INTERNAL REPORT · 14 NOVEMBER 2026

Options for the plant

A backup line for the middle and the large plant. A demonstration farm at the large plant that shows farmers how to cut every route of pollution: a pig stable and a test field. And the same plants placed next to the Bulgarian mine, with what that does to our landed cost in Denmark.



€3.7 m
backup line; pays if it saves 2–3 days a year*

–€0.29 m
a year: pigs and field before depreciation*

€115 m
large plant with everything, cash after five years*

€218
a big bag tonne landed from Most, against €317*

Requests of 14 November, worked through on the same model as the factory report: the same tonnes, the same list prices, the same rules. Chapters 14–17 of **knowhow/factory/** hold the reasoning and the sources. Nothing here is quoted.

> **How to read it.** Figures marked * are our own estimates. Every budget assumes that everything sells at list price, as chapters 10–12 do. Two salmon units were studied and removed on request.

SUMMARY

Seven findings

1. **A backup line costs €3.7 m*** and €343,000 a year. At list price it pays if it saves 0.34 weeks of sales a year at 50,000 t, 0.23 at 100,000 t. A dryer failure can take weeks.

2. **The farm's value is its measurements.** Two identical stable sections, one with zeolite, and a 40 ha field with suction cups and a drain station show ammonia, methane, odour, nitrate and phosphorus side by side.

3. **Pigs and field do not pay on their own:** −€288,000 a year before depreciation*. A 1,500-place stable does not carry two people. Paid trials or a listed technology must carry it.

4. **At the Bulgarian mine a big bag lands for €218 a tonne*** against €317 from the Danish plant (50,000 t). Small packs gain about €59. Freight is the largest cost at Most, and it is unquoted.

5. **The five-year cash at 50,000 t rises from €42.9 m to €78.6 m***; a third of the gain is the 10% tax rate.

6. **A large site that buys no electricity in any hour costs €1.8 m more***: 3 × 500 kW and one 200 kW engine instead of one of 532 kW, an 18,900 m³ gas store and 63,000 t of manure instead of 53,100. The engines then run with the dryer, and their heat earns back €59,000 a year net.

7. **But the concession plans 14,000–28,400 t a year, the rock averages 78% clinoptilolite, and the farm would be 2,400 km from the farmers it should convince.** Keep the farm in Denmark, whatever happens to the factory.

* our own estimate, not a measurement or a quote

A backup line

A second, smaller chain beside the main line at **12.5 t an hour**: intake, dryer, screens and a big-bag station. It shares the silos, the mill and the packing lines, and covers the links that stop most often and take longest to repair.*

Thousand euro	Low	Base	High
Intake hopper, feeders, conveyors	200	300	400
Dryer, 12.5 t/h, with burner	400	590	860
Screening tower, five fractions	230	330	460
Dust extraction and filters	200	300	450
One big-bag filling station	80	100	150
Electrical and controls	200	280	400
Steelwork, installation, commissioning	300	450	650
Hall extension, 600 m²	480	660	840
With engineering and contingency	**2,596**	**3,738**	**5,229**

A year: €271,000 of depreciation, €47,000 of maintenance, €25,000 for a test week each quarter. No extra staff.

	50,000 t	100,000 t
Share of the year's tonnes it can make alone	100%	75%
Contribution lost per week without product	€1.0 m	€2.0 m
Outage it must prevent each year to pay	0.34 weeks	0.23 weeks
Most money tied up, without / with	33.4 / 37.1	42.0 / 45.7
Cash after five years, without / with, € m	42.9 / 39.2	124.5 / 120.8

The lost contribution is real only if the packed stock runs out and customers do not wait. The backup does not help when the silos, the mill or the packing lines fail; spare parts on the shelf do that more cheaply.

* our own estimate, not a measurement or a quote

CHAPTER 15 · LARGE PLANT ONLY

Showing farmers every route of pollution

Zeolite binds ammonium. It does not bind nitrate or phosphate. So the farm shows a whole system, with zeolite as one tool in it, and every route is measured rather than claimed.

Route	What the farm does	What is measured
Ammonia from the stable	two identical sections, zeolite in one	outlet air of each section, all year
Methane and odour from stored slurry	slurry flushed to the digester every day	both sections
Ammonia when spreading	digestate with and without zeolite	plots after spreading
Nitrate to groundwater and drains	nitrogen when the crop takes it up	suction cups, drain station
Phosphorus to streams	calcium-material teabags at the drain outlet	drain water in and out
Climate gas from energy	manure makes power and heat	gas and electricity metered



Why measurements are worth more than pigs. A Danish farmer may count an ammonia-reducing technology only when it is on the environmental agency's technology list, and listing needs documented measurements (the rules are not yet read in the source). A stable with a control section is the cheapest way to produce them.

The pig stable and the test field

Pig stable, a year	k€
1,500 places, about 4,800 pigs sold	651
Feed	−364
Piglets	−287
Vet, energy, water, straw, fees	−59
Two people	−170
Maintenance	−29
Result before depreciation	**−259**

Investment €1.9 m* (€1.4–2.5 m). Margin before staff **−€13 a pig*** at €1.54 a kilo of carcass. Slurry 2,400 t a year to the digester.

Test field, a year	k€
40 ha of wheat, 8 t at €200	64
Machinery, seed, crop protection, tax, analyses	−94
Result before depreciation	**−30**

Land €1.1 m*; drain station and plot equipment €150,000. No higher yield is counted: that is what the field is there to test.

Pigs and field together	
Investment, with the land	€3.2 m
Result before depreciation, a year	−€0.29 m
Cash in five years (built in year 2)	−€4.0 m

The large plant with everything	€ m
Plant with the backup line, cash after five years	120.8
Pigs and field	−4.0
Biogas plant for no electricity bought (chapter 17)	−1.6
Total, cash after five years	**115.1**



The stable pays only if the trial work is paid for: about €0.26 m a year from grants, paid trials for other suppliers, or our own product development. A stable on an industrial site will also need its own environmental approval and distance to neighbours.

* our own estimate, not a measurement or a quote · 5 / 9

No electricity bought, in any hour

The planned engine makes as much electricity in a year as the site uses, but the site draws most in the shifts. Here plant, backup line and farm buy **nothing** from the grid in any hour. The connection stays for selling surplus and for emergencies.

Large plant	Planned	Engine follows shift	Self-supplied
Engines	1 × 532 kW	1 × 532 kW	3 × 500 + 1 × 200 kW
Covered in the same hour	62%	88%	100%
Bought from the grid, MWh a year	1,604	524	0
Manure a year	53,100 t	53,100 t	63,000 t
Radius at a fifth of the manure	14.2 km	14.2 km	15.4 km

Shift load about **905 kW**, nights and weekends about **162 kW**. Two engines carry the shift, a third stands by, a small one runs the nights. A gas store of about 18,900 m³ holds the night and weekend gas for the shift, and a 500 kWh battery holds the voltage when a motor starts or an engine trips.*

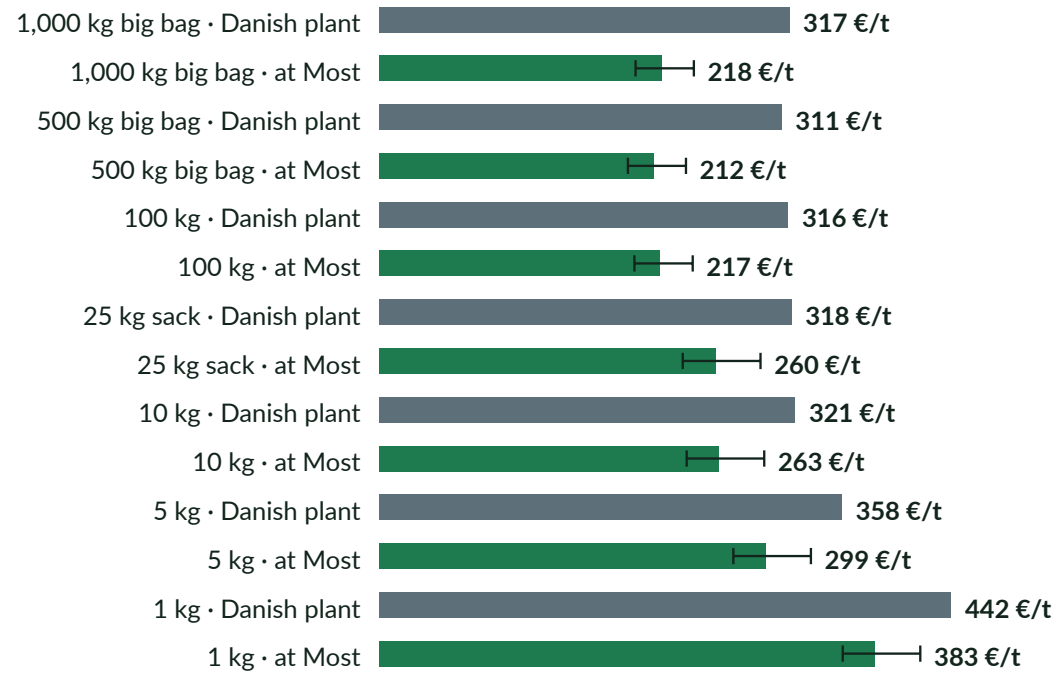
Thousand euro	Low	Base	High
Digesters, pumps and pre-tank for 63,000 t of manure	2,030	2,937	4,291
Gas engines: 3 × 500 kW and one of 200 kW	1,020	1,275	1,530
Gas store, 18,900 m³	566	849	1,132
Battery, 500 kWh	125	175	225
Island controls, load shedding, synchronising	200	300	450
Biogas plant, self-supplied	**3,941**	**5,536**	**7,628**
Biogas plant as planned	2,820	4,080	5,960
Extra, with engineering and contingency	**1,392**	**1,808**	**2,071**

It costs capacity, not energy. The site uses only 3% more electricity than planned. And engines that run with the shift can pre-heat the dryer with their exhaust (2,001 MWh of gas saved), so the extra €1.8 m earns back about €59,000 a year net*. Whether the dryer can take exhaust heat must be asked in the quote.

* our own estimate, not a measurement or a quote

Landed cost in Denmark

Full cost per tonne of product at the Danish warehouse door, year 5 at 50,000 t, before the selling cost. At Most the rock costs **€38** at the face instead of €160 at a Danish quay, labour €20,000 a person instead of €85,000, and the finished product travels instead of the rock.



Euro a tonne. Range at Most from the freight range.*

Per tonne	Danish plant	At Most
Rock	160	38
Unloading, quay truck, dryer gas	15	3
Running the site	87	34
Depreciation	47	39
Freight of the product, big bags / small packs	0	75 / 115
Danish warehouse	0	22

Big bag, € a tonne	25,000 t	50,000 t	100,000 t
Danish plant	389	317	269
At Most	293	218	177

* our own estimate, not a measurement or a quote · 7 / 9

The five-year budget at Most

€ m	25,000 t DK	25,000 t Most	50,000 t DK	50,000 t Most	100,000 t DK	100,000 t Most
Site and plant	32.4	25.5	43.3	34.1	57.7	45.3
Most money tied up	27.9	19.7	33.4	25.0	42.0	29.3
Result before depreciation, year 5	22.7	24.5	47.8	51.7	98.7	106.2
Cash after five years	7.3	26.5	42.9	78.6	124.5	189.0
Money back in year	5	4	4	4	4	3

Same tonnes, list prices and pack mix as chapters 10–12. At 50,000 t the extra €35.6 m of cash comes from lower running cost (€13.2 m), lower tax (€11.0 m), lower investment (€9.2 m) and stock (€2.3 m).



The large plant with everything, cash after five years, € m	Denmark	At Most
Plant with the backup line	120.8	185.7
Pigs and field	−4.0	−2.0
Self-supplied biogas plant	−1.6	−1.5
Most money tied up	50.7	32.4
Total	**115.1**	**182.2**

* our own estimate, not a measurement or a quote · 8 / 9

CHAPTER 16 · BEFORE ANYONE MOVES

What the numbers do not show

1. **The concession is far too small.** Hrisi plans about 14,000 t a year, possibly 28,400. Even the small plant needs 25,000 t. The Most deposit is large (about 260 Mt, a 1984 state estimate), but a plant there needs more concession ground.
2. **It is a different rock.** Most averages about 78% clinoptilolite; the present rock is 93–100% in our semi-quantitative XRD. Grades, exchange capacity and the feed grade (at least 80%) need new specifications, or grade control in the pit.
3. **The farm loses its audience.** It exists to show Danish farmers how to cut pollution on Danish soil under Danish rules. Measurements near Kardzhali may not count for the Danish technology list, and the teabag pickup works in Danish streams. Keep the farm in Denmark even if the factory moves.
4. **African swine fever** has been found in Bulgarian domestic pigs in recent years (not yet read in a source): a risk of culling and movement bans that a Danish stable does not carry.
5. **Manure for the digester** around Kardzhali has not been looked at.
6. **Time and stock.** Product is 3–5 weeks on the way; spring orders must be in the Danish warehouse before they are placed.

First quotes and answers to get	From
Rail Most → Burgas and sea to Aarhus or Fredericia, big bags and containers	a forwarder, a broker
More concession ground at Most	Bulgarian counsel, the ministry
XRD and exchange capacity of Most rock, bench by bench	our own assay
A 12.5 t/h dryer and screen	two suppliers
Technology-list rules for a stable trial	the Danish environmental agency

Sources read for these chapters: the cost and mine models, Eurostat labour and energy prices 2025. Photographs, Wikimedia Commons: Onsemeliot (CC BY-SA 4.0); Florian Gerlach (Nawaro) (CC BY-SA 3.0); AnRo0002 (CC0); Slaunger - Derivative by Diliff (CC BY-SA 3.0).