

Annex – Synthetic biology derived products commercially available or released into the environment 2013

Category	Product	Company	Production Location	Market Status	Additional Info	Sources
Plastic/ textile	Bio-PDO (1-3 propanediol) Brand names: Sorona/ Susterra	Du Pont Tate and Lyle	Loudon, Tennessee, USA	Commercial since 2006. Current production 140 million lbs/year.	Synthetic yeast developed by genencor, transforms corn feedstock.	
Plastic/ Textile/ Urethane	Bio-BDO (1,4- butanediol)	BioAmber	Pomacle, France	Commercial since 2012.	BioAmber believes the global addressable market for these products exceeds \$4 billion, principally used to make polyesters, polyurethanes, spandex and biodegradable plastics.	http://www.bio-amber.com/bioamber/en/news/article?id=516
Plastic	PHA (polyhydroxy alkanoates) Brand Names: Mirel, Mvera	Metabolix Inc.	Clinton, Iowa, USA; Leon, Spain	Initial commercial production run with ADM was stopped. Currently selling 5 million pound back- inventory while scaling up new commercial production in Spain for second half of 2013.	Focus on compostable plastic bags, barrier film, protective wrap, agricultural multi film and high strength films.	http://seekingalpha.com/article/971971-metabolix-s-ceo-discusses-q3-2012-results-earnings-call-transcript?page=2 http://www.plasticsnews.com/article/20120727/NEWS/307279980/metabolix-finds-new-partner-to-make-biopolymer-mirel
Flavouring/ Fl fragrance	Bio- Nooktatone	Isobionics (formerly DSM)	Geleen, The Netherlands	Commercial since 2011.		http://www.isobionics.com/products_nootkatone.htm
Flavouring/ Fl fragrance	BioValencene	Isobionocs	Geleen, The Netherlands	Commercial since 2011.		http://www.isobionics.com/press3.htm

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Flavouring/ Flagrance	Nooktatone (grapefruit flavour)	Allylix	Lexington Kentucky USA; San Diego, California USA	Commercial - Produced in 2000 runs since 2011.	Used as an ingredient in beverages, confections, frozen dairy and baked goods, as well as a fragrance in perfumes and colognes. Also being tested as insect repellent. "It had been selling its biosynthetic terpenes to customers in the flavor and fragrance markets. The company's terpenes are used in products currently found on supermarket shelves."	http://www.cookandschmid.com/AllylixflavorandfragranceindustryCarolynFritzKellyQuigleySanDiegoBusinessJournalventure.htm
Flavouring/ Flagrance	Valencene (orange oil flavour)	Allylix	Lexington Kentucky USA; San Diego, California USA	Commercial - Produced in 2000 runs since 2011.	According to Allylix one commercial fermentation will produce as much valencene as 1.2 million metric tons of oranges.	http://www.slideshare.net/cookandschmid/alx-ppt091410bbcems97
Flavouring/ Flagrance	Resveratrol	Evolve (formerly produced by Fluxome)	Copen- hagen, Denmark	Commercial. Self-affirmed as GRAS and European novel foods approved.	Global market \$50.2 million.– food supplements, chewing gums, beverages and anti-aging moisturizing creams.	http://www.nutraingredients.com/Industry/Evolve-pays-550-000-for-Fluxome-resveratrol-business
Flavouring/ Flagrance	Vetivone (vetiver fragrance) Brand name: Epivone (epi- betavetivon)	Allylix	Lexington Kentucky USA; San Diego, California USA	Due to be have been commercialized 3 rd quarter of 2012.	Allylix has obtained Significant intellectual property surrounding Epivone™, including the recent issuance of several patents.	http://www.allylix.com/press/allylix-commercialize-novel-specialty-chemical

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Cosmetics	Squalane Brand name: Neossance	Amyris / Nikko Chemicals Co	Paraiso, Brazil	Commercial since Aug 2011. Nikko sells to Japanese cosmetics market.	Used for face, body and hair care, moisturizing creams, cleansing lotions, sunscreens, lipsticks & lip glosses, makeup primers, foundations, tinted moisturizers, etc.	http://www.businesswire.com/news/home/20110819005151/en/Amyris-Signs-Multi-Year-Contract-Supply-Renewable-Squalane http://www.centerchem.com/PDFs/NEOSSANCE%20SQUALANE%20-%20Datasheet%20F%200312.pdf
Oils	Algal Dielectric Oil	Solazyme	Peoria, Illinois, USA	Commercial production is expected to exceed 8.5 million gallons starting as early as the second half of 2013.	Full production is sold to Dow Chemical. Dielectric fluids are a \$2 - \$3 billion market – used to insulate electrical transformers.	http://seekingalpha.com/article/590601-dow-looks-to-corner-the-2-billion-dielectric-fluids-market
Oils	Base Oils (lubricants) Brand name: Novaspec	Novii: Amyris / Cosan Joint venture	Paraiso, Brazil	To begin commercial production 2nd half of 2013.	Engine lubricants.	http://novvi.com.br/media/images/docs/novvi_datasheet_2pg_012612.pdf http://seekingalpha.com/article/1205111-amyris-management-discusses-q4-2012-results-earnings-call-transcript?page=5&p=qanda&l=last
Rubber	Liquid farnesene rubber	Amyris and Kuraray		Commercial production and official market launch to begin in second half of 2013 for Kuraray.	For high performance car tyres.	http://seekingalpha.com/article/1205111-amyris-management-discusses-q4-2012-results-earnings-call-transcript?page=5&p=qanda&l=last http://www.gupta-verlag.com/general/news/dkt-2012/11705/Kuraray

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Fuels	Algal Diesel fuel Brand name: Sola Diesel	Solazyme	Peoria, Illinois, USA	Commercial production at 75,000 liter scale since 2008.	Mostly sold to US Navy for battleships. Now also selling to United Airlines, Volkswagen and to car users through Propel forecourts.	http://seekingalpha.com/article/1253151-solazyme-s-ceo-presents-at-raymond-james-34th-annual-institutional-investors-conference-transcript?all=true&find=solazyme
Fuels	Isobutanol	Gevo	Luverne, Minnesota, USA	Already commercially produced 150,000 gallons but suspended pending legal and scale-up issues	Selling under contract to Sasol.	http://seekingalpha.com/article/1249331-gevo-s-ceo-discusses-q4-2012-results-earnings-call-transcript?page=6&p=qanda&l=last
Fuels	Biodiesel Brand name: "No Compromise"	Amyris	Paraiso, Brazil	Commercial since 2011.	Supplies buses in Sao Paulo, Brazil and other niche fuel markets.	http://www.amyris.com/News/131/Amyris-to-Supply-S%C3%A3o-Paulo-City-Buses-with-Renewable-Diesel-from-Sugarcane
Pharmaceutical	Shikimic acid (star anise) used in Oseltamivir (Tamiflu) Anti-viral drug	Roche		Commercial since 2005.	Technology acquired from Draths Corporation. In March 2012 Roche told ETC Group: "For our Tamiflu production we mostly rely on the microbial fermentation process."	http://www.etcgroup.org/sites/www.etcgroup.org/files/Final_CBD_Star%20Anise_case_study_TA.pdf
Pharmaceutical	Sitagliptin-dipeptidyl peptidase-4 inhibitor (Diabetes drug)	Merck/Codexis		Commercial since 2012 – FDA approved in USA.		http://www.bio.org/articles/current-uses-synthetic-biology?page=show

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Animal Feed/ Fuel	MGT – Mascoma Grain Technology (grain treated with synthetic enzymes)	Mascoma / Lallemand Ethanol Technology		Commercial since 2012. Approved for animal feed use in the US.	Mascoma reported in 2012 that MGT was used in production of over 20 million gallons of ethanol in commercial trials – expects that it will begin recognizing revenues from its MGT product in the first quarter of 2012.	http://www.mascoma.com/download/MCM-LET__MGT_Update_Press_Release_FINAL.pdf
Chemicals	Succinic Acid /polyester polyols	Myriant	Lake Providence, Louisiana, USA	Due to start commercial production 1st Quarter of 2013.	The plant will produce 30 million pounds of bio-succinic acid annually. This initial capacity is already sold out and plans are in place to expand Myriant's production capacity in 2014 to 170m lb/year Partnering with Piedmont Chemical to produce urethane foams, coatings, adhesives and sealants.	http://www.myriant.com/platform/lake-providence-facility.cfm . http://www.myriant.com/media/press-releases/piedmont-chemical-launches-renewablepolyols-leveraging-renewable-chemicals-from-dupont-and-myriant.cfm
Chemicals	Succinic Acid	Bioamber and Mitsui	Pomacle, France; Sarnia, Ontario, Canada	Commercial since Jan 2010	Currently produces in 350,000 litre fermenter in France. New 17,000 metric tons facility in Ontario to become operational in 2013 in collaboration with Mitsui.	
Crops	Modified corn with built in degrading enzyme. Brand name: Inzyme	Agrivida	Iowa and Indiana, USA	Small open test plots of total less than 100 acres were planted in 2012.		http://www.agrivida.com/news/releases/2012jun5.html

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Crops	Modified corn with built in degrading enzyme. Brand name: Enogen	Syngenta/Verenium	Merill, Iowa, USA	Commercially available. Approved by EPA 2011.	Syngenta is contracting farmers to grow Enogen crop in 2013 for use by ethanol companies – e.g. Plymouth Energy, Siouxland Energy, Golden Grain Energy.	http://www.syngenta.com/country/us/en/Enogen/Newsroom/Pages/PlymouthNewsRelease.aspx