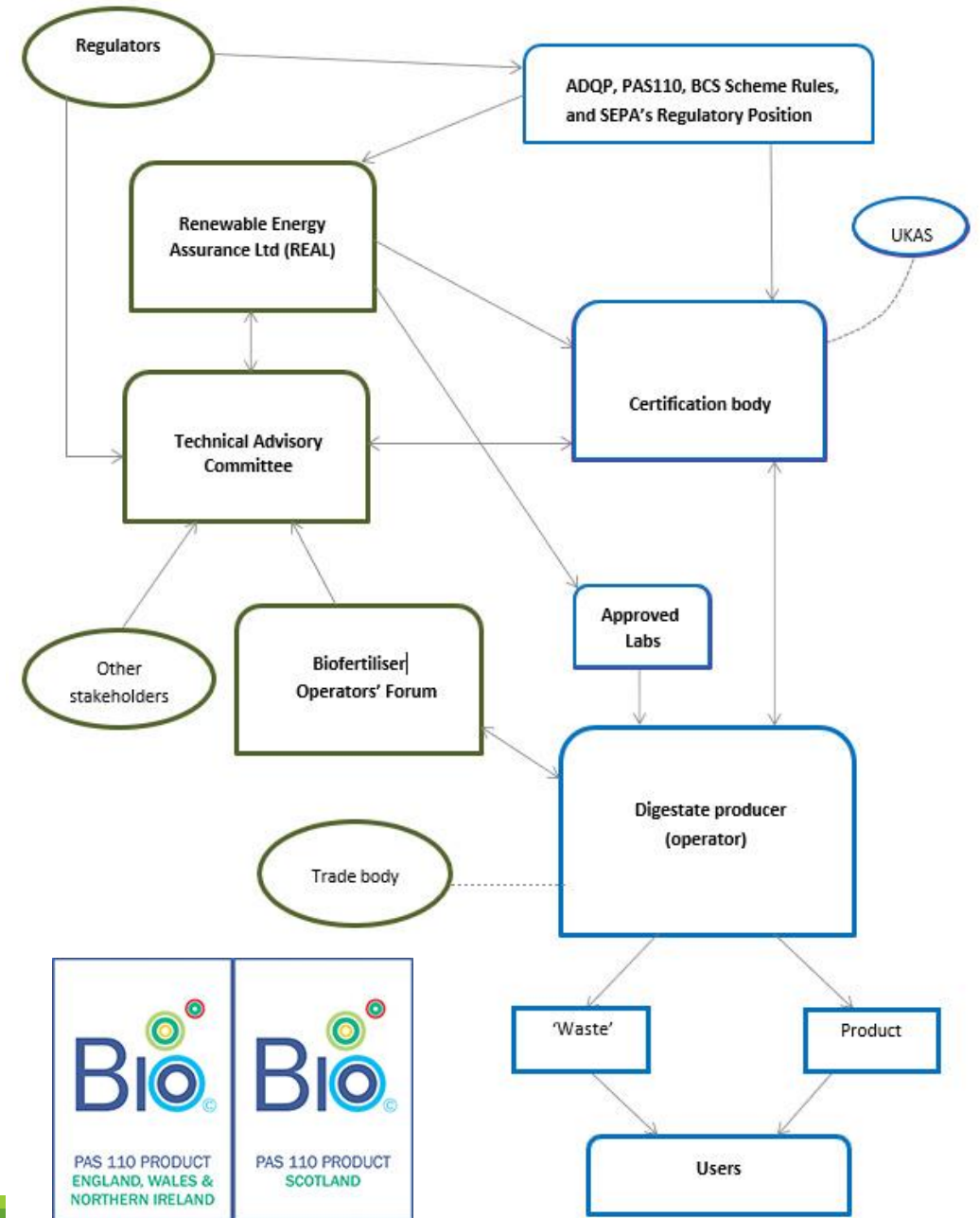
- 220 accredited sample takers
- 99 accredited testing laboratories
- 15 appointed quality advisors

Members of BGK

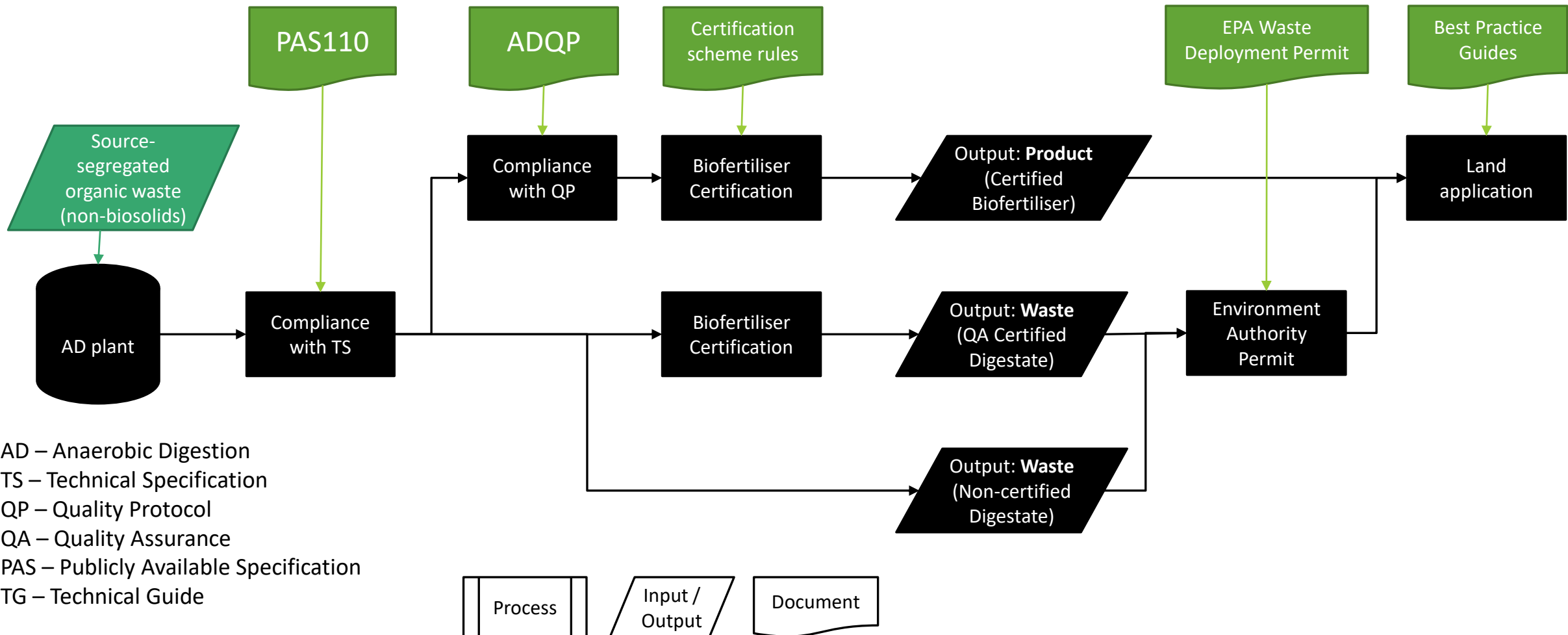
- Regional quality assurance associations
- Quality Assurance divisions
- Plant operators

United Kingdom

- REAL – certification scheme for both Digestate and Compost
- Independent company set-up to remove bias
- 3 people administering REAL
- Technical advisors, Operators' Forum
- 3 Certification Bodies
- Approved laboratories
- Key documents:
 - **PAS110** – Best Practice Guide
 - **Anaerobic Digestion Quality Protocol** – End of waste criteria for the production and use of quality outputs from anaerobic digestion of source-segregated biodegradable waste



United Kingdom



United Kingdom

PAS110

industry specification against which producers can check that the digestates are of consistent quality and fit for purpose

- quality management
- risk analysis (HACCP)
- requirements for the input materials & process management controls and monitoring
- digestate sampling, testing, validation checks and information for end users

ADQP

- **Input materials** - list of permitted feedstocks
- **Production process** - in accordance with agreed standard/specification
- **Output** - sample and test in accordance with approved standard/specification
- **Produce delivery documentation** - despatch from site of production for storage and use in designated market sector
 - agriculture, forestry and soil/field-grown horticulture; and
 - land restoration (where only separated fibre can be used).

Sweden



"Certified Re-use"

The quality assurance scheme (QAS) launched in 1999

Product certification system and process requirements

Digestate (SPCR 120) and Compost (SPCR 152)

Certification is mandatory when using digestate based on source separated food waste in organic farming

19 co-digestion plants with SPCR 120-certified digestate

In 2020 - 30% of the digestate produced was approved for use in organic production.

Swedish Waste Management Association (Afvall Sverige)

Steering committee
responsible for development of the system – experts, stakeholders, authorities

Independent certification body - certifies and controls the plants

Sweden



“Certified Re-use”

Positive list for substrate groups

- only substrate from food and feed chain
- no material from waste water sector allowed

Qualification year

- Samples taken by independent certifier
- Samples taken by operators (4-8 depending on size of plant)
- QA documentation reviewed
- Process control parameters – recorded and controlled

Process parameters:

- Types and amounts of substrates, additives and chemicals
- Temperature and pH in the reactor
- Time between feeding of substrate
- Hydraulic retention time
- Time and temperature in the hygenisation tank
- Organic loading rate
- Volumetric loading
- Actions taken to avoid re-contamination
- Process disturbances

Certification valid for 5 years

Sampling reduced to 1-4 samples/year



Diversions

Scotland

- stricter End of Waste Criteria than England and Waste, no blending allowed
- food waste management scheme which sets out their expectations across the food waste chain – Duty of Care

Sweden

- from 2023 - food waste collection bags must be evaluated for contact with foodstuff to reduce risk

Canada



PRINCIPLES

Digestate Quality Alliance (DQA) involve proponents and facilities who are voluntarily using the program to help their customers understand how to use these soil-destined products most effectively.

Key Elements of our Quality Assurance Program for Compost and Digestate

- **Standardized product sampling**
- **Uniform laboratory testing**
- **Appropriate product attributes and usage guidelines**

LEGISLATIVE BACKGROUND

The *Fertilizer Act* –

- set safety standards and labelling requirements for all fertilizer and complementary products (including compost)

Organic Soil Conditioners—Composts

- Bureau de Normalisation du Québec (BNQ)
- three categories of compost (AA, A, and B), and includes criteria for physical characteristics (e.g., moisture, OM, foreign matter, sharps); chemical characteristics (e.g., trace elements); maturity; and biological characteristics (e.g., fecal coliform and Salmonella)

Guidelines for Compost Quality

- Canadian Council of Ministers of the Environment (CCME)
- *Category A – used freely including* • *Agricultural and residential land,* • *Horticultural operations,* • *Nursery industry*
- *Category B - may be limited by some provinces due to the presence of sharp foreign matter or higher trace element concentrations*

United States

ABC Digestate Standard Testing and Certification Program - by American Biogas Council

standard method of **quantifying, characterizing and communicating the physical and chemical qualities of digestate**

voluntary, industry led, third party verified

Program-Certified laboratories - standardized terminology, quality management systems, and test methods

Table 1: Required testing for Digestate End Use Classifications

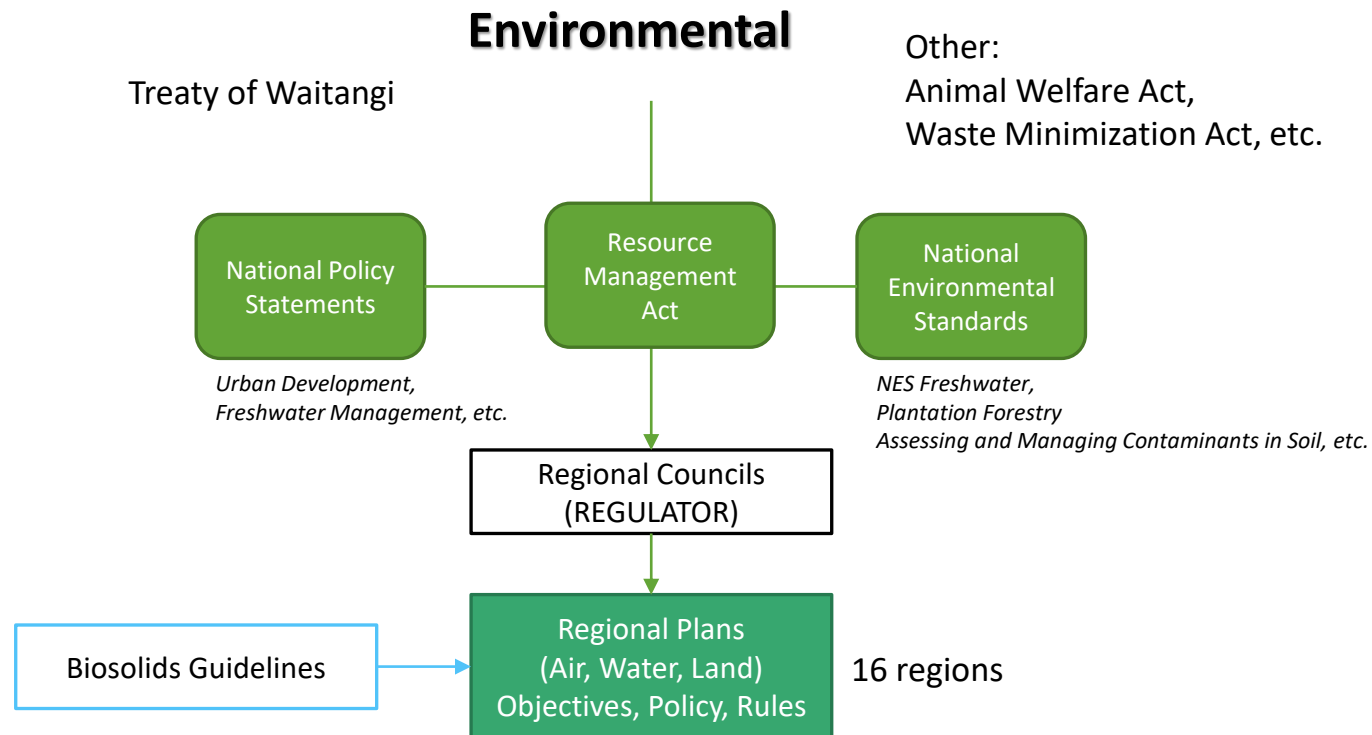
These tests provide the minimum information required to determine appropriate use. Digestate users may require additional testing parameters prior to acceptance.

Possible Digestate End Use	Generally Unrestricted Bulk Sales or Land Application	Restricted Land Application
Fecal Coliform or Salmonella	X	X
Total N, P, K	X	X
Organic Ammonia and Nitrate Forms	X	X
Secondary and Micro-Nutrient Assay	X	
pH	X	
Total Solids and Moisture Content	X	X
Volatile Solids	X	
Metals	X	X
Physical contamination	X	X
Soluble Salts	X	
Stability (VFA or CO ₂ Respiration)	X	X

	Germany	Sweden	UK	Canada	US
QA vs QC	QA	QA	QA	QC	QC
Independent verification	yes	yes	yes	yes	yes
Operated by	Bundesgütegemeinschaft Kompost e. V.	Swedish Waste Management Association	Biofertiliser Certification Scheme	Digestate Quality Alliance	American Biogas Council
Voluntary	yes	yes, but compulsory for organically certified product	yes	yes	yes

		ECN-QAS (Germany)	PAS110 (UK)		Canada		
					Permitted Use	Restricted Use	45 yrs (kg/ha)
Impurities	DM	<0.5%	<0.35%		<2%		
weed seeds		<2 seeds per litre					
total plastics					<0.5%		
size			< 5mm stones, < 2mm other		<25 mm		
Heavy metals							
Arsenic					13	170	15
Lead (Pb)	mg/kg DM	130	160		150	1100	100
Cadmium (Cd)	mg/kg DM	1.3	1.2		3	34	4
Chromium (Cr)	mg/kg DM	60	80		210	2800	210
Cobalt	mg/kg DM				34	340	30
Copper (Cu)	mg/kg DM	300	160		100	1700	150
Nickel (Ni)	mg/kg DM	40	40		62	420	36
Mercury (Hg)	mg/kg DM	0.45	0.8		0.8	11	1
Molybdenum	mg/kg DM				5	94	4
Selenium	mg/kg DM				2	34	2.8
Zinc (Zn)	mg/kg DM	600	320		500	4200	370
Stability		< 4000 mg/l organic acids	residual methane production				
Pathogens							
Salmonella		absent in 25 g DM	absent in 25 g DM		<3 CFU/g DW TS		
E.coli and Enterococci		should be tested if required by ABP regs	< 1,000 CFU/g DM		< 1000 CFU/g DW TS	< 2,000,000 CFU/g DW TS	
Feacal Coliform					<1000 MPN/g dry		

NZ Regulatory Framework



NZ Regulatory Framework

Food production

National level requirements

- Agricultural Compounds and Veterinary Medicines (ACVM) Act 1997, ACVM Regulations 2011
- Hazardous Substances and New Organisms Act 1996
- Animal Products Act 1999
 - **Risk Management Programmes (HACCP)** - required for animal products and materials that are for human consumption
- Biosecurity Act 1993



Biosolids Guidelines

Industry-specific requirements

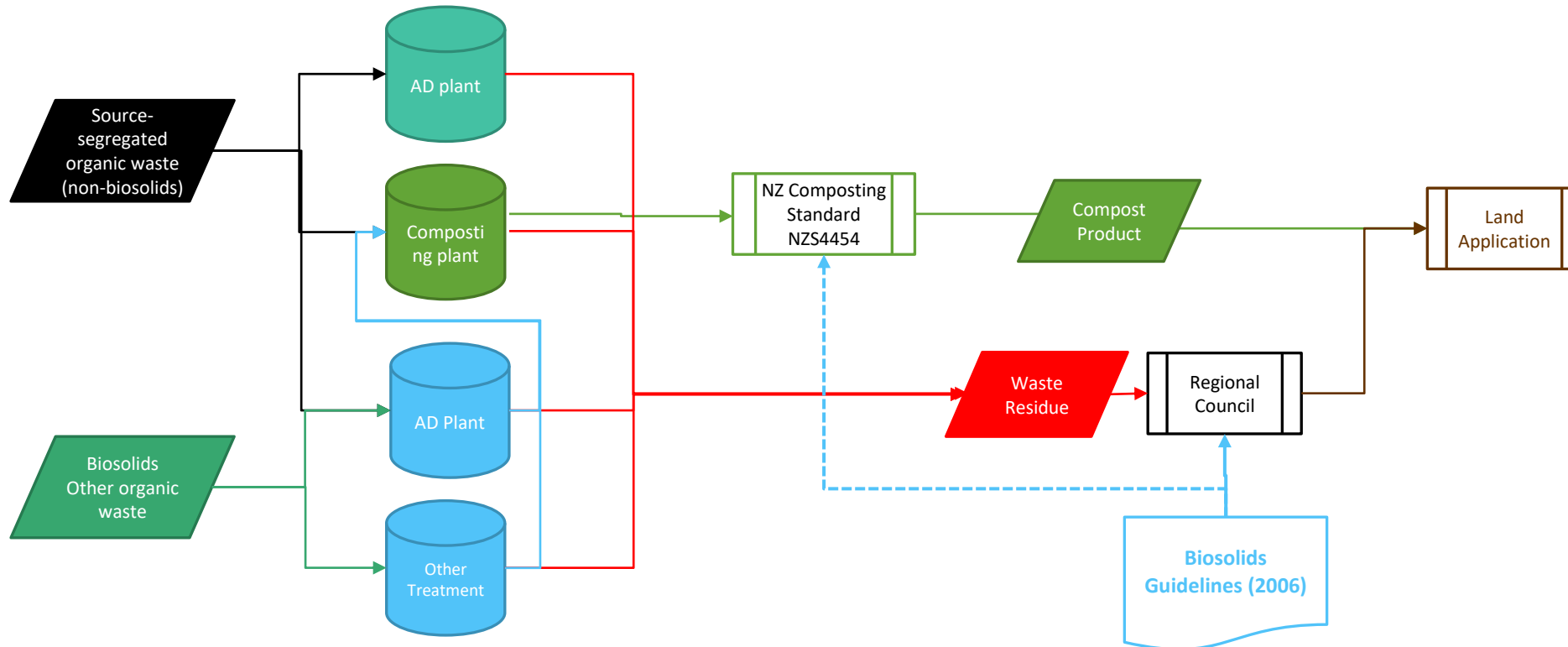
- Operational Code NZCP1: Design and Operation of Farm Dairies
- Sustainable Winegrowing NZ, etc.



Processor-specific requirements

- Terms of Supply

Current NZ Organic Residues framework



Guidelines for Beneficial Use of Organic Material on Land

Revision Led by Water NZ

Steering committee – WasteMINZ, the Centre for Integrated Biowaste Research (CIBR) and the New Zealand Land Treatment Collective (NZLTC), Ministries of Environment (MfE), Health (MoH) and Primary Industries (MPI).

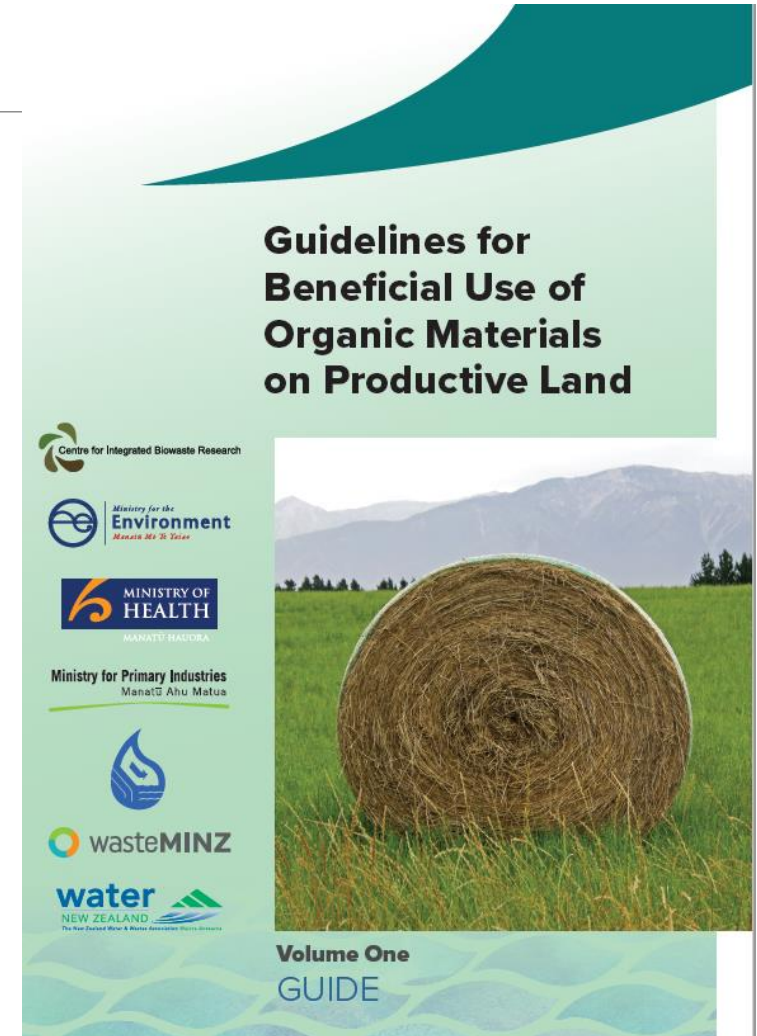
Extends the Biosolids Guidelines to other organic residues

Technical Guide – specifies **science-based qualitative requirements for safe application of organic material to land**

Based on Multi-aspect Risk Assessment

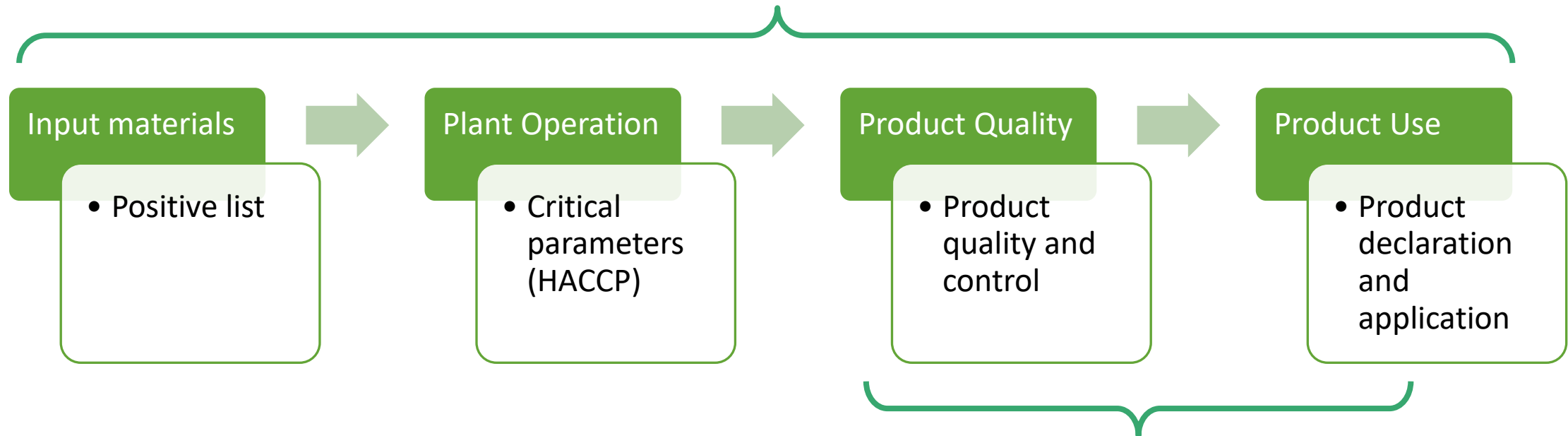
- Human health – Pathogen, Metals, Organic contaminants
- Environmental Risks – Groundwater and Surface water, Habitat and biodiversity, Soil organisms and fertility, Plant health and crop yield, Odour, dust and bioaerosol generation
- Animal health and production
- Trade risks
- Sensitivity of receiving environment
- Social and Cultural considerations

Undergone public consultation



Summary and Recommendations

Quality Assurance – to produce consistent and safe product
aligned with Animal Product Act



Quality Control – to control environmental load
science-based limits adopted from Beneficial Guidelines

Summary and Recommendations

Scheme

- Some level of independence from the operators is required to build trust
- Sampling and testing requires standardised protocol
- Allow for growth/expansion to include further categories

Scheme operation

- Start small – 1 person can manage the scheme
- The work is never really done
 - Feedback loop from users for continuous improvement
 - Stakeholder management
 - Legislation changes
- Emphasis on education

What next?

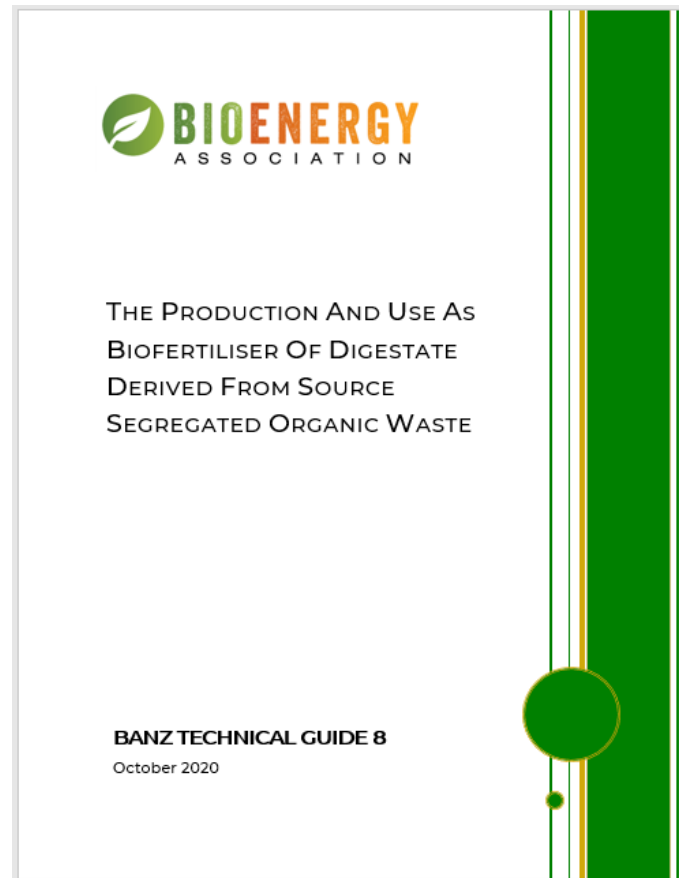
Identify and consult on criteria for certification of digestate

Propose governance and auditing entities

Design the key elements of the certification scheme

Lobby for Guidelines for Beneficial Use to be released to use

Technical Guide 8



Quality Management

Feedstock Control

Process Management

Product Management

Health and Safety

Digestate Application

Case Studies