EMPLOYMENT PROMOTION PROGRAMME PHASE III (EPP) - FOUNDRY AND SCRAP METAL INDUSTRY ECONOMIC IMPACT STUDY

EPP project: Analysing and optimizing the metal industry as well as the economic impact of implementing export measures to reduce on-going job losses and plant closures in the Foundry and Scrap Metal Industries

FINAL TECHNICAL REPORT

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1 EXECUTIVE SUMMARY

Brief Summary of Insights

1. The three different metals differ vastly as far as international scrap prices and exported volumes are concerned, hence the need for three distinct Value Chain Maps.

2. It is clear that while the export of scrap metal is increasing, the local output from the scrap beneficiating industry (Foundries) is decreasing. Scrap exports grew by 62% between 2007 and 2011 at an average growth rate of 13% per annum, while Foundry outputs declined by 13% for the same period, or a growth rate of minus 3% per annum.

3. The Foundry and Scrap Metal Industry as a whole is Strategically and Economically very important to South Africa as it contributes R24 433 million per annum (constant 2011 prices) to the National GDP. The Employment opportunities currently created by the Scrap Metal handling and beneficiation industry amounts to 535 845. (Direct, Indirect and Induced) It is important to note that 462 737 are directly engaged in the Foundry and Scrap Metal Industry, 12 988 are directly employed by the Foundry Industry, 15496 by Scrap Metal Recycling Industry, 9227 by industry generating scrap metal and the balance of 425 026 earn an income from collecting scrap and waste of all types.

4. The Foundries are the most important role player as far as GDP is concerned. The Foundries contribute R9 048 million per annum to the National GDP. Its eventual closure through policy neglect will severely impact the South African Economy.

5. The study confirms clearly that an intervention by Government to optimise the Foundry and Scrap Metal Industry in South Africa is needed and will be by far more beneficial than a policy of "Doing Nothing" allowing the current status quo to persist.

6. The most optimal Intervention Scenario is: Promote the local production of castings (and therefore the scrap usage) by paying a supply grant to the Scrap Metal Recyclers per tons supplied to the Foundry Industry. The total net effect of R3 300 million per annum reflects the combined positive turnover for all three metals. It is important to note that this Scenario involves Government intervention of approximately R291 million per annum for Ferrous, R136 million per annum for Aluminium and R437 million per annum for Copper. The total intervention will cost Government R864 million per annum. This Scenario rates first for Ferrous and Copper scrap metal and, by a small margin, second for Aluminium scrap metal.

7. The most optimal Intervention Scenario for Aluminium scrap metal is: Promote the local usage of scrap metal by subsidising the input price of scrap metal to the local Foundry Industry. The total net effect of R172 million per annum reflects the positive turnover for Aluminium scrap metal. It is important to note that this Scenario involves Government intervention of

approximately R147 million per annum for Aluminium, and can be translated into a cost to Government.

8. Directly controlling the export of scrap metal export will have a negative effect on the Foundry and Scrap Metal Industry. Imposing physical quotas will have a positive financial effect on the Foundry Industry, but will lead to job losses. Export price control by means of export taxes or other means will have a negative financial as well as negative direct employment effect.

9. The study used 15% as the assumption for the size of the modelled interventions for the four intervention scenarios. This gives a good indication of the direction that Government policy and intervention should focus on. It needs to be mentioned though that the Project-Industry Reverence Group pointed out that recent surveys amongst the members of industry indicated that a feasible size of an intervention should be of a magnitude of between 20% and 30%.

Background

The Department of Trade and Industry (the DTI) Industrial Policy Action Plan (IPAP) of 2007 and IPAP2 identified the metal industry as a sector vital to sustainable economic and employment growth. This industry is expected to play a major role in supplying the massive infrastructure development programme, launched by the government to stimulate the local economy, while creating significant numbers of new and sustainable skilled jobs.

The Scrap Metal Industry is an important role player in the supply of feedstock to the Foundry Industry. In its own right the Scrap Metal Industry also makes a significant contribution to the economy, especially with respect to employment creation.

The Foundry Industry, as a major role player within the metal industry, has extensive job creation potential in further beneficiation through the processing of castings. In the case of the Foundry Industry, the growing export of scrap metal, which is a major raw material to Foundries, is to be considered specifically since it limits the essential supply of scrap metal to the Foundries, and more specifically the reduction of input costs, which is one of the key measures in the policy action plan to support local business. Despite the need to sustain the Foundry Industry and the related downstream industries involved, such as the expanding automotive industry which is a key user of metal products, inter alia, the output and employment of the Foundry Industry within the metal industry have steadily declined over the past few decades.

The Employment Promotion program Phase III (EPP), which is funded with international funding and managed and administered by the University Of Cape Town, Development Policy Research Unit (DPRU) and which reports to an Industry Reference Group, initiated this study: “PROMOTION PROGRAMME PHASE III (EPP) - FOUNDRY AND SCRAP METAL INDUSTRY ECONOMIC IMPACT STUDY”. Conningarth Economists were appointed for the execution of this study. A Project-Industry Reference Group has been initiated by Dr Laurraine Lotter who oversees the project, as representative of BUSA on the EPP Industry Reference Group. The Project-Industry Reference Group consists of representative members from the metal recycling as well as the scrap metal consuming industry in the South African economy.

Objective

The objective of the study was agreed with the Project Industry Reference Group as follows:

A- It is proposed that research be undertaken to establish the Value Chains of the Foundry and Scrap Metal Industries, and the need for and potential impact of an intervention/or no intervention in the industries.
B - The focus of the research is the strategic, economic and employment impact of the retention or loss of a Foundry Industry in South Africa.
C - The impact of Government intervention to ensure an adequate supply of metal scrap for local users will also be assessed.

From the research into the Foundry and Scrap Metal Industry, three major components emerged as follows:

The first component deals with the fact that the Foundry Industry is not able to grow satisfactorily. The main problem is that it most probably cannot compete internationally on the import, as well as on the export side. As stated in the key outcomes required by the Terms of Reference, the analysis of the Value Chain (specifically the direct and indirect inputs) of the Foundry Industry were, therefore, the key to providing answers to these problematic aspects.

Secondly, it became evident from investigating the problem that the major aspect for this sector is the export of scrap metal at the loss of beneficiation. This does not only pose a problem for the domestic Foundry Industry, but even gives an advantage to international competitors who buy the scrap metal relatively cheap from South Africa and produce final products that compete with South Africa's products. It is therefore important that this situation were to be analysed thoroughly, to determine whether it truly poses a problem to the industry or whether there are other underlying problems, such as poor management, lack of capital, or lack of quality of labour.

Thirdly, for the Government to intervene in this problematic situation, it was necessary that an analysis be carried out which should clearly state whether or not it is in favour, with the interest of the community at large, to intervene or not. In the event of intervention, the government needs to make sure that it makes a net positive contribution to aspects such as economic growth, creation of job opportunities, income distribution and poverty alleviation.

In essence the scope of work was to produce the following four main outcomes (Chapters):

- Nature, magnitude and Value Chain Mapping of the Scrap Metal Industry in relation to the Foundry Industry.
- Overview of the Current macro-economic impact situation of the Foundry and Scrap Metal Industry.
- Future Macro-economic Impact of Various Alternative Developmental Intervention Scenarios for the Foundry and Scrap Metal Industry.
- Conclusions, Insights and Guidelines for Policy purposes.

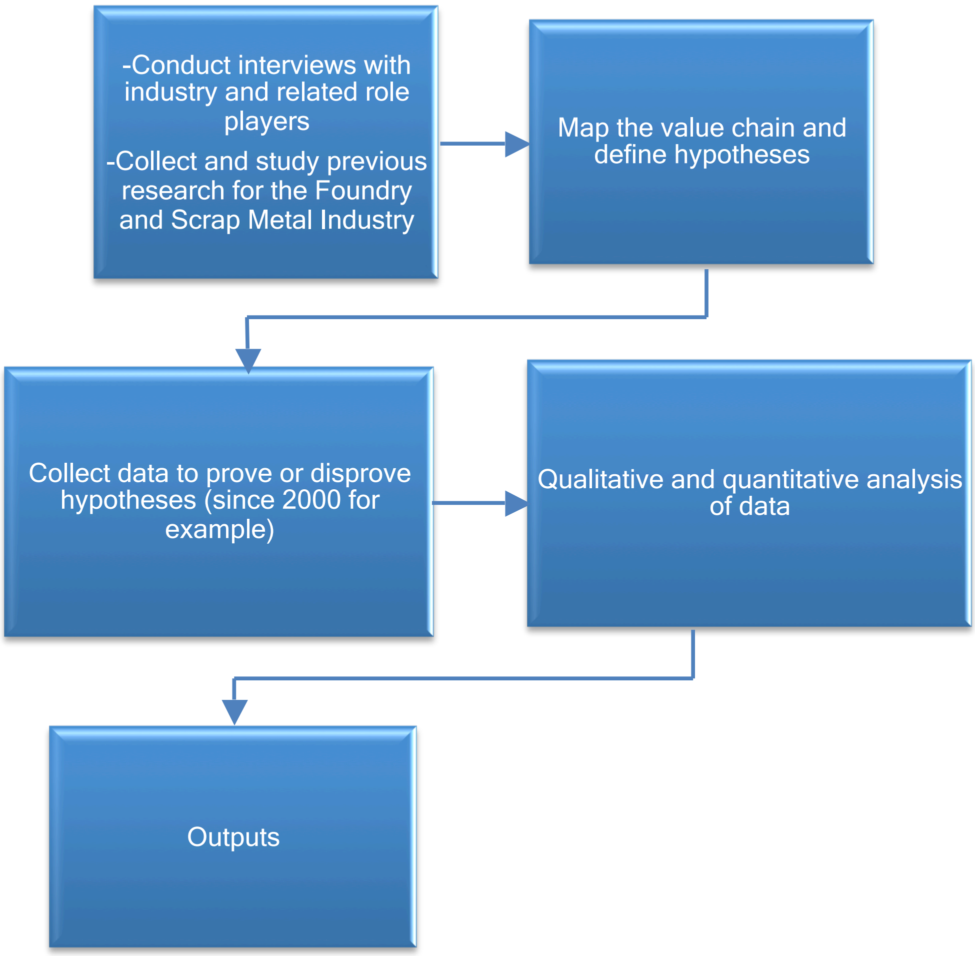
Methodology

a. Value Chain Mapping and Analysis

It is important to assess the Value Chain of the Foundry and Scrap Metal Industries. This was done by looking at the detailed input/output structures of the Foundry and Scrap Metal Industries as well as identifying the key factors.

The following gives the framework of the methodology that was followed for the Value Chain analysis.

Figure 1: Methodology Framework



b. Macro-economic Overview

Desktop and field studies were undertaken in order to understand the overall current macro-economic status quo and detailed workings of the Foundry and

Scrap Metal Industry. This will assist the research team in understanding the current macro-economic state of the industry in terms of size, relationships and trends (Policy environment, employment, economic growth, production, export and local consumption etc.)

c. Macro-economic impact of various developmental intervention scenarios for the metal industry

The first task in assessing the impact of the various developmental intervention scenarios on the Foundry and Scrap Metal Industry was to assess the problem posed to the Foundry Industry by the excessive exporting of scrap metal. This was completed through field work, discussion of the industry with the main stakeholders, as well as surveying the main stakeholders of the industry in South Africa.

The second task was the development of price, supply and demand curves for the various role players of the Foundry and Scrap Metal Industry, i.e. the scrap metal recyclers and foundries. Two approaches have been followed namely:

- The Delphi technique where the specialists in the industry were tasked to determine the correlation between output and demand, and price changes.
- Regression analysis was carried out on how the demand and supply of the international market reacts to price changes. This was accomplished by making use of time series analysis. Data was obtained from the U.S. Geological Survey website.

The third task was to analyse various developmental intervention scenarios by making use of the price, supply and demand curves as well as a macro-economic impact model based on the Social Accounting Matrix (SAM) of South Africa developed by Conningarth Economists and the Development Bank of Southern Africa (DBSA).

The Scenarios

The following Scenarios were identified as those that would cover all the hypotheses underlying the study, and lead to the best understanding of what future actions could be the most beneficial.

Table 1: Do Nothing and Various Developmental Intervention Scenarios

Scenario Number	Name	Scenario Description
1	Do Nothing	Maintain the status quo.
2	Export Quotas	Restrict export of scrap by volume control.
3	Export Tax	Restrict export of scrap by imposing export tax.
4	Subsidy to Foundries	Promote the local usage of scrap by subsidising the input price of scrap to the local Foundry Industry.
5	Subsidy to Scrap Metal Recyclers	Promote the local production of castings (and therefore the scrap usage) by paying a supply grant to the Scrap Metal Recyclers per tons supplied to the Foundry Industry.

The study used 15% as the assumption for the size of the modelled interventions for the four intervention scenarios. This gives a good indication of the direction that Government policy and intervention should focus on. It needs to be mentioned though that the Project-Industry Reverence Group pointed out that recent surveys amongst the members of industry indicated that a feasible size of an intervention should be of a magnitude of between 20% and 30%.

Results, Insights and Guidelines of Study

From the results of the study it is possible to draw insights and policy guidelines from them, to be used for future optimisation of the Foundry and Scrap Metal Industry. The insights and policy guidelines were formulated for each of the various metals.

The policy considerations that are addressed are subdivided into two major divisions.

- The first division: “Is there really a need that any intervention should be made?”
- The second division: “What intervention should be taken to optimise the Foundry and Scrap Metal Industry?”

An important aspect of the decision-making criteria, used to decide upon the type of intervention, is that not only should the impact on the industry under consideration be taken into account, but also the impact on the broader economy. The impact on the economy is considered in terms of economic growth, employment creation and poverty alleviation.

Ferrous Scrap Metal

a. Requirement for Intervention

The table below depicts the financial activity's impact on the various role players of the Ferrous Foundry and Scrap Metal Industry, for each of the scenarios. Financial activity is measured in terms of gross profit (sales less cost of sales) to avoid double counting. It also gives an indication of the direct employment impact of the various scenarios. The financial activities and the direct labour will be used as criteria to determine if there is a requirement for intervention into the Ferrous Foundry and Scrap Metal Industry. All the intervention scenarios have been adjusted to the final year of the analysis period, to enable a comparison of the Do Nothing Scenario with the intervention scenarios on an equivalent basis. In practice this was done by calculating the net impact of the scenarios, and adding or subtracting the net impact to or from the Do Nothing Scenario to each of the intervention scenarios.

Table 2: The Financial Effect (measures in terms of gross profit) and Direct Labour Effect of Various Scenarios to Optimise the Ferrous Scrap Metal Industry - All Scenarios (Constant 2011 Prices) Adjusted for Future Growth

Financial Activity					
	Scenario 1: Do Nothing	Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
	(R Million)				
Total Net Effect	2 925	4 555	2 504	3 759	5 414
Rating Above/Below Do Nothing		Above	Below	Above	Above
Direct Labour Effect					
	(Numbers)				
Total Net Effect	99 028	87 261	52 267	99 870	114 669
Rating Above/Below Do Nothing		Below	Below	Above	Above

From the financial activity, measured in terms of gross profit, it is evident that three of the four intervention scenarios have a higher impact than the Do Nothing Scenario. If the direct employment impact is taken as a decision-making criterion, then it is also evident that to intervene in the Ferrous Foundry and Scrap Metal Industry will optimise the situation.

b. Selection of Preferred Intervention(s) for Ferrous Scrap Metal

The tables below depict the impact on the Ferrous Foundry and Scrap Metal Industry, for each of the various intervention scenarios. The decision criteria used for comparative reasons are financial activity, macro-economic activity, as well as combined criteria using the Multi Criteria Decision Analysis (MCDA) approach.

The above mentioned decision criteria are now described in more detail.

1. Financial Activity Criteria

Table 3: Financial Activity Criteria - Intervention Scenarios (Constant 2011 Prices)

	Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
	(R Million)			
Total Net Effect	1 629	-421	833	2 489
Ranking	2	4	3	1

Scenario 5 which represents the Scrap Metal Recyclers subsidy, with a total net effect of R2 489 million, is the most optimal intervention scenario. It is important to note that this scenario involves Government intervention of approximately R291 million per annum. An affirming point about this scenario is that all of the role players share positively from it.

2. Macro-economic Criteria

The macro-economic evaluation of the intervention scenarios are accomplished in terms of two components of decision-making criteria, namely, the Absolute Criteria as well as the Efficiency Criteria.

Table 4: Macro-economic Criteria - Intervention Scenarios (Constant 2011 Prices)

		Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
1. Absolute Criteria					
a.) Economic Growth	(R Million)	1 575	-1 809	1 206	3 243
Ranking		2	4	3	1
b.) Direct Labour	(Number)	-11 518	-46 686	974	15 937
Ranking		3	4	2	1
c.) Total Labour	(Number)	-3 952	-49 090	5 735	27 749
Ranking		3	4	2	1
d.) Poverty Alleviation (Low Income Households)	(R Million)	150	-275	129	368
Ranking		2	4	3	1
e.) Fiscal Impact	(R Million)	573	91	138	732
Ranking		2	4	3	1
2. Efficiency Criteria					
a.) Total Labour/ Government Incentive	(Ratio)	N/A	N/A	22.19	95.39
Ranking		N/A	N/A	2	1
b.) Total Labour/ Total Capital	(Ratio)	-1.09	-46.21	2.52	4.94
Ranking		3	4	2	1
c.) Total GDP/ Total Capital	(Ratio)	0.43	-1.70	0.53	0.58
Ranking		3	4	2	1

In terms of both the Absolute and Efficiency criteria, Scenario 5 stands out as the number one ranked scenario amongst all four of the intervention scenarios.

3. Multi Criteria Decision Analysis

Multi criteria decision analysis (MCDA) has found many applications in both public and private sector organisations. It is both an approach and a set of techniques with the goal of providing an overall ordering of options, from the most preferred to the least preferred option.

In terms of this analysis the MCDA attempts to combine the results of the financial activity criteria and the macro-economic criteria in order to arrive at micro level criteria in the decision-making process.

The results of the MCDA for Ferrous Scrap Metal are presented in the table below.

Table 5: MCDA Results for Ferrous

	Scenario 2	Scenario 3	Scenario 4	Scenario 5
MCDA score (0%-100%), 50%=0,	**68%**	**20%**	**75%**	**100%**

According to the MCDA criteria, Scenario 5 scores the highest ranking which translates into the most optimal Scenario.

Aluminium Scrap Metal

a. Requirement for Intervention

The table below depicts the financial activity's impact for Aluminium Scrap Metal. The definition of the requirement for intervention is explained in the Ferrous Scrap Metal section above.

Table 6: The Financial Effect (measures in terms of gross profit) and Direct Labour Effect of Various Scenarios to Optimise the Aluminium Scrap Metal Industry - All Scenarios (Constant 2011 Prices) Adjusted for Future Growth

Financial Activity					
	Scenario 1: Do Nothing	**Scenario 2: Export Volume Control**	**Scenario 3: Export Tax Imposed**	**Scenario 4: Local Usage Subsidy**	**Scenario 5: Scrap Collectors subsidy**
	(R Million)				
Total Net Effect	-108	-45	36	64	-73
Rating Relative to Do Nothing		Above	Above	Above	Above
Direct Labour Effect					
	(Numbers)				
Total Net Effect	1 021	918	432	1 263	1 630
Rating Relative to Do Nothing		Below	Below	Above	Above

From the financial activity impact, measured in terms of gross profit, it is evident that all four of the intervention scenarios have a higher financial impact than the Do Nothing Scenario. If the direct employment impact is taken as a decision-making criterion, then it is also evident that to intervene in the Aluminium Foundry and Scrap Metal Industry will optimise the situation.

b. Selection of Preferred Intervention(s) for Aluminium Scrap Metal

The tables below depict the impact on the Aluminium Scrap Metal Industry, for each of the various intervention scenarios. The preferred intervention decision-making criteria have already been discussed in Ferrous Scrap Metal and remain the same for Aluminium Scrap Metal.

The decision criteria are now described in more detail below.

1. Financial Activity Criteria

Table 7: Financial Activity Criteria - All Intervention Scenarios (Constant 2011 Prices)

	Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
	(R Million)			
Total Net Effect	63	144	172	34
Ranking	3	2	1	4

Scenario 4 which represents the local usage subsidy, with a net effect of R172 million, is the most optimal intervention scenario. It is important to note that this scenario involves Government intervention of approximately R147 million per annum. A point to note about Scenario 4 is that only the Foundries benefit, with no change experienced by the Scrap Metal Industry.

2. Macro-economic Criteria

The macro-economic evaluation of the intervention scenarios are carried out in terms of two components of criteria, namely, the Absolute Criteria as well as the Efficiency criteria.

Table 8: Macro-economic Criteria - All Intervention Scenarios (Constant 2011 Prices)

		Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
1. Absolute Criteria					
a.) Economic Growth	(R Million)	30	15	353	226
Ranking		3	4	1	2
b.) Direct Labour	(Number)	-86	-556	281	621
Ranking		3	4	2	1
c.) Total Labour	(Number)	299	82	1 673	1 306
Ranking		3	4	1	2
d.) Poverty Alleviation (Low Income Households)	(R Million)	1	-5	38	30
Ranking		3	4	1	2
e.) Fiscal Impact	(R Million)	20	77	-31	-71
Ranking		2	1	3	4
2. Efficiency Criteria					
a.) Total Labour/ Government Incentive	(Ratio)	N/A	N/A	11.38	9.60
Ranking		N/A	N/A	1	2
b.) Total Labour/ Total Capital	(Ratio)	1.62	0.27	2.52	4.05
Ranking		3	4	2	1
c.) Total GDP/ Total Capital	(Ratio)	0.16	0.05	0.53	0.70

Ranking		3	4	2	1

In terms of the Absolute and Efficiency criteria the 1^{st} and 2^{nd} rating alternate between intervention Scenario 4 and 5. Intervention Scenario 4 is ahead of Scenario 5. It could be said, as far as these criteria are concerned, that Scenario 4 i.e. Local usage subsidy directly to the Foundry Industry, has the highest ranking while at the same time there is no negative effect for the Scrap Metal Industry.

3. Multi Criteria Decision Analysis

The MCDA combines the results from the Financial Activity Criteria and the Macro-economic Criteria in order to arrive at micro level criteria in the decision-making process.

The results of the MCDA for Aluminium Scrap Metal are presented in the table below.

Table 9: MCDA Results for Aluminium

	Scenario 2	Scenario 3	Scenario 4	Scenario 5
MCDA score (0%-100%), 50%=0,	**65%**	**65%**	**90%**	**74%**

According to the MCDA criteria, Scenario 4 scores the highest ranking which translates into the most optimal Scenario.

Copper Scrap Metal

a. Requirement for Intervention

The table below depicts the financial activity's impact and the definition of the financial activity is discussed in the previous section of Ferrous Scrap Metal.

Table 10: The Financial Effect (measures in terms of gross profit) and Direct Labour Effect of Various Scenarios to Optimise the Copper Scrap Metal Industry - All Scenarios (Constant 2011 Prices) Adjusted for Future Growth

Financial Activity					
	Scenario 1: Do Nothing	Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
	(R Million)				
Total Net Effect	6 955	7 772	6 853	7 131	7 732
Rating Relative to Do Nothing		Above	Below	Above	Above
Direct Labour Effect					
	(Numbers)				
Total Net Effect	7 516	7 340	5 639	7 541	8 323
Rating Relative to Do Nothing		Below	Below	Above	Above

From the financial activity impact, measured in terms of gross profit, it is evident that three of the intervention scenarios have a higher impact than the Do Nothing Scenario. If the direct employment impact is taken as a decision-making criterion, then it is also evident that to intervene in the Copper Foundry and Scrap Metal Industry will optimise the situation.

b. Selection of Preferred Intervention(s) for Copper Scrap Metal

The tables below depict the impact on the Copper Foundry and Scrap Metal Industry, for each of the various intervention scenarios, the decision-making criteria used for the selection of the preferred scenario is the same criteria as described in the Ferrous Scrap Metal section above.

The mentioned decision criteria are now described in more detail.

1. Financial Activity Criteria

Table 11: Financial Activity Criteria - All Scenarios (Constant 2011 Prices)

	Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
	(R Million)			
Total Net Effect	817	-101	177	777
Ranking	1	4	3	2

Scenario 2 which represents the control of export volumes via a quota, with a net effect of R817 million, is the most optimal intervention Scenario. It is important to note that this scenario involves no Government intervention, and only the Foundries benefit from it.

2. Macro-economic Criteria

The macro-economic evaluation of the intervention scenarios are carried out in terms of two components of criteria, namely, the Absolute Criteria as well as the Efficiency criteria.

Table 12: Macro-economic Criteria - All Intervention Scenarios (Constant 2011 Prices)

		Scenario 2: Export Volume Control	Scenario 3: Export Tax Imposed	Scenario 4: Local Usage Subsidy	Scenario 5: Scrap Collectors subsidy
1. Absolute Criteria					
a.) Economic Growth	(R Million)	784	-1 124	644	1 571
Ranking		2	4	3	1
b.) Direct Labour	(Number)	-48	-1 839	96	899
Ranking		3	4	2	1
c.) Total Labour	(Number)	3 828	-3 299	2 640	5 632
Ranking		2	4	3	1
d.) Poverty Alleviation (Low Income Households)	(R Million)	75	-153	69	186
Ranking		2	4	3	1
e.) Fiscal Impact	(R Million)	288	249	-195	21
Ranking		1	2	4	3
2. Efficiency Criteria					
a.) Total Labour/ Government Incentive	(Ratio)	N/A	N/A	6.49	12.88
Ranking		N/A	N/A	2	1
b.) Total Labour/ Total Capital	(Ratio)	2.06	-4.87	2.17	2.51
Ranking		3	4	2	1
c.) Total GDP/ Total Capital	(Ratio)	0.42	-1.66	0.53	0.70
Ranking		3	4	2	1

In terms of both the Absolute and Efficiency criteria, Scenario 5 stands out as the number one ranked intervention scenario amongst all four scenarios. It is only in terms of fiscal impact that Scenario 5 is not ranked the highest. It must be noted that Scenario 5 will require an annual subsidy to the Copper Metal Recycling Industry in the region of R437 million. However it has a very high labour to government incentive ratio of 12.88. It is estimated that 899 direct and 5 632 total employment opportunities will be created by this intervention.

3. Multi Criteria Decision Analysis

The MCDA combines the results from the Financial Activity Criteria and the Macro-economic Criteria in order to arrive at a micro level criteria in the decision-making process.

The results of the MCDA for Copper Scrap Metal are presented in the table below.

Table 13: MCDA Results for Copper

	Scenario 2	Scenario 3	Scenario 4	Scenario 5
MCDA score (0%-100%), 50%=0,	**89%**	**23%**	**67%**	**93%**

According to the MCDA criteria, Scenario 5 scores the highest ranking which translates into the most optimal Scenario.

Overall Outcome:

For each of the different Scrap Metals the most optimal result as determined by considering all the decision criteria by means of the MCDA analysis is:

Ferrous Scrap Metal: Promote the local production of castings (and therefore the scrap usage) by paying a supply grant to the Scrap Metal Recyclers per tons supplied to the Foundry Industry.

Aluminium Scrap Metal: Promote the local usage of scrap by subsidising the input price of scrap to the local Foundry Industry.

Copper Scrap Metal: Promote the local production of castings (and therefore the scrap usage) by paying a supply grant to the Scrap Metal Recyclers per tons supplied to the Foundry Industry.

Conclusions: Addressing the Scope of the Study

Element 1: Analyse the Value Chain of the Foundry Industry.

A study of the nature and magnitude of the total Foundry and Scrap Metal Industry was undertaken. The different metal types were studied and for each the turnover and volume were quantified. The study focuses on ferrous metal scrap (including stainless steel), aluminium metal scrap and copper metal scrap (including brass) as a group since it makes up the bulk of metal waste and scrap traded in South Africa, i.e. 96.6 % of all traded waste and scrap. These three metals, ferrous, aluminium and copper are treated and discussed separately as their cost per ton and quantities traded, differ widely. The table below illustrates the different volumes and values.

Table 14: Break Down of Different Scrap

Scrap Metal type	Volume (kton)		Value (R million)	
Ferrous	3 395	93.7%	11 124	59.1%
Aluminium	107	3.0%	1 391	7.4%
Copper	120	3.3%	6 321	33.6%
Total	3 623	100.0%	18 836	100.0%

The Value Chain Mapping focused on the different volumes and values that are beneficiated or exported. The quantities and values of the beneficiation output and export of scrap metal are summarised in the table below:

Table 15: Scrap Metal Local Beneficiation vs. Export

	Ferrous		Aluminium		Copper		Total	
	Kilo Tons	R Million	Kilo Tons	R Million	Kilo Tons	R Million	Tons	R Million
Use by primary mills[1]	1 500	4 950	-	-	-	-	1 500	4 950
Beneficiation ("Foundries")	480	1 572	66	858	40	2 094	549	4 524
Exports	1 420	4 602	41	533	81	4 228	1 542	9 363
Total	3 400	11 124	107	1391	121	6 322	3 575	18 837

The Value Chain Mapping also quantified the employment numbers related to the scrap handling industry excluding those in the steel mills and it is depicted in the table below:

Table 16: Scrap Metal Industry Employment Breakdown

Scrap Metal	Industry	Collectors	Recyclers	Consuming Industry (Beneficiation)	Total
Ferrous	8 500	402 400	14 200	9 600	434 700
Aluminium	200	8 300	300	1 700	10 500
Copper	300	14 300	500	700	15 800
Total	9 000	425 000	15 000	12 000	461 000

Two general perceptions that exist about the export versus local beneficiation of scrap metal were tested. These are:

That a positive correlation exists between the increase in the international price of scrap metal and the increase in volume of scrap exported.

[1] Primary steel mills are not considered in the bulk of this study as the focus is on the other beneficiates of scrap metal.

That while the exports of scrap metal have been increasing the output of beneficiated scrap metal by foundries has decreased.

The change in export volumes for the three scrap metals were compared to the output volumes from Foundries. The result showed that there was a decrease in Foundry output at a rate of 3% p.a., while the export of scrap metals grew at a rate of 13% p.a.

Element 2: Determine the strategic, macro-economic and employment implications of a viable Foundry Industry and Scrap Metal Industry.

To determine the importance of a viable Foundry and Scrap Metal Industry in South Africa a macro-economic impact assessment of the current situation in the Foundry and Scrap Metal Industry has been conducted. The main outcome of this analysis is:

- The Foundry and Scrap Metal Industry's total impact on South Africa's GDP is estimated to amount to approximately R24 433 million (constant 2011 prices), of which the direct impact is estimated at R10 917 million, which is almost half of the total impact. This emphasises the importance of the multiplier effects in the macro-economic activity.
- Labour input is a key element of the production process. The study determined the number of employment opportunities currently created in the industry as 535 845 nationally. It is important to note that 462 737 are engaged in the Foundry and Scrap Metal Industry, 15 000 are directly employed by the Foundry and Scrap Metal Industry, and the balance of 447 737 earn an income from collecting scrap and waste of all types. One of the crucial aspects of any macro-economic assessment is determining the personal income distribution characteristics thereof, especially with regard to how low income households will be impacted. The extent to which low-income households are positively affected by the spin offs in the industry, is illustrated by the fact that the impact on low-income households is R2 953 million per annum which translates to 19.0% of the total impact on households' income.
- It is estimated that the positive impact on the Balance of Payments amounts to approximately R10 637 million per annum.
- Total government revenue amounts to approximately R7 054 million per annum.
- In terms of GDP the Foundries contribute the most out of the mentioned role players, contributing R9 048 million per annum. However, in terms of employment, collectors contribute the most, currently with 433 577 jobs. Collector's employment numbers are vastly greater than any other role player in the Foundry and Scrap Metal Industry, where the Collectors income is earned from collecting all types of scrap and waste.

Element 3: Determine the impact that the controlled export of scrap metal will have on the Foundry and Scrap Metal Industry.

One of the developmental intervention scenarios that was analysed in the study was the impact of controlling the volume of exported scrap metal. Two scenarios were developed and analysed to place control over the volume of scrap metal exported. The first scenario made use of direct volume control quotas and the second scenario made use of an export tax in order to control the export volume of scrap metal.

The export quota scenario has a positive effect in terms of financial activity due to its positive effects on the Scrap Metal Industry. In terms of employment it has a significant negative effect of nearly 12 000 jobs (This accounts for the direct jobs only; in terms of the indirect jobs the impact will be much more significant). Using export taxes to control the volume of scrap metal exports have a negative effect on financial activity as well as direct labour.

Element 4: Determine the impacts in the event of a closure of the South African Foundry Industry.

The impact of the South African Foundry Industry was part and parcel of the macro-economic impact of the current situation of the Foundry and Scrap Metal Industry. Using GDP as an indicator, the Foundry Industry's impact on the South African economy is R9.0 billion. The Foundry's direct contribution to national GDP is R2.4 billion. The Foundry Industry contributes about a third of the broader sectors contribution i.e. Foundry's and Scrap Metal Industry.

If employment is concerned, about 49 000 jobs are created directly, indirectly and induced. An important aspect is that most of these jobs are created indirectly and induced revealing the multiplier effects on the economy.

Element 5: Determine the likelihood of success of Government intervention in the Foundry and Scrap Metal Industry.

To answer this element of the scope, the policy considerations that will be addressed are subdivided into two major divisions.

- The first division: "Is there really a need that any intervention should be made?"
- The second division: "What intervention should be taken to optimise the Foundry and Scrap Metal Industry?"

For all the scrap metal groups, namely; Ferrous, Aluminium and Copper Scrap Metal, the answer is quite clear that there really exists a need for Government intervention in the Foundry and Scrap Metal Industry. The exports of scrap metal, where scrap metal forms an integral part of inputs to the Foundry Industry, grew significantly over the past years and it is projected that this will continue in the future. This poses a problem for the future existence of the Foundry Industry.

The development intervention Scenario 5, based on a collection subsidy by Government to the Metal Recyclers, poses the biggest positive impact for Ferrous and Copper scrap metal. However, in terms of Aluminium scrap metal, Scenario 4 also based on a collection subsidy by Government to the Foundries, poses the biggest positive impact. Scenario 5 for Aluminium is the second best development intervention scenario by a small margin. According to the modelling system Scenario 5 could create in the order of 28 000, 1 300 and 5 700 additional jobs in the near future for Ferrous, Aluminium and Copper Scrap Metal, respectively.

2 INTRODUCTION

The Department of Trade and Industry's (the dti) Industrial Policy Action Plan (IPAP) of 2007 and IPAP2 identified the metal industry as a sector vital to sustainable economic and employment growth. This industry is expected to play a major role in supplying the massive infrastructure development programme, launched by the Government to stimulate the local economy, while creating significant numbers of new and sustainable skilled jobs.

The Scrap Metal Industry is an important role player in the supply of feedstock to the Foundry Industry. In its own right the Scrap Metal Industry also makes a significant contribution to the economy, especially with regards to employment creation.

The Foundry Industry, as a major role player within the metal industry, has extensive job creation potential in further beneficiation through processing of castings. In the case of the Foundry Industry, the growing export of scrap metal, which is a major raw material to Foundries, is specifically to be considered since it limits the essential supply of scrap metal to the Foundries and more specifically the reduction of input costs, which is one of the key measures in the policy action plan to support local business. Despite the need to sustain the Foundry Industry and the related downstream industries involved, such as the expanding automotive industry which is a key user of metal products, *inter alia*, the output and employment of the Foundry sector in the metal industry have steadily declined over the past decade or more.

The Employment Promotion program Phase III (EPP), which is funded with international funding and managed and administered by the University of Cape Town, Development Policy Research Unit (DPRU) and which reports to an Industry Reference Group, initiated this study: "EMPLOYMENT PROMOTION PROGRAMME PHASE III (EPP) - FOUNDRY AND SCRAP METAL INDUSTRY ECONOMIC IMPACT STUDY". Conningarth Economists were appointed for the execution of this study. A Project-Industry Reference Group was initiated by Dr Laurraine Lotter who oversees the project, as representative of Business Unity South Africa (BUSA) on the EPP Industry Reference Group. The Project-Industry Reference Group consists of representative members from the metal recycling as well as the scrap metal consuming industry in the South African economy.

The Reference Group met with Conningarth Economists on 20 September 2012 where the project was launched and an inception report agreed upon and accepted as the agreed Terms of Reference for the project. A further progress reporting/ discussion meeting was held on 30 November 2012 where the interim findings, Value Chain Mapping and modelling approach were discussed with the Project-Industry Reference Group. At the meeting, the objectives for the study and scope of work as described below were reaffirmed with the Project-Industry Reference Group. The meetings proved to be beneficial in terms of the quality of the outcome of the study resulting from good comments and inputs from the representatives on the Reference Group.

In the table below the industry organisations representing the Project-Industry Reference Group can be depicted.

Table 17: Project-Industry Reference Group

Industry Body	Representative
Aluminium Federation of South Africa	Mr Mark Krieg (Convenor)
Non Ferrous Metal Industry Association	Mr Bob Stone Mr Willie J Willemse
Institute of Foundry Men	Mr John Davies
Steel and Engineering Industries Federation of South Africa SEIFSA	Mr Henk Langenhoven
Copper Association of South Africa	Mr Evert Swanepoel
Metal Recycles Association of South Africa	Mr Mike Wilson Mr Quintin Starkey Mr Cobus Venter (Econex)

This report is considered as a 'Technical Report'. The main findings and conclusions from the Technical Report can be found summarised in the Management Report for ease of reading.

3 OBJECTIVE, SCOPE AND APPROACH OF WORK

3.1 Objective

The objective of the study was agreed with the Project-Industry Reference Group as follows:

A- That research be undertaken to establish the Value Chains of the Foundry and Scrap Metal Industries, and the need for and potential impact of an intervention/or no intervention in the industry.
B - The focus of the research is the strategic, economic and employment impact of the retention or loss of a Foundry Industry in South Africa.
C - Assessment of the impact of Government intervention to ensure an adequate supply of scrap metal for local users.

3.2 Scope

In general the scope was to determine the potential impact of Government intervention alternatives on the Foundry and Scrap Metal Industry to advance its economic growth and employment creation. The work entailed the development of a model/instrument able to determine the macro-economic impact of the stimulation in terms of the outcomes of various alternative interventions. The model/instrument required was to be able to do the following:

- Analyse the Value Chain of the Foundry Industry.
- Determine the strategic, economic and employment implications of a viable Foundry and Scrap Metal Industry.
- Determine the impact that the controlled export of scrap metal will have on the Foundry and Scrap Metal Industry.
- Determine the impacts in the event of a closure of the South African Foundry Industry.

- Determine the likelihood of success of Government intervention in the Foundry and Scrap Metal Industry.

From the research into the industry, three major components emerged, as follows:

The first component deals with the fact that the SA Foundry Industry is not able to grow satisfactorily. The main problem is probably that it cannot compete internationally in imports, as well as the exports. As stated in the key outcomes required by the Terms of Reference, the analysis of the Value Chain (specifically the direct and indirect inputs) of the Foundry Industry were, therefore, the key to providing answers to these problematic aspects.

Secondly, it became evident from observing the problem, that the major aspect for this sector is the export of scrap metal at the loss of local beneficiation. This does not only pose a problem for the domestic Foundry Industry, but even provides an advantage to international competitors who buy the scrap metal relatively cheap from South Africa and produce final products that compete with South African products. It is, therefore, important that this situation had to be analysed thoroughly, to determine whether it really poses a problem to the industry or whether there are other underlying problems, such as poor management, lack of capital, or quality of labour.

Thirdly, for the Government to intervene in this problematic situation, it was necessary that an analysis be done, which should clearly state whether or not it would be to the advantage of the domestic community at large to intervene. And that in the event of such intervention, the government would be sure to make a net positive contribution to aspects such as economic growth, creation of job opportunities, income distribution and poverty alleviation.

In essence the scope of work was to result in the following four main outcomes (Chapters):

- Nature, magnitude and Value Chain Mapping of the Scrap Metal Industry in relation to the Foundry Industry.
- Overview of the Current macro-economic impact situation of the foundry and Scrap Metal Industry.
- Future Macro-economic Impact of Various Alternative Developmental Intervention Scenarios of the Foundry and Scrap Metal Industry.
- Conclusions, Insights and Guidelines for Policy purposes.

3.3 Methodology

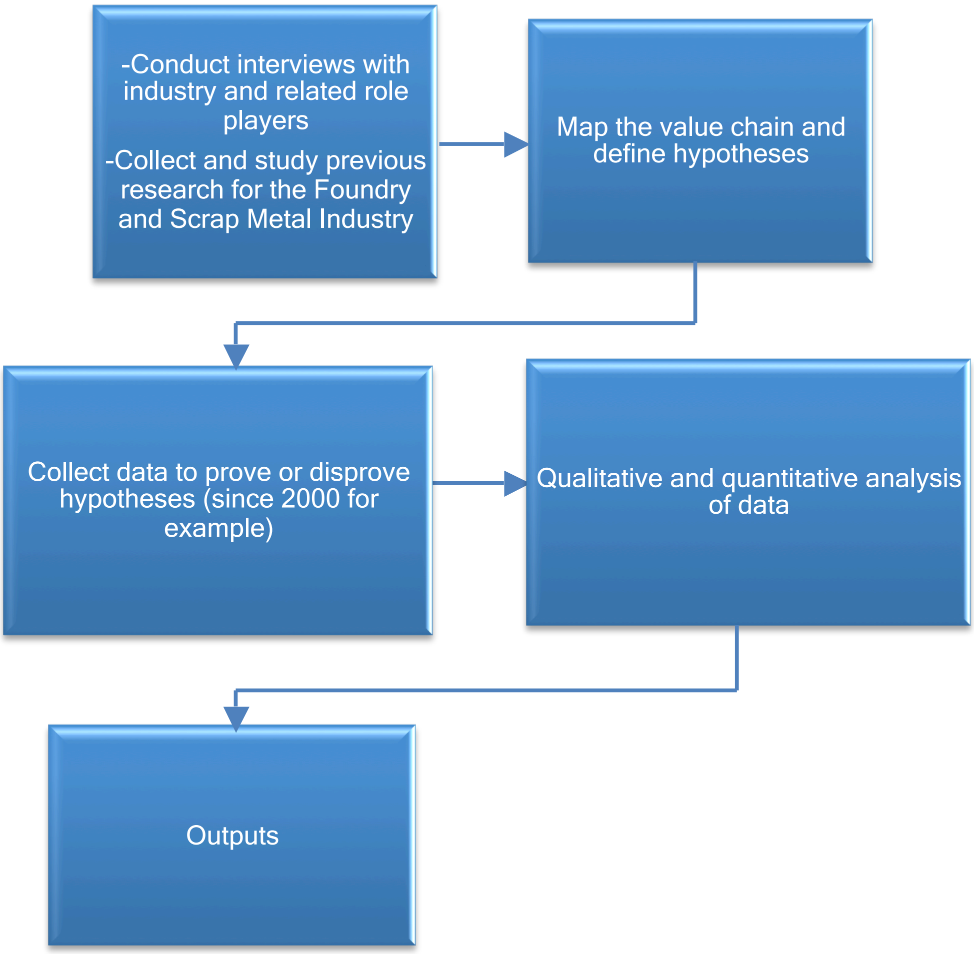
The methodologies for the four outcomes listed above are discussed separately in this section.

3.3.1 Value Chain Mapping and Analysis

It is important to assess the Value Chain of the Foundry and Scrap Metal Industries. This was done by looking at the detailed input/output structures of the Foundry and Scrap Metal Industries, as well as identifying the key factors.

The figure below gives the framework of the methodology that was followed for the Value Chain analysis.

Figure 2: Methodology Framework



3.3.2 Overview of the Current Macro-economic Impact Situation of the Foundry and Scrap Metal Industry

Desktop and field studies were undertaken in order to understand the overall current macro-economic status quo and detailed workings of the Foundry and Scrap Metal Industry. These assisted the research team in understanding the current macro-economic state of the industry in terms of size, relationships and trends (Policy environment, employment, economic growth, production, export and local consumption etc.)

3.3.3 Future Macro-economic Impact of Various Alternative Developmental Intervention Scenarios for the Foundry and Scrap Metal Industry

The first task in assessing the impact of various developmental scenarios of the Foundry and Scrap Metal Industry was to assess the problem posed to the Foundry Industry by the excessive exporting of scrap metal. This was completed through field work, discussion of the industry with the main stakeholders, as well as surveying the main stakeholders of the industry in South Africa.

The second task was the development of price; supply and demand curves for the various role players of the Foundry and Scrap Metal Industry, more specifically the scrap metal recyclers and the Foundries. Two approaches were followed namely:

> The Delphi technique where the specialists in the industry were tasked to determine the correlation between output and demand, and price changes.
>
> Regression analysis was carried out on how the demand and supply of the international market reacts to price changes. This was accomplished by making use of time series analysis. Data was obtained from the U.S. Geological Survey website.

The third task was to analyse various developmental intervention scenarios by making use of the price, supply and demand curves, as well as a macro-economic impact model based on the Social Accounting Matrix (SAM) of South Africa, developed by Conningarth Economists and the Development Bank of Southern Africa (DBSA).

4 NATURE, MAGNITUDE AND VALUE CHAIN MAPPING OF THE SCRAP METAL INDUSTRY IN RELATION TO THE FOUNDRY INDUSTRY

4.1 Nature and Magnitude of the Foundry and Scrap Metal Industry

4.1.1 Nature and Magnitude of the Total Foundry and Scrap Metal Industry - Overview

Scrap metal is an important resource for recycling in downstream beneficiation in industries such as steel producers, smelters, foundries and tubing & wire manufacturing. The most important of the many types of scrap metal are ferrous, aluminium and copper. Further downstream beneficiation includes the manufacturing of various types of capital goods and equipment in various sectors of the local economy.

It has become increasingly important to consider the Foundry and Scrap Metal Industry in terms of its importance to the local economy, by comparing the benefits of its local beneficiation with that of its export as scrap metal. This is necessitated by the insufficient supply of scrap metal to the local Foundry and related Industries, more so in the wake of increasing exports of scrap metal and the declining output of the Foundry Industry.

The study focuses on ferrous metal scrap (including stainless steel), aluminium metal scrap and copper metal scrap (including brass) as a group since it makes up the bulk of metal waste and scrap traded in South Africa, i.e. 96.6 % of all traded waste and scrap.

Table 18: Metal Scrap % of Total Scrap

Fe, Al & Cu Scrap	**R18 836 million**	**96.4%**
Other Waste and scrap	R712 million	3.6%
Dept of SS P57 Waste and Scrap (Supply & Use)	R19 549 million	100.0%

These three scrap metals, namely; Ferrous, Aluminium and Copper are treated and discussed separately as their cost per ton and quantities traded, differ widely. The table below illustrates the different volumes and values.

Table 19: Break Down of the Three Major Scrap Metals

Scrap Metal type	Volume (kton)		Value (R Million)	
Ferrous	3 395	93.7%	11 124	59.1%
Aluminium	107	3.0%	1 391	7.4%
Copper	120	3.3%	6 321	33.6%
	3 623	100.0%	18 836	100.0%

The quantities and values of the beneficiation output and export of scrap metal are summarised in the table below:

Table 20: Scrap Metal Local Beneficiation vs. Export

	Ferrous		Aluminium		Copper		Total	
	Kilo Tons	Rm	Kilo Tons	Rm	Kilo Tons	Rm	Tons	Rm
Use by primary mills[2]	1 500	4 950	-	-	-	-	1 500	4 950
Beneficiation ("Foundries")	480	1 572	66	858	40	2 094	549	4524
Exports	1 420	4 602	41	533	81	4 228	1 542	9 363
Total	3 400	11 124	107	1 391	121	6 322	3 575	18 837

The employment numbers related to the scrap handling industry excluding those in the steel mills are depicted in the table below:

Table 21: Scrap Metal Industry Employment Breakdown

Scrap Metal	Industry	Collectors	Recyclers	Consuming Industry (Beneficiation)	Total
Ferrous	8 500	402 400	14 200	9 600	434 700
Aluminium	200	8 300	300	1 700	10 500
Copper	300	14 300	500	700	15 800
Total	9 000	425 000	15 000	12 000	461 000

4.1.2 Nature and Magnitude of Ferrous Scrap Export

The ferrous scrap historic export figures are given in the table below:

[2] Primary steel mills are not considered in the bulk of this study as the focus is on the other beneficiates of scrap metal.