

# Trends in the Omega-3 Market

September 23, 2013

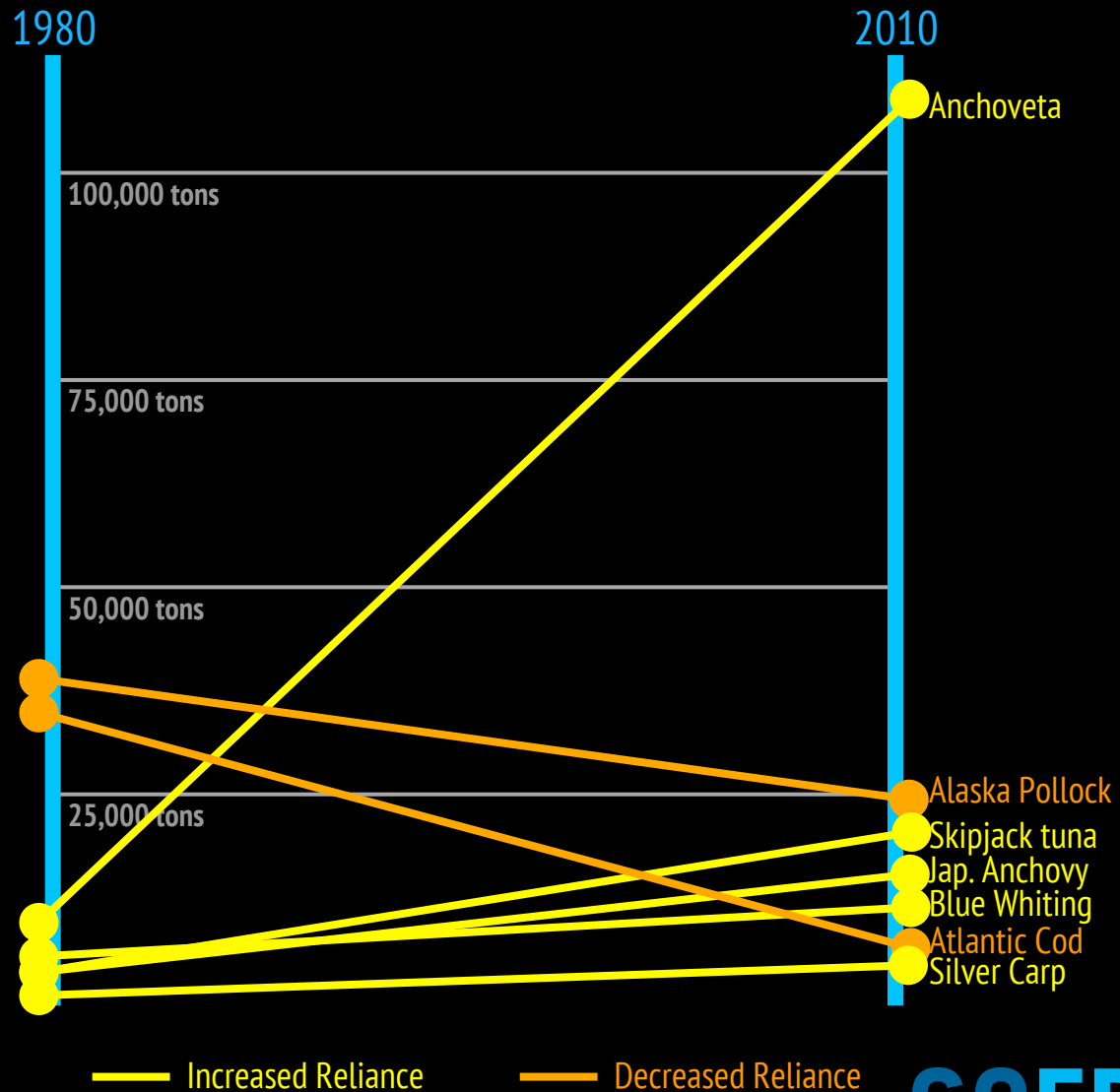
**GOED**  
**OMEGA-3**

**Let's look at the supply side of the market first.**

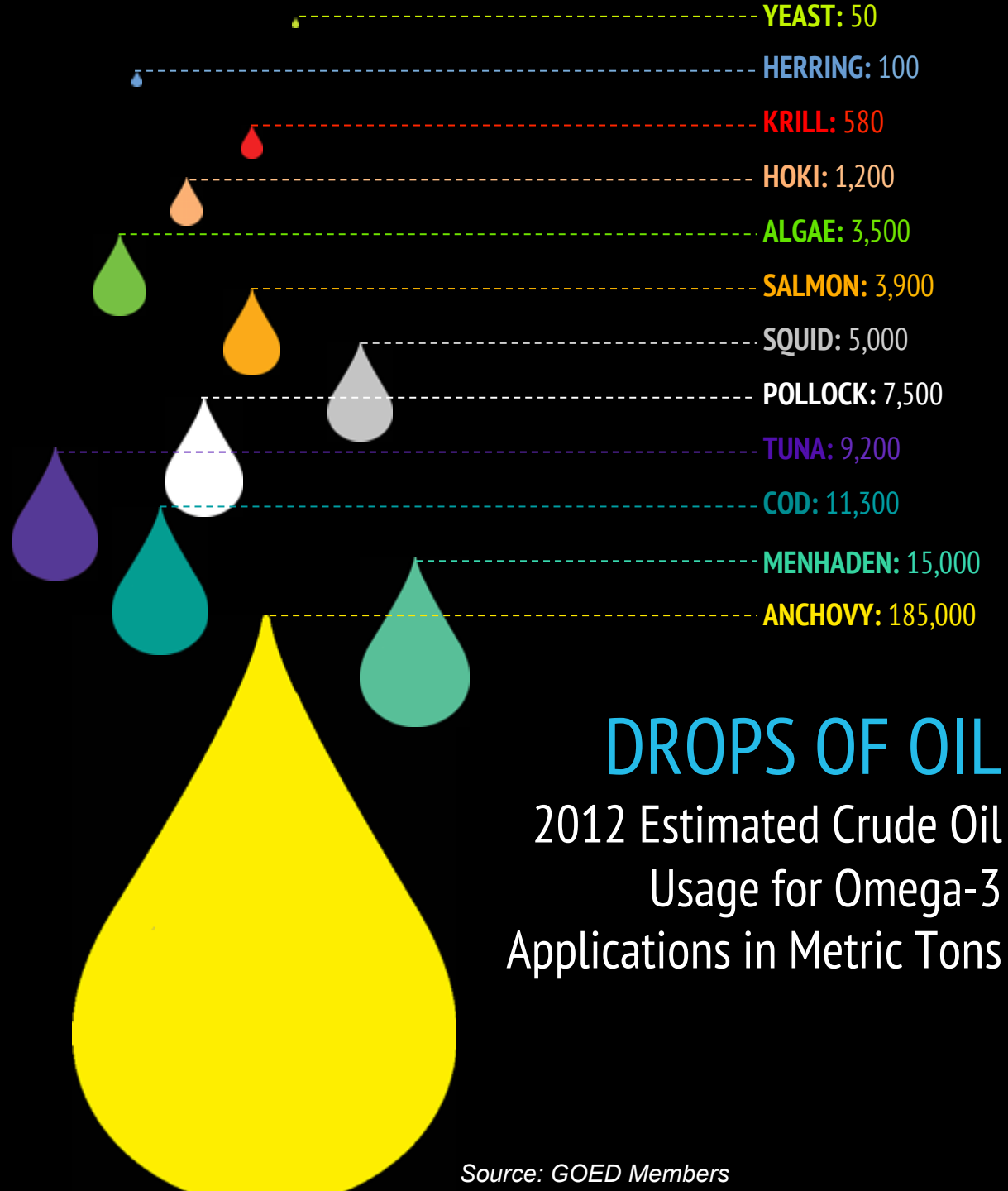
Sustainability and availability of oils are big issues with marine oil supply.

We know that fishery capacity of EPA and DHA is already changing and that we are more reliant on fewer fisheries for these nutrients, the anchoveta fishery in particular.

### 30-Year Change in EPA and DHA Capacities of Leading Fisheries



Source: GOED analysis of FAO and USDA data

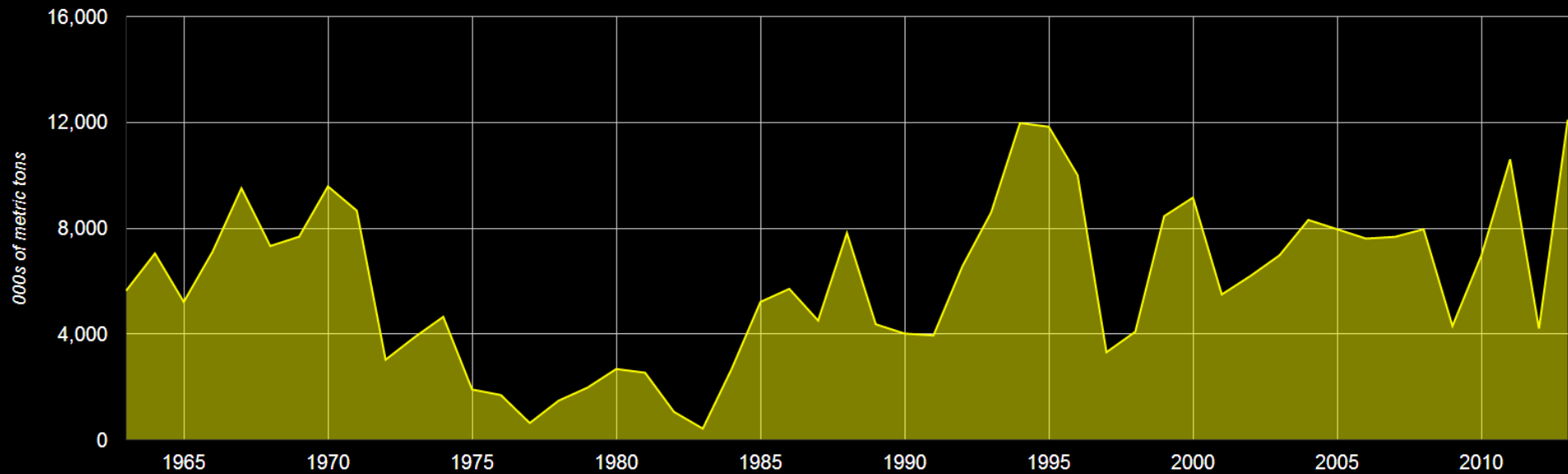


It is no secret that understanding of omega-3 supply trends is tied intimately to the anchovy fisheries

Source: GOED Members

The Peruvian Anchoveta fishery has suffered in the past from poor management, but has recovered due to successful, aggressive action

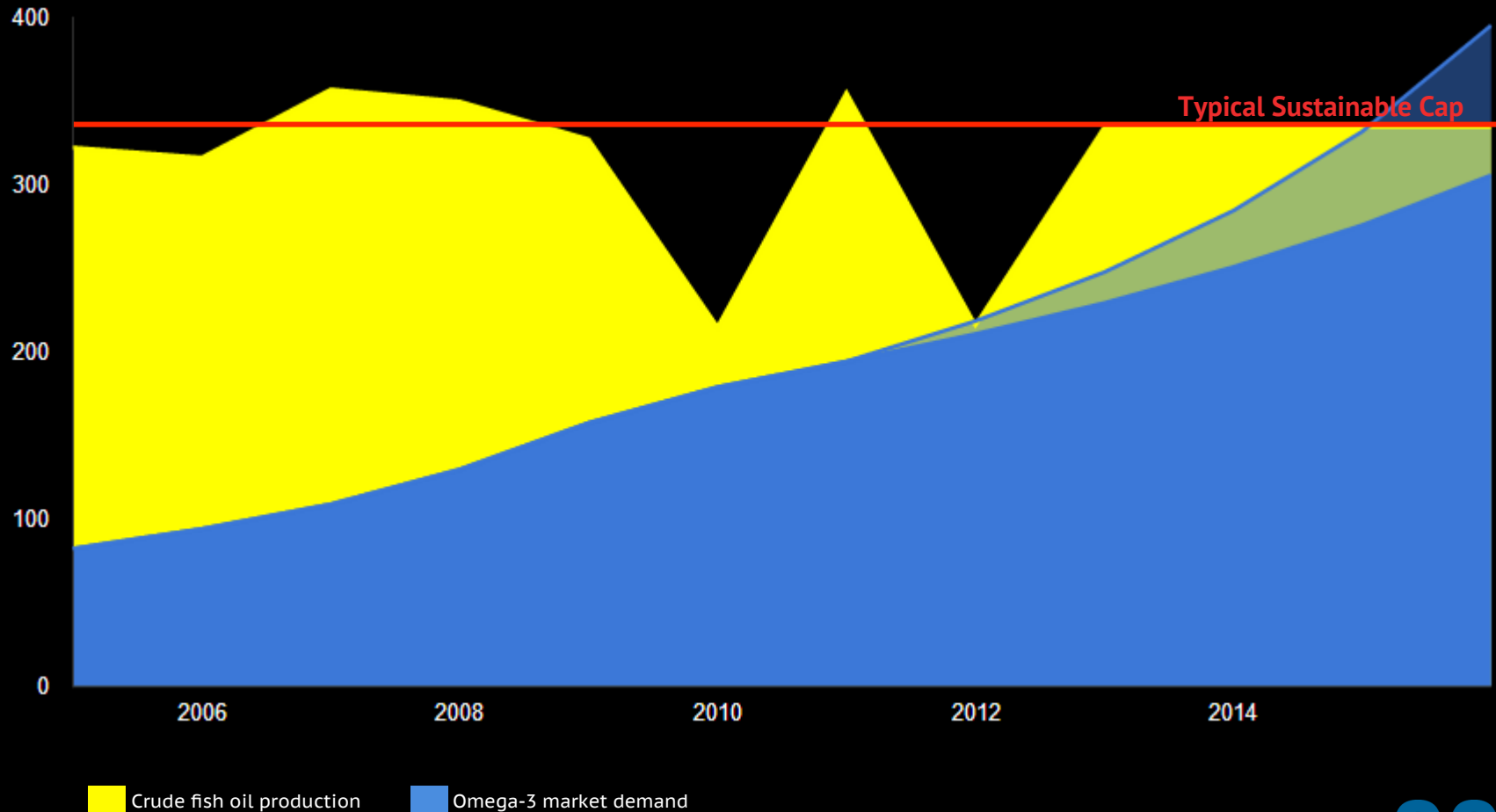
### Spawning Biomass of Peruvian Anchoveta, 1963-2013



We have presented data in the past on an impending supply shift as a result of demand increasing beyond the anchovy capacity

## Crude Anchovy Fish Oil Production and Omega-3 Market Demand

(in 000s of metric tons)



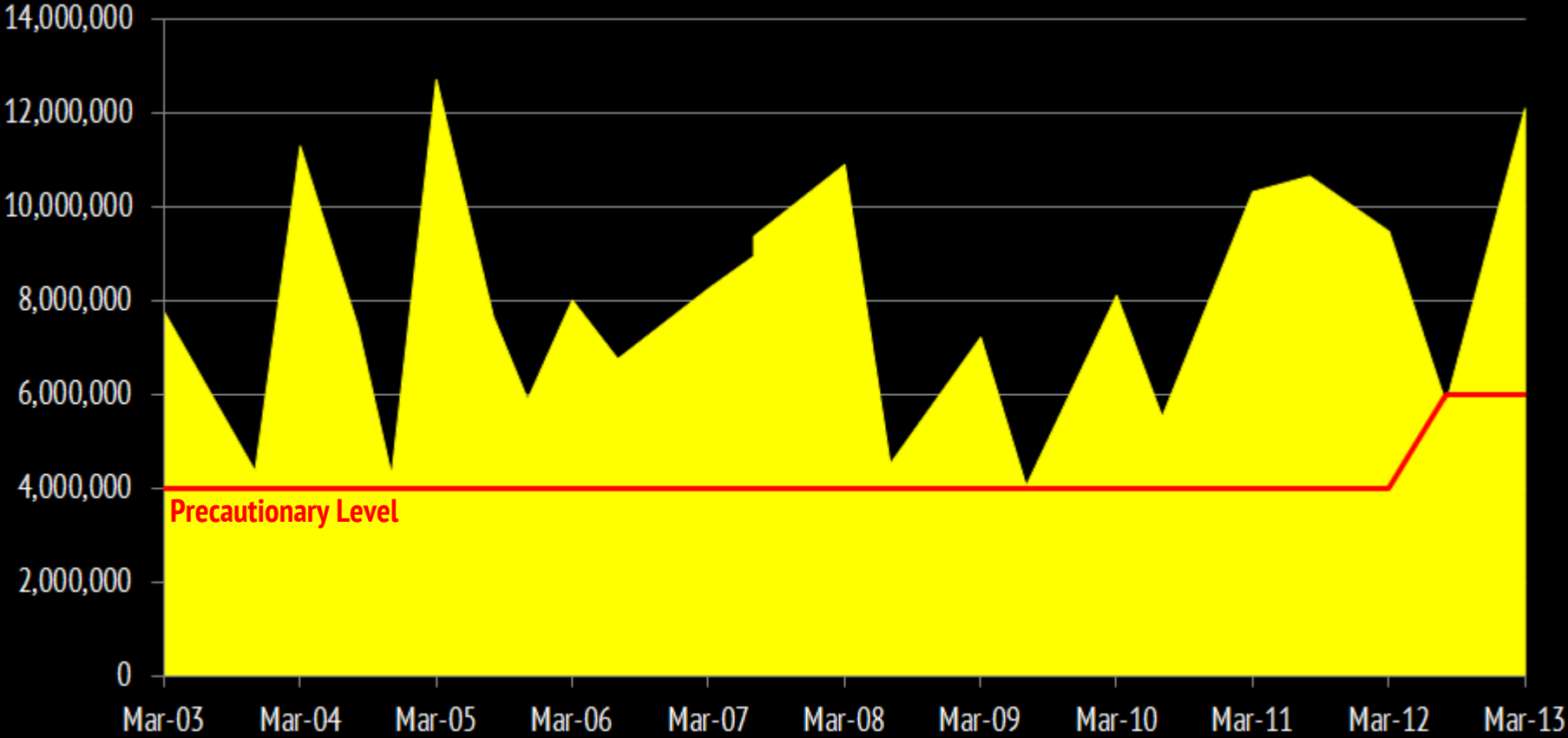
**This is not a sustainability issue though.**

This is the result of sustainable management of the fishery and growing demand for its products.

Since trigger levels have been introduced, the anchovy fishery has never fallen below them...and the triggers are even stricter now

### Peruvian Anchoveta Biomass

(in metric tons)



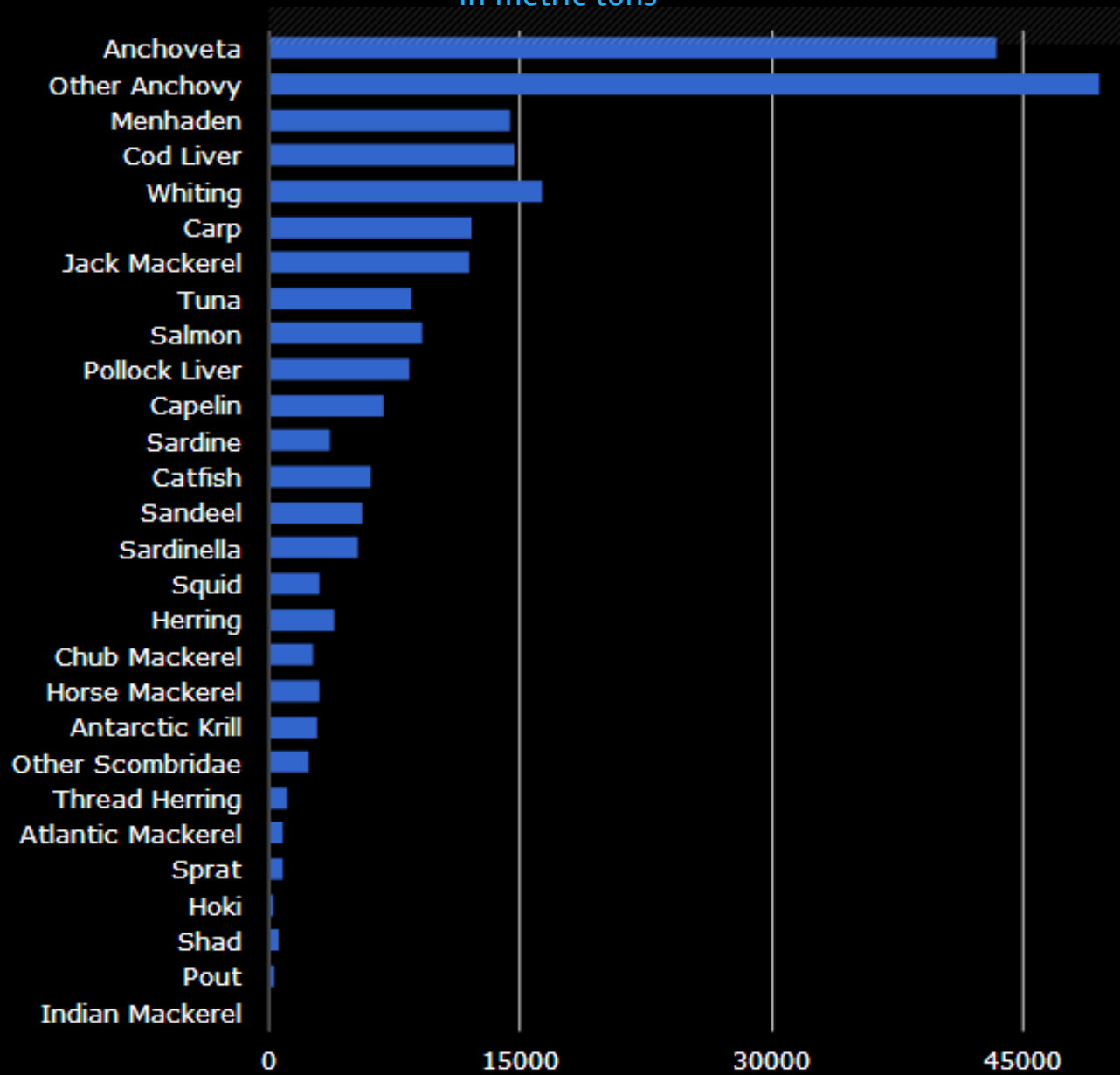
Source: IMARPE





# Available EPA and DHA Capacity from Selected Fisheries

in metric tons



Many other fisheries can supply enough EPA and DHA to be attractive to the right omega-3 customers now, and we expect to see more of these oils

## Fish



Anchovy  
Sardine  
Mackerel  
Tuna  
Cod  
Salmon  
Menhaden  
Trout  
Pollock  
Hoki  
Halibut  
Sandeel  
Angelfish  
Saithe

## Squid



Market Squid  
Shortfin Squid

## Zooplankton



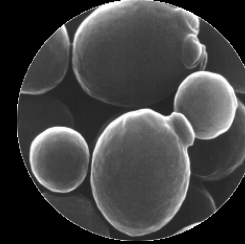
Antarctic Krill  
Pacific Krill  
Northern Krill  
Calanus  
Shrimp

## Algae



Schizochytrium  
Cryptocodinium  
Euglena  
Nannochloropsis  
Phaeodactylum  
Nitzschia alba  
Aurantiochytrium

## Fungi



Y. Lipolytica  
M. alpina  
Sap. diclina  
Sac. kluyveri  
C. elegans

## GM Plants



Soybeans  
Rapeseed  
Brassica  
Linseed  
Rockcross

The list of omega-3 sources, both commercial and in research, is getting longer with new algae, new fish and new zooplankton projects having been announced in the last six months

Krill



Salmon Roe



Herring Roe



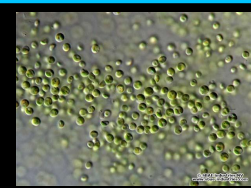
Egg Yolk



Sandeel



Nannochloropsis



## Phospholipid Path

**New sources being launched will compete with anchovy oils.**

Each of these new sources is launching with their own unique value proposition to differentiate from the dominant anchovy.

Shrimp



Nannochloropsis



Squid



Soy SDA



## Triglyceride Path

**We also need to find new sources of EPA and DHA outside of the marine environment to close the broader gap and relieve pressure on fisheries.**

Fermentation



- Commercially producing DHA today
- High cost of capital
- Uses sugars as energy sources

Open-Air



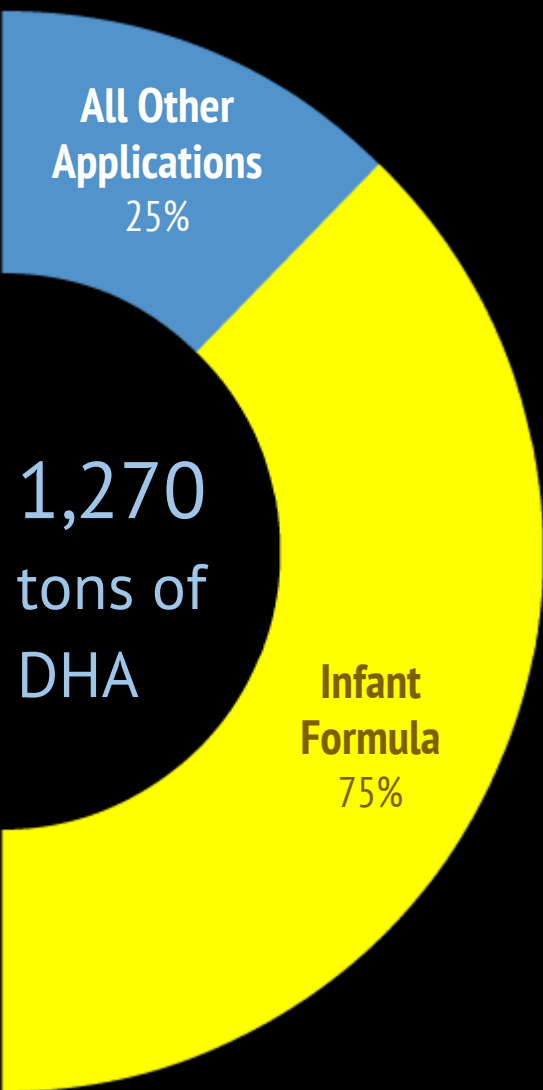
- Limited production of EPA today
- High cost of capital
- Uses sunlight as energy source

Photobioreactor



- No commercial production today
- High cost of capital
- Uses sunlight as energy source

Algal sources of omega-3s are being researched in three predominant types of production systems



Most algal DHA is going into infant formulas and provides less than 0.2% of the world's omega-3 nutrition needs today.

**What is the potential of **algae** to fill demand that the oceans cannot provide?**

It will depend on the economies of scale that these companies can achieve in order to displace their higher capital costs.

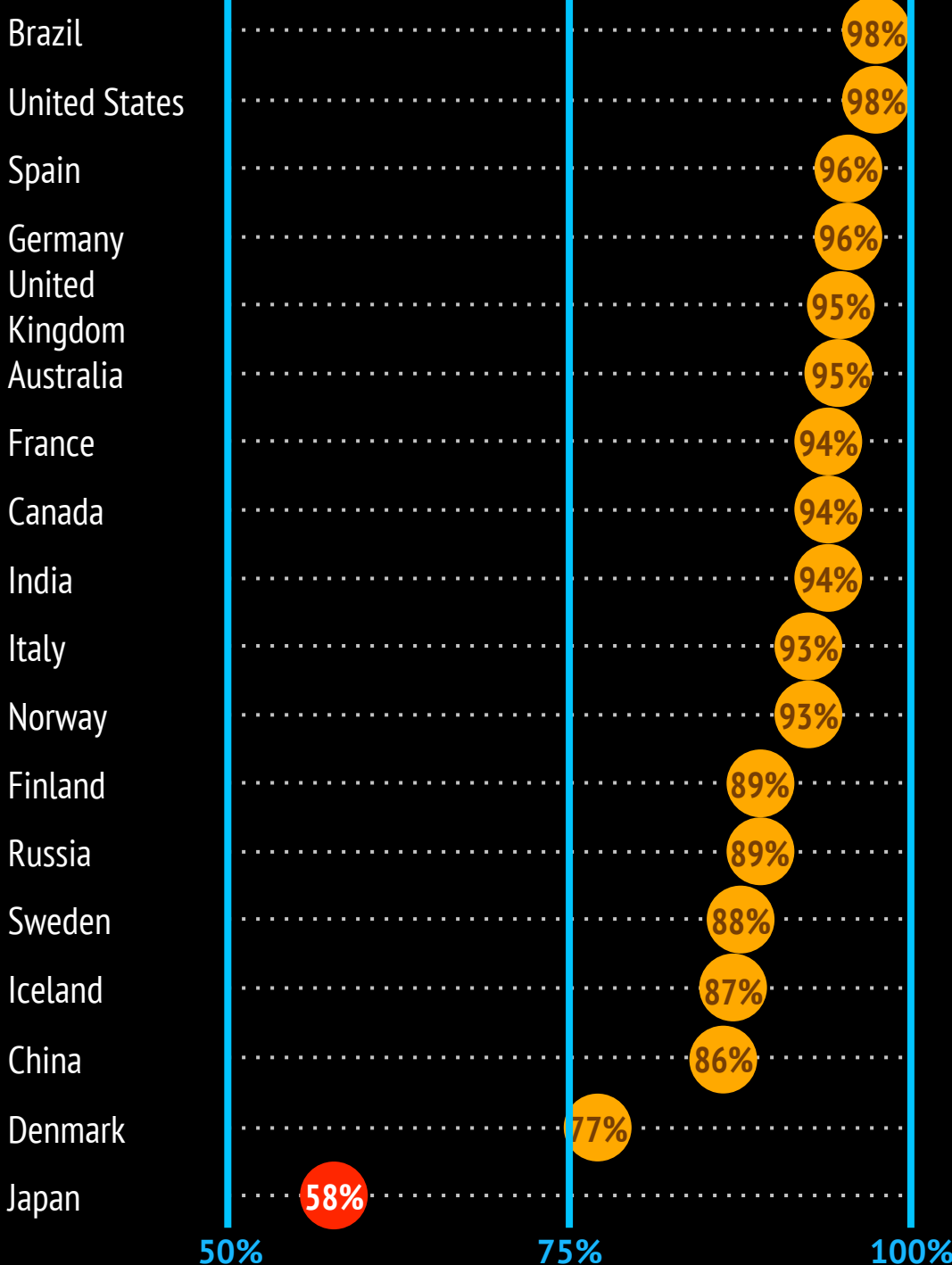
**Now let's look at consumers.**



# \$25.4

# Billion

Estimated Global Consumer Spending on Products  
Containing EPA/DHA Oils



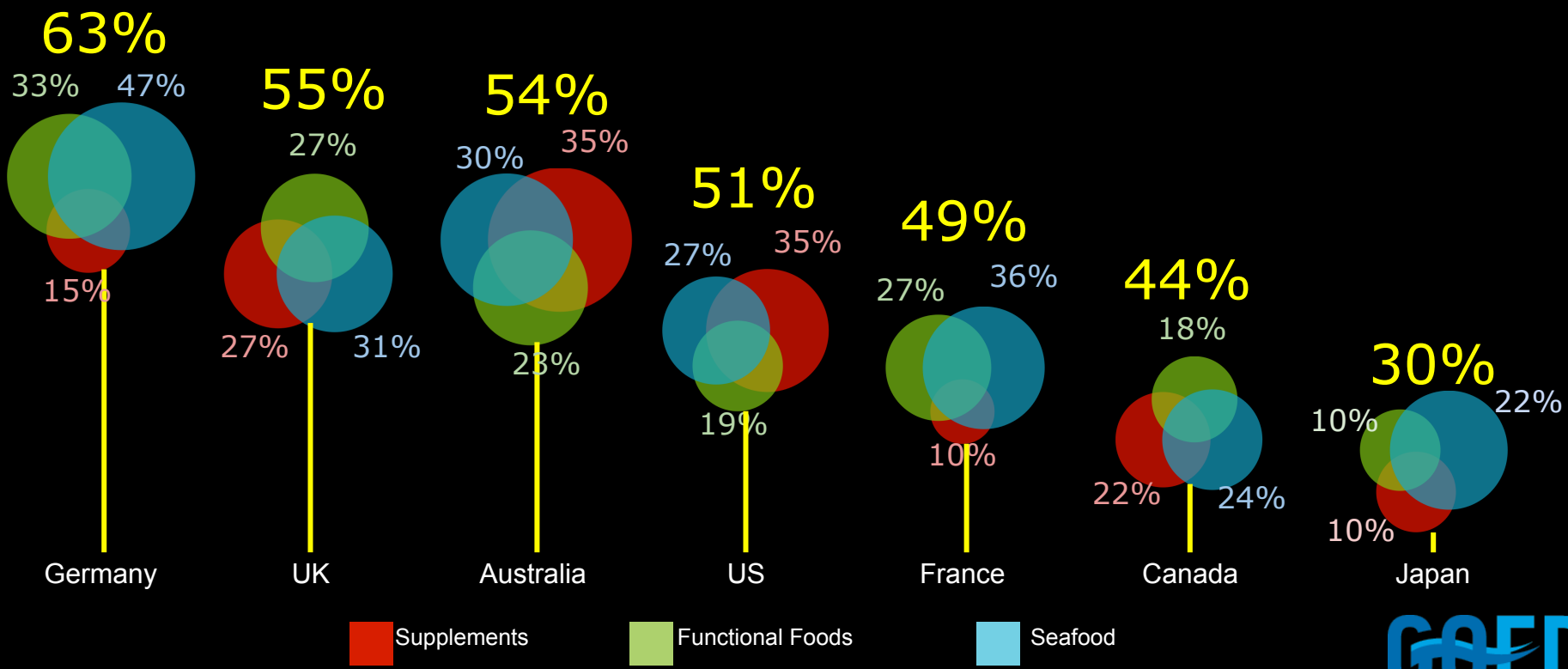
## Let's start with consumer awareness.

Japanese consumers have the lowest awareness of omega-3s, DHA or EPA of any major economy, and surveys from Dentsu show it has been falling for nearly a decade.

Sources: GOED Proprietary Consumer Research, Leatherhead, YouGov



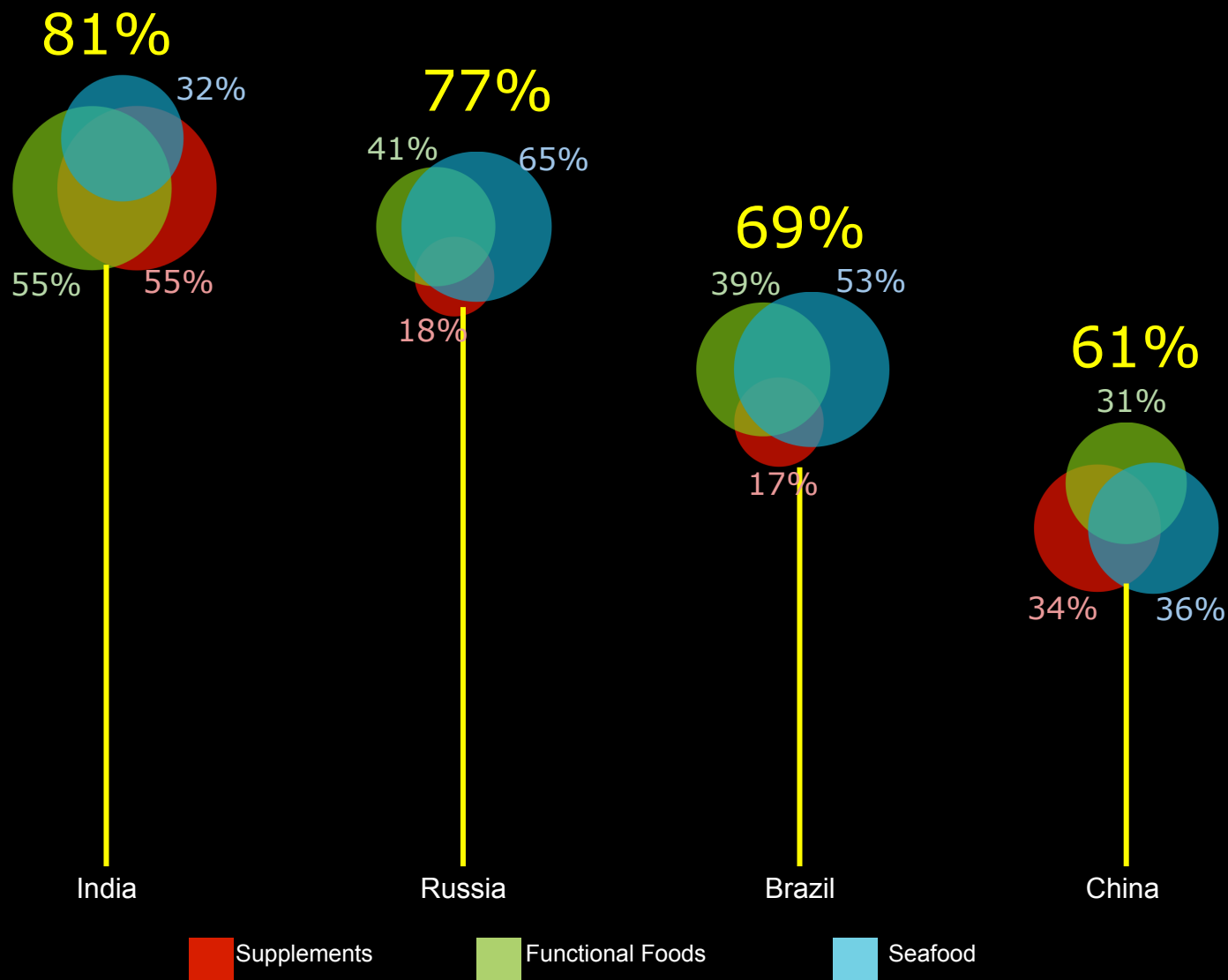
In developed countries usage rates are generally high when you consider all sources of omega-3s, but supplements are not always a main driver



Source: GOED Proprietary Consumer Research



# The BRIC countries are interesting because of their high acceptance of omega-3s and recently gained economic power



Source: GOED Proprietary Consumer Research



**Lastly, let's look at how market trends are affecting the omega-3 supplement market.**

The pharmaceutical market is ultimately the one to watch here.

# Consumers actually spend more on EPA and DHA fortified foods than supplements or pharmaceuticals

## Global Consumer Spending on EPA & DHA Omega-3 Products, 2011

Billions of US\$



# However, these foods contribute much less EPA and DHA to the diet than supplements

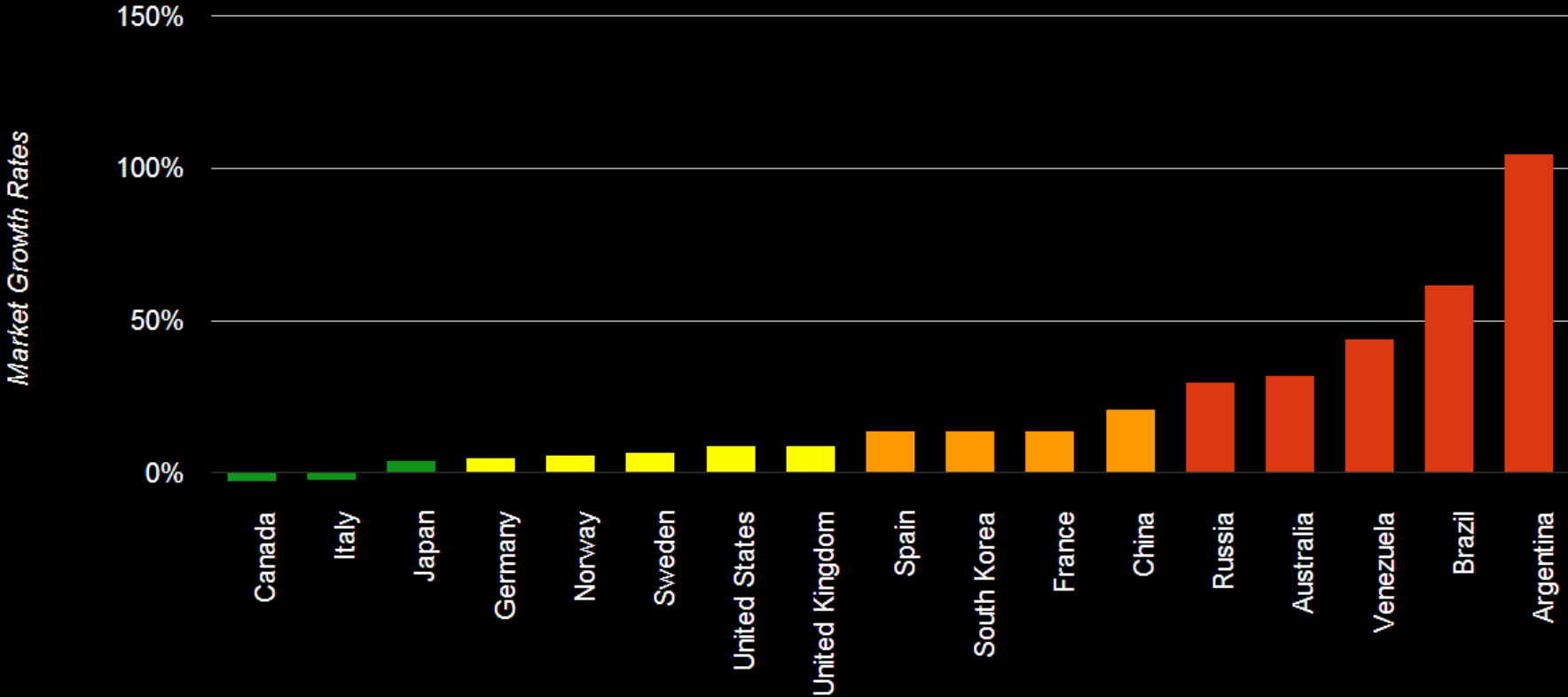
## Global Consumption of EPA & DHA Oils in Consumer Products, 2011

*Metric Tons*



# Globally growth in the supplement market was reasonably strong last year

## 2012 Omega-3 Market Growth Rates as Reported by GOED Members



Source: GOED Membership





## **What is happening in the omega-3 pharmaceutical market?**

This market is only just beginning and its growth will depend on new product launches.

# EPA and DHA omega-3s have become attractive targets for new pharma products

38

Pharmaceuticals or pharma targets in development or on the market using EPA and/or DHA omega-3s

14

Companies that are publicly looking into new pharma targets using EPA and/or DHA

21

Health indications being targeted by these new and existing pharma products

# However, only 3 of the 38 pharma targets using EPA/DHA have been launched

## Epadel

### Mochida Pharmaceuticals

- 97% EPA product
- For treatment of arteriosclerosis obliterans and hyperlipidemia
- Only sold in Japan to date
- Generic competition now allowed

## Omacor

### Pronova Biopharma

- 85% EPA and DHA product
- For treatment of very high triglycerides
- Sold in 57 countries under the Omacor, Lovaza, Zodin, Eskim, Esapent and Seacor brand names

## Vascepa

### Amarin Corporation

- 97% EPA product
- For treatment of very high triglycerides
- Launched in Q1 2013 for sale in the US

# This has significant implications on incentives in the value chain



**Crude Fish Oil Mfrs**



**Oil Refiners & Concentrators**



**Supplement Manufacturers**



**Pharma Manufacturers**

Situation

Finite supplies of oil, but increasing demand for their product

Margins are being squeezed and increases in scale have limited return

Every company sources similar oils, so it is hard to differentiate

Pipelines running dry; so they need high probability drug targets

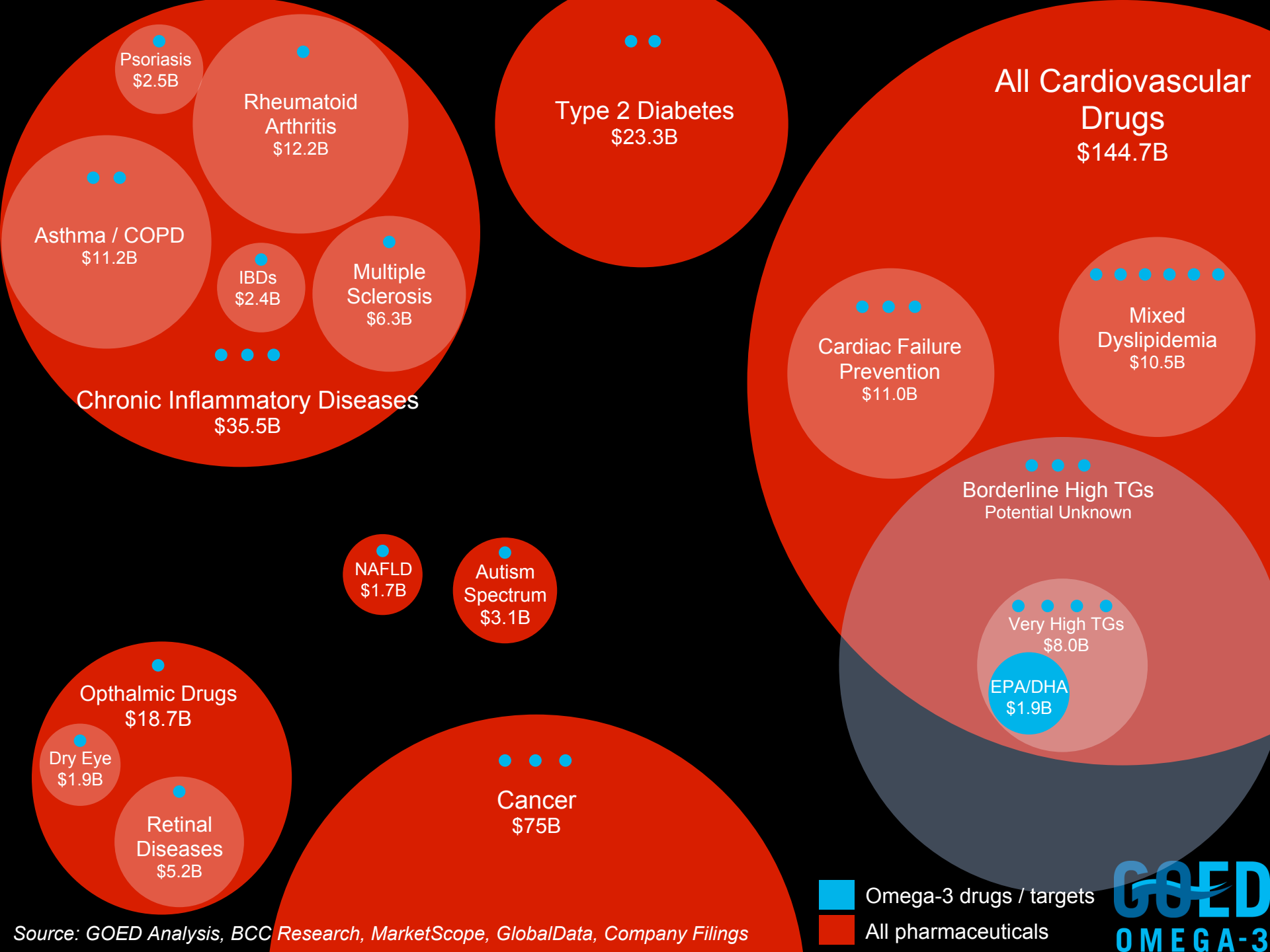
Outlook

Pharmaceutical companies will pay the highest prices to secure supply

Pharmaceuticals offer a chance to displace some low margin demand

Pharmaceuticals may be a threat, but also lead to an educated consumer

Omega-3 mechanisms are understood, increasing odds of success



All Cardiovascular  
Drugs  
\$144.7B

Type 2 Diabetes  
\$23.3B

Cardiac Failure  
Prevention  
\$11.0B

Mixed  
Dyslipidemia  
\$10.5B

Borderline High TGs  
Potential Unknown

Very High TGs  
\$8.0B

EPA/DHA  
\$1.9B

Cancer  
\$75B

Chronic Inflammatory Diseases  
\$35.5B

Ophthalmic Drugs  
\$18.7B

Dry Eye  
\$1.9B

Retinal  
Diseases  
\$5.2B

IBDs  
\$2.4B

Multiple  
Sclerosis  
\$6.3B

Psoriasis  
\$2.5B

Rheumatoid  
Arthritis  
\$12.2B

Autism  
Spectrum  
\$3.1B

NAFLD  
\$1.7B

Omega-3 drugs / targets  
All pharmaceuticals

GOED  
OMEGA-3

Source: GOED Analysis, BCC Research, MarketScope, GlobalData, Company Filings

# What is the pharma market opportunity?

This is just speculation, but if omega-3s achieved the same penetration in these other indications as they achieved in the very high triglyceride market, the omega-3 drug market could reach more than **\$23 billion** in global sales.



# Questions?

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