

FROM FOREST TO HYDROGEN

Nonsan BE-CCUS V3 Integrated Project

Bioenergy with CCUS · Green Hydrogen · 24/7 RE100

Today's Round — 7 Sections

- 01** **Three Converging Crises in Korea**
Forest backlog · RE100 · Gray charcoal
- 02** **ARK Ecosystem — Mainstream Orchestrator**
Upstream forestry ↔ downstream markets
- 03** **V3 Integrated Structure — SPC1 + SPC2**
Dual-SPC · branch & merge process
- 04** **5-Stream Revenue + Integrated Asset View**
KRW 619 → 814 Bn (+31.5%)
- 05** **Financial Simulation — V2 vs V3**
76.5% EBITDA margin · 3.58x DSCR
- 06** **24/7 RE100 + Green H₂ + White Carbon**
Solving 4 national agendas at once
- 07** **Roadmap · PF Structure · Investment Thesis**
Action plan + 7 decision gates

SECTION 01

Three Converging Crises in Korea

Three structural problems demand a single solution

Forest backlog of 1Bn m³ · RE100 supply <9% · 96% gray-charcoal import dependency. Each treated as a separate policy or industrial issue costs ~1-2% of GDP. ARK V3 absorbs all three simultaneously on a single site.

Three Crises, One Solution

FOREST BACKLOG

1.0 Bn m³

Unharvested forest stock

70-80% of Korean forests have aged into Class IV-VI (40+ years). Harvest-replant cycles have stalled. Lack of off-take markets drives wildfire & pest spread, collapsing carbon sink capacity.

RE100 + GRID

< 9 %

RE100 fulfillment rate

100+ Korean RE100 corporates. Solar/wind intermittency + grid saturation prevent 24/7 industrial supply. Top bottleneck for Yongin semi cluster & data center siting decisions.

GRAY CHARCOAL

96 %

Import dependency

96% of industrial carbon is imported gray charcoal from SE Asia/China. Supply-chain insecurity + opaque carbon footprint + CBAM non-compliance erodes Korean export competitiveness.

These three are linked crises — they generate true value only when solved together on a single site.

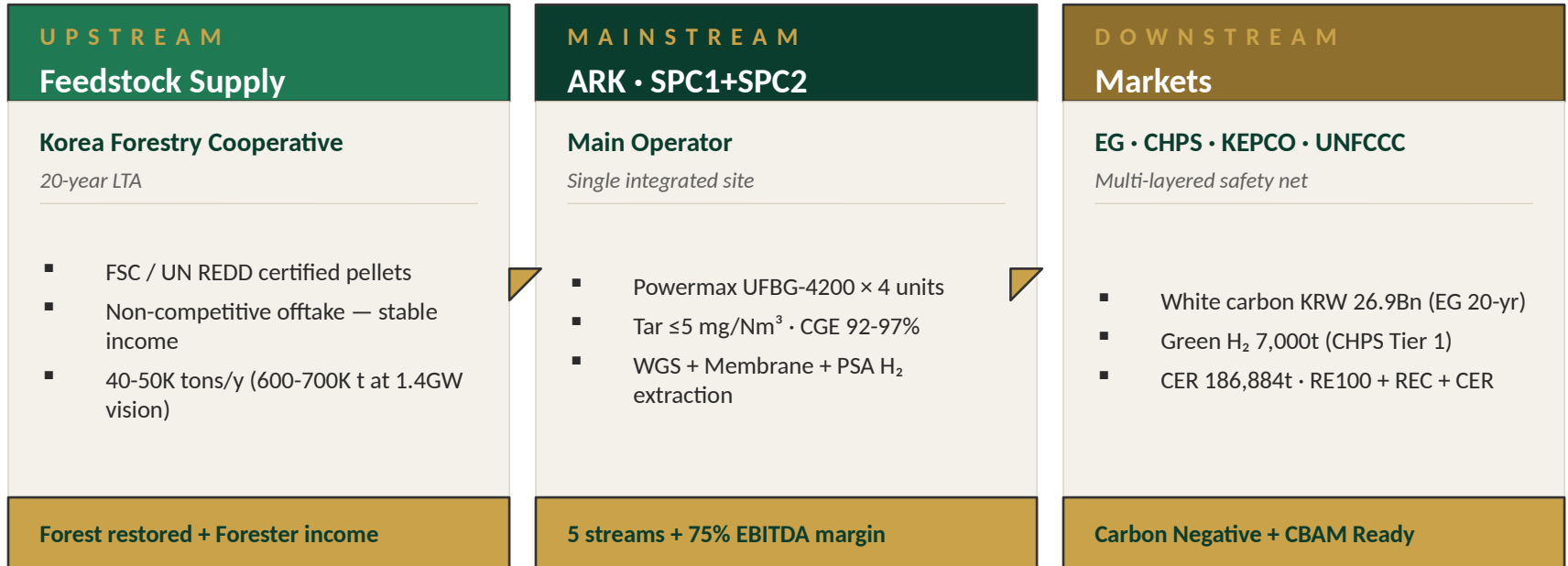
SECTION 02

ARK Ecosystem — Mainstream Orchestrator

Mainstream orchestrator, not just a power company

ARK is the mainstream orchestrator of Korea's biomass value chain. We design and operate the value transformation between upstream (Korea Forestry Cooperative, 20-year LTA) and downstream (CHPS · KEPCO · EG · CBAM markets).

Forest to Hydrogen — ARK Owns the Mainstream



ARK is not a power company. ARK is the mainstream orchestrator from forest to hydrogen.

SECTION 03

V3 Integrated Structure — SPC1 + SPC2

Branch & merge — pre-engineered process integration

V3 leaves V2 base business (power · white carbon · CER) untouched while branching part of clean syngas to extract hydrogen and merging the tail gas back into power generation. Additional OPEX/CAPEX ≈ 0 ; >95% drops directly to EBITDA.

SPC1 Safety 100% + SPC2 Upside Stack

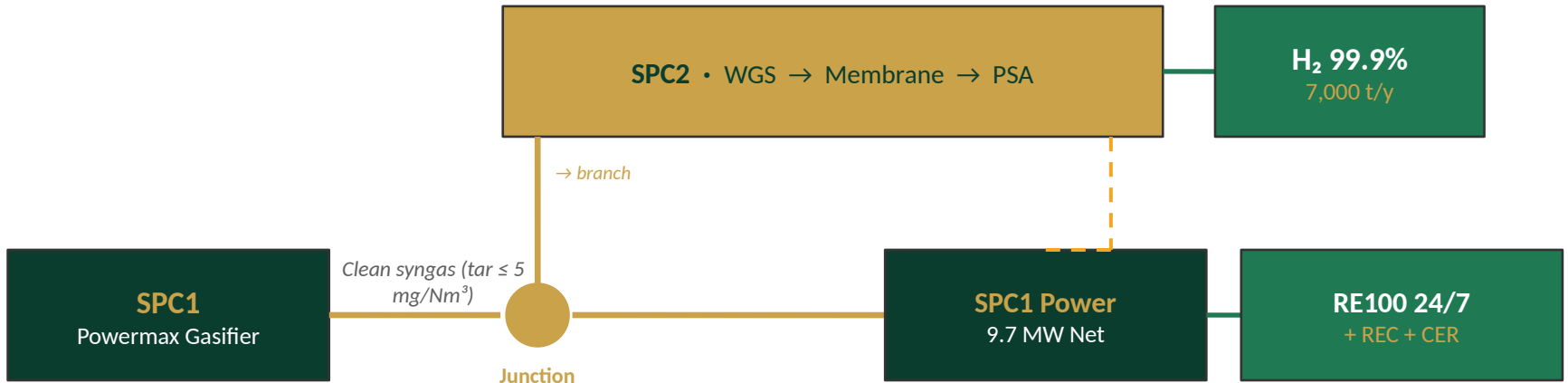
SPC1 Nonsan Bioenergy Co.		SPC2 Nonsan Hydrogen Energy Co.	
V2 KPMG FS v2.0 — unchanged		V3 new — stacked on top	
Annual Revenue (V2 only)	KRW 61.9 Bn	H ₂ production	7,000 tons/y
EBITDA margin		Revenue (Base)	KRW 99.6 Bn
Project IRR	24.7%	Project IRR	48.3%
PF KRW 140 Bn	Tranche A/B/C	CAPEX (separate PF)	KRW 22 Bn
DSCR (RF Y4)	2.64x	DSCR / Payback	3.1 yrs
Phase 1 COD : Sep 2027		Phase 2 COD : Sep 2028	



Cross-Default Blocked

V2 PF KRW 140Bn lender protection 100% intact — V3 add-on revenue is one-way upside stack

Syngas Branch & Merge — V3 Signature Process



- ① SPC1 gasification + ESP cleanup
- ② Branch portion of syngas → SPC2
- ③ WGS-PSA → H₂ 7,000 t/y
- ④ Tail gas → SPC1 generator (merge)
- ⑤ SPC1 → SPC2 RE100 PPA 2 MW
- ⑥ Site · feedstock · O&M shared

Same site · same feedstock · +KRW 19.5 Bn revenue · additional OPEX/CAPEX ≈ 0

5 Core Contracts — Legal Separation + Operational Integration

Contract	Term	Key conditions	Financial impact (SPC1)
① SGSA — Clean syngas supply	20 yrs	Tar ≤ 5 mg/Nm ³ · 2,500-3,000 KRW/kg-H ₂ · Take-or-Pay 80%	+ KRW 17.5-21.0 Bn /y
② Site Lease	25 yrs	5-7K m ² · CPI indexed · infra usage rights	+ KRW 0.8 Bn /y
③ RE100 PPA — On-site direct	15 yrs	2 MW × 8,322h × 300 KRW/kWh fixed · RE100 cert guaranteed	+ KRW 4.9 Bn /y
④ Joint O&M — HPS integrated	10 yrs	HPS outsourced · 90% uptime guarantee · LD	Cost down · efficiency ↑
⑤ Tail Gas Recovery — Free	20 yrs	Post-PSA tail gas free supply to SPC1 generator	V2 power preserved

Cross-Default Blocked · SPC1 and SPC2 carry independent PF, tax & environmental liability — default does not transfer

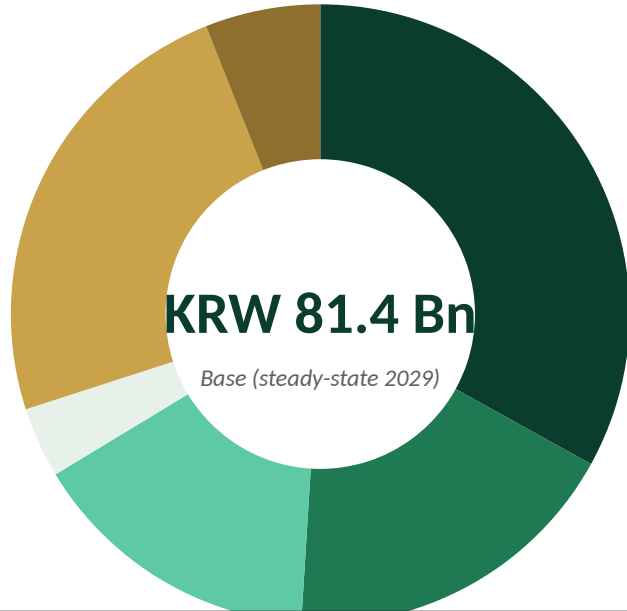
SECTION 04

5-Stream Revenue + Integrated Asset View

From 619 to 814 — capital efficiency at the extreme

On top of V2's KRW 61.9 Bn guaranteed revenue, V3 adds syngas supply (+19.5) · RE100 PPA (+4.9) · site lease (+0.8) — totaling SPC1 V3 revenue of KRW 81.4 Bn. With near-zero additional OPEX/CAPEX, 95%+ flows directly to EBITDA.

SPC1 V3 Revenue — 619 + 195 + 49 = 814 (KRW 100M)



Revenue breakdown (Base, KRW 100M)

① White Carbon (V2)		269
③ CER (V2)		146
② KEPCO PPA (V3 net)		125
④ Biochar / Steam (V2)		30
⑤ Syngas Supply (V3)		195
⑥ RE100 PPA (V3)		49

V3 new streams 244 (⑤ + ⑥) · +OPEX only 4 → ~240 (98%) drops directly to EBITDA

Integrated Asset (SPC1 + SPC2) — Single Asset View

	SPC1 alone (V3 Base)	SPC2 alone (Base)	Integrated Climate-Tech Hub
Annual Revenue	KRW 81.4 Bn	KRW 99.6 Bn	KRW 181 Bn
Annual EBITDA	KRW 62.3 Bn	KRW 57.1 Bn	KRW 119 Bn
EBITDA Margin	76.5%	57.3%	~66%
Project IRR	33.2%	48.3%	—
Annual CER (tCO ₂ e)	110,884	86,000	186,884
Exit Valuation	—	—	KRW 1.2-1.4 Tn (~USD 0.9-1.0 Bn)

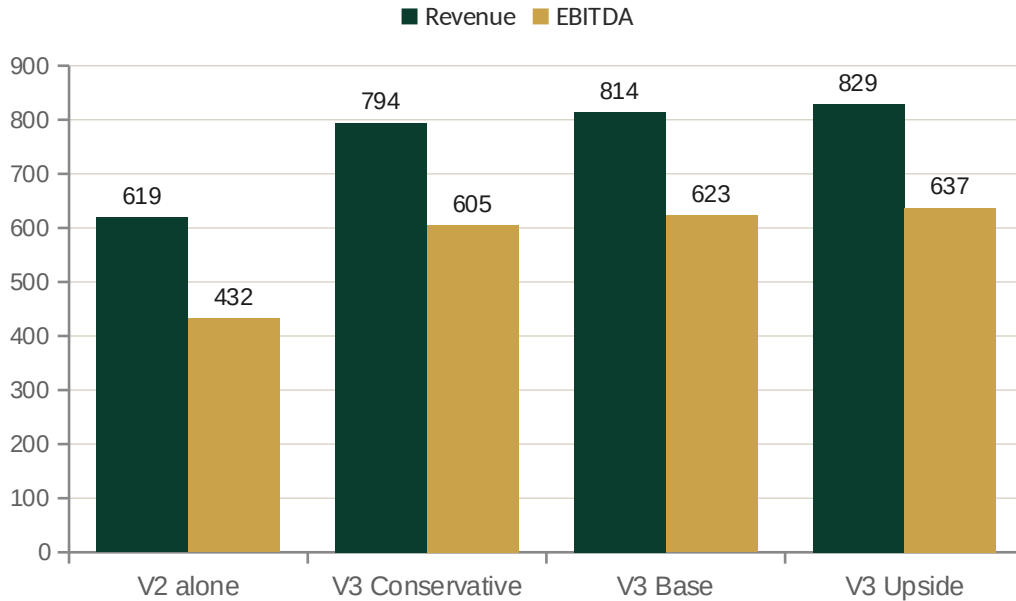
Top-quartile asset profile aligned with global infra-fund exit targets (Macquarie GIF • GIC • KIC)

Financial Simulation — V2 vs V3

Top quartile economics with defensive add-on

V2 standalone IRR 24.7% · DSCR 2.64x → V3 Base IRR 33.2% · DSCR 3.58x. Even under Worst Complex (6 simultaneous adverse shocks), V3 DSCR holds at 1.94x — a +0.26x improvement vs V2 1.68x. The add-on revenue functions as a downside-rigidity asset.

Steady-state P&L (Base, SPC1 alone, KRW 100M)



V3 Base Key Metrics

EBITDA margin

76.5%

+6.7pp vs V2

Project IRR

33.2%

+8.5pp vs V2

Equity IRR

150.4%

+37.2pp vs V2

DSCR (RF Y4)

3.58x

+0.94x vs V2

+19.5 in revenue → +19.1 in EBITDA (97%) — V3 add-on is a risk-free incremental

20-Year Cumulative — Absolute Asset Value

20Y CUM EBITDA

V2 alone

KRW 864 Bn

V3 Integrated Base

KRW 1,216 Bn

+ 352

20Y CUM FCFF

V2 alone

KRW 776 Bn

V3 Integrated Base

KRW 1,090 Bn

+ 314

20Y CUM FCFE

V2 alone

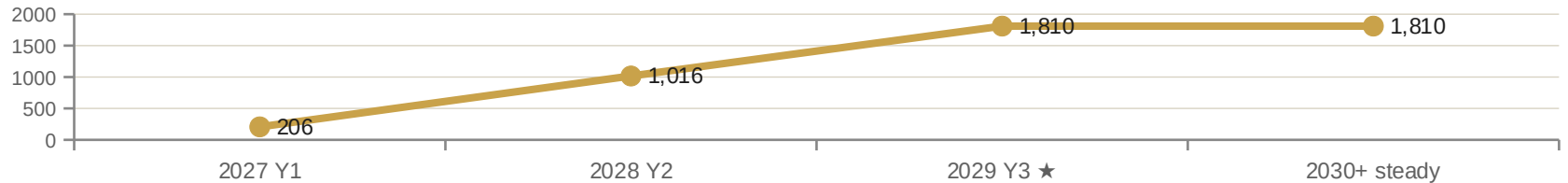
KRW 418 Bn

V3 Integrated Base

KRW 714 Bn

+ 296

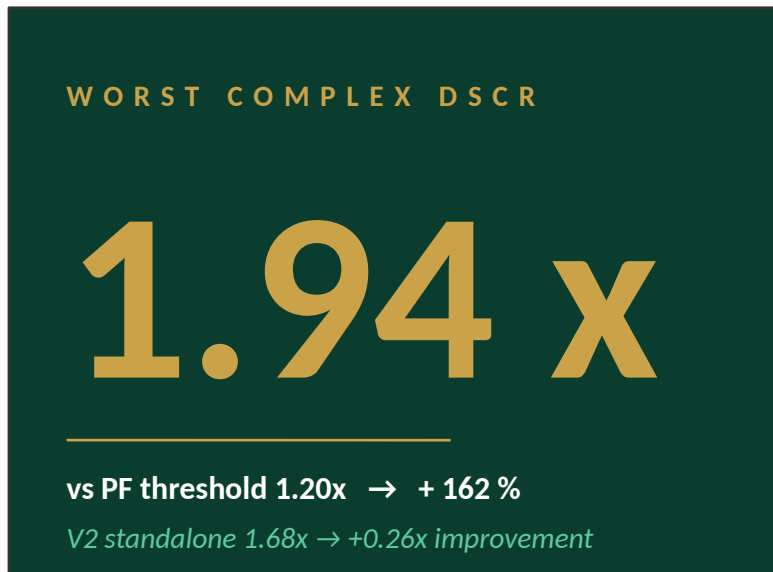
Annual integrated revenue ramp (Base, KRW 100M)



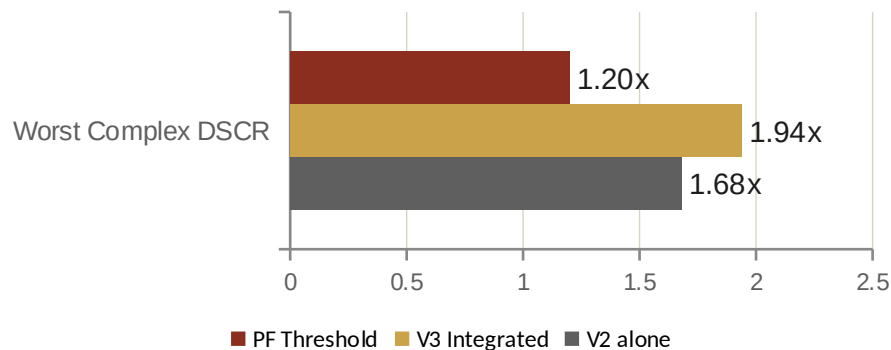
Phase 2 COD (Sep 2028) brings integrated revenue to KRW 181 Bn — sustained 16+ years

Even Under Worst Case, 162% Above PF Threshold

White carbon -20% / Power -20% / CER -50% / Syngas -15% / Uptime -10% / O&M +10% — simultaneous



V2 alone vs V3 Integrated — same shock



Revenue	EBITDA	EBITDA margin	Project IRR
KRW 62.9 Bn	KRW 43.8 Bn	69.6%	19.2%

V3 add-on is not an upside bet — it's a defensive add-on hardening the downside

SECTION 06

24/7 RE100 + Green H₂ + White Carbon

Solving four national agendas on a single site

Forestry renaissance (NDC) · 24/7 RE100 (zero grid burden) · CHPS Tier 1 green hydrogen · white carbon (96% import substitution) — ARK V3 is the only single-site asset that solves all four disconnected national agendas simultaneously.

24/7 RE100 With Zero Grid Burden — The Only Real Solution

Criterion	Solar / Wind	Conventional Gas	ARK BE-CCUS
24/7 stable supply	✗ intermittent	○	○ 95% uptime
RE100 certification	○	✗	○ + REC + CER
Grid burden	high	high	○ on-site PPA
Industrial co-location	△	△	○ modular distributed
CBAM compliance	○	✗	◎ carbon negative

Target offtakers

Yongin Semi Cluster

AI Data Centers

Refining/Petchem Hub

Export Manufacturing (CBAM)

Green H₂ — Absorbing Policy Alpha (Effectively Locked)

PRODUCTION

7,000 tons

Annual H₂ production (99.9% purity)

CARBON INTENSITY

≤ 1 kg

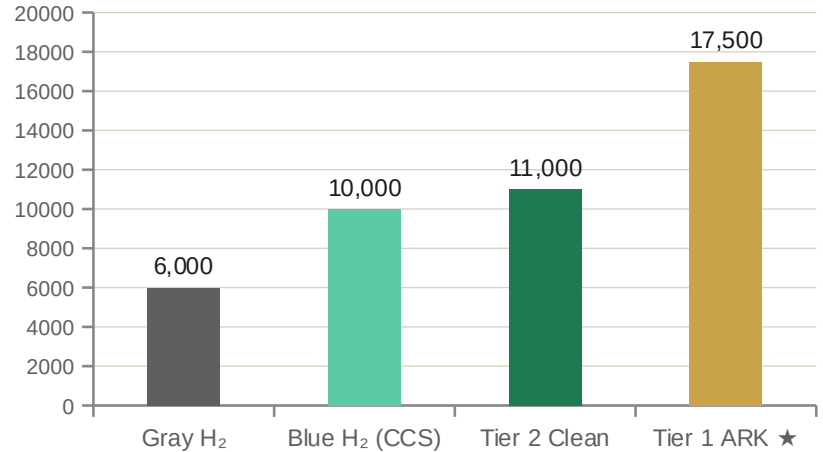
CO₂ / kg H₂ · Tier 1 grade

REVENUE (15Y FIXED)

KRW 99.6 Bn

SPC2 annual rev (Base, 12,500 KRW/kg)

H₂ price tiers (KRW/kg)



BE-CCUS is intrinsically carbon negative ·

Tier 1 effectively confirmed + 15-year fixed-price PPA

SECTION 07

Roadmap • PF • Investment Thesis

From decision to Phase 2 COD — 30 months

Apr 2026 V3 decision → Aug 2026 V2 PF Financial Close → Sep 2027 Phase 1 COD (KRW 61.9 Bn) → Sep 2028 Phase 2 COD (integrated KRW 181 Bn). Seven decision gates and two separate PF tracks deliver safety and autonomy simultaneously.

30 Months — From Decision to Integrated Revenue



DECIDE & FINANCE

Apr 2026 ~ Aug 2026

BUILD & OPERATE V2

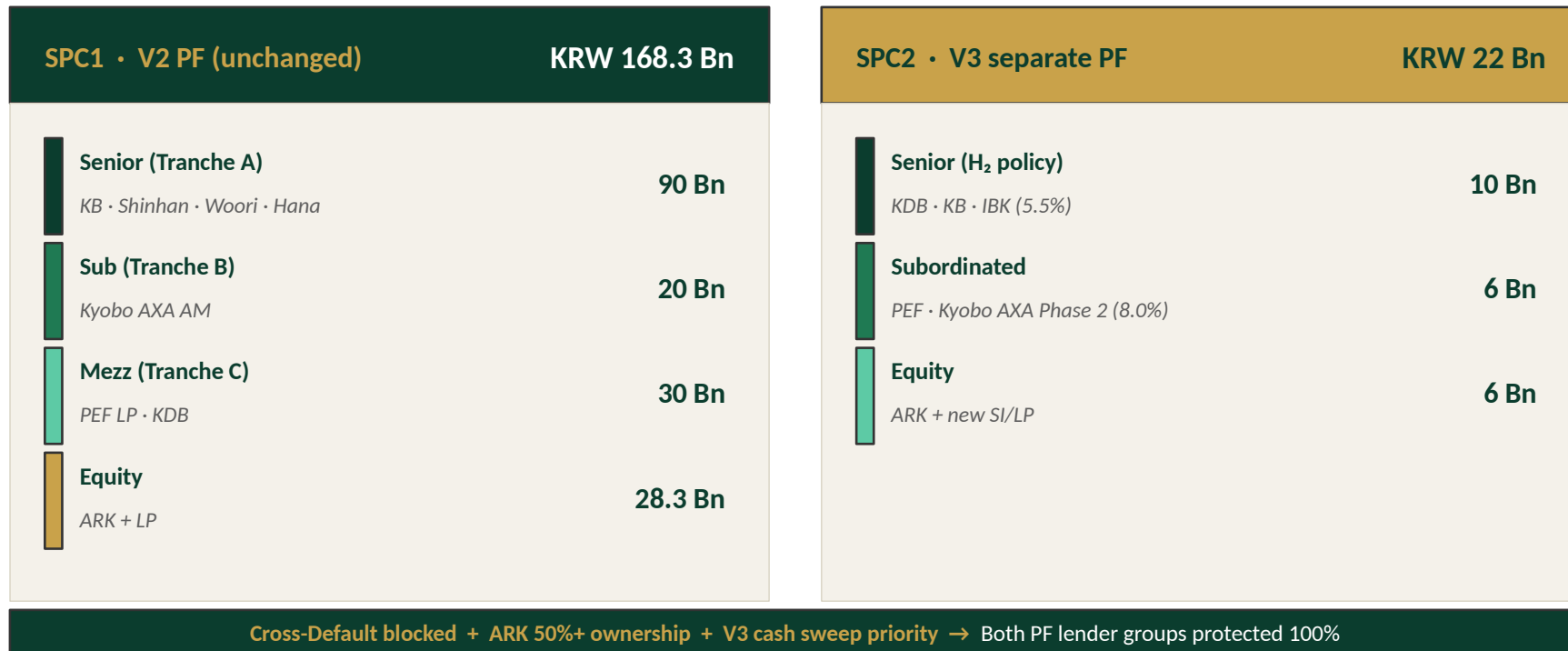
Aug 2026 ~ Sep 2028

INTEGRATED V3

Sep 2028 ~ 2046

G4 (Sep 2027) V2 KRW 61.9 Bn revenue starts · G7 (Sep 2028) Integrated KRW 181 Bn revenue

PF Separation — Safety + Autonomy



Why ARK V3 — Five Decisive Reasons

01

V2 PF unaffected

KRW 61.9 Bn guaranteed revenue & PF 140 Bn debt service unchanged. SPC2 separation fully isolates V2 lenders from cross-default risk.

02

+19.5 risk-free incremental

Additional OPEX/CAPEX $\approx 0 \cdot 95\%$ + EBITDA pass-through. V2 EBITDA 432 \rightarrow V3 623 (+44%). One-way upside stack.

03

Phase 2 policy alpha

CHPS Tier 1 entry \rightarrow H₂ price guarantee 15-20K KRW/kg. SPC2 IRR 48-65%. Structural strengthening of syngas pricing power.

04

Pre-engineered efficiency

Site, piping, DCS & permits integrated at V2 design stage \rightarrow SPC2 CAPEX $\sim 30\%$ saved (22 vs typical 30 Bn).

05

Worst Complex DSCR 1.94x

Even under combined worst case, +0.26x improvement vs V2 1.68x. Both PF tracks carry overwhelming safety margin — defensive add-on.

KPMG: "Strongly Recommended (V3 Integrated) — global infra-asset top quartile"

Nonsan BE-CCUS V3

The Capital-Efficient Standard of Korean Climate-Tech Finance

Same site ONE FOOTPRINT	Same feedstock ONE FUEL	3× revenue MULTIPLIED OUTPUT	75% margin EBITDA	187K tCO₂eq CER PER YEAR
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