CIP-113 Policy Manager - Quick Guide

Introduction

CIP-113 is a Cardano Improvement Proposal that defines smart tokens with programmable transfer rules. This application allows you to create, mint, and manage CIP-113 compliant tokens with built-in access control mechanisms.

Prerequisites

- **Wallet Connection**: Connect a Cardano wallet (Nami, Eternl, etc.)
- **Admin Rights**: You must be an admin to mint tokens for a policy
- **Network**: Currently running on Cardano Preview Testnet

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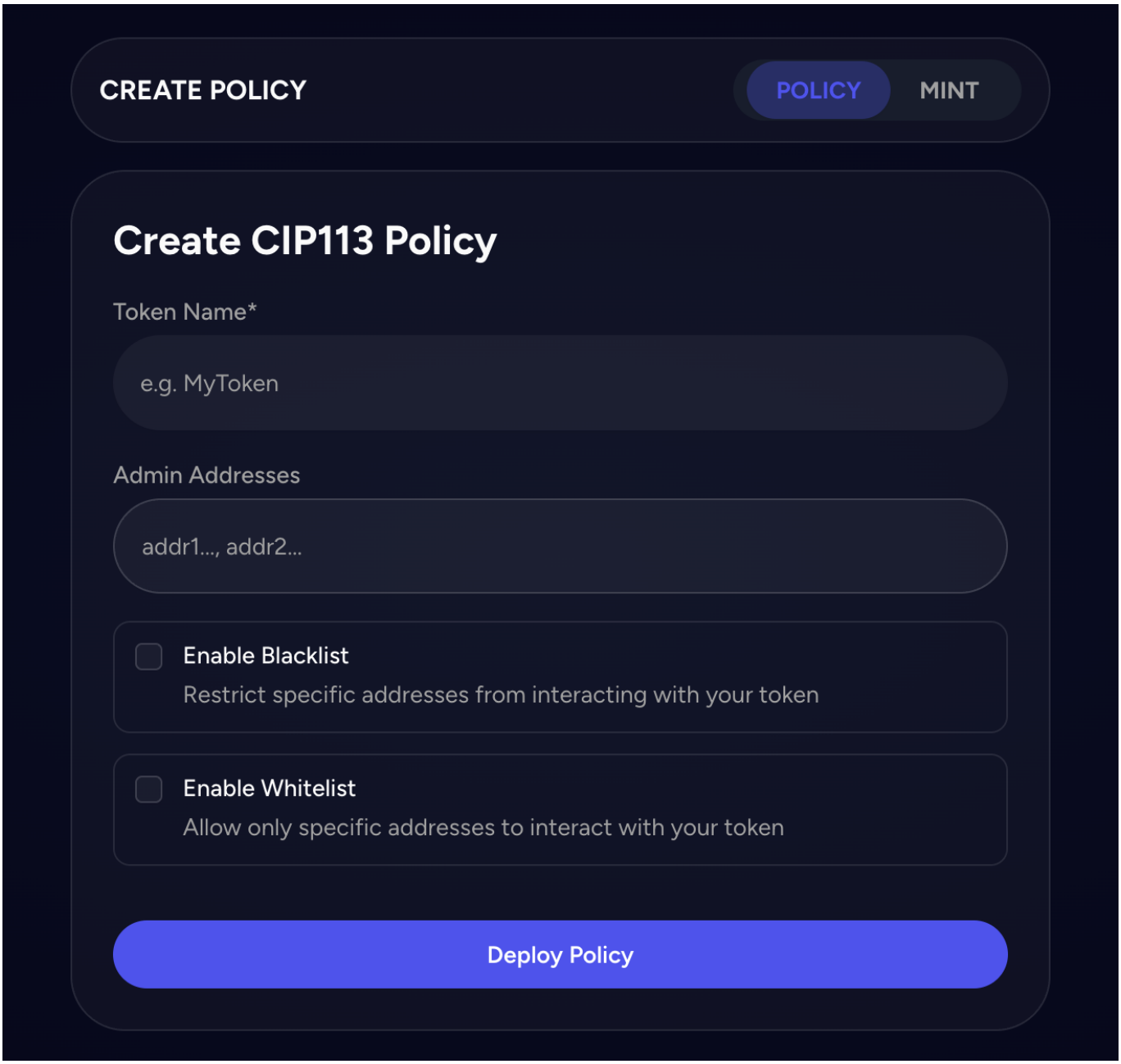
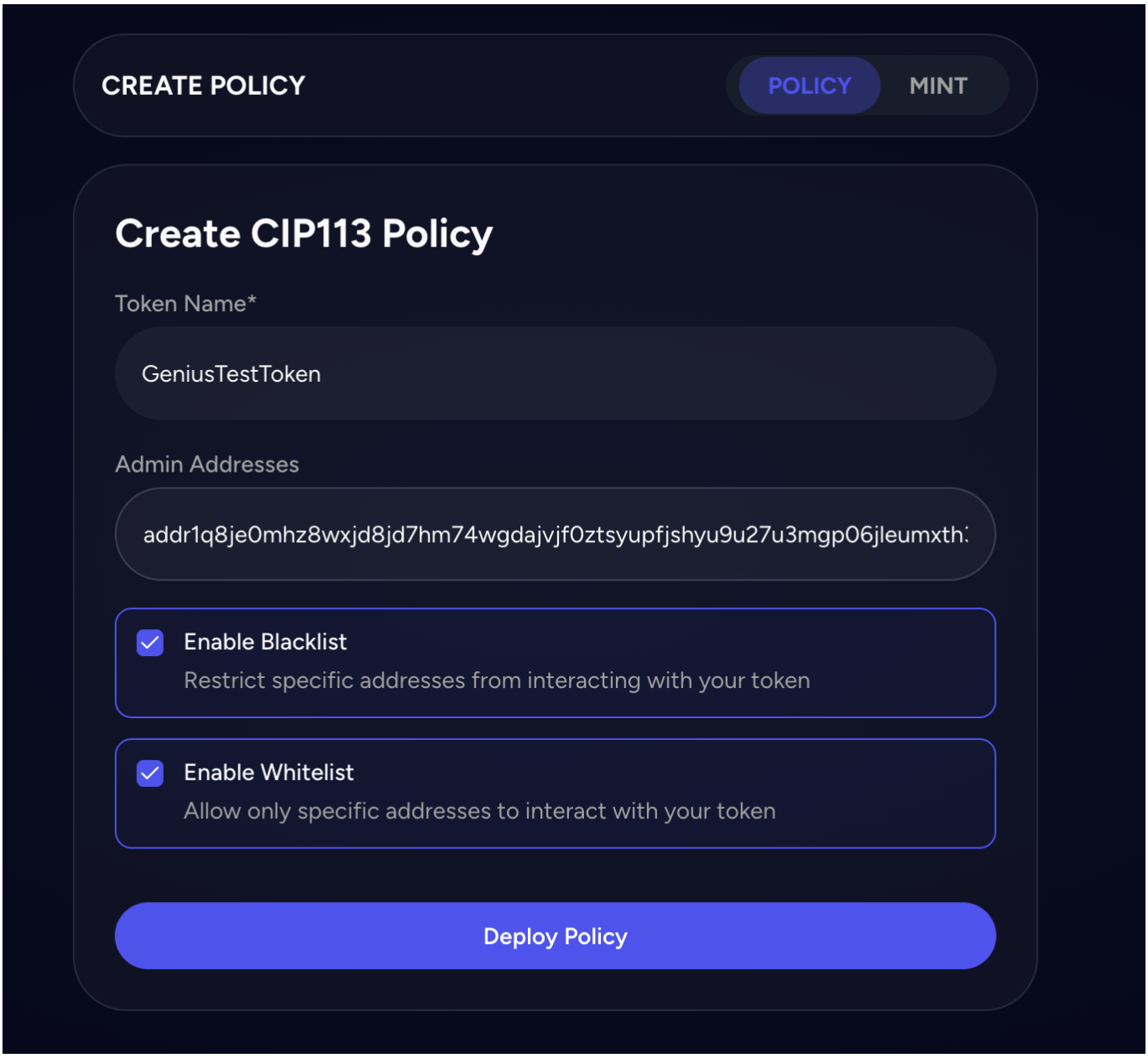
1. Create Policy

Create a new CIP-113 policy that defines the rules and governance for your token.

Form Fields

- **Token Name*** (required): Name of your token (max 32 characters)
- **Admin Addresses**: Comma-separated list of additional admin addresses. Your wallet address is automatically included as admin
- **Enable Blacklist**: Restrict specific addresses from receiving/sending tokens
- **Enable Whitelist**: Allow only specific addresses to receive/send tokens


CREATE POLICY
POLICY
MINT
Create CIP113 Policy
Token Name*
e.g. MyToken
Admin Addresses
addr1..., addr2...
Enable Blacklist
Restrict specific addresses from interacting with your token
Enable Whitelist
Allow only specific addresses to interact with your token
Deploy Policy



Smart Contract Details

The policy creation deploys two Plutus V3 smart contracts:

1. **Rule Script** (Withdraw Validator): Enforces blacklist/whitelist rules and validates admin signatures
    - Parameterized with: blacklist linked list, whitelist linked list, admin public key hashes
2. **Smart Token Script** (Minting Policy): Controls token minting and transfer logic
    - Parameterized with: token name (hex), rule script policy hash

Transaction Flow

1. User submits form with token configuration
2. System generates both validator scripts with parameters
3. Two stake credentials are registered on-chain (one for each script)
4. Transaction is signed by user's wallet and submitted
5. Policy ID is generated from the minting script hash

Example Transaction:

```
Transaction URL:
https://preview.cexplorer.io/tx/dcacabe6e6b2b5dff1138a5b2ef21c79635ba5c013
2a024fc9342efd22b4a3fb?tab=overview
```

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2. Mint Tokens

Mint tokens under an existing policy with comprehensive metadata tracking. Only admin addresses can mint tokens.

Form Fields

Basic Information

- **Selected Policy*** (required): Choose from policies where you are an admin
- **Quantity*** (required): Amount of tokens to mint (must be > 0)

Required Metadata

The following metadata fields are **required** to ensure proper token identification and compliance:

- **Asset Reference ID*** (`asset_ref_id`):
  - **Format**: UUID v4 (e.g., `xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx`)
  - **Purpose**: Stable series identifier for this RWA program; serves as a join key across on-chain and off-chain data
  - **Usage**: Correlates the token series with the off-chain evidence pack and public documentation
  - **Note**: Never changes for the life of the token series
- **Attestation SHA-256*** (`attestation_sha256`):
  - **Format**: 64-character lowercase hexadecimal string (SHA-256 hash)
  - **Purpose**: Cryptographic proof that the published Asset↔Token Mapping document is exactly the one this token references
  - **How to Generate**:
    1. Finalize your Token-ownership-Mapping.pdf document
    2. Compute SHA-256 hash over the exact file bytes
    3. Use the resulting 64-hex string
  - **Verification**: This value must match the hash printed in your public "Proof of Ownership" document

Optional Metadata (Mapping Convenience Pointers)

These fields help verifiers easily locate and validate the mapping document:

- **Mapping CID** (`mapping.cid`):

    - **Format**: IPFS Content Identifier (CID)
    - **Purpose**: Points to where Token-ownership-Mapping.pdf is pinned on IPFS
    - **Example**: `QmX...abc123`

- **Mapping URL** (`mapping.url`):

    - **Format**: HTTPS URL
    - **Purpose**: HTTPS mirror of the Token-ownership-Mapping.pdf
    - **Example**: `https://example.com/docs/mapping.pdf`

- **Signature Type** (`mapping.signature.type`):

    - **Format**: String (e.g., `"pgp"` or `"cms"`)
    - **Purpose**: Indicates the type of detached signature for the mapping document

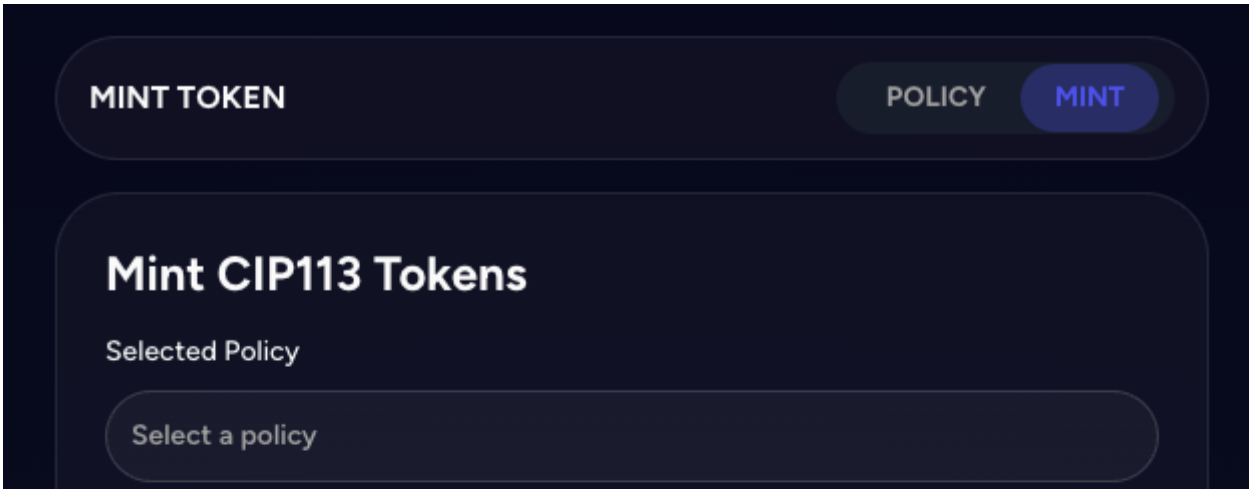
- **Signature CID** (`mapping.signature.cid`):

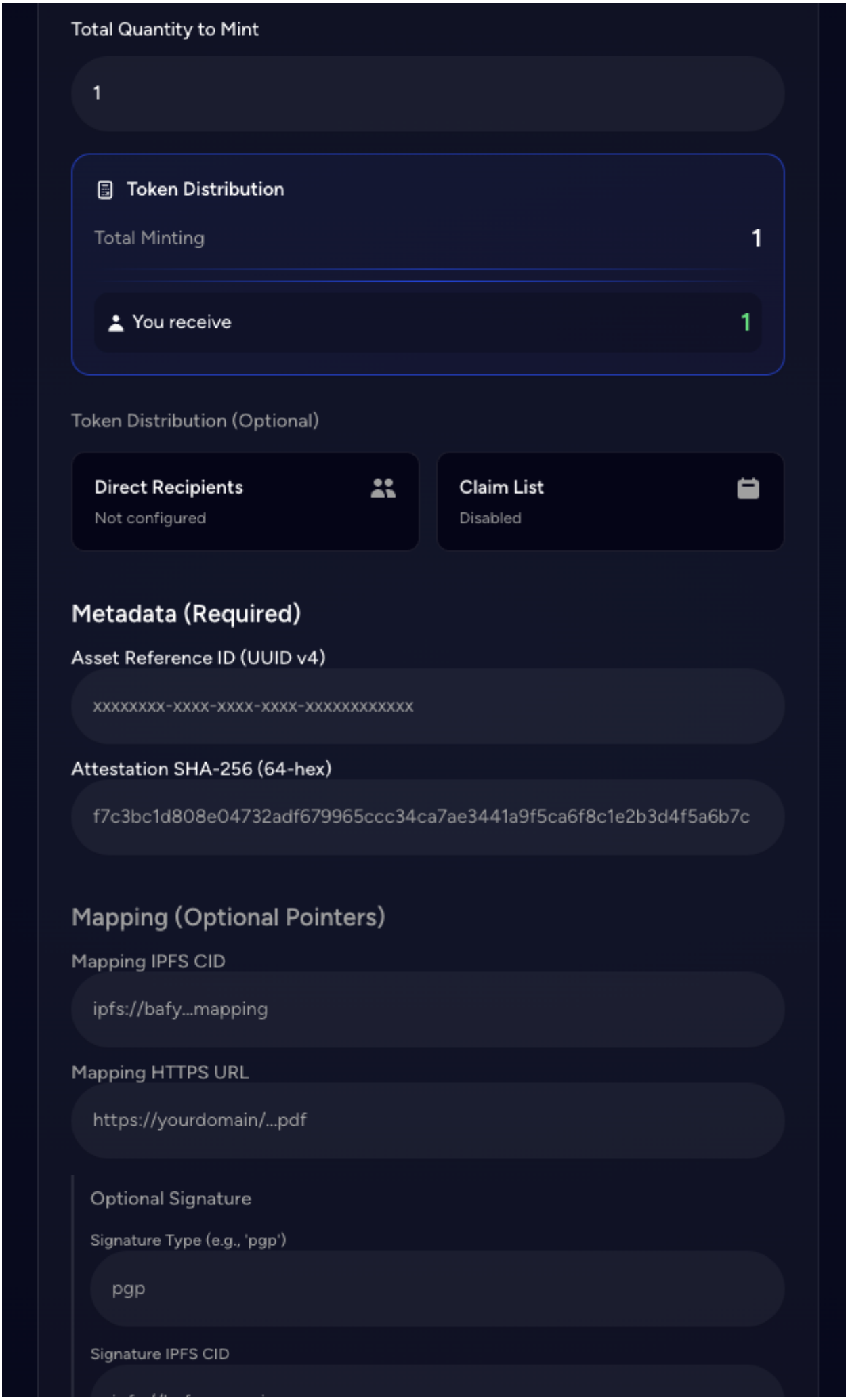
    - **Format**: IPFS CID
    - **Purpose**: Points to the detached signature file on IPFS
    - **Example**: CID for `Token-ownership-Mapping.pdf.asc`

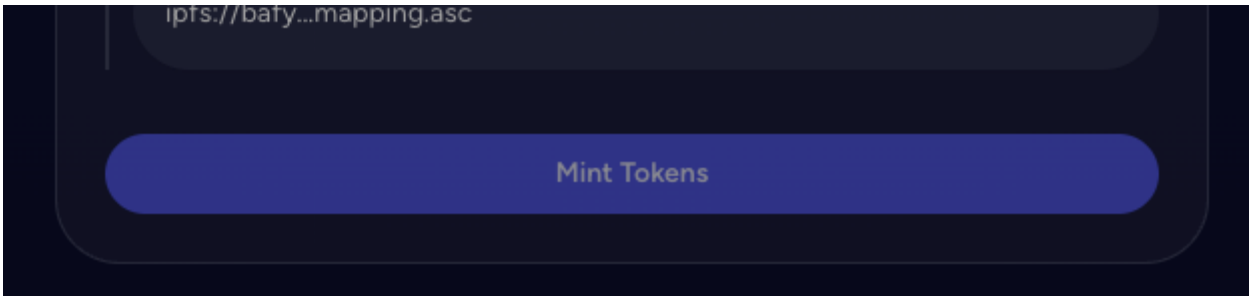
Auto-Generated Metadata (Tokenomics)

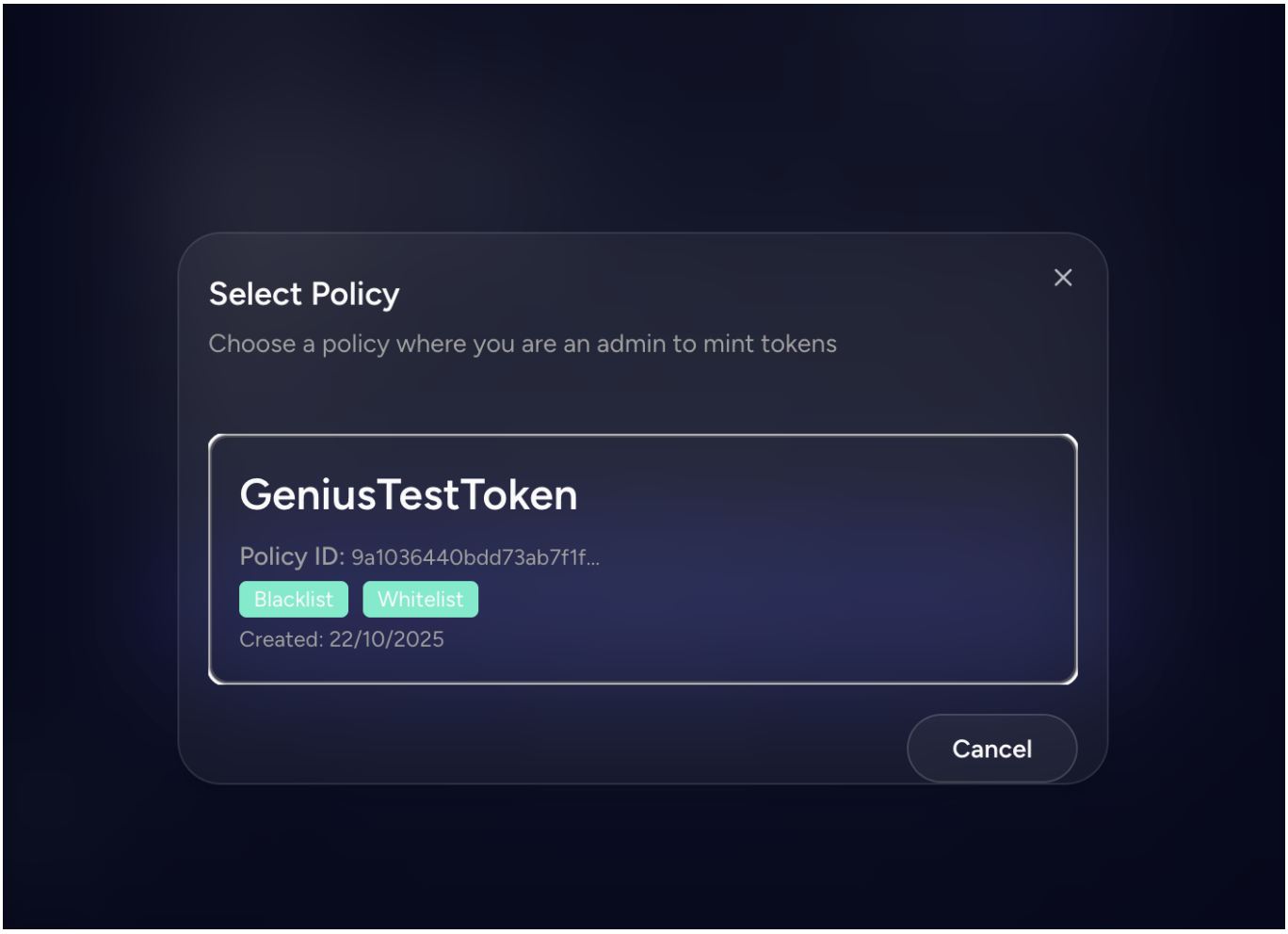
The following fields are **automatically calculated** by the system:

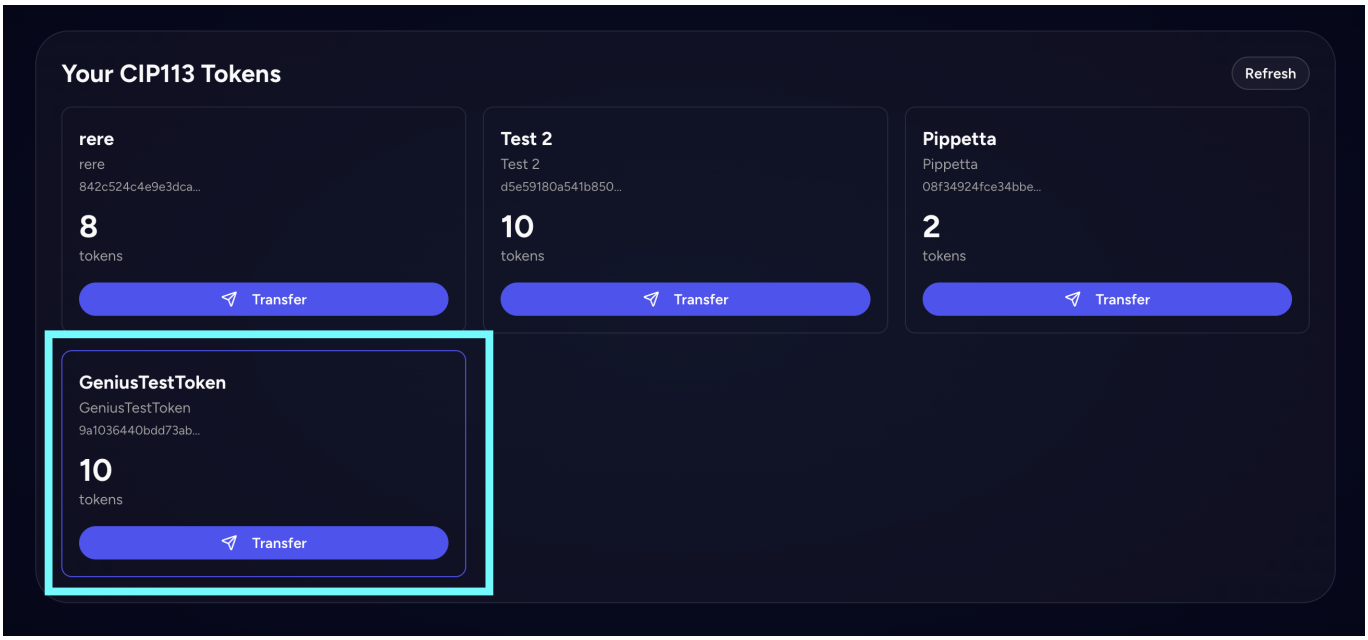
- **Total Supply** (`total_supply`): Derived from the quantity field; represents total tokens created at mint
- **Decimals** (`decimals`): Fixed at `1` for UI/display precision (on-chain amounts are integers)
- **Admin PKH** (`admin_pkh`): Array of payment key hashes authorized for mint/burn and WL/BL operations (extracted from the policy)
- **Initial Allocations** (`initial_allocations`): Records who receives tokens at mint; totals equal `total_supply`
- **Minting Policy Hash** (`minting_policy_hash`): 56-character hex hash of the Smart Token Script used to mint this asset
- **Rule Script Policy Hash** (`rule_script_policy_hash`): 56-character hex hash of the Rule Script that enforces whitelist/blacklist and admin privileges
- **Unit** (`unit`): Unique on-chain ID in format `<policy_id>.<token_name_hex>` (e.g., `abc123....<4c55584f4646>`)




Total Quantity to Mint
1
Token Distribution
Total Minting
1
You receive
1
Token Distribution (Optional)
Direct Recipients
Not configured
Claim List
Disabled
Metadata (Required)
Asset Reference ID (UUID v4)
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
Attestation SHA-256 (64-hex)
f7c3bc1d808e04732adf679965ccc34ca7ae3441a9f5ca6f8c1e2b3d4f5a6b7c
Mapping (Optional Pointers)
Mapping IPFS CID
ipfs://bafy...mapping
Mapping HTTPS URL
https://yourdomain/...pdf
Optional Signature
Signature Type (e.g., 'pgp')
pgp
Signature IPFS CID







Metadata Validation and Auditor Checks

When minting, the system ensures:

✓ **Ownership ID**: `unit` parses to the expected `policy_id` and `token_name` ✓ **Series Link**: `asset_ref_id` appears identically in mapping and Proof-of-Ownership docs ✓ **Rule Enforcement**: `rule_script_policy_hash` equals the deployed Rule Script ✓ **Document Integrity**: `attestation_sha256` matches the SHA-256 of the published Mapping.pdf ✓ **Supply Consistency**: `tokenomics.total_supply` equals the sum of `initial_allocations` ✓ **Minting Authority**: `minting_policy_hash` matches the minting script used for `unit` ✓ **Admin Authority**: `admin_pkh` matches the admin set enforced by the CIP-113 Rule Script

Pre-Mint Checklist

Before minting, ensure you have:

1. ✅ Generated a unique `asset_ref_id` (UUID v4)
2. ✅ Finalized your Token-ownership-Mapping.pdf document
3. ✅ Computed the SHA-256 hash → set `attestation_sha256`
4. ✅ Confirmed the deployed Rule Script hash
5. ✅ (Optional) Generated and uploaded detached signature file

Minting with Initial Allocations

During the minting process, you can optionally distribute tokens directly to a list of recipients. This is useful for:

- **Airdrops**: Distributing tokens to a predefined list of wallets
- **Team/Investor Allocations**: Sending tokens to specific stakeholders at generation time

To use this feature:

1. Prepare a CSV or list of addresses and amounts
2. Input them into the "Initial Allocations" section of the mint form
3. The system will generate outputs for each recipient in the mint transaction
4. The remaining balance (Total Supply - Allocations) will be sent to your admin wallet

Setting up a Claim List

You can also create a **Claim List** during minting. This allows users to claim tokens later rather than receiving them immediately.

1. Enable "Create Claim List" in the mint form
2. Upload a list of eligible addresses and their maximum claimable amounts
3. These users will see their eligibility in the "My Claimable Tokens" dashboard

Smart Contract Details

The minting transaction interacts with both validators:

- **Minting Script**: Validates the minting redeemer and checks rule script validation
- **Rule Script**: Executed via withdrawal (0 ADA) to verify admin signature and enforce rules

Tokens are sent to a **smart receiver address** - a script address parameterized with the user's public key hash. This ensures CIP-113 compliance and enables programmable transfer logic.

All metadata is embedded in the transaction's metadata field (label 721 for CIP-25 compatibility), making it permanently available on-chain.

Transaction Flow

1. User selects a policy and specifies quantity
2. User fills in required metadata fields (`asset_ref_id`, `attestation_sha256`)
3. User optionally adds mapping pointers (CID, URL, signature info)
4. System automatically calculates:
    - Smart receiver address for current user
    - Tokenomics fields (`total_supply`, `decimals`, `admin_pkh`, etc.)
    - Complete metadata structure
5. Transaction builds:
    - Minting output with specified quantity
    - Required signer: user's public key hash
    - Withdrawal from rule script (0 ADA) to trigger validation
    - Output sent to user's smart receiver address
    - Metadata attachment with all token information
6. Transaction is signed and submitted
7. Tokens appear in user's CIP-113 token balance with full metadata

Post-Mint Actions

After successful minting:

1. **Publish Documentation**: Host your Token-ownership-Mapping.pdf (and detached signature if applicable)
2. **Publish Proof of Ownership**: Create and publish a document showing the same `asset_ref_id` and `attestation_sha256`
3. **Verify On-Chain**: Confirm all metadata appears correctly in the transaction metadata
4. **Update Records**: Keep track of your IPFS CIDs and URLs for future reference

Example Transaction:

```
Transaction URL:
https://preview.cexplorer.io/tx/3dccad56b252499e4b9d0809f9d453cb13ffcd11dc
6760d81fe0616e39ef7365?tab=overview
```

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3. Transfer Tokens

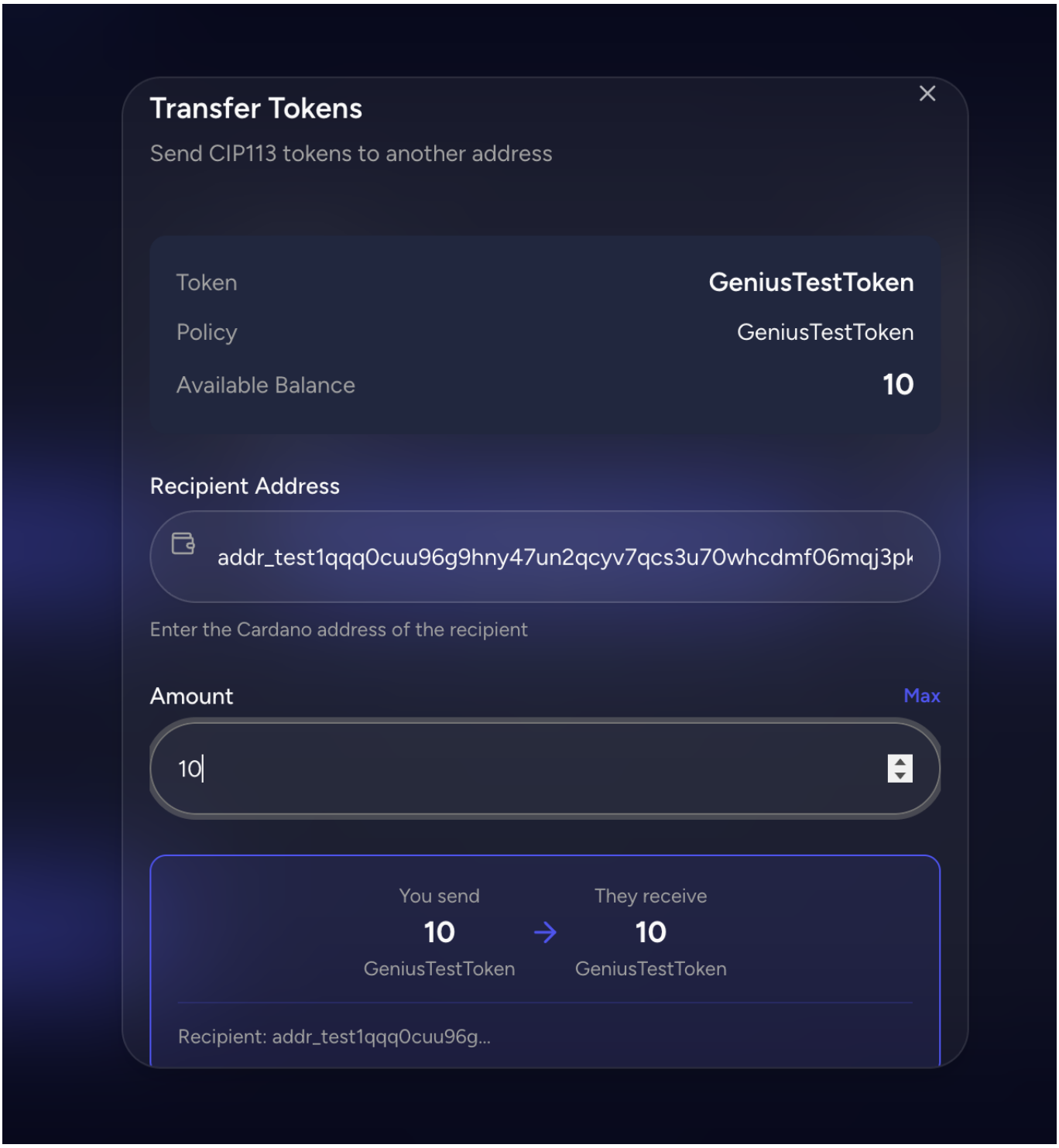
Transfer CIP-113 tokens to another Cardano address.

Form Fields

- **Recipient Address*** (required): Destination Cardano address (addr1...)
- **Amount*** (required): Quantity to transfer (must be ≤ available balance)

The modal automatically displays:

- Current token balance
- Token name and policy information
- Transfer summary with sender/recipient details



Smart Contract Details

CIP-113 transfers involve spending from script addresses:

- **Smart Token Script**: Validates transfer redeemer and rule compliance

- **Rule Script**: Verifies sender signature and checks blacklist/whitelist rules

Both the sender and recipient use **smart receiver addresses** parameterized with their respective public key hashes.

Transaction Flow

1. User specifies recipient address and amount
2. System selects appropriate UTxO containing tokens
3. System calculates:
    - Recipient's smart receiver address
    - Change amount (if not transferring full balance)
4. Transaction builds:
    - Spending input: UTxO from sender's smart receiver address
    - Output 1: Tokens to recipient's smart receiver address
    - Output 2 (if change): Remaining tokens back to sender's smart receiver address
    - Withdrawals from both smart token and rule scripts (0 ADA each)
    - Required signer: sender's public key hash
5. Transaction is signed and submitted
6. Tokens are transferred to recipient's CIP-113 address

Example Transaction:

```
Transaction URL:
https://preview.cexplorer.io/tx/418731ff5e281ce158991cd47cf607bbf35ce15d92
962a4750ac43d91f6b13b2?tab=overview
```

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4. Burn Tokens

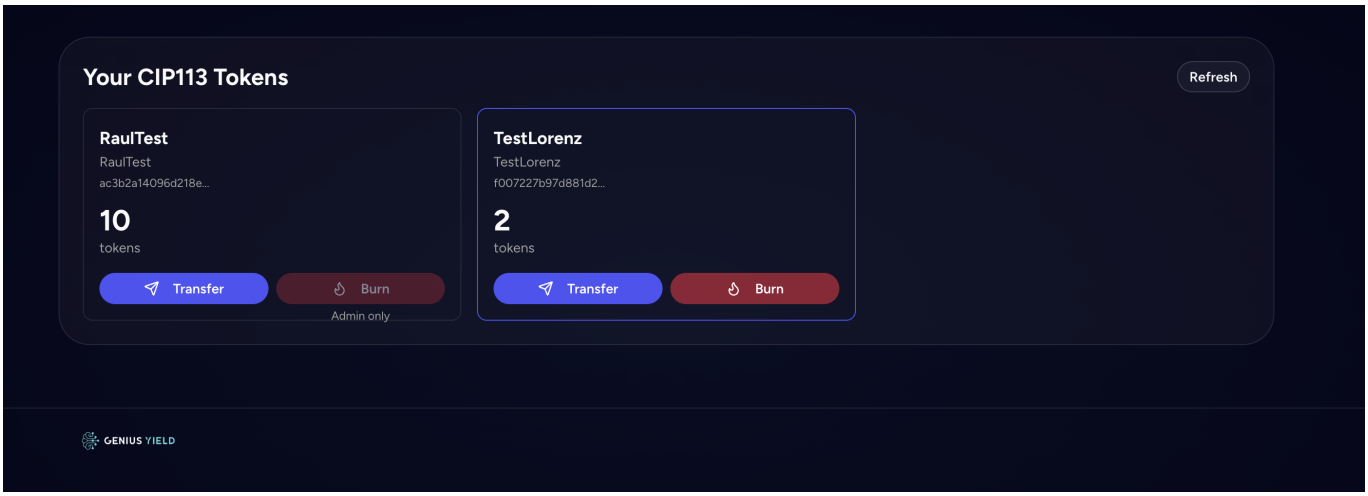
Permanently destroy CIP-113 tokens. **Only policy administrators can burn tokens.**

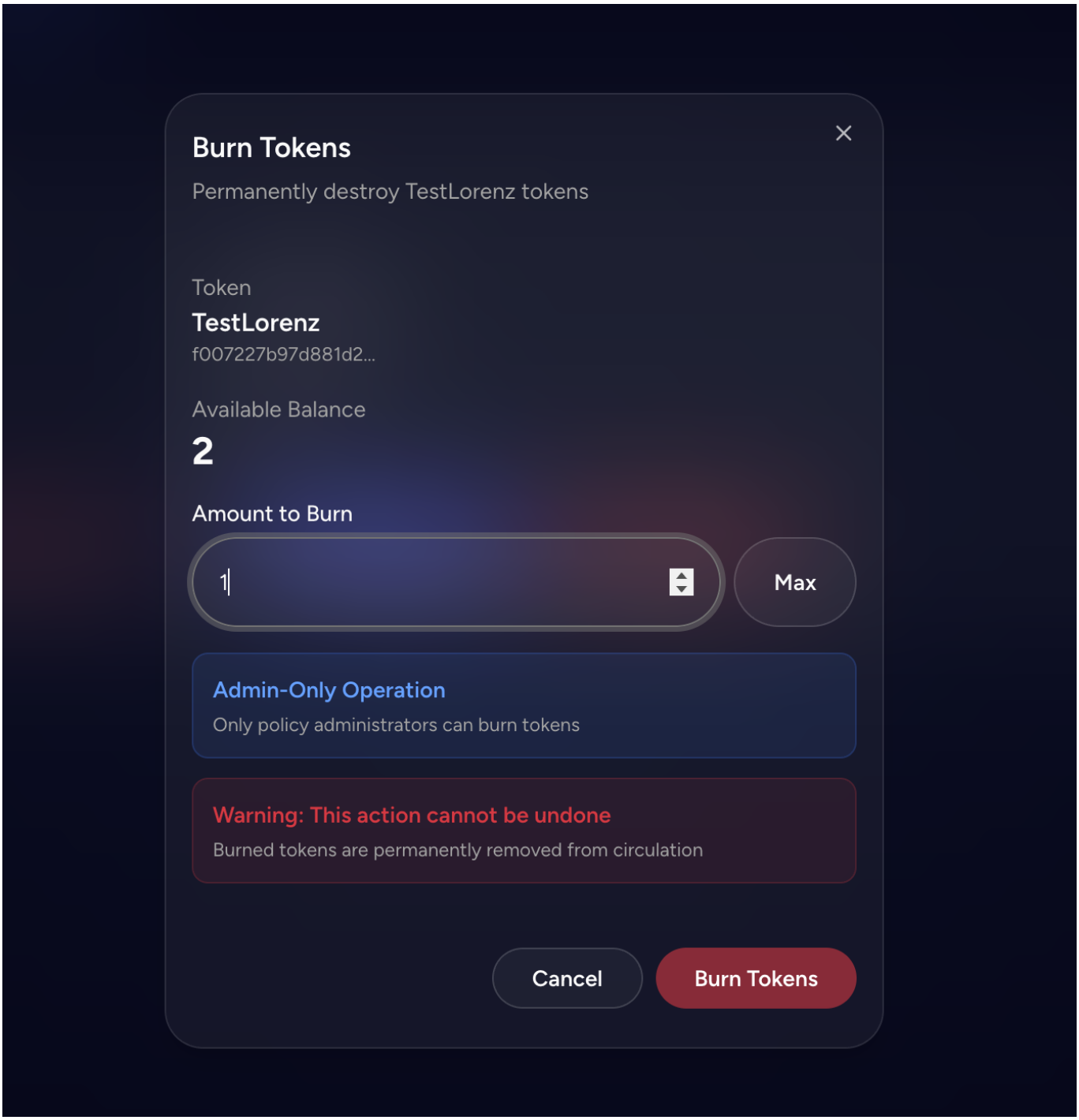
Form Fields

- **Amount*** (required): Quantity to burn (must be > 0 and ≤ available balance)

The modal automatically displays:

- Current token balance
- Token name and policy information
- Warning message about irreversible action
- Admin-only operation notice





Access Control

Important: The burn operation is restricted to policy administrators only.

- The burn button is **disabled** for non-admin users
- Only addresses listed in the policy's `adminAddresses` can execute burns
- This ensures controlled token supply management

Smart Contract Details

Token burning is implemented as negative minting:

- **Smart Token Script**: Validates burn redeemer (`ConStr0(["burn"])`) and rule compliance
- **Rule Script**: Verifies admin signature and enforces governance rules
- **Minting Amount**: Negative value (e.g., `-100` to burn 100 tokens)

The transaction spends UTxOs from the admin's smart receiver address and burns the specified amount.

Transaction Flow

1. Admin user specifies amount to burn
2. System validates user is in policy's admin list
3. System selects appropriate UTxO(s) containing tokens
4. Transaction builds:
    - Spending input: UTxO(s) from admin's smart receiver address
    - Negative mint: Burns specified token quantity
    - Change output (if applicable): Remaining tokens back to admin's smart receiver address
    - Withdrawals from both smart token and rule scripts (0 ADA each)
    - Required signer: admin's public key hash
5. Transaction is signed and submitted
6. Tokens are permanently removed from circulation

Example Transaction:

```
Transaction URL:
https://preview.cexplorer.io/tx/95921989c3255ed28698f6dcc6ef27f5dee448bce7
14f9ee98c373ca181bce29
```

Important Notes

- **Irreversible**: Burned tokens cannot be recovered
- **Admin Only**: Only policy admins can execute burn transactions
- **Supply Reduction**: Burning permanently reduces total token supply
- **Change Handling**: If burning partial balance, change is returned to admin's smart receiver address

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Technical Notes

- **Script Addresses**: All CIP-113 tokens are held in script addresses (smart receiver addresses), not regular wallet addresses

- **Collateral**: Transactions involving smart contracts require collateral UTxOs
- **Plutus Version**: All scripts are Plutus V3
- **Redeemers**:
  - Minting uses `ConStr0(["mesh"])`
  - Burning uses `ConStr0(["burn"])`
  - Transfers use `ConStr0([])` for token script and `ConStr1([[signerHash], [0], [0]])` for rule validation
- Spending from smart addresses uses `ConStr0([])`

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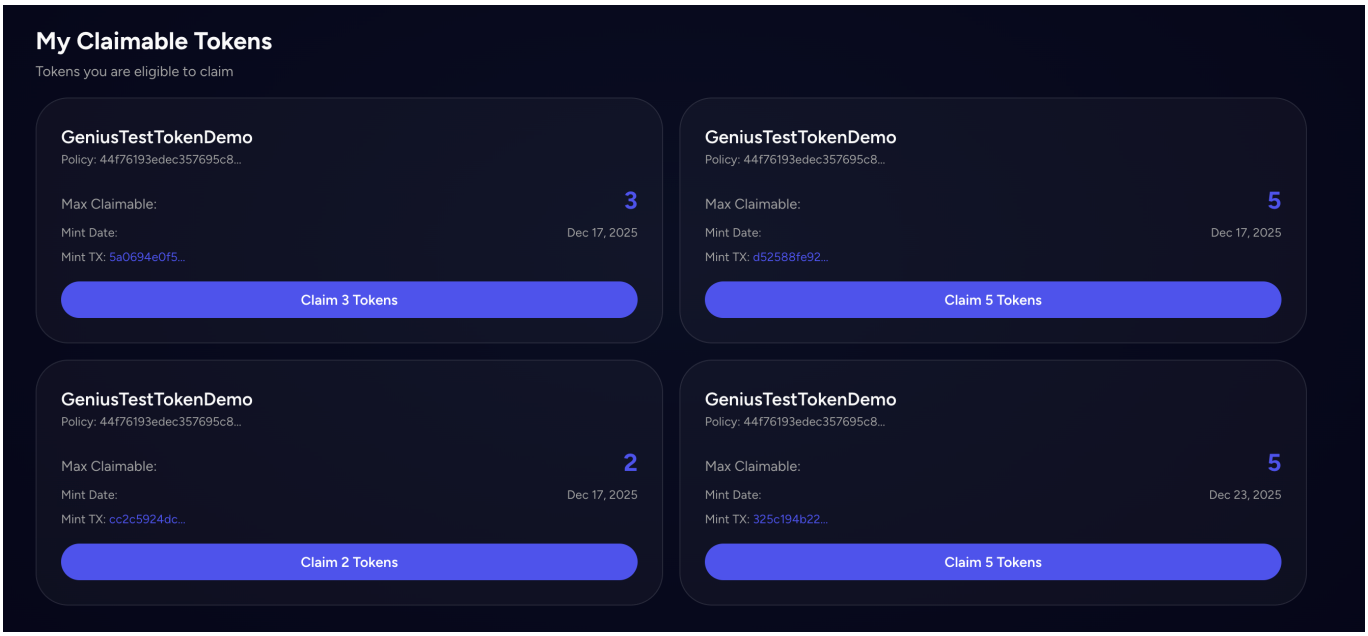
5. Claim Tokens

Users can check their eligibility for token claims in the "My Claimable Tokens" dashboard.

Claiming Process

1. Navigate to the "Claimable" tab in the dashboard
2. If you were included in a claim list, you will see your eligible tokens
3. Click "Claim" to initiate the transaction




```
Transaction URL:
https://preview.cexplorer.io/tx/130dcb8caaab71142e3f716344a724ba8e9d426184
851af69b47598de7ddf59e
```

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6. Send Rewards

Admins can distribute tokens as rewards without the ability to burn them in this view.

1. Navigate to "Send Rewards" tab in the dashboard
2. Select a token to distribute
3. Use the "Send Rewards" button

4. The "Burn" option is hidden in this view to prevent accidental destruction of assets

```
Transaction URL:
https://preview.cexplorer.io/tx/b98a1196b54d1a6f0c68181fba870fb6eeaff4a1c6
77a8f4b1e95f6c74056684
```