

Business Breakthrough Barometer 2024

Sustainable fuels



World Business
Council
for Sustainable
Development

BAIN & COMPANY 



29 October, 2024



Key messages

- **The sustainable fuel sector are increasingly positive about the investment environment, but few expect supply to be sufficient in 2030**
 - 96% of sector respondents have increased investments into net-zero activities the last 3 years
 - Only 18% of sector companies expect production will be sufficient to meet demand in 2030
- **Businesses have responded positively to recent policy shifts aimed at driving demand and improving the investment climate for sustainable fuels**
 - Companies say recent regulatory changes have been pivotal; +95% of sector respondents have increased investments into net-zero activities the last 3 years
 - Many businesses leaders welcome the elevated ambitions for sustainable fuel use within REDIII
 - Mandates, have been singled out as critical, providing a clearer demand signal and reducing uncertainty for fuel suppliers
 - While U.S. incentives have also been well-received, concerns remain about the lack of focus on developing advanced sustainable fuels and the overall stability, with current emphasis on road transport overlooks the pressing need for aviation-focused support, as 70% of business see the greatest need of biofuels in the aviation sector
- **Despite policy advancements, companies remain deeply concerned about feedstock supply and the limitations of existing technologies**
 - There is scepticism that current supply chains can scale to meet growing demand given constrained feedstocks (oil, lipids, and food-based)
 - The EU's decision to add cover crops to the approved feedstocks is expected to ease supply pressures, though the scale of impact remains uncertain
 - Over the past year, profitability for producers has come under pressure due to volatility in feedstock prices, eroding confidence and reducing the appetite for further investment in traditional FAME and HEFA pathways
- **Across the value chain, fuel producers tend to be pessimistic on the near-term scaling of novel production technologies such as AtJ and GFT**
 - AtJ and GFT can leverage abundant feedstocks like municipal waste and agricultural residues, but only 0.4 Mt of capacity is currently deployed
 - CapEx requirement are a major barrier, with AtJ and GFT projects requiring investments of around 4-5x HEFA plants
 - As a result, many projects are struggling to reach FID, with investors unwilling to commit to high-risk ventures without more robust policy incentives
- **Longer term, businesses see strong potential in PtL due to its ability to leverage a near unlimited feedstock supply, but progress has been slow**
 - Businesses are optimistic PtL could play a key role in meeting demand for SAF by the mid-2030s
 - But current costs are 3-4x HEFA; and potential offtakers are holding back from long term agreements in anticipation of falling costs.
 - Companies urge greater support for point source capture above current US incentives of \$85 per toe
 - DAC is seen as a longer-term and more risky investment, requiring significantly more funding and incentives to bring the technology down the cost curve
- **Companies cite challenges with securing cost-effective feedstock and lack of international standards as top barriers**
- **Top of business agenda is policy interventions within demand support, scaling advanced technologies, and standards & certifications**

The sustainable fuel sector are increasingly positive about the investment environment, but few expect supply to be sufficient in 2030



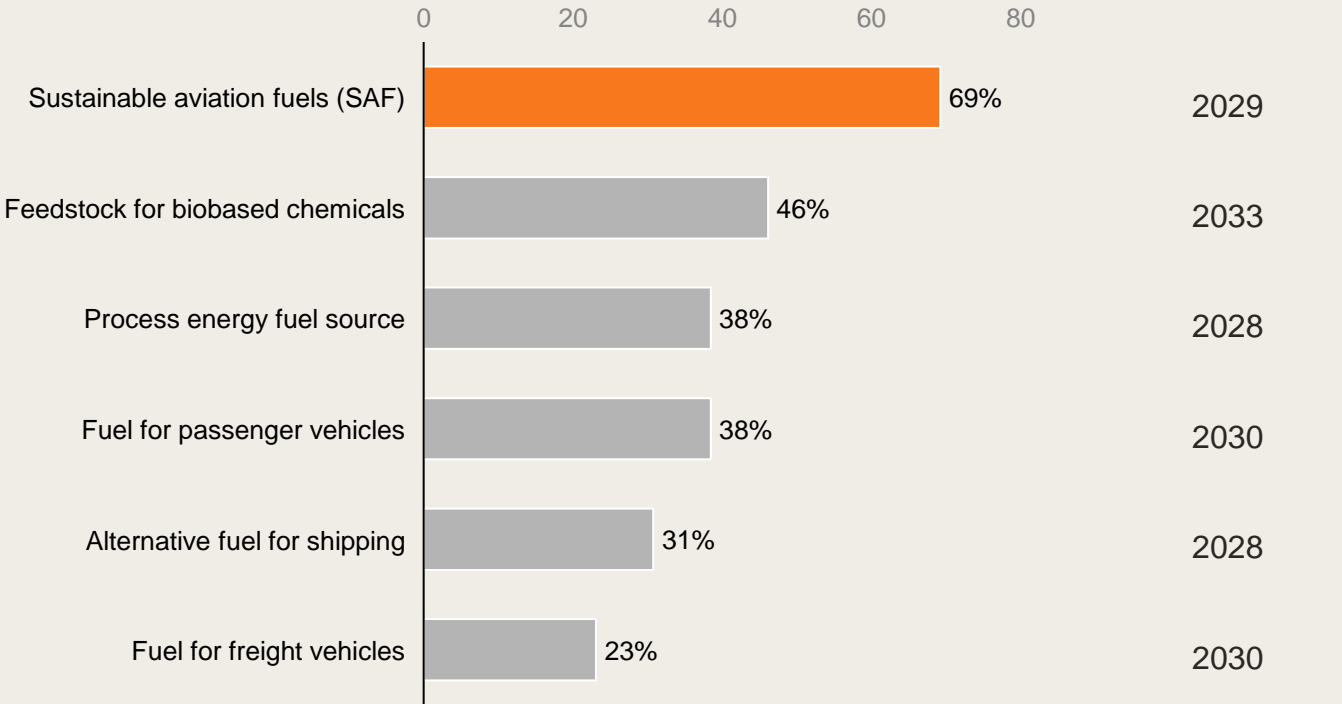
96% of sector respondents have increased investments into net-zero activities the last 3 years

Only 18% of sector companies expect production will be sufficient to meet demand in 2030

Source: Business Breakthrough Barometer Sector Survey (N=250)

Businesses have responded positively to recent policy shifts aimed at driving demand and improving the investment climate for sustainable fuels

Share of survey respondent choosing use case as top 3 use case to drive biofuel demand (%)



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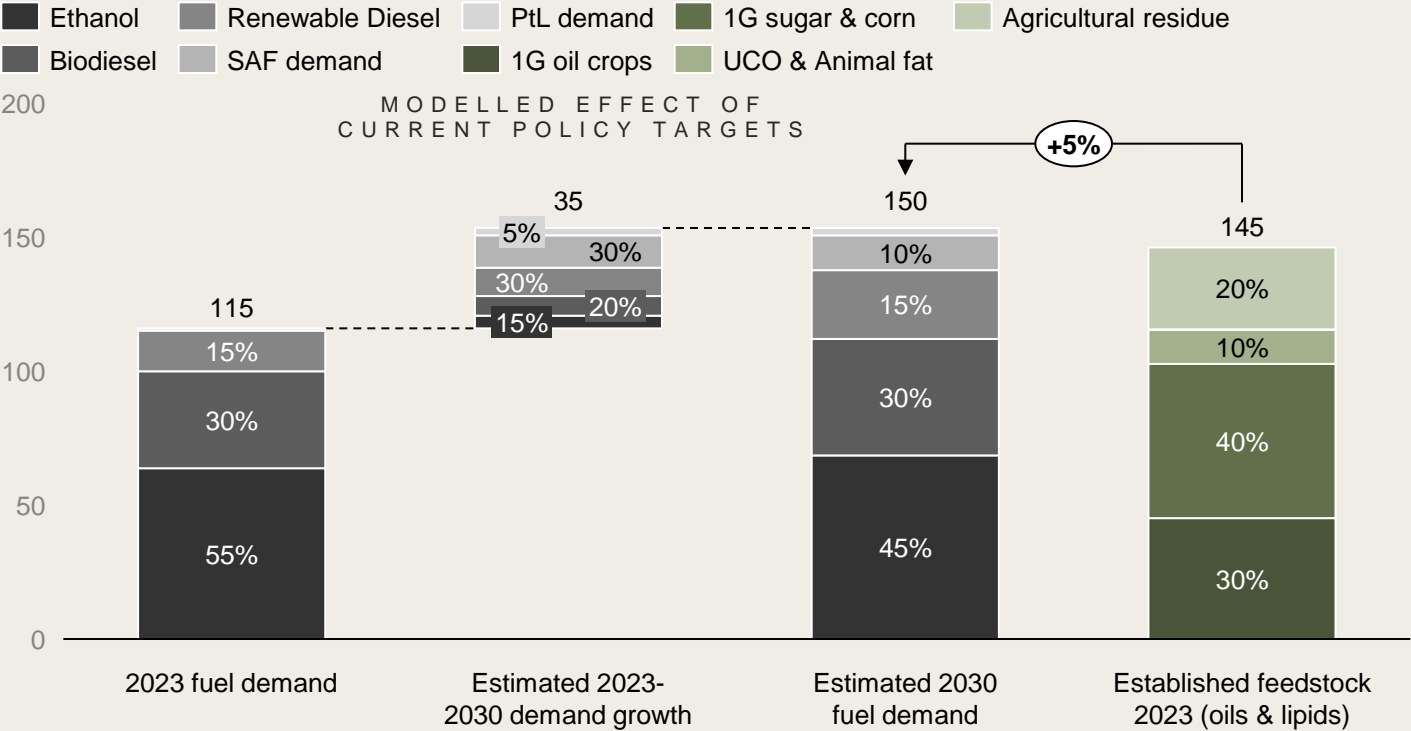
RED III will drive sustainable fuel demand, it creates significant penalties for not meeting set targets, especially in Germany

VP MARKET DEVELOPMENT,
SUSTAINABLE FUEL PRODUCER

Note: RED = Renewable Energy Directive
Source: European Commission; Business Breakthrough Barometer Sector Survey (N=250); Business Interviews; Lit. search; Bain analysis

Despite policy advancements, companies remain deeply concerned about feedstock supply and the limitations of existing technologies

Global Sustainable Aviation Fuel (SAF), Renewable diesel, Ethanol and Biodiesel demand vs. HEFA, FAME & Ethanol pathway practically available feedstock (Mtoe/yr, 2023)



- There is scepticism that current supply chains can scale to meet growing demand due to constraints in sustainable feedstocks (oil, lipids) and competition with food supply for first-generation food-based feedstocks (sugar, corn)
- The EU’s decision to add cover crops to the approved feedstocks is expected to ease supply pressures, though the scale of impact remains uncertain
- Over the past year, profitability for producers has come under pressure due to volatility in feedstock prices, eroding confidence and reducing the appetite for further investment in traditional FAME and HEFA pathways

Feedstock is what limits scaling sustainable fuel supply, companies are currently fighting over existing feedstock supply

CEO, FEEDSTOCK SUPPLIER

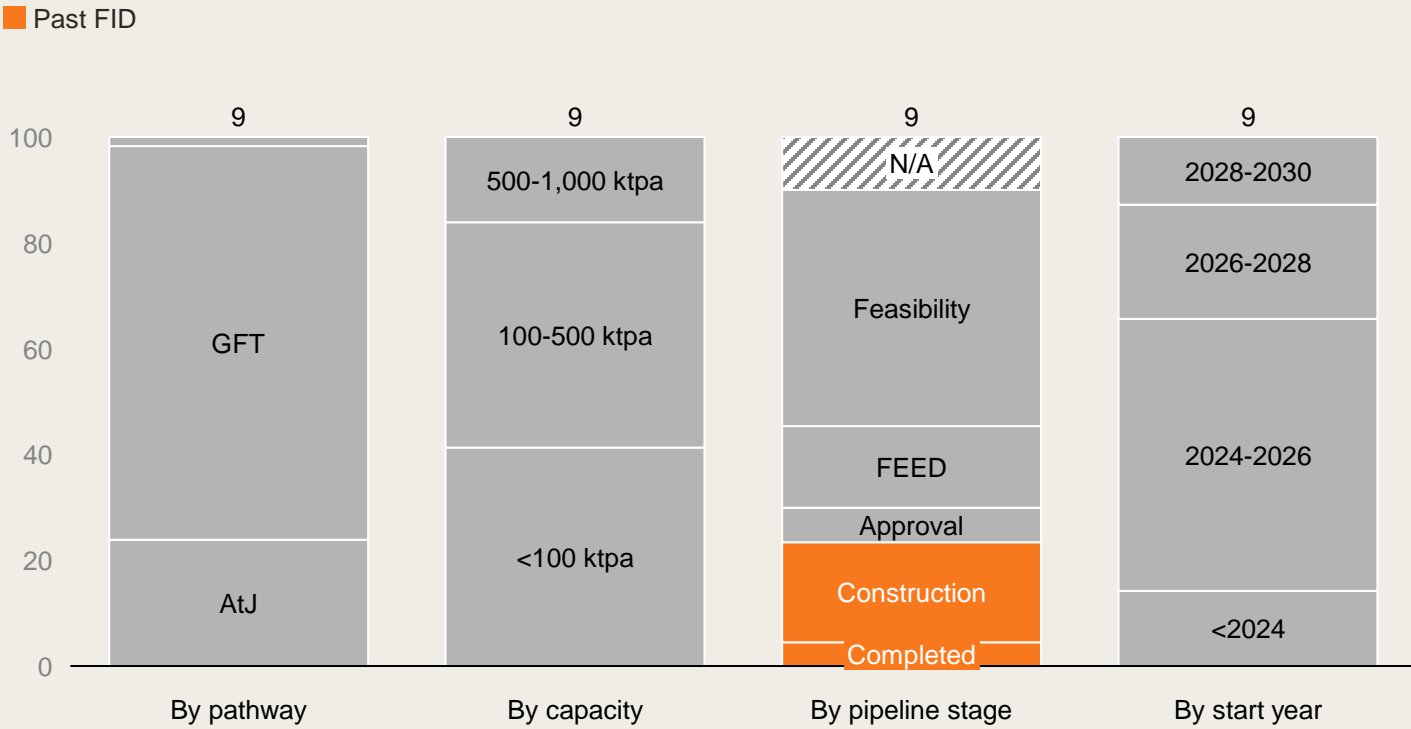
Today SAF is produced by hydrotreating veg oils and animal fats, known as HEFA, and these feedstocks have a limitation on the total supply. And so, everybody realizes that the question is what comes next and alcohol/methanol are seen as likely options

CEO, SUSTAINABLE FUEL PRODUCER

Note: PtL = Power-to-Liquid, UCO = Used cooking oil, FAME = Fatty acid methyl esters, HEFA = Hydroprocessed Esters and Fatty Acids 1) Includes all practically available feedstock of animal fat and UCO (of which a significant share will be consumed by FAME refineries) Source: GlobalData 2024, Bain integrated supply and demand model; Business Breakthrough Barometer Sector Survey (N=250); Business Interviews; Bain analysis

Across the value chain, fuel producers tend to be pessimistic on the near-term scaling of novel production technologies such as AtJ and GFT

Global GFT & AtJ refinery capacity pipeline (Mtoe, As of 2024-Jan)



- AtJ and GFT can leverage abundant feedstocks like municipal waste and agricultural residues, but **only 0.4 Mt of capacity is currently deployed**
- **CapEx requirements are a major barrier**, with AtJ and GFT projects requiring investments of around 4-5x HEFA plants
- **As a result, many projects are struggling to reach FID**, with investors unwilling to commit to high-risk ventures without more robust policy incentives

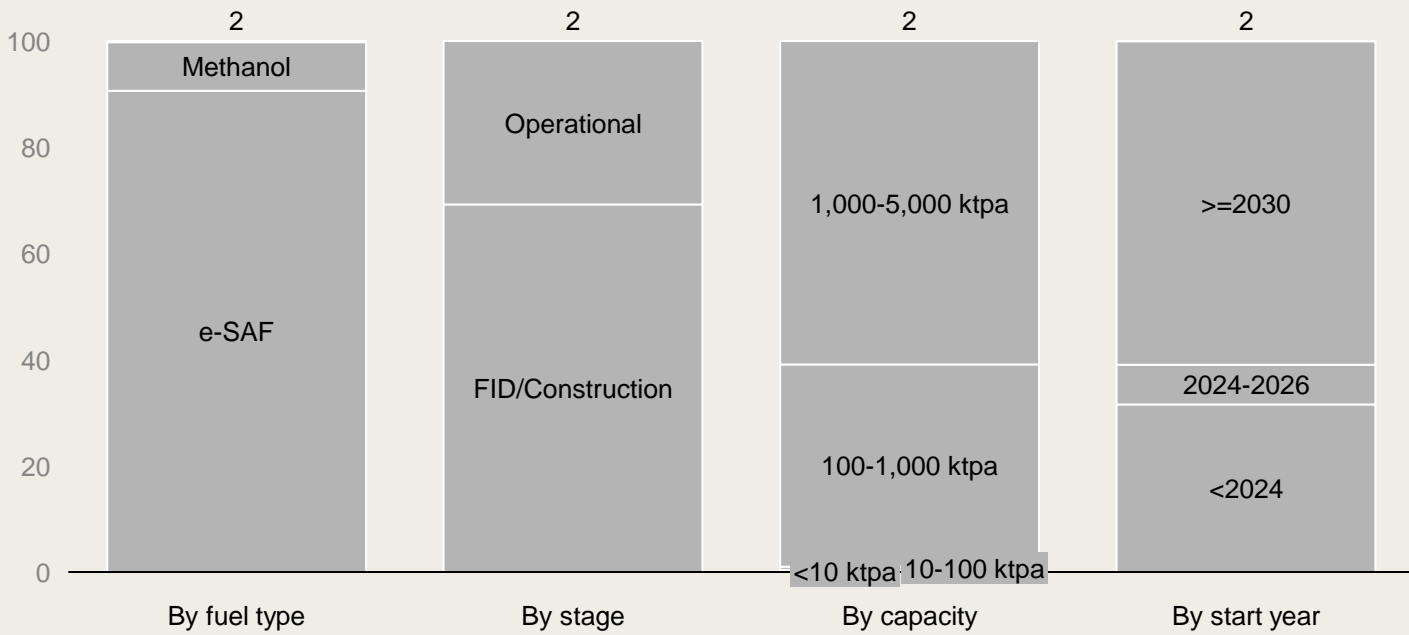
We need long-term fixed-price offtakes to secure the project funding needed to unlock large-scale investment in green fuels ... Mandates alone aren't enough; **we need mechanisms that help our customers to commit to the green premium needed for long-term offtake**

CEO, SUSTAINABLE FUEL PRODUCER

Source: GlobalData 2024; Bain Integrated supply and demand model; Business Breakthrough Barometer Sector Survey (N=250); Business Interviews; Bain analysis

Longer term, businesses see strong potential in PtL due to its ability to leverage a near unlimited feedstock supply, but progress has been slow

Global Power-to-Liquid capacity pipeline passed FID (Mtoe, As of 2024-May)



- Businesses are optimistic PtL could play a key role in meeting demand for SAF by the mid-2030s
- But current costs are 3-4x HEFA; and potential offtakers are holding back from long term agreements in anticipation of falling costs.
- Companies urge greater support for point source capture above current US incentives of \$85 per toe
- DAC is seen as a longer-term and more risky investment, requiring significantly more funding and incentives to bring the technology down the cost curve

The PtL routes can be the long-term solution to green fuels at scale, but very few first movers are building these now because they're not commercially viable without a large green premium. It's going to take another three to five years before the scale can really come in and start to drive down costs. Supporting early movers to bridge the cost gap now is essential

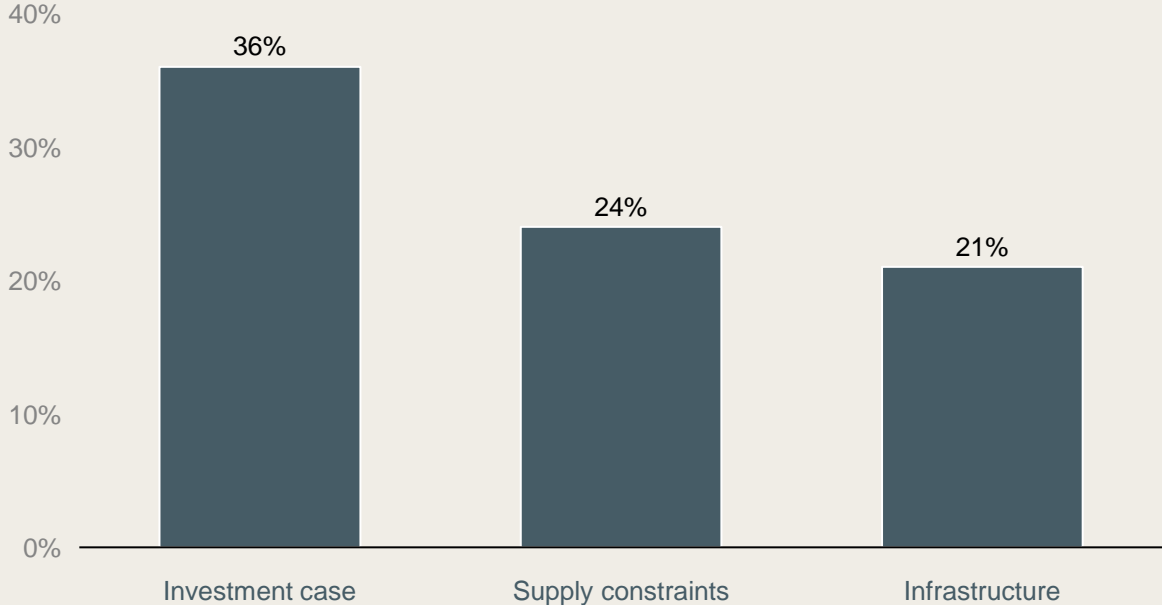
CEO, SUSTAINABLE FUEL PRODUCER

Note: 1) Includes ammonia, eGasoline, eDiesel and combined methanol and kerosene plants
 Source: Bain Integrated supply and demand model; GlobalData Hydrogen Plant database (May 2024 update); Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

Companies cite challenges with securing cost-effective feedstock and lack of international standards as top barriers

Which of the following do you view as the sector's largest barriers for accelerating investment in the development and production of biofuels?
Please select the top 3 most impactful barriers

Share of survey responses selecting barrier in the top 3 (%)



INVESTMENT CASE

- Companies are struggling with profitability given volatile feedstock prices (waste fats, oils, and greases) and therefore dampening investment in further supply
- High CapEx requirements for advanced technologies are a key barrier for getting projects past FID
- This is exacerbated by a perception of regulatory instability, and in some jurisdictions weak measures to create and sustain robust demand



SUPPLY CONSTRAINTS

- Mature feedstocks (1 gen oil crops, UCO & animal fat) are constrained by current regulation, resulting in a tight market fighting over existing supply according to suppliers; greater direct support for breakthrough technologies is critical



INFRASTRUCTURE

- The lack of harmonized international standards for sustainable fuels forces producers to navigate varying regulations, increasing compliance costs and creating uncertainty

Source: Business Breakthrough Barometer Sector Survey (N=250), Business interviews; Bain analysis

Sector sees key policy focus for sustainable fuels in demand support, subsidies, standard collaboration, and streamlined certification process

WHAT ARE THE TOP THINGS REGULATORS SHOULD FOCUS ON IN THE NEXT 12 MONTHS TO ACCELERATE INVESTMENT IN THE DEVELOPMENT AND DEPLOYMENT OF KEY TECHNOLOGIES AND SOLUTIONS TO ENABLE THE NET ZERO TRANSITION WITHIN THE BIOFUEL SECTOR?



INTERNATIONAL



Source: Business Breakthrough Barometer Sector Survey (N=250)

Top of business agenda is policy interventions within demand support, scaling advanced technologies, and standards & certifications

Policy focus

National  International 





Demand support





Advanced technology support



Standards & certifications

-  **Mandates for sustainable fuels** targeting specific demand sectors, favouring fuel types with the most long-term potential
-  Developing **book and claim systems** is fundamental for scaling early production of sustainable fuels, as it ensures production can occur in the most rational and cost-efficient hubs

-  **R&D funding and tailored support programs** to support development of advanced technologies like direct air capture and power-to-liquid
-  **CapEx support** for first-of-a-kind advanced sustainable fuel supply projects is crucial to encourage investment in unconstrained pathways

-  Establish **consistent global standards and definitions** for sustainable feedstock to ensure a level playing field
-  **Clarify and simplify certification processes** for sustainable fuels to reduce administrative burdens and enhance transparency

Thank
You



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