

ARGUS RECYCLED POLYMERS

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Methodology overview

Methodology rationale

Argus strives to construct methodologies that reflect the way the market trades. Argus aims to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, the specific currencies, volume units, locations and other particulars of an assessment are determined by industry conventions.

In the recycled polymers markets, Argus publishes physical market prices in the open market as laid out in the specifications and methodology guide. Argus uses the trading period deemed by Argus to be most appropriate, in consultation with industry, to capture market liquidity.

In order to be included in the assessment process, deals must meet the minimum volume, delivery, timing and specification requirements in our methodology. In illiquid markets, and in other cases where deemed appropriate, Argus assesses the range within which product could have traded by applying a strict process outlined later in this methodology.

Survey process

Argus price assessments are informed by information received from a wide cross section of market participants, including producers, consumers and intermediaries. Argus reporters engage with the industry by proactively polling participants for market data. Argus will contact and accept market data from all credible market sources including front and back office of market participants and brokers. Argus will also receive market data from electronic trading platforms and directly from the back offices of market participants. Argus will accept market data by telephone, instant messenger, email or other means.

Argus encourages all sources of market data to submit all market data to which they are a party that falls within the Argus stated methodological criteria for the relevant assessment. Argus encourages all sources of market data to submit transaction data from back office functions.

Throughout all markets, Argus is constantly seeking to increase the number of companies willing to provide market data. Reporters are mentored and held accountable for expanding their pool of contacts. The number of entities providing market data can vary significantly from day to day based on market conditions.

For certain price assessments identified by local management, if more than 50pc of the market data involved in arriving at a price assessment is sourced from a single party the supervising editor will engage in an analysis of the market data with the primary reporter to ensure that the quality and integrity of the assessment has not been affected.

Market data usage

In each market, Argus uses the methodological approach deemed to be the most reliable and representative for that market. Argus will utilise various types of market data in its methodologies, to include:

- Transactions
- Bids and offers
- Other market information, to include spread values between grades, locations, timings, and many other data.

In many markets, the relevant methodology will assign a relatively higher importance to transactions over bids and offers, and a relatively higher importance to bids and offers over other market information. Certain markets however will exist for which such a hierarchy would produce unreliable and non-representative price assessments, and so the methodology must assign a different relative importance in order to ensure the quality and integrity of the price assessment. And even in markets for which the hierarchy normally applies, certain market situations will at times emerge for which the strict hierarchy would produce non-representative prices, requiring Argus to adapt in order to publish representative prices.

Verification of transaction data

Reporters carefully analyse all data submitted to the price assessment process. These data include transactions, bids, offers, volumes, counterparties, specifications and any other information that contributes materially to the determination of price. This high level of care described applies regardless of the methodology employed. Specific to transactions, bids, and offers, reporters seek to verify the price, the volume, the specifications, location basis, and counterparty. In some transactional average methodologies, reporters also examine the full array of transactions to match counterparties and arrive at a list of unique transactions. In some transactional average methodologies, full details of the transactions verified are published electronically and are accessible by subscribers. The deals are also published in the daily report.

Several tests are applied by reporters in all markets to transactional data to determine if it should be subjected to further scrutiny. If a transaction has been identified as failing such a test, it will receive further scrutiny. For assessments used to settle derivatives and for many other assessments, Argus has established internal procedures that involve escalation of inquiry within the source's company and escalating review within Argus management. Should this process determine that a transaction should be excluded from the price assessment process, the supervising editor will initiate approval and, if necessary, documentation procedures.

Primary tests applied by reporters

- Transactions not transacted at arm's length, including deals between related parties or affiliates.
- Transaction prices that deviate significantly from the mean of all transactions submitted for that day.
- Transaction prices that fall outside of the generally observed lows and highs that operated throughout the trading day.
- Transactions that are suspected to be a leg of another transaction or in some way contingent on an unknown transaction.
- Single deal volumes that significantly exceed the typical transaction volume for that market.
- Transaction details that are identified by other market participants as being for any reason potentially anomalous and perceived by Argus to be as such.

- Transaction details that are reported by one counterparty differently than the other counterparty.
- Any transaction details that appear to the reporter to be illogical or to stray from the norms of trading behaviour. This could include but is not limited to divergent specifications, unusual delivery location and counterparties not typically seen.
- Transactions that involve the same counterparties, the same price and delivery dates are checked to see that they are separate deals and not one deal duplicated in Argus records.

Secondary tests applied by editors for transactions identified for further scrutiny

Transaction tests

- The impact of linkage of the deal to possible other transactions such as contingent legs, exchanges, options, swaps, or other derivative instruments. This will include a review of transactions in markets that the reporter may not be covering.
- The nature of disagreement between counterparties on transactional details.
- The possibility that a deal is directly linked to an offsetting transaction that is not publicly known, for example a “wash trade” which has the purpose of influencing the published price.
- The impact of non-market factors on price or volume, including distressed delivery, credit issues, scheduling issues, demurrage, or containment.

Source tests

- The credibility of the explanation provided for the outlying nature of the transaction.
- The track record of the source. Sources will be deemed more credible if they
 - Regularly provide transaction data with few errors.
 - Provide data by Argus' established deadline.
 - Quickly respond to queries from Argus reporters.
 - Have staff designated to respond to such queries.
- How close the information receipt is to the deadline for information, and the impact of that proximity on the validation process.

Assessment guidelines

When insufficient, inadequate, or no transaction information exists, or when Argus concludes that a transaction based methodology will not produce representative prices, Argus reporters will make an assessment of market value by applying intelligent judgement based on a broad array of factual market information. Reporters must use a high degree of care in gathering and validating all market data used in determining price assessments, a degree of care equal to that applying to gathering and validating transactions. The information used to form an assessment could include deals done, bids, offers, tenders, spread trades, exchange trades, fundamental supply and demand information and other inputs.

The assessment process employing judgement is rigorous, replicable, and uses widely accepted valuation metrics. These valuation

metrics mirror the process used by physical commodity traders to internally assess value prior to entering the market with a bid or offer. Applying these valuation metrics along with sound judgement significantly narrows the band within which a commodity can be assessed, and greatly increases the accuracy and consistency of the price series. The application of judgement is conducted jointly with the supervising editor, in order to be sure that guidelines below are being followed. Valuation metrics include the following:

Relative value transactions

Frequently transactions occur which instead of being an outright purchase or sale of a single commodity, are instead exchanges of commodities. Such transactions allow reporters to value less liquid markets against more liquid ones and establish a strong basis for the exercise of judgment.

- Exchange one commodity for a different commodity in the same market at a negotiated value.
- Exchange delivery dates for the same commodity at a negotiated value.
- Exchange a commodity in one location for the same commodity at another location at a negotiated value.

Bids and offers

If a sufficient number of bids and offers populate the market, then in most cases the highest bid and the lowest offer can be assumed to define the boundaries between which a deal could be transacted.

Comparative metrics

- The relative values between compared commodities are readily discussed in the market and can be discovered through dialogue with market participants. These discussions are the precursor to negotiation and conclusion of transactions.
- Comparison to the same commodity in another market centre.
- Comparison to a more actively traded but slightly different specification commodity in the same market centre.
- Comparison to the same commodity traded for a different delivery timing.
- Comparison to the commodity's primary feedstock or primary derived product(s).
- Comparison to trade in the same commodity but in a different modality (as in barge versus oceangoing vessel) or in a different total volume (as in full cargo load versus partial cargo load).

Volume minimums and transaction data thresholds

Argus typically does not establish thresholds strictly on the basis of a count of transactions, as this could lead to unreliable and non-representative assessments and because of the varying transportation infrastructure found in all commodity markets. Instead, minimum volumes are typically established which may apply to each transaction accepted, to the aggregate of transactions, to transactions which set a low or high assessment or to other volumetrically relevant parameters.

For price assessments used to settle derivatives, Argus will seek to establish minimum transaction data thresholds and when no such threshold can be established Argus will explain the reasons. These

thresholds will often reflect the minimum volumes necessary to produce a transaction-based methodology, but may also establish minimum deal parameters for use by a methodology that is based primarily on judgement.

Should no transaction threshold exist, or should submitted data fall below this methodology's stated transaction data threshold for any reason, Argus will follow the procedures outlined elsewhere in this document regarding the exercise of judgement in the price assessment process.

Transparency

Argus values transparency in energy markets. As a result, where available, we publish lists of deals in our reports that include price, basis, counterparty and volume information. The deal tables allow subscribers to cross check and verify the deals against the prices. Argus feels transparency and openness is vital to developing confidence in the price assessment process.

Swaps and forwards markets

Argus publishes forward assessments for numerous markets. These include forward market contracts that can allow physical delivery and swaps contracts that swap a fixed price for the average of a floating published price. Argus looks at forward swaps to inform physical assessments but places primary emphasis on the physical markets.

Publications and price data

Argus recycled polymers prices are published in the Argus Recycled Polymers report. Subsets of these prices appear in other Argus market reports and newsletters in various forms. The price data are available independent of the text-based report in electronic files that can feed into various databases. These price data are also supplied through various third-party data integrators. The Argus website also provides access to prices, reports and news with various web-based tools. All Argus prices are kept in a historical database and available for purchase. Contact your local Argus office for information.

A publication schedule is available at www.argusmedia.com

Corrections to assessments

Argus will on occasion publish corrections to price assessments after the publication date. We will correct errors that arise from clerical mistakes, calculation errors, or a misapplication of our stated methodology. Argus will not retroactively assess markets based on new information learned after the assessments are published. We make our best effort to assess markets based on the information we gather during the trading day assessed.

Ethics and compliance

Argus operates according to the best practices in the publishing field, and maintains thorough compliance procedures throughout the firm. We want to be seen as a preferred provider by our subscribers, who are held to equally high standards, while at the same time maintaining our editorial integrity and independence. Argus has a strict ethics policy that applies to all staff. The policy can be found on our website at www.argusmedia.com. Included in this

policy are restrictions against staff trading in any energy commodity or energy related stocks, and guidelines for accepting gifts. Argus also has strict policies regarding central archiving of email and instant messenger communication, maintenance and archiving of notes, and archiving of spreadsheets and deal lists used in the price assessment process. Argus publishes prices that report and reflect prevailing levels for open-market arms length transactions (please see the [Argus Global Compliance Policy](#) for a detailed definition of arms length).

Consistency in the assessment process

Argus recognises the need to have judgement consistently applied by reporters covering separate markets, and by reporters replacing existing reporters in the assessment process. In order to ensure this consistency, Argus has developed a programme of training and oversight of reporters. This programme includes:

- A global price reporting manual describing among other things the guidelines for the exercise of judgement
- Cross-training of staff between markets to ensure proper holiday and sick leave backup. Editors that float between markets to monitor staff application of best practices
- Experienced editors overseeing reporting teams are involved in daily mentoring and assisting in the application of judgement for illiquid markets
- Editors are required to sign-off on all price assessments each day, thus ensuring the consistent application of judgement.

Review of methodology

The overriding objective of any methodology is to produce price assessments which are reliable and representative indicators of commodity market values and are free from distortion. As a result, Argus editors and reporters are regularly examining our methodologies and are in regular dialogue with the industry in order to ensure that the methodologies are representative of the market being assessed. This process is integral with reporting on a given market. In addition to this ongoing review of methodology, Argus conducts reviews of all of its methodologies and methodology documents on at least an annual basis.

Argus market report editors and management will periodically and as merited initiate reviews of market coverage based on a qualitative analysis that includes measurements of liquidity, visibility of market data, consistency of market data, quality of market data and industry usage of the assessments. Report editors will review:

- Appropriateness of the methodology of existing assessments
- Termination of existing assessments
- Initiation of new assessments.

The report editor will initiate an informal process to examine viability. This process includes:

- Informal discussions with market participants
- Informal discussions with other stakeholders
- Internal review of market data

Should changes, terminations, or initiations be merited, the report editor will submit an internal proposal to management for review and approval. Should changes or terminations of existing assessments be approved, then formal procedures for external consultation are begun.

Changes to methodology

Formal proposals to change methodologies typically emerge out of the ongoing process of internal and external review of the methodologies. Formal procedures for external consultation regarding material changes to existing methodologies will be initiated with an announcement of the proposed change published in the relevant Argus report. This announcement will include:

- Details on the proposed change and the rationale
- Method for submitting comments with a deadline for submissions
- For prices used in derivatives, notice that all formal comments will be published after the given consultation period unless submitter requests confidentiality.

Argus will provide sufficient opportunity for stakeholders to analyse and comment on changes, but will not allow the time needed to follow these procedures to create a situation wherein unrepresentative or false prices are published, markets are disrupted, or market participants are put at unnecessary risk. Argus will engage with industry throughout this process in order to gain acceptance of proposed changes to methodology. Argus cannot however guarantee universal acceptance and will act for the good order of the market and ensure the continued integrity of its price assessments as an overriding objective.

Following the consultation period, Argus management will commence an internal review and decide on the methodology change. This will be followed by an announcement of the decision, which will be published in the relevant Argus report and include a date for implementation. For prices used in derivatives, publication of stakeholders' formal comments that are not subject to confidentiality and Argus' response to those comments will also take place.

Timing

Argus recycled polymers prices are published weekly on Fridays. Market information received after the deadlines below may not be considered for inclusion in the relevant assessments.

- European assessments: 4pm London time
- North American assessments: 3pm Houston time
- Asia-Pacific Assessments: 4pm Singapore time

If Friday is a holiday in London, Houston or Singapore, relevant regional prices will be assessed on the last publishing day before the holiday. A publication schedule is available at www.argusmedia.com.

rPET

Europe

Argus publishes prices for PET waste bales, rPET flakes and rPET food grade pellets. Price assessments are for freely-negotiated transactions for volumes to be delivered up to four weeks forward from the day of publication.

Price assessments are of the prevailing range of prices in the market since the last assessment. While all relevant market information is considered for inclusion in a given assessment, in periods of high volatility, assessments are weighted towards market activity that occurred closer to the day of publication.

Bales

Bottle bales

Prices are published weekly on a delivered basis, in €/t unless otherwise stated. Load size is one truck of bound bales, typically 12-18t. Colourless bales are at least 80pc clear.

Bottle bale colourless, delivered west Europe

Delivered to France, Germany, Ireland, Portugal; 60-70pc yield of PET.

Bottle bale colourless, delivered north Europe

Delivered to Scandinavia (Sweden, Denmark, Norway), Benelux (Belgium, the Netherlands, Luxembourg); 70-85pc yield of PET

Bottle bale colourless, delivered central Europe

Delivered to Poland, the Czech Republic and Slovakia; 70-85pc yield of PET

Bottle bale colourless, delivered eastern Europe

Delivered to Romania and Bulgaria; 60-70pc yield of PET

Bottle bale colourless, delivered UK

Delivered to the UK, 50-60pc yield of PET, published in £/t

Bottle bale colourless, from yellow container collection, delivered Spain

Delivered to Spain, from yellow container collection, meeting the Ecoembes specification. Published quarterly, typically during the month before the quarter of supply.

Tray bales

Prices are published monthly on a delivered basis, in €/t unless otherwise stated. Prices are published in the last issue of the month. Load size is one truck of bound bales, typically 20-25t. Tray bales contain at least 90pc PET trays, post-consumer thermoformed PET packaging waste recovered from sorting centres or PET recycling facilities. PET tray packaging includes food trays for meat, fruit and vegetables as well as other packaging such as rigid film, pots, tubs, mugs and bowls.

Tray bale monolayer, colourless, delivered western Europe

Colourless, monolayer PET tray bales; monolayer meaning a single-layer tray or made entirely of PET. Colourless bales are at least 90pc

clear. Delivered to France, Ireland, Germany, Scandinavia (Sweden, Denmark, Norway), Benelux (Belgium, the Netherlands, Luxembourg), Italy, Spain, Portugal.

Tray bale multilayer, colourless, delivered western Europe

Colourless, multilayer PET tray bales; multilayer contains different layers of materials with the majority by mass being PET. Colourless bales are at least 90pc clear. Delivered to France, Ireland, Germany, Scandinavia (Sweden, Denmark, Norway), Benelux (Belgium, the Netherlands, Luxembourg), Italy, Spain, Portugal.

Flakes

Bottle flakes

Prices are published weekly, on a delivered basis, in €/t unless stated otherwise. Load size is one truck, typically 21-23t of colourless, hot washed flakes with 15pc blue flake (+/-5pc). Bottle flake is derived from PET bottle bales and typically has an intrinsic viscosity (IV) of 0.7-0.8 dL/g.

Bottle flakes delivered northwest Europe

France, Ireland, Germany, Scandinavia (Sweden, Denmark, Norway), Benelux (Belgium, the Netherlands, Luxembourg)

Bottle flakes delivered UK

Published in £/t

Bottle flakes delivered south Europe

Spain, Portugal, Italy, Greece

Bottle flakes delivered central and east Europe

Poland and Romania

Tray flakes

Prices are published monthly, on a delivered basis, in €/t unless otherwise stated. Prices are published in the last issue of the month. Load size is one truck, typically 23-25t, hot washed flake. Tray flake is derived from PET tray bales and typically has an intrinsic viscosity (IV) of 0.6-0.7 dL/g.

Tray flakes colourless delivered western Europe

Delivered to France, Ireland, Germany, Scandinavia (Sweden, Denmark, Norway), Benelux (Belgium, the Netherlands, Luxembourg), Italy, Spain, Portugal, at least 95pc colourless flake.

Food grade pellets

Prices are published weekly, on a free delivered basis to the specified locations, in €/t. Load size is one truck, typically 22-24t. Pellets are EFSA approved for use in food contact applications, and REACH compliant. Food grade pellets are produced from bottle flakes and typically has an intrinsic viscosity (IV) of 0.75-0.85 dL/g.

Food grade pellets delivered northwest Europe

UK, France, Ireland, Germany, Scandinavia (Sweden, Denmark, Norway), Benelux (Belgium, the Netherlands, Luxembourg)

Food grade pellets delivered south Europe

Spain, Portugal, Italy, Greece

Food grade pellets delivered central and eastern Europe

Poland and Romania

North America

Argus publishes prices for PET waste bales, rPET flakes and rPET food grade pellets in North America. Price assessments are for freely-negotiated transactions for volumes to be delivered up to one month forward from the day of publication.

Bales

Prices are published weekly, on an ex-works basis for post-consumer (PCR) bales. Load size is one truck of bound bales, typically 12-18t. Prices are assessed in USC/lb. A \$/t conversion is also published.

Price assessments are of the prevailing range of prices in the market since the last assessment. While all relevant market information is considered for inclusion in a given assessment, in periods of high volatility, weekly assessments are weighted towards market activity that occurred closer to the day of publication. Quantities vary and specifications are a guide only.

Bales ex-works US west coast

A grade bale

85% PET bottle fraction by weight or more. Specifications in line with the Association of Plastic Recyclers' APR definition for PET bottle bales. Ex-works collection from the west coast (California, Oregon, Washington).

B grade bale

70% to 85% PET bottle fraction by weight. Specifications in line with the Association of Plastic Recyclers' APR definition for PET bottle bales. Ex-works collection from the west coast (California, Oregon, Washington).

Bales ex-works US east coast

85% PET bottle fraction by weight or more. Specifications in line with the Association of Plastic Recyclers' APR definition for PET bottle bales. Ex-works collection from the east coast (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Washington, DC, Virginia, North Carolina, South Carolina, Georgia, Florida)

Flake

Prices are published monthly, on an ex-works basis. Prices for each month are published in the first issue of that month. Load size is one truck, typically 21-23t. Prices are assessed in USC/lb. A \$/t conversion is also published. Qualities vary and specifications are a guide only.

Flake ex-works US west coast

Natural-coloured rPET flake, hot-washed and intended for the manufacture FDA-approved rPET food grade pellets. Ex-works collection from the west coast (California, Oregon, Washington).

Pellet

Prices are published monthly, on an ex-works basis. Prices for each month are published in the first issue of that month. Load size is one

truck, typically 22-24t. Prices are assessed in USC/lb. A \$/t conversion is also published. Qualities vary and specifications are a guide only.

Pellet ex-works US west coast

Natural-coloured rPET pellets, approved by the FDA for use in food-contact packaging. Ex-works collection from the west coast (California, Oregon, Washington).

Northeast Asia

Argus publishes prices for hot-washed recycled PET flakes and food grade pellets. Price assessments are for freely-negotiated transactions for volumes to be delivered up to two months forward from the day of publication.

While all relevant market information is considered for inclusion in a given assessment, in periods of high volatility, assessments are weighted towards market activity that occurred closer to the day of publication.

rPET flake, China

Prices are published weekly in Yuan/t. Load size is one truck, typically 20-25t.

rPET flakes domestic China

rPET flakes, delivered within China, colourless with less than 10pc coloured material. Intrinsic viscosity (IV) of 0.70-0.72 dL/g. PVC content less than 100ppm. Published in Yuan/t

Food grade pellets, fob northeast Asia

Pellets for use in food contact applications. Prices are published weekly in \$/t. Load size is one truck or one 20ft container, typically 20-25t.

rPET pellets (recycle 25pc), fob northeast Asia

Contain 25pc recycled materials, intrinsic viscosity (IV) of 0.78-0.88 dL/g. Fob northeast Asia, including China, South Korea, Taiwan and Japan. Published in \$/t.

rPET pellets (recycle 100pc), fob northeast Asia

Contain 100pc recycled materials, food-grade pellets, intrinsic viscosity (IV) of 0.78-0.88 dL/g. Fob northeast Asia, including China, South Korea, Taiwan and Japan. Published in \$/t

Southeast Asia

Argus publishes prices for PET waste bales, rPET food grade flakes and rPET food grade pellets. Price assessments are for freely-negotiated transactions for volumes to be delivered up to six weeks forward from the day of publication.

Price assessments are of the prevailing range of prices in the market since the last assessment. While all relevant market information is considered for inclusion in a given assessment, in periods of high volatility, assessments are weighted towards market activity that occurred closer to the day of publication. Prices are assessed and published in the currencies listed below and are also converted to \$/t for publication at the prevailing exchange rate on the day of assessment.

Bales

Prices are published weekly on a delivered basis. Minimum load size is 4t. Colourless bales are at least 60pc clear and mixed-colour bales are 50-60pc clear, with 80-95pc yield of PET.

PET bottle bale colourless, domestic Indonesia

Delivered to buyers, inclusive of trucking and barging. Published in IDR/kg.

PET bottle bale mixed colour, domestic Indonesia

Delivered to buyers, inclusive of trucking and barging. Published in IDR/kg.

Food grade flakes

Prices are published weekly, in \$/t. Minimum load size is 20t. Colourless flakes with 15pc blue flake (+/- 5pc), mixed-colour flakes with less than 80pc clear flake. Hot-washed. Maximum polyvinyl chloride (PVC) content of 50ppm.

rPET food grade flakes colourless, fob southeast Asia

Loading from Indonesia, Malaysia, Thailand, the Philippines, Vietnam, and Singapore.

rPET food grade flakes mixed colour, fob southeast Asia

Loading from Indonesia, Malaysia, Thailand, the Philippines, Vietnam, and Singapore.

Food grade pellets

Prices are published weekly in \$/t. Load size is one truck or one 20ft container, typically 20-25t. 100pc post-consumer recycled material, intrinsic viscosity (IV) of 0.78-0.84 dL/g

rPET food grade pellets, fob southeast Asia

Loading from Indonesia, Malaysia, Thailand, the Philippines, Vietnam, and Singapore.

rPET calculated net forwards

Net forward prices for rPET exports from Asia-Pacific to the US and Europe are calculated by adding container freight rates, adjusted for shipment size, to published fob northeast Asia and southeast Asia rPET price assessments.

Freight rates are based on 40ft containers. Pellets are also shipped in 20ft containers when more cost effective.

Prices are published weekly in \$/t; a €/t conversion is also published for cif ARA net forwards.

Container freight rates, assuming 24.75t shipments (24.75t/FEU), are the latest available rates republished from Argus Global Polypropylene. See the [Argus Global Polypropylene methodology](#) for more details. \$/FEU data is converted to \$/t basis assuming 24.75t/FEU. Freight rates used in net forward calculations are adjusted for the specified shipment size.

rPET food grade pellet cif USWC - northeast Asia net forward

The cif US west coast (USWC) net forward is calculated by adding the

low and high values of the fob northeast Asia 100pc rPET food grade pellet price to the midpoint of the Shanghai-Los Angeles container freight rate, adjusted for a cargo size of 20t/FEU.

rPET food grade pellet cif ARA - northeast Asia net forward

The cif Amsterdam-Rotterdam-Antwerp (ARA) net forward is calculated by adding the low and high values of the fob northeast Asia 100pc rPET food grade pellet price to the midpoint of the Shanghai-Rotterdam container freight rate, adjusted for a cargo size of 24t/FEU.

rPET flake cif ARA - southeast Asia net forward

The cif Amsterdam-Rotterdam-Antwerp (ARA) net forward is calculated by adding the low and high values of the fob southeast Asia food grade flakes price to the midpoint of the Vung Tau-Antwerp container freight rate, adjusted for a cargo size of 23t/FEU.

Freight rates

Argus Recycled Polymers includes three container freight rates, which are republished from Argus Global Polypropylene:

- Shanghai-Los Angeles
- Shanghai-Rotterdam
- Vung Tau-Antwerp

See the [Argus Global Polypropylene methodology](#)

Recycled polyolefins

Europe

Argus publishes prices for polyethylene (PE) and polypropylene (PP) waste bales, and rPE and rPP regrinds and regranulates. Price assessments are for freely-negotiated transactions for volumes to be delivered up to four weeks forward from the day of publication. Prices are assessed and published in the currencies listed below and are also converted to \$/t for publication at the prevailing exchange rate on the day of assessment.

Bales

Prices are published weekly, on a delivered basis for post-consumer (PCR) and post-commercial (post-use) bales. Load size is one truck of bound bales, typically 12-18t. Qualities vary and specifications are a guide only.

High density polyethylene (HDPE) rigid bale PCR (D329 or equivalent) del northwest Europe

DSD-standard D329 specifications. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Assessed and published in €/t.

Polypropylene (PP) rigid bale PCR (D324 or equivalent) del northwest Europe

DSD-standard D324 specifications, including post-consumer bales with higher flexible content, sometimes called D324 minus 1. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Assessed and published in €/t.

Mixed plastic waste (D350) to incinerator, del Germany, €/t

Mixed plastic from sorting of post-consumer plastic waste, aligns with DSD-standard D350 specifications. Delivered to incinerator, and not counted towards sellers' recycling quota. Published monthly, on the first Friday of each month for delivery during the month. Prices are negative when payment is made to the incinerator to take the material.

HDPE natural PCR bale del UK

Waste bale, at least 90pc rigid HDPE by mass, natural colour, from post-consumer waste, delivered to UK, assessed and published in £/t.

HDPE mixed colour PCR bale del UK

Waste bale, at least 90pc rigid HDPE by mass, mixed colour, from post-consumer waste, delivered in UK, assessed and published in £/t.

PP mixed colour PCR bale del UK

Waste bale, at least 90pc rigid PP by mass, mixed colour, from post-consumer waste, delivered in UK, assessed and published in £/t.

Shrink hood flexible PE bale post-commercial del northwest Europe

Flexible polyethylene waste from post commercial collection, composed of at least 90pc LDPE shrink hoods, transparent. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Assessed and published in €/t.

98/2 flexible PE bale, post commercial del northwest Europe

Flexible polyethylene waste from post commercial collection, e.g. post-use secondary or industrial packaging, 98pc transparent. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Assessed and published in €/t.

80/20 flexible PE bale, post commercial del northwest Europe

Flexible polyethylene waste from post commercial collection, e.g. post-use secondary or industrial packaging, 80pc transparent. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Assessed and published in €/t.

Coloured flexible PE bale, post commercial del northwest Europe

Flexible polyethylene waste from post commercial collection, e.g. post-use secondary or industrial packaging, mixed coloured. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Assessed and published in €/t.

Kerbside flexible waste bale (D310), del northwest Europe, €/t

Flexible plastic waste from kerbside/household collection, DSD standard D310 specifications, delivered to recycler. Published quarterly, on the first Friday of each calendar quarter for delivery during the quarter. Delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg). Prices are negative when a payment is made to the recycler to take the material.

98/2 flexible PE bale post-commercial del UK

Flexible polyethylene waste from post commercial collection, e.g. post-use secondary or industrial packaging, 98pc transparent. Delivered to UK. Assessed and published in £/t.

Regrind

Prices are published weekly, on a delivered basis, in €/t. Load size is one truck, typically 21-23t. Prices are for product delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg).

rHDPE regrind mixed colour household packaging del northwest Europe

HDPE regrind, mixed colour, cold washed, from household packaging waste

rPP regrind mixed colour household packaging del northwest Europe

PP regrind, mixed colour, cold washed, from household packaging waste

Regranulate pellets

Prices are published weekly, on a delivered basis, in €/t. Load size is one truck, typically 21-23t.

Prices are for product delivered to Germany, France and the Benelux region (Belgium, the Netherlands, Luxembourg).

rHDPE BM natural from PCR deodorised del northwest Europe

Mechanically recycled. Bottle-to-bottle quality, deodorised, for home and personal care market, from post-consumer waste

rHDPE BM white from PCR deodorised del northwest Europe

Mechanically recycled. Bottle-to-bottle quality, deodorised, for home and personal care market, from post-consumer waste

rHDPE pipe, dark/black del northwest Europe

Dark/black/mixed colour. Mechanically recycled. Suitable for extrusion into standard pipe applications

rPP light, packaging, deodorized del northwest Europe

Mechanically recycled rPP from post-consumer waste. Melt flow MFI 15-25. How-washed, deodorized, off white/light grey. Suitable for demanding consumer-facing applications e.g. packaging

rPP grey, high MFI, plant pot and bucket del northwest Europe

Mechanically recycled rPP from post-consumer waste. Melt flow MFI 40-50. Unmodified impact resistance. Suitable for less-demanding consumer facing applications e.g. plant pots, and can in some cases be used as part of a blend for bucket applications

rPP IM, dark/black del northwest Europe

Black or resultant colour from non-colour-sorted waste, mechanically recycled. Suitable for thick-walled injection moulding applications e.g. crates

rLDPE transparent, collation shrink grade, del northwest Europe €/t

rLDPE regranulate, transparent, minimal gels and odours. Suitable for virgin replacement in collation-shrink packaging applications with MFI 0.2-0.5.

rLLDPE stretch film transparent del northwest Europe

rLLDPE regranulate, from post-commercial waste. Transparent, minimal gels and odours. Suitable for virgin replacement in stretch film applications with MFI 1.5-2.0.

rLDPE/LLDPE standard film, transparent del northwest Europe

Mechanically recycled. Mainly based on standard 98/2 flexible polyethylene bales from post-commercial waste. Melt flow index 0.6-1.1, limited gels and odours, suitable for transparent secondary packaging film applications (excluding collation shrink and stretch film)

rLDPE/LLDPE standard film, dark/black del northwest Europe

Mechanically recycled. Dark/black/mixed colour. Based on flexible polyethylene bales from post-commercial waste. Melt flow index of 0.6-1.1, suitable for dark-coloured industrial films and refuse sacks.

North America

Argus publishes prices for polyethylene (PE) and polypropylene (PP) waste bales, and rPE and rPP regranulates. Price assessments are for freely-negotiated transactions for volumes to be delivered up to one month forward from the day of publication.

Bales

Prices are published weekly, on an ex-works basis for post-consumer (PCR) bales. Load size is one truck of bound bales, typically 12-18t. Prices are assessed in USC/lb. A \$/t conversion is also published. Qualities vary and specifications are a guide only.

HDPE natural bottle bale, ex-works US Midwest

Post consumer natural HDPE bale. Specifications in line with the Association of Plastic Recyclers' (APR) definition for HDPE coloured bottle bale. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

HDPE coloured bottle bale, ex-works US Midwest

Post consumer mixed-coloured HDPE bale. Specifications in line with the Association of Plastic Recyclers' (APR) definition for HDPE coloured bottle bale. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

PP post-consumer bale, ex-works US Midwest

Post consumer PP bale. Specifications in line with the Association of Plastic Recyclers' (APR) definition for PP small rigid plastics bale. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

Regranulate pellets

Prices are published monthly, on a delivered basis for recycled polyolefin regranulates. Prices for each month are published in the first issue published after the fourth day of that month. Load size is one truck, typically 21-23t. Prices are assessed in USC/lb. A \$/t conversion is also published. Qualities vary and specifications are a guide only.

rHDPE BM natural, FDA approved for food contact, ex-works US Midwest

Natural-coloured rHDPE, approved by the FDA for use in food-contact packaging. Consumer packaging-quality blow-moulding grade. Based upon post-consumer waste. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

rHDPE BM grey, non-FDA approved, ex-works US Midwest

Grey rHDPE, not approved by the FDA (by letter of no objection) for use in food-contact packaging. Consumer packaging-quality blow moulding grade. Based upon post-consumer waste. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

rHDPE black/dark general purpose, ex-works US Midwest

Black or resultant colour from non-colour-sorted waste. rHDPE, suitable for thick-walled injection moulded products. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

rPP light grey, FDA approved for food contact, ex-works US Midwest

Light grey rPP, approved by the FDA (by letter of no objection) for use in food-contact packaging. Consumer packaging-quality. Based upon post-consumer waste. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

rPP light grey, non-FDA approved, ex-works US Midwest

Light grey rPP, not approved by the FDA for use in food-contact packaging. Based upon post-consumer waste. Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

rPP black/dark general purpose, ex-works US Midwest

Black or resultant colour from non-colour-sorted waste. rPP, suitable for thick-walled injection moulding applications (e.g. crates/pallets). Ex-works collection from US Midwest (Indiana, Illinois, Michigan, Minnesota, Wisconsin, Iowa, and Missouri).

Northeast Asia

Argus publishes prices for rPE regranulates. Price assessments are for freely-negotiated transactions for volumes to be delivered up to six weeks forward from the day of publication.

Price assessments are of the prevailing range of prices in the market since the last assessment. While all relevant market information is considered for inclusion in a given assessment, in periods of high volatility, assessments are weighted towards market activity that occurred closer to the day of publication. Prices are assessed and published in \$/t.

Regranulates**rHDPE BM natural colour from PCR, food contact, fob China**

Mechanically recycled. Natural-coloured rHDPE, from post-consumer waste, approved by the FDA, EFSA or equivalent certifications for use in food contact packaging. Consumer packaging-quality blow moulding grade.

Southeast Asia

Argus publishes prices for rPE regranulates and bales. Price assessments are for freely-negotiated transactions for volumes to be delivered up to six weeks forward from the day of publication.

Price assessments are of the prevailing range of prices in the market since the last assessment. While all relevant market information is considered for inclusion in a given assessment, in periods of high volatility, assessments are weighted towards market activity that occurred closer to the day of publication. Prices are assessed and published in the currencies listed below and are also converted to \$/t for publication at the prevailing exchange rate on the day of assessment.

Bales**High density polyethylene (HDPE) rigid bale PCR natural, domestic Indonesia**

Used, rigid, from post-consumer waste, e.g. bottles and dishes, excluding packaging parts such as caps, lids, labels, etc. At least 85pc PE by mass. Minimum load size is 4t. Delivered to buyers, inclusive of trucking and barging. Published in IDR/kg.

98/2 flexible PE bale, post commercial, cif southeast Asia

Flexible polyethylene waste from post-commercial collection, e.g. post-use secondary or industrial packaging, 98pc transparent.

Cif Indonesia, Thailand, Malaysia, Philippines, Vietnam, and Singapore. Published in \$/t.

Regranulate pellets**rHDPE natural colour from PCR, domestic Indonesia**

Mechanically recycled. Minimum load size is 4t. Delivered to buyers, inclusive of trucking and barging. Published in IDR/kg.

rLDPE/LLDPE standard film, transparent, fob southeast Asia

Mechanically recycled. Based on standard flexible PE bales from post-commercial waste. Melt flow index 0.5-1.4, limited gels and odours, suitable for transparent secondary packaging film applications.

Loading from Indonesia, Malaysia, Thailand, Philippines, Vietnam, and Singapore. Published in \$/t.

Recycled PVC

Europe

Argus publishes prices for rPVC regrind (flakes), pellets and micronized powder from post-consumer waste.

Prices are published monthly, on an ex-works basis. Prices for each month are published in the first issue of that month. Load size is one truck, typically 21-23t for regrind and 22-24t for pellet and micronized powder.

Prices are assessed and published in the currencies listed below and are also converted to \$/t for publication at the prevailing exchange rate on the day of assessment.

Ex-works northwest Europe

France, Germany, Benelux (Belgium, the Netherlands, Luxembourg)

rPVC regrind white ex-works northwest Europe

White rPVC regrind (flake), k-value 67, from window profile waste, no additives, assessed in €/t

rPVC regrind mixed colour ex-works northwest Europe

rPVC regrind (flake) from mixed-colour waste (typically grey), k value 64-67, no additives, assessed in €/t

rPVC pellet white ex-works northwest Europe

White rPVC pellet, k-value 67, from window profile waste, no additives, assessed in €/t

rPVC micronised powder mixed colour ex-works northwest Europe

rPVC micronized powder from mixed-colour waste (typically dark grey), k value 64-67, no additives, assessed in €/t

Ex-works UK

rPVC regrind white ex-works UK

White rPVC regrind (flake), k-value 67, from window profile waste, no additives, assessed in £/t

rPVC regrind mixed colour ex-works UK

rPVC regrind (flake) from mixed-colour waste (typically grey), k value 64-67, no additives, assessed in £/t

rPVC pellet white ex-works UK

White rPVC pellet, k-value 67, from window profile waste, no additives, assessed in £/t

rPVC micronised powder mixed colour ex-works UK

rPVC micronized powder from mixed-colour waste (typically dark grey), k value 64-67, no additives, assessed in £/t

Pyrolysis oil

Europe

Argus publishes prices for pyrolysis oil derived from pyrolysis chemical recycling of plastic waste in Europe.

Price assessments are of the prevailing range of prices in the market since the last assessment, taking into account transactions and discussion with market participants. Assessments are published weekly, on an fca basis for deliveries into Europe up to six weeks forward from the day of trade.

Assessments take into account spot volumes, including test volumes, the price of which may differ from prices paid for supply under long-term contracts, which themselves vary.

At times of limited market liquidity, reporters will also consult market participants on the effect of fluctuations in related markets such as virgin naphtha, bionaphtha, plastic waste and electricity when making assessments.

Indicative specifications are shown below. Specifications, including final boiling point and contaminant levels can affect the price of pyrolysis oil. All trades are scrutinised and outliers may be excluded from the assessment. Trade for product outside of these specifications may be considered for inclusion in the assessment if deemed relevant to the price of more-standard product.

Pyrolysis oil plastic-derived refinery grade fca Europe

Un-upgraded pyrolysis oil derived from pyrolysis of plastic waste, intended for processing in a refinery or upgrading unit.

Final boiling point of <600C

Indicative contaminant levels:

- Chlorides: <500ppm
- Nitrogenates: <4,500ppm
- Oxygenates: <8,000ppm

Light fraction pyrolysis oil plastic-derived fca Europe

Light fraction pyrolysis oil derived from pyrolysis of plastic waste, intended for processing as a replacement feedstock in a steam cracker

Final boiling point <400C

Indicative contaminant levels:

- Chlorides: <150ppm
- Nitrogenates: <500ppm
- Oxygenates: <2,500ppm

Petrochemical prices

Argus Recycled Polymers includes prices for virgin petrochemicals and polymers. Prices are the latest available at the time of publication.

Ethylene

- Ethylene del NWE contract month 1
- Ethylene cfr Taiwan contract month 1
- Ethylene del USCG pipeline net transaction contract month 1

See the [Argus Ethylene and Derivatives methodology](#)

Propylene

- Propylene polymer grade del Europe contract (MCP) month 1
- Propylene polymer grade fob US contract month 1
- Propylene polymer grade del Taiwan contract month 1

See the [Argus Propylene and Derivatives methodology](#)

Polyethylene

- HDPE injection moulding del NWE
- HDPE injection moulding cfr China
- HDPE injection moulding fas Houston bagged
- LLDPE butene del NWE
- LLDPE butene cfr China
- LLDPE butene fas Houston bagged

See the [Argus Global Polyethylene methodology](#)

Polypropylene

- PP homopolymer del NWE
- PP raffia cfr China

See the [Argus Global Polypropylene methodology](#)

Polyvinyl chloride

- S-PVC pipe del NWE final month 1

See the [Argus PVC and Vinyls methodology](#)

Circular naphtha

Mass-balanced circular naphtha northwest Europe premium

An assessment of the premium to fossil naphtha paid in northwest Europe for naphtha derived from post-consumer plastic waste via pyrolysis or equivalent chemical recycling technology, using mass-balance accounting as certified under ISCC+.

Cargo size: 1,000-5,000t

Timing: delivery 10-30 days forward from the date of assessment

Currency/unit: \$/t

Bionaphtha

Argus Recycled Polymers also includes two bionaphtha prices, which are snapshots of the price on the first day of the named month.

- Bionaphtha cfr northeast Asia
- RED bionaphtha fob ARA range USD/t
- Bionaphtha chemical feedstock fob ARA range USD/t

See the [Argus Biofuels methodology](#)