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New Members

We welcome ALCAN CABLE, USA as Full Member. Returned and most welcome again is PT SUCACO, Indonesia.

NEXANS while hiving off, continues with strong support for ICF. ALCATEL (Fiber Optics) under new management remains Full Member.

NEW PRESIDENT

Dr. Ing. Giuseppe Morchio, having left Pirelli, has also resigned as ICF President. We thank him for the active support he has given to our organisation. ICF Vice President - Future President Dr. Noritaka Kurauchi, Chairman of the Board of SUMITOMO ELECTRIC INDUSTRIES, LTD., has taken over with immediate effect as President Elect.

HIGH TECH 1865

Workers on the telegraph system were equipped with a device to measure quantity (= current) and intensity (=voltage) of electricity. Visible is a compass needle; inside the coils is a similar but opposed compass needle with a tiny weight to keep the pointer vertical when in rest. The front needle shows direction and value if current or voltage is applied to the respective winding.

In that same year J.C. Maxwell published his famous Treatise on Electricity and Magnetism with the conclusion that his theory properly describes light waves.

ICF CONGRESS - Berlin 2001

The Hotel Adlon in Berlin will be the venue for the 11th ICF Congress, October 10-14.

Four topics are now under preparation.

- Network Evolution Energy
- Network Evolution Telecom
- Regional Analysis Europe
- Strategic Materials.



Energy Networks are subject to a number of change factors originating from economics, technology and politics. From these different viewpoints the workshop will aim to explain the drivers and the impact on transmission and distribution networks.

Network Evolution Telecom will revisit the shifts as forecasted by Dr. Nakahara in 1998 now showing steep increase of demand for bandwidth and Internet access. How will optic switching with advanced lasers influence network roll-out and required cable services, in what phase are the networks in distinguished regions, how to judge prospects of xDSL ?

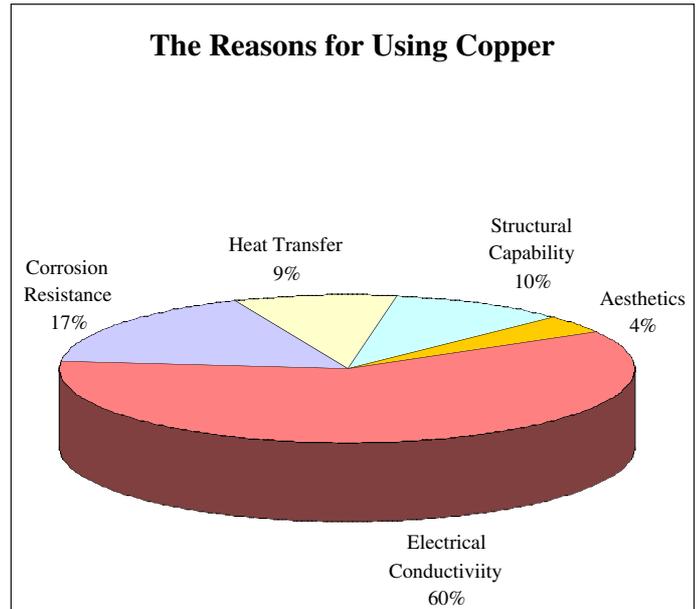
A Regional Analysis for Europe will be based on a survey presently underway in co-operation with Europacable and positive response by our members to the inquiries is highly appreciated. Segmentation will be applied and we expect to visualise the dynamics of change in this region. The data package and graphics will be edited in a separate document to be distributed in Berlin.

The impact of long term trends in costs, availability and shortages for strategic materials such as copper, aluminium, polymers, and maybe fibers, is of basic importance. For metals an in depth analysis revealing the change factors, resulting in a medium term 2 to 3 year outlook is planned. Polymeric materials already had an important impact on the wire and cable industry, shifting the insulation process from batch to continuous. What outlook for polymers can be made in terms of resources, technology, increased refinement for applications ?

Join the Berlin Congress and find replies to such questions and discuss the issues with your ICF business colleagues.

Copper: The Strategic Material

Copper is a key strategic material for the wire and cable industry. In 2000, it constituted nearly 30% of the value of industry net sales. Not only is copper statistically important, its highly volatile pricing makes an understanding of copper market dynamics vital to the running of a successful cable company. The copper market itself is undergoing massive change. In January Phelps Dodge, the world's number two copper producer, signalled its willingness to close temporarily some mining operations in the United States if prices were too low. More recently,



Union Miniere indicated that it will exit the copper business altogether if its rate of return is insufficient. This more aggressive stance on the part of producers and widely divergent views on the current state of copper market fundamentals make this an opportune time to take a look at copper and its markets. In this article, we attempt to shed some light on the structure of copper demand, the mechanisms that determine price and market prospects in the near-to-medium term.

The wire and cable industry constitutes the most important market for copper. We calculate that 52% of all fabricated copper is destined for wire and cable and, as scrap material is used rarely in cable, the industry's share of new copper is much higher (over 60%). This is hardly surprising given that copper's electrical conductivity is the property that counts above all others in determining its use. In all, 60% of copper is fabricated as electrical conductors. Most of this is in wire and cable, but there are also significant tonnages going into copper mill products such as busbar and copper strip for connectors.

In wire and cable, copper has no real substitute across a broad spectrum of its uses, aluminium making serious inroads only in power utility markets and optical fibre mainly being used only in external telecom business. In non-electrical markets, the role of copper is less secure. Characteristics of copper other than electrical conductivity leading to its use are corrosion resistance (17% of the market), heat transfer properties (9%), structural capability (10%) and aesthetics (4%). In many applications a combination of these properties leads to copper use in prefe-

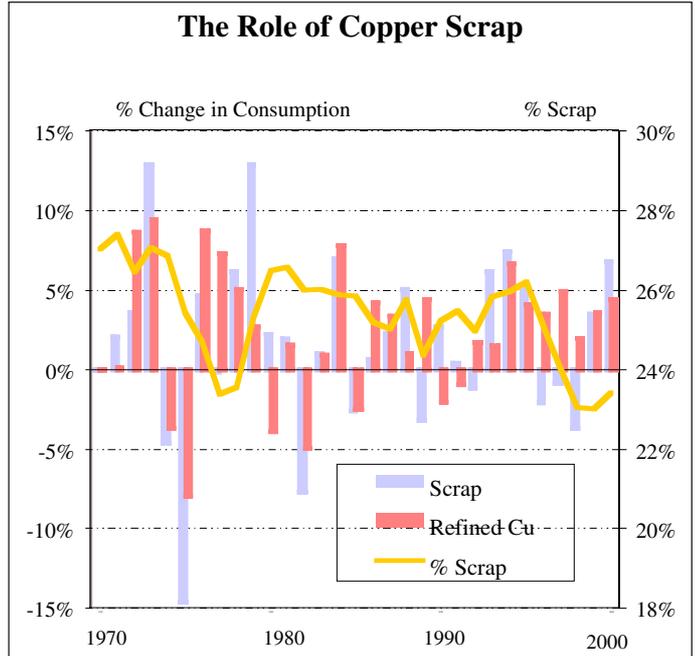


rence to alternative materials such as plastics, steel or aluminium. Copper’s capabilities may be enhanced in combination with other metals in alloys, most commonly with zinc to create brass, known best for its superb machining properties.

Other than wire and cable, copper use is split between copper mill products (20% of copper use) and alloy mill and miscellaneous products (28% of copper use). The most important copper mill product group is tube, where copper’s corrosion resistance, heat transfer and structural properties combine to create a large market in plumbing, air conditioners and refrigeration and (to a lesser extent) industrial applications. The other large copper mill product group is flat products - copper plate, sheet, strip and foil. These products are used in a variety of electrical, construction and industrial applications.

Within the alloy mill and miscellaneous category, we include large markets in rod and bar (used in plumbing, heating and refrigeration, builders’ hardware and general engineering) and flat products (used in heat exchangers, electrical and electronic conductivity applications and industrial markets). Apart from this, copper is used in a diverse array of other products, ranging from alloy wire and tube, to forgings, salts, powders and chemicals. In this group we also include wirerod use in applications other than electrical wire and cable.

Although the products are very different, it is possible to apply a similar framework of end market analysis to copper/alloy products as to the cable industry. Metalica’s work on wire and cable market segmentation shows that cable



applications can be divided into “Premise”, “Network” and “OEM & General” market segments, accounting for 36%, 34% and 30% of consumption respectively. For just copper cable, the share of the network segment is somewhat smaller as both aluminium and optical fibre have a large market share.

Carrying out a similar analysis for all copper consumption, including copper/alloy mill and other products, we find the same three segment groups apply (in this case labelled “Construction” rather than “Premise”, and “Infrastructure” rather than “Network”). There are important differences in the structure of segmentation, however. Slightly more than half of copper/alloy mill and miscellaneous products are used in OEM and general markets, while very little is used in infrastructure. Geographically, copper/alloy product fabrication is rather more concentrated than is the case for wire and cable. It is normal for countries to develop a cable business at an earlier stage of economic development than is the case for copper/alloy mill products, so cable output tends to be more local.

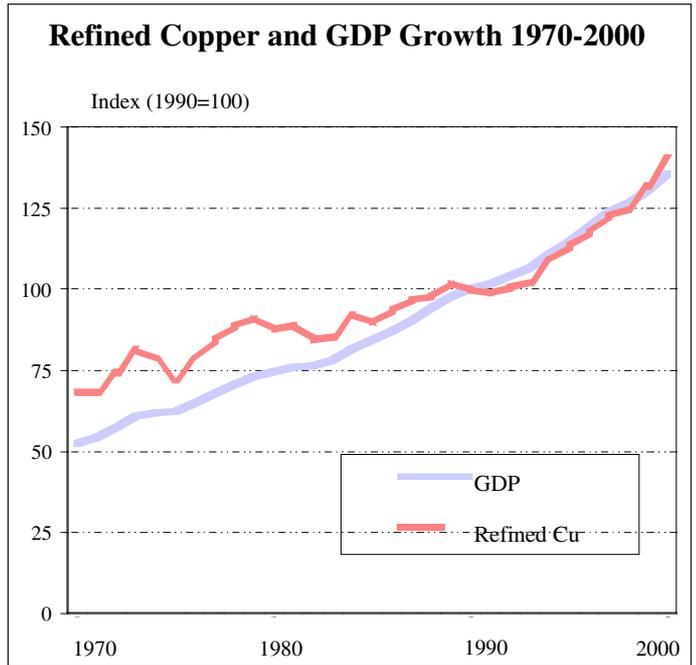
Despite the differences, it is clear that, overall, copper use is well distributed between different product types, end applications and regions. This level of diversity might seem to suggest a stable market in which consumption grows by fairly regular increments from year to year in line with the general economy, as good performance in one market segment is offset by less strong performance elsewhere. Looking at the supply side of the equation, we may also expect to see a fundamentally stable marketpla-

	Wire & Cable	Copper Mill Products	Alloy/Misc. Products
Construction	20%	12%	8%
Infrastructure	13%	1%	1%
OEM	19%	7%	19%

ce in copper. Output of refined copper is well distributed geographically and by company. Even after the acquisition of Cyprus by Phelps Dodge and Asarco by Grupo Mexico late in 1999, the top five producers still account for only 34% of global production of refined copper. A long lead time of three years or more from the discovery of copper deposits to first mine output or from smelter/refinery project initiation to cathode production coupled with stable output during the long lifespan of most production units might suggest a market where annual output change is fairly modest and predictable. The interaction between the refined copper and scrap should also work as a force for stability. Scrap, used as an alternative to mined product (concentrates) in copper production and to refined copper (cathode) in fabrication, tends to become more readily available when refined copper supply is short, as copper prices are high. Thus, any shortage of primary metal is offset both by additional scrap-based refined production and also by a reduced demand for refined metal due to substitution by scrap.

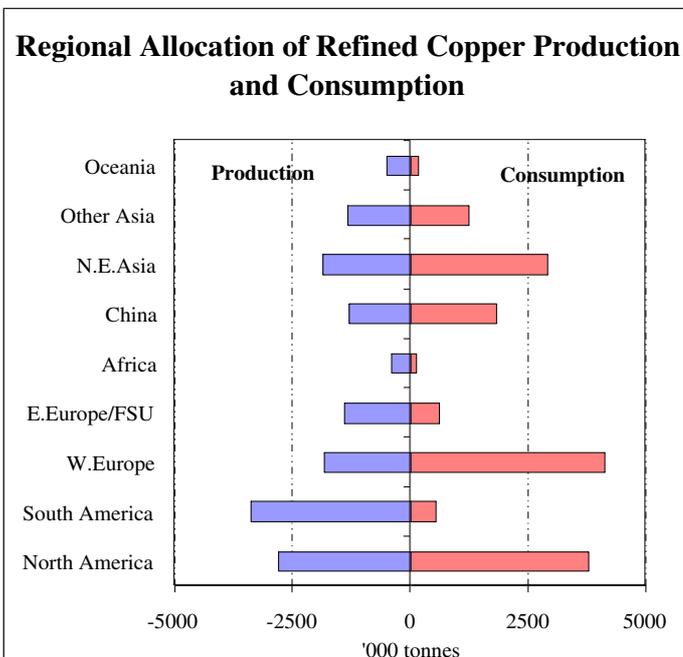
With this market structure, we may ask why copper prices are so unstable and so difficult to forecast accurately. We can get near to an answer to this by taking a closer look at market fundamentals, or the relationship between supply and demand. To really understand copper market dynamics, however, we must also take account of market manipulation. We shall take a look at both, in turn.

Looking first at consumption, it appears that purchases of copper are nothing like as stable as one might first



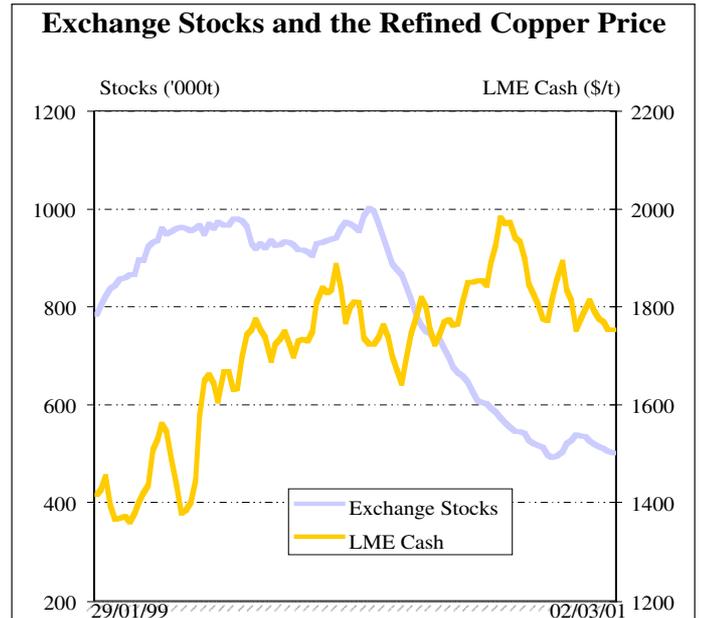
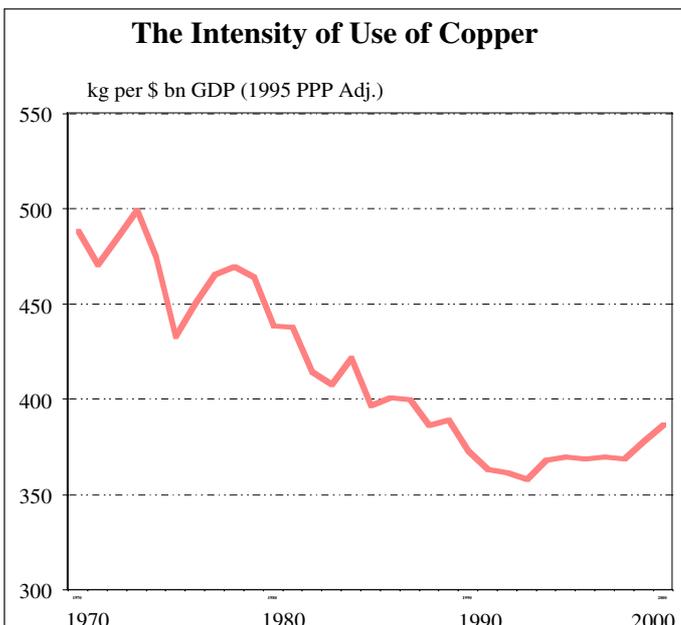
expect. Over the past decade we have seen annual variations in consumption growth ranging from -0.9% (1991) to +7.4% (2000). Over the same period, the amplitude of variation in global economic growth (+1.7% to +4.1%) was much more modest. The reason for this lies partly in the structure of copper consumption. Around 40% of all copper use is related to building construction; the construction industry tends to be much more volatile than the underlying economy. The other large slice of copper consumption, in the OEM and general market, can be equally volatile. Insofar as OEM markets relate to discretionary consumer spending on items such as automobiles or domestic appliances, or to discretionary capital investment by business, the end markets for copper can be greatly influenced by fairly minor changes in the economic climate. Perhaps more important, any change in the market for copper products is magnified by inventory adjustment. As the end market improves, consumers add to their copper purchases in anticipation of a larger sales volume in the future, the reverse happens in a declining market. In OEM business, inventory adjustment takes place at each stage in the supply chain so that copper, which may be several process stages removed from the end product, is faced with a much-amplified inventory adjustment effect.

Like consumption, the supply of copper is by no means as stable or predictable as one may think that it should be. The real surprises usually come on the down side. Labour disputes, political unrest, floods, smelter explosions and



other technical difficulties all play their part in disrupting production at individual facilities. A combination of minor disruptions can have a major impact on the copper market, while major curtailments to production individually can have a dramatic influence on the market. The high price of copper from the late 1980s into the early 1990s owed much to the closure of Bougainville copper mine in Papua New Guinea due to rebel activity and the collapse of production in the African Copper Belt as the region sank into political and economic chaos.

Even if copper production were to run more smoothly, it is probable that it would fail to match consumption closely. Increases in production result from investment decisions made some time previously, based on current estimates of future demand. In the short-to-medium term, future consumption needs are far from predictable. Even long-term trends can be misread by the investment community. Over past decades, the copper industry got used to long-term market growth that at best matched the global economy, often performing much worse than this. In the early 1990s the intensity of use of copper measured against GDP stabilised, even improving slightly, as the impact as substitution of copper by aluminium, downsizing of components, the one-off collapse of the former Eastern Bloc and structural inventory drawdown were taken out of the equation. The industry has begun to accept that refined copper market growth may slightly exceed that in GDP, achieving 3.0-3.5% p.a. It has not yet accepted as more than a temporary phenomenon the surge in copper consumption growth rates relative to GDP that has taken place since 1997. Over the



past three years GDP growth has averaged 3.1% p.a., refined copper consumption 4.5% p.a., suggesting a long-term growth rate at least 1% p.a. higher than that previously expected. The reasons for and likely longevity of the current boom in the intensity of use of copper are being examined in the Metalica/SHSS multi-client study „Copper in the New Economy” (to be published mid-year). Whatever the conclusions, we are already seeing a copper project list that is inadequate to meet the needs of the market.

Any misreading of the prospects for consumption by the copper industry can have a quite dramatic influence on price. Although the mismatch between refined copper output and consumption rarely accounts for more than 3% of market volume in any one year, the direction of the mismatch - whether the market is in surplus or in deficit - is critical in determining price. Copper is a freely traded commodity, moving easily from one owner to the next. This being the case, a shortage of metal can create a real fear amongst consumers that they will be the ones left without any copper with which to run their factories. They are, therefore, prepared to bid the price upwards. Though the producer's fear that he may be unable to place his metal in an over-supplied market is not as great, still the price uncertainty faced by those that are left to put their metal on the terminal market (LME, Comex and Shanghai exchanges) in a surplus market has a dampening effect on price.

A surplus or deficit affects price primarily through its influence on available stocks. At present, prices remain quite low (at around \$1800/t) despite the market deficit as sufficient stocks remain available to dispel any possible fear



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of scarcity. Similarly, a surplus is not particularly relevant if insufficient available stocks are present to easily satisfy consumer needs. Thus, stocks play a pivotal role in the determination of price.

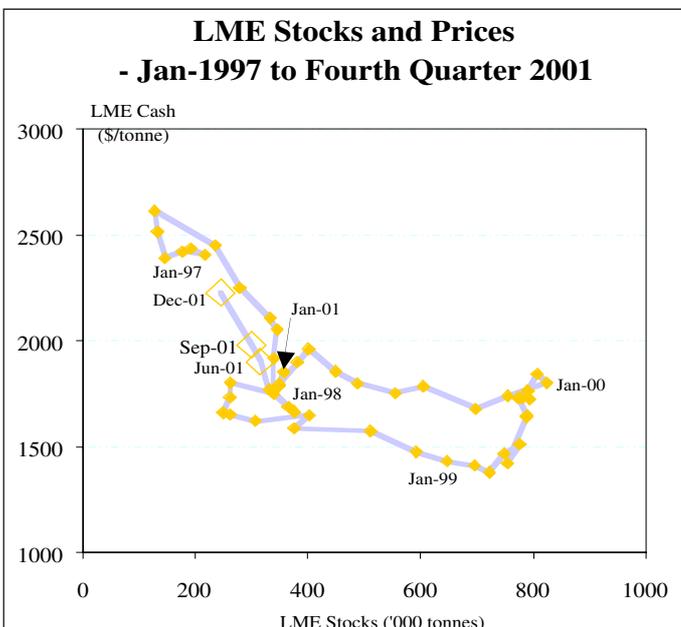
Perceptions of exactly what is meant by stocks vary. The only really concrete figures relate to exchange stocks, mostly held in LME warehouses. In theory, these are also the most liquid stocks. Other stocks of metal, commonly ignored but also potentially available for consumption, are held by copper producers, consumers, traders and some are also in transit at any given time. These non-exchange stocks constitute a large amount of copper. At the end of 2000, for example, BME estimates that there was 2.2Mt of non-exchange copper stock against only 0.5Mt on the exchanges.

The dichotomy between the “visible” stocks on the exchanges and “invisible” stock off the exchanges forms the basis of one of the most common forms of market manipulation. When exchange stocks are quite low, it is possible to make the market appear to be tighter than is actually the case by moving metal off-warrant from the exchange warehouse to a location where it is less visible, such as another bonded warehouse or consumer yard. Similarly, metal that may otherwise have been placed on to the exchanges may be withheld in order to help create an apparent scarcity. Large volume movements off, or equally onto, the exchanges can thus be used to create the illusion that the balance between supply and demand in the physical market is changing, thus altering the pricing environment for copper.

Exchange stocks may be manipulated more subtly than by the actual movement of metal on or off exchange. When the market is tight, it is not uncommon for a large proportion of the copper sitting in warehouses to be owned by one or a few parties and for this quantity to be known to be „tightly held” (i.e. the warrants are not for sale). This, again, creates an artificial scarcity of copper. Another ploy is to place exchange stocks in warehouses far removed from the point of consumption. Although this does not actually reduce the amount of copper available, it does help to persuade consumers to pay more to achieve a certain supply of copper, either through a higher base price or local spot premia. The most obvious example of the placing of copper away from the consumer is the use of the US West Coast LME warehouses in Los Angeles and Long Beach that, through much of 1997 and 1998, held significantly more than half of all LME stocks. This copper was the metal of last resort, costing 3-4c/lb in out-charges and freight above Comex plus local premium to even US MidWest customers wishing to gain access to it.

Other forms of price manipulation involve purely paper transactions rather than the physical control of metal. Financial instruments are available that allow market participants to gain or lose money based on the accuracy of their view on the future price of copper. Intended initially to facilitate a „hedge” to minimise price risk relating to a future physical position in copper, such instruments are now more often used independently of any physical position by parties that have no direct interest in the physical market. In the short term, the price of copper can depend as much on whether these financial interests are “long of copper” (being net purchasers of forward metal and thus bolstering price) or whether they are “shorting the market” (by being net sellers) as on the fundamentals of the physical market.

The potential for financial gain for those prepared to gamble on the copper price is enormous, as prices fluctuate within a very broad range. At the lower end, copper prices are limited to that necessary to persuade producers to supply enough copper to meet consumer needs. This price is commonly taken to be the maximum cash cost of production applying to most of the copper industry. (It is assumed that a small proportion of output (say 10-25%) can be uneconomic in the short-to-medium term, even on a cash basis, as non-economic considerations and the direct costs involved in closure lead some uneconomic facilities to remain open.) Before the recent increase in





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energy costs, the minimum sustainable price of copper was taken to be 65-70c/lb (\$1450-1550/t). At the upper end of the spectrum, there is no such clear theoretical limit to price. Copper prices can increase to the point where consumers are prepared to pay no more. As, in the short term, demand for copper-containing products is inelastic, initial purchasers of copper are able to pass on virtually all of a substantial price rises to their customers. Because of this market structure, copper price spikes in a tight market are two or three times as high as the minimum base level price. While it may take several years for the copper market to go from peak to trough, large fluctuations of 30-40% may be achieved in a matter of weeks given the right market conditions, offering ample opportunity for a quick profit to be made by market speculators. The involvement of purely financial interests in the copper business makes the interpretation of the market much more difficult than it would otherwise be. In theory, ample measures exist for judging the state of the physical market and, also in theory, this should give a good indication of price prospects. Exchange stock figures are published. All else being equal, a rise or fall in exchange stocks would indicate a real change in the balance between supply and demand. Although the LME has improved the standard of its reporting, now providing daily stock figures, an indication of the concentration of ownership and the amount due to be taken out of the warehouses, this does not get over the fact that exchange stock change can be a false indicator of the underlying market. The structure of the forward price curve should give another guide to the trend in

market fundamentals, while regional spot premia should give some insight into local market conditions were these indicators not also distorted by market manipulation.

Given the inaccuracy of the easily available market indicators, many turn to close market observers such as BME, CRU or Brook Hunt for their interpretation of the facts. Here is BME's view of the current market. According to BME, we are now experiencing a copper market waiting for some firm signal to spark an upward price move. Prices failed to increase substantially in 2000 or the early part of 2001, despite the fact that there was a deficit throughout.

What worries the market is whether there really was a large deficit in 2000 and, in 2001, and if the slowdown in the global economy is going to have a more serious impact on copper consumption than most analysts forecast. BME acknowledges some concern over last year's deficit, which certainly was not as large as suggested by the 430,000 tonne drawdown in LME stock over the course of the year. Clearly, some copper found its way into non-exchange warehouses in the latter half of 2000, much of which is thought to be in China. We are now seeing the sporadic release of this metal on to the exchanges, with an inevitable dampening effect on price. Once the over-hang of non-exchange stock is removed, consumption growth should be sufficient to bring about a renewed drawdown in exchange stocks. BME forecasts a fairly modest 2.1% refined copper consumption growth in 2001, incorporating in its view an absolute decline in the United States and Japan. This consumption trend would

Refined Copper Balance, Stocks and Prices -BME Forecasts ('000 tonnes)

	1999	% Ch	2000				% Ch	2001				% Ch		
	Yr	99/98	Q1	Q2	Q3	Q4	Yr	00/99	Q1	Q2	Q3	Q4	Yr	01/00
Prices														
LME Cash (\$/t)	1572	-4.9	1794	1739	1872	1848	1813	15.3	1780	1875	1975	2200	1958	8.0
Refined Copper Balance														
Refined Production	14439	2.6	3710	3730	3703	3805	14948	3.5	3825	3830	3821	3860	15336	2.6
Refined Consumption	14283	5.5	3726	3969	3809	3843	15347	7.4	3810	4021	3900	3966	15697	2.3
Balance	156	<i>n/a</i>	-16	-239	-106	-38	-399	<i>n/a</i>	15	-191	-79	-106	-361	<i>n/a</i>
Refined Copper Stocks														
LME	790	33.4	755	553	402	357	357	-54.8	370	315	300	245	245	-31.4
Other Exchanges	146	-13.1	164	143	155	164	164	12.3	170	140	125	100	100	-39.0
Producer/Consumer St.	795	-1.2	820	825	815	800	800	0.6	780	760	745	710	710	-11.3
Transit Stocks	584	3.7	455	459	532	545	545	-6.7	566	495	506	525	525	-3.7
Trader/Other Stocks	509	22.0	465	399	492	480	480	-5.7	491	370	366	380	380	-20.8
Total Stocks	3090	8.0	3074	2835	2729	2691	2691	-12.9	2706	2515	2436	2330	2330	-13.4



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keep the copper market in deficit, whatever the view taken on copper output.

At the time of writing (March 9th), output growth is the area of greatest uncertainty in our forecasts. In January, Phelps Dodge announced that it would notify workers at three of its US mines of the possibility of production curtailments, with a final notification of action scheduled for March 26th at the latest. The mines have a combined output of 305,000tpy. The announcement was taken by analysts to mean the probable temporary closure of at least two of the listed mines; this is assumed by BME. While we see the most likely case as being one of substantial market deficit in 2001, therefore, we still await news from Phelps Dodge. If production follows the path that we expect, exchange stocks should fall to around 350,000 tonnes by the end of 2001, a zone within which the market becomes susceptible to upward price pressure. BME forecasts an average LME cash price of \$2200/t (100c/lb) in the final quarter of 2001, \$1960/t (89c/lb) for the year as a whole.

News in Brief

(provided by Metalica, UK)

Results of Europe's Cablemakers: Europe's cable producers have recorded strong results in 2000. **Pirelli's** cable business sales rose 23% to Euro 4.53 billion; its group operating profit rose 31% to Euro 0.43 billion. **Nexans** reported 14% sales growth to Euro 4.78 billion, a rise of 5% on a copper adjusted basis. Net income was up by 22%, at Euro 0.17 billion. **Draka** reported a 56% leap in sales, of which 12% was organic, to reach Euro 1.73 billion. Its operating profit was Euro 0.15 billion, up 52%, **United States Major Cablemakers Post Modest Results:** For 2000, **Superior Telecom Inc.** recorded a marginal gain in sales to reach US\$2.05 billion. Proforma earnings were down by 56% at US\$27.5 million; after the inclusion of non-recurring charges and goodwill amortization Superior recorded a marginal net loss. **General Cable** reported a 29% gain in metal adjusted sales, of which 9% was organic, to reach US\$2.31 billion. Net income on the same basis was up 15% at \$46.8 million, but this income was overshadowed by a net loss of US\$73.2 million on divested business.

In January, **Lucent** posted a \$1 billion first quarter loss and announced a proposed 10% cut in its workforce, or

10,000 jobs, taking a restructuring charge of \$1.6 billion. In February, Lucent achieved \$6.5 billion in refinancing. Under the agreement made, Lucent has promised bankers that this year's losses will not exceed \$2,35 billion. Lucent had already announced the sale of **Agere Systems**, its chips and optical components subsidiary, to help meet its targets.

In order to refocus on mining **Phelps Dodge** has announced that **Phelps Dodge Wire & Cable (PDWC)** and its carbon black business, the components of PD's non-mining subsidiary **Phelps Dodge Industries (PDI)**, are for sale. The PDWC sale will include winding wire and speciality wire business in North America and international cable subsidiaries in South America, Thailand, the Philippines and China.

Corning Tempers Growth Plans: Due to reduced customer orders expectations, **Corning Inc.** has reduced its annual growth forecast for photonic components from 70-80% to 50%. Corning has cut 354 temporary and 825 salaried staff positions at its components subsidiaries. It has also announced that it is to delay the opening of its new \$445 million components plant in Nashua, New Hampshire, originally scheduled for October.

Moves at General Cable: **General Cable** is to sell its mineral insulated cable subsidiary **Pyrotenax** to **Raychem HTS**, a **Tyco** company. Pyrotenax has plants in the United Kingdom and Canada. General Cable has also announced the formation of a 50-50 joint venture with **Sterlite Optical Technologies** of India. The new company will purchase optical fibre from Sterlite in India for manufacture into cable in the United States.

Ongoing Rationalisation in Japan: **Showa Electric** and **Fujikura** have announced that they are to form a new company to merge their winding wire activities in Japan, 55% owned by Showa, 45% by Fujikura. Meanwhile **Hitachi Cable** and **Sumitomo Electric** have reassessed their planned co-operation, now reviewing a comprehensive tie-up in HV power cable in a new 50-50 joint venture.

The ICF Newsletter is published several times each year by The **International Cablemakers Federation**, P.O.Box 26, A-1014 Vienna

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