資料1
フュージョンエネルギーの実現に向けた
安全確保の基本的な考え方検討タスクフォース
令和6年9月19日

“COMMERCIALIZING LASER FUSION TO SAVE OUR PLANET”

INTRODUCTION TO BLUE LASER FUSION

“COMMERCIALIZING LASER FUSION TO SAVE OUR PLANET”

- Dr. Shuji Nakamura, 2014 Nobel Prize Laureate

BLUE LASER FUSION, INC.

Goleta, CA USA and Tokyo, Japan

Company overview

Founded in 2022, US company

US and Japan sites

- Headquarters: Palo Alto, CA (Silicon Valley)
- CA Office & Lab: Goleta, CA (Santa Barbara)
- Japan entity: Tokyo office, Osaka lab

World renown team of innovation experts

- Target modeling and fabrication
- Laser beam combination & optical enhancement cavity
- Target injection & reactor design

Experienced growth stage commercialization team

- Gov program & commercial business development
- Site planning for power plant design & construction
- IP, legal, regulatory & export compliance

Shuji Nakamura, Ph.D
CEO, Co-Founder
Board Member

Hiroaki Ohta, Ph.D
CTO, Co-Founder
Board Member

Richard Ogawa, Esq.
General Counsel, Co-Founder
Board Member

FUSION INDUSTRY ASSOCIATION

Company member

Japan Fusion Energy Council (J-Fusion)

Founding member

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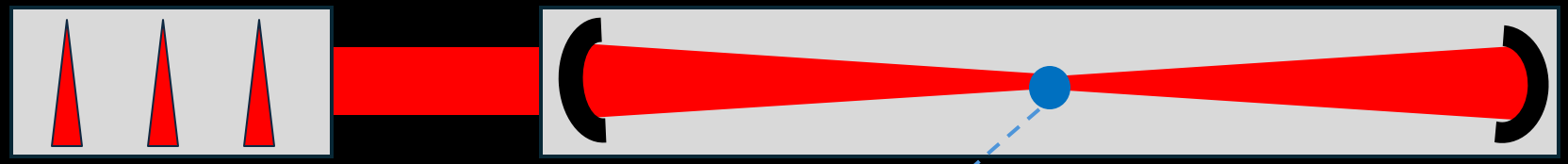
Key technologies: Laser + Target innovations

High efficiency CBC laser
Novel, high energy, modular pulsed source

Optical enhancement cavity (OEC)
10,000X laser pulse energy stacking



High gain target
Proprietary, low cost solid fuel design

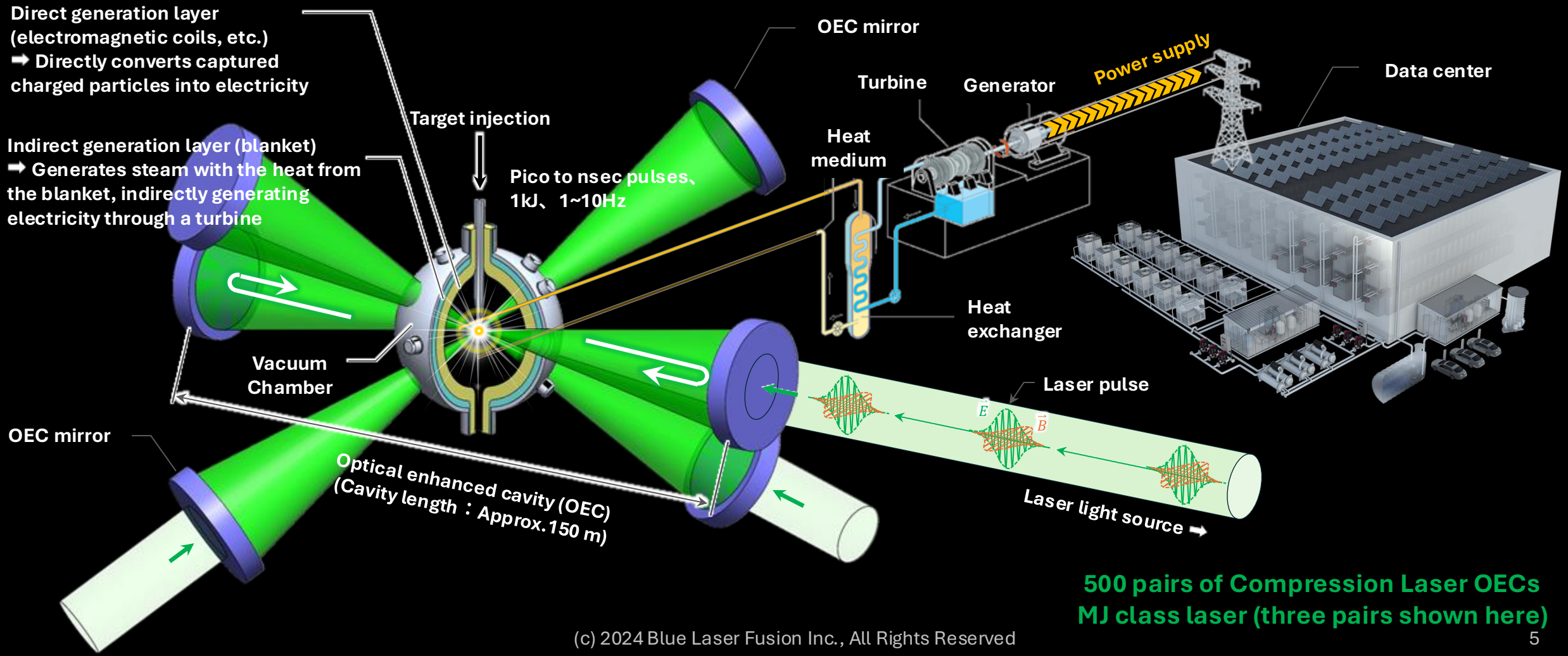
Direct drive, fast ignition
Efficient (no hohlraum) high density fuel compression & heating

Efficient energy conversion
High efficiency conversion of charged particles

Blue Laser Fusion innovations are enabling for commercial fusion.

Blue Laser Fusion's OEC Fusion Reactor

Innovative high-performance pulse source (CBC laser) light is accumulated between two pairs of mirrors, enhancing intensity to achieve fusion (OEC Fusion Reactor method)



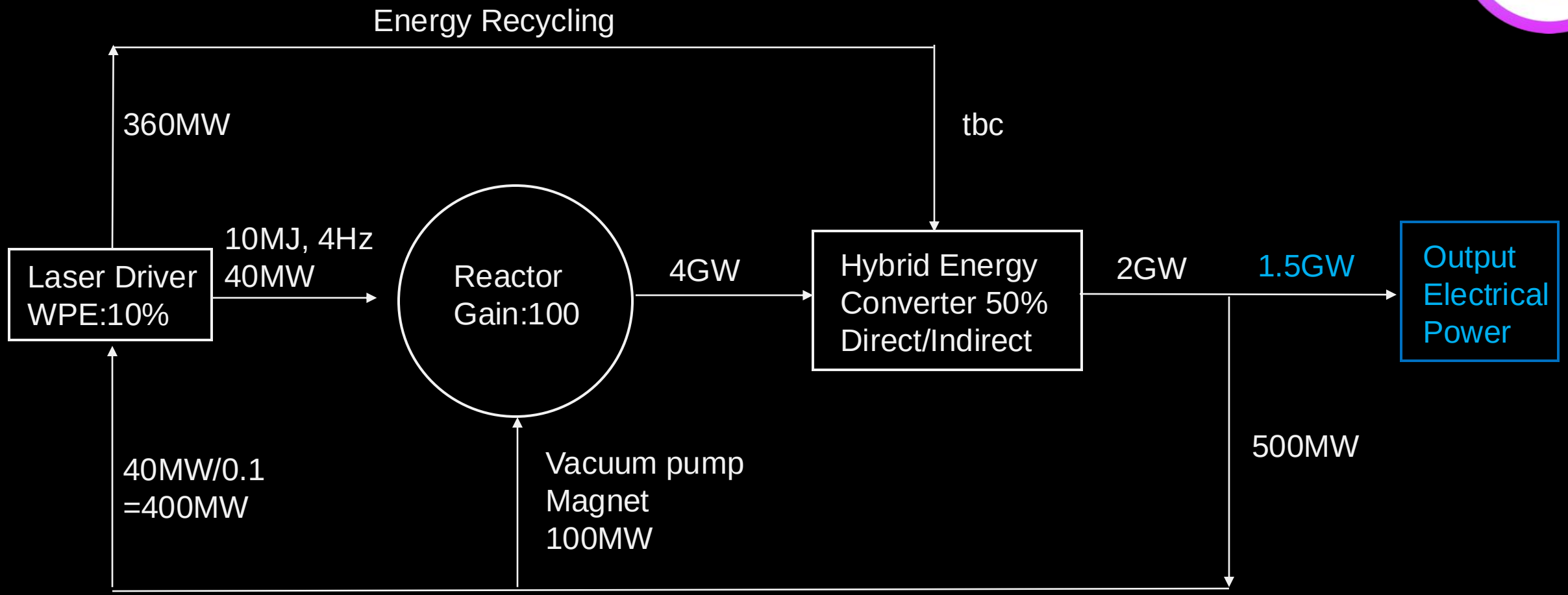
500 pairs of Compression Laser OECs
MJ class laser (three pairs shown here)

BLF's Novel High Gain Target with Neutron Reduction

Parameter	DT target & reactor	BLF target & reactor
Reaction	He4 (3.5MeV) + n(14.1MeV)	Multi-layer, high gain fuel target
Ignition temperature	✓	✓
Gain	✓	✓
Neutrons	✗	✓
Cost	✗	✓
Total	✗	✓

BLF's target design is designed for commercial fusion and addresses performance and cost shortfalls of previous approaches.

Energy Flow of OEC Fusion System: Gain100, 10MJ Pulse



Number of OECs: 500
Frequency: 4Hz
Reflectivity: 99.9995%

Development and Construction Roadmap

Phase 1: 2024-2025

OEC & Novel target Proof-of-concept

- BLF begins designing and testing ICF reactor configured with a proprietary and novel high-power pulse stacking OEC laser.
- BLF's novel solid high gain target tested.
- BLF performs study on facilities, technology, equipment, people, legal & regulatory.

Phase 2: 2026-2027

Construct Reactor

BLF begins construction of the ICF plant including

- Proprietary and novel high-power pulse stacking OEC lasers
- Novel, solid high gain solid fuel target
- Fusion reactor
- Target delivery system &
- Building

Phase 3: 2028-2030

Demonstrate ignition

- BLF shall start operating and optimizing of the ICF reactor and the power generation system.
- BLF shall demonstrate a prototype power generation system with an electric power of 1GW around 2030.

3 Phase roadmap culminates in 1GW fusion pilot plant in 2030.

Site planning overview

Site planning underway

- US: Calif REACH with Vandenberg & Diablo Cleantech Park, TVA offering candidate sites
- Japan: Takenaka collaboration; signed MOU
- EU: Collaboration discussions underway RSE Italia

2024-2025, Phase 1
15m OEC laser, 1 kJ
100kW electrical
(BLF Goleta facility)

2025-2026 Phase 1
150m OEC laser, 10 kJ
1MW electrical, 1 acre
(Vandenberg or Diablo CA)

Vandenberg Space Force Base
REACH
The Port of Hueneme
PRECISION CONSTRUCTION SERVICES

2026-2027 Phase 2
Small scale pilot, 50 kJ
5 x 150m OECs
Research reactor
10MW elect, 2 acres
(TVA, IPA Utah, Diablo CA)

TENNESSEE VALLEY AUTHORITY
IPA Intermountain Power Agency
DIABLO CANYON
BECHTEL

2028-2030 Phase 3
Full scale pilot commercial power plant, GW class
500 x 150m OECs 10MJ IFE reactor
Power to grid
500MW elect, 50 acres
(TVA, IPA Utah, Diablo CA)

TENNESSEE VALLEY AUTHORITY
IPA Intermountain Power Agency
DIABLO CANYON
BECHTEL

BLF Awarded INFUSE Grant by U.S. DOE

- Project: "High Energy Pulsed Laser Amplification Using Optical Enhancement Cavities"
- Collaboration with California Institute of Technology
- Part of DOE's $4.6M INFUSE program supporting public-private partnerships

Department of Energy Announces $4.6 Million to Fund Public-Private Partnerships for Fusion Research

List Posted: 8/8/2024

Selection for award negotiations is not a commitment by DOE to issue an award or provide funding.

Principal Investigator	Title	Institution	City	State	Zip Code	Partner
Theobald, Wolfgang	Mitigation of Cross Beam Energy Transfer and Hot Electrons by Laser Spectral Bandwidth	Focused Energy, Inc.	Austin	TX	78758-3352	University of Rochester
Washington, Aaron	Development of advanced, oxidation-resistant vanadium alloys for fusion blanket applications	Tokamak Energy, Inc.	Wilmington	DE	19801-1120	Oak Ridge National Laboratory
Perlado, J. Manuel	Tritium Handling System Assessment for Proton Fast Ignition	Focused Energy, Inc.	Austin	TX	78758-3352	Savannah River National Laboratory
Jacobson, Craig	Are Magnetohydrodynamic Forces Low Enough to Enable Single Coolant Lead Lithium Blankets in Tandem Mirror Reactors?	Realta Fusion Inc.	Madison,	WI	53726-4014	Oak Ridge National Laboratory
Eidietis, Nicholas	Developing Matter Injection Technologies for Fusion Power Applications	General Atomics	San Diego	CA	92121-1122	Oak Ridge National Laboratory
Monton, Carlos	Metal "Film" Pump for Direct Internal Recycling of Fusion Fuel	General Atomics	San Diego	CA	92121-1122	Idaho National Laboratory
Khechfe, Alexi	In situ Elemental Analysis of Fluoride Molten Salt Using Laser Induced Breakdown Spectroscopy (LIBS)	CFS	Devins	MA	02139-4239	Oak Ridge National Laboratory
Rutkowski, Adam	Testing of Engineered Membranes in Fusion-Relevant Metal Foil Pumps	Marathon Fusion	San Francisco	CA	94103-3812	Colorado School of Mines
Reyes, Susana	Tritium extraction from flibe blankets using the CoRExt process	Xcimer Energy Corporation	Redwood City	CA	94065-1422	Savannah River National Laboratory
Dorn, Chris	Isotopic Characterization of Li-6-enriched Lithium-Lead Samples under Neutron Irradiation	Kyoto Fusioneering America	Seattle	WA	98101-1217	Idaho National Laboratory
Dettrick, Sean	Validation of Kinetic Models of FRC Stability against C-2W Experiment	TAE Technologies, Inc.	Foothill Ranch	CA	92610-2607	Princeton Plasma Physics Laboratory
Eich, Thomas	SOLPS-derived separatrix operating space scalings for informing SPARC integrated power exhaust scenarios	CFS	Devins	MA	02139-4239	Oak Ridge National Laboratory
Jacobson, Craig	Efficient Neutral Beam Injection for Mirror Fusion Reactors	Realta Fusion Inc.	Madison,	WI	53726-4014	Lawrence Berkeley National Laboratory
Kotschenreuther, Michael	Testing Novel Liquid Metal PFC compositions	ExoFusion	Bellevue,	WA	98005-1805	Pennsylvania State University
Johnson, Zachary	High Temperature Superconducting Cable Testing and Optimization for Stellarator Fusion Applications	Type One Energy Group	Madison,	WI	53703-4475	Florida State University
Cohen, Trevor	High Energy Pulsed Laser Amplification Using Optical Enhancement Cavities	Blue Laser Fusion	Goleta	CA	93117-2896	California Institute of Technology
Sowder, Andrew	Building a Tritium Facility Operating Experience Body of Knowledge to Support Commercial Fusion Power Plant Safety Case Development and Licensing	Electric Power Research Institute	Palo Alto	CA	94304-1356	Savannah River National Laboratory

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THANK YOU