Fiùtur Energy Transition Program: "Green Loan" PoC

Project Summary Report
28th January, 2025

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EXECUTIVE SUMMARY

The general intention of Fiùtur is to enable development of open source and open standards for the sustainability and financial services community in order to support its stated mission of being a network of global market participants to design, build and implement SMART Programs that deliver trustworthy information (in the form of SMART Outcomes) for optimal capital allocation in the transition economy.

This document describes the work done over the course of ~3 months to deliver a **"Proof of Concept" solution** for Fiùtur's Energy Transition program focusing on methane. Specifically, the implementation of the "Green Loan" use case for the energy transition economy is crucial to facilitate the reliable exchange of information related to energy transition assets in an accurate, trusted, consistent and robust manner. Reaching this objective will help ensure wide interoperability across global regulatory, financial, and sustainability communities, which is critical in providing accurate analysis and unambiguous communication across all jurisdictions.

This PoC demonstrates the feasibility of connecting knowledge graphs representing rich financial concepts, such as those represented in FIBO for green, sustainability-linked and transition loans, to systems that are devoted to measuring, monitoring and documenting the places where the 'rubber hits the road', such as in Fiùtur's AI-driven platform.

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GREEN LOAN USE CASE

This Green Loan PoC − while addressing a specific set of problems related to the use case − is the first step of connecting FIBO (https://spec.edmcouncil.org/fibo/) to SMART Program Outcomes in the form of an ontological model.

This PoC has focused on the following use case:

"The terms of a loan can be modified or influenced by the environmental performance, with respect to certain key milestones, of the asset being financed".

As part of this use case PoC − and in line with the entry-level description / requirements (SOW, sections 3.3 and 3.4) EDM Council has extended FIBO to cover sustainability-related financial instruments, including but not limited to green loans, sustainability-linked loans, and transition loans, including a number of related concepts. These extensions provide the hooks to connect the terms of a debt instrument, such as the use of proceeds of for emissions reductions, measured with respect to relevant Key Performance Indicators (KPIs), to detailed outcome metrics provided by Fiùtur that demonstrate progress towards meeting those goals. That progress may or may not be sufficient to show that the terms of the loan met requirements and thus an interest rate should be reduced, or collateral requirements loosened, etc. These extensions include:

- The nature of sustainability related and transition loans, and incorporation of axioms that classify loans as (1) sustainable or not, (2) climate specific or not, and (3) climate-specific loans that are focused on emissions reduction through equipment upgrades, as in transition loans

- The nature of the relevant legal requirements (terms and conditions of the loan) and consequences if certain milestones are met through clauses such as use of proceeds

- The nature of any changes to interest rate terms based on meeting milestones

This initiative differentiates between commercial and consumer loans, with a focus on commercial lending, as by definition, sustainability-linked and transition loans are commercial loans, while more general green loans can be either. Initial participants in this initiative will later (in the follow-up phases(s)) determine regulatory jurisdictions to be prioritized as a function of greenwashing regulations in place and the risk information accuracy demand of BCBS 239.

GREEN LOAN PoC RESULTS & DELIVERABLES

The DELIVERABLES of the Green Loan PoC include:
1. Green Loans Ontology, which was added to the FIBO suite of ontologies,
2. Fiùtur Energy Transition Ontology, focused on outcomes, which is maintained in our Github repository,
3. A set of competency questions together with example data that demonstrate the adequacy of the PoC ontologies in meeting initial goals, as well as the example expressed in OWL in GitHub,
4. Related project development documentation,
5. An OntoViewer online html-documented view of the ontology together with the CD/CI infrastructure.

TECHNICAL DEVELOPMENTS

Green Loans Ontology

From the outset of the PoC, the goal was to extend the Financial Industry Business Ontology (FIBO), which is expressed in the Web Ontology Language (OWL), a W3C Recommendation[1]. FIBO is a family of ontologies designed to work together to provide high-level semantics of financial contracts, parties to those contracts, and related concepts used as the basis for securities master data management and many other finance-related use cases. Prior to the start of this PoC, FIBO was already the most authoritative and widely used ontology in the financial domain, and has been extended for a variety of use cases by financial institutions, systems integrators, other consultancies, regulators and researchers around the world. Many of the constructs needed to represent loans were already present in the ontology, but details specific to green loans, sustainability-linked loans and transition loans were needed. Additional work to incorporate the notion of use of proceeds, and to link such clauses to the relevant key performance indicators were also missing.

The FIBO development team worked with Fiùtur to identify relevant sources for the necessary terms and conditions, for the language to add to enable representation of these kinds of concepts, and to bridge gaps in FIBO as needed to support what became the primary use case for a fictional loan for transition of equipment at an oil terminal at the Port of Mombasa. While enrichment for more sophisticated loans and related analyses may be needed in a follow-up effort, the additions made over the course of the PoC now cover this case and support demonstrations that can be used to solicit additional resources.

Details related to the new Green Loans ontology are shown in the OntoViewer. In order to see some of the new connections, looking specifically in that ontology in the viewer to expand on the details of a transition loan provides the following:

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[1] https://www.w3.org/TR/owl2-quick-reference/

Figure 1. Partial Expansion of Transition Loan

Additional documentation related to the patterns now embodied in the FIBO Loans module, including those for green loans, are available in the FTX wiki, including screen shots from Stanford University's Protégé tool of some of the additional features.

Asset Outcomes Ontology

In addition to the Green Loans ontology, a starting-point ontology covering aspects of outcomes and related concepts in the existing implementation of the Fiùtur's graph was created. This ontology, currently called AssetOutcomes, provided the specific connections between FIBO and the Fiùtur technology to allow us to link outcomes for given KPIs and related details to the green loan in question.

The asset outcomes ontology is also available in GitHub. The mapping developed between the ontologies and language used in Fiùtur's original graph, expressed in various ways including JSON, is also available in the wiki.

The example used to demonstrate the efficacy of the work for the fictitious loan for the Mombasa Oil Terminal is available in GitHub.

The relevant test queries are described in the wiki, which provides an idea of the kinds of questions that can be asked and answered of a knowledge graph that implements the combined ontologies for an underlying data set or data sets.

Collaborative Ontology Infrastructure

We set up a (temporarily private) GitHub repository that stores all artefacts developed within the scope of this FTX PoC. The relevant ontology files, which are version-controlled in this repository, are processed by means of the EDMC Jenkins infrastructure.

Every change to any FTX ontology is run through a testing pipeline (developed and used in the development of FIBO, IDMP-O and IOF/NIST):
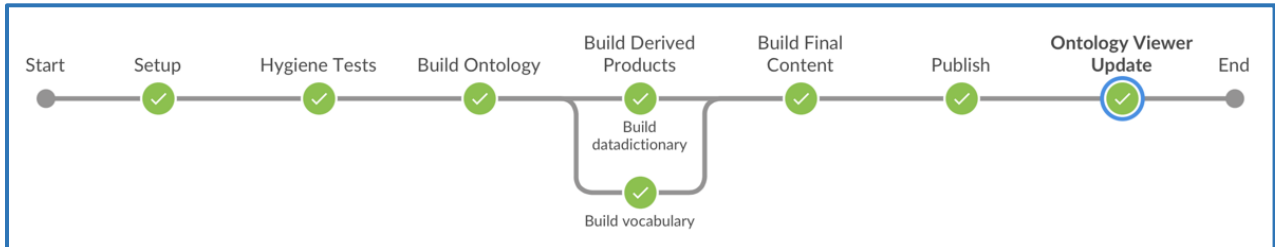

Figure 2. Development Pipeline

Onto-Viewer

The final outcome of the Jenkins orchestrator process described in the previous section can be accessed through the Onto-Viewer web application and classes can be navigated similarly to FIBO, as used to generate Figure 1.

Benefits of the GREEN LOAN PoC

We believe that this PoC demonstrates the feasibility of connecting knowledge graphs representing rich financial concepts, such as those represented in FIBO for green, sustainability-linked and transition loans, to systems that are devoted to measuring, monitoring and documenting the places where the 'rubber hits the road', such as in Fiùtur's AI-driven platform. Having data about financial contracts is very useful on its own, but the capability to link those contracts to the metrics that demonstrate results (or lack thereof) is extraordinary and has the potential to change the industry. One immediate benefit is to provide the automation to hold organizations accountable with respect to meeting the goals of the loan's lending criteria. But more importantly, it proves the capability to link fine-grained metrics of the results of addressing clean-energy goals to the financing needed to meet those goals, and to demonstrate how such a linkage can drive scientifically and data backed quantifiable outcomes rather than rough, qualitative senses about those outcomes.