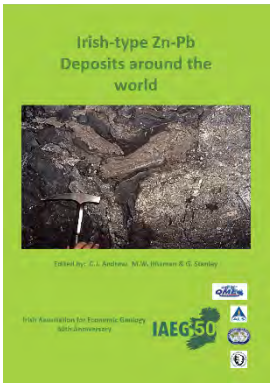

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"What has Zinc ever done for us?" A geologist's assessment of zinc's contribution to the Irish economy

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Abstract: To paraphrase Monty Python's Life of Brian "*what has zinc ever done for us?*". This is a geologist's assessment of zinc's economic impact on Ireland. The assessment is based on a series of reports from the Natural Resources section of the Department of the Environment, Climate and Communications (DECC), as well as other open-sourced data available from the DECC. Ireland has the most zinc discovered per square kilometre than anywhere else in the world. It is this exploration potential that has attracted both global and indigenous prospectors and investors. Consequently, this has allowed the establishment of an exploration and mining infrastructure within the country. So, zinc is the main reason Ireland has a modern exploration and mining industry. It is why we continue to be one of the leading mining countries in Europe. In 2022, Ireland produced 9.5% of European zinc mine output (4th in Europe) and 0.8% of world zinc mine output (18th in World). And the future for Irish zinc is bright. It is estimated that by 2035, the current transition to net zero will require 20% more zinc, and by 2050 demand could reach 145% of 2019 levels. As a significant proportion of this growth will be driven by the use of zinc in offshore wind-energy generation, with demand in this sector growing to 150% of 2019 levels by 2035, Ireland position as a zinc producing region will continue to grow.

Keywords: Value of zinc mining, economic returns, employment benefits, community advantage.

Exploration and Zinc

In Ireland, zinc is our constant, that main commodity that the mining sector depend upon, year on year. That constant allows us to dabble in whatever mineral is fashionable. Zinc exploration in Ireland dates to the 1950s and has a successful track record in finding and developing economic deposits, starting with Abbeytown in Co Sligo, mined from 1950 to 1961, right up to the 2012 discovery of Tara Deep. We have been so successful that Singer in 1995 ranked Ireland first globally in terms of zinc discovered per square kilometre, and second with respect to lead. Since then, we have added additional resources, including the inferred resource at Pallas Green, Co Limerick, and Tara Deeps, Co Meath, to the mix. A combined inferred resource of 72Mt @ 7.7% Zinc and 1.4% lead. In fact, Pallas Green comes second in significance of deposits in Ireland, based on metal tonnes, and Tara Deeps places fourth (Figure 1).

The exploited zinc deposits are the real economic win for Ireland, becoming major economic drivers in rural economies. However, exploration has its own micro economy. A micro economy that supports the junior exploration sector in Ireland, our small to medium service enterprises, and provides a wealth of experience for our geoscientists to go out into the world. This diaspora brings its own soft influence on the global mining industry. Something in evidence at Irish night during PDAC every year.

The Indecon report of 2013 notes the importance of the substantial number of exploration jobs, both direct and indirect, with significant numbers of people employed across the regions of Ireland. This is just not direct employment by exploration companies but also indirect employment in the service industries, for example the various geological and geophysical consultancies, drilling companies and laboratories. The report notes that in 2011, a total of 225 jobs were supported by exploration activities in the sector and this increased to 240 full-time equivalent persons (*est.*) in 2012, of which 77% were skilled. The breakdown of this is shown in Figure 2. The report also estimates the wages and salaries of the exploration employees in 2011 was in excess of €4.4 million and €4.3 million in 2012.

Indecon also looked at exploration expenditure on Irish-produced non-labour inputs, estimated to be €23.7 million in 2012. This comprised of €12.5 million on purchases from suppliers, finished goods and raw materials and €11.17 million on professional and other services. A similar level of expenditure was evident in 2011.

If we expand on this and look at the exploration spend in Ireland from 1995 to 2021 (Figure 3), we can see that it has continued to grow, doubling in the period from the 1990's to the 2020s, with high spending outlier years including 2011 and 2012. The expenditure has gone from averaging just under €10 million per year in the latter half of the 1990s to averaging over €23 million since 2010 (Figure 3). The expenditure is based on

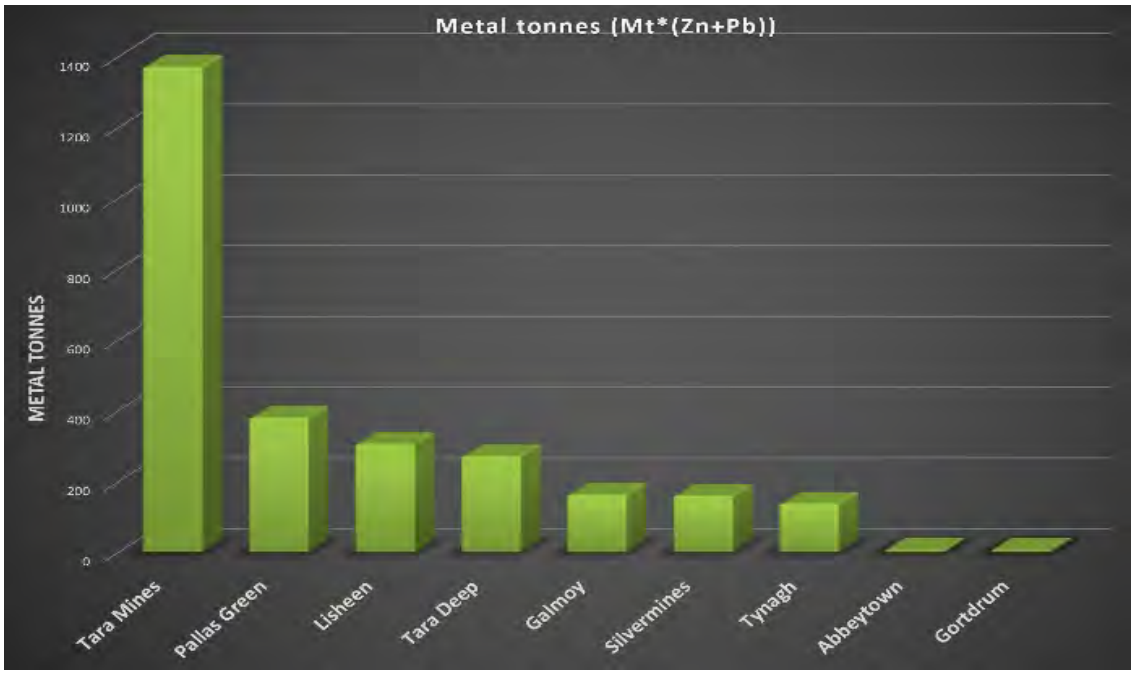

Figure 1: *Ireland's economic and significant deposits zinc deposits ranked by metal tonnes.*

the data released by the Geoscience Regulation Office (GSRO). The data is a conservative estimation of the total spend by exploration companies as the GSRO only considers expenses incurred in a technical field programme, with ancillary costs like office overheads only allowed to a maximum of 10% of the licence expenditure requirement.

The data in Figure 3, shows a relationship between the zinc price and exploration expenditure in Ireland. Excluding the zinc price spike of 2006 / 2007, as the zinc price has increased over the last 25 years, it has generally been matched by exploration expenditure in Ireland. We also can see a similar trend for the number of prospecting licences held, as is shown in Figure 4. Again the 2006 / 2007 price spike has to be excluded. Both the zinc price and the number of prospecting licences held correlates reasonably well up until the last 2 to 3 years.

Employment in:	**2011**			**2012e***		
	Full Time Persons - Average	**FTE of Part Time**	**Total FTEs**	**Full Time Persons - Average**	**FTE of Part Time**	**Total FTEs**
Employment in Exploration (in Mines/'brownfield')	12.9	0.0	12.9	15.0	0.0	15.0
Employment in Exploration (Prospecting Licence Areas)	145.0	8.1	153.1	144.0	14.5	158.5
Employment in Other Support Services (estimated exploration-related)	55.8	3.5	59.3	57.4	8.9	66.2
Total Persons Engaged	**214**	**12**	**225**	**216**	**23**	**240**

Source: Indecon Confidential Survey of Prospecting Licence Holders and Indecon analysis
*Note: Figures are based on the grossing up of sample data from the Indecon Confidential Survey of Prospecting Licence Holders. Total persons engaged have been rounded up to the nearest number of persons. Employment in exploration includes both 'Brownfield' exploration and 'Greenfield' exploration.

Figure 2: *Table from the 2013 Indecon report showing the employment numbers in exploration for 2011 and 2012.*

Figure 3: *Graph of exploration expenditure, including drilling expenditure, in comparison with the US $ zinc price from 1995 to 2023.*

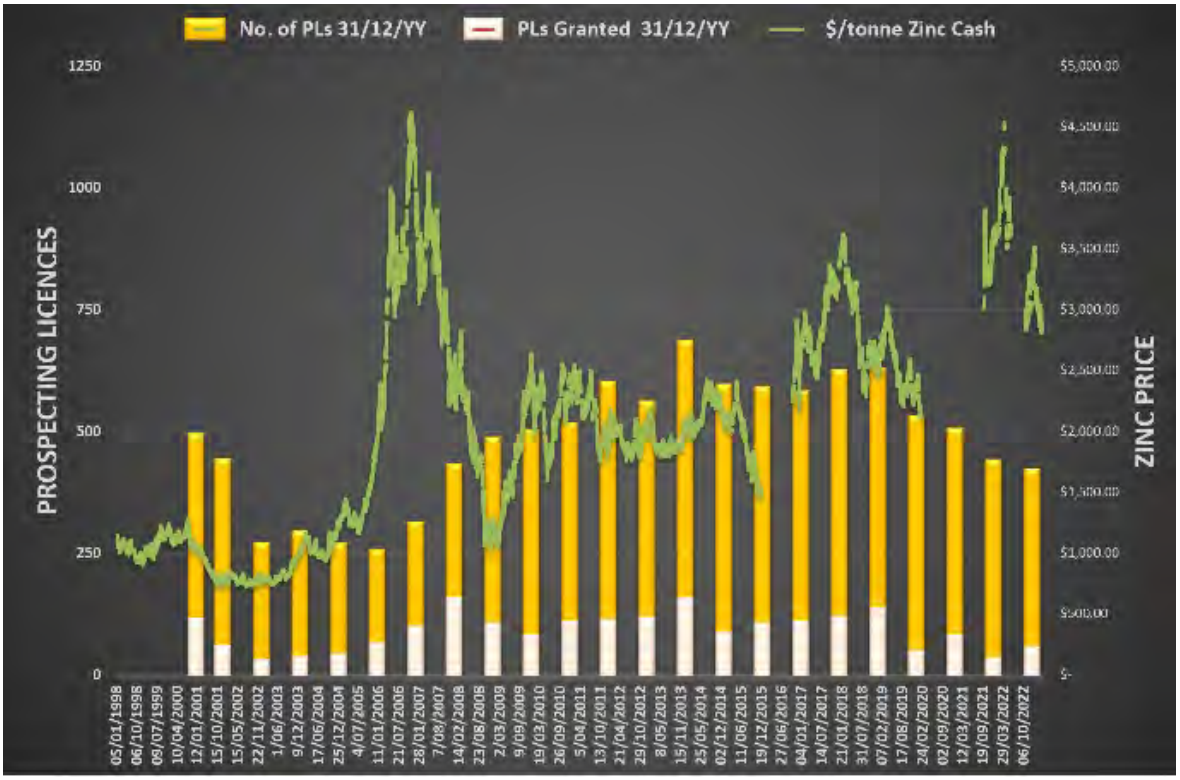

Figure 4: *Graph of prospecting licences held, including licences granted per year, in comparison with the US $ zinc price from 1995 to 2023.*

However, what both graphs illustrate is the importance of zinc to the Irish exploration sector. Fluctuations in the zinc price has a significant influence on both the overall exploration spend within Ireland and the number of prospecting licences held indicating that zinc is central to Irish exploration activity.

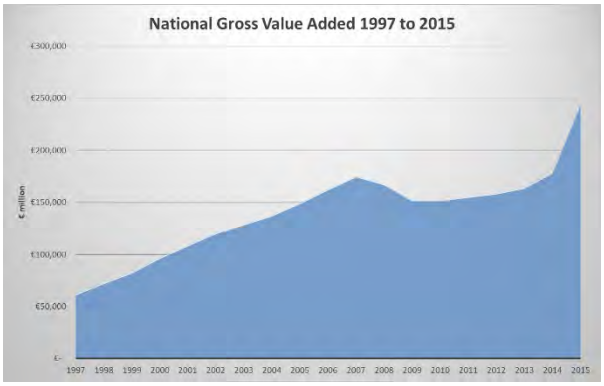

Figure 5: *Gross Value added 1997 to 2015 - Constant Price data is chain linked annually and referenced to year 2020. (Central Statistics Office).*

Mining and Zinc – Show me the Money!

While exploration does make an important contribution to the Irish economy, it pales in comparison to that of the economic impact of a mine. We go from talking about millions to talking about billions, as illustrated below in the infographics on the mines at Galmoy (Figure 6) and Lisheen (Figure 8). These are from the 2020 AECOM report published by the Exploration and Mining Division, now the Geoscience Regulation Office (GSRO), of the Department of the Environment, Climate and Communications. The report was a detailed independent look at the full mine cycle of both mines, from construction to closure and rehabilitation. The mining operations of the Galmoy Mine in Co. Kilkenny and Lisheen Mine in Co. Tipperary were the first mines in Ireland to be opened, operated, and closed under a modern regulatory regime.

The AECOM report is a critical look at the effects of mining on their communities. Assessing the social, environmental, and economic effects of each mine on its local area. For this paper only the economic findings of the report are considered, however the three main capitals are often interconnected, in particular the social and economic effects. Some of the key economic findings of the report were:

- During mine operation, Galmoy mine had an average of 213 direct employees; 80 per cent of whom lived within 30km of the mine. Lisheen employed 350 people, 74 per cent of whom lived within 30km of the mine. Both mines also supported close to 800 additional jobs in the wider economy. As well as the employees spending locally, they also contributed to the local economy indirectly by boosting school numbers, taking part in local voluntary organisations, and bringing transferrable skills to businesses post-closure. Following closure, employees at both mines were given generous redundancy payments and were provided with upskilling programmes in preparation for closure. And following closure there were low levels of long-term unemployment in the area.

- The total turnover at Lisheen was estimated at €2.76 billion, resulting in a €1.3 billion Gross Value Added (GVA), 11 per cent of GVA for the Mining and Quarrying sector (*Gross Value Added is the value that producers have added to the goods and services they have bought. When they sell their wares, producers' income should be more than their costs, and the difference between the two is the value they have added* - CSO). In comparison, Galmoy accounted for 3 per cent of the sector's GVA at €0.3 billion. Just so we do not get ahead of ourselves when talking in billions, when this is put into context of the Irish economy, the national GVA for the same period, 1997 to 2015 was €2,669 billion, see Figure 5.

- Galmoy spent €676 million directly during the construction and operation phases, with €560 million in indirect expenditure (by suppliers to the mine) and an estimated induced expenditure (effect of spending wages) of €465 million. Lisheen, being a bigger operation, had direct spending of nearly €2.29 billion with indirect expenditure of €1.97 billion, and induced expenditure of €1.57 billion by employees spending their wages.

- Galmoy mine contributed over €60 million to public finances in several ways, including €12.8 million paid in royalties and dead rent, €0.6 million in corporation tax, €14.9 million in employer's PRSI, as well as €30.9 million in PAYE by workers. It also paid commercial rates to Kilkenny County Council in the region of €3.2 million, and development contributions for local road upgrades of about €1.49 million, Figure 7.

- While Lisheen contributed over €250 million to public finances. This included about €65.3 million in royalties and dead rent, €55.3 million in corporation tax, €36 million in employer's PRSI and €77.4 million in PAYE by employees. It also paid commercial rates to North Tipperary County Council in the region of €16.5 million, and development contributions of €6.58 million, Figure 9.

- The other economic benefit to the local economy are the improvements to infrastructure such as roads, power and water services that were made during the lifetime of the operations. In addition, the infrastructure in and around the mine site has enabled both sites to continue to be used for commercial purposes.

Both mines were located in rural communities and during operation they were significant economic drivers in these areas. Post closure this economic stimulus was removed, however the mines left behind a legacy of improved infrastructure of industrial sites and roads, as well as new skill sets within the community. It is not just Galmoy and Lisheen that have left these positive economic legacies after production has ceased. Tynagh is a very good example of a positive post-closure

Figure 6: *Infographic on Galmoy Mines Co Kilkenny.* Courtesy of the GSRO

Figure 8: *Infographic on Lisheen Mines, Co Tipperary. Courtesy of the GSRO*

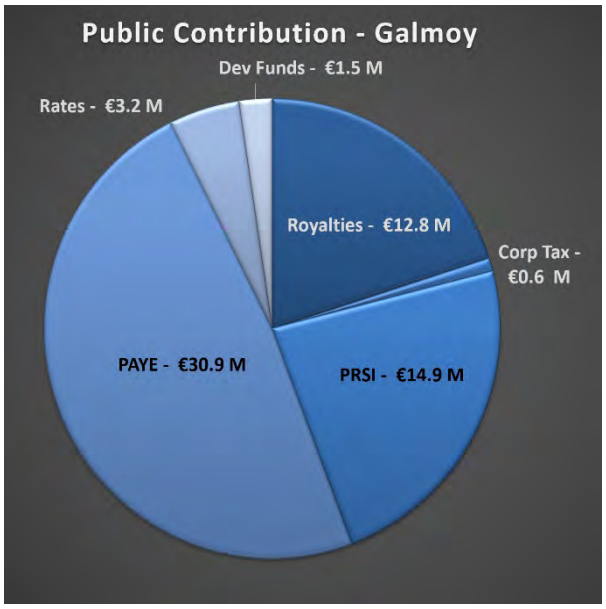

Figure 7: *Galmoy Mines' public finances contribution. AECOM Report 2020*

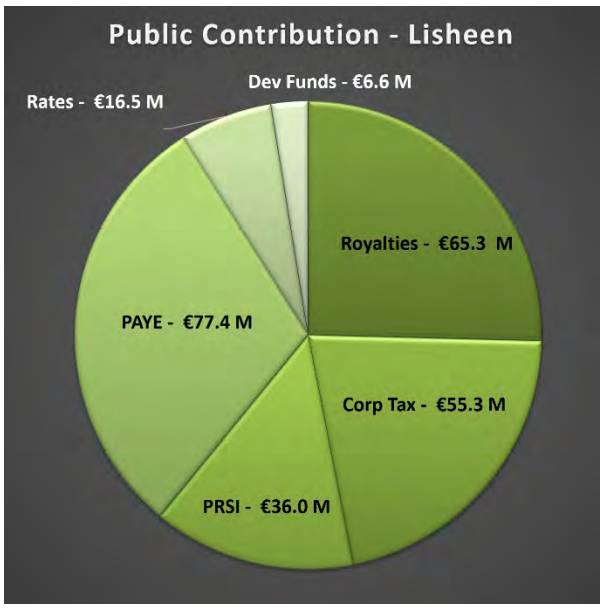

Figure 9: *Lisheen Mines' public finances contribution. AECOM Report 2020*

economic legacy. Several companies associated with Tynagh are still prominent today in the Irish extractive sector: OMAC laboratories, now ALS Global Loughrea, just celebrated over 40 years in business in 2020 is one of the major employers in Loughrea Co Galway with about 200 staff. O'Neill-McHugh Laboratories, (OMAC), grew out of the old Irish Base Metals laboratory in Loughrea and was founded in 1980. Two other companies associated with Tynagh are the exploration and ground investigation drilling companies, Irish Drilling Ltd and Priority Drilling Ltd. Irish Drilling based out of Loughrea has been in business for over 55 years and employs over 55 people and Priority Drilling has been providing drilling services since

1954, employing over 65 people based out of Killimor in County Galway. That is over 300 jobs in rural East Galway since the 1950s. It should be noted that not all of the legacy from Tynagh has been positive, and there remains a number of environmental issues associated with the former mine.

The AECOM report was solely focused on two specific mines. However, the Indecon reports of 2013 and 2017, carried out by the Exploration and Mining Division and the Geological Survey Ireland, gives a wider view of the zinc sector of the Irish extractive industry between the years 2011 and 2017. Figure 10 shows that following the closure of Galmoy in November 2012 and Lisheen in November 2015 zinc turnover and GVA both dropped. In fact, with just Boliden Tara Mines left in operation by 2016, zinc turnover and GVA halved from 2011 to 2016.

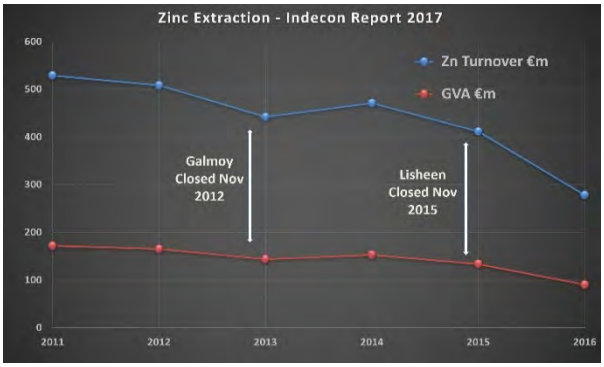

Figure 10: *Zinc turnover and Gross Value Added from 2011 to 2016. Indecon Report 2017*

While Boliden Tara Mines until recently was the only producing zinc mine in Ireland, it in itself is a significant contributor to the Irish economy. Based on the information provided by Boliden, in their 2016 planning application for an extension to their tailings management facility, they employ approximately 570 people and contribute between €60-70 million annually to the local economy. Approximately €45 million is expended in payroll, €10 million on contractors, €10-15 million on local suppliers and €1.75 million in local rates. Annually they spend €55 million on purchases within the state, inclusive of the local spend.

"Apart from the sanitation, the medicine, education, wine, public order, irrigation, roads, the fresh-water system, and public health, what have the Romans ever done for us?"

Zinc has allowed for the development of a strong exploration and mining infrastructure in Ireland. It is an important employer in the communities it works in and supports an important skill set in the country. However, we are still only an exporter of zinc concentrate. We are on the bottom rung of the ladder and maybe it is time for us to consider adding addition value to our zinc, instead of exporting concentrate. The world is going through significant and fundamental change and this maybe an opportunity for Ireland to be more than an exporter of zinc concentrate. As the EU wakes up to the importance of the supply of raw materials should Ireland look to benefit further from our abundant of zinc?

Over the next decade Ireland plans, not just to become self-sufficient in energy, but to be a net exporter of energy. Is there an opportunity for Ireland to become a producer of low carbon refined zinc? We could build a low carbon smelter using power from our offshore wind and green hydrogen, similar to the Boliden zinc smelter in Odda Norway (Ammerlaan, 2022). Or go further and follow the example of Teck's partnership with Metal Tech Alley, in B.C.'s Lower Columbia Region which is developing a cluster of advanced materials and metallurgy companies. Metal Tech Alley aims to build a regional circular economy, where waste is designed out, and where value is created throughout the product life cycle, with the goal of keeping both products and value in the economy (Teck 2021).

Should Ireland be looking at a complete circular life cycle for our zinc, from mine, to product, to recycle? The Glencore 2022 annual report states that the "*major transformation of the global energy system necessary to achieve the goals of the Paris Agreement is supported by zinc's use in offshore wind-energy generating facilities. These scenarios show zinc demand growing to 150% of 2019 levels by 2035 and to 200% by 2050*". Ireland will drive part of this zinc demand, as a significant proportion of our future energy needs is to come from offshore wind. So why not build the capacity within clusters to mine, smelt and build value added products from Ireland's zinc? Examples are already available within the EU where a number of countries and lithium companies have come together to form clusters that will result in the production of lithium batteries from lithium mined within the EU. The aim of the clusters is to bring the technology and infrastructure within the EU together so that the final product is produced close to the source of the material. The examples are there, and as the EU wakes up to the importance of security of metal supply and the opportunities green energy will afford us, Ireland has the opportunity to generate even greater economic benefits from its zinc.

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