Executive Summary: Kentucky – AISF (American Innovation & Sustainability Fund)

Overview

The **Kentucky initiative** within the **AISF Master Plan** centers on **revitalizing Appalachian coal communities** by **extracting rare earth elements (REEs)** from **coal waste** and **acid mine drainage (AMD)**, while also **scaling AI-powered orthotics** to improve mobility for **elderly**, **pediatric**, and **diabetic** populations. By **repurposing coal ash, coal refuse, and AMD** into valuable REEs for **clean energy** and **high-tech** applications, and **deploying Invisa.ai™** orthotics, this project will **foster economic renewal**, **improve healthcare access**, and **strengthen U.S. supply chains**.

Key Objectives

- **Rare Earth Extraction from Coal Waste**
  - **Recover REEs** (neodymium, yttrium, cerium) from **coal refuse** and **AMD**, traditionally viewed as waste.
  - Transform Kentucky's legacy of **coal mining** into a **domestic source** of critical minerals for **EV batteries**, **wind turbines**, and **defense**.
- **AI-Driven Orthotics Access**
  - **Invisa.ai™** orthotics (Invisabrace®, InvisaSole®) to **improve mobility** and **reduce costs** for **vulnerable populations**—diabetics, elderly, children with disabilities.
  - Partner with **Kentucky's healthcare providers** (UK HealthCare, Pediatric Orthotic Clinics) to **scale adoption** of AI-powered devices.
- **Economic Revitalization & Job Creation**
  - **Transition** from fossil fuel extraction to sustainable industries, creating **400–500 direct jobs** in **mining, materials processing, and AI healthcare**.
  - Additional **1,000+ indirect jobs** in **logistics, research, and support**, stimulating long-term growth in Appalachian coal communities.

Phases

Phase 1 (0–12 months)

- **Feasibility Studies & Site Assessment**
  - Evaluate **coal ash** and **AMD sites** in Kentucky for **REE content** and **mineral extraction** potential.
  - Collaborate with **University of Kentucky**, local mining firms to identify **extraction methods**.
- **Pilot Testing**
  - Launch a **small-scale pilot** extraction system targeting **5–10 tons** of REEs from **coal waste**.
  - Focus on **neodymium** and **yttrium** for initial recovery.
- **AI Orthotics Development**
  - Begin clinical trials for the **Invisa.ai™** orthotics system in partnership with **Kentucky healthcare providers** (UK HealthCare, Pediatric Orthotic Clinics).
  - Target **mobility-impaired children** and **elderly** residents for pilot deployment of **Invisabrace®** and **InvisaSole®**.

Phase 2 (12–24 months)

- **Coal Waste Processing Facility**
  - Establish a **modular** processing facility handling **5,000 tons** of coal waste/year, recovering **50–75 tons** of REEs annually.
  - Emphasize **neodymium**, **yttrium**, **cerium** extraction for **clean energy** applications.
- **Orthotics Rollout**
  - Scale **Invisa.ai™** across Kentucky's healthcare system, distributing **500–1,000** orthotic devices in **rural** and **underserved areas**.
  - Focus on **diabetes** management, **elder care**, and **pediatric mobility**.
- **Revenue Generation**
  - **$3–5M** annually from REE sales, **$2–3M** from orthotics in Phase 2.
  - Expand partnerships with **healthcare providers** and insurer contracts.

Phase 3 (24–36+ months)

- **Full-Scale Rare Earth Refining Facility**
  - Scale up to **10,000 tons** of coal waste/year, producing **100–150 tons** of REEs annually.
  - Process **coal ash** from across Kentucky and other Appalachian regions, making the state a **significant domestic REE source**.
- **National Orthotics Deployment**

- Expand **Invisa.ai™** to **10,000+ patients** in Kentucky and beyond, focusing on **pediatric**, **senior**, and **diabetic** care.
- Target **$30–40M** annual revenue from orthotic device sales.

➢ **Revenue Projections**

- By **Year 5**, **$20–30M** from REE sales and **$30–40M** from orthotics, for a combined **$50–70M** annually.

Impact

➢ **Environmental Impact**

- Process **10,000 tons** of coal waste/year, extracting **100–150 tons** of REEs, reducing **environmental footprint** of coal ash and AMD sites.
- Remediate **toxic sites**, **improve water quality**, and mitigate pollution in Kentucky's mining regions.

➢ **Economic Impact**

- **$100M+** annual economic impact, creating **500–600 direct jobs** in extraction & AI healthcare, plus **1,000+ indirect jobs**.
- Introduce **sustainable industries**, diversifying the region's **coal-dominated** economy and ensuring **long-term** economic growth.

➢ **National Security & Supply Chain Resilience**

- Domestic production of **critical minerals** reduces U.S. dependence on **foreign sources**—strengthening **EV**, **renewable**, and **defense** supply chains.
- **Invisa.ai™** orthotics enhance public health, lowering healthcare costs for chronic conditions.

Financial Projections

Capital Investment & Revenue Timeline

Phase	Timeline	Capital Investment	Key Revenue Drivers	Projected Annual Revenue
Phase 1	0–12 months	~$5–8M	Pilot extraction (5–10 tons REEs), pilot orthotics trials	Minimal (R&D, clinical validation)
Phase 2	12–24 months	~$10–15M (cumulative)	5,000 tons coal waste/yr, 50–75 tons REEs, 500–1,000 orthotics devices	$3–5M (REE) + $2–3M (orthotics)

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5-Year Financial Outlook

- **Year 1**
  - **Investment**: ~$5–8M for **feasibility** and **pilot** extraction, orthotics R&D.
  - **Revenue**: Minimal, focusing on **clinical validation** and **small-scale extraction**.
- **Year 2**
  - **Additional Investment**: ~$5–7M more to scale.
  - **Revenue**: **$3–5M** from REEs, **$2–3M** from orthotics, driven by **modular** extraction facility and **expanded** orthotics rollout.
- **Year 3**
  - **Scaling**: Achieve moderate production & orthotics distribution across **rural** areas.
  - **Revenue**: **$10–15M** total from both sources.
- **Year 5**
  - **Full-Scale**: 10k tons of coal waste/year, 10,000+ orthotics devices.
  - **Annual Revenue**: **$20–30M** (REE) + **$30–40M** (orthotics) = **$50–70M** total.
  - **IRR**: **20–25%** over 5–7 years.
  - **Breakeven**: By **Year 3**.
  - **3x ROI**: By **Year 5**, leveraging both **REE** refining and **AI healthcare** expansions.

10-Year Outlook

- **Expanded Production**: Facility expansions could double or triple REE output, potentially **$100M+** in annual mineral revenue.
- **Orthotics Market Penetration**: 20–25% share of AI-driven orthotics in the **Midwest** region, broader **U.S.** expansions, potentially **$100M** in annual device sales.
- **Robust State Economy**: Billions in cumulative economic contributions, thousands of **stable jobs** in **extraction** & **medtech**.

15-Year Outlook

- **Regional & Global Leadership**: Kentucky emerges as a **major** domestic REE supplier, fueling **EV**, **battery**, **wind** markets, and **orthotics** become a global brand.

- **Long-Term Coal Remediation**: Decades of coal waste sites **remediated**, forging a **sustainable** legacy for Appalachian communities.

Return on Investment & Risk Mitigation

- **Diversified Revenue Streams**
  - **REE Sales** (to EV, wind, defense), **Orthotics Device Sales** (Invisabrace®, InvisaSole®), **Telehealth** subscriptions (Invisa.ai™).
  - Minimizes market risk by tapping **clean energy** and **healthcare** simultaneously.
- **Phased Investment**
  - Pilot results guide next-phase expansion; each stage is **validated** before more considerable capital outlays.
  - Partnerships with the **University of Kentucky, local mining,** and **healthcare** providers mitigate R&D risk.
- **Regulatory & Community Engagement**
  - Early engagement with **Kentucky state agencies** for environmental compliance and community support.
  - Potential **federal grants** offset costs for **coal waste** remediation and **health equity** programs.
- **Clinical Validation**
  - Data from **Invisa.ai™** trials with **pediatric** and **elderly** groups ensures **insurance coverage** and system-wide adoption.

Conclusion

The **Kentucky initiative** under the **AISF Master Plan** offers a **transformative** approach to **coal waste utilization** and **AI-powered healthcare**. By **extracting REEs** from **coal refuse** and **AMD** and **delivering Invisa.ai™** orthotics to under-resourced communities, it stimulates **economic growth**, **environmental remediation**, and **health improvements** in Appalachia. With **$25–30M** capital through Phase 1 and 2, the project targets **$50–70M** in annual revenue by **Year 5**—achieving a **20–25% IRR** and **3x ROI**. Over **10–15 years**, Kentucky stands to become a **key U.S. supplier** of critical minerals for **clean energy** and a **pioneer** in **AI-driven orthotics**, revitalizing coal communities for a **sustainable** future.